

The Thunderbolts Project Presents:

Holoscience Archive

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Synopsis

1. Preface

"The most merciful thing in the world ... is the inability of the human mind to correlate all its contents... The sciences, each straining in its own direction, have hitherto harmed us little; but someday the piecing together of dissociated knowledge will open up such terrifying vistas of reality... That we shall either go mad from the revelation or flee from the deadly light into the peace and safety of a new dark age."

- H. P. Lovecraft

In a broadly interdisciplinary inquiry such as this, communication itself can pose quite a challenge. Typically, the greatest difficulties in communication will occur when one is questioning something already "known" to be true. On matters of underlying principle, the confidence behind established ideas can be so high that discussion itself may seem quite senseless. This difficulty is aggravated by fragmentation of the process by which information is gathered and evaluated. The specialization of intellectual inquiry carries with it certain risks when assumptions within one discipline rest upon prior assumptions in other disciplines. No one can be an expert on everything, and when considering possibilities outside one's personal expertise, it is only natural to defer to what specialists in other studies claim to know. But what are the consequences of this when theoretical suppositions, though perceived as fact, cannot account for compelling new fields of data?

Given the extreme fragmentation of established science today it is difficult to imagine that the enterprise as a whole could ever "correlate all its contents." Yet extraordinary strides toward that "someday" envisioned by Lovecraft may now be possible through a new approach – one in which electrical phenomena receive the full attention they deserve, and all appropriate fields of evidence are included. To some, the prospects may appear every bit as disturbing as Lovecraft imagined. But for those who instinctively seek out unifying principles, the new horizons will be at once breathtaking and hopeful.

This introduction will present a new "deep focus lens" for viewing the physical universe, from sub-atomic particles to galactic realms unknown before the Hubble telescope. The Electric Universe is a holistic answer to myopia* -that narrowing of vision which naturally accompanies the fragmentation of knowledge and learning. For those with the courage to see clearly, the required "unlearning" of fashionable ideas carries no real cost whatsoever. The terror Lovecraft envisioned is only the first rush of uncertainty, when ideas long taken for granted are thrown into question by facts and simple reasoning previously ignored. The "piecing together of dissociated knowledge" will only require us to confront the deep contradictions in things experts have long claimed to know. With the courage to see clearly, the adventure itself could well be "the most merciful thing in the world," adding new insights into the greatest dramas of early human history and vital

perspective to humanity's situation in the cosmos. Lovecraft did not realize that the "terrifying vistas" are but a mirage seen through an open door. The truth is always unified, and as such it can only be friendly to those who seek the truth first. As we pass through the door, it is not fear that goes with us, but the exhilaration of discovery.

- Wal Thornhill / David Talbott

*Myopia – a disinclination to acknowledge the existence of something.

2. The Electric Universe

The Electric Universe model is a coherent "Big Picture" of our situation in the universe, spanning many disciplines. It highlights repeated electrical patterns at all scales that enable laboratory experiments to explain the strange, energetic events seen, for example, in deep space, on the Sun, and on Jupiter's moon, Io. The Electric Universe works backward in time using observations rather than forward from some idealised theoretical beginning. It provides simple answers to problems that are now clothed in fashionable metaphysics and mysticism. It is more interdisciplinary and inclusive of information than any prior cosmology. It points to practical possibilities far beyond the limits set by current science.

The Electric Universe model grew out of a broad interdisciplinary approach to science. It is not a technique taught in universities. The Electric Universe is based more on observations and experiment than abstract theory. It recognizes connections between diverse disciplines. It concludes that the crucial requirement for understanding the universe is to take fully into account the basic electrical nature of atoms and their interactions. Strangely, this is not the case in conventional cosmology where weaker magnetism and the infinitely weaker force of gravity rule the cosmos. Such a simplification may suit a theoretical physics based on electrical neutrality of matter in Earthly laboratories but it does not apply in space where plasma dominates.



Plasma has been called the "fourth state" of matter, after solids, liquids and gases. Most of the matter in the universe is in the form of plasma. A plasma is formed if some of the negatively charged electrons are separated from their host atoms in a gas, leaving the atoms with a positive charge. The negatively charged electrons, and the positively charged atoms (known as positive ions) are then free to move separately under the influence of an applied voltage or magnetic field. Their net movement constitutes an electrical current. So, one of the more important properties of a plasma is that it can conduct electrical current. It does so by forming current filaments that follow magnetic field lines. Filamentary patterns are ubiquitous in the cosmos.

3. A Little History

"To be sure, nature distributes her gifts unevenly among her children. But there are plenty of the well-endowed, thank God, and I am firmly convinced that most of them live quiet, unobtrusive lives."

- Albert Einstein

The pieces of the Electric Universe "Big Picture" are supplied by some remarkable individuals, most of them unknown and who have lived or are living "quiet, unobtrusive lives" away from universities. For those with a sense of history this fact should serve to increase curiosity rather than dull it. Most revolutions in science have come from people who taught themselves outside the academic system and were not constrained by the fallacies and fashions of the day. It has been well documented that modern institutions of science operate in such a way as to enforce conformity and prevent research and publication of revolutionary ideas. J. R. Saul argues that medieval scholasticism was re-established during the 20th century. If so, the new "Enlightenment" will have to come, as before, from outside academia.



For me, enlightenment began with the controversial polymath and author of *Worlds in Collision*, Immanuel Velikovsky. In 1950 he demonstrated an interdisciplinary, comparative technique for uncovering hard evidence of planetary catastrophe from the recorded memories of the earliest civilizations. His method was forensic in that he looked for reports of physical events of a highly unusual nature that were nonetheless corroborated globally by totally separate cultures. Then by applying scientific knowledge of cause and effect, it was possible to build a very detailed model of the sequence of those events. Finally, the model enabled specific predictions to be made and confirmed – a requirement of a good scientific theory. Some of the predictions he made were outrageous at the time: Venus would be near incandescently hot, Jupiter would emit radio noise, the Moon rocks would be magnetised, and so on. Velikovsky was right, astronomers of the day were wrong. However, you will not find any textbook that gives him credit because his theory was judged to be wrong. Presumably they were all lucky guesses!

It became clear to Velikovsky that Newton's concept of gravity was insufficient to explain the reported behaviour of the planets. And it certainly could not answer the obvious question, "why do the skies look so peaceful now?" This allowed a dogmatic response by academia to Velikovsky's seminal breakthrough. It was said his theory didn't obey Newton's laws. But what did Newton know of electricity? And if anyone believes that Newton's laws guarantee a stable planetary system – think again! Any gravitational system with more than two orbiting bodies is unstable. Yet the question is hardly ever asked, let alone answered, "what produces the observed stability of the solar system?" Velikovsky was convinced that the clue lay in his discovery that electrical forces

dominate the incredibly weak force of gravity at times of planetary close encounters. Although he was unable to explain at the time how this would create the observed stability of the solar system, with his uncanny prescience he had pointed the way to the Electric Universe.

Since then skeptical scholars have shown Velikovsky's historical perspective of cataclysmic events to be wrong. However, his basic premise of planetary encounters has been confirmed and the details fleshed out to an extraordinary degree. Several pioneering researchers in this new field now agree that awe-inspiring planetary encounters did occur in pre-history. To the most ancient civilizations they were a culturally defining memory. They



were the inspiration for pyramids, megaliths, statues, totems and sacred rock art. The survivors of global upheaval felt it imperative that the memory be preserved and passed down faithfully to future generations in the expectation that the "gods" would return. The memorialization took the form of architecture, ritual and story to re-enact the apocalyptic power of the planetary gods over human destiny. Such a catastrophic beginning explains why civilization appeared like a thunderclap out of nowhere. Unfortunately, with no reference points in the present behavior of the planets, the stories lost their real meaning. This short explanation may seem contrived until the wealth of supporting evidence can be presented. However, it highlights the crucial distinction between the planetary catastrophism of the Electric Universe and that of neo-catastrophists who attempt to explain the evidence for planetary encounters in terms of cometary phenomena. Modern comets simply do not fit the descriptions from the past. Nor can they account for abundant evidence of fresh looking planetary cratering and scarring. Besides, in an Electric Universe comets are not the apocalyptic threat to the Earth imaginatively portrayed by artists. Such pictures are entirely fanciful because a comet would be disrupted electrically by a cosmic thunderbolt before it hit the Earth. The only visible evidence remaining would be an electric arc crater like Meteor Crater in Arizona.

The Electric Universe model grew from the realization that a new plasma cosmology and an understanding of electrical phenomena in space could illuminate the new work being done in comparative mythology. In return the images of events witnessed in the prehistoric sky and their sequence could help unravel the recent history of the Earth, Mars and Venus. By accepting data over a far wider span of knowledge and human existence than conventional cosmology allows, the Electric Universe model began to provide pragmatic and common sense answers to many questions that seem unrelated. It followed the entreaty of the Nobel Prize winning plasma physicist and cosmologist, Hannes Alfvén, to work backwards in time from observations rather than forward from some idealized theoretical beginning.

"We have to learn again that science without contact with experiments is an enterprise which is likely to go completely astray into imaginary conjecture."

- Evolution of the Solar System, NASA 1976, H. Alfvén & G. Arrhenius, p. 257.



The result is now a "Big Picture" that emphasizes our dramatic prehistory and essential connectedness to the universe. No longer do we have to look at ourselves and the universe through the distorting sideshow mirrors of modern science.

The implications of electrical activity between planets will be profoundly disturbing for those who have built their cosmology around the weak force of gravity, acting in an electrically sterile universe. This strange, dogmatic oversight guarantees that nothing will remain in future of the fanciful Big Bang theory or the simplistic story of the formation of the solar system.

4. What Big Bang?

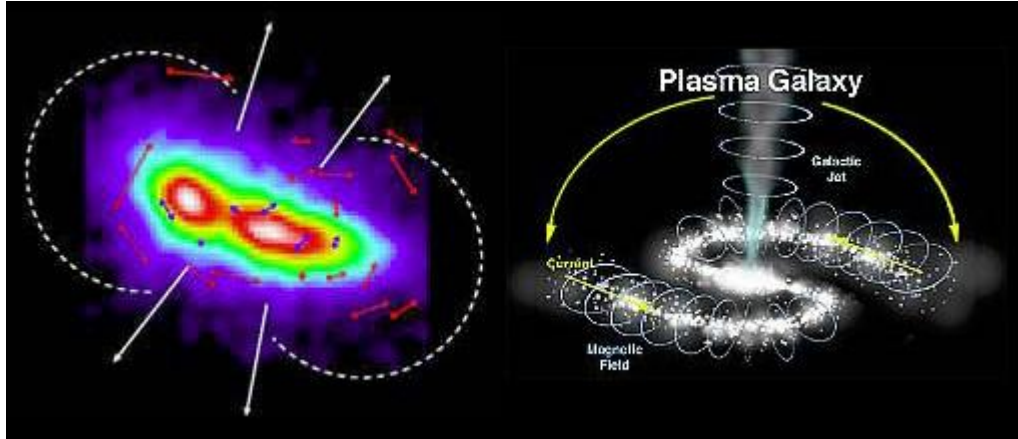


The Big Bang is already dead! The unheralded "Galileo of the 20th century", Halton Arp, has proven that the universe is not expanding. The Big Bang theory is based on a misinterpretation of redshift. The redshift of a distant galaxy is measured in the light coming from that galaxy. Lines in the spectrum of that galaxy show a shift toward the red compared with the same lines from our Sun. Arp discovered that high and low redshift objects are sometimes connected by a bridge or jet of matter. So redshift cannot be a measure of distance. Most of the redshift is intrinsic to the object. But there is more: Arp found that the intrinsic redshift of a quasar or galaxy took discrete values, which decreased with distance from a central active galaxy. In Arp's new view of the cosmos, active galaxies "give birth" to high redshift quasars and companion galaxies. Redshift becomes a measure of the relative ages of nearby quasars and galaxies, not their distance. As a quasar or galaxy ages, the redshift decreases in discrete steps, or quanta.

The huge puzzle for astrophysicists is why a galaxy should exhibit an atomic phenomenon. So we turn to particle physics. This difficulty highlights the fact that quantum "mechanics" applied to atoms is a theory without physical reality. The weirdness of quantum theory has been attributed to the subatomic scale to which it applies. But now that we have quantum effects in something the size of a galaxy, this convenient nonsense is exposed. If Arp is right many experts are going to look very silly. His discovery sounded the alarm in some halls of Academe and since nobody likes a loud noise – particularly if they are asleep – the knee-jerk response was to attack the guy with his finger on the alarm button. Arp's telescope time was denied, papers rejected, and he was forced to leave the US to pursue his work.

5. Electric Galaxies

For more than 10 years plasma physicists have had an electrical model of galaxies. It works with real-world physics. The model is able to successfully account for the observed shapes and dynamics of galaxies without recourse to invisible dark matter and central black holes. It explains simply the powerful electric jets seen issuing along the spin axis from the cores of active galaxies. Recent results from mapping the magnetic field of a spiral galaxy confirm the electric model.

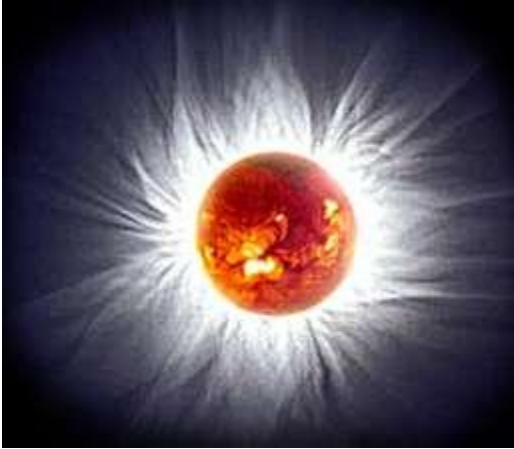


On the other hand, cosmologists cannot explain why spiral shapes are so common and they have only ad-hoc explanations for galactic magnetic fields. More recently, intergalactic magnetic fields have been discovered which is the final straw to break the camel's back. Incredible gravitational models involving invisible "black holes" have had to be invented in a desperate attempt to explain how the attractive force of gravity can result in matter being ejected in a narrow jet at relativistic speeds.



Why do we accept such science fiction as fact when an Electric Universe predicts spiral shapes, magnetic fields and jets? The cosmic magnetic fields simply delineate the electric currents that create, move and light the galaxies.

6. *Electric Stars*



Plasma physicists argue that stars are formed by an electromagnetic "pinch" effect on widely dispersed gas and dust. The "pinch" is created by the magnetic force between parallel current filaments that are part of the huge electric currents flowing inside a galaxy. It is far more effective than gravity in concentrating matter and, unlike gravity, it can remove excess angular momentum that tends to prevent collapse. Stars will form like beads on a wire until gravity takes over. The late Ralph Juergens, an engineer from Flagstaff, Arizona, in the 1970's took the next mental leap to

suggest that the electrical input doesn't stop there and that stars are not thermonuclear engines! This is obvious when the Sun is looked at from an electrical discharge perspective. The galactic currents that create the stars persist to power them. Stars behave as electrodes in a galactic glow discharge. Bright stars like our Sun are great concentrated balls of lightning! The matter inside stars becomes positively charged as electrons drift toward the surface. The resulting internal electrostatic forces prevent stars from collapsing gravitationally and occasionally cause them to "give birth" by electrical fissioning to form companion stars and gas giant planets. Sudden brightening, or a nova outburst marks such an event. That elucidates why stars commonly have partners and why most of the giant planets so far detected closely orbit their parent star. Stellar evolution theory and the age of stars is an elaborate fiction. The appearance of a star is determined largely by its electrical environment and can change suddenly. Plasma physicists and electrical engineers are best able to recognize plasma discharge phenomena. Stellar physics is in the wrong hands.

7. *Planets*

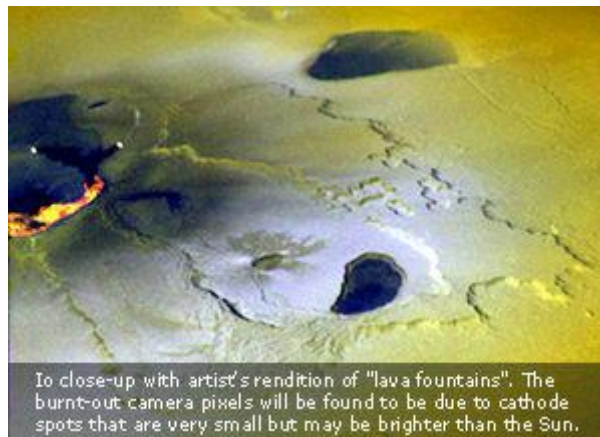
Earth-like planets and moons are similarly "born" by electrical expulsion of part of the positively charged cores of dwarf stars and gas giants. That explains the dichotomy between the dense rocky planets and moons and the gaseous giant planets. In the Electric Universe model, gravity itself is simply an electrostatic dipolar force. So planetary orbits are stabilized against gravitational chaos by exchange of electric charge through their plasma tails (Venus is still doing so strongly, judging by its "cometary" magnetotail, and it has the most circular orbit of any planet) and consequent modification of the gravity of each body. Planets will quickly assume orbits that ensure the least electrical interaction. Impacts between large bodies are avoided and capture rendered more probable by exchange of electric charge between them. Capture of our Moon becomes the only option, it cannot have been created from the Earth. Evidence of past planetary instabilities is written large on the surfaces of all solid bodies in the solar system. That evidence is in the form of electric arc cratering.

8. Electrical Cratering



Electric discharges between closely approaching bodies takes the form of "thunderbolts of the gods", or distinctively shaped helical plasmoids. Such plasmoids were sculpted by many ancient cultures when depicting Jupiter hurling his thunderbolt.

Jupiter's thunderbolt raises questions about the history of mankind and the Earth that have never before been asked. When it comes to dating planetary surfaces, plasmoids cause characteristic electrical arc scarring in the form of sinuous channels and neatly circular craters with steep walls and occasional central peaks. **Such craters are universally misinterpreted as impact craters.** The sinuous channels are wrongly classified as riverbeds or lava channels. Minutes or hours of electrical scarring can produce a surface like that of the Moon, which is later interpreted in ad hoc fashion to be billions of years old. Hemispheric differences in cratering are expected in this model. And for the sceptics, subdued electric arc machining of a planet-sized body continues to this day on Jupiter's innermost moon, Io. See the news items on this website for many successful predictions about the discoveries that would be made as close-up images of Io became available.



Planetary geologists are not trained to recognize electric arc scarring otherwise they would have seen at a glance the characteristic cathodic surface erosion and cathode jets on Io. They are definitely not volcanoes as we know them from geology textbooks.

9. *Electrical Weather*



Most people are unaware that we have no understanding of how lightning is created in clouds. The simplest answer is that lightning is not generated there at all. Clouds merely form a convenient path to Earth for electricity originating in space. Without clouds it is possible to have a "bolt from the blue". That is happening on Venus (although the sky certainly isn't blue). Weather systems are driven primarily by external electrical influences.

Consequently the Sun has weather patterns. And the most distant planet, Neptune, has the most violent winds in the solar system though it receives very little energy from the Sun. Electric discharges from space cause Mars' huge dust devils and planet-wide dust storms. They are responsible for Jupiter's Great Red Spot and the "spokes" in Saturn's rings. It is why Venus has lightning in its smog-like clouds and its mountain-tops glow with St. Elmo's fire. It is why the Earth has lightning stretching into space in the form of "red sprites" and "blue jets", and why tethered satellites "blow a fuse".

However, nobody is trained to consider electrical energy input to weather systems.

The image above is a NASA artist's view of lightning on Venus during the descent of one of the Pioneer probes. Venus has smog-like clouds that are not expected to generate lightning and yet the planet suffers intense lightning. This argues against the popular notion of what causes lightning.

10. *Life Itself*

It seems that when a dwarf star or gas giant planet "gives birth" to a rocky satellite, parent and child usually remain closely bound. Our solar system, with its widely spaced orbits and chaotic features, appears to be the result of a recent cosmic "traffic accident". This seemingly wild conjecture is supported by the global stories of prehistoric planetary encounters. So to use our situation as a measure of a normal planetary system will give wildly misleading ideas of how life begins and estimates of the likelihood of life elsewhere in the universe. The most benign situation for life in an Electric Universe is inside the electrical cocoon of a brown dwarf star. Radiant energy is then evenly distributed over the entire surface of any planet orbiting within the chromosphere of such a star, regardless of axial rotation, tilt, or orbital eccentricity.

The exceedingly thin atmosphere of such stars has the essential water and carbon compounds to mist down onto planetary surfaces. The reddish light is ideal for photosynthesis. Such a model provides one reason why the Search for Extra-Terrestrial Intelligence (SETI) project is unlikely to succeed. Any advanced civilization on such a planet will be unaware that the universe exists outside its own stellar environment, and radio communication through the glow discharge of the star is impossible!

Our education systems are not suited to the broad interdisciplinary knowledge required in an Electric Universe.

11. Some Basics

"The machines that are first invented to perform any particular movement are always the most complex, and succeeding artists generally discover that with fewer wheels, with fewer principles of motion than had originally been employed, the same effects may be more easily produced. The first philosophical systems, in the same manner, are always the most complex."

- Adam Smith.

The Electric Universe takes a simplifying leap by unifying the nuclear forces, magnetism and gravity as manifestations of a near instantaneous electrostatic force. Instead of being "spooked" by the concept of action-at-a-distance, like most physicists this century, the Electric Universe accepts it as an observational fact. Anyone who has tried to force two like poles of magnets together has demonstrated action-at-a-distance. "Electromagnetic" radiation is then simply the result of an oscillating electrostatic force.

At the level of the atom, the Electric Universe model takes a lead from the work of Ralph Sansbury, an independent New York researcher. Foremost is the simple recognition of the basic electrical nature of matter and the primacy of the electrostatic force** in matter interactions. It also rests upon the simple assumption that the proton, neutron and electron are composed of smaller charged particles, orbiting each other in a classical sense in stable, resonant orbits. That is, the energy exchanged between those sub-particles in elastic deformation during each orbit sums to zero. Being charged, the sub-particles interact via the electrostatic force. A simple calculation shows that the sub-particles that form an electron must travel at a speed far in excess of the speed of light – some 2.5 million light-years per second, or from here to the far side of the Andromeda galaxy in one second! So the electrostatic force must act at a speed which is almost infinite on our scale for the electron to be stable. It is the stable orbital resonances of these sub-particles, both within and between particles that give rise to the phenomena of protons, neutrons, electrons and atoms. Other denizens of the particle "zoo" are merely transient resonant states of the same charged sub-particles. The so-called "creation" of matter from energetic photons is an illusion in which pre-existing matter is reorganized into new resonant states that give the impression that a particle has suddenly materialized. Antimatter is a misnomer since it too is formed from the same sub-particles as "normal" matter except that the total charge is mirrored. Matter cannot be created or annihilated.

A Conventional View of Forces in Physics

1. Nuclear forces keep the nucleons (protons and neutrons) together in the atomic nucleus. They are the dominating forces in the nucleus, but of no importance at large distances from it.

2a. Electric forces. A positive charge and negative charge attract each other, but similar charges repel. Electric forces keep the atoms together ("bind" the electrons to the nucleus). They are of a certain importance in the nucleus. At large distances electric forces are usually not so important because of a screening effect. For example, a positive charge attracts negative charges to its neighborhood so that they screen off the field from the positive charge.

2b. Magnetic forces are closely related to the electric forces. Because they cannot be screened very easily, they are efficient at larger distances than electric forces. Example: the Earth's magnetic field.

3. Gravitation is much weaker than electric forces and therefore of no importance in the atom. As the gravitation cannot be screened, it is the dominating force at large distances. The orbits of the planets and the motions of stars and galaxies are ruled by gravitation. – H. Alfvén.

Quantum Theory

For the first time the highly successful quantum theory gains a physical explanation in terms of resonant motion of charged particles, mediated by a near-instantaneous electrostatic force. A quantum electron orbit is one in which the exchange of energy between all of the sub-particles in the nucleus of an atom and those in an orbiting electron, sum to zero over the orbit. Exchange of energy takes the form of distortion of a particle to form an electrostatic dipole or a move to a new resonant orbit.

Relativity Theory

Einstein's Special Theory was designed to define simultaneity in a universe where the fastest force or signal was restricted to the measured speed of detection of light from a distant source. With an electrostatic force of near-infinite speed acting between the sub-particles of all matter, relativity theory reduces to classical physics. This leaves open the question of what we are measuring when we determine the speed of light. The speed of light in galactic terms is exceedingly slow, requiring about 150,000 years to cross our galaxy. However, the astronomer Halton Arp has shown that the redshifts of entire galaxies are quantized which requires some form of near instantaneous, galaxy-wide communication at the sub-atomic level. There are now several reported experiments that

demonstrate faster than light effects. With the Special Theory gone, and the universe in communication with its parts effectively in real-time, there can be no time travel and space and time are independent. Common sense has always suggested that this was so. Einstein's General Theory was devised to explain gravity. It attempts to discard the observed action-at-a-distance of gravity by proposing a counter-intuitive warping of space in the presence of massive objects. This unnecessary complication of space is then added to the current metaphysical concepts of what constitutes the mass of an object. But space must also "warp" at near infinite speed to produce the observed planetary orbits. Common sense, observation, and parsimony of hypotheses all suggest that the electrostatic model of gravity (see below) is superior. There is now experimental evidence from gravity measurements at the time of a total solar eclipse that supports the Electric Universe model and discounts the General Relativity model.

$E = mc^2$

Einstein's famous mathematical expression $E=mc^2$, equating energy and mass is known by almost everyone. However, most textbooks go on to use the word "matter" in place of "mass." But nowhere has it been shown that mass and matter are interchangeable. In fact, we are entirely ignorant of what constitutes the mass of an object. So it is inadmissible to imply that energy and matter are interchangeable. The ultimate expression of this idea led to the nonsense of the big bang. It seems simpler and more sensible to suggest that both nuclear and chemical energy is released or absorbed by the rearrangement of the resonant orbits of charged particles. It is then common sense to suggest that mass is the measured response of a system of charged particles to an external electrostatic force. The more massive an object, the more the electrostatic force contributes to the elastic deformation of its protons, neutrons and electrons, rather than their acceleration. This is the phenomenon seen in particle accelerators and conventionally attributed to relativistic effects. But relativity reduces to classical physics in a universe where the electrostatic force has near-infinite speed. The first question to be asked is – if it is that simple, why hasn't it been thought of long ago? The answer seems to lie in the propensity for mathematical theory to supersede common sense and observation. There is also a problem of language when mathematicians attempt to provide real meaning for their symbols.

12. So What?

The consequences and possibilities in an Electric Universe are far-reaching. First we must acknowledge our profound ignorance! We know nothing of the origin of the universe. There was no Big Bang. The visible universe is static and much smaller than we thought. We have no idea of the age or extent of the universe. We don't know the ultimate source of the electrical energy or matter that forms the universe. Galaxies are shaped by electrical forces and form plasma focuses at their centers, which periodically eject quasars and jets of electrons. Quasars evolve into companion galaxies. Galaxies form families with identifiable "parents" and "children". Stars are electrical "transformers" not thermonuclear devices. There are no neutron stars or Black Holes. We don't know the age of stars because the thermonuclear evolution theory does not apply to them. Supernovae

are totally inadequate as a source of heavy elements. We do not know the age of the Earth because radioactive clocks can be upset by powerful electric discharges.

The powerful electric discharges that form a stellar photosphere create the heavy elements that appear in their spectra. Stars "give birth" electrically to companion stars and gas giant planets. Life is most likely to form inside the radiant plasma envelope of a brown dwarf star! Our Sun has gained new planets, including the Earth. That accounts for the "fruit-salad" of their characteristics. It is not the most hospitable place for life since small changes in the distant Sun could freeze or sterilize the Earth. Planetary surfaces and atmospheres are deposited during their birth from a larger body and during electrical encounters with other planets. Planetary surfaces bear the electrical scars of such cosmic events. The speed of light is not a barrier. Real-time communication over galactic distances may be possible. Therefore time is universal and time travel is impossible. Anti-gravity is possible. Space has no extra dimensions in which to warp or where parallel universes may exist. There is no "zero-point" vacuum energy. The invisible energy source in space is electrical. Clean nuclear power is available from resonant catalytic nuclear systems. Higher energy is available from resonant catalytic chemical systems than in the usual chemical reactions. Biological enzymes are capable of utilizing resonant nuclear catalysis to transmute elements. Biological systems show evidence of communicating via resonant chemical systems, which may lend a physical explanation to the work of Rupert Sheldrake. DNA does not hold the key to life but is more like a blueprint for a set of components and tools in a factory. We may never be able to read the human genome and tell whether it represents a creature with two legs or six because the information that controls the assembly line is external to the DNA. There is more to life than chemistry.

We are not hopelessly isolated in time and space on a tiny rock, orbiting an insignificant star in an insignificant galaxy. We are hopefully connected with the power and intelligence of the universe.

The future in an Electric Universe looks very exciting indeed!

1999

Chandra X-Ray Observatory Discovers Flaming Cosmic Wheel!

Posted on [October 6, 1999](#) by [Wal Thornhill](#)



NASA's new Chandra X-Ray Observatory <http://chandra.harvard.edu/photo/snrg> has returned an image of utmost importance in understanding the universe.

"Stretching across forty light years of space, the multi-million degree source resembles a flaming cosmic wheel."

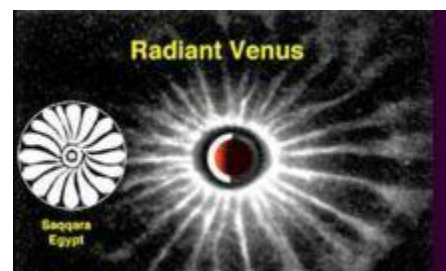
The Electric Universe provides the answer.

In 1980 David Talbott published *The Saturn Myth*. In it he noted that the cosmic wheel is a universal motif used by all ancient peoples when describing the primordial sky. What in heaven could it mean?

His research showed that within human memory Saturn, Venus and Mars towered above the Earth in a great planetary polar conjunction. Incredible as it may sound, the evidence is so specific that Talbott was prepared to stake everything on the evidence although at that time he knew there was no way that astronomers would allow it, based on their training.

The cosmic wheel that the ancients drew identified the planet Venus with spokes or fiery streams radiating across the face of Saturn.

Those spokes are the characteristic signature of a radial electric discharge in the near vacuum of space where the "spokes" follow the magnetic field lines between Saturn and Venus. Venus must have been beneath the pole of Saturn to form such a pattern. The picture shows Venus and Mars superimposed on a plasma focus discharge and was presented to an international conference in Portland, Oregon in January 1997. I wrote then:



"The number of 'radiating streams' would increase under increasing electrical stress. Laboratory experiment has shown that the three and four rayed streams are the preferred stable forms of such a plasma discharge. The streams would rotate with Saturn's rotation, following the planet's magnetic field lines, giving a bent swastika or 3 legs-o-man appearance."

One example of an early representation of the cosmic wheel is shown on the left of the image.

The Chandra satellite has now confirmed that a cosmic wheel can be formed in space by a toroidal plasma discharge. Although this was known from laboratory experiments it remains unrecognized by astronomers. (Hence the NASA report describes the spokes as "puzzling" and the concept of "multi-million degree" temperatures is inappropriate in an electric discharge). Further images from Chandra will be important evidence for the Electric Universe because x-rays are only emitted where electrical activity is strongest. That is, in supernovae, active galaxies and the coronae of stars.

There is one additional feature in the Chandra image worthy of mention. The cosmic wheel of legend sat atop a writhing pillar of light, or world mountain. Such axial projections are also characteristic of toroidal plasma discharges. I suggest that is precisely what the bright twisted thread is at 5 o'clock in the Chandra image.

Dave Talbott – 1, Astronomers – 0.

Credit: Cosmic wheel image – NASA/CXC/SAO

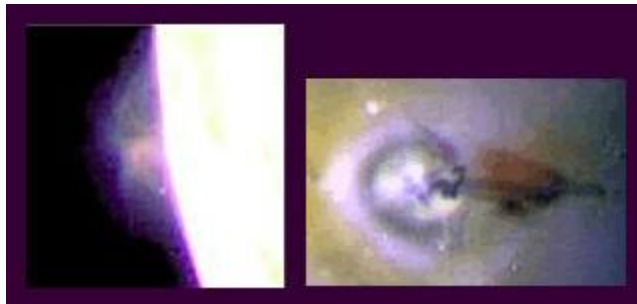
Nasa Risks Galileo Spacecraft by Flying a "Kite" at Io!

Posted on [October 8, 1999](#) by [Wal Thornhill](#)

JPL News wrote: "Galileo makes two daring passes less than 620 km above Io on October 11 and November 25, 1999. In November Galileo might even pass through the plume of Pillan Patera, making it the first spacecraft ever to fly through an alien volcano."

NASA scientists are upholding a long tradition of misinterpreting observations from their space probes. This time they are jeopardising one of their most successful missions. Long ago in 1979, when the so-called volcanoes of Io were first discovered, Professor Thomas Gold of Cornell University wrote that they are actually the site of powerful electric discharges. NASA geologists paid no attention.

Jupiter is still capable of hurling a few thunderbolts!



"The biggest mystery about Io's volcanoes is why they're so hot," says Bill Smythe, a co-investigator on JPL's NIMS team.

"At 1800 K, the vents are about 1/3 the temperature of the surface of the sun!"

The temperature measured by Galileo is an average based on the sharpest resolution of its instruments. If scientists are having difficulty explaining 1800 K, they are in for a shock when they get closer...

I predict that when seen close up the temperature of those hot spots will approach that of the Sun as they are both electric arcs. (Electric arcs create intensely hot spots.)

The plan to fly the Galileo spacecraft through the the plume of an Io volcano in November is therefore as foolhardy as flying a kite in an electrical storm. It is to be hoped that NASA will recognise the dangers in time to change their plan for November. That is, if Galileo survives the October flyby.

"Another thing we'll be going for with these close-up flybys are high resolution pictures of the lava flows", continued Smythe.

"We really want to know what the shapes and edges of the flows look like because that can tell us a lot about the properties of the lava. On Earth lava flows form little side lobes, or extrusions that look like arms, feet and toes."



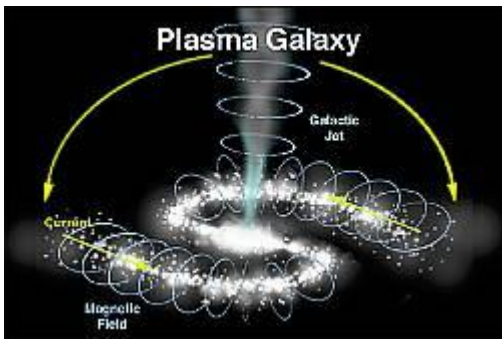
On the contrary, most of the dark patterns seen radiating from the crater in this image of the Marduk "volcano" are not lava flows. They have the shape of lightning scars on Earth and are caused by powerful currents streaking across the surface to satisfy the arc's hunger for electric charge. They rip huge sinuous furrows in the soil and hurl it to either side to form levee banks and side lobes. The stubby side channels will be found to have rounded ends like those seen on Martian "rivers".

Credit: Closeup of an Io Volcano – NASA, Voyager Project, Copyright Calvin J. Hamilton

The Big Bang Never Was!

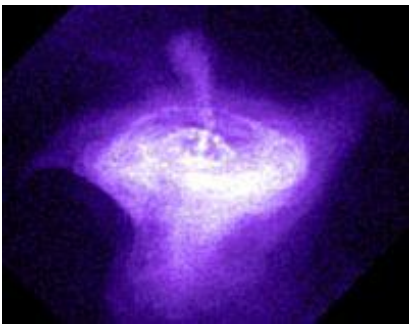
Posted on [October 11, 1999](#) by [Wal Thornhill](#)

The CHANDRA X-Ray Observatory is fulfilling its promise. Modern cosmology is being found wanting with every new discovery. The reason is simple. The universe is governed by the powerful electric force, not gravity. So by detailed imaging in x-rays, Chandra is able to see clearly for the first time the tell-tale signature of electrical activity in the centres of cosmic powerhouses – supernovae and galactic centres. What will replace present cosmology? A new PLASMA cosmology. Plasma constitutes 99.999% of the matter in the universe. It is staggering to realise that Big Bang cosmology is restricted largely to the physics of 0.001% of the universe – solids, liquids and gases on the surface of this planet! And much of the accepted physics of stars is untestable by experiment.



So, what is plasma? In space it is a very tenuous gas in which some electrons have been stripped from atoms leaving behind positively charged ions. The result is a gas which responds to electric and magnetic fields in complex but easily recognizable ways. Plasma researchers have begun their own international meetings on plasma cosmology because they saw objects in deep space that were identical to phenomena seen in their labs. In 1992 Eric Lerner published

The Big Bang Never Happened. In it he presented a diagram showing the flow of electric current in a plasma galaxy.



In September, Chandra returned an image of the supernova remnant in the Crab nebula. The press release says:

"The center of the remnant contains a rapidly rotating neutron star- or pulsar- that is apparently pumping enormous amounts of energy into the nebula in the form of high-energy particles and magnetic fields. Chandra's X-ray image provides significant clues to the workings of this mighty cosmic generator..."

The x-rays trace out the path of electric current in the object. Note the axial jet and flat disk – look familiar?

All of the features of galaxies have been modeled by plasma physicists without the need for ad hoc additions of unseen dark matter or black holes. Plasma cosmology has one great advantage in that the phenomena are scalable from galaxies down to stars, planets and the lab. So it is possible to bring cosmology back down to earth and do away with

invisible dark matter, neutron stars, black holes and the Big Bang. They are unnecessary when the electric force is a thousand trillion trillion trillion times stronger than gravity!

The crab nebula remnant is not a pulsar. It is a normal star unfortunate to be the focus of a powerful galactic discharge. The rapid pulsations from it are the usual result of pouring electrical energy into a tuned circuit. The cosmologists of the future will be electrical engineers!

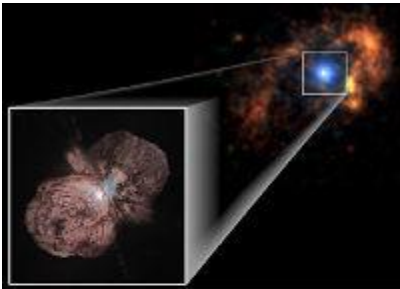
Credit: CRAB CHANDRA – NASA/CXC/SAO

Shocks from Eta Carina

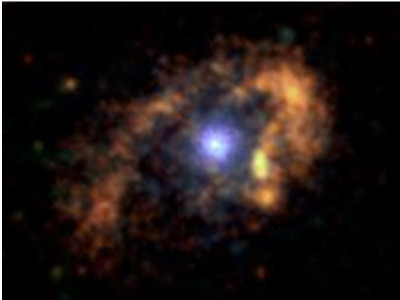
Posted on [October 12, 1999](#) by [Wal Thornhill](#)

Excerpt from Space Science News:

"Just three years ago the Hubble Space Telescope provided a dazzling image of a star that was blowing off massive quantities of material in a blast that looked like a supernova yet, mysteriously, wasn't one. Now the Chandra X-ray Observatory has looked at Eta Carina and showed details that are, well, shocking."



A Hubble Space Telescope image of Eta Carina is shown scaled to fit within the much larger X-ray nebula discovered by Chandra. The lobes are as wide as our solar system and expanding in opposite directions away from a central bright disk at speeds in excess of 1 million km/h (600,000 mph). The odd shape is believed to be partly due to the star's intense magnetic field channeling plasma.



"It is not what I expected," said Dr. Fred Seward of the Harvard-Smithsonian Center for Astrophysics. The new X-ray observation shows three distinct structures: an outer, horseshoe-shaped ring about 2 light years in diameter, a hot inner core about 3 light-months in diameter, and a hot central source less than 1 light-month in diameter which may contain the superstar that drives the whole show. The outer ring provides evidence

of another large explosion that occurred over 1,000 years ago.

All three structures are thought to represent shock waves produced by matter rushing away from the superstar at supersonic speeds. The temperature of the shock-heated gas ranges from 60 million deg Kelvin in the central regions to 3 million K (108 million deg. F to 5.4 million deg. F) on the outer structure.

Since it looked like a supernova, one naturally would assume that was the end of the star. All that should be left are beautiful nebula and, perhaps, a neutron star or black hole where the original star once stood. Instead, Eta Cannae is still there (in a subtle bit of grammar, astronomers refer to the star as Eta Carinae and the nebula as Eta Carina).

For The Electric Universe there are no surprises.

As long ago as 1968 Dr Charles Bruce of the UK Electrical Research Association identified planetary nebulae as bipolar electrical discharges from a central star. Eta Carina obviously belongs in that category.

Unfortunately, astronomers have very limited options in their toolkit to explain 3 million degree temperatures and x-rays from gas more than a light-year from the central star. However, it is simple to explain if it is a plasma heated by electric current being fed into Eta Carinae.

Just as with our own sun, the highest "temperatures" are then encountered outside the star. That would explain why there is relatively little radiation from the star at the centre. Most of the power focussed on the hapless star is being intercepted by distant gas and dust and radiated energetically into space.

Dr. Fred Seward said:

"I expected to see a strong point source with a little diffuse emission cloud around it. Instead we see just the opposite- a bright cloud of diffuse emission, and much less radiation from the centre."

A star is merely a focus of a galactic electric discharge and does not have to provide internal energy to power objects like the Eta Carina nebula.

A good sense of the desperate ideas required to save the old model can be gauged from the following post-script to the NASA report:

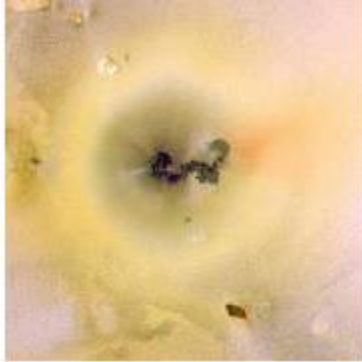
"As if its huffing and puffing behavior weren't weird enough, Eta Carina also appears to be a Death Star powerful enough to make Darth Vader turn in his light saber. Sveneric Johansson, a specialist in atomic spectroscopy at the University of Lund in Sweden, has proposed that Eta Carinae also is acting as a massive ultraviolet laser. Johansson, using Hubble observations made with the Goddard High-Resolution Spectrograph, reported in 1996 that his interpretation is not yet proven, but that it appears to be the most plausible explanation of the data."

Image credit: NASA/CXC/SAO

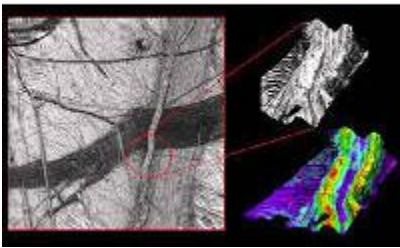
Jupiter's Thunderbolt

Posted on [October 21, 1999](#) by [Wal Thornhill](#)

Why did the planetary gods dominate our imagination at the dawn of civilization? Yet nine out of ten people today could not identify bright Jupiter in the night sky. And another question that is never asked, what was really meant by Jupiter's weapon, the thunderbolt?



It seems it was no earthly lightning. It moved "like a hot coal, spat from a fire." And depictions of Jupiter show his thunderbolt to be an odd shape rather like a corkscrew or football. It is a form expected only from modern plasma physics! So, if Jupiter has had a shoot-out in the dim past, what "smoking guns" should we expect to find?

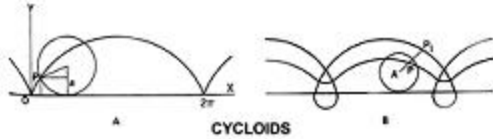


Let's look at the two large moons closest to Jupiter, Io and Europa: As reported in Holoscience news of 8 October, Io's gun is still smoking! Its surface is being spark machined under the gaze of the Galileo spacecraft. Geologists, handicapped by earthly comparisons, have had to resort to volcanoes to explain what are clearly plasma jets on Io.

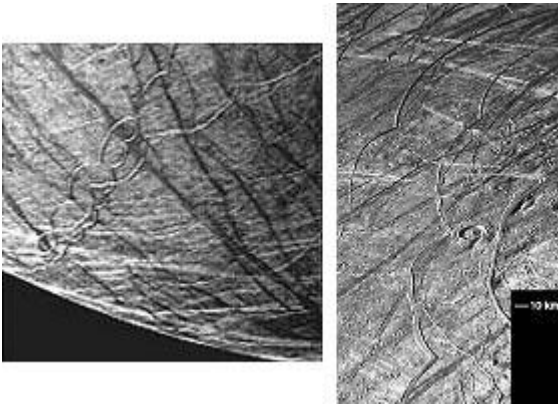
What earthly volcano has a caldera that moves tens of kilometres in a year or two? What volcano can loft material hundreds of kilometres into space? The dark feature is not a lava flow – it is subsurface material exposed and burnt by the wandering arc. There will not be a single hot caldera but rather a series of intensely hot cathode "spots" sitting on high points of the crater rim. They give rise to the very fast "cathode jets" seen as faint blue radial streaks in the picture.

But it is the more distant moon, Europa, that has a frozen record of strikes by Jupiter's thunderbolts in the recent past. It was not a target itself but it bears the scars from being caught in the crossfire. Just as lightning looks for the easiest path to ground, Jupiter's thunderbolts preferred to run across the surface of Europa rather than through the near vacuum of space. The result is a filamentary pattern of superimposed furrows running this way and that for hundreds and thousands of kilometers across the face of the moon. As the surface lightning blasted its way across the moon, it heaped material to either side to form levees. It ripped across earlier channels as if they were not there. Jupiter's lightning was so powerful that it converted some of the oxygen in the water ice to sulfur – creating the dark colouration down the centre and to either side of the large furrows. (The same process on Io over thousands of years has coated that moon with sulfur so that it now looks like a "pizza").

Geologists, straining for an earthly explanation of Europa's appearance have come up with cracked ice. But no ice field on Earth produces sinuous channels with levee banks. And there is one strange pattern that has defied sensible explanation – the hundreds of kilometers long cycloidal cracks called flexi.



(A cycloid pattern is traced out by a spot on a wheel rim as the wheel rolls along a surface. In other words it is two kinds of motion added together – rotational and linear).



Again, the electrical explanation is simple. We have already seen linear motion of the arcs recorded by the straighter furrows. And circular motion of an arc can be demonstrated in the lab by having a magnetic field parallel to a cathode surface. So when Europa became entangled in Jupiter's thunderbolt and the powerful magnetic fields carried with it were momentarily draped over the moon's surface, cycloidal furrows were simply created by rotating travelling arcs.

Europa receives a lot of attention because it is thought to have an ocean that might harbour life hidden under the icy surface. But if geologists' cracked ice models are so wide of the mark then they may be disappointed. On the other hand, the electrical model suggests a far more interesting history of the solar system than textbooks allow!

Credit: Galileo Project – JPL, NASA

Dying Star, or Serious Electrical Fault?

Posted on [October 27, 1999](#) by [Wal Thornhill](#)

Comment on NASA News of October 24, 1999.



"The object shown in this NASA/ESA Hubble Space Telescope image is a remarkable example of a star going through death throes just as it dramatically transforms itself from a normal red giant star into a planetary nebula. This process happens so quickly that such objects are quite rare, even though astronomers believe that most stars like the Sun will eventually go through such a phase."

How can astronomers expect us to accept that this object is a dying star and predict the future of our Sun when it is reported later that the object poses "a serious challenge to astrophysical theorists"? Red giant stars themselves are not well understood.

The star is jetting gas and dust in two opposite directions at speeds up to 450,000 mph (700,000 km/h). This odd behaviour requires a total about face from the usual notion that the gravity of a star draws matter toward it. The speeding matter forms thin streamers on the right and a jet-like structure on the left. On the right, wisps of material in the jets appear to strike some dense blobs of gas.

"These Hubble Near Infrared Camera and Multi-Object Spectrometer data pose a serious challenge to astrophysical theorists: How can a star generate such tightly collimated streams of gas and dust and accelerate them to such very high velocities?"

Ask the plasma physicists and electrical engineers! For decades some have been publishing details of how such features are formed. Electrical current naturally flows through space in "thin streamers". It can accelerate matter over vast distances and form high velocity jets. It can light up "blobs" of gas far from any star. The late Dr. Charles Bruce of the Electrical Research Association in England and Fellow of the Royal Astronomical Society identified planetary nebulae as catastrophic stellar electric discharges as long ago as the 1960's. His insight has been ignored.

The news report continues:

"William B. Latter from the California Institute of Technology and his group are using these data to obtain a better understanding of the detailed structure in the

outflowing material, look for evidence for the origin of the thin streamers and jets, and learn more about the star itself. This information will give astronomers a more complete understanding of the final stages in the lives of stars like our Sun."

On the contrary, experts demonstrate little grasp of how our own Sun works so any attempt at "a more complete understanding" of the fate of our Sun by looking at other stars will be faulty. And until the electrical engineers are called in there will be no fix for the fault.

At present we restrict ourselves to a simplistic century old model of stars as isolated balls of gas heated internally. However, we live in an Electric Universe so challenges to that model will prove increasingly serious, and in the end – fatal. It is the old model, not the star, that is dying.

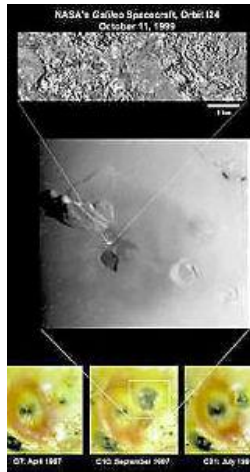
Credit for the original report and image: NASA, ESA, William B. Latter (SIRTF Science Center/California Institute of Technology), John H. Biegging (University of Arizona), Casey Meakin (University of Arizona), A.G.G.M. Tielens (Kapteyn Astronomical Institute), Aditya Dayal (IPAC/NASA Jet Propulsion Laboratory), Joseph L. Hora (Center for Astrophysics), and Douglas M. Kelly (University of Arizona).

Image Credit: NASA, ESA and W B Latter (SIRTF Science Center/Caltech)

Closest Ever Picture of Io

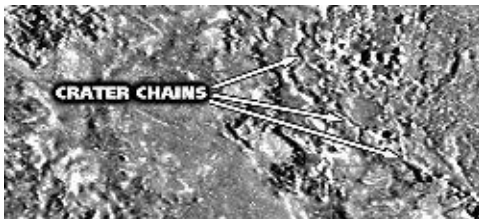
Posted on [October 29, 1999](#) by [Wal Thornhill](#)

From NASA News of 24 October 1999



The highest resolution image ever of Jupiter's volcanic moon Io, (the black and white image at top) was taken by NASA's Galileo spacecraft on Oct. 11, 1999, from an altitude of 617 kilometers (417 miles). It shows an area about 7.2 kilometers (4.5 miles) long and 2.2 kilometers (1.4 miles) wide. Features as small as 9 meters (30 feet) can be discerned, providing a resolution which is 50 times better than the image taken by the Voyager spacecraft in 1979. The box drawn in the center image, a Galileo image of Io taken earlier in the mission, shows the area displayed in the new image at top. The three color images below show the volcanic region from a much higher altitude than the other images and follow a volcanic eruption.

This new image targeted lava flows that erupted from the volcano Pillan. A complex mix of smooth and rough areas can be seen with clusters of pits and domes, many of which are the size of houses. The volcanic features are similar to those found on Earth and Mars. However, this combination of different types of lava flows has not been seen before in such a small area, demonstrating the variety of volcanic processes that continue to change the surface of Io.



... In the electrical model, the clusters of pits and domes are not volcanic. As expected in an Electric Universe, chains of circular craters show that an electric discharge has moved across the surface of Io. Such crater chains are characteristically found on cathode surfaces as the arc jumps from the neat, circular crater it has just burnt to the nearest high point – often the rim of the same crater. The mounds also are most likely "fulgamites" – the kind of raised blisters found on lightning arrestors after a lightning strike. The movement of Io's so-called volcanoes of over 100km in a few years is also more easily understood as a travelling arc. Features on Mars are similar because they too were caused by interplanetary discharges in the recent past.

Galileo's camera and near-infrared mapping spectrometer measured the temperatures of the lavas during the eruption and found that they were hotter than any known eruption on Earth in the last two billion years.

... It was the temperature of the cathode arcs that was being measured, averaged over a large area. Better resolution will show that Io's hot spots are far too hot to be volcanic.

They will be found to be made up of multiple smaller spots at temperatures of many thousands of degrees – temperatures found in an electric arc.

Credits: The Jet Propulsion Laboratory, Pasadena, CA manages the Galileo mission for NASA's Office of Space Science, Washington, DC.

URL for the news item and image is:

http://science.nasa.gov/newhome/headlines/ast24oct99_1.htm [Dead link in 201, use link below]

<http://photojournal.jpl.nasa.gov/catalog/PIA02507>

Gravity vs. Plasma

Posted on [November 3, 1999](#) by [Wal Thornhill](#)

Before leaping straight in to Mel Acheson's Gravity vs Plasma view, I thought it would be appropriate to explain the difference between the 2 cosmologies.

EXPLANATION:

Accepted cosmology is based on the unique case of electrically neutral bodies embedded in neutral interstellar gas and dust. It is derived from the very special physics that applies only in laboratories at the Earth's surface. It relies on the incredibly weak force of gravity to create, shape and drive stars and galaxies. It needs unseen "dark matter" to shape galaxies. It requires that stars are isolated bodies powered by an internal nuclear engine. It assumes that the observed interstellar magnetic fields are magically divorced from the electric currents that **MUST** create them. Complex, filamentary structures are seen at every scale and attributed to colliding gas. But colliding gases heat up and disperse. Yet this is given as the model for how stars are formed. Because gravity is infinitely weak, theorists have had to conjure up an infinitely heavy object – the Black Hole – to save appearances. Cosmology has become the realm of the mathematician alone and inevitably lost touch with reality.

DEFINITION:

The Electric Universe cosmology is new and is based on the most general case of the behaviour of electrically charged bodies embedded in a charged plasma. Plasma is a gas in which electrons have been removed from some of the atoms – in other words, it is ionised. Like a metal where the electrons are free to move, plasma is an excellent electrical conductor. 99.999% of matter in the universe is composed of plasma. A charged plasma has a small excess of negative or positive charge. Plasma naturally forms filaments in response to electric and magnetic fields. Those filaments may "pinch" magnetically to form stars. Stars are not isolated but receive electrical power from the galaxy – hence the million degree solar corona. Electromagnetic forces are infinitely more powerful than gravity and capable of simply explaining phenomena attributed to Black Holes. Electromagnetic forces can repel or attract. Gravity only attracts – requiring amazing legerdemain to explain colossal outpourings of matter from centres of galaxies. Plasma cosmology is the practical realm of electrical engineers. It is verifiable by experiment because of the enormous scalability of the phenomena.

GRAVITY vs PLASMA

By Mel Acheson

Kuhn's 1962 essay (The Structure of Scientific Revolutions) exploring the nature of changes in scientific theories, and a plethora of commentaries since, have made it out to

be a Big Deal and to be also somewhat mysterious: "revolution", "incommensurability of paradigms", "new world", etc.

It seems to me the essence of it is simply different viewpoints. Just as the landscape looks different when viewed from different locations, the facts and theories of the sciences appear different when understood from different conceptual locations in the intellectual landscape.

Ptolemy drew a picture of what the universe looked like from the Earth. Copernicus described how it looked from the Sun. Newton depicted the view from gravity. Notice that the terms "Earth", "Sun", and "gravity" are not "something out there" but are concepts that make sense of or create meaning from a selection of observations. Gravity, for example, made sense of falling apples and revolving planets. The other viewpoints "saw" no connection between apples and planets. Definitions changed: The observations once considered important in the term "planet" were replaced with other observations. New mathematical techniques were developed which would have seemed nonsensical to people occupying the old viewpoints. The resulting view of the "gravity universe" was that of isolated "billiard balls" occasionally perturbing each other. This replaced the old views of a system of nested spheres or an assembly of epicycles.

Now the "Electric Universe" is a different viewpoint. Notice, for example, that its definition of "plasma" is not the conventional one of "ionized gas". That latter definition jumps to the conclusion that you can understand something about plasma by falling back on what you know about ideal gases and thermal ionization. The ideal gas law is an important insight in the conventional view, but it becomes a blindfold in the electric view, preventing you from seeing what's before your eyes. Rather, "plasma" is an emergent (i.e., higher-level or statistical-level) orderliness of complex electrical forces: such properties as filamentation, long-range attraction and short-range repulsion, braiding, characteristic velocities, formation and decay of plasmoids, and identity of properties at different scales.

The mathematical shorthand that was developed for articulating the gravity view and for using the technologies based on it doesn't work for the plasma view. A new mathematics -and new technologies- will need to be invented.

The view of the universe from a plasma vantage point is one of persistently interacting aggregates with wide-spread resonance effects: a "driven" universe rather than one rolling to a stop.

So the definitions are different, the facts are different, the math is different, the theories are different: The universe looks different because the plasma physicist is standing in a different conceptual location from the gravity physicist. And although the content of each paradigm can't be compared with the other, the respective viewpoints can be compared.

B. J. F. Lonergan's 1957 work (Insight) on the nature of understanding provides one ground upon which different viewpoints can be compared. Theories come and go, but the

underlying function, purpose, and construction of theories arise from the nature of cognition. As one of the ways in which people relate to the universe, cognition fashions intellectual tools -theories- to accomplish particular goals. Hence, from a selection of theories, one can be preferred on the basis of its utility value – the one which seems most likely to achieve the goal with the greatest efficiency and least effort.

One criterion for the efficient achievement of the goal of understanding the universe is comprehensiveness. Again comparing the intellectual landscape with the physical, the higher the viewpoint the greater the purview. In this sense, Kuhn's process of periods of cumulation of knowledge within a paradigm separated by episodes of paradigm shifts can be understood as the progressive achievement of higher viewpoints affording greater purviews. Notice that from this understanding the often-used (and abused when applied outside a paradigm) judgements of "right/wrong", "correct/incorrect", even "true/false", are meaningless.

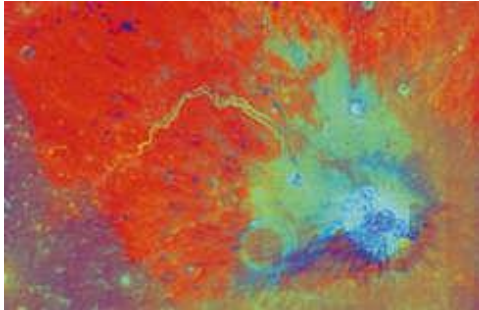
Upon this ground for comparing viewpoints, the case can be made that the plasma paradigm is "higher" than the gravity one in that it encompasses a larger domain of evidence. Not only does it explain more phenomena, it explains those phenomena with a comprehensive and unitary theory. It "sees" more landscape, more features of that landscape, and more relationships among those features.

Gravity, in contrast, "sees" fewer features and "sees" them as disparate events, each requiring a separate ad hoc explanation. For example, every feature on every planet has its own theory: impact craters, volcanoes, tidal cracks, floods of disappearing water, lava that runs uphill, runaway greenhouses, etc. The generality of gravity is obscured with ad hoc inventions, and those inventions fail to account for details intrinsic in the plasma view. Gravity fails to account for entire new observations, extrapolating itself beyond reality and into denial: Super-massive stars spinning super-fast, exploding stars whose shock-waves create intricate structures, cannibalistic galaxies, dark matter that overwhelms observed matter, photos cropped between galaxies and connected quasars, silence in the face of the quantization of redshifts, etc. More and more evidence is being ignored.

Newton was unaware of plasma. Today his disciples spend years in training learning when and how to shut their eyes to it. It's not just the Big Bang, General Relativity, and Quantum Mechanics that are in trouble but the foundation of them all: Gravity is an exhausted and bankrupt concept. A higher, more comprehensive foundation is needed. The technologies of gravity have lifted us to a viewpoint that's bigger than gravity, and we need new ideas and new tools to make sense of the new vistas.

It Has To Be Moonglow!

Posted on [November 5, 1999](#) by [Wal Thornhill](#)

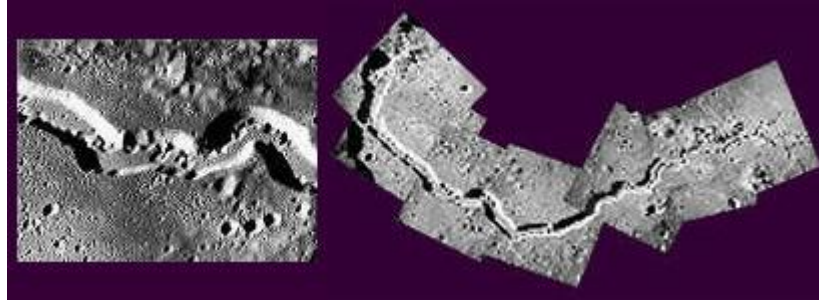


The region around the crater Aristarchus (at lower right) has been a focus for observers searching for transient lunar phenomena. This false-color mosaic was assembled from blue, red, and near-infrared images taken by the Clementine spacecraft and represents brightness ratios between the wavelengths. Images taken several weeks apart reveal a surface change in the cobra-head crater at the right-hand end of the meandering channel of Schröter's Valley. Courtesy Paul Spudis.

This past week 700 planetary scientists from around the world gathered in Abano Terme, Italy, to present their latest observations from ground- and space-based instruments. Sky & Telescope's Senior Editor J. Kelly Beatty filed this report from the conference. The week-long meeting [of the American Astronomical Society] featured the first unambiguous confirmation of a spontaneous change in a feature on the Moon. Amateur observers have claimed to witness dozens of transient lunar phenomenon (TLPs) for decades, but most professionals found the reports unconvincing because the events were almost always seen only visually. Now, however, a group led by Bonnie Buratti (Jet Propulsion Laboratory) has found "before" and "after" images from the Clementine spacecraft for an TLP reported last April 23rd. The area in question, the "cobra head" at the beginning of Schröter's Valley near the crater Aristarchus, is covered by relatively young volcanic flows, and it has often been the location of TLP sightings. Buratti says two bright spots along the valley's western wall are distinctly redder in the Clementine "after" images from April 27th ? a clear indication that some kind of change took place subsequent to the "before" images taken March 3rd.

So now it's official – TLP's are real!

Just as astronomers would not believe that stones could fall from the sky, most have balked at the idea that our long-dead Moon could show signs of life. Yet there have been many reports in the last century from reputable observers of glowing patches, point-like flashes and obscurations on the Moon. Now the Clementine lunar orbiter has confirmed a transient change in redness in a lunar crater. Explanations have involved outgassing, volcanism, raising of moondust, and rock fluorescence under bombardment from solar wind particles. However, the emission of visible light is poorly understood. In this case, remnant volcanism is thought to be most likely. Rilles are thought to be collapsed lava tubes.



But Schröter's Valley is not volcanic. That brilliant engineer, the late Ralph Juergens, showed in the early 1970's that it is a typical scar caused by a massive lightning bolt. If it were volcanic, where is the lava outflow? Where is the collapsed roof of a lava tube? Where do we find lava tubes 7 km wide? How could a flowing liquid of any sort form the tortuous inner channel on the valley floor? Why does that channel become narrower toward its "outflow" end? How do some rilles cross mountains?



The Electric Universe model has a simple explanation. All bodies in the solar system are embedded in an electric glow discharge, centred on the Sun. The Moon is subject to some of the electrical input that produces planetary aurorae, lightning on Earth and Venus, planet-wide dust-storms and huge dust-devils on Mars, and "volcanoes" on Io. Because the Moon has no atmosphere, electric discharges are diffuse – creating glows over large areas. Flashes are due to sudden concentration of the discharge at high points, known on Earth as St. Elmo's fire, and the occasional true lightning. Obscuration by dust is due to electrostatic levitation. Whatever made Schröter's Valley a target for lightning in the past is likely to make it a prime target now and well worth watching for further TLP's. Lunar explorers in future should take lightning conductors with them!

Credit: Earth Rille created by lightning – National Geographic

Chandra vs. Chandra

Posted on [November 7, 1999](#) by [Wal Thornhill](#)



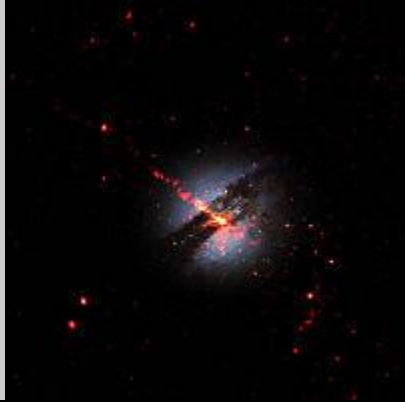
Chandra in his later years

NASA's premier X-ray observatory was named the Chandra X-ray Observatory in honor of the late Indian-American Nobel laureate, Subrahmanyan Chandrasekhar. He was widely regarded as one of the foremost astrophysicists of the twentieth century.

Early in his career he demonstrated that there is an upper limit (now called the Chandrasekhar limit) to the mass of a white dwarf star. A white dwarf is the last stage in the evolution of a star such as the sun. When the nuclear energy source in the center of a star such as the sun is exhausted, it collapses to form a white dwarf. This discovery is basic to much of modern astrophysics, since it shows that stars much more massive than the sun must either explode or form black holes.

In fulfilling the promise expected of it in the Electric Universe, it is ironic that the Chandra X-ray Observatory will render obsolete the life's work of its namesake. The proposal by astrophysicists that stars can collapse to form white dwarfs or black holes is to extend to the giddy limit the ignorance we have of how our own Sun functions. It seems that astrophysicists are inured to the real meaning of the immense numbers they use daily in their work. Think about it – who in their right mind would use a force to accelerate particles that is weaker than the electric force by a factor of 10 followed by 35 zeroes? The simplest way for Nature to generate x-rays is to accelerate electrons electrically – just as we do in our hospitals. So x-ray bright objects in space are pin-pointing active electrical, not gravitational phenomena.

Here's the latest example:

<p>X-ray Eye Sees Centaurus A's Core Wednesday, October 27</p>	
	<p><i>Astronomers are ecstatic again over the latest view from the Chandra X-ray Observatory. An image of the active galaxy Centaurus A (NGC 5128) released Monday provides never-before-seen detail of the powerful jets, as long as our whole galaxy is wide and emanating from the galaxy's core, which contains a supermassive black hole. "The Chandra image is like having a whole new laboratory to work in," says Giuseppina Fabbiano (Harvard-Smithsonian Center for Astrophysics). "Now we can see the main jet, the counter jet, and the extension of the jets beyond the galaxy. It is gorgeous in the detail it reveals." The new X-ray image also shows a cluster of X-ray hotspots around the core, which is hidden from visible-light view by a dark lane of dust. x-ray jets. The image helps give new insight into what happens when galaxies collide.</i></p>
<p><i>An X-ray image of Centaurus A taken by the Chandra X-ray Observatory has been superimposed over an optical view of the galaxy taken by the 4-meter reflector at Cerro Tololo Inter-American Observatory.</i></p>	

Full Story at http://science.nasa.gov/newhome/headlines/ast26oct99_1.htm

There is no "supermassive black hole" at the centre of Centaurus A. The jet we see is the result of a simple plasma focus effect. It is a phenomenon being studied in several laboratories around the world because of its ability to produce powerful narrow beams of particles and radiation. Electric current flowing into the centre of a galaxy along its spiral arms creates powerful magnetic fields at the centre that wind up like a giant cosmic spring. At some moment, the spring effectively snaps – accelerating matter in opposed beams out of the plane of the galaxy. The repetitive nature of these outbursts can be seen in the bright x-ray blobs along the beam. This is one of the closest active galaxies to the Milky Way.

But wait, there is much, much more to this picture than meets the eye. The NASA image is cropped. The galaxy is not colliding with anything. The astronomer, Halton Arp, in his paradigm shifting book, "Seeing Red" (see [link page](#) for his book) finds this part of the sky so exciting that he uses italics and exclamation points liberally as he describes the area in the direction of the jet:

"... CenA, ... with its outer radio isophotes sketched in, resembles a flame with the sparks of galaxies and clusters rising upward."

[Seeing Red, pp. 147, 148].

Arp makes a convincing argument for the birth of new galaxies in such jets from the centres of active galaxies! In that process he has proven that faint, highly redshifted galaxies are merely youthful – not distant. There was never a Big Bang!

Arp goes on:

"Since the higher redshift galaxies in the CenA line are presumed to have originated in ejection from this giant, active radio galaxy, the Abell clusters so densely surrounding those second generation galaxies are implied to be third generation ejecta – in various directions, but still relatively close to their galaxies of origin."

From the standard viewpoint there is no connection between Centaurus A and the dozens of bright galaxies stretching away along its spin axis. So, in all of the website photos you only see the galaxy and its jet – the flame Arp refers to, but none of the sparks.

Chandra is dead, long live Chandra!



With thanks to Amy Acheson
for her contribution

Credits:

X-ray image courtesy NASA/CXC/SAO. Optical image courtesy AURA/NOAO/NSF.
Photograph of Halton Arp: Earl Fisher.

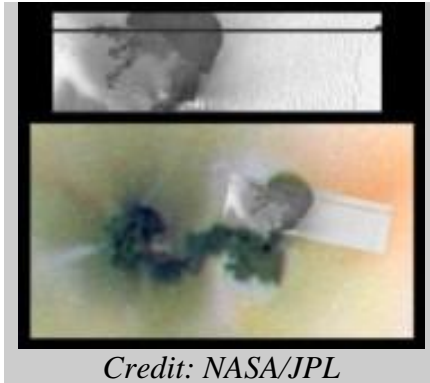
Hawaiian-Style Volcano on Io?

Posted on [November 7, 1999](#) by [Wal Thornhill](#)

Excerpts from a NASA/JPL Press Release November 5, 1999

New images from Galileo reveal unexpected details of the Prometheus volcano on Io including a caldera and lava flowing through fields of sulfur dioxide snow.

It appears that the Prometheus volcano on Io has characteristics remarkably similar to those of the Kilauea volcano in Hawaii, although Prometheus is much larger," said Dr. Laszlo Keszthelyi (KEST-ay), a Galileo research associate at the University of Arizona, Tucson, AZ. "Both volcanoes are long-lived eruptions, with flows that apparently travel through lava tubes and produce plumes when they interact with cooler materials."

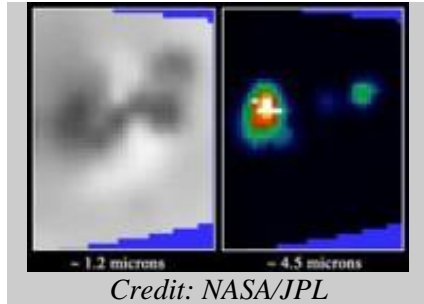


Credit: NASA/JPL

This is a high-resolution image of part of Prometheus, an active volcano on Jupiter's volcanic moon Io. In earlier, lower resolution images, it appeared that all the dark material at Prometheus comprised a single, long lava flow. The new image shows for the first time that the northeastern end of this dark feature is actually a lava-filled caldera 28 kilometers (17 miles) long and 14 kilometers (9 mile s) wide. The underground source of the Prometheus lava

is probably beneath this newly discovered caldera. Galileo scientists are intrigued also by the snowfield containing hummocks, seen to the east of the Prometheus caldera."

Prometheus is the "Old Faithful" of Io's many volcanoes. It has been active during every observation over the past 20 years by NASA's Voyager and Galileo spacecraft and the Hubble Space Telescope. The new spectrometer images show two distinct hot spots at Prometheus — a large one to the west and a fainter, cooler one to the east. The images reveal numerous lava flows near the western hot spot and enable scientists to identify a crater, or caldera, 28 kilometers (17 miles) long and 14 kilometers (9 miles) wide near the hot spot to the east.



The active volcano Prometheus on Jupiter's moon Io was imaged by the near-infrared mapping spectrometer instrument onboard NASA's Galileo spacecraft during the close flyby of Io on October 10, 1999. The spectrometer can detect active volcanoes on Io by measuring their heat in the near-infrared wavelengths (just beyond the red end of human vision). It can also obtain

information on the composition of materials on Io's surface using the same wavelengths. The image on the left, taken at an infrared wavelength, shows the different compositions of materials on the volcano. The dark material is thought to be silicate lava, and the white material is sulfur dioxide frost. The image on the right was taken at a longer infrared wavelength that shows heat coming out of the volcano. The hottest areas appear white and the coolest appear black.

Previously, it was thought that the 50 to 100 kilometer- (30 to 60 mile-) tall plume observed at Prometheus formed where the lava erupts onto the surface. Now, however, it appears that the plume forms at the far end of the lava flows. The caldera and eastern hot spot are thought to be associated with the vent where the molten rock rises to the surface. It appears that after the lava reaches the surface, it is transported westward through lava tubes for about 100 kilometers (60 miles) before breaking out onto the surface again. Here, numerous lava flows wander across a plain covered with sulfur dioxide-rich snow. The plume is created by the interaction of the hot lava with the snow.

Comment: It is impossible for hot lava to turn snow into a gas, accelerate the gas to supersonic velocity in tightly collimated jets, and deposit it in a ring. On October 29 the Holoscience News Report made the following statement: "As expected in an Electric Universe, chains of circular craters show that an electric discharge has moved across the surface of Io. Such crater chains are characteristically found on cathode surfaces as the arc jumps from the neat, circular crater it has just burnt to the nearest high point – often the rim of the same crater." So the jets will form, as we see, preferentially at the edges of the dark, burnt areas in what is known as a "cold cathode" arc. If there were hot lava exposed it would act like the heaters in old radio tubes and start a fixed, "hot cathode" discharge. It is possible, but not necessary, that the kidney-shaped area to the East was the initiator of the discharge as a lava lake. After the lava cools, the arc would wander, creating the fractal pattern of burnt, contiguous pits that extends to the west for more than 100 kilometers. The rounded, scalloped edges to the "lava flow" are characteristic of an arc scar and are seen in abundance on Martian channels.



*Lightning creates a cold cathode scar on a golf green. Note the "lava flow" and sinuous rilles!
Credit: National Geographic*

Knowing the topography would also be a crucial test since it is normal for an arc to run uphill as well as down. Lava follows the lowest levels.

The hummocky snowfield to the East looks very much like a spark-machined surface, created by swarms of minor lightning strikes (that also attend earthly volcanic eruptions) in the higher gas pressures near the main arc, and subsequently covered with snow. Once again, it is similar to the terrain surrounding some of the giant electrical scars on Mars, for example the scarp of Olympus Mons where there is a halo of furrowed and pitted land.

The report continues:

This plume feature is just one of several similarities between Prometheus and Hawaii's Kilauea. Volcanologists say that Prometheus has been erupting for more than 20 years and Kilauea has been erupting for more than 16 years. The current vent at Kilauea consists of a small lava lake about 100 meters (330 feet) across that produces a relatively small thermal hot spot. From this vent, lava is transported 10 kilometers (6 miles) in lava tubes to the Pacific Ocean where large steam plumes are generated by the interaction between the hot lava and the ocean. Galileo scientists believe the plume seen on the western end of Prometheus is similar to this Hawaiian steam plume, except the Ionian plume is composed largely of sulfur dioxide and rises much higher because of Io's low atmospheric density and gravity.

Comment: The explanations in terms of a volcano are becoming increasingly strained and ad hoc. The dark surface appears to be pitted with circular craters rather than being a lava flow. Lava tubes are always called upon to explain sinuous features on planetary surfaces where there is no other liquid available to create channels. Many are wider than the Hawaiian lava tube is long and extend for thousands of kilometres at constant width over hill and dale! In the infra-red image there is no heat connection evident between the caldera in the east and the hotspots in the west. This is to be expected if they are electric arcs. It is to be hoped that a closeup nightside image of these small bright arcs becomes available.

The full report is available at :

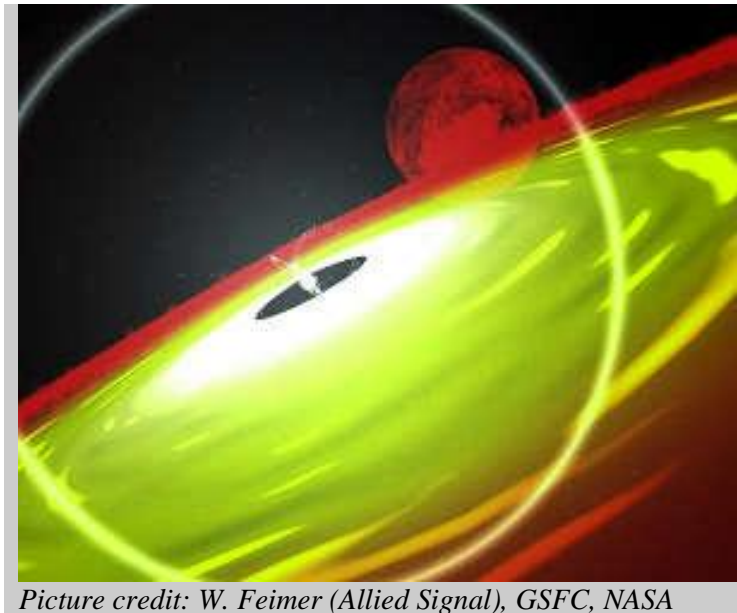
http://science.nasa.gov/newhome/headlines/ast05nov99_2.htm

Strange Star or Strange Science?

Posted on [November 20, 1999](#) by [Wal Thornhill](#)

Nowhere is the gravitational paradigm of cosmology shown to exhibit more strangeness than in compact high energy phenomena in deep space. A report in the journal Nature of 15 November proposes that a recently discovered star "is made of an exotic stuff called 'strange matter', never yet seen on Earth". In other words, it may be a "strange star". This bizarre suggestion comes out of the mathematics describing stars that generate rapid pulses of radiation, commonly called "pulsars". The x-ray pulses are thought to be due to a rotating beam of x-rays that flashes toward the Earth once per revolution like a cosmic lighthouse.

[Report from Nature](#) [Link dead 2012]



Picture credit: W. Feimer (Allied Signal), GSFC, NASA

This seemingly simple model began to show signs of strain many years ago when the first millisecond pulsar was discovered. In order to flash (rotate) several times a second a pulsar would need to be very compact indeed, only a few kilometres in diameter. But to generate x-rays gravitationally requires an extreme concentration of matter to accelerate particles to a sufficiently high energy so that when they strike the star x-rays are produced. The only objects that theoretically meet that requirement are neutron stars and black holes. Both kinds of object are well outside our experience.

The discovery now of an x-ray pulsar SAX J1808.4-3658 (J1808 for short), located in the constellation of Sagittarius, that flashes every 2.5 thousandths of a second (that is 24,000 RPM!) goes way beyond the red-line even for a neutron star. So another ad hoc requirement is added to the already long list – this pulsar must be composed of something even more dense than packed neutrons – strange matter!

When astrophysicists are having difficulty with their models they traditionally turn for rescue to the nuclear physicists. (They were called in to explain away the missing solar neutrinos). The news report goes on:

"The most fundamental building blocks of nuclear matter are thought to be particles called quarks. The 'regular' nuclear particles or 'nucleons' – protons and neutrons – are composed of 'up' and 'down' quarks: two up quarks and a down quark make one proton, while a neutron consists of two downs and an up. But there are at least four other, more exotic, kinds of quark, amongst them the so-called 'strange' quark. In nucleons, quarks are supposed to exist in inseparable groups of three, which is why no one has ever seen an isolated quark. But at extremely high densities of matter, quarks may become uncoupled or 'deconfined'. 'Strange matter' is a melange of deconfined up, down and strange quarks. Physicists are hoping that the new particle colliders currently under construction, such as the Large Hadron Collider at CERN in Geneva, will create conditions extreme enough to break quarks free. But the Universe may have got there first. X.-D. Li of Nanjing University, China, and colleagues' suggestion that J1808 is a strange star follows a small number of similar proposals for other astrophysical objects that emit bursts of X-rays. The X-ray bursts from these objects are signs of violent activity of a sort that becomes possible only when matter is pushed to extremes."

I think J R Saul highlighted the language problem we are seeing here when he wrote:

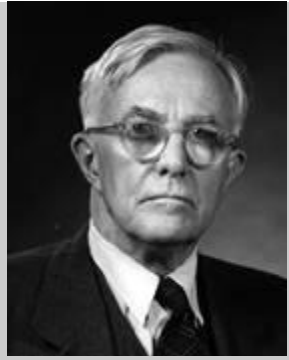
"Ten geographers who think the world is flat will tend to reinforce each other's errors. If they have a private dialect in which to do this, it becomes impossible for outsiders to disagree with them. Only a sailor can set them straight. The last person they want to meet is someone who, freed from the constraints of expertise, has sailed around the world."

-J R Saul, Voltaire's Bastards.

The Nobel Laureate, Irving Langmuir, coined the term "pathological science" for "the science of things that aren't so".

Two key symptoms of such science are:

- (1) the resort to fantastic theories contrary to our experience, and
- (2) the use of ad-hoc requirements to save the appearances.



Irving Langmuir

If we apply these criteria, two disciplines that share line honours for pathological or strange science are cosmology and particle physics. They both deal with unseen objects – neutron stars, black holes, quarks, etc. They both produce fantastic ad-hoc requirements to explain new discoveries – dark matter, super-heavy objects and exotic particles. They cross-infect each other with their theoretical requirements both to save appearances and convince governments to spend large sums of research money for super-colliders to replay bits of a hypothetical Big Bang, or to build gravity-wave telescopes when we have no proof such waves exist. The above report brings such strange science

sharply into focus.

It is not ordinary matter, but scientific models that are being pushed to extremes. Einstein warned: "Most mistakes in philosophy and logic occur because the human mind is apt to take the symbol for reality". Neutron stars and quarks have never been seen. They are derived from mathematical symbols. Let's take quarks first. There is little to suggest that any of the shrapnel from high energy colliders exists in normal matter. If enormous energy is spent in shattering a proton to unlock the hypothetical quarks then the energy itself may manifest as particles that don't play any part in ordinary matter. Flying a 747 into a mountainside and picking over the ruins is not the best way of finding out how an aircraft works. Suggesting that a star can be composed stably of unobserved particles simply because a theory of invisible, super-heavy objects demands it is asking too much!

Here are some of the many unstated assumptions underpinning the X-ray pulsar model:

(my comments are in italics)

1. It is assumed that the physics of neutral matter and ideal gases on Earth can be used to explain the operation of the glowing balls of plasma we call stars.

99.999% of the universe is made of plasma. It is not necessarily electrically neutral and does not behave like an ideal gas.

2. It is assumed that all interstellar plasma is mostly an ionized, uncharged, superconducting gas that can trap and carry magnetic fields.

Plasma is not a superconductor so magnetic fields cannot be trapped in it. The origin of the magnetic fields is not clear from standard theory. The Electric Universe proposes that magnetic fields and plasma filaments in space are formed by electrical currents in charged plasma. (No book on astronomy mentions electrical effects).

3. It is assumed that we understand how our Sun and other stars shine, evolve, and someday die or form neutron stars.

We do not understand the Sun's magnetic field, the hot corona, solar wind, solar cycle, x-ray variability, coronal mass ejections, sunspots, low neutrino count, etc., etc.

4. It is assumed that we understand what causes a supernova explosion.

The number of ad hoc assumptions required for a mechanical explosion following a sudden stellar implosion results in a highly unlikely explanation. SN1987A showed that such explosions are not spherically symmetrical.

5. It is assumed that a supernova can "squeeze" stellar protons and electrons together to form neutrons.

A first-order wild conjecture. The model incorporates many unproven assumptions about the unseen internal structure of stars. If the implosion is not spherically symmetrical there may be insufficient "squeeze" to force protons and electrons to merge, even if that were possible. No account is taken of electrical effects. Our own Sun with a mean density only slightly above that of pure hydrogen shows that electrostatic forces are at work within stars to offset compression forces.

6. It is assumed that it is possible to form a stable neutron star.

When not associated with protons in a nucleus, neutrons decay into protons and electrons in a few minutes. Atomic nuclei with too many neutrons are unstable. If it were possible to form a neutron star, why should it be stable?

7. It is assumed that a supernova can further squeeze neutrons until they "pop their quarks".

A second-order wild conjecture.

8. It is assumed that it is possible to have a stable massive object composed of quarks.

A third-order wild conjecture based on the pathologies of both astrophysics and nuclear physics. It is an unseen object composed of unseen matter.

9. It is assumed that a neutron star can convert the energy of infalling matter into tightly collimated, pulsed x-ray beams.

It is difficult to imagine a more unlikely way of achieving this effect.

10. It is assumed that a spinning object is required to cause the pulsations.

Only required in a purely mechanical model.

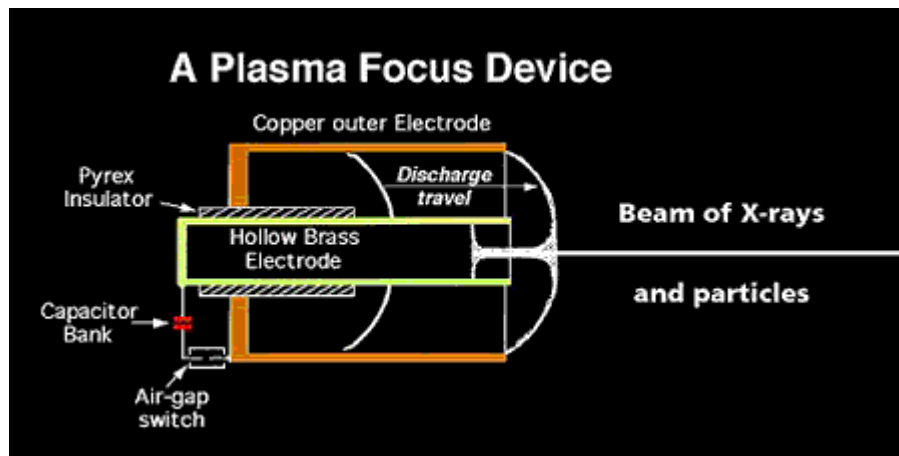
11. It is assumed that Nature overlooks the normal (and infinitely easier) method of creating x-rays by accelerating electrons in an electric field.

12. It is assumed that Nature overlooks the simplest way of creating pulsed radiation by a charge-discharge relaxation oscillator cycle (where electric charge builds up slowly until a threshold is reached and a sudden discharge occurs).

13. It is assumed that Nature ignores the simplest way of creating a highly collimated x-ray beam and particle jet (if one is required from the observations) by the use of the plasma focus effect.

Is this science or science-fiction?

The Electric Universe model assumes that Nature knows best. It does not require strange matter or a strange star. The x-ray pulses are caused by regular electric discharges between two or more orbiting, normally constituted, electrically charged bodies. It is a manifestation of a periodic arc instead of a spinning star. If beaming of the radiation is occurring then that should be verifiable here on Earth in the lab by studying the plasma focus device.



The Electric Universe model lets go of the Newtonian dogma that gravity is the driving force in the cosmos. It allows for the possibility that the fundamental characteristic of normal matter – its electric charge – plays the most significant role. So if gravity wave telescopes detect anything at all, it won't be gravity waves from super-heavy objects. And particle physicists who are trying to work out how the universe was constructed from strange matter early in the Big Bang are wasting their time. The astronomer [Halton Arp](#), author of the Atlas of Peculiar Galaxies, has conclusively disproven the theory of an expanding universe and so knocked out the foundation of the Big Bang theory.

Meanwhile the plasma physicists and electrical engineers are waiting in the wings for those astro-and nuclear-physicists parading their strange science in public to get off the stage. It would be entertaining if it weren't so serious. But it is costing us dearly and holding up real progress.

More Io Closeups

Posted on [November 22, 1999](#) by [Wal Thornhill](#)

Jupiter's Moon Io: a Flashback to Earth's Volcanic Past

Excerpts From A NASA/JPL Press Release November 19, 1999

Jupiter's fiery moon Io is providing scientists with a window on volcanic activity and colossal lava flows similar to those that raged on Earth eons ago, thanks to new pictures and data gathered by NASA's Galileo spacecraft.

The sharp images of Io were taken on Oct. 11 during the closest-ever spacecraft flyby of the moon, when Galileo dipped to just 380 miles (611 kilometers) above the surface. The new data reveal that Io, the most volcanic body in the solar system, is even more active than previously suspected, with more than 100 erupting volcanoes.

"The latest flyby has shown us gigantic lava flows and lava lakes, and towering, collapsing mountains," said Dr. Alfred McEwen of the University of Arizona, Tucson, a member of the Galileo imaging team. "Io makes Dante's Inferno seem like another day in paradise."

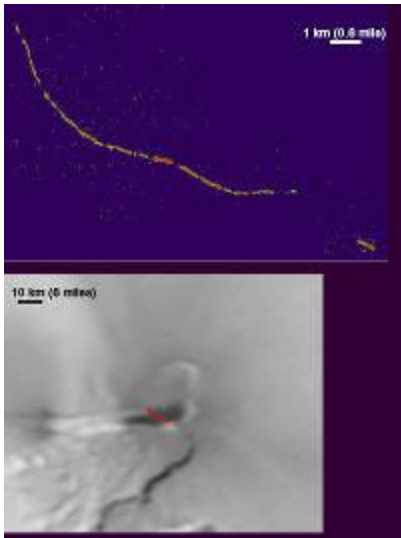
Judging by the NASA/JPL News headline, NASA's eye on funding seems to be more acute than its eye for science. To paraphrase an old joke about a hammer and a screw – when all you have is a geologist, everything looks like a volcano. The evidence points ever more strongly to electric arcs creating the hot spots and surface features on Io. Nevertheless the report continues:

Ancient rocks on Earth and other rocky planets show evidence of immense volcanic eruptions. The last comparable lava eruption on Earth occurred 15 million years ago, and it's been over 2 billion years since lava as hot as that found on Io (reaching 2,700 degrees Fahrenheit) flowed on Earth.

"No people were around to observe and document these past events," said Dr. Torrence Johnson, Galileo project scientist at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. "Io is the next best thing to traveling back in time to Earth's earlier years. It gives us an opportunity to watch, in action, phenomena long dead in the rest of the solar system."

As predicted by the Electric Universe model several years ago, Io is a living laboratory for electrical sculpting of planetary surfaces. As for such activity being long dead in the rest of the solar system, that presupposes an undisturbed planetary system over billions of years. An objective assessment of the discoveries of the space age show that dogma to be wishful thinking as the estimates of planetary surface ages are drastically revised downward.

The new data focus on three of Io's most active volcanoes – Pele, Loki and Prometheus. The vent region of Pele has an intense high-temperature hot spot that is remarkably steady, unlike lava flows that erupt in pulses, spread out over large areas, and then cool over time. This leads scientists to hypothesize that there must be an extremely active lava lake at Pele that constantly exposes fresh lava. Galileo's camera snapped a close-up picture showing part of the volcano glowing in the dark. Hot lava, at most a few minutes old, forms a thin, curving line more than six miles (10 kilometers) long and up to 150 feet (50 meters) wide. Scientists believe this line is glowing liquid lava exposed as the solidifying crust breaks up along the caldera's walls. This is similar to the behavior of active lava lakes in Hawaii, although Pele's lava lake is a hundred times larger.

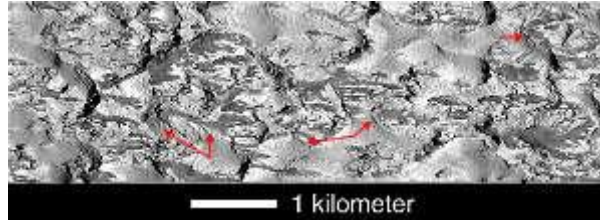


The intensely hot spot of Pele is visible in daylight. Its visibility and steady brightness is understandable if it is a hot spot of an electric arc. It does not require another ad hoc condition of lava in addition to its extreme temperature. The necklace of bright spots glowing in the dark fit the cathode spots model of the electric arc better than a line of exposed lava. The result would be a crater chain like a large version of those seen in the earlier closeup of Io and also in the latest image seen below. Crater chains are ubiquitous on solid surfaces throughout the solar system, from asteroids and the tiny moon of Mars (Phobos) to the Moon, Venus and Mars. They are not well explained by either internal geological forces or by external impact events.

The image below is a closeup of "a degraded mountain" and shows "a lumpy landscape". The caption released with the image reads:

"Curiously, the variation in brightness between the dark and light areas within this image is the greatest seen to date on Io. Galileo scientists are continuing to investigate the processes that produce this puzzling surface".

The dark areas seem consistently lower and flatter than the lumpy bright areas. This also fits with the view that the dark "volcanic flows" seen elsewhere are exposed sub-surface that has been melted and possibly chemically altered as a result of an impinging electric arc. Overlying material has been "spark machined" into space in the form of cathode jets (read "volcanic plumes" in conventional speak) at some earlier time. A feature of spark machining is circular pitting of the surface and a flat floor of the pits. Notice the tendency for circular scalloping of the edges of the dark material and its flatness. There also appear to be several small chains of circular pits. They, too, are a feature of cathode scarring and were seen in the first closeup of an Io "lava flow".



The image has been slightly computer enhanced. The arrows point to some of the crater chains.

Mountains on Io are much taller than Earth's largest mountains, towering up to 52,000 feet (16 kilometers) high. Paradoxically, they do not appear to be volcanoes. Scientists are not sure how the mountains form, but new Galileo images provide a fascinating picture of how they die. Concentric ridges covering the mountains and surrounding plateaus offer evidence that the mountains generate huge landslides as they collapse under the force of gravity. The ridges bear a striking resemblance to the rugged terrain surrounding giant Olympus Mons on Mars.

The resemblance is likely to be due to the fact that Olympus Mons itself is not a volcano but one of the largest anodic electrical scars yet discovered in the solar system. Such high mountains are formed by gargantuan electrical forces. Some of the concentric features are similar to those found on lightning arrestors after a lightning strike.

Image Credits: NASA/JPL

New Io images taken by the spacecraft are available at:

<http://www.jpl.nasa.gov/pictures/io> [dead link 2012]

Other Stars, Other Worlds, Other Life?

Posted on [December 15, 1999](#) by [Wal Thornhill](#)



The astronomer, Herschel, had the crazy notion that people inhabited the Sun beneath the shining clouds. Well, maybe not our Sun, but he might yet have the last laugh.



Emeritus Professor at the Australian National University, Dr. S. Ross Taylor has concluded after a lifetime's work on the formation of the solar system:

"When the remote chances of developing a habitable planet are added to the chances of developing both high intelligence and a technically advanced civilization, the odds of finding 'little green men' elsewhere in the universe decline to zero."

The bleak suggestion that we are freaks of chance and probably all the intelligence there is in this immense universe is intuitively unsatisfactory.

The problem with all predictions about intelligent life elsewhere in the universe is that it assumes we have defied history and reached a pinnacle of understanding at the close of the 20th century. History teaches that the peak we have climbed may be atop a house of cards. We might accept Dr. Taylor's conclusion based on the current model but it could be like pronouncing intelligent life to be highly unlikely in the ruins following the crash of a jumbo-jet. The solar system could be the result of a cosmic traffic accident. Possibly it is not the most hospitable environment for life. So using it as a benchmark must lead to pessimistic forecasts of the solar system:

"When the remote chances of developing a habitable planet are added to the chances of developing both high intelligence and a technically advanced civilization, the odds of finding 'little green men' elsewhere in the universe decline to zero."

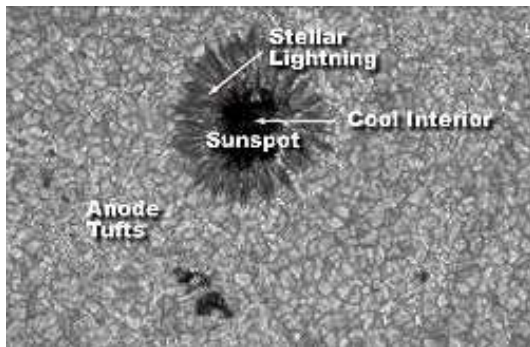
The bleak suggestion that we are freaks of chance and probably all the intelligence there is in this immense universe is intuitively unsatisfactory.

Let's examine a key assumption underlying such speculation – that we understand what constitutes a star. The first presumption appears in the following statement from the Encyclopedia Britannica:

"The most basic property of stars is that their radiant energy must derive from internal sources. Given the great length of time that stars endure (some 10,000,000,000 years in the case of the Sun), it can be shown that neither chemical nor gravitational effects could possibly yield the required energies. Instead, the cause must be nuclear events wherein lighter nuclei are fused to create heavier nuclei..."

Astrophysicists have never considered the simpler alternative – that stars are powered externally. All their genius has been directed at modelling how a giant ball of hydrogen could be coaxed into slowly releasing pent up atomic energy in the most difficult way imaginable – heating it to tens of millions of degrees. With one notable exception, no one has bothered to look for an alternative despite the fact that none of the observed features of the Sun have any business being there in the thermonuclear model.

The exception is the work of a remarkable engineer from Flagstaff Arizona, the late Ralph Juergens. In his model, stars simply form a positive electrode (anode) in a galactic glow discharge. The Sun and all stars are lit up by the electrical energy that shapes and flows along the arms of the galaxy. The Sun is a giant ball of lightning! This surprisingly simple model fits all of the observations about our Sun and forms one of the key ideas in the Electric Universe. A star's size, brightness and color are then largely determined by its electrical environment. That explains the puzzling lack of neutrinos expected from nuclear reactions in the Sun's core, and how some stars are able to vary their output far more quickly than the thermonuclear model allows.

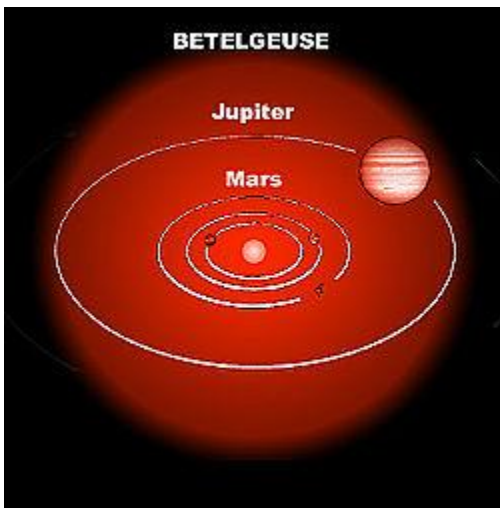


Stellar lightning bolts are effective particle accelerators that can synthesize heavy elements in nuclear reactions at the surface of a star. The heavy elements seen in the Sun's spectrum are created at the surface of the Sun, along with the few neutrinos we observe. That neutrino numbers seem to follow surface and external effects like sunspots and the solar wind is to be expected in an electric star. It is inexplicable in the thermonuclear model.

In the last few years a new class of faint stars has been discovered. They are called L-Type Brown Dwarfs because the element lithium appears in their spectra. They are the most numerous stellar objects in the galaxy and bridge the gap between stars and Jupiter-sized planets. They are too small to be shining from internal thermonuclear power. A

further puzzle is that they radiate blue and ultraviolet light even though they are cool at a temperature around 950K. Water molecules dominate their spectra.

All of these puzzles are simply explained by an electric star. There is no lower limit to the size of a body that can accept electric power from the galaxy so the temperatures of smaller dwarfs will range down to levels conducive to life. The light of a red star is due to the distended anode glow of an electrically low-stressed star. The blue and ultraviolet light come from a low-energy corona. (Our Sun's more compact red anode glow is seen briefly as the chromosphere during total solar eclipses. And the Sun is electrically stressed to the extent that bright anode "tufting" covers its surface with granulations and the corona emits higher energy ultraviolet light and x-rays as relativistic electrons strike it).



At the other extremity of size, Red Giants are a more visible and scaled-up example of what an L-type Brown Dwarf star might look like close-up. The Red Giant Betelgeuse is so huge that if it were to replace our Sun then Mercury, Venus, Earth, Mars and Jupiter would be engulfed by it. Astronomers recognize that such stars could swallow planets yet their plasma envelope is so tenuous that it would not impede the planetary orbits within the star's atmosphere. However, astronomers believe that any planet it swallowed would be gradually vaporized by intense heat from the star's core. But the standard stellar model has to be seriously fudged to explain Red

Giants, their central temperature turns out to be so low that no known nuclear process can possibly supply the observed energy output. The electric model, on the other hand, works seamlessly from Supergiant star to a planet-sized Brown Dwarf.

Since an electric star is heated externally a planet need not be destroyed by orbiting beneath its anode glow. In fact life is not only possible inside the glow of a small brown dwarf, it seems far more likely than on a planet orbiting outside a star! This is because the radiant energy arriving on a planet orbiting inside a glowing sphere is evenly distributed over the entire surface of the planet.



There are no seasons, no tropics and no ice-caps. A planet does not have to rotate, its axis can point in any direction and its orbit can be eccentric. The radiant energy received by the planet will be strongest at the blue and red ends of the spectrum. Photosynthesis relies on red light. Sky light would be a pale purple (the classical "purple dawn of creation"). L-type Brown Dwarfs have water as a dominant

molecule in their spectra, along with many other biologically important molecules and elements. Its "children" would accumulate atmospheres and water would mist down. It is therefore of particular interest that most of the extra-solar planets discovered are gas giants, several times the size of Jupiter, orbiting their star extremely closely. It is our system of distantly orbiting planets that seems the odd one out. In fact it argues in favor of a galactic traffic accident between the Sun and a sub-Brown Dwarf like Jupiter or Saturn.

So let's examine a second major plank of standard theory – that we understand where planets come from. The nebula theory of the origin of planets is so problematic that it only survives because no one has been able to come up with a better idea. A many-body system controlled by a single force, gravity, is inherently unstable and should fly to pieces. In an Electric Universe the model is simple. Planets are "born" from stars in a descending hierarchy of size by the highly efficient expedient of electrical splitting of an unstable positively charged core. That is why the majority of stars have partners. It explains why many of the extra-solar planets orbit their star extremely closely – that is where they were created. It is why Jupiter and Saturn have a large number of close-orbiting moons. Close orbits are normal. Distant or highly eccentric orbits are more likely to be a result of capture. An exchange between orbital and electrical energy quickly stabilizes orbits.

It can be seen that the Electric Universe model provides a superior environment for the establishment of life than a planet relying on a distant star and having to be self-sufficient for its atmosphere and surface deposits. Such a planet needs to rotate fairly quickly to even out the energy received and must have a small axial tilt for the same reason. It has only a limited range of orbits and eccentricity for life to survive. It also requires that the star maintains a steady radiance over millions of years. This is the Earth's present situation and I believe Prof. Taylor is right in considering the chances for life to have begun and to have survived here are close to zero.

If the following sounds like science fiction, so be it. Science fiction writers are far better than experts at predicting future knowledge. What then might be the Earth's history? The distant orbits from the Sun suggest that we were captured along with our Brown Dwarf parent. In the process, the electric power that drove our parent star was usurped by the Sun. As well as turning out the primordial light, the Sun stripped the Earth from its mother's womb along with the Moon. Night fell for the first time and stars appeared. Ice ages began suddenly. The polar caps formed. High latitudes became uninhabitable. It is worth adding that many of the moons, or remaining offspring, of the gas giants have surprisingly icy surfaces and some have atmospheres. Life may have existed once on Mars and some of those moons.

The Electric Universe model has almost biological overtones that favor life. In the process of growing in a galactic electromagnetic pinch, stars are prevented from becoming too massive by "budding off" other stars and gas giant planets. Some progeny remain to form binary or multiple star families. Others escape from their parent. All receive their share of energy from the galaxy. The most common stars in the galaxy are

also the dimmest, the L-Type Brown Dwarfs. These stars have the "food" required for life present in their atmospheres. Such a dwarf star/gas giant may undergo a nova outburst to eject part of its core to form dense Earth-like planets and moons. If they remain close to the parent they may be enveloped within the "womb" of the stellar anode glow where it seems the principal conditions for life are present. Our search for intelligent life should therefore focus on the faintest close stars in the sky. But there is a problem in relying on radio signals because they cannot pass through the hot plasma of an anode glow. (That could account for the lack of success of SETI so far). It would limit the ability of intelligent creatures living in that environment to know anything about the wider universe since they would not see stars. There would be no incentive for space travel which, in any case, might be a problem through the anode glow region. Maybe we on Earth are almost a "one off", as Dr. Taylor says, to have survived an escape from our stellar cocoon to see the wider universe. If so, I hope we learn to use our privileged position wisely.

The most disturbing idea I have left to last: the words used by ancient civilizations that are interpreted today as "the Sun" – like the Egyptian "Ra", the Greek "Helios", and the Roman "Sol" – all originally referred to the gas giant Saturn! Was that planet our primordial parent? Was Saturn until recently a much larger brown dwarf? (The apparent size and color of an electric star is an electrical phenomenon. If Jupiter's magnetosphere were lit up it would appear the size of the full Moon). Was ancient man around to see it as a sun? If not, why would anyone call a faint yellowish speck in the night sky – the Sun? Just how recently did Saturn get its icy ring? Does the discovery that the human race seems to have spread from a handful of survivors in the not so distant past have anything to do with this story? Oddly enough, an interdisciplinary approach can answer many of these questions in surprising detail. But it requires letting go of a lot of "things we know ain't so".

The present model of isolated self-powered stars with a family of relatively distant planets gives infinitesimally small windows of opportunity for life to gain a foothold, let alone sustain it for millions of years. An Electric Universe where energy is available to objects throughout the entire volume of a galaxy is an infinitely better environment for life. Faint, dwarf electric stars may be crucial to a radical reassessment of the likelihood of other intelligent life in the universe. Who knows, the Cassini mission to Saturn may be a kind of homecoming? It will return some surprises.

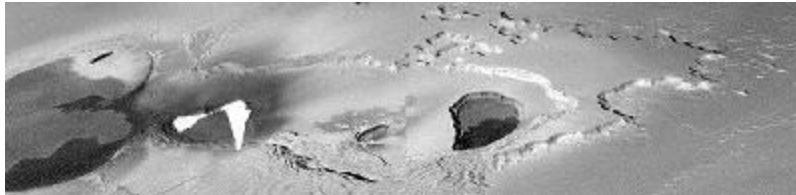
Meanwhile, following the ages-old tradition of commemorating the Earth's lucky escape from doom in a cosmic accident and its first new year in the solar system – I wish you all a HAPPY SATURNALIA!

Image Credit: Dr. S. Ross Taylor – Photo by Darren Boyd.

NASA'S Xmas Coloring Book

Posted on [December 22, 1999](#) by [Wal Thornhill](#)

NASA have just released the first images from their Thanksgiving Day, November 25, 1999, closest flyby of Io. See them at <http://www.jpl.nasa.gov/pictures/io> [dead link 2012, try <http://photojournal.jpl.nasa.gov/catalog/PIA02519>].



My earlier prediction that the so-called volcanos would be much hotter than the estimates made at lower resolution has been hinted at by NASA. It is reported that the "lava" might be hotter than 1600K. This scenario sounds like a replay of the surface temperature of Venus!

"The active lava was hot enough to cause what the camera team describes as "bleeding" in Galileo's camera, caused when the camera's detector is so overloaded by the brightness of the target that electrons spill down across the detector. This shows up as a white blur in the image."

But 1600K is only red-hot. What lava on Earth, even when photographed at night, would cause bleeding of a solid-state camera image? It usually occurs only if such a camera is pointed at a very bright light. I think that is precisely what occurred at Io. The Galileo camera was looking at a number of arc-lights in the form of cathode spots. Their temperature could range as high as 6000K over very small areas – approaching that of the surface of the Sun. That would certainly overload Galileo's pixels! The smearing seems to have occurred vertically downwards in the image so the cathode spots would form a line along the top of the white areas. That conforms to lower resolution images taken earlier from above another "volcano". It is important to note that cathode spots usually arrange themselves in a line along a segment of a circle. That fits the evidence of circular scalloping of the landforms in the rest of the image. And it is the remainder of the image that confirms the electric arc model.



The descriptions of the burnt-out white smears in the picture as lava fountains are a classic example of "seeing" only what you believe. To register detail in the bright light would probably have required a neutral density filter that would have darkened the rest of the picture to obscurity. But NASA knows that it is a volcano (just as they knew Venus wasn't all that hot) so that didn't enter into their plans. Instead they have had to resort to coloring-in the picture. But where are the huge lava flows that are supposed to

extend for more than 100 kilometers (60 miles) in some instances? The surface has an etched appearance rather than showing a build-up of volcanic outpourings.

The picture caption continues:

"Also of great interest is the flat-topped mesa on the right. The scalloped margins are typical of a process geologists call "sapping," that occurs when erosion is caused by a fluid escaping from the base of a cliff. On Earth, such sapping features are caused by springs of groundwater. Similar features on Mars are one of the key pieces of evidence for past water on the Martian surface. However, on Io, the liquid is presumed to be pressurized sulfur dioxide. The liquid sulfur dioxide should change to a gas almost instantaneously upon reaching the near-vacuum of Io's surface, blasting away material at the base of the cliff. The sulfur dioxide gas eventually freezes out on the surface of Io in the form of a frost. As the frost is buried by later deposits, it can be heated and pressurized until it becomes a liquid. This liquid then flows out of the ground, completing Io's version of the 'water cycle.'"



Martian fretted terrain

NASA scientists have had to introduce the ad hoc requirement of different liquids flowing beneath the surfaces of Mars and Io to drive surface sapping. The process of sapping has not been well studied and the photographs on Earth given as examples in Prof. Baker's book, *The Channels of Mars*, do not look much like that seen on Mars or Io.

The cross-cutting channels on Mars are inexplicable by any flowing liquid. Sapping requires a replenishable source of liquid. It needs the surface layer to be harder than the material beneath. The eroded material slumps into the channel. On both Mars and Io the eroded material has not flowed anywhere, it has disappeared! Neither shows any sign of erosive liquids on the surface. So the 'water cycle' on Io is a desperate analogue considering that the erosion on Io is an order of magnitude or more greater than any

examples of sapping seen here on Earth – where we have an abundance of liquid water.



Io Plume and fallout ring

The Io close-up shows a surface that bears all of the classic features of a spark-machined surface – the flat clean crater floors and steep circular scalloped walls with sharp edges. It is ironic that in comparing it to the Martian "fretted" terrain, NASA has chosen another superb example of cathodic erosion. The eroded material is jetted into space leaving a surgically clean wound. This is a hallmark of

spark-machined surfaces. The cathode jets are seen today on Io and misinterpreted as volcanic plumes. Blast effects at the surface of Io caused by the hypothetical conversion

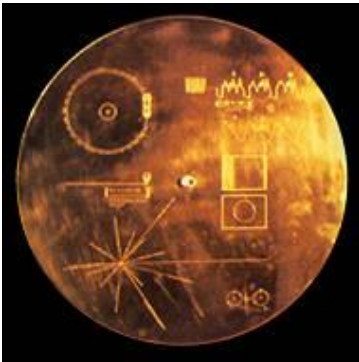
of sulfur dioxide from the liquid to the gaseous state will not give rise to the vertical supersonic plumes observed. Nor will it sort the material that falls back to the surface into perfect rings in the manner of a giant natural mass spectrometer.

2000

Alien Skies

Posted on [February 11, 2000](#) by [Wal Thornhill](#)

"Homo sapiens sapiens is not always as sapiens as he sapiently should be."
Professor Gus Nossall.



Two Voyager spacecraft are carrying a message from the human race to the remote future, somewhere in the distant stars. Our faint hope is that some other life form will find one of those spacecraft and decipher its cryptic hieroglyphs. If so, we will have established contact with other intelligent life in the universe!

In a similar way, our ancestors have sent us not one, but thousands, of important messages in the form of legends and art from our remote, alien past. Like the Voyager message, they require intelligence to decode. Do we have that intelligence? Surprisingly, until the last half of the 20th century, the answer has been no! The problem has been in our human tendency to project our familiar world onto those messages. Intelligent aliens would be better equipped to decode those messages because they would have to make a conscious effort to give up their familiar references in an effort at understanding.

As the comparative mythologist David Talbott has shown, we have simply assumed that the sky we rejoice in is the same as the sky that our long-forgotten ancestors lived beneath. On the other hand, alien investigators would not know whether we had one sun, or two or more, what color those suns were, and whether they rose and set like ours. So, when the ancient peoples from around the world record that the sun remained fixed in position in the sky, the aliens could allow for the possibility that the Earth was in some kind of phase lock with its nearest star. What have we done with similar information? We have discarded it as impossible nonsense.



So our first obstacle has been the intellectual arrogance we bring to our attempts at understanding the stories and images our ancestors considered **of utmost importance to be passed on faithfully** to future generations. What we fail to understand we have minimized or denigrated. As De Santillana and Von Dechend wrote in *Hamlet's Mill – An Essay Investigating the Origins of Human Knowledge and Its Transmission Through Myth*:

"... we almost dare not admit the assumption ... that our ancestors of the high and far-off times were endowed with minds wholly comparable to ours, and were

capable of rational processes -always given the means at hand. It is enough to say that this flies in the face of a custom which has become already a second nature.

Our period may some day be called the Darwinian period, just as we talk of the Newtonian period of two centuries ago. The simple idea of evolution, which it is no longer thought necessary to examine, spreads like a tent over all those ages that lead from primitivism into civilization. Gradually, we are told, step by step, men produced the arts and crafts, this and that, until they emerged into the light of history.

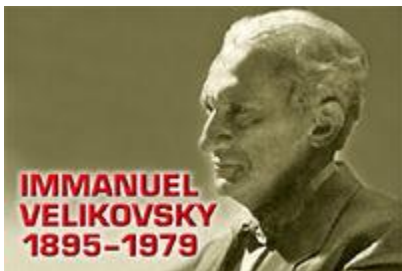
*Those soporific words "gradually" and "step by step," repeated incessantly, are aimed at covering an ignorance which is both vast and surprising. One should like to inquire: which steps? But then one is lulled, overwhelmed and stupefied by the gradualness of it all, which is at best a platitude, only good for pacifying the mind, since **no one is willing to imagine that civilization appeared in a thunderclap.**"*

The use of the word "thunderclap" is remarkably prescient of the authors for it has been established by Talbott, that the over-riding concern of our ancestors was with the actions of the capricious and warring planetary gods. And the weapon of choice was the thunderbolt. It was no earthly spark. It took the strange involuted, corkscrew form of plasmoids and was associated with stones (meteorites) falling from the sky and global devastation.



Tibetan thunderbolt, or Dorje

It is therefore of little wonder that mythic traditions were established in an effort to remind future generations of those terrible experiences. Recent evidence from genetic studies suggests that the human race sprang from a handful of survivors. The question remains – survivors of what? Talbott answers provocatively that we are survivors of the apocalypse; doomsday; the end of the world. It was a time when the planets were not mere specks in the night sky but instead loomed as majestic, sometimes terrifying, spheres in the heavens.



Like me, Talbott received an early intellectual mentoring from that great but unrecognized interdisciplinary scholar of the 20th century, Immanuel Velikovsky. It was he who identified the biologically impossible fire-breathing, flying dragon or serpent as an awe inspiring comet which later settled down to become the planet Venus. Velikovsky alone predicted the

intense internal heat of Venus and was further vindicated before his death by the announcement of Venus' "cometary tail" which stretches as far as the Earth's orbit. As space exploration has continued, his ideas of 50 years ago have been confirmed while experts are continually forced back to their drawing boards. If a theory were to be judged by its successful predictions then Velikovsky should have received a Nobel Prize. Instead, academics lashed out with unprecedented fury at someone who would cross their jealously guarded disciplinary boundaries and open doors that they were unaware existed.

The overwhelming desire "not to know" certain things seems to afflict us all. That is particularly true where the safety of our tiny blue spaceship Earth is concerned. It could be that much of modern science is subconsciously aimed at making us feel safe by pushing cataclysmic events into remote times or deep space. Velikovsky suggested that the human race behaves collectively like the victim of a dreadful trauma. The result is a kind of localized amnesia and an unwillingness to confront the painful memory. But until we face and accept our true past we will continue to behave neurotically. Here may lie the key to understanding our insane destructive behaviour toward ourselves and the planet as an unconscious identification with, and re-enactment of, the power of the old planetary gods. Only understanding can bring true healing.

Clearly, astronomers can point to powerful theoretical reasons why the solar system cannot have had a chaotic recent history. However, astronomy is an odd science. While using all of the trappings of 20th century technology, its theory is firmly rooted in gas-light era science. As Velikovsky rightly said, "it is of Victorian vintage". Astrophysicists have not yet discovered the electric light. Nowhere will you find any reference to electrical energy in celestial mechanics. Yet the ancients were adamant, as Heraclitus, ca. 500 B.C., put it:

"It is the thunderbolt that steers the universe."

Anomalistic behaviour of experiments during solar eclipses show that we do not understand the true nature of gravity. Common sense (which as one wag said, isn't so common) suggests that it is a property associated with the fundamental electrical nature of matter and has nothing to do with empty space.

So, aliens who intercept a Voyager spacecraft should have a clear advantage in deciphering our plaque and recording from the remote past. This is in stark contrast to our difficulty in understanding messages from our own species in the not so distant past. Aliens would not need to impose limits like a planet that has been undisturbed for billions of years, merely to make them feel secure. The chances are that they live in a far more interesting environment anyway, with two or more suns. But they should have no difficulty in visualizing a planet orbiting a gas giant, with other planets looming nearby, and a distant single sun. Nor do we – provided that it is an artist's fancy of an alien planet. Yet this is the kind of message we have been sent from the past!

The aliens won't have to be super intelligent to detect from the Voyager recordings that they are dealing with a damaged species. And when they see that we have not mastered

the electrical nature of gravity and resort to primitive rocket engines – maybe they will have discovered homo sapiens ignoramus?

So NEAR, and Yet So Far from Understanding

Posted on [February 13, 2000](#) by [Wal Thornhill](#)

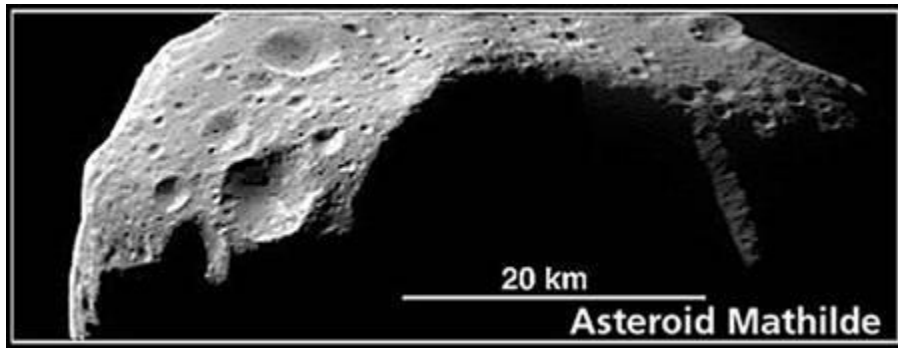
On Valentine's Day, 2000, the Near Earth Asteroid Rendezvous (NEAR) spacecraft is due, on its second attempt, to go into orbit around asteroid 433 Eros. It will be the first spacecraft to orbit an asteroid. NEAR will examine the odd-shaped rock, about twice the size of Manhattan Island, for about a year.

What do we expect to learn from this adventure? Astronomers agree that it is a chance to examine material left over from the formation of the solar system. Maybe they are pieces of a failed planet? In any case, the usual mantra is invoked: it will help us understand the origin of the solar system. Yet images returned from close fly-bys of asteroids together with Hubble Space Telescope images of the large asteroid, Vesta, have already provided more puzzles than answers. That situation will continue while we remain so far from understanding what we are looking at. The accepted model for the origin of the solar system is a modern "fairy story", in the words of one noted astronomer, requiring ad hoc miracles to occur on every page in order to arrive at a happy ending.

The biggest puzzle concerns the amazingly large craters on most of the asteroids. They create severe problems for the impact theory of accretion but astronomers have no alternative mechanism to offer. In an article in *Science* of 19 December 1997, titled "New View of Asteroids", Erik Asphaug writes:

"Last June, NEAR flew by the main belt asteroid 233 Mathilde ... Although the resolution was 50 times as coarse as expected at Eros, the images of Mathilde reveal some surprises and provoke an overdue reevaluation of asteroid geophysics. Mathilde has survived blow after blow with almost farcical impunity, accommodating five great craters with diameters from 3/4 to 5/4 the asteroids mean radius, and none leaving any hint of global devastation. Given that one of these great craters was last to form, preexisting craters ought to bear major scars of seismic degradation, which they do not. Furthermore, asteroids Gaspra and Ida (encountered by Galileo en-route to Jupiter) and the small satellite Phobos all exhibit fracture grooves related to impact, yet fracture grooves are absent on the larger, more battered Mathilde.

Consider the third largest asteroid, 4 Vesta, a basalt-covered volcanic body 530 km in diameter that resembles the Moon as much as it does Mathilde or Toutatis. Recent views (36 km per pixel) by the Hubble Space Telescope show a 460 km crater, with raised rim and central peak, covering the entire southern hemisphere – an impact scar surpassing (in relative diameter, but not relative depth) the great chasms of Mathilde.

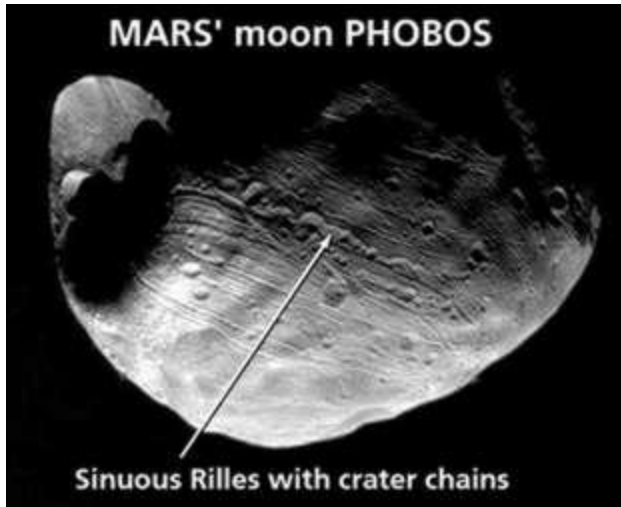


Such craters greatly challenge our understanding of impact processes on asteroids, and on planets in general; evidently, our science must adapt. The study of asteroids is therefore particularly exciting, as small planets provide the fulcrum for the growth of planetology, and for an evolution of geophysics in general. Complex and poorly understood solar system processes – such as impact cratering, accretion and catastrophic disruption, the evolution of volcanic structures, and the triggering of differentiation – may reveal themselves only in a study across the gamut of planets, from the least significant house-sized rock to the most stately terrestrial world. Like clockwork miniatures, asteroids demonstrate primary principles governing planetary evolution at an accessible scale, and thousands await discovery and exploration in near-Earth space alone."

In the Electric Universe model, moons, asteroids, comets and meteors are created in electrical discharges between planetary bodies. They are ripped from a planet's surface by electrical forces that easily overwhelm the weak gravitational force. The most well-known, albeit unrecognized, arc scar from a recent planetary encounter is seen on Mars in the form of the colossal Valles Marineris canyons.

Two million cubic kilometers of rock was excavated by the arc and hurled into space. Some fell back to form the strewn fields of boulders seen by every Mars lander. Some remained in orbit to become the two moons of Mars, Phobos and Deimos.





(It is just possible that there is more rubble in orbit about Mars that has been the cause of inexplicable failures of spacecraft on arrival there). The rest formed meteors and a belt of asteroids. This model simply explains why many meteorites contain minerals whose crystals show that they must have formed inside a planet. It explains the origin of the Martian meteorites that are still arriving on Earth. And the electric arc mechanism explains simply the strange flash-heating of chondrules and other minerals found in

meteorites. So, if EROS' parent was Mars it may show similarities to Martian rocks.

The most compelling evidence of their electrical birth is that all asteroids imaged to date bear scars in the diagnostic form of circular electric arc cratering. One large crater on asteroid Vesta has an untouched central peak. Impacts do not form circular craters with sharp rims – they "splatter". They don't form central peaks. Small secondary craters appear preferentially on the raised rims of earlier craters while the reverse is never seen – which also rules out an impact origin.

Crater-filled grooves, seen clearly on Phobos have nothing to do with impact fracturing and are merely small sinuous rilles created by surface lightning streaking toward the main arc.



Sinuous rilles are not collapsed lava tubes. Since electrical cratering is a slower process than sudden impacts and does not involve mechanical shock to the same extent, there is little disturbance of pre-existing craters – as seen dramatically on Mathilde.

It is worth noting the odd low apparent density of many asteroids. In such cases, astronomers introduce another ad-hoc assumption that the asteroid is porous, containing up to 60% free space. But that raises the question of how, in their model, such an object could sustain any sizeable impact without shattering. In contrast, the Electric

Universe model expects that a low level of charge on the surface of an object will lower its measured gravitational influence. For example, comets display non-Newtonian behaviour simply because they are visibly discharging and changing their state of electric charge. So a low density may be due to the electrical state of an asteroid rather than any porosity. In that case, the surface minerals will have a higher density, as measured on

Earth, than the gravity of the asteroid would lead us to believe. Certainly, the asteroids do not give the appearance of being a "rubble pile". If asteroids maintained their integrity under the intense electrical forces that removed them from a planet they must have considerable mechanical strength.

Having been "born" in a cataclysm created by a powerful electric discharge there may be strong remanent magnetism in any susceptible minerals on an asteroid. Strong magnetic remanence has been inferred on the asteroid Gaspra, equaling the Earth's field strength, and it is a distinguishing feature of most meteorites. The process of electrical cratering will generate regions of anomalously strong patterns of magnetism. In addition, nuclear processes are to be expected. So nucleosynthesis, transmutation of elements and the formation of isotopes and radionuclides will have had an effect on the surface of asteroids similar to that seen in meteorites where odd isotopes occur from short-lived heavy parent radio-nuclides and others do not match those found in the solar wind.

In order to advance we require much more than that "our science must adapt" or that understanding of these processes will come about from "an evolution of geophysics". It will require nothing less than a revolution in science before understanding is possible. That revolution begins with discarding the fairy tales about the formation of the solar system and returning to the laboratory to study the effects of electric discharges on model planetary surfaces. However that might be difficult for those who believe unshakably in their childhood stories and for many of the modern "virtual reality" computer generation.



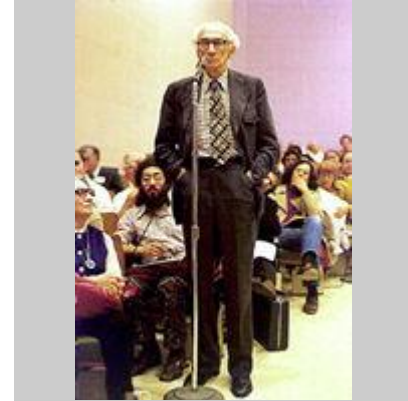
Image Credit: Robert Dunlap.

Image Credit: Crater laboratory image by Robert Dunlap.

The Impact of Pseudo-Science

Posted on [March 17, 2000](#) by [Wal Thornhill](#)

This year is the 50th anniversary of the publication of an astonishing and controversial book – *Worlds in Collision*. The provocatively titled 1950 book was written by Immanuel Velikovsky and caused an unprecedented furor in scientific circles. It led to the transfer of the book from the hurting academic publisher and dismissal of those who publicly supported the work. Among those summarily sacked was the distinguished Gordon Atwater, curator of the Hayden Planetarium, who planned to dramatize the book using the planetarium.



*Velikovsky at the 1974 McMaster symposium, *The Recent History of the Solar System*. Photo: W. Thornhill*

In 1974, the AAAS held a session in San Francisco which was supposed to allow Velikovsky a forum to answer his critics. It was, as it transpired, a disgraceful ambush.



Now, some quarter century later, the American Association for the Advancement of Science (AAAS) has discussed a similar topic but without Velikovsky's presence. The subject was "unpredictable events of extra-terrestrial origin and their impact on humanity". It was an occasion for the the sensationalists to parade their predictions of doomsday by impact from a comet or asteroid. It also became another opportunity for academics to rewrite history and indulge in yet another miserable attack on Velikovsky.

As reported in the WhyFiles:

"...there are some neo-catastrophists, located mainly in Britain, who have an almost Velikovskian pseudo-scientific take on this matter and have argued that such impacts are more frequent ... Velikovsky, of course, is the guy who gave asteroid impacts such a bad name back in 1950."

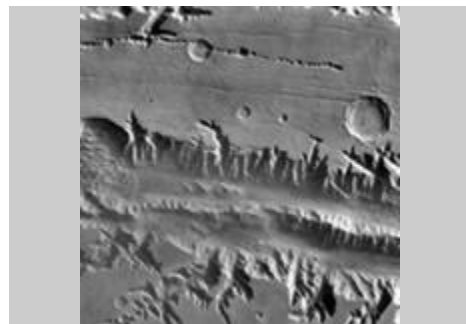
See: <http://whyfiles.news.wisc.edu/106asteroid/index.html> [dead link 2012]

It seems unlikely that Velikovsky's historical reconstruction of planetary catastrophes is correct and it is the British neo-catastrophists rather than academia who we have to thank for their scholarly work on the subject. However they have not argued for more frequent asteroid impacts. None of this denies Velikovsky priority in identifying the major destructive influence in the Earth's past as the near approaches of the planets Mars and Venus. His reconstruction of awesome celestial events in the dimly remembered past follow the laws of physics and the rules of evidence. His model is a good one when

measured by its prediction score against that of conventional models. Conventional models are woefully deficient to pronounce upon impacts and their effects. To begin with, planetologists have admitted they are unable to experimentally reproduce the features of so-called impact craters. So, what are the craters? If they are not a result of impacts, what possible use are they in predicting future impacts? Is the science of impacts a pseudo-science?

Amazingly, Mars was often sculpted by ancient artists as a sphere. How could it be if Mars has always occupied its present orbit? The list is very long of other striking anomalies that have to be ignored by astronomers to maintain the status quo. A science that willfully disallows the documentary evidence for planetary encounters amassed by Velikovsky, and others since, is itself a pseudo-science.

One point I will concede to the astronomers. Velikovsky's book title is misleading. It is not about colliding planets or asteroids. It seems there is an intrinsic avoidance mechanism involving cosmic electric discharges. But no astrophysicist on this planet is taught anything about electric discharges in space. Proof of that can be seen in the Tethered Satellite debacle. Yet the ancients reported planetary thunderbolts that wrought destruction on a global scale. That is where we must begin to look for the cause of cratering. Jupiter's thunderbolt is said to have created the colossal scar of Valles Marineris in a moment on Mars' face. Planetologists, in their limited view, have attributed it to water erosion.



Valles Marineris. Circular craters (some with terraced walls), crater chains and scalloped canyons are all characteristic of electrical scarring.

As Sir Fred Hoyle wrote:

"... could it be that Velikovsky had revealed, admittedly in a form that was scientifically unacceptable, a situation that astronomers are under a cultural imperative to hide? Could it be that, somewhere in the shadows, there is a past history that it is inadmissible to discuss?" The answer is obviously "yes". But Hoyle shows his own Achilles heel when he mentions Velikovsky's documentary evidence as being "scientifically unacceptable". He is not alone when he writes "... we believed in the primacy of mathematical rules...". But who is to say what the rules were when Jupiter hurled thunderbolts? Certainly not the rules of Sir Isaac Newton, who knew nothing of electricity. It is inadmissible to discuss Velikovsky's work because it requires a revolution in science. Astronomy would have to leave the gas-lit Victorian era and enter the era of the electric light. But science does not welcome revolution. Hoyle again: "Slender progress means that the sheep cannot be separated from the goats. Nothing happens to threaten existing establishments... When there is near zero progress, slight steps can be misinterpreted (or misrepresented) as large steps, governments can be urged to throw immense sums of money into the air in the vain hope that something of

value will be forthcoming, and, above all, establishments can perpetuate themselves."

I leave the last word on the subject to Mel Acheson:



When the Hebrews prepared to invade the land of Canaan, they were given the imperative to kill all the inhabitants, including the cattle. They didn't kill all the cattle, and they were punished. But they did write the history so God was on their side.

What brings this historical anecdote to mind is a "history" of catastrophics at the WhyFiles. After listing a series of events that are now considered catastrophic from ancient times to modern, the WhyFiles says this:

"1950 — Immanuel Velikovsky publishes "Worlds in Collision", a pseudoscientific warning about impact hazards. In equal parts bogus and frightening, Velikovsky casts the entire field of impact studies into disrepute."

[You remember "impact studies": that ancient discipline which was a paragon of scientific inquiry until Velikovsky single-handedly demolished its respectability.]

Now that the data have become so compelling that catastrophic events can no longer be ignored, the Uniformists need to invade catastrophist territory. But what they wish was uninhabited virgin wilderness turns out to be occupied. After centuries of denial that catastrophic events occur, after volumes written to disparage the idea, after calumnies composed to bury investigations under the headstone of pseudoscience, the invaders are embarrassed by the indigenous catastrophists.

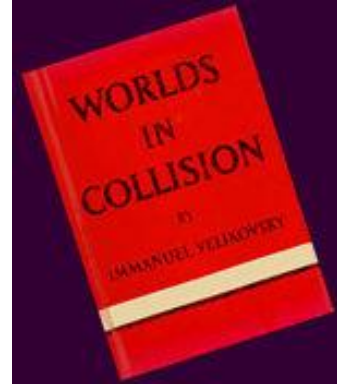
So the indigenes must be eliminated and history re-written to make the invaders into the good guys: Velikovsky is blamed for the centuries of disrepute, and the invaders can claim to have rescued "impact studies" from the depredations of crackpots.

The unsavory truth is that Uniformists since the time of Lyell have done all they could to derogate ideas containing any hint of catastrophism. And they largely succeeded: No scientist would mention catastrophic events or their proponents (else he would quickly find himself no longer a scientist: Where, pray tell, is Gordon Atwater?). Catastrophists were shunned as superstitious crackpots or religious fanatics. No small part of Velikovsky's greatness was his courage and genius in presenting such a well-researched and well-argued case that the wall of silence was breached, even if only to scream vituperations at him. Had he not done what he did, it's likely the wall would still be standing, and the ungrateful inhabitants of "impact studies" would be just more crackpots. It was **Velikovsky** who rescued catastrophics.

These little men who trail far behind Velikovsky and who make snide remarks with fabricated "history" while trying to cash in on his accomplishments are devoid of both grace and gratitude. Such continuing displays of malice are what give science its bad name.

Mel Acheson

Note: Worlds in Collision is planned to be reprinted later this year on the 50th anniversary of its first printing.



Science Heading For a Big Bang

Posted on [April 27, 2000](#) by [Wal Thornhill](#)

Forget the glossy astronomy books and magazines – the Big Bang is pure fiction. The discoveries that prove it will also bring about the end of science-as-we-know-it. Of course, many books and articles have been published recently heralding the end of science – meaning there is little left to learn. The truth is the opposite. Much of what we think we know "ain't so". As always, unlearning it will give us more trouble than learning something new.

The belief of scientists in their cleverly concocted creation story, the Big Bang, has become so entrenched and over-hyped that it is difficult to imagine an effective face-saving strategy when the news leaks out that it is nonsense. And let there be no doubt about it, the hard science to prove the case against the Big Bang has been done by an astronomer who is uniquely well placed for the task.



His name is Halton Arp, known for his classic work in "Arp's Atlas of Peculiar Galaxies". When he began to announce findings nearly 30 years ago that contradicted orthodox cosmology he was refused telescope time and publication in the standard journals. In frustration he published two books, the first in 1987 titled "Quasars, Redshifts and Controversies", and more recently "Seeing Red". "Redshift" is the term used to describe the shift in frequency of spectral lines toward the red end of the spectrum. It's known to occur when an object is speeding away from us. Edwin Hubble discovered that the luminosity of a galaxy is related to its redshift: the fainter the galaxy, the higher the redshift. He suggested one interpretation of this data is that the greater the redshift (and therefore, the velocity), the farther away the galaxy. Thus, the expanding universe was born. But he was careful not to assume that this was the only possible interpretation of the redshift data. Others since have thrown scientific caution to the winds and used Hubble's hypothesis as a rubbery yardstick with which to measure the size and age of the universe. Arp avoided this unscientific approach and made discoveries that are unequalled in the history of astronomy.

Many peculiar galaxies turn out to be what are known as active galaxies. They are often seen to have thin jets of matter firing from their cores, and bridges of matter or radio lobes connecting them with nearby objects. Arp noticed that quasars are clustered in the sky with active galaxies far too often to be a coincidence. Quasars are faint starlike objects whose spectra are highly redshifted. The Big Bang view is that their redshifts are due to the expansion of the universe and the doppler effect as the quasars race away from us at a good fraction of light speed. A high redshift equates in that model to great distance so they should have no association with much closer galaxies. Yet Arp showed that some quasars are connected by bridges or jets of matter to active galaxies. Since the advent of orbiting x-ray telescopes these bridges are becoming abundantly clear.

But now we come to the results of Arp's work that will shake the foundations of modern physics. He found that quasars lined up on either side of active galaxies as if they are spat out at regular intervals from the galactic cores, above and below the plane of the galaxy. He then found that the redshifts of these quasars fall back toward normal levels and increase in brightness the further they are from the parent galaxy. In other words, the redshift is a measure of the age of the quasar. Also, the quasars slow down as if they are increasing in mass.

Even more shocking was Arp's discovery that quasar redshifts are quantised! **If science worked as advertised, this should be banner headline news!** This raises the specter that our highly prized physics is way off the beam; that we do not understand such fundamental concepts as mass and gravity, nor the real meaning of quantum theory. So our university libraries and bookshops are crammed with science fiction. Nothing short of the biggest conceptual revolution in history will redress the situation. But universities are not in the business of fostering revolutions and the media seems incapable of exposing their nonsense. Based on his experiences, Arp wrote:

"Investigative journalism so far as science is concerned is dead in the water."

He believes that with such a broken-down way of doing and reporting science, breakthroughs must come from individuals outside academia.

It is happening. The signs of revolution have been around for decades. But with their backs turned to us and absorbed in their computer screens, those who have derailed science are oblivious to the "Big Bang" that is about to occur. As David Stove, the noted Australian philosopher, wrote in *Anything Goes*:

"Everyone dislikes a sudden loud noise, but it is worse still if you are half asleep at the time."

We can expect a bad-tempered reaction when it occurs.

The famous mathematician Johann von Neumann seemed to intuit the problem at the heart of the mathematical physics approach when he wrote:

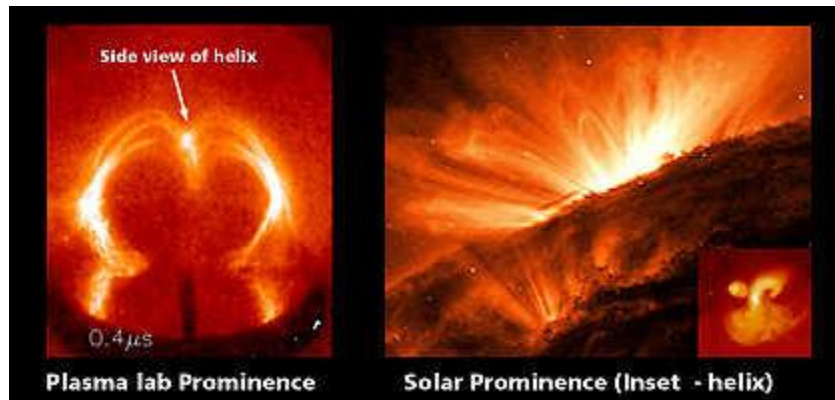
"In mathematics you don't understand things. You just get used to them."

Meanwhile a growing number of independent thinkers have noted that physics lost any remaining connection with reality with the advent of relativity theories and quantum mechanics. Paradoxically, the way forward is to return to classical physics which is based on immutable standards and causality. The equations of modern science are merely descriptive and not causal explanations. The same equations may apply to many different causes. Relativity introduces "rubbery" rather than immutable standards. Mass, length and time change with velocities and observers. As the philosopher [Michael Miller](#) [dead link 2012] puts it:

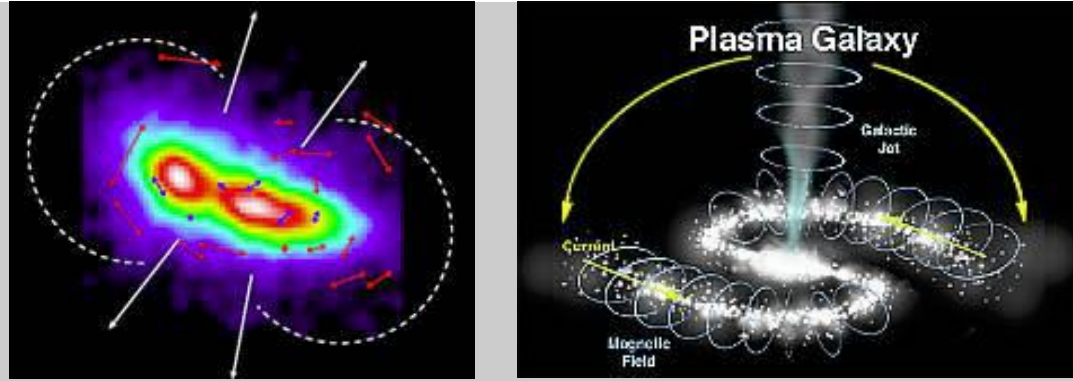
"If a measuring standard varies who-knows-how, then the quantities measured by means of it vary who-knows-how, and the equations connecting those quantities mean who-knows-what. This is precisely the bog in which relativists have mired themselves; their doctrine of curved space is symptomatic. ...Generations of science students have tried to make sense of curved space, and succeeded only in warping their minds."

As with past revolutions, the seeds are already sown. A good scientist would be alert, without prejudice, to wider future possibilities. Unfortunately, academia teaches and encourages prejudice and a narrow focus. Arp goes so far as to compare the dogmatism of astronomy unfavorably to that of the medieval church. It is the mission of HOLOSCIENCE to look at the BIG PICTURE and find the promising ideas that could form the new science of this new millennium. Arp's observational work on intrinsic redshift is already a cornerstone for a new cosmology. It depicts a smaller, stable cosmos as part of an infinite, eternal universe. It has almost biological overtones when it traces families of galaxies with quasars being the galactic children in various stages of adolescence.

There are two key elements required to explain the dynamics of quasar formation and quantization of redshift. [An article](#) featured in the March-April issue of American Scientist drops the first shoe. It demonstrates (again) that plasma physics holds the key to understanding stars and galaxies and the inexplicable (in gravitational terms) ejection of vast gobs of matter at colossal speeds.



Experiment shows that a powerful electric current in a magnetic field can create a solar coronal mass ejection event (CME). And since magnetic fields are caused by electric currents, the prime mover is electric discharge phenomena in a plasma. From personal experience, electric discharges in plasmas are not a part of the curriculum for astrophysicists. Cosmology should be the realm of plasma physicists and electrical engineers.

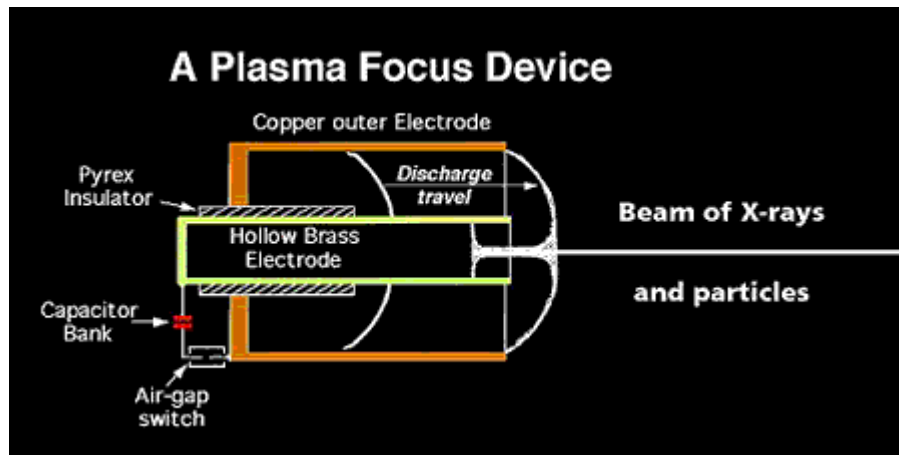


The red and blue arrows show the observed magnetic field directions and the white dashed curves outline the magnetic bubble structure. The long white arrows depict the direction of the wind from the center of the galaxy.
Photo: JAC

Electric current (yellow lines) flows along the magnetic field lines - which conforms closely to the image of M82

Another recent example: British astronomers have discovered a "magnetic bubble" around one of Arp's favorite galaxies, M82. Notice that astrophysicists always deal with effects (winds, magnetism) and not causes (electric currents). The diagram of M82 is almost identical to that of the plasma physicist, Eric Lerner, in his book "The Big Bang Never Happened", published in 1992.

In that book, a simple, highly compact and efficient ejection engine is described – the plasma focus.



It can explain simply the episodic ejection of quasars from the centers of active galaxies. In an Electric Universe infinitely heavy objects are not needed to offset the infinitely weak force of gravity when explaining high-energy outbursts. Black holes and neutron stars simply do not exist. The electrical nature of matter prevents the formation of super-massive objects.



The second shoe is dropped heavily by the physicist Ralph Sansbury who has been using his own resources to experiment with laser light and show that there are near-instantaneous electric forces that can account for light, magnetism and gravity. In other words, the electric force is fundamental and all others are derived from it – even the nuclear force. The quantum nature of matter interactions are then seen in a classical sense to be due to electrostatic resonances operating at near-infinite speed between sub-particles that constitute electrons, protons and neutrons. Causality is reinstated in physics. **If science worked as advertised, this should be banner headline news!** (And Ralph wouldn't be working alone in his basement). In the view of HOLOSCIENCE, this is the only model that can sensibly explain Arp's galaxy-wide quantum jumps in redshift.

The argument goes like this: a quasar is ejected from a galactic nucleus by the plasma focus effect as an electron-deficient plasmoid (electrons are trapped in the focus longer than the much heavier protons). Now, the phenomenon of mass is due to the energy conserving elastic response of charged particles to external electric forces. If gravity is an electric force, inertial and gravitational mass will always be identical. So, because the electric polarization of stars in the quasar is low at first, the mass of protons and neutrons will be lower than in the parent galaxy.

Consequently electron orbits within quasar atoms will have lower energy – light from them will be redshifted. Luminosity will also be lower due to the lack of charge-carrying electrons. Electrons streaming after the quasar create an x-ray jet and vast radio-lobes. Such electron jets are seen clearly in images from the orbiting Chandra X-Ray telescope.



The active galaxy Centaurus A showing bright x-ray knots in its jet. An X-ray image of Centaurus A taken by the Chandra X-ray Observatory has been superimposed over an optical view of the galaxy taken by the 4-meter reflector at Cerro Tololo Inter-American Observatory.

As electrons arrive at the quasar, the luminosity increases at first and mass and redshift undergo quantum jumps to new resonant states across the quasar or galaxy.

From a [NASA news report](#) issued on April 19:

"The distance record for a quasar has been broken yet again. At the present time, no other object in the universe has been found to be more distant than the above speck. The recently discovered quasar has been clocked at redshift 5.82. The exact relation between redshift and distance remains presently unknown, although surely higher redshifts do mean greater distance. The above quasar is likely billions of light-years away and so is seen when the universe was younger than one billion years old, less than a tenth of its present age. Like all quasars, this object is probably a large black hole in the center of a distant galaxy."

Blah, blah....

Has NASA suddenly become uncharacteristically coy about the meaning of the redshift? The use of the word "surely" implies a question mark.

It is usual in academia to ignore and ostracize a dissenter in the hope he will give up. But Arp is not a quitter, he is a big hitter. If ostracism fails then scientists rewrite history as if they really knew it all along. The first step in that process is to equivocate in scientific reports to allow a new interpretation to be introduced retrospectively. Watch carefully!

Wal Thornhill

Credits: Photograph of Ralph Sansbury: Wal Thornhill.

Failed Star or Failed Science?

Posted on [July 19, 2000](#) by [Wal Thornhill](#)

A Brown Dwarf Solar Flare

From NASA Science News for July 12, 2000

Astronomers were surprised when NASA's Chandra X-ray Observatory detected an x-ray outburst from a failed star only 60 times more massive than Jupiter.

NASA's latest observatory, designed to see the most violent and stunning cosmic phenomena, captured something unexpected. The Chandra X-ray Observatory, orbiting in space about one-third of the way to the moon, saw the first-ever flare from what's known as a brown dwarf, or failed star.

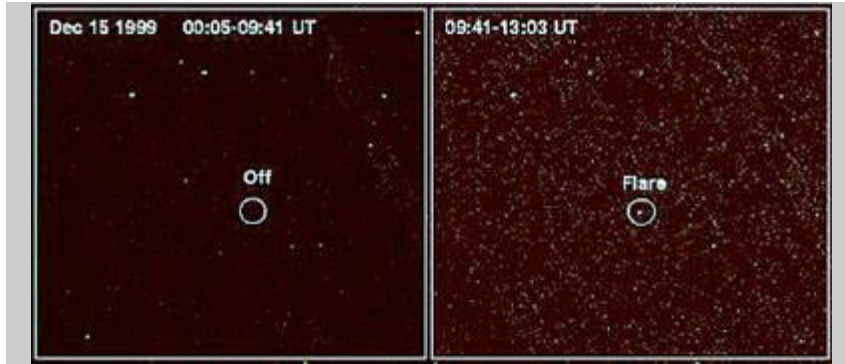
"We were shocked," said Dr. Robert Rutledge of the California Institute of Technology (Caltech) in Pasadena, CA, the lead author on the discovery paper to appear in the July 20 issue of Astrophysical Journal Letters. "We didn't expect to see flaring from such a lightweight object. This is really the mouse that roared."

Comment: On 15 December 1999 I wrote: "All of these puzzles are simply explained by an electric star. There is no lower limit to the size of a body that can accept electric power from the galaxy so the temperatures of small dwarfs will range down to levels conducive to life. The light of a red star is due to the distended anode glow of an electrically low stressed star." There are no "failed" stars in an Electric Universe. Since the power source for stars is external rather than internal, brown dwarfs can be expected to show most of the same kinds of variability as brighter stars. That includes sudden discharges (flares).

The study of the bright X-ray flare will increase understanding of the explosive activity and origin of magnetic fields of extremely low-mass stars.

Chandra detected no X-rays at all from the object called LP 944-20 for the first nine hours of a twelve-hour observation, and then the source flared dramatically before it faded away over the next two hours.

The energy emitted in the brown dwarf flare was comparable to a small solar flare, and was a billion times greater than observed X-ray flares from Jupiter. The flaring energy is believed to come from a twisted magnetic field. "This is the strongest evidence yet that brown dwarfs and possibly young giant planets have magnetic fields, and that a large amount of energy can be released in a flare," said Dr. Eduardo Martin, also of Caltech and a member of the team.



For the first 9 hr 36 min of Chandra's observation, no X-rays were detected from the brown dwarf (left panel). Then the brown dwarf turned on with a bright X-ray flare (right panel) that gradually diminished over the last few hours of the observation. The grainy appearance of the image on the right is due to a shorter exposure time. The bright dots in the background are other X-ray sources, 7 of which have been identified as stars.

For the first 9 hr 36 min of Chandra's observation, no X-rays were detected from the brown dwarf (left panel). Then the brown dwarf turned on with a bright X-ray flare (right panel) that gradually diminished over the last few hours of the observation. The grainy appearance of the image on the right is due to a shorter exposure time. The bright dots in the background are other X-ray sources, 7 of which have been identified as stars.

Professor Gibor Basri of the University of California, Berkeley, the principal investigator for this observation, speculated that the flare "could have its origin in the turbulent, magnetized hot material beneath the surface of the brown dwarf. A sub-surface flare could heat the atmosphere, allowing currents to flow and give rise to the X-ray flare — like a stroke of lightning."

LP 944-20 is about 500 million years old and has a mass about 60 times that of Jupiter, or 6 percent of that of the Sun. Its diameter is about one-tenth that of the Sun and it has a rotation period of less than five hours. Located in the constellation Fornax in the southern skies, LP 944-20 is one of the best-studied brown dwarfs because it is only 16 light years from Earth.

The absence of X-rays from LP 944-20 during the non-flaring period is in itself a significant result. It sets the lowest limit on steady X-ray power produced by a brown dwarf, and shows that the million-degree Celsius upper atmospheres, or coronas, cease to exist as the surface temperature of a brown dwarf cools below about 2500 degrees Celsius.

"This is an important confirmation of the trend that hot gas in the atmospheres of lower-mass stars is produced only in flares," said Professor Lars Bildsten of the University of California, Santa Barbara, also a member of the team.

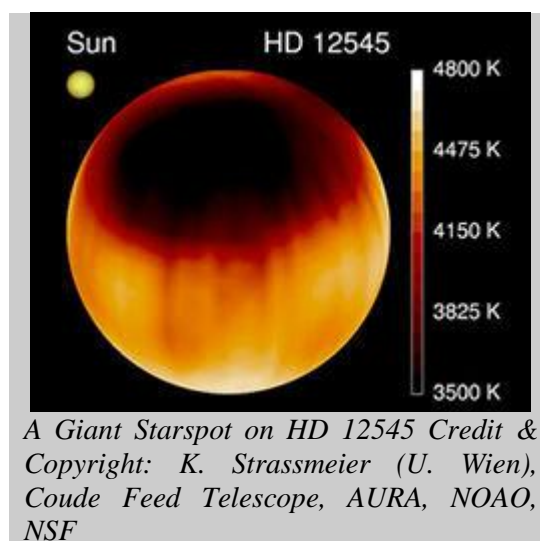
Brown dwarfs have too little mass to sustain significant nuclear reactions in their cores. Their primary source of energy is the release of gravitational energy as they slowly contract. They are very dim — less than a tenth of a percent as luminous as the Sun — and of great interest to astronomers because they are poorly understood and probably a very common class of objects intermediate between normal stars and giant planets.

Comment: On October 11 1999 I wrote:

"... images from Chandra will be important evidence for the Electric Universe because x-rays are only emitted where electrical activity is strongest."

Astrophysicists are unable to interpret the information from Chandra sensibly because their training does not include plasma electrical discharge phenomena. The unfortunate result is "pathological science" that employs magnetic fields that are generated by poorly understood and unseen theoretical "dynamoes" inside cosmic bodies. The resulting hypothetical magnetic fields are then trapped in plasma despite the fact that plasma is not superconducting. Then magical "reconnection" of magnetic field lines is invoked to explain sudden energetic outbursts classified as being "like lightning". If we don't use magnetic reconnection in storm clouds to explain lightning, why use it in deep space to explain a similar phenomenon?

As further evidence that magnetic models are inadequate, on July 12 the following image was posted on the [Astronomy Picture of the Day website](#).



Explanation: What could cause a star to have such a large spot? Our Sun itself frequently has sunspots, relatively cool dark magnetic depressions that move across its surface. HD 12545, however, exhibits the largest starspots yet observed. Doppler imaging – the use of slight changes in color caused by the rotation of the star – was used to create this false-color image. The vertical bar on the right gives a temperature scale in kelvins. This giant, binary, RS CVn star,

also known as XX Trianguli, is visible with binoculars in the constellation of Triangulum. The starspot is thought to be caused by large magnetic fields that inhibit hot matter from flowing to the surface.

Comment: The explanation of sunspots has been contrived to fit the idea of an internally powered star. Common sense suggests that any break in the photosphere should allow the hotter and brighter material beneath to show through. Sunspots should be brilliant blue-white rather than cooler and darker. Once again astrophysicists have invoked magical magnetic fields to "solve" the problem. However, HD 12545 strains the magnetic theory of starspots past breaking point. Where does all of the throttled heat flow go? If it is diverted around this colossal starspot, the edges should be much brighter than the rest of the star.

The electric star model expects this kind of transition between a star like our Sun and a red giant like HD 12545. Bright anode tufting is a feature of mercury arc rectifiers when the current load is high. Anode tufts tend to clump together while retaining their identity. Our Sun is a relatively small stellar anode so the photosphere is densely packed with bright granulations or anode "tufts". A red giant is a large anode so that "tufting" is not required to carry the current load. As a result, the red anode (chromospheric) glow predominates. A red star with a binary partner may also have an asymmetric anode glow due to a distortion in the current supply created by the partner. Starspots will be cooler because the power that drives the stellar electric discharge is being diverted. Starspots can be any size on an electric star.

The 12-hour observation of LP 944-20 was made on December 15, 1999, using the Advanced CCD Imaging Spectrometer (ACIS).

The ACIS instrument was built for NASA by the Massachusetts Institute of Technology, Cambridge, and Pennsylvania State University, University Park. NASA's Marshall Space Flight Center in Huntsville, AL, manages the Chandra program. TRW, Inc., Redondo Beach, CA, is the prime contractor for the spacecraft. The Smithsonian's Chandra X-ray Center controls science and flight operations from Cambridge, MA.

2001

Eros Not So Mysterious

Posted on [February 10, 2001](#) by [Wal Thornhill](#)

The following message is from Reuters:

On February 12, the world's first spacecraft will land on an asteroid – Eros, named after the Greek god of love – and stream a series of photographs in nearly real time. That equates to two images a minute, which will be streamed to the Web site www.near.jhuapl.edu At more than 196 million miles from Earth, the asteroid will be the most distant object on which a spacecraft has landed.

The event is the grand finale of a one-year orbital mission of Eros, the first of NASA's Near Earth Asteroid Rendezvous (NEAR) program, whose goal has been to determine Eros' mineralogical make-up and its relationship to comets, meteorites and the origin of the solar system.

The Result?

The NEAR web site Science Update December 28, 2000 is headlined:

More Mysteries

We are planning to devote the last two months of the mission to low altitude observations. What we have seen so far in the low orbits has merely whetted our appetite for more. We went up close to have a better look at the surface than ever before, but we now see things we do not understand, and we need more information. That has been the story of the NEAR mission, and that is why we are going back to low orbit despite the rough ride that the irregular gravity field of Eros will give us.

The craters on Eros provide several examples of mysteries that we are working on. Craters are the records of impacts that have largely shaped the surface of Eros, of other asteroids we have seen, and of objects from Mercury to the moons of Neptune. From the beginning of the mission, we saw two large concavities on Eros, for which we have proposed the names Himeros and Psyche. In the early images Himeros appeared saddle-shaped, and we could not be sure if it was indeed an impact crater, but Psyche displayed from the start the classical bowl shape of an impact crater. Although it was not immediately apparent, Himeros was actually not saddle-shaped at all, but bowl-shaped. Careful mapping of its topography by the NEAR Laser Rangefinder and by the imager shows that as far as Eros' gravity field is concerned, its depth is consistent with impact excavation. Still, if it is an impact crater, it is oddly shaped.

Another mystery is that the interior surface of Himeros is relatively smooth and much less heavily cratered than typical areas on Eros, and so it must be relatively young. The same is true for the interior of Psyche. However, the largest impact features on a body are most likely the oldest. Moreover, there is a third global scale depression on Eros that is actually larger than Psyche in diameter. We have proposed to name this third depression Shoemaker Regio, and it too may be an ancient, degraded impact crater or as many as three degraded craters side-by-side. The interior of Shoemaker Regio is young like the interiors of Himeros and Psyche, because it is lightly cratered, but it is also the most boulder-rich area on Eros and very different from the relatively smooth interiors of Himeros and Psyche. What has happened?

We do not know. Eros is a body without atmosphere or ocean, without large-scale volcanism (Eros has never melted completely, but some partial melting may have occurred in the past), and without plate tectonics, but it has ongoing geologic activity. What could be sculpting the surface except impacts? Much the same can be said for the Moon, although the Moon did have extensive magmatic activity (releases of lava on a global scale) billions of years ago. On the Moon, the primary process shaping the surface is cratering. In the lunar highlands, for example, we see that the continuing rain of projectiles has produced a state that approaches what we call "equilibrium saturation", where each new impact on the average erases as many pre-existing craters as it makes new ones (each projectile makes a primary crater but can make additional craters if it produces ejecta that fall back to the surface at high speed). In the equilibrium state, we find that the density of craters on the surface obeys a characteristic relation. Namely, if we count craters of a given size range, say from 10 km to 14 km diameter in a certain region on the Moon, and we ask what is the total area covered by craters of this size in this region, we find empirically that about one fifth of the area is covered. The same is roughly true for craters in other size ranges (say from 20 to 28 km), as long as the minimum and maximum diameters of the size range stay in the same ratio, and provided that the craters are not too large. This distribution implies that the total number of craters smaller than some diameter scales roughly as the inverse square of this diameter, up to some maximum size. That is, the total number of craters smaller than 2 km is four times as many as the total number smaller than 4 km, and the number smaller than 1 km is four times as many again. Similar distributions are found on heavily cratered bodies throughout the solar system, although there are deviations from the simple power law that reflect the geologic histories of the individual objects.

The crater size distribution records how many projectiles of various sizes hit the Moon, which interests us because the distribution of projectiles that bombarded the Moon must also hit the Earth. Although there are complications – it is not completely straightforward to relate the distribution of craters to that of projectiles – this is why horrific impacts like the one at Chicxulub, which ended the age of the dinosaurs on Earth, are much less frequent than minor impacts like the one that made Barringer Meteor Crater (and we are thankful). This is also

why the largest impact craters on a body, like Psyche or Himeros (if it is one), are likely to be the oldest. Larger impacts occur less frequently, so it is unlikely for a large impact to have occurred very recently. Moreover, large impacts create large volumes of ejecta and produce large seismic disturbances, both of which tend to erase small craters around them (by covering or obliterating them). A very large impact, like Psyche on Eros, may be able to erase small craters globally. Perhaps if Psyche formed after Himeros, it could have 'reset' the surface on Eros by erasing small craters, but then how was the interior of Psyche also reset?

In any case, when we saw heavily cratered surfaces on Eros, we were not surprised, and we expected an equilibrium saturation distribution to apply. However, the distribution of craters that we actually see at Eros is very different. An equilibrium saturation distribution would mean that if we are able to see smaller craters, we should find more of them, approximately as the inverse square of the size. This is not true at Eros. We went to low altitudes and looked for smaller craters, but found that craters below about a hundred meters in diameter are markedly depleted. Furthermore, the smaller the size of crater we look for, the fewer we find relative to what we would expect from an equilibrium distribution.

So, again we ask, what is happening? Perhaps it will not be us, but some future scientists, who will unravel some of the mysteries we are studying. In any case, we are working hard to understand the surface of Eros.

Andrew Cheng

NEAR Project Scientist

Comment:

The mysteries about the asteroid Eros begin the moment it is assumed that the history of asteroids is fairly well known. A great deal is made out of the so-called impact cratering record. But the story about the formation of the solar system from a disk of rubble is nothing more than a fable. And like any fable, disbelief must be suspended when a miracle is called upon at the end of each chapter to keep the story alive.

We don't have to wait for future scientists to unravel the mysteries of Eros. It is almost 30 years since the publication of an electrical model of the solar system by the brilliant engineer from Flagstaff, Arizona – Ralph Juergens. Following his death in 1979, the Canadian physicist, Earl Milton, continued the work of his good friend. A simple version of the cosmic electricians' story is that most comets, asteroids and meteoroids have a common origin. They are formed from material that has been electrically torn from an existing planet during a close encounter with another planet. The forces that melted, shaped and eroded the surface of an asteroid are those encountered in plasma arc machining. Milton and Juergens independently came to the same conclusion. In 1980, Milton wrote: "Likely the small body of the comet here functions as an undersized anode and evaporates like an electrode in an arc. Over time the cometary nucleus should

become cratered and pitted like the surfaces of some of the planets and satellites of the Solar System. When a spacecraft finally achieves a rendezvous with one of the comets scientists are going to be surprised to find a surface pitted like that of the Moon, Mars, or Mercury." The same statement applies to asteroids. The circular craters on Eros with smooth interiors are not due to impacts. The size distribution of craters is dependent solely upon the power of the cosmic lightning being endured by the body during its birth or during a cometary existence. And differences in cratering density have nothing to do with age of the surface. Electrical cratering takes place in a flurry and, as with the sunward side of a comet, may be selective in the areas struck.



Credit: NASA/JHUAPL

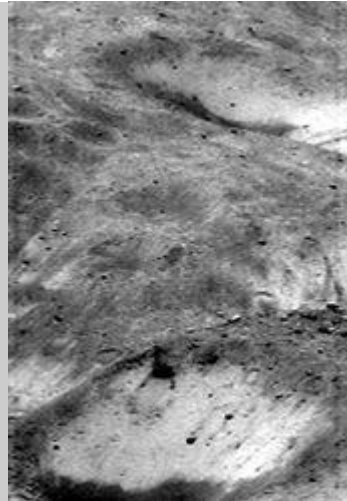
Groovy Asteroid Images returned by NEAR Shoemaker show that Eros, like a number of other asteroids and asteroid-like moons, has a surface cut by linear troughs called "grooves." Similar features have been identified on asteroids Ida and Gaspra and on Mars' moon Phobos. However, the high-resolution images of Eros allow the origin of its grooves to be investigated in unprecedented detail.

This image showing several grooves was taken May 17, 2000, from an orbital altitude of 52 kilometers (32 miles). The whole scene is about 1.4 kilometers (0.8 miles) across, and shows features as small as 4 meters (13 feet).

Grooves on asteroids are usually explained as evidence of structural faults. In fact, with their population of craterlets they are to be seen wherever electrical arcing has been widespread on a surface. They often form parallel patterns and are caused when powerful electric currents travel along the surface. The filaments of current exhibit long range attraction and short range repulsion, which creates parallel grooves. Eros has such features which have been compared with a wood-grained appearance. The on-channel craters are formed where the intense surface heating creates sufficient charge carriers to be the focus of a short-lived arc.

Comets and asteroids are the same bodies, distinguished only by their orbits. Asteroids occasionally show a diffuse cometary appearance and one asteroid, Chiron, was observed in 1988 to become a comet. An asteroid will become a comet if its orbit becomes highly elliptical. Any large object, including a planet, will find a rapidly changing electrical stress as it moves radially with respect to the Sun. The result is the formation of a Langmuir plasma sheath to enclose the charged body's alien electric field. That is what forms and stabilizes the huge comet comas that may have a visible diameter of a hundred thousand kilometres. There is no way that the puny gravitational field of a 10km rock can control that volume. The close up image of the nucleus of comet Halley, snapped by the Giotto spacecraft as it flew by, shows the kind of electrical surface machining that shapes asteroids. The nucleus cratering and presence of x-rays and energetic particles near a comet were all predicted by Milton years before the Halley encounter in 1986.

The electrical model of the solar system has implications for the NEAR spacecraft as it attempts to softly crash-land on the asteroid. An electrical discharge between NEAR and Eros may occur even though the spacecraft has had a year to slowly equalize its voltage with that of the asteroid. If that happens, the signal from the spacecraft may disappear before touchdown. Once down, and if still functioning, dust could electrostatically coat the lenses of the cameras. The state of surface material in the form of dust, soil and boulders, will be determined by the asteroid's history. It is more likely to have loose surface material if the asteroid has not had a cometary history since its formation. The many boulders on Eros hint that this is so. Small craters on the Moon were seen by the Apollo astronauts to contain glassy deposits at their centers. They are the equivalent of fulgurites formed by lightning in sand. With luck a close up of the small craters may show evidence of glass. The place to look is the enigmatic light colored filamentary deposits which are reminiscent of the light colored rayed-craters on the Moon. Such rays, Juergens showed, are electrical in origin.



*Image Credit:
NASA/JHUAPL*

A Lacework Surface With the Sun high in Eros' sky, shadows disappear and bright surface features stand out. In this picture taken by NEAR Shoemaker on July 19, 2000, from an orbital altitude of 36 kilometers (22 miles), the Sun is nearly overhead. The steep local slopes are hard to see without shadows, but the lacework of bright and dark regolith is at its most conspicuous. The image shows a region about 800 meters (2,600 feet) across. The smallest visible rocks are about 6 meters (19 feet) across.

Congratulations to the engineering team of NEAR for a highly successful mission.

Science has a long way to catch up!

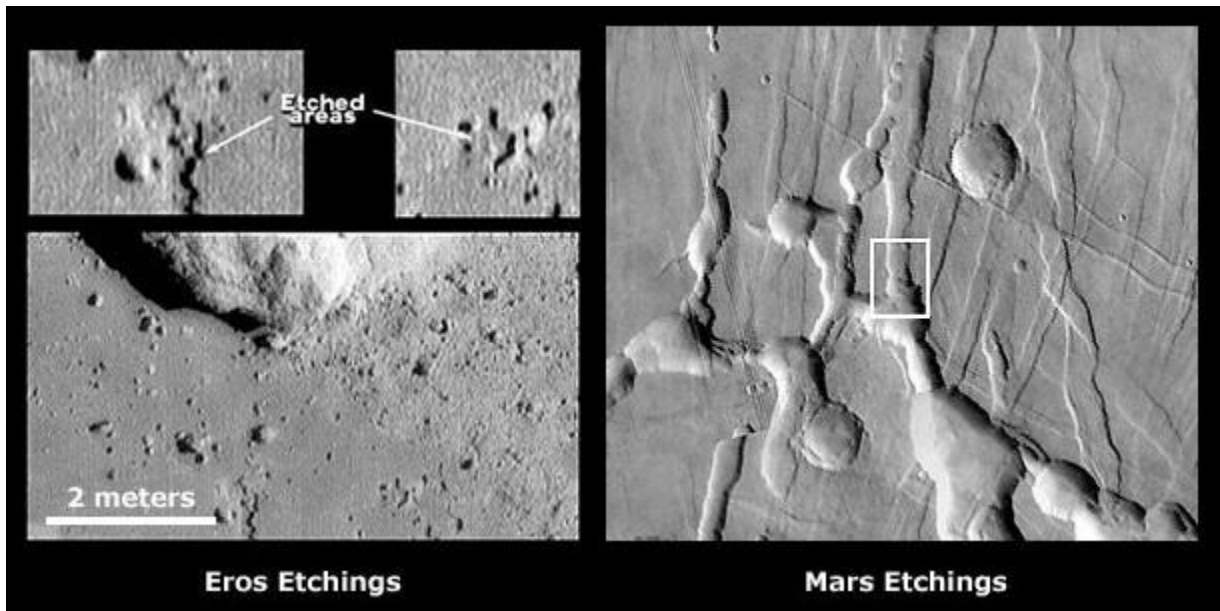
POSTSCRIPT:

Near has made a historic landing on Eros. And 69 detailed pictures were taken during the last 5 kilometres descent. The closest was from a height of only 120 metres showing features down to 1 centimetre across. In a press conference on 14 February, Dr Joseph Veverka said:

"These spectacular images have started to answer the many questions we had about Eros, but they also revealed new mysteries that we will explore for years to come."

One of those mysteries was an area "where the surface appears to have collapsed." They are shown here in the insets above the closest image taken of Eros.

The argument of surface collapse is well worn, having been used to describe similarly etched areas of Mars. There it is attributed to subsurface liquid flows. It doesn't work on Mars, so to use it as an explanation on an asteroid is a sign of desperation. The simple answer is that it is electric arc erosion. The left hand closeup image shows the usual sharp, rounded edges and flat floor of spark machining craters. Electric discharge phenomena are scaleable over a huge range so that it is acceptable to compare erosion on a surface under a microscope with landforms on Mars that stretch over hundred's of kilometres. It seems entirely appropriate on Valentine's day that Eros should be showing us his etchings!



Scientists Fail to Unravel the Kinks in Solar Waves

Posted on [April 4, 2001](#) by [Wal Thornhill](#)

NASA/JPL NEWS RELEASE

Posted: March 29, 2001

Kinks in the Sun's magnetic field have puzzled scientists since they first started studying the solar wind, and now researchers at NASA's Jet Propulsion Laboratory, Pasadena, Calif., have found the reason: they are caused by the evolution of a type of magnetic wave called Alfvén waves.



Artist's concept of Ulysses. Photo: ESA

Scientists measured sudden changes in the Sun's magnetic field with the magnetometer instrument on the Ulysses spacecraft, which is orbiting the Sun's poles at a distance between Jupiter and Mars. Ulysses has been studying the Sun since 1990 and has just finished studying the south pole of the Sun at solar maximum, a time of great activity.

"Over the poles of the Sun, we saw abrupt decreases in the magnetic field," said JPL's Dr. Bruce Tsurutani, a co-investigator on the magnetometer instrument on Ulysses. "We did not know what they were, because we had never seen anything like it before. Now we know that the disturbance is caused by Alfvén waves."

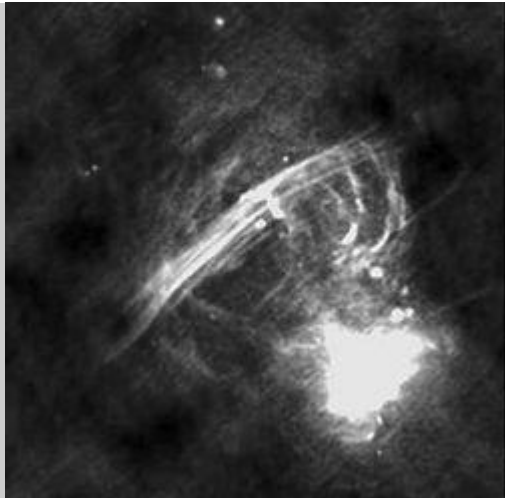
Scientists expected to find that either the field magnitude remained the same, though the angle changed, or that the magnitude changed, with no fields threading across the structure, said Tsurutani. Instead, they found that the ends of Alfvén waves always have both rotational and tangential characteristics.

Like the movements of a plucked guitar string, Alfvén waves travel down the magnetic fields that emanate from the Sun. Disturbances in the Sun's magnetic field, which is embedded in the solar wind, travel through space to eventually cause auroras on Earth. The high-energy particles from the solar wind become trapped in the Earth's magnetic field and come down into the atmosphere near the Earth's north and south magnetic poles. The highly-charged particles then collide with oxygen and nitrogen in Earth's atmosphere and emit light, forming the aurora.

Tsurutani also studied polar plumes, long trails from the base of the Sun. The plumes form in the Sun's polar regions, the upper and lower 30-degree latitude regions, and where these plumes occur, the magnetic field isn't kinked, but instead forms long, thin, straight tubes. This means that the Alfvén waves don't operate in these regions, though scientists don't yet know why.

"Ulysses was able to find that the Sun's polar plumes stretch out past the orbit of Mars and maybe farther," said Tsurutani. "What's fascinating is how these plumes can be so thin and so long at the same time." A plume could be 100 times wider than it is long (sic). The European Space Agency's Solar and Heliospheric Observatory (SOHO) noted these polar plumes in 1996.

Comment:



Example of the "long thin straight tubes" and "kinked" surrounding filaments that define the Birkeland currents flowing into the center of our galaxy.

What is fascinating is that astrophysicists cannot "see" what they are looking at because of the dogma that electric currents cannot flow in space and the Sun cannot be electrically charged. The thin, straight tubes are diagnostic of Birkeland currents. Birkeland currents also have an outer twisted filament or rope-like form taken by electric current flowing in plasma. The Alfvén waves are therefore more likely to be the structure of the magnetic field associated with Birkeland currents. Otherwise there is some unspecified activity required beneath the Sun's surface to excite the Alfvén waves, or "pluck the guitar string" as it is colorfully described. Unfortunately this "explanation" follows a well-established tradition of ascribing every weird feature of the Sun to poorly defined

activity hidden from view inside the Sun. It is what is known as "pathological science" – a term coined by a pioneer of plasma physics and Nobel Laureate, Irving Langmuir.

The report goes on...

Alfvén waves are named for Hannes Alfvén, a Swede who in 1942 discovered the waves, for which he was later awarded the Nobel Prize.

Comment:

Alfvén must be spinning in his grave to see the continued misuse of his work by astrophysicists. In 1970 he used the occasion of his Nobel Prize acceptance speech in unprecedented fashion to admonish them for treating plasma in a way he had subsequently shown to be mistaken.

He said:

"The cosmical plasma physics ...is to some extent the playground of theoreticians who have never seen a plasma in a laboratory. Many of them still believe in formulas we know from laboratory experiments to be wrong. The astrophysical ...crisis has not yet come."

We are still waiting...

Tsurutani discussed his findings this week at the European Geophysical Society's 26th annual meeting, joined by his colleagues on the study, Dr. Carlos Galvan, Dr. John Arballo, Dr. Regina Sakurai and Dr. Daniel Winterhalter, from the Space Plasma Physics Element at JPL, Dr. Bimla Buti University of New Delhi and Dr. Gurbax Lakhina, director of the Mumbai Geomagnetic Observatory, Bombay, India.

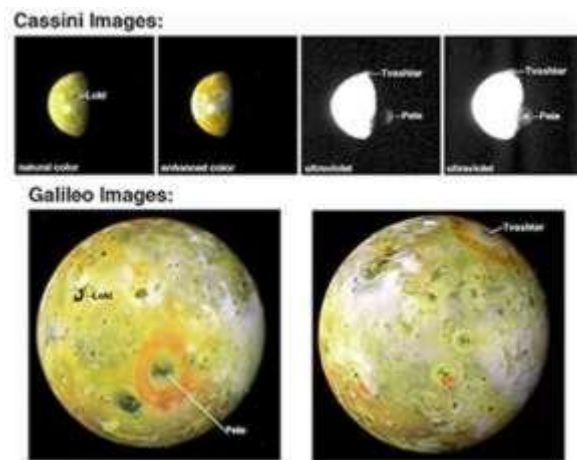
Ulysses, launched in 1990, is a joint venture of NASA and the European Space Agency. JPL manages Ulysses for NASA's Office of Space Science, Washington, D.C. JPL is managed by the California Institute of Technology in Pasadena for NASA.

Two Spacecraft Watch an Arc Welder on Io

Posted on [April 5, 2001](#) by [Wal Thornhill](#)

MEDIA RELATIONS

*OFFICE JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
March 29, 2001*



Original Caption Released with Image: Two tall volcanic plumes and the rings of red material they have deposited onto surrounding surface areas appear in images taken of Jupiter's moon Io by NASA's Galileo and Cassini spacecraft in late December 2000 and early January 2001.

A plume near Io's equator comes from the volcano Pele. It has been active for at least four years, and has been far larger than any other plume seen on Io, until now. The other, nearer to Io's north pole, is a Pele-sized plume that had never been seen before, a fresh eruption from the Tvashtar Catena volcanic area.

The observations were made during joint studies of the Jupiter system while Cassini was passing Jupiter on its way to Saturn. The two craft offered complementary advantages for observing Io, the most volcanically active body in the solar system. Galileo passed closer to Io for higher-resolution images, and Cassini acquired images at ultraviolet wavelengths, better for detecting active volcanic plumes.

The Cassini ultraviolet images, upper right, reveal two gigantic, actively erupting plumes of gas and dust. Near the equator, just the top of Pele's plume is visible

where it projects into sunlight. None of it would be illuminated if it were less than 240 kilometers (150 miles) high. These images indicate a total height for Pele of 390 kilometers (242 miles). The Cassini image at far right shows a bright spot over Pele's vent. Although the Pele hot spot has a high temperature, silicate lava cannot be hot enough to explain a bright spot in the ultraviolet, so the origin of this bright spot is a mystery, but it may indicate that Pele was unusually active.

Comment:

In the Holoscience news report of 22 December 1999, [NASA's Xmas Coloring Book](#), an alternative explanation was offered:

"The Galileo camera was looking at a number of arc-lights in the form of cathode spots."

It is definitely unusual activity for a volcano to produce UV light. However an electric arc is a copious source of UV light. This is further confirmation of the electrical sculpting of Io's surface. What we are witnessing are not volcanos but planetary surface sculpting by cosmic electric arcs. It is a process that has left characteristic circular craters and fretted terrain on all solid bodies in the solar system. It calls into question everything we think we know about the history of the solar system.

The NASA report continues...

Also visible is a plume near Io's north pole. Although 15 active plumes over Io's equatorial regions have been detected in hundreds of images from NASA's Voyager and Galileo spacecraft, this is the first image ever acquired of an active plume over a polar region of Io. The plume projects about 150 kilometers (about 90 miles) over the limb, the edge of the globe. If it were erupting from a point on the limb, it would be only slightly larger than a typical Ionian plume, but the image does not reveal whether the source is actually at the limb or beyond it, out of view.

A distinctive feature in Galileo images since 1997 has been a giant red ring of Pele plume deposits about 1,400 kilometers (870 miles) in diameter. The Pele ring is seen again in one of the new Galileo images, lower left. When the new Galileo images were returned this month, scientists were astonished to see a second giant red ring on Io, centered around Tvashtar Catena at 63 degrees north latitude. (To see a comparison from before the ring was deposited, see PIA-01604 or PIA-02309.) Tvashtar was the site of an active curtain of high-temperature silicate lava imaged by Galileo in November 1999 and February 2000 (image PIA-02584). The new ring shows that Tvashtar must be the vent for the north polar plume imaged by Cassini from the other side of Io! This means the plume is actually about 385 kilometers (239 miles) high, just like Pele. The uncertainty in estimating the height is about 30 kilometers (19 miles), so the plume could be anywhere from 355 to 415 kilometers (221 to 259 miles) high.

Comment:

The ring of deposits does not make any sense whatever for a volcanic outburst. However, the shape and size of the plumes and the trajectory of the particles to form a ring have been explained by plasma physicists in terms of an electrical discharge. The result is rather like that of a giant natural mass spectrograph.

The NASA report continues...

If this new plume deposit is just one millimeter (four one-hundredths of an inch) thick, then the eruption produced more ash than the 1980 eruption of Mount St. Helens in Washington.

NASA recently approved a third extension of the Galileo mission, including a pass over Io's north pole in August 2001. The spacecraft's trajectory will pass directly over Tvashtar at an altitude of 200 kilometers (124 miles). Will Galileo fly through an active plume? That depends on whether this eruption is long-lived, like Pele, or brief, and it also depends on how high the plume is next August. Two Pele-sized plumes are inferred to have erupted in 1979 during the four months between Voyager 1 and Voyager 2 flybys, as indicated by new Pele-sized rings in Voyager 2 images. Those eruptions, both from high-latitude locations, were shorter-lived than Pele, but their actual durations are unknown. Before its August flyby, Galileo will get another more-distant look at Tvashtar in May.

It has been said that Io is the heartbeat of the jovian magnetosphere. The two giant plumes evidenced in these images may have had significant effects on the types, density and distribution of neutral and charged particles in the Jupiter system during the joint observations of the system by Galileo and Cassini from November 2000 to March 2001.

These Cassini images were acquired on Jan. 2, 2001, except for the frame at the far right, which was acquired a day earlier. The Galileo images were acquired on Dec. 30 and 31, 2000. Cassini was about 10 million kilometers (6 million miles) from Io, ten times farther than Galileo.

More information about the Cassini and Galileo joint observations of the Jupiter system is available online at <http://www.jpl.nasa.gov/jupiterflyby>

Cassini is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Galileo and Cassini missions for NASA's Office of Space Science, Washington, D.C.

Solar Neutrino Puzzle is Solved?

Posted on [August 13, 2001](#) by [Wal Thornhill](#)

The Electric Universe model has made some capital from the fact that the key evidence for a nuclear engine in the Sun, the neutrino count, failed to live up to expectations. In Physics World, July 2001, [see <http://physicsweb.org/article/world/14/7/10>] an article appeared that asserted that the solar neutrino puzzle is now solved and that it "confirms that our understanding of the Sun is correct." Is this a serious blow to the Electric Universe model? The short answer is no! The longer answer requires a bit of background.

Why does the Standard Solar model have a neutrino puzzle?

The Sun is mostly hydrogen gas. According to the Standard Solar model, if the Sun were not generating heat, gravity would compress all of the gas into a much smaller space. Since the sun is bigger than a hydrogen sphere held together by gravity, we know (along with the fact that it shines VERY brightly) that there must be a source of energy inside. And only nuclear energy can produce enough energy to last for billions of years. According to the Standard Solar model, originally proposed by Eddington* in the 1920's, just knowing the solar radius and mass and that the sun is supported in hydrostatic equilibrium we can calculate the temperature in the center needed to support the rest of the sun. The temperature works out to be of the order of 10 to 20 million degrees Kelvin.

What is the nuclear process that is supposed to maintain this unimaginable temperature?

At tens of millions of degrees hydrogen is fully ionized into electrons and protons and the resulting energetic protons are free to collide. It is proposed that such collisions form the first step in a chain of nuclear reactions known as the proton-proton (p-p) chain. In the p-p reaction, two protons are fused together to form a deuteron, a positron and a neutrino. A deuteron consists of a proton and neutron. A positron is a positively charged electron. For this reaction to happen the two colliding protons must approach each other within 0.1 trillionth of a centimetre and simultaneously one of the protons must decay to a neutron and positron. Although it is extremely improbable for this reaction to happen (one reaction per particle in 14 thousand million years!), there is such a vast supply of protons available that it is argued many such reactions occur. The second stage in the p-p chain is the fusion of a deuteron with another proton to form a nucleus of an isotope of helium, ^3He , consisting of two protons and one neutron, and a gamma ray photon. In the last stage this isotope must fuse with another ^3He isotope to form a helium nucleus, ^4He , and two protons. The first two steps must occur twice before the last can take place.

Producing nuclear fusion by squeezing and heating matter is the most inefficient method conceivable, as witness the half-century long attempts to produce fusion power. It is highly improbable even under the calculated extreme conditions at the center of the Sun. The unlikely process above omits to mention that quantum tunnelling is also needed to make it work. And if nuclear fusion is happening as

theorized, it can only produce the first few light elements in the periodic table. Where do the heavy elements, seen in the Sun's spectrum, come from? Don't say "from supernovae" because there are far too few of them. What's more, they are in the business of dispersing matter into the vastness of interstellar space. Wouldn't it be better to have a theory that solved this fundamental problem in situ for all stars? Nature does not do anything the hard way so why would she not use the same technique that particle physicists use to create heavy elements on Earth – particle accelerators? But particle accelerators require electrical power and astrophysics is the only science that does not use it! Astronomy remains, with Eddington, in the gas-light era.

The Neutrino Problem

From the usual understanding of the p-p reaction, about 1.8×10^{38} neutrinos are produced by the Sun per second. That means at Earth's distance, some 400 trillion neutrinos go through our bodies every second! This is a phenomenal number, and yet there is not the slightest interaction with any of them. However, detection of these neutrinos would give us a method to "view" inside the solar core because they pass through the substance of the Sun with ease. On the other hand, radiant energy from the Sun's core may take millions of years to percolate to the surface. The problem is to detect the neutrinos, since those from the p-p reaction have an energy which is far too low for detection. However, higher energy neutrinos are known to come from a side reaction involving 3 He and 4 He particles to form a beryllium nucleus (${}^7\text{Be}$) which then captures a proton to form a boron nucleus (${}^8\text{B}$); this nucleus then breaks up into Beryllium (${}^8\text{Be}$) plus a positron and neutrino. Only 2 of these reactions are produced out of 10,000 completions of the p-p reaction, so these neutrinos are rarer. To detect these higher energy electron neutrinos, a large vessel (400 cubic metres) filled with dry-cleaning solvent (perchloroethylene) was placed 1.5 km underground in a gold mine in South Dakota — away from all other cosmic radiation. Left for 3 months a few of the chlorine atoms (${}^{37}\text{Cl}$) are expected to react with the neutrinos to form ${}^{37}\text{Ar}$ and an electron, which then reverts to ${}^{37}\text{Cl}$ plus a neutrino. The ${}^{37}\text{Ar}$ atoms are purged with helium gas and the decay is counted. According to the standard model, the detector should measure about 8×10^{-36} interactions per second per atom or 8 SNU (pronounced 'snoo') with an error rate of 33%. The neutrino detector has averaged only 2.2 SNU with a deviation of 0.3 SNU. The detection has been only about one third of the calculated number and the discrepancy is well outside both the uncertainty of the calculations and experimental deviations. The problem was so intractable for the Standard Solar model that the particle physicists were called upon to determine if there was something we did not know about the neutrino. They proposed that if neutrinos had mass (so far undetected) then they might oscillate between the three known forms, the electron, muon and tau neutrino. The low count of electron neutrinos might then be accounted for if they had changed "flavour" on their journey from the Sun's core to the Earth.

Solar neutrino puzzle is solved

The Physics World article opened confidently with the above heading and the assertion:

"New evidence that solar neutrinos can change 'flavour' confirms that our understanding of the Sun is correct and that neutrinos have mass."

It continued:

"The first results from the Sudbury Neutrino Observatory [SNO] in Canada have finally solved a problem that has puzzled astrophysicists for 30 years: why do experiments detect less than half the number of solar neutrinos predicted by models of the Sun? The results confirm that electron neutrinos produced by nuclear reactions inside the Sun 'oscillate' or change flavour on their journey to Earth. Neutrino oscillations are only possible if the three flavours of neutrino [electron, muon and tau] have mass. The SNO result therefore has important implications for cosmology and particle physics.



The Sudbury Neutrino (SNO) experiment

Although the SuperKamiokande experiment in Japan has seen strong evidence for the disappearance of "atmospheric neutrinos" [neutrinos that are produced when cosmic rays interact with nuclei in the Earth's atmosphere (Physics World July 1998 pp17-18)] the SNO results are significant because, when combined with solar-neutrino data from SuperKamiokande, they show for the first time that the disappearance of one neutrino flavour is accompanied by the appearance of another. This is the key signature of neutrino oscillations. The new results are also in excellent agreement with the predictions of standard solar models.

The SNO collaboration includes physicists from 15 centres in Canada, the US and the UK, and the results were presented on 18 June at the annual conference of the Canadian Association of Physicists in Victoria, and at seminars at Oxford University in the UK and the University of Pennsylvania in the US. They have also been submitted to the journal Physical Review Letters. "It is incredibly exciting to see such intriguing results coming out of our first data analysis," says the collaboration's UK spokesman, David Wark of the Rutherford Appleton Laboratory and Sussex University, "and there is so much more to come."

Neutrinos are elementary particles of matter with no electric charge and very little mass. They only interact weakly with matter, which makes them very difficult

to detect. Indeed, the SNO experiment detects a mere 10 or so solar neutrinos per day. Electron neutrinos are produced in the Sun's core when boron-8 nuclei undergo beta decay: the Sun is not thought to produce muon or tau neutrinos. Previous experiments have detected less than half of the predicted solar-neutrino flux, but these experiments were only sensitive to electron neutrinos. The combined SNO and SuperKamiokande results make it clear that this shortfall arises because electron neutrinos have changed into muon or tau neutrinos.

'This result agrees perfectly with theoretical predictions and indicates that we really do understand the nuclear processes that are the source of the Sun's energy', says Lincoln Wolfenstein, a particle theorist at Carnegie Mellon University in the US. According to the SNO detector, the flux of electron neutrinos from the Sun is 1.75 million neutrinos per square centimetre per second. The SuperKamiokande experiment puts the total flux at 2.32 million in the same units (S Fukuda et al. 2001 Phys. Rev. Lett. 86 5651, 5656). By comparing these figures, physicists from SNO and SuperKamiokande calculated that the true solar-neutrino flux is 5.44 million neutrinos per square centimetre per second, which is in excellent agreement with the 'standard solar model' of energy production in the Sun."

The headline underscores a cultural problem in reporting science that leads to bald statements of "fact" when a conclusion is in fact conjectural. The detection of neutrino oscillations cannot confirm the Standard Solar model. It merely offers a possible solution to one of a number of serious observational problems with the Standard Solar model. There can be no confirmation of oscillation of neutrino flavours between the Sun and the Earth without simultaneous neutrino measurements being made near the Sun. And that poses formidable experimental problems. On the other hand, the Electric Universe proposes an electrical model for stars, based on the pioneering work of Ralph Juergens. It argues that Eddington's model, which treated the Sun as a ball of neutral gas, is wrong. The large difference in the weight of the proton, 1836 times heavier than the electron, ensures that in the Sun's strong gravity hydrogen atoms will form weak electric dipoles with their positive poles aimed at the Sun's center. (At temperatures near that of the Sun's surface, hydrogen is only weakly ionized). And since the electric force outguns gravity to the tune of 39 powers of 10, its omission from the Standard Solar model renders that simple gas model unrealistic. The effect of the radially aligned atomic dipoles is to propel free electrons in the plasma toward the Sun's surface, leaving behind an excess of positive charge. As we know, like charges repel, so the interior of the Sun will simply resist compression due to gravity. In other words, the electric force will tend to compensate for gravitational compression and make the Sun more homogeneous, with presumably a small core. In fact, the Sun is about the size expected if its hydrogen were not compressed by gravity! So it is not necessary for an internal nuclear furnace to bloat the Sun to the size we see.

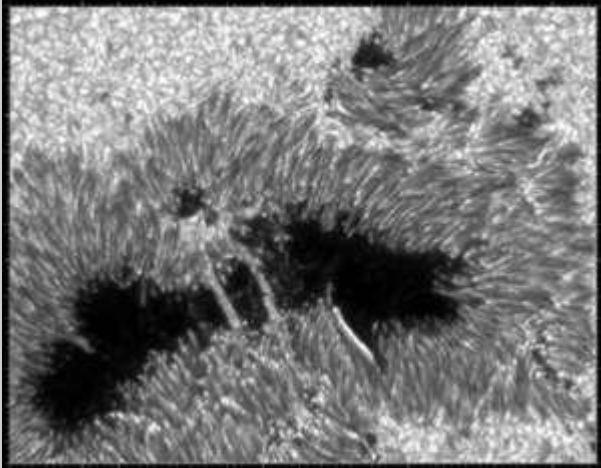
It is important to stress that the only other method of divining what is inside the Sun, that of measuring small solar surface oscillations, or helioseismology, supports a homogeneous model of the Sun. In 1976 the discoverers of a dominant 160 minute radial

pulsation of the Sun were well aware of that serious implication of their discovery. The Sun can have no nuclear engine! Everything possible has been done since to explain the observation away, without success. It remains one of those damned facts that will be explained... someday soon. Meanwhile, most of the complex oscillation overtones have been fitted to Standard Solar models. But that is not surprising given the many degrees of freedom to tweak those mathematical models. The Electric Sun hypothesis has the virtue that it does not require any hidden activity inside the Sun to explain the features of the Sun. It is amenable to physical testing in the laboratory because we are not dealing with supposed unearthly conditions at the center of a star and because plasma phenomena are scalable over 14 orders of magnitude (at last count).

What if the neutrino discovery is correct?

It says nothing about the correctness of the Standard Solar model. However, it does have "important implications for cosmology and particle physics". If neutrinos do have mass it will tend to confirm the Electric Universe model. In it, neutrinos are not fundamental particles but are comprised of the same charged sub-particles that make up all matter. They are the most collapsed form of matter known. When a positron and an electron "annihilate", the orbital energy in both is radiated as a gamma ray and the sub-particles that comprised them both assume a new stable orbital configuration of very low energy, or mass. Matter cannot be created from a vacuum nor annihilated in this model. The differences between the neutrino "flavours" is merely one of different quantum states and therefore different masses.

The electric Sun model expects far more complex heavy element synthesis to take place in the natural particle accelerators in the photospheric lightning discharges. In that case the various neutrino "flavours" are all generated on the Sun and do not need to "oscillate" on their way to the Earth to make up an imagined deficit. What is more, fluctuations in neutrino counts are expected in this model to be correlated with electrical input to the Sun, that is, with sunspot numbers and solar wind activity. This has been observed. The standard solar model does not expect any correlation since there is a lag estimated in the millions of years between the nuclear reaction in the core and its final expression at the surface of the Sun.



Electric discharges in plasma take the form of twisted filaments, seen here in a closeup of sunspots. Each filament is a powerful natural particle accelerator.

There is an experiment suggested by the SNO results that could confirm the Electric Sun's photospheric origin of neutrinos. It would require continuous measurement of neutrinos of all flavours as a very large sunspot group rotated with the Sun. In this model, sunspot umbrae are not a source of neutrinos so there should be modulation effects associated with the Sun's rotation that might be measurable with present equipment. Such an experiment, if sensitive enough, offers the possibility of detecting neutrino oscillations in the Sun as they traverse varying proportions of the body of the Sun. A positive result would falsify the standard nuclear model of the Sun.

The PhysicsWeb article continues:

"Proponents of 'dark matter' will be pleased to hear that neutrinos have mass. Astrophysicists have struggled for years to understand why galaxies rotate as if they contain more matter than we can see, and many believe this can only be explained by 'dark matter' that cannot be seen. 'Our calculations show that neutrinos account for between 0.1% and 18% of the mass in the universe,' says Wark. 'Neutrinos may not account for all the dark matter, but they could certainly represent some of it now that we know they have mass.' The new results limit the possible range of masses for neutrinos to between 0.05 and 0.18 eV."

Comment:

A sea of neutrinos won't account for galactic rotation curves — the neutrinos cannot be distributed evenly, but must be collected in a halo. Dark matter is not required to explain galactic form and rotation in a plasma universe. The galactic forms and evolution have been experimentally confirmed in plasma laboratories and in super-computer plasma simulations. No strange invisible matter is needed. However, a vast sea of unreactive neutrinos could be the long debated "ether" that permeates space. Space is not a void. We then have an electrically responsive medium for the transmission of light in which the characteristic velocity of an electrical disturbance in that medium is the so-called speed of light, c .

The PhysicsWeb article concludes:

Removing uncertainties. The new-found mass of neutrinos must also be incorporated into the Standard Model of particle physics. According to Wark, the neutrino could be the first ever example of a Majorana particle, a type of particle that is its own antiparticle. "If you could place a bet at the bookmakers on the next change to the Standard Model, the Majorana theory would be the front-runner," he says.

Author: Katie Pennicott is Editor of PhysicsWeb

Comment:

In the Electric Universe model, there is no antimatter forming antiparticles. An electron and a positron are composed of the same charged sub-particles in different conformations. They come together to form a stable neutrino, emitting most of their orbital energies in the process. They do not annihilate each other. In that sense a neutrino embodies both the electron and the positron. It can have no antiparticle. The bookmakers would be wise not to bet on the Standard Model of particle physics.

To sum up, the electrical model of the Sun requires that neutrinos of all "flavours" are produced by heavy element nucleosynthesis in the photosphere of the Sun. It is far simpler than the nuclear fusion model whose major assumptions cannot be confirmed, either by visual inspection or certain "rogue" data. All of the obvious electrical discharge phenomena seen on and above the photosphere have analogs that can be seen on Earth and/or reproduced in electrical engineering laboratories. It is simpler to assume that the energy we receive from the Sun is coming from where we see it – at the surface, or photosphere, rather than a minuscule and unlikely hydrogen bomb 93 million miles distant, shrouded in opaque gas. Then the fact that sunspots are dark makes perfect sense – it is cooler everywhere beneath the photosphere. Mysteriously generated magnetic fields are not required to explain every strange solar phenomenon and to defy the laws of physics in the process by breaking and 'reconnecting' hypothetical field lines. The surprisingly even magnetic field of the Sun, from the equator to the poles, is to be expected if the Sun is the focus of a cosmic electric discharge, as Juergens suggested 30 years ago. Magnetism cannot exist on the Sun without electric currents. Finally, the very experiments designed to confirm the Standard Solar model may instead confirm the Electric Sun model if neutrino variability can be clearly tied to sunspot activity.

A number of authors have suggested that we have almost reached the end of new science. That is true while we are confronted, in this scientific age, with a medieval response to a new paradigm. It is as if we were whisked back to the time of Copernicus and Kepler. Before that there was religious adherence to a complex Earth-centered Ptolemaic model of the heavens. It offered as its greatest virtue mathematical beauty in the addition of endless epicycles to make the model fit the observations of the heavens. The mathematicians were in their heaven and resisted the simpler but less beautiful (non-circular) Sun centered model. It required a revolution in thinking. Centuries later, the

mathematicians are doing it again while they dominate astrophysics. It is very unwelcome for them to be confronted with a far simpler electrical engineer's model of the Sun that does not require endless mathematical intervention to save it. Perhaps it remains for those without such a cloistered view to see that just as our civilization and science depends upon remotely generated electric power, the idea of a remotely powered electrical Sun has a certain uncommon-sense symmetry to it – particularly when plasma physicists have already identified the cosmic "transmission lines".

See also Prof. Don Scott's analysis of the report at:

<http://www.electric-cosmos.org/sudbury.htm>

* Eddington, A.S., *The Internal Constitution of the Stars*. See particularly pages 272-3.

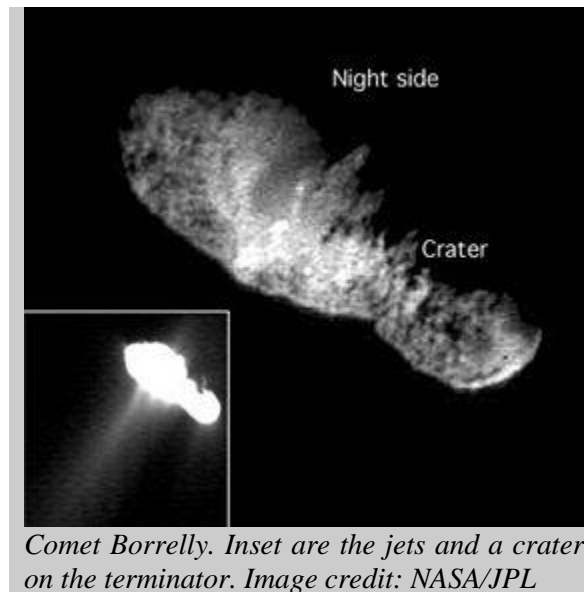
Comet Borrelly Rocks Core Scientific Beliefs

Posted on [October 18, 2001](#) by [Wal Thornhill](#)

[The *blockquoted text in italics* is from an original news story. The **bolded text** is a statement of the "core beliefs" held by astronomers. The regular text is my commentary with *short quotations in italics*.]

The above headline accompanied the news item in the Sydney Morning Herald of 9/27. Comet Borrelly has been visited by the aging Deep Space 1 (DS1) spacecraft and the clearest pictures to date of a comet nucleus returned. It was a tremendous engineering feat to nurse the spacecraft to this rendezvous. However, despite the headline it seems certain that the core scientific beliefs of NASA scientists will not be disturbed. The reason is that core beliefs are often so ingrained that they are unrecognized.

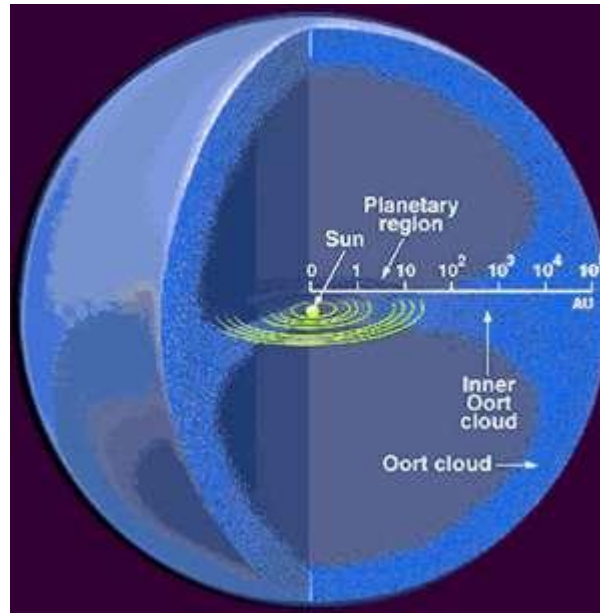
"Comets are perhaps at once the most spectacular and the least well understood members of the solar system." Marcia Neugebauer, JPL



Comet Borrelly. Inset are the jets and a crater on the terminator. Image credit: NASA/JPL

Astronomers are already saying that the pictures of the 10-kilometre- (6-mile-) wide core of Comet Borrelly will revolutionise our understanding of these frozen wanderers. DS1 passed within 2,000 kilometres (1,200 miles) of the comet's rocky, icy heart late on Saturday September 22 GMT.

Here is the first core belief to remain unquestioned – a comet has been held over in deep freeze beyond the solar system since the time the planets were formed. Then, after billions of years, somehow it has been deflected into the inner solar system.



Comets are believed to enter the inner solar system when disturbed from an invisible cloud of icy objects located about 1000 times the distance of Pluto, a good fraction of the way to the nearest star. The disturbance is thought to be due to a passing star or the movement of the Sun above and below the galactic plane. But many astronomers have pointed to the lack of evidence for sporadic comet showers that such disturbances should unleash and concluded that such events could only account for about one-fifth of the comets we see. The astronomer, Tom Van Flandern, has devised a scale model that demonstrates the silliness of this theory. If the Earth's orbit were represented by the period at the end of this sentence and Pluto's orbit by a circle of one centimetre diameter, then the nearest star is 41 metres away. The Oort cloud of comets would orbit near a sphere 6 metres in diameter containing one comet per cubic millimetre. The comets would move at about 3 millimetres per 1000 years. They are effectively motionless. Passing stars on rare occasions 'whiz' past at a metre per 1000 years and stir up the nearby comets. Less than 1 in 10,000 disturbed comets will be knocked onto a path that will target the 1 millimetre or so sphere surrounding the Sun where a comet might be seen from the Earth. Having visualized this, Van Flandern makes the point that the true size of a sphere encompassing Pluto's orbit is so vast that all of the 200 billion stars in our galaxy would fit with room to spare in that volume. He writes:

"But the volume enclosed by the comet cloud is a billion times greater yet. It truly is unimaginably large, surviving as a plausible idea in large part because our intuitions fail so miserably to comprehend the vastness of this volume."

One serious observational difficulty with the model is the total lack of comets on hyperbolic orbits. And like other examples in astronomy it is a theory based on invisible matter.

"The Oort-shell, ...has become widely regarded as a firmly established triumph of 'modern cometary theory' when in fact, it is a piece of trash heralded as one of the corner-stones of cometary 'science'."

[Journey to the Centre of Uncertainty, Prof. R A Lyttleton, Speculations in Science & Technology, Vol. 8, No. 5 p. 343.]

DS1 sent back black-and-white photos, as well as data on gases and infrared waves around the comet, and how the gases interact with the solar wind (the process that drives a comet's characteristic tail).

Here is the second core belief that will not be questioned – the solar wind is merely a wind that blows the gases from a comet away from the Sun to form a tail. The tail should disperse like smoke in a strong wind. This highlights the third and fundamental core belief that all objects in the universe are electrically neutral.

In May, 1996, the Ulysses spacecraft, which is studying the Sun, surprised scientists when it encountered the ion tail of Comet Hyakutake. The comet was then 360 million miles from the spacecraft! That is four times the distance of the Earth from the Sun. To remain intact over that distance the tail of a comet must carry electrical current to prevent its dispersal. That is because an electric current in space takes the form of a twisted filament known as a "Birkeland current", rather like an invisible braided copper wire. When the current is strong enough such filaments are visible. They can be seen when comets are close to the Sun and they are ubiquitous in images from deep space. They may stretch, in the former case, over interplanetary distances and in deep space over intergalactic distances. The notion that all objects in the universe are at the same electrical potential – zero, has kept astrophysics firmly in the seventeenth century, with Isaac Newton. The solar wind does not "drive" a comet's tail mechanically. Observations show that a comet is highly negatively charged with respect to the Sun. It behaves like a classical "cold cathode" in a vacuum.

Comets exhibit odd orbital behaviour due to what is euphemistically known as a "non-gravitational" force. The obvious suggestion was made that cometary jets act upon the nucleus to modify its orbit. However, it is natural for a charged body to experience an electrical acceleration in the Sun's weak radial electric field. It is also natural for spacecraft, which become electrically charged and do not have jets to experience a "non-gravitational" acceleration. That is precisely what has been observed. Cometary jets are not required to cause the anomalous acceleration of comets.

"Deep Space 1 plunged into the heart of Comet Borrelly and has lived to tell every detail of its spine-tingling adventure," said project manager Dr Marc Rayman. "The images are even better than the impressive images of Comet Halley taken by Europe's Giotto spacecraft in 1986." "Up to Saturday night, we had only one example of a comet's nucleus. Now, we have another one, and with it a much better understanding of comets," said Dr Don Yeomans, of the American space agency's (NASA) Jet Propulsion Laboratory, at a press conference to unveil the

images. "It's mind-boggling and stupendous," said Dr Laurence Soderblom, the leader of DSI's imaging team. "These pictures have told us that comet nuclei are far more complex than we ever imagined. They have rugged terrain, smooth rolling plains, deep fractures and very, very dark material."

A fourth core belief is that comets are merely inert, dirty snowballs evaporating in the heat of the Sun.



Fred Whipple. Photo Smithsonian Astrophysical Observatory, courtesy Dr. Whipple

The dirty snowball model of comets was proposed by Fred Whipple in 1950 and has since become dogma. His words are inscribed on a microchip riding on the Stardust spacecraft, on its way to a rendezvous with Comet Wild-2 in 2004: "Today we know that comets are black and cold, consisting of ices and dust that coalesced from an interstellar cloud as it collapsed to form the solar system." Actually, as argued above, we know no such thing. The ices were required to explain why comets formed huge comas and tails as they neared the Sun. But it was obvious that something was wrong with such a simple heating model when in 1991 Comet Halley flared up between the orbits of Saturn and Uranus – fourteen times further from the Sun than the Earth. The images showed that the 15 kilometre nucleus had ejected a cloud of dust that stretched more than 300,000 kilometres. Cometary scientists were baffled by the outburst

because the usual explanation of solar heating of ices cannot work at that distance. The comet is effectively in deep freeze. However, the electrical explanation fits the observation that the Sun was very active at the time. The negatively charged comet acts as a focus for the bursts of protons in the solar wind. The result is electrical erosion of its surface and the formation of a coma.

Ices are not required to drive the comet jets. Ices cannot explain the narrow jets nor the corkscrew shape they sometimes take. Comet Hale-Bopp emitted more dust than could be explained by subliming ices. Further evidence that a comet is a cathode and emits electrons came from the puzzling discovery of negatively charged atoms in the inner coma of comet Halley. The problem for the inert comet model is that these ions are easily destroyed by solar radiation and therefore require an efficient production mechanism that is not available from solar heating. In the electrical model there is a high density of emitted electrons and neutral atoms available near the nucleus to form negative ions. Negative ions may form the sunward "spike" seen occasionally from comets.

The low density calculated for some comets seems, at first glance, to support the dirty snowball model of comets. However, there is no difference between the appearance of a comet nucleus and an asteroid. One schizoid object, Chiron, has been called both an asteroid and a comet at different times. Yet asteroids are thought to be much more evolved bodies than comets. The Electric Universe proposes that their origin is identical and that a cometary display is due entirely to highly eccentric motion of a charged body

in the radial electric field of the Sun. And if gravity is a dipolar electrical effect in matter then G is not a constant and it is possible that the mass of a highly negatively charged body will measure less than that of the same body when uncharged. As a result the calculated density will be low and it will not reflect the true composition of the comet (or asteroid, moon, planet, etc).

Comet Borrelly's surface darkening may result from the effects of the electrical discharge on surface material – just as we see on [Jupiter's moon, Io](#), at the base of its electrical jets. On the other hand, the bright areas seem to be where the active jets originate. That brightness may not simply be reflected light but instead a gleam from "St. Elmo's fire" type surface discharging. The puzzling star-like appearance of some comet nuclei can be explained by surface arcing.

The Comet Borrelly images have thrown up several surprises. As DSI flew through the coma, the cloud of dust and gas surrounding the nucleus, scientists had expected that the solar wind would flow symmetrically around the cloud, with the nucleus in the centre. But they found that although the solar wind was indeed flowing symmetrically around the cloud, the nucleus was off to one side, shooting out a great jet of material. "The shock wave is in the wrong place," said Dr Rayman. "We have to understand that." Dr David Young, of the University of Michigan, added: "The formation of the coma is not the simple process we once thought it was. Most of the charged particles are formed to one side, which is not what we expected at all." One commentator said that it was like finding the shock-wave from a supersonic jet in the wrong place – a mile to the side of the aircraft!

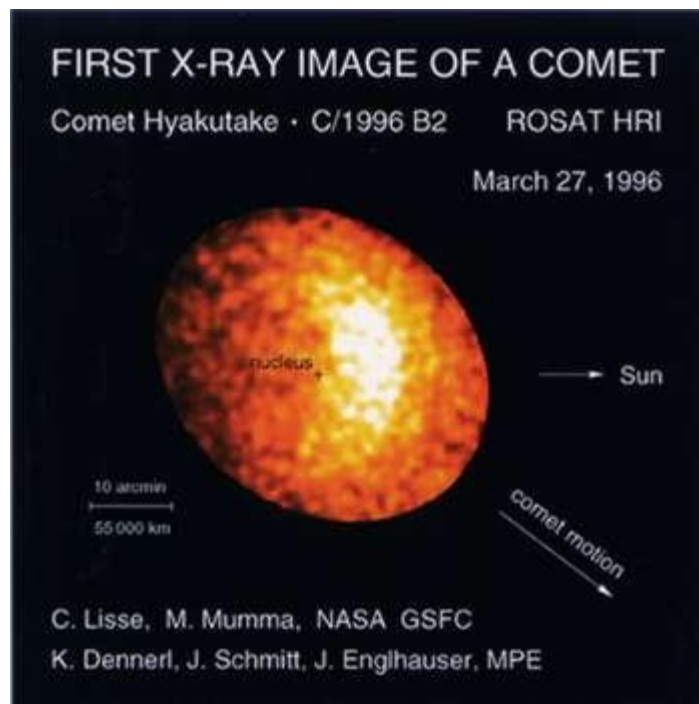
A fifth belief is that a comet is simply a supersonic object moving through the solar wind. And a sixth belief is that ices on the surface of a comet nucleus sublime in the Sun's warmth to form a huge enveloping cloud of gas.



Scientists were surprised when Giotto images of Comet Halley showed that the dust and gas was being emitted from just a few small craters on the sunlit nucleus. Comet Borrelly showed the same behaviour. It has been said that the human facility for self delusion is the most highly developed of all. One of the finest examples is when scientists explain the pencil thin jets from a comet as the sublimation of ices from the bottoms of craters. The presence of neatly circular craters on a comet nucleus is oddity enough, if gas is merely blowing off bits of a dirty crust. The craters would need to be more like gun barrels than pits to form thin jets. There is also the problem of concentrating the heat of the Sun at the bottoms of holes that are not pointing at the Sun. To make it more difficult, the dark, heat absorbing regions are not where the jets are issuing from. As for the off-center coma, in 1985 the International Cometary Explorer (ICE) spacecraft found that cometary effects were asymmetric around comet Giacobini-Zinner.

So it seems symptomatic of rigid scientific beliefs that NASA scientists were caught again by surprise in 2001!

The answer to all of these conundrums is simple if a comet is highly negatively charged with respect to the Sun. As the comet accelerates toward the Sun electrons begin to be stripped from the nucleus like a "cold-cathode". It develops a visible glow discharge and Birkeland current tail. These electrical effects we call a comet. At some point, more powerful arcs strike on the comet nucleus and give rise to "cathode-jets" which move about and burn circular craters. The electrical discharges to a cometary cathode will follow the magnetic field lines in the vicinity of the comet. So it will be interesting to compare the jet directions with the solar wind field direction which, because it spirals out from the Sun, does not coincide with the comet-Sun line. There is no "shock wave" to be understood in the usual sense. A charged body in the plasma of space will form a sheath to protect itself from its electrical environment. The boundary of the comet's coma defines the virtual anode region of a plasma glow discharge. Electrons are accelerated outward and positive ions inward across the sheath. Strong X-rays are generated where these particles recombine.



No one expected comet Hyakutake to be a powerful source of x-rays.

"Astronomers using ROSAT (the European Space Agency's Roentgen satellite) decided to look at Hyakutake and they were shocked by what they saw. ROSAT images revealed a crescent-shaped region of x-ray emission around the comet 1,000 times more intense than anyone had predicted."

Dr. Michael J. Mumma wrote:

"We had no clear expectation that comets [would] shine in X-rays."

Some astronomers wondered why they would bother pointing an x-ray telescope at a comet. The x-rays were as intense as those ROSAT usually picks up from bright x-ray stars and they flickered like a fluorescent-tube on a time scale of hours. Flickering effects in plasma discharges are normal because of the non-linearity in its current carrying ability. Meanwhile another ad hoc proposal had to be dreamt up to explain the x-rays. So the Sun was made entirely responsible for the x-rays by suggesting that highly ionized atoms from the solar wind were scavenging electrons from the cometary atmosphere and the energy available from that recombination was sufficient to generate the observed x-rays. But that constitutes an electric current into the comet which is unsustainable if a comet is supposed to be electrically neutral.

Deep Space 1 took measurements with its plasma instruments between 90,000 kilometers (56,000 miles) and 2,000 kilometers (1,200 miles) away. These data show that the flow of ions around the comet's rocky, icy nucleus is not centered on the comet's nucleus as scientists expected before the Borrelly flyby. Ions in the turbulent flow are heated to about 1 million Kelvin (2 million degrees Fahrenheit).

Turbulent flow in supersonic shocks has become the catch-all for astrophysicists when confronted with energetic processes away from stars in deep space. The extreme temperature calculated for the ions is based on the assumption that their motion is random, in other words, thermal. If the motion is not random but is accelerated in an electric field, the notion of temperature is entirely misleading and inappropriate. The detection of a forbidden oxygen line at 1128Å in cometary comas is consistent with the presence of an intense electric field. At comet Giacobini-Zinner ICE detected ions around the spacecraft in very highly collimated beams (electric currents) coming from the direction of the Sun. The shape of the comet's coma is determined principally by the electrical stresses near the comet and the resulting active discharges, or cathode jets. It is not simply a supersonic shock front. It is also obvious that a tiny piece of rock cannot have significant gravitational influence on a coma of gas that may be up to several million kilometres in diameter and entrain more mass than the comet nucleus. Far more powerful electrical influences provide a simple answer.

The highest-resolution image of the nucleus of Comet Borrelly shows a variety of terrain, including mountains and fault structures. Darkened material is visible over the surface.

The surface complexity of the comet nucleus is due to electrical arc erosion. The "fault structures" are chains of cathode arc craters. The negatively charged comet nucleus behaves as a cold cathode, which has electrons stripped from high points on its surface by the strong electric field near the nucleus. When first seen, comets are in the "glow" discharge mode. As it closes on the Sun, the comet discharge switches to the arc mode.

This results in a number of high current density, bright cathode "spots", which burn a circular pit or crater into the comet's surface. Each spot is associated with a "cathode jet". The narrow jet electrically accelerates the evaporated material into space. Cathode spots tend to "jump" around on the cathode surface, giving a flickering effect and forming crater chains. Comet Borrelly seems to be covered in such pits and crater chains. As the comet nucleus rotates, spots will switch off and on because the electric field is strongest on the sunward side. This behaviour has fueled the story of ices subliming in the sunlight.



Phobos has been described as a captured asteroid. If the electrical model is correct, comet and asteroid origins are the same. So the surfaces should be directly comparable. Here can be seen crater chains and larger circular craters. Particularly striking is the crater chain to the right of center which curves sharply and terminates on a larger crater. Note the similar morphology to [Schröter's Valley](#). Crater chains are routinely misinterpreted by geologists as indicative of sub-surface faults. Neither impacts nor faults explain this feature.

Comet Borrelly was 200 million kilometres from the Sun at the end of September 2001.

In 1871 Professor W. Stanley Jevons, noted author of *The Principles of Science* (1874), wrote that several of his colleagues "asserted that comets owe many of their peculiar phenomena to electrical action." That was in the days before modern scientific beliefs disallowed such speculation. Today, astrophysicists are spooked by calculations of the energy required to separate bulk positive charge from negative charge. So more than a century later they treat all astronomical objects as electrically neutral despite the obvious signatures of electrical discharge shown by comets and larger bodies. **The adherence to this core belief has crippled astrophysics.** The result has been a plethora of science-fiction stories about neutron stars, dark matter and black holes. They are only required by the mathematics when the almost infinitesimal force of gravity is used as the chief driving force of the cosmos. On the other hand, a good theory is one that coherently explains all of the observed phenomena and predicts outcomes of better observations and experiment. The surprise upon each new discovery shows that our modern story of

comets is a poor fable. **A revolution in our understanding of comets will only occur when the unconscious core beliefs are questioned.**

In future: There is a plan for a comet mission called Deep Impact. Scheduled for July 2005, Deep Impact's spacecraft will arrive at comet Tempel 1 and become the first mission to impact the surface of a comet. A 350-kg (770-lb) copper mass impactor will create a spectacular football field-sized crater, seven stories deep on a comet 6-km (approximately 4 miles) in diameter. This is the first attempt to peer beneath the surface of a comet to its freshly exposed material for clues to the early formation of the solar system.

Given the erroneous standard model of comets it is an interesting exercise to imagine what surprises are in store for astronomers if the plan is successful. The electrical model suggests the likelihood of an electrical discharge between the comet nucleus and the copper projectile, particularly if the comet is actively flaring at the time. The projectile will approach too quickly for a slow electrical discharge to occur. So the energetic effects of the encounter should exceed that of a simple physical impact, in the same way that was seen with comet Shoemaker-Levy 9 at Jupiter. Changes to the appearance of the jets may be seen before impact. The signature of an electrical discharge would be a high-energy burst of electrical noise across a wide spectrum, a "flash" from infra-red to ultraviolet and the enhanced emission of x-rays from the vicinity of the projectile. The energy of a mechanical impact is not sufficient to generate x-rays.

If the arc vaporizes the copper projectile before impact the comet will not form the crater expected. On the other hand, any copper metal reaching the surface of the comet will act as a focus for an arc. And copper can sustain a much higher current density than rock or ice. There would then be the likelihood of an intense arc, with possibly a single jet, until the copper is electrically "machined" from the comet's surface. Copper atoms ionized to a surprisingly high degree should be detectable from Earth-based telescopes. Electrical discharges through the body of a poor conductor can be disruptive and are probably responsible for the breakup of comets. It is not necessary for them to be poorly consolidated dust and ice and to simply fall apart. So there is some small chance that astronomers will be surprised to see the comet split apart, if the projectile reaches the surface of the comet and results in an intense arc.

The Deep Impact mission seems rather pointless when the cathode arcs are doing the job of exposing the comet's subsurface. However, if comets are an electrical phenomenon and have nothing to do with the formation of the solar system then astronomers are bound to be baffled once more. And that could be worth every dollar NASA spends on Deep Impact.

Mars and the Grand Canyon

Posted on [October 24, 2001](#) by [Wal Thornhill](#)

"The ultimate objective of comparative planetology, it might be said, is something like a vast computer program into which we insert a few input parameters (perhaps the initial mass, composition and angular momentum of a protoplanet and the population of neighboring objects that strike it) and then derive the complete evolution of the planet."

Carl Sagan, The Solar System, Scientific American, September 1975, p.29.

First Law of Computing: Garbage in = garbage out.

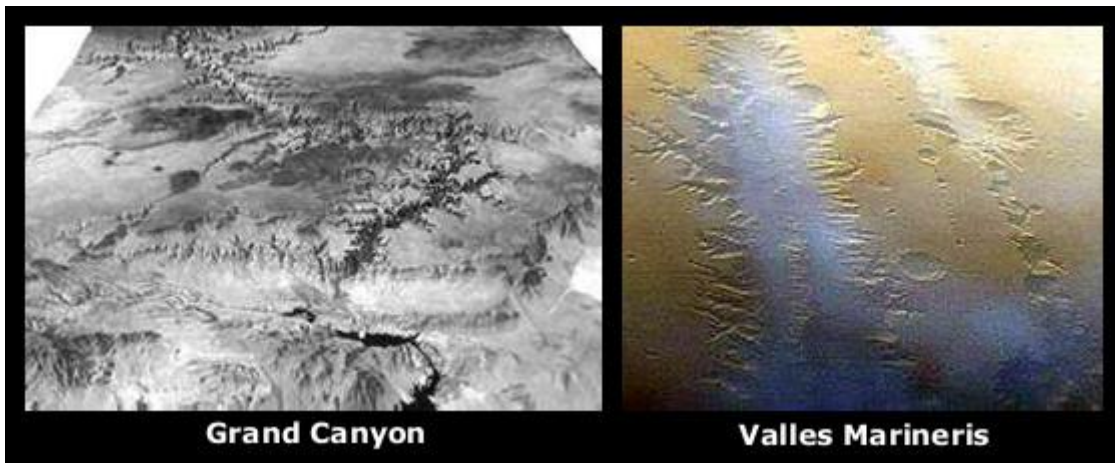
Most people would think that experts agree on an explanation for the formation of such a grandiose site as the Grand Canyon. Surprisingly that isn't so. It is an enigma. The latest attempt to figure it out occurred as late as June last year at the Grand Canyon Symposium 2000. The Colorado River is held generally responsible for carving the Canyon. However, even before the Glen Canyon dam stemmed its awesome desert floods, the river seems hopelessly inadequate to have formed such a geological spectacle. The Colorado River flows west from the Rockies and encounters a raised plateau known as the Kaibab Upwarp. Instead of turning away from that barrier it continues through the plateau. How could it do that? The river is much younger than the Kaibab Upwarp so it could not have progressively cut the Canyon even if the land rose very slowly. In any case, most of the material that was removed from the Canyon seems to be missing, according to a report from the symposium, leaving little evidential support for the original theory that a simple progression of water erosion formed the Canyon we see today. Since the 1930's and 1940's, geologists have searched for other explanations — that the Canyon once drained to the south-east (reversing the route of the present-day Little Colorado, then joining the Rio Grande and into the Gulf of Mexico. When problems arose with that explanation too, it was proposed that it once flowed NE along one of the present-day side tributaries such as Cataract Creek.



See: http://www.kaibab.org/geology/gc_geol.htm#how and The New York Times, June 6 2000, Making Sense of Grand Canyon's Puzzles by Sandra Blakeslee]

Now let us consider a 21st century solution to the question of how the Grand Canyon was formed, based not only on Earthly evidence, but also on data returned by space probes and produced by more than a century of experimental and theoretical work in plasma laboratories.

The Grand Canyon has often been compared in form, if not size, to the gigantic canyons of Valles Marineris on Mars. Because of these similarities it was initially thought that Valles Marineris was caused by massive water erosion at some earlier, supposedly wetter, epoch in Martian history. That idea has been abandoned because the evidence for water erosion and ponding in Valles Marineris is missing. The favored explanation now is that the surface of Mars has opened up with a giant tectonic rift, rather like the East African rift valley. Rifting is usually accompanied by vulcanism caused by increased heat flow from the interior. Yet major volcanic features are lacking in Valles Marineris. There are also many deep yet short tributary canyons, which require a different explanation. The favored one is undercutting by groundwater erosion. Both on Earth and Mars the canyons seem to have been cut cleanly into a raised flat surface. There is very little collateral damage to that surface. Is it likely that two different causes could end up creating landforms on two planets that look so similar?



Both vast canyons confront us with enigmas. Is there a simple answer?

At the heart of geology and planetary studies is a reasoning process called abduction. It is a form of logic whose major premise is certain and minor premise is probable. Then let us consider the question of flowing-liquid erosion. The major premise is "all sinuous channels are formed by a flowing liquid" and the minor premise is "Nirgal Vallis on Mars is a sinuous channel." The deduction follows that "Nirgal Vallis was formed by a flowing liquid."

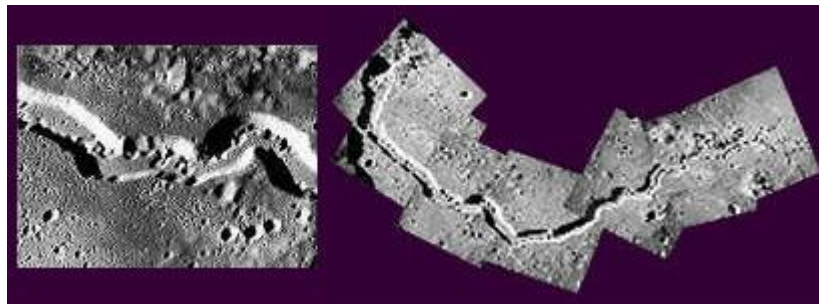


However such reasoning can be hopelessly misleading if the major premise is not certain. Mars is a desert planet with no possibility of flowing liquids today nor, it seems, for a long time past. But the huge channels look as if they were carved yesterday. That should be sufficient to doubt the major premise. However lazy logic forces us simply to conclude that there must have been large quantities of liquid water on Mars in the past. That is the present consensus. So typically the missing water has been

conveniently consigned out of sight, beneath the Martian surface. The same thing was said of the channels on the Moon before the Apollo missions proved otherwise. Once again this incurious approach has led to huge expenditure on new spacecraft to detect sub-surface ice on Mars.

What if the major premise is completely wrong? What if none of the sinuous channels (usually called 'rilles') on Mars, Venus and our Moon, were originally formed by flowing liquids? This is a key question to be answered before we can address the more complex canyons on Mars and here on Earth. Rilles have the same form on all of these bodies, yet no one today seriously suggests that we look for water on the furnace-hot surface of Venus or on the airless Moon. Instead, hot fluid lava has been called upon as the flowing liquid on these bodies. The problem is that the lava had to remain liquid over hundreds, and in some cases thousands, of miles. So a roof of rock was added, to form lava tubes. But some of those roofs needed to be miles wide! Some rilles on the Moon and Venus are wider than the longest lava tubes on Earth. And the rock roofs had to collapse later to expose the channels. There is no rubble from collapsed roofs in any of the rilles. The rilles are cleanly chiselled into the surface. The lava is supposed to have flowed billions of years ago on the Moon, and only millions of years ago on Venus.

A good example of a lunar rille, photographed in great detail by the Apollo astronauts, is Schröter's Valley. The channel looks brand new. Once again, the liquid that is supposed to have cut the channel is missing – there is no lava outflow. And lava cannot seep into the ground and be hidden as water can. Something is wrong with this picture. **The major premise must be wrong.**



There are many more mysterious features of these channels. Their wider "outflow" end is higher than the narrow "source" end, as if whatever formed them was not responding to gravity. In flagrant breach of that law, some run both uphill and down with no sign of the damage that might be expected if the topographical changes were due to later vertical movement of the terrain. Others cut through mountain ridges as if they were not an obstacle. Unlike rivers, rilles often run in parallel. Some have circular craters along their length, others seem to be formed from a continuous series of pits. Most terminate on a crater. Because of the many craters found in and around them, dating the rilles by crater counting makes them appear older than the surface they cut into. The channels are often much more sinuous for their width or the slope of the surface, than would be expected if they had been carved by a liquid. Some have a smaller, more sinuous channel in the floor of the larger channel. Some have flat floors and steep walls. Others have a deep V-shaped cross-section. Tributaries, if any, are often short, end in a circular alcove, and join the main channel at near right angles. To explain these (on worlds with water), recourse is usually made to underground water flows that remove soil and cause collapse and progressive headward erosion of the channel. Many channel floors show transverse markings or small ridges. On Mars they have been described as sand dunes. Many channels have material heaped up on each side to form levees. There are neither catchment areas nor systems of feeder streams sufficient to carve the often-gigantic main channels or tributary streams. The source and sink of the water remains invisible. And the question remains: where did the eroded soil go?

"The real actors on the stage of the universe are very few, if their adventures are many. The most 'ancient treasure' -in Aristotle's words- that was left to us by our predecessors of the High and Far-off Times was the idea that the gods are really stars, and that there are no others. The forces reside in the starry heavens, and all the stories, characters and adventures narrated by mythology concentrate on the active powers among the stars, who are planets." Giorgio Di Santillana and Hertha von Dechend in Hamlet's Mill.

"The thundergod is regarded as the most powerful of all the gods of heaven and earth, since the effects of his anger are so terrible and so evident." Christopher Blinkenberg in The Thunderweapon in Religion and Folklore.

See <http://www.users.qwest.net/~mcochrane/Thundergods/thundergods.html>

The answer has been available for 30 years! It was provided by an engineer, the late Ralph Juergens, of Flagstaff, Arizona. In a brilliant series of papers that would not be published in a mainstream scientific journal, he showed that flowing liquids are not adequate or even necessary to explain river-like channels on planets and their moons. He showed how the strange features of those channels could be simply scaled down and matched against the kind of damage caused by powerful lightning strikes on Earth. **So**

even if Mars had surface moisture in the past its vast channels were not carved by rushing water.



Example of a powerful lightning strike at Baker, Florida in 1949. It furrowed the infield for 40 feet during a baseball game, killing 3 players and injuring 50 others. The more sinuous path taken by the lightning can be seen as a smaller trench in the bottom of the furrow. National Geographic, June 1950, p.827

When we look at the pattern of a lightning scar on Earth we see the features of sinuous rilles in miniature. Electrical phenomena exhibit the same forms from the scale of centimeters to the scale of thousands of kilometers. In fact, it has been shown in high-energy electrical experiments that the same patterns of behavior can be scaled up yet another 100 million times. Because of this, the forms of scars on insulators and semiconductors and/or the surface erosion of spark-machined objects, seen under a

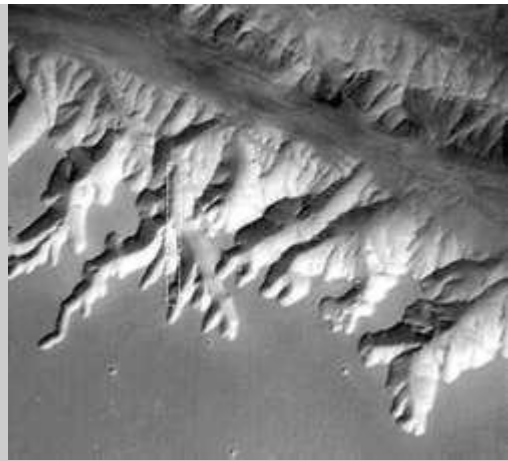
microscope, can be used as analogs of electrical scarring of planetary surfaces. Plasma cosmology can do inexpensive controlled experiments on Earth to answer puzzles that have plagued planetologists for decades.



Without a shadow of a doubt, Valles Marineris is an electrical arc scar. It bears the hallmarks, writ large on a planet's face. Juergens identified it as such 30 years ago from the early Viking Orbiter spacecraft images.

"... to me this entire region resembles nothing so much as an area sapped by a powerful electric arc advancing unsteadily across the surface, occasionally splitting in two, and now and then-weakening, so that its traces narrow and even degrade into lines of disconnected craters. ...I can only wonder: Is it possible that Mars was bled of several million cubic kilometers of soil and rock in a single encounter with another planetary body? Might the Canyonlands of Mars have been created in an event perhaps hinted at by Homer when he wrote: "Athena [Venus) drove the spear straight into his [Ares' (Mars')] belly where the kilt was girded: the point ran in and tore the flesh... [and] Ares roared like a trumpet..."

Juergens' explanation requires a dynamic recent history of the solar system, entirely different from the one we have been taught to believe. It highlights an electrical dimension to astrophysics which is nowhere to be found in their textbooks. So it is little wonder that geologists are clueless when confronted with electrical erosion. When planets come close, gargantuan interplanetary lightning results. It is perfectly capable of stripping rock and gases from a planet against the puny force of gravity. It does so leaving characteristic scars. It can explain why some two million cubic kilometers of material is missing from Valles Marineris along with 90% of the atmosphere Mars was expected to have. A subsurface arc through an electrically coherent stratum can explain the peculiar morphology of Valles Marineris. The parallelism of the canyons is due to the long-range magnetic attraction of current filaments and their short-range strong electrostatic repulsion. Particularly significant are the small parallel rilles composed essentially of chains of craters. A traveling underground explosion follows the lightning streamer and cleanly forms the V-shaped tributary canyons. There is no collapse debris associated with undercutting water flow. Similarly, the "V" cross-section is usual for craters formed by underground nuclear explosions. The circular ends of the tributaries, where the explosion began, are precisely of that shape. In comparison, headward erosion by ground water sapping gives a U-shaped cross-section and does not necessarily end in a circular alcove. Note that some of the tributary canyons on the south rim of Valles Marineris cut across one another at near right angles. This might be due to repeated discharges from the same area chasing the main stroke as it travelled along Ius Chasma. No form of water erosion can produce crosscutting channels like that. The fluted appearance of the main canyon walls is probably due to the same travelling explosive action.



The system of V-shaped tributary canyons along the south rim of Ius Chasma on Mars (7°S, 82°W).

The walls of Valles Marineris shows evidence of widespread sedimentary layering on Mars. But such enormous quantities of sediment must have eroded from somewhere and the fact that any ancient highlands are preserved on Mars is difficult to reconcile with such a source. A second major difficulty is that Valles Marineris is near the top of a bulge 10 km above datum. How are sediments deposited at that altitude? It would require the region first being a deep basin to collect a thick stack of sediments (assuming there was copious fast-running surface water), then uplifted an incredible 20 km by a mantle plume and voluminous lava intrusions with little surface volcanism.

How many major premises in geology are wrong? The electrical model provides a far simpler solution never considered before in sedimentation. The material removed electrically from one body in a cosmic discharge is transferred in large part to the other

body. That creates widespread surface layering. The airless Moon shows evidence too of extensive layering and it is covered in electrical scars.

The arguments for the electrical sculpting of Valles Marineris apply equally to the Grand Canyon. These major features on two very different planets look so similar for the simple reason that the same forces created them. Water was not involved in the process. Let us note the similarities. The Grand Canyon is on a high plateau. The tributaries are deeply incised, short, and tend to end in rounded alcoves. The tributary canyons of Ius Chasma are strikingly similar to those of the Grand Canyon. The material excavated from the Grand Canyon seems to be missing. On a watery Earth, the Colorado river simply took advantage of the sinuous channel carved by the subsurface cosmic lightning. The edges of the Grand Canyon are sharp and do not show much erosion into the mile deep valleys. That argues for very recent formation. Geologists cannot decipher the history of the Grand Canyon because their training never envisaged electrical erosion as a result of interplanetary thunderbolts. Nor did it teach that thick strata and anomalous deposits can be dumped from space in hours. Interplanetary electrical forces can raise mountains, twist and overturn strata, dump oceans on to land, preserve shattered flora and fauna in the rocks – all in a geological instant. But since Lyell, geologists have managed to lull us all into insensibility with vast time spans and piecemeal explanations for each morphological feature of the landscape. The question that should be asked is whether the slow causes they invoke are sufficient to the task they are asked to perform. Fossils do not form under normal circumstances. The sharp outlines of mountains and the tortured strata within them look like still frames from a dramatic action movie. And when it comes to assigning ages, cosmic thunderbolts cause radioactivity, change radioactive decay rates, and add and subtract radioactive elements. So the the assumptions underpinning the rickety edifice of geological dating will need re-examination without prejudice. Geologists are between a rock and a hard place because the main claim of geology to being a "hard" science has come from its bold claims to chart the history of the Earth. But it is clear that the chart they have been handed by cosmogonists and the clock bequeathed by the physicists are equally worthless.



It is interesting to find that NASA and the SETI Institute have set up a base camp on Devon Island, Nunavut Territory, in the Canadian high arctic, for the scientific study of the Haughton impact crater and its surroundings. The joint study is known as the Haughton Mars project because the unexplored island is considered a Mars analog. Mars analogs are sites on the Earth where geologic features approximate those encountered on Mars. Devon Island has channels described as glacial meltwater networks. Several types of valleys resemble those seen on Mars. The resemblance appears to be more than superficial, as the similarities are often specific and unique. They have been compared to the tributary canyons of Valles

Marineris and are claimed as perhaps the clearest evidence for episodes of sustained fluid erosion on Mars by water. However they present many unusual characteristics that cannot be explained by water erosion:

1. the valleys are spaced apart with large undissected areas between valleys,
2. the valleys display open, branching patterns with large undissected areas between branches,
3. branches often have ill-defined sources but mature in width and depth over short distances relative to the size of the network,
4. branches maintain relatively constant width and depth over long distances,
5. branches split and rejoin to form steep-walled islands,
6. branches have V-shaped cross-sections which transition to larger U-shaped troughs with steep walls and flat floors,
7. channels on valley floors are absent or poorly expressed. Their scale also varies over an order of magnitude.



Aerial photograph of a 1 km-wide, deeply-incised, winding, V-shaped glacial trough valley on Devon Island with its tributaries. Note that the surrounding plateau is otherwise little dissected and that there are no major streams feeding onto this canyon. (Photo: NASA HMP)

Here we have a different explanation from geologists for essentially the same morphological feature. The Devon valley networks are merely interpreted to be glacial meltwater channel networks formerly lying under an ice sheet. Some valleys do have a little ice in

them today. However, the arguments for their formation by the action of ice make little sense. It suggests that glacial melting on a cold desert planet formed some Martian valley networks, which is hardly helpful. The strong similarities between the Devon valley networks and the tributaries of Valles Marineris, like that of the Grand Canyon to Valles Marineris, is simply because they were formed by the same process – a cosmic electric discharge. All of the unusual features listed above are expected in cathode erosion.



V-shaped Devon Island valley.

Even the nearby Houghton crater is to be expected, for the same reason that rilles on other planets and moons are associated with craters and often have more craters than the surrounding landscape. The Houghton crater is simply the scar of a cosmic thunderbolt, like practically every other circular crater in the solar system.

So NASA is correct in their choice of analog, but wrong in their attribution of causes. In light of more than a century's research in the field of plasma cosmology and the 20th century discoveries of the space age, we can confidently propose the celestial thunderbolt as a common cause of the formation of canyons and rilles on rocky planets and moons.

See: <http://www.arctic-mars.org/docs/03c.LPSC.pdf>

There is a geological perspective on planetary scars available at:

http://daac.gsfc.nasa.gov/DAAC_DOCS/geomorphology/GEO_10/GEO_CHAPTER_10_TABLE.HTML where the difficulties facing geologists are often expressed. With the perspective offered here you may begin to form your own opinion.

2002

Charge Separation in the Mind

Posted on [January 22, 2002](#) by [Wal Thornhill](#)

"The operation of removing a problem from its traditional context and placing it into a new one, looking at it through glasses of a different color, as it were, has always seemed to me of the very essence of the creative process. It leads not only to a reevaluation of the problem itself, but often to a synthesis of much wider consequences, brought about by a fusion of two previously unrelated frames of reference."

- Arthur Koestler, *The Watershed: A Biography of Johannes Kepler*.

My sane friends (yes, I do have a few) point out that an electrified universe is impossible because of the astronomical amount of energy it would take to create any significant amount of charge separation in space. Various calculations, usually on the backs of envelopes, show that to produce the effects conventionally attributed to gravity would necessitate, electrically, a separation of charges requiring many times the energy available. To turn a nuclear star into an electric star, for example, would require many times the energy output of the star just to separate enough electrons from their hydrogen protons to generate sufficient current. With galaxies, the problem is billions of times worse. It's much easier—the difference, they say, between possible and impossible—to squeeze a stellar mass of hydrogen with its own gravity until it gets hot enough to ignite its nuclear furnace.

Of course, they're right. They're the experts, and they're sane besides. It's almost with embarrassment that I bring up a matter of insight that reveals their oversight. Everyone knows those hot nuclear stars began as cold clouds of hydrogen. We detect those clouds throughout the universe. And they must be collapsing because the law of gravity requires it. As they collapse, they heat up, until the heat triggers nuclear reactions. Then the radiation pressure outward balances the gravitation pressure inward and a star is formed. This is a chain of logic that's linked together with mathematical certainty.

But where did that ontological cloud of hydrogen come from? I don't mean its physical origin. As I mentioned, we detect clouds of hydrogen throughout the universe. I mean where was it assumed a cloud of hydrogen was the progenitor of a star? That origin is in the third sentence of the previous paragraph, indicated by the word "must". That origin is in the mind, in imagination. The cloud of hydrogen is needed only if you assume gravity is the sole force operating. If you assume gravity, you require the cloud, with which you can prove the necessity of gravity. And inside this circular cage of logic the gerbil of astrophysics begins to run.

An electric star wouldn't begin with the cloud. It would begin with charge separation. Everything we see in the universe, with the possible exception of a few specks of planets and reflection nebulas, is ionized to some degree. It's a PLASMA, the fourth and dominant state of matter in the universe. The positive ions and negative electrons move,

and because protons are a couple of thousand times more massive than electrons, any force—electrical, magnetic, gravitational, even mechanical—can cause some separation of charges. An immeasurably small surplus of one electron or proton in a volume measured in cubic meters is all that's necessary for a weak electric field to exist in deep space. That electric field will drive an electric current, which will generate a magnetic field that interacts with the fields of other currents.



Lagoon Nebula Detail
Hubble Space Telescope • WFPC2

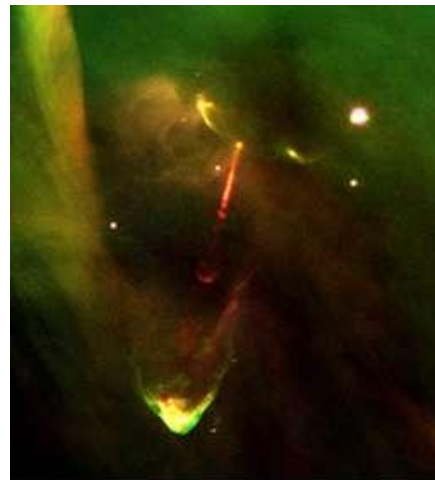
An elementary observation of matter in deep space is that the currents tend to form twisted pairs of filaments, called Birkeland currents, that snake along the magnetic field lines. These filaments suck in surrounding ions and gas and dust as if they were cosmic vacuum cleaners, overwhelming gravitational forces. Their magnetic fields pinch the mixture, called a dusty plasma, into higher density blobs and columns.

As the magnetic pinching increases, the electric field intensifies, which further increases the pinching. The compressing blobs form spinning focuses of electrical discharges, first a red glow, then brilliant arcs, driven by the current in the filament that generated them until the energy is dissipated. We see these filaments and blobs in high-energy plasma labs.

We see them in lightning. We see them as the balls of arc discharges we call stars. We see them as the filigreed bubbles and cones of neon-tube-like glow discharges we call planetary nebulas. We see them in the forms of spiraling galactic arms and of pencil-thin beams of galactic jets. We see them at the largest scale we can observe, that of superclusters of galaxies. The initial condition of the observed universe is that of charges already separated.

Now the original question comes full circle. The problem is not that of supplying the energy to ionize neutral matter. The problem is that of dissipating the energy of already ionized matter. It's the act of neutralizing existing separations of charges that provides the prodigious energy driving and shaping the universe. After seeing that the universe is already electrified, a calculation on the back of another envelope shows that gravity is too weak—by about 40 orders of magnitude!—to account for the observed structure, movement, and dissipation of energy. It's the gravity universe that's impossible.

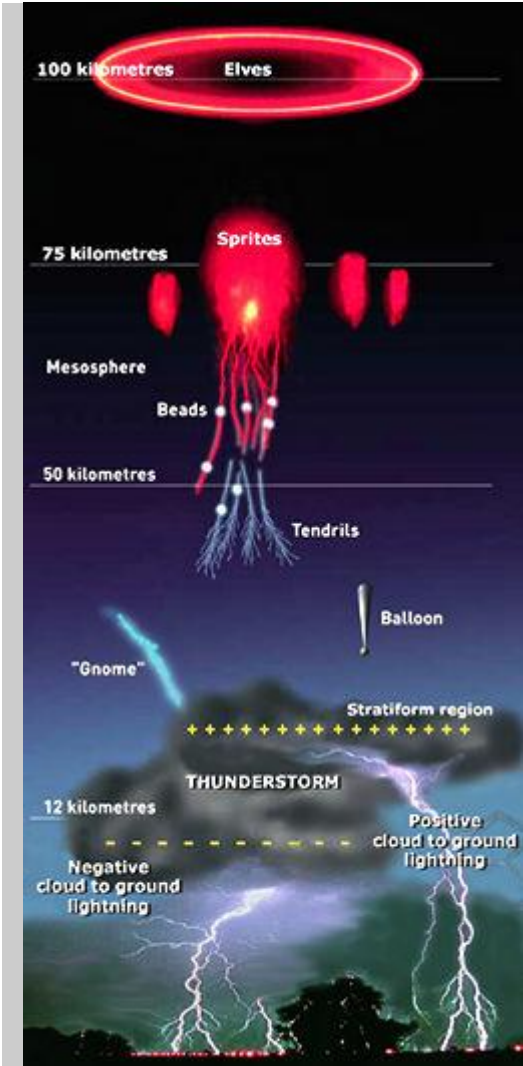
Mel Acheson



Protostar HH-34 in Orion (detail)

The Balloon Goes Up Over Lightning!

Posted on [January 29, 2002](#) by [Wal Thornhill](#)



Gnomes, sprites and elves stretch into space above powerful thunderstorms. Their fanciful names may reflect the fact that airline pilots reported them but for many years no one would believe them.

In August 2001 a high-altitude balloon was sent aloft to ride far above the great storms of the mid-west USA. Researchers had sent the balloon, like a Dark Rider out of Tolkien, riding into the moonless night, seeking sprites, gnomes and the ring of the elves.



Surprisingly, in the 1920s, the Scottish physicist **C. T. R. Wilson** predicted the existence of brief flashes of light high above large thunderstorms. Almost 70 years later, Bernard Vonnegut of SUNY Albany realized that evidence for Wilson's then-unconfirmed predictions might appear in video imagery of Earth's upper atmosphere, recorded by space shuttle astronauts. He encouraged NASA's **William Boeck** and **Otha Vaughan** to look for evidence. Their search was successful. At the 1990 fall meeting of the American Geophysical Union, Boeck and Vaughan presented evidence for upper-atmosphere flashes. Evidence of a different nature came from the University of Minnesota's **John Winckler** and his colleagues, who had serendipitously observed a flash in moonless night skies over Minnesota in 1989.



Edgar Bering. Photo Credit: Bill Ashley, UH Media Center

Few direct measurements have been made of the flashes, dubbed "sprites" by Davis Sentman of the University of Alaska Fairbanks. Sentman chose the name "sprites" for the red flashes because, like woodland elves, they can only be seen out of the corner of your eye. The thin air of the mesosphere where the sprites appear is too high for

research aircraft to fly and too low for orbiting spacecraft to access, so most of what is known comes from low-light video cameras and electromagnetic sensors based in mountain-top labs. Prof. **Edgar Bering**, a physicist at the University of Houston in Texas, has recently changed that. He heads a team from NASA's National Scientific Balloon Facility to study sprites by the tricky business of flying a high-altitude balloon above major thunderstorms.

Adapted from Rider on the Storm by Harriet Williams, New Scientist Vol. 172 No. 2321, 15 December 2001

After more than a decade of disagreement, atmospheric physicists think they are finally close to agreeing on how sprites form. Bering's balloon offers one of the first real chances to confirm their theories. But it seems a storm is brewing that threatens to set Bering against his colleagues. What little information we have has led to a model of sprite formation that many in this close-knit community of investigators now agree on. It depends on intense but short-lived electric fields created in the atmosphere by lightning discharge.

How a sprite is formed

Although most lightning originates in the negative charges at the bottom of storm clouds, roughly 1 in every 5 lightning strikes originate in the positive charges near the cloud tops. This results in an energetic positive cloud-to-ground discharge, in which the positive charge is neutralized by an upwards flow of electrons from the ground. The negative charges left in the lower part of the cloud set up what physicists call a "quasi-electrostatic field"- an intense electric field that extends high into the atmosphere above the storm.

"There is absolutely no question in my mind," says Umran Inan, director of the Space, Telecommunications and Radioscience Lab at Stanford University. "Sprites are caused by QE fields."

The sprite lies above horizontal (so-called spider) lightning in the lower portion of the upper stratiform cloud. The spider lightning's large horizontal extent shows the size of the large layer of electric charge that feeds the positive ground flashes. Such lightning flashes are not generally seen in ordinary isolated thunderclouds.

Other unanswered questions remain. The extraordinarily rapid initial growth of sprites is not well understood. Nor is the pronounced asymmetry between the number of sprites produced by negative lightning and the number produced by positive lightning. Only two sprites have ever been clearly associated with flashes of negative cloud-to-ground lightning, whereas the number of sprites verifiably produced by more energetic positive cloud-to-ground lightning runs to thousands. Obviously, there is still much to learn.

The critical breakdown limit for air depends on its density. At very high altitudes-about 75 kilometres up-where air density is low, the QE field now exceeds the critical breakdown limit for air. Electrical breakdown occurs and molecules such as nitrogen and oxygen are ionised, releasing electrons. Under the influence of the QE field, free electrons are accelerated upwards, while positive ions accelerate down towards the ground.

Edgar Bering's balloon flights suggest that the currents responsible for sprites may carry far more oomph than anyone had suspected. Previous estimates suggested that the sprite-inducing current carries about 3000 amperes. Bering's data, on the other hand, puts the figure nearer 12,000 amperes. Whether this huge current could pose any direct physical danger to anyone is unknown. Airliners don't fly in the mesosphere, but sprites can reach down into the cloud tops. And it is certainly possible that sprites could affect spacecraft, Bering suggests. Sprites are the prime suspect in the unexplained downing of a high-altitude balloon a few years ago.

Almost as quickly as it appears, the sprite fades away, disappearing completely in just a couple of milliseconds. However, the QE field is believed to last much longer. Researchers on the ground can monitor its presence using radio receivers since the field produces a continuous electromagnetic signal at frequencies from a few hertz to tens of kilohertz. The signal often persists long after the sprite has disappeared, slowly fading as charges in the cloud disperse. This electromagnetic signal, Inan and his colleagues argue, is the signature of the QE field.

But what scientists needed were direct measurements of the electric field. What could be better than information gathered by a balloon flying high above the clouds?

The team scoured the balloon flight results for the signature of a QE field-the low-frequency radio hum. But they were in for a surprise. The balloon's instruments did not record it. The researchers realized the favoured model of sprite formation didn't measure up.

The results from the ground stations suggest that once a positive lightning strike occurs, the intensity of the electric field in the mesosphere builds up over two or three milliseconds until breakdown occurs, and the sprite lights up. This delay may be related to the flow of currents created by the lightning which bring the high-altitude electric field to the level required for breakdown, says Victor Pasko, an atmospheric physicist at Pennsylvania State University in University Park. Then, once the sprite has faded, charges in the clouds begin to disperse or flow away, and the electric field observed from the ground decays slowly over tens of milliseconds.

However, the balloon data paints a very different picture. It implies that sprites are produced by a sudden burst of current and there is no slow build-up of the electric field. Several milliseconds after the positive lightning strike, sensors recorded a sudden upward-flowing current pulse. Just 300 microseconds later, the sprite lit up in the sky. To

add to the mystery, the electric field disappeared far more rapidly than ground observations suggest, in just a few milliseconds.

Bering's results-some of which he presented at the recent American Geophysical Union meeting in San Francisco-**turns sprite theory on its head. "The charge that produces sprites is not below in the cloud, it's in the mesosphere itself,"** suggests Bering. So now there are new puzzles: **where could this charge be coming from**, and if there's no QE field, what causes the delay between lightning and sprite? "We have a problem understanding why the sprite takes so long to form," admits **James Benbrook**, a colleague of Bering's in the physics department at the University of Houston.

And what of the low-frequency hum picked up by labs on the ground? Bering thinks the signal may be caused by the lightning strike itself rather than the mechanism that lights up a sprite. Researchers on the ground face an additional problem, they are close to one electrical contact of the global electric circuit-the Earth itself. The low-frequency hum could be an artefact and we hear it if we are on the ground when the charges in the clouds flow to earth, Bering suggests.

Benbrook agrees. The signal received on the ground is more likely due to the rearrangement of charge in the cloud tops, he says, or the flow of current in the lightning channel.

"But I don't see what that has to do necessarily with an excitation mechanism in the mesosphere."

Other researchers urge caution in interpreting Bering's results. "At high altitudes the field can be very small," says Pasko. Inan suggests that more sensitive instruments on the balloon may have picked up the hum of the QE field.

"Whether or not there is a continuing field signature is a matter of how sensitive your measurements are. It could be there but below the noise level of your instrument."

Most sprite investigators agree that Bering should have been able to detect the low-frequency hum, and blame his instruments for failing to do so. Bering defends the quality of his experiment and insists his instruments were working. "We wouldn't have seen the electric signal of the sprite if they weren't."

Can the QE field theory recover from this blow? "My personal guess is no," **says Bering.**

"None of the existing models will survive when people finally pay attention to what our data actually says."

Toward an Electric Universe model of Sprites



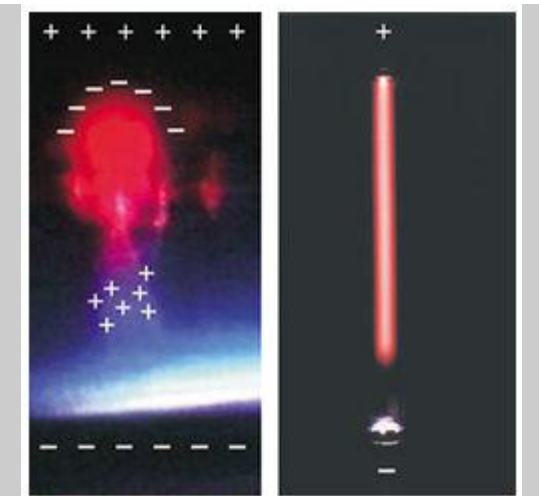
A glow discharge tube with a magnet showing the red anode column and blue filaments.

The size and color of sprites is simply explained by the very low air pressure at great heights. In the same way that a long spark in a laboratory discharge tube becomes an extended glow as the air is pumped from the tube, so the "sparks" of lightning at ground level become colorful glows and filaments when they occur in the upper atmosphere.

In *Physics Today*, November 2001, Earle R. Williams* made the obvious connection in a feature article, *Sprites, Elves, and Glow Discharge Tubes*.

"The venerable field of gaseous electronics underlies the understanding of a lightning-like phenomenon of spectacular extent, shape, and color. Sprites and elves are a grand natural manifestation of ideas and laboratory experiments conceived many decades ago by Rayleigh, Thomson, Wilson, and Langmuir—all of whom won Nobel prizes—and by a host of 19th century glow discharge tube spectroscopists."

* Earle Williams is a research scientist at the Massachusetts Institute of Technology in Cambridge. He works at the Parsons Laboratory on the main campus and at Lincoln Laboratory.



*A sprite (left) mimics the glows seen in a discharge tube (right). Image: *Physics Today**

The discharge tube model has been confirmed by many ground-based experiments. But discharge tubes require a power supply to function. Where is the power supply for sprites? Anyone who says that it is powered by the thunderstorm hasn't understood the question. If we don't understand how a thunderstorm generates lightning then we have much further to go than is generally admitted by researchers.

Bering writes:

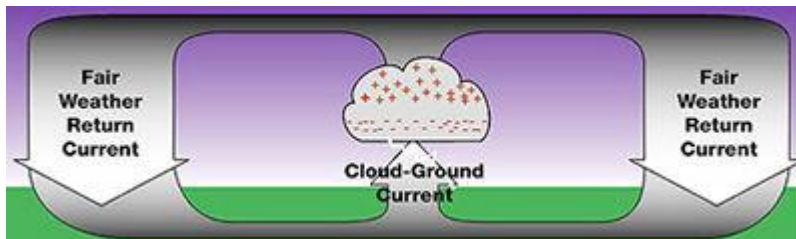
"from what is known to date, it may be speculated that sprites or jets, or both, are an integral feature of every thunderstorm system of moderate size or larger in the terrestrial system, and may be an essential element of the earth's global electrical circuit. Further, it seems likely that they have been a part of thunderstorms that have occurred over previous millions of years or longer. One may speculate about the possible occurrences of similar phenomena associated with lightning on other planets where lightning has been detected, most notably Jupiter and Venus."

Bering's speculations are well-founded from the Electric Universe point of view but the stumbling block to further understanding is immediately apparent in the use of the words "earth's global electrical circuit." As big as the term "global" sounds, the circuit is too restricted. It is a circuit that assumes heat driven convection in clouds is the global electricity generator. This generator mysteriously separates electric charge in storm clouds to power world-wide currents. However, the circuit is "unplugged." It is isolated from electrical connection with anything else in the universe. Such a lack of a holistic or cosmic-scale vision is a fundamental constraint on theorists.

In a report on Venusian lightning, following the successful Russian Venera 11 and 12 entry probes, Professor Donald Hunten of the department of Planetary Sciences at the University of Arizona, Tucson, summed up:

"The indications are that lightning is likely to occur in any substantial planetary atmosphere. Theories of electrification are faced with the need to explain its presence under a wide variety of circumstances and atmospheric conditions."

There are no water clouds on Venus.



In July 1993 at the Cambridge, U.K., Conference of the Society for Interdisciplinary Studies* I presented a paper about the planet Venus that dealt with reports of lightning. I said:

"The principal difficulty in understanding the origin of lightning is likely to be the assumption that the Earth and Venus are closed electrical systems with no input from the solar plasma environment via the magnetosphere."

So let us examine the larger picture. There has been one crucial name missing from the earlier list of Nobel Prize winners. He was on the point of being nominated for a Nobel

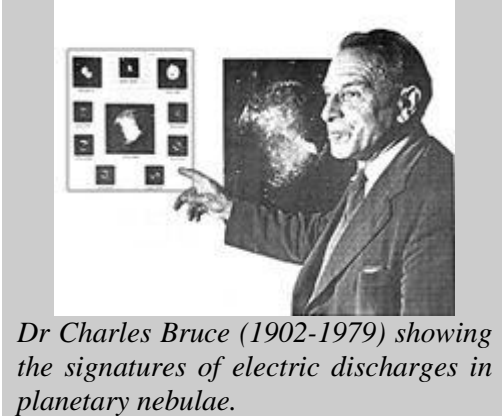
Prize when he died. Kristian Olaf Bernhard Birkeland (1867-1917) was the founder of experimental astrophysics. Note the crucial adjective "experimental" as distinct from modern theoretical astrophysics. He studied under Poincaré and Hertz and was a professor at Oslo University at the age of 31. Wealth and fame accompanied his many achievements in technology and applied physics.

Birkeland was the good guy in a 50-year dispute involving the idea that electrons streaming along magnetic field lines caused the Earth's auroras. His opponent was the astronomer Sydney Chapman who maintained that the Earth moved through a vacuum. In 1974 space probes found in Birkeland's favour. Chapman and others then promptly made space plasma superconducting, which relieved them from the complications of dealing with electric fields. Birkeland actually demonstrated his theory long before in an experiment called a "terrella." It consisted of an electromagnet contained within a sphere and placed in a large vacuum chamber. By initiating an electric discharge in the chamber he was able to reproduce a light show with many of the odd features of auroras. **The importance of this simple experiment cannot be overstated because it demonstrates that aurorae and lightning seem to require an electrical power source external to the Earth! That would explain the puzzle raised by Bering:**

"The charge that produces sprites is not below in the cloud, it's in the mesosphere itself."

The Electric Universe model suggests that the Earth plays a cathode role in the Sun's discharge and therefore is in the business of supplying negative electrons to space and receiving positive ions from the solar wind. It is interesting therefore that the presence of solar wind ions inside the earth's magnetosphere has puzzled scientists. Thunderstorms are not electricity generators, they are passive elements in an interplanetary circuit, like a self-repairing leaky condenser. The energy stored in the cloud "condenser" is released as lightning when it short-circuits. The short-circuits can occur either within the cloud or across the external resistive paths to Earth or the ionosphere. The charge across the cloud "condenser" gives rise to violent vertical electrical winds within the cloud, not vice versa. By creating a short-circuit to high altitudes in the storm the lightning effectively "throws the switch" connected to the glow discharge "tube" in the upper atmosphere. It then makes perfect sense that the much taller positive cloud-to-ground discharge will be more effective at providing power to the glow discharge than will low-level negative cloud-to-ground lightning because the circuit resistance is lower. Ultimately, lightning on Earth is driven by electric power focused on the Sun but minutely intercepted by the Earth. So lightning on Earth is a pale imitation of what is happening on the Sun.

It is not surprising, therefore, that it took a man who was an electrical researcher, astronomer, and expert on the effects of lightning, Dr. Charles E. R. Bruce of the Electrical Research Association in England, to recognize the fact. That was in 1941! Such is the inertia of science.



Dr Charles Bruce (1902-1979) showing the signatures of electric discharges in planetary nebulae.

So Bering is right, similar phenomena will be encountered on other planets, but modified by each planet's environment. And it is quite sobering for historians of science to note that a century ago Birkeland foreshadowed that electrical experiments like the terrella could be done to model other planets, the Sun, and galaxies.

He wrote:

"experiments were carried out under these conditions for many years. It was in this way that there gradually appeared experimental analogies to various cosmic phenomena, such as zodiacal light, Saturn's rings, sun spots and spiral nebulae."

* See <http://www.catastrophism.com/cdrom/pubs/journals/review/v1993cam/index.htm>

Do we have any proof of interplanetary electric currents?

In the Venus paper mentioned earlier, I wrote:

"The magnetic flux 'ropes' of the solar wind, entwined about the planet, are indicative of electric currents flowing directly into the planet's ionosphere. ...Any cosmic body which is charged relative to the surrounding plasma has a plasma sheath or magnetosphere. It is a region in which electric current flows and energy is released. The sheath is generally invisible unless the current is strong enough to generate light, such as on the Sun and in the coma and tails of comets."

Four years later in a news item, "Planet's tail of the unexpected" on 31 May 97, New Scientist reporter, Jeff Hecht, wrote:

*"One of our neighboring planets can still pack a few surprises, it seems. Using satellite data, an international team of researchers has found that Venus sports a giant, ion-packed tail that stretches almost far enough to tickle the Earth when the two planets are in line with the Sun. 'I didn't expect to find it,' says team member **Marcia Neugebauer** of the Jet Propulsion Laboratory in Pasadena, California. 'It's a really strong signal, and there's no doubt it's real.'*



NASA's Pioneer Venus Orbiter first found the tail in the late 1970's. Around 70,000 kilometres from the planet, the spacecraft detected bursts of hot, energetic ions, or plasma. But now Europe's Solar and Heliospheric Observatory (SOHO), a project partly sponsored by NASA, has shown that the tail stretches some 45 million kilometres into space, more than 600 times as far as anyone realized. This satellite, which sits about 1.5 million kilometres away from the Earth, passed through the tail last July, when it was roughly in line with Venus and the Sun. Neugebauer suspects the tail is 'a lot of little stringy things' like those of some comets, which can have several ion tails. If so, says Neugebauer, 'the theorists are going to have fun trying to explain why they're as narrow as we saw them'. Standard physics says that narrow plasma streams are unstable and should dissipate fast. No one can yet explain how they hold together over tens of millions of kilometres. This surprise has since been repeated for comet Hyakutake with its tail stretching half a billion kilometres across the solar system!"

No one can explain 'stringy things' in space?

Birkeland's name has been given to an electrical phenomenon very important in space plasma. He found that electric currents move through space largely by means of electrons spiraling along magnetic field lines. Such a plasma current is known as a "**Birkeland current**". When two Birkeland currents are parallel they experience a long range attractive force that brings them closer together, or pinches them. When they get very close, a short range repulsive force holds them apart so that they maintain their identity. The result is that separate Birkeland current filaments come together to form pairs and the pairs form a twisted, filamentary "rope" of electric current in space. Plasma physicists have shown that **Birkeland currents can remain coherent even over vast intergalactic distances.**

The prescient Birkeland again:

"According to our manner of looking at the matter, every star in the universe would be the seat and field of activity of electric forces of a strength that no one could imagine. We have no certain opinion as to how the assumed enormous electric currents with enormous tension are produced, but it is certainly not in accordance with the principles we employ in technics on the earth at the present time. One may well believe, however, that a knowledge in the future of the

electrotechnics of the heavens would be of great practical value to our electrical engineers. It seems to be a natural consequence of our points of view to assume that the whole of space is filled with electrons and flying electric ions of all kinds. We have assumed that each stellar system in evolutions throws off electric corpuscles into space."

Birkeland was right. The "stringy things" that puzzled astronomers are proof positive of electric currents in plasma. Venus-and Jupiter, the archetypal god of thunder,-are part of an electric circuit that involves the Sun. The Sun is part of a circuit that involves the entire galaxy. The Earth with its own Langmuir sheath (misnamed magnetosphere) is wired in to the same power grid. This raises a serious question about the study of weather and climatology because a crucial energy input to the Earth is unrecognized. If that is so then **predictions about the Earth's climate are presently worthless because they ignore the largest single influence on Earth's weather.** This oversight may explain why scientists are having difficulties explaining weather systems on other planets too. Jupiter, for instance, is known to be the source of intense electromagnetic activity. That energy is thought to be derived from Jupiter's rotation-in other words Jupiter is a giant electrical generator. If so, it should be expected that the equator is being 'braked' in the process. What do we find? The equator is spinning fastest of all! Jupiter is an electric motor, not a generator. Enormous power is being intercepted by its vast Langmuir sheath, lighting up the moon, Io, with cathode arcs, on its way to Jupiter. This simple electrical model also explains why the fastest winds in the solar system, 1000 mph, are found on Neptune, the most distant planet from the Sun. And it explains the enigmatic "spokes" in Saturn's rings.

Bering notes that short duration (~1 ms) gamma ray (>1 MeV) bursts of terrestrial origin have been detected by the Compton Gamma Ray Observatory over thunderstorm regions, and their source is believed to lie at altitudes greater than 30 km. X-rays and gamma-rays are hallmarks of high-energy electric discharge processes. An external source delivering power through an atmosphere that is increasing in density downwards, can be expected to give rise to the highest energy radiation at the top of the atmosphere or at the footprints of arcs on the surface (lightning). It is a situation we see on the Sun where the hardest radiation comes from high above the photosphere, except when an arc touches down and a solar flare results. The electrical model may be extended to all bodies in an Electric Universe.

So, as in *The Fellowship of the Ring*, Bering's "Dark Rider" didn't find what it was looking for. The secret for the wizards of science is to let die their ancient myths of an electrically sterile universe. Then the future may be theirs to foretell. It requires no magic.

If Tolkien will forgive me,

**There is one power to rule them all and in the darkness, light them -
ELECTRICITY**



An interesting footnote to lightning on Venus:

It is known that lightning backscatters microwaves at wavelengths of a few centimetres. One of the most puzzling discoveries by the Magellan Venus Orbiter was that all high terrain on Venus reflected radar signals as if it were coated by metal. I explained this phenomenon several years ago as being due to a glow discharge in a dense plasma. It is the most prevalent form of lightning on Venus because that planet doesn't have clouds like the Earth to provide a convenient path to ground for cosmic electric power. Without clouds on Earth we too would have glowing mountain tops and destructive super-bolts from a blue sky. The Galileo spacecraft detected super-bolts on Venus.

What is a sprite?

Sprites are colossal towers of red and blue light, 10 kilometres or more across, usually climbing up to 30 kilometres from a starting height of about 50 kilometres, well above the storm. They glow for only a few thousandths of a second, which makes them difficult to see and record. Most importantly they seem to be triggered by lightning flashes in storms far below.

Although we are all familiar with the story of vertical movements of water droplets in storm clouds giving rise to lightning, the truth is that **it is not known what causes a thunderstorm**. Somehow negative charges collect at the bottom of a cloud and positive charges at the top. Eventually the intensity of the electric field between cloud and ground causes electrical breakdown of the air. The freed electrons are accelerated by the field toward the ground in the form of sinuous "stepped leaders." This is a weakly luminous process. On reaching the ground a conductive channel is now available between the

ground and the cloud. The result is the brilliant arc of the "return stroke" – a bolt of lightning.

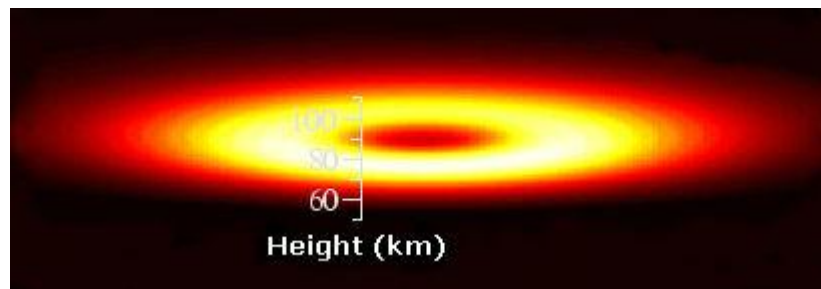
The simplest and smallest sprites are single vertical columns named C sprites. Large collections of C sprites resemble a mammoth fireworks display. A subset of the sprites with tendrils—often the largest and most energetic—also exhibit upward branching toward the ionosphere, and are named carrots. Very large sprites with diffuse tops and lower tendrils extending down to altitudes of 30-40 km have been dubbed angels, jellyfish, and A-bombs. With maximum vertical extents exceeding 60 km, these giant sprites extend vertically three times farther than the largest thunderstorms.

Long-lived species may also be present at lower altitudes—in the long tendrils that stretch down below the sprite's body to the cloud tops like the tentacles of an octopus. These tendrils light up with bright, spherical "beads" which on some occasions outlive the main sprite, lasting up to a hundred milliseconds in some cases, and can even momentarily flare up long after the sprite body has faded. "*Such bright spots give the impression of embers in a dying fire,*" says **Stenbaek-Nielsen**, from the Geophysical Institute of the University of Alaska.

A good web page is: <http://lightning.nmt.edu/sprites/sprites.html>

What is an ELVE?

Elves are shaped quite differently from sprites and were first identified in 1990 as brief brightenings of the airglow layer in space shuttle imagery. The ringlike elve in Figure 1 (not "elf": the acronym stands for "emissions of light and very low frequency perturbations from electromagnetically pulsed (EMP) sources") is centered on the vertical channel to ground. It is a rapidly expanding ring of luminosity in a narrow altitude range (85-95 km). For an observer on the ground, the flash appears to drop in altitude and spread outward with time. While the optical flash may last only tens of microseconds, light is emitted from different regions for 1 millisecond as the EMP propagates radially outward.



What is a gnome?

"We're seeing things we've never seen before on top of active storms-electrical discharges coming out the top of clouds that could be a new form of lightning," says Walter Lyons of the Yucca Ridge Field Station, Colorado. They have tentatively been christened gnomes.

"They look like fingers of light going straight up out of the cloud but at rather slow speed. It looks like lightning in pictures but takes over a second or two to happen."

Could gnomes be more energetic than sprites? *"I wouldn't volunteer to sit in one,"* says Lyons.

"Sprites have tremendous amounts of energy spread over a great volume. We've got no idea how much energy is in a gnome, but it's compressed into a smaller area."

A Mystery Solved – Welcome to the Electric Universe!

Posted on [March 20, 2002](#) by [Wal Thornhill](#)

"We simply do not have a truly unified view of the world, one that paints an unambiguous picture of some overall scheme. ...one invariably confronts a deep fissure that can be overcome only with revolutionary new ideas."

- Etienne Klein & Marc Lachièze-Rey, THE QUEST FOR UNITY – The Adventure of Physics.

NASA has confirmed a "deep fissure" in our understanding of the universe. The answer, though revolutionary, is simple. But it implies that the real nature of the universe is nothing like the fanciful stories we are being told. So who will have the courage to listen? Robert Matthews, Science Correspondent for The Sunday Telegraph filed this report:

Mysterious force holds back NASA probe in deep space

A SPACE probe launched 30 years ago has come under the influence of a force that has baffled scientists and could rewrite the laws of physics.

Researchers say Pioneer 10, which took the first close-up pictures of Jupiter before leaving our solar system in 1983, is being pulled back to the sun by an unknown force. The effect shows no sign of getting weaker as the spacecraft travels deeper into space, and scientists are considering the possibility that the probe has revealed a new force of nature. Dr Philip Laing, a member of the research team tracking the craft, said:

"We have examined every mechanism and theory we can think of and so far nothing works."

"If the effect is real, it will have a big impact on cosmology and spacecraft navigation," said Dr Laing, of the Aerospace Corporation of California.



Pioneer 10 was launched by NASA on March 2 1972, and with Pioneer 11, its twin, revolutionised astronomy with detailed images of Jupiter and Saturn. In June 1983, Pioneer 10 passed Pluto, the most distant planet in our solar system. Both probes are now travelling at 27,000 mph towards stars that they will encounter several million years from now. Scientists are continuing to monitor signals from Pioneer 10, which is more than seven billion miles from Earth.

Research to be published shortly in The Physical Review, a leading physics journal, will show that the speed of the two probes is being changed by about 6 mph per century – a barely-perceptible effect about 10 billion times weaker than gravity. Scientists initially suspected that gas escaping from tiny rocket motors aboard the probes, or heat leaking from their nuclear power plants might be responsible. Both have now been ruled out. The team says no current theories explain why the force stays constant: all the most plausible forces, from gravity to the effect of solar radiation, decrease rapidly with distance.

The bizarre behaviour has also eliminated the possibility that the two probes are being affected by the gravitational pull of unknown planets beyond the solar system. Assertions by some scientists that the force is due to a quirk in the Pioneer probes have also been discounted by the discovery that the effect seems to be affecting Galileo and Ulysses, two other space probes still in the solar system. Data from these two probes suggests the force is of the same strength as that found for the Pioneers.

Dr Duncan Steel, a space scientist at Salford University, says even such a weak force could have huge effects on a cosmic scale. "It might alter the number of comets that come towards us over millions of years, which would have

consequences for life on Earth. It also raises the question of whether we know enough about the law of gravity."

Until 1988, Pioneer 10 was the most remote object made by man – a distinction now held by Voyager 1.

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[Go to original article.](#)

Solution of the mystery:

Common sense suggests that it is unlikely that the laws of physics will need to be rewritten, simply that we should understand better those we have. We need not trouble ourselves with arguments about the nature of gravity in this instance because the mystery can be solved if the electrical nature of the universe is acknowledged. The mystery only arises because astrophysics is taught incorrectly. Students are taught that any separation of charge in space is quickly neutralized as electrons rush to neutralize the charge imbalance. As a result, electricity in space is almost never mentioned, except as a transient effect. So no astrophysicist would think to ask the question of whether there is a steady interplanetary electric field. They have not "examined every mechanism and theory."

It is always assumed that there is a source of electrons to meet any deficiency and that they can be supplied faster than the charging process. However, space is a far better vacuum than any we can achieve on Earth, so the assumption that there are sufficient electrons available may not be true. And where there are sufficient electrons, in their rush to neutralize the electric field they may undergo the magnetic "Z pinch" effect that cuts off the current at some maximum value before recovering and beginning the cycle once more. In fact, observations of energetic activity in space on all scales show this kind of "bursty" behavior. The most recent example came from Jupiter and was reported by Scientific American on March 4 as "a mysterious X-ray 'hot spot' that flares up like a beacon every 45 minutes." We produce X-rays every day in industry and medicine by using electrical discharges. Why would Nature do it any other way?

In our electric universe the forces between charged objects is of the same form as Newton's equation, with charge replacing mass. The BIG difference is that the electrical force is about 10^{39} times stronger than gravity. So if there is an electric field in space, it will have a measurable effect on a charged spacecraft.

An electric field in space can give rise to electric discharge phenomena like those seen in a low-pressure gas. The most familiar example is the neon tube, and for some lucky people—the wonderful natural spectacle of an aurora. Extensive research was done on gas discharges early in the 20th century but its application to solar physics, pioneered briefly in the 1970's by an engineer from Flagstaff, Arizona, Ralph Juergens, was perforce published in an obscure journal and permitted to sink without trace.

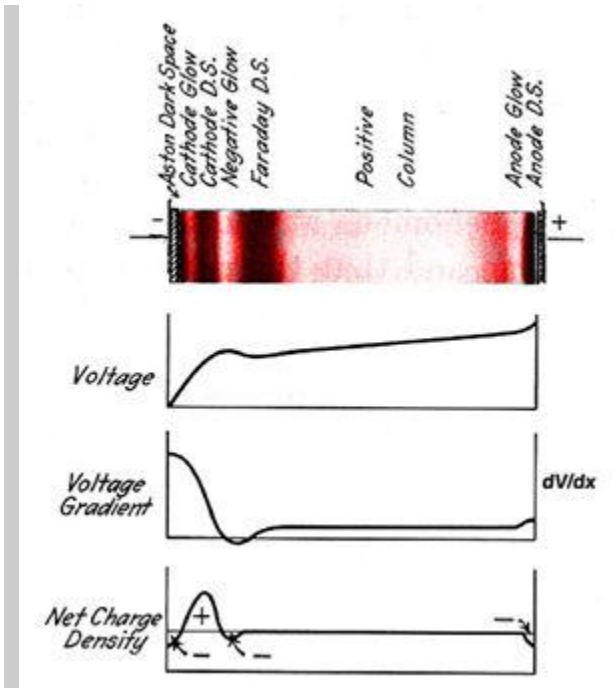


Diagram from *Gaseous Conductors*, by James D. Cobine, Dover Publications.

This is a diagram showing a discharge tube with all of the important features annotated above the tube. [D.S. = dark space]. Note that in the Sun's huge environment, the only bright regions are very close to the Sun because the energy density is too low to excite a glow. Below the tube are graphs showing the variation of important variables along the tube length. The simple discharge tube demonstrates some of the complexity of electric discharges in near vacuum and surprisingly it holds the key to the mystery of spacecraft deceleration.

As Juergens argued, within our solar system the Sun bears all of the hallmarks of a small spherical anode in a galactic discharge. The planets occupy a vast region within the

heliosphere, known in gas discharge theory as the positive column, which has a weak electric field centered on the Sun. Unlike the thin neon tube, the Sun occupies a vast sphere more than 16 billion miles across, so the positive column disappears and the current is carried throughout that volume by a low density of ionization. It requires only that the Sun's electric field has sufficient strength to cause a drift of electrons toward the Sun, superimposed on their random thermal motion. In other words, it is immeasurably small. Notice that the net charge density in the positive column is zero. In other words, there are an equal number of negative and positive charges in interplanetary space. That is what spacecraft have generally found.

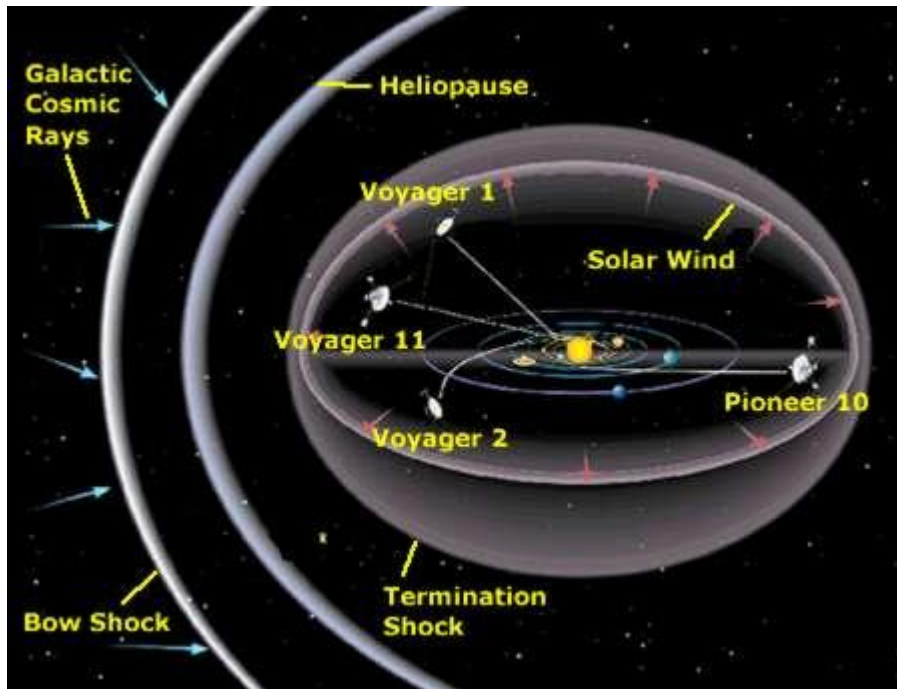
The regions of high electric field are close to the anode and cathode. In the Sun's case, being the anode, it is in the corona, where electrons are accelerated toward the Sun, causing the apparent million-degree temperatures there, and the protons are accelerated away from the Sun—to form the solar "wind." The continued acceleration of the positive particles in the solar wind beyond the orbits of Mercury and Venus is a natural consequence of the same weak electric field that slows down the negatively charged

spacecraft. The cool photosphere beneath a "hot" corona is, for the first time, understandable if the Sun's energy is delivered externally.

Of course, the Sun does not have an identifiable cathode in space like the metal cathode in the glow discharge tube. Instead, the plasma in space forms a bubble, known as a "virtual cathode." Effectively it is the heliopause. In plasma terms, the heliopause is not a result of mechanical shock but is a Langmuir plasma sheath that forms between two plasmas of different charge densities and energies. In this case it forms the boundary between the Sun's plasma and that of the galaxy. Such "bubbles" are seen at all scales, from the comas of comets to the 'magnetospheres' of planets and stars. To the plasma engineer they show that the central body is electrically charged relative to its surroundings.

After launch, a spacecraft accepts electrons from the surrounding space plasma until the craft's voltage is sufficient to repel further electrons. Near Earth it is known that a spacecraft may attain a negative potential of several tens of thousands of volts relative to its surroundings. So, in interplanetary space, the spacecraft becomes a charged object moving in the Sun's weak electric field. Being negatively charged, it will experience an infinitesimal "tug" toward the positively charged Sun. Of most significance is the fact that the voltage gradient, that is the electric field, throughout interplanetary space remains constant. In other words, the retarding force on the spacecraft will not diminish with distance from the Sun. This effect distinguishes the electrical model from all others because all known force laws diminish with distance. The effect is real and it will have a fundamental impact on cosmology and spacecraft navigation because...

Pioneer 10 has confirmed the electrical model of Stars!



Pioneer 10 is now 7.4 billion miles from Earth, maybe 90 percent of the way to the heliopause. The electrical model of the solar system predicts that additional anomalies will be found if a distant spacecraft encounters the heliopause while still in contact with Earth. For the heliopause is the "cathode drop" region of the Sun's electrical influence. It is a region of strong radial electric field, which will tend to decelerate the spacecraft more strongly. Almost the full difference between the Sun's voltage and that of the local arm of the galaxy is present across the heliopause boundary. As a result, it is the region where so-called "anomalous" cosmic rays are generated by the strong field. It has nothing to do with a shock front and some poorly defined acceleration mechanism. Some measure of the driving electrical potential of the Sun may be gained from the study of "anomalous" cosmic rays. Also we can deduce the driving potential of other stars by the study of normal cosmic rays.

The implications of an electrical dimension to stars are profound. Obviously, if we do not understand our closest star, all speculation about more distant stars and their histories are misguided. Of course, it begs the question of the power source that maintains the galactic charge differentials to power stars. It is here that the electric star hypothesis merges seamlessly with plasma cosmology, which also had its origin in electrical engineering. [Plasma cosmology](#), which is now recognized by the IEEE, is practically unknown amongst astronomers and astrophysicists. The latter have been content to ignore the warnings of Hannes Alfvén, the "father" of plasma physics and plasma cosmology, that their use of plasma theory is outdated and wrong.

For example, the spiral arms of a galaxy must carry the electric current that lights the stars. The force between parallel currents varies inversely with distance, instead of the much more rapid fall-off of gravity with the square of the distance. The result is that the longest-range force law in the universe governs galactic motions, and short-range repulsion maintains the integrity of the spiral arms. In comparison, by using the puny force of gravity astrophysicists must insist on the cranky notion that most of the mass in the universe is invisible and distributed in arbitrary fashion. Even so, they cannot explain the preferred spiral structure of galaxies.

As a leading member of The Spaceguard Foundation, Duncan Steel's final comment about comets is self-serving. Those who publicize the threat of comet or asteroid impact with the Earth have a great deal to "unlearn" and learn anew about the electrical nature and origin of comets. What really happens when charged bodies are on a collision course? Who has ever seen a single bolt of lightning in an artist's depiction of cosmic impact? Spaceguard argues that an impact could send us the way of the dinosaurs. But something far more dramatic than a puny impact killed the megafauna, simply because they could not function in Earth's present gravity. Our scientific beliefs must change spectacularly once the electrical nature of the universe is recognized.

Images courtesy of NASA. Solution of the mystery © Wal Thornhill 2002.

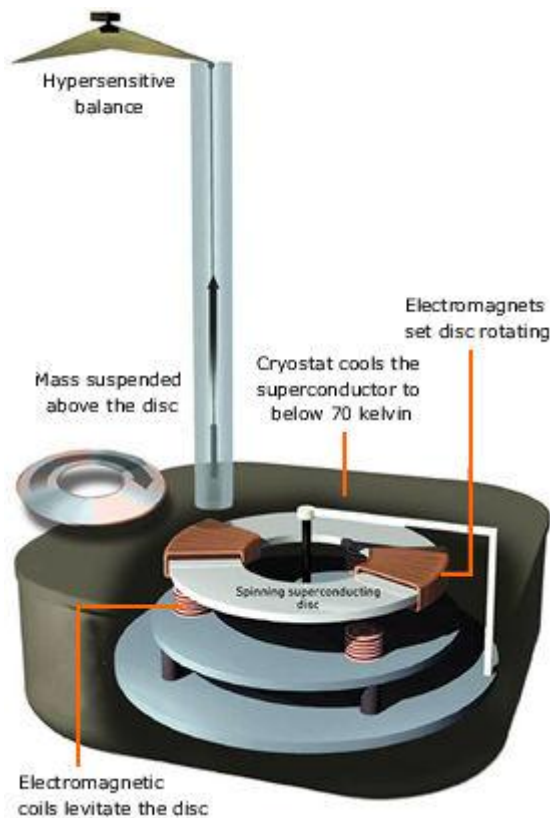
Antigravity?

Posted on [May 21, 2002](#) by [Wal Thornhill](#)

According to the physicist, Lee Smolin, cranks are just a fact of life for working physicists.

"Several of us have speculated that there must be a particular psychosis that results in people believing that they have disproved relativity."

New Scientist, 12 Jan 2002, reported that Evgeny Podkletnov is a Russian émigré whose claim to have demonstrated antigravity caused such a storm he was thrown out of his job at Tampere University of Technology five years ago. He now works as a researcher in superconducting materials at the nearby University of Tampere. He has recently convinced NASA to spend \$600,000 on a machine he claims will shield matter from Earth's gravity. The implication is that if it works it will open up a whole new branch of theoretical physics.



In 1992 he published a paper describing how he had stumbled across a "gravity shielding" effect while running a routine test on one of his superconductors. The details were sketchy. But the basics are these: make a superconducting disc 145 millimetres in diameter and 6 millimetres thick, according to a special chemical recipe that Podkletnov did not make public. Cool the disc to below -233 degrees Celsius, then levitate it using a magnetic field. Finally, apply an electric current alternating at around 100 kilohertz to coils surrounding the disc. The current makes the disc rotate in the constantly changing magnetic field, something like an electric motor (see graphic). So far, there's nothing extraordinary here.

But Podkletnov claimed that when the disc was spinning at more than 5000 revolutions per minute, objects placed above it lost around 1 per cent of their weight. Increasing the spin speed, he claimed, reduced their weight still further. In subsequent experiments, he claims to have seen weight reductions of up to 2 per cent.

Podkletnov concluded that this apparatus somehow reduced the strength of the Earth's pull on any object placed above it and called it a "gravity shielding" device. Stick a more

powerful version of this apparatus on the bottom of a spacecraft and rocket propulsion would be history: just the slightest nudge would be needed for lift-off into space. Terrestrial transport would be revolutionised too, together with a large chunk of theoretical physics.

Comment:

Here we see a tendency to ascribe observations that don't fit the accepted paradigm to "new physics" or "new forces." However, rather than add more barnacles to the heavily encrusted vessel of theoretical physics, the truly scientific approach would be to revisit all of the assumptions that underpin the accepted paradigm to see if they might be wrong. Unfortunately, it is at this point we are usually torpedoed by fashionable dogma, as shown by the opening comment from Lee Smolin, who also wrote:



"What is space and what is time? This is what the problem of quantum gravity is about. In general relativity, Einstein gave us not only a theory of gravity but a theory of what space and time are—a theory that overthrew the previous Newtonian conception of space and time. The problem of quantum gravity is how to combine the understanding of space and time we have from relativity theory with the quantum theory, which also tells us something essential and deep about nature."

In the words of the inimitable Harry Belafonte:

"It was clear as mud, but it covered de ground, de confusion made me head go 'round."

Here we have the confusion about gravity, space and time, instigated by Einstein, to be compounded with ignorance about the physical meaning of quantum theory. We are about 80 years overdue for a simplification, rather than more complexity. If, by the attempt I must join the ranks of the cranks, then so be it. As one noted astronomer has said:

"When the complete answer is not known, in a sense everyone is a crackpot."

It is somewhat ironic that Einstein hated the probabilistic nature of quantum theory because it seems that the confusion created by his [Relativity](#) theories prevented a classical model being developed. That is, a model that relates cause and effect, and where time and space are not subject to dilatation. "God does not play dice," he is reputed to have said. He felt that quantum physics could not possibly be complete because it cannot relate cause and effect and does not go beyond predicting the properties of matter statistically. Einstein, starting with the following three premises, showed that quantum theory was not a complete description of reality:

1. The predictions of quantum theory are correct
2. No effect can travel faster than the speed of light
3. If, without in any way disturbing a system, we can predict with certainty the value of a physical quantity, then there exists an element of physical reality corresponding to that physical quantity.



The Irish physicist, John Bell, was able to prove rigorously that any theory claiming to describe reality on the basis of (1) and (3) is automatically in conflict with (2). But rather than confront the possibility that (2) may be wrong at the level of fundamental particle interactions, physicists have preferred to enter the realm of metaphysics with meaningless terms like "spooky interaction at a distance", "non-locality", and "entanglement." It has even been suggested that macroscopic objects behave classically but atoms and subatomic particles do not! The coherent behaviour of lasers, Bose-Einstein condensates, and on the grandest scale—the discovery of quantized redshifts of galaxies, should have disposed of that idea.

What can a simple answer possibly be? "God is subtle but he is not malicious," Einstein said in 1921. But was it his "law" of the universal speed limit that stood in the way of further progress? We observe that gravity operates between atoms at a speed far greater than the speed of light. Otherwise the Earth would be tugged toward an empty point in space that the Sun occupied 8 minutes ago, and the Earth's orbit would quickly change. If Newton was right and gravity does operate at near-infinite speed then Einstein's Special Theory reduces to Euclidean space of 3-dimensions and time is universal. There is no reality to "warped space" and "space-time." We return from fantasy-land to the world we perceive, which is probably a giant step back to the future. So, could it be that the force of gravity and the electric force are the same, and that the speed of light is merely the characteristic velocity of an electrical disturbance in the medium of space? After all, space is not a vacuum – it teems with neutrinos. That would be a major simplification.

The first problem with an electric gravitational force is that like charges repel and unlike charges attract, whereas gravity always attracts. A simple way out of that problem is to propose that electrons, protons and neutrons are composed of smaller orbiting charged units (which we may dub "subtrons")* whose total charge sums to $-e$, $+e$ and zero, respectively. The magnetic moment of the neutron and spin of the electron suggests that this is so. The stumbling block to such a model has always been the assumption of Einstein's speed limit on the electric force between charged subtrons. For instance, it has been calculated that subtrons orbiting inside the classical radius of the electron would have a speed of 2.5 million light-years per second. That is the distance from here to the other side of the great Andromeda galaxy in one second! The speed of the electric force must exceed that by a considerable margin for the electron to be a stable particle.



* The word "subtron" was coined by Ralph N. Sansbury in his monograph "Electron Structure" in The Journal of Classical Physics in January 1982. It led to a new classical explanation of magnetism and gravity.

The electron, proton and neutron have not only a classical size but also a shape, which changes in response to the electric force. The electrical energy absorbed by these particles in deformation rather than acceleration gives rise to the phenomenon of inertial mass. It is the fundamental origin of the relationship $E = mc^2$. If gravity is an electrical force, we can see why the gravitational mass of a body is identical to its inertial mass. We have a real classical model with which to explain inertia, gravity, magnetism and quantum theory. Magnetism is a subject on its own to be dealt with later. But if we take an atom for example, it is a complex system of electrical resonances between orbiting charged subtrons within orbiting charged particles. A stable electron orbit is one in which the gain and loss of energy between a deformable electron and all of the subtrons in the other electrons and the nucleus sums to zero over that orbit. Electrons in an atom "whisper" to the nucleus in order to prevent the "classical catastrophe" of the electron spiralling into the nucleus. Changes in resonant state occur in quantum jumps and give rise to an un-cancelled oscillating electric force that may be accepted by another atom. An atomic nucleus operates in the same way, so that quantum tunnelling effects and nuclear interactions can be understood in resonant terms rather than simplistic coulomb barriers. The nuclear force is then another manifestation of the electric force between resonant subsystems within the nucleus. "Cold" fusion is possible in such a resonant system and radioactive decay has an electrical cause and can therefore be modified. It seems that electrons in composite (more than one proton) atomic nuclei are essential for resonant stability. When they leave a nucleus in the company of a proton we call the pair a neutron. Oddly enough, that resonant system is unstable, with the result that it has a lifetime outside the nucleus measured only in minutes.



"...it may be that the next exciting thing to come along will be the discovery of a neutron or atomic or electron electric dipole moment. These electric dipole moments ... seem to me to offer one of the most exciting possibilities for progress in particle physics."

- Steven Weinberg, from his summary talk for the 26th International Conference on High Energy Physics at Dallas in 1992.

To return to gravity, each subatomic particle is itself a small sphere of orbiting charges, which will be distorted in an external electric field to form an electric dipole. Since each particle is free to rotate, the dipoles will align themselves with the field so that they always attract each other. Chemists who deal with dipolar molecules have already noted the similarity of their interactions to that of gravity. The distortion of the subatomic particles is exceedingly small and so the

dipole is exceedingly weak. That accounts for the difference between the naked electric force and the gravitational force of some 40 powers of ten. An immediate objection to this model is that the force between dipoles falls off with the cube of the distance, while gravity diminishes with the square of the distance. But Newton's law operates counter-intuitively as if the entire mass of the Earth were concentrated at the center of the Earth. The electrical model must take into account the real situation and integrate the effect of all of the dipoles throughout the Earth. The result is the usual inverse square relationship.

Newton developed a mathematical expression that related an apparent force, gravity, between ponderous objects, to their masses and the distance between them. The expression involved a constant, G, given the grand title of the Universal Gravitation Constant, with no evidence whatsoever of its universality or its constancy. The electrical model of gravity has G a variable that depends also upon the charge distribution in the body. That would explain why G is the most ill defined "constant" in physics.

The New Scientist report goes on to mention that:

"Podkletnov's only current collaboration is with Giovanni Modanese, an Italian physicist who is trying to build a theoretical explanation for Podkletnov's results. But because physicists have such a poor understanding of the mechanisms behind both gravity and high-temperature superconductivity, his explanations are necessarily vague. He suggests that quantum processes within the superconducting material are interacting with quantum processes in the gravitational field. But, he admits, he can't go far with the work because there are too many unknowns."

We can understand his problems! However, the electrical model may offer a basis for understanding the Podkletnov experiment. When the thermal energy of a conductor is reduced to a level where it becomes a superconductor, the resonant behaviour of the conduction electrons extends throughout the entire conductor and is lossless. The atomic nuclei are also involved in the macroscopic resonance and that may explain why particular atomic nuclei in particular proportions work best as superconductors. It is a curious fact that conduction electrons in a superconducting magnet have an inertia that is the square of the number of electrons, instead of the normal Newtonian linear relationship. This seems to be telling us that the electrons in Podkletnov's spinning superconducting disk are able to absorb energy more by distortion than by acceleration. Now, if we envisage the electric force of gravity acting on a static horizontal disk, it distorts all of the subatomic particles in the disk in the direction of the gravitational force and consequently forms small vertical electric dipoles. If we spin the disk, there is an accelerative force toward the center of the disk, which will distort the particles radially. These particle distortions must rotate through 360 degrees for each revolution of the disk. But as we have seen, superconductors fiercely resist such accelerations so there will be a lag in orientation of the dipoles.

All that is required to provide a gravitational shield like that claimed by Podkletnov is to have the gravitationally induced dipoles offset from the vertical by particle distortion. It

seems probable that the effect would be more marked if the disk were rotated in the vertical plane. In that case the gravitational dipoles have to rotate through 360 degrees each revolution and the opportunity for offset from the vertical seems much greater. That could possibly explain the apparent loss of weight of gyroscopes demonstrated on TV by the controversial Eric Laithwaite.



When Professor Eric Laithwaite [1921-97] was invited to give the Faraday Lecture in 1974-5 at the Royal Institution, he brought with him an array of gyroscopes – from toy ones that balanced on model Eiffel towers, to a huge 50lb one that he spun up and raised effortlessly above his head with one hand. "Look," he exclaimed to the assembled dignitaries, "It's lost weight!" ignoring their evident shock at such a heretical claim.

"I thought my fellow scientists would be genuinely interested, so I wasn't prepared for the utter hostility of their reaction," Laithwaite recalled later. The Royal Institution did not publish his lectures. Laithwaite's nomination for the Fellowship of the

Royal Society was cancelled. He retired from Imperial College in 1981 pretty much in disgrace. "None of my critics could ever explain to me how a 50lb spinning wheel loses weight," he said.

At the very least, the work of Ampere, Gauss and Weber should be reexamined to see how Weber was able to deduce by 1870! the existence of the charged atomic nucleus and oppositely charged orbiting electrons, the classical electron radius, and the nuclear binding force. Some of these things had to wait until the 20th century for their eventual discovery, without any mention of the priority of the aforementioned distinguished scientists. So goes the scandalous politics of science. Their work demonstrated that the more general laws of the electrical behavior of matter must take into account all of the electrostatic and electrodynamic interactions between the positive and negative charges that comprise normal matter. By applying their methods to charged subtrons we may find the secret to antigravity.

Warped Minds

The best analogy I have seen of Einstein's Special Theory of Relativity comes from a small book, *The Logic of Special Relativity* by S. J. Prokhovnik. In it he equates the apparent shortening of measuring rods and slowing of clocks when they move away from an observer at constant velocity to the diminution in size experienced by two receding travellers. The effect is reciprocal but no one imagines that the effect is real. Strangely, in effect that is precisely what Einstein did imagine and it has led to continual confusion and argument. Experiments were said to prove the effect was real but when examined closely each brought its own set of preconceptions to the data. The problem was compounded when it was argued that space itself shortened, not the rod. It is like saying that the receding traveller appears to shrink because the space he occupies is shrinking. And as

space is shrinking it takes less time to cover a given distance. Here we see the insidious effect of this kind of thinking because we now have time and space tangled up together.

The British scientist, Herbert Dingle, for many years wrote the entry for the Encyclopedia Britannica on Einstein's Special Theory of Relativity before recanting. Then, in his book, *Science at the Crossroads*, he related the difficulties he encountered after he realized that Einstein's version of the theory of relativity didn't make sense. He wrote:

"The equations [Einstein or Lorentz as the need arose] worked, so the 'experimenters' became convinced that the theory, whatever it was, must be right. The superior minds acknowledged that they did not understand it, but the majority could not rise to that height. Nothing is more powerful in producing the illusion that one understands something that one does not, than constant repetition of the words used to express it, and the lesser minds deceived themselves by supposing that terms like 'dilation of time' had a self-evident meaning, and regarded with contempt those stupid enough to imagine that they required explanation. Anyone who cares to examine the literature from 1920 to the present day, even if he has not had personal experience of the development, can see the gradual growth of dogmatic acceptance of the theory and contempt for its critics, right up to the extreme form exhibited today by those who learnt it from those who learnt it from those who failed to understand it at the beginning."

Mathematics is an indispensable and powerful tool where it has been demonstrated that it applies to a real world experience. However, it is inappropriate and, as Dingle points out, potentially dangerous, to give credence to deductions arising purely from the language of mathematics. The problem is that mathematicians now dominate physics and it is fashionable for them to follow Einstein's example, with fame going to those with the most fantastic notions that defy experience and common sense. So we have the Big Bang, dark matter, black holes, cosmic strings, wormholes in space, time travel, and so on and on. It has driven practically minded students from the subject. There is an old Disney cartoon where the scientist is portrayed with eyes closed, rocking backwards in his chair and sucking on a pipe, which at intervals emits a smoke-cloud of mathematical symbols. Much of modern physics is a smoke-screen of Disneyesque fantasy. Inappropriate mathematical models are routinely used to describe the universe. Yet the physicists hand us the ash from their pipes as if it were gold dust. If only they would use the ashtrays provided.

*"It seems that every practitioner of physics has had to wonder at some point why mathematics and physics have come to be so closely entwined. Opinions vary on the answer. Bertrand Russell acknowledged "Physics is mathematical not because we know so much about the physical world, but because we know so little."
...Mathematics may be indispensable to physics, but it obviously does not constitute physics."*

- Klein & Lachièze-Rey, *THE QUEST FOR UNITY – The Adventure of Physics*.

Water on Mars?

Posted on [July 15, 2002](#) by [Wal Thornhill](#)

Planetary scientists are busy looking for evidence of water on Mars in support of plans to send robotic and, eventually, manned missions to the red planet. Water is a key ingredient in the search for signs of extraterrestrial life. Some scientists speculate that life may have once existed on Mars because a few massive channels there suggest floods of copious liquid surface water in the planet's dim past. Also, the possibility of life is suggested by the presence of carbon dioxide as a major constituent of the thin atmosphere.

The scientific community has shifted its earlier view of Mars dramatically. Instead of stories about the cold desert planet, the popular press now prints headlines such as: "Flood Carves Instant Grand Canyon." The situation is ripe for seeing only what is already believed. This bias shows in the language when channels are identified unequivocally as fluvial (carved by flowing water) and of late Noachian age (between 3.5 and 3.7 billion years old), the very name invoking images of a universal flood.

The thesis presented on this website tells a completely different history of Mars, based upon the electrical nature of the solar system and recent chaotic orbital behavior. It may seem outrageous to propose a completely different Mars about 10,000 years ago, instead of 3,500 million years ago in the conventional story. However, the dating techniques used by geologists rely on a belief in fictional and endlessly adjustable planetary evolution stories – a different story for each planet. These stories have proven to be totally non-predictive. Good science requires accounting for as much of the relevant evidence as possible. Instead of working forward from a set of beliefs about the past, we should first assemble all the data we can, including that from the stories told by ancient people about the behavior of objects they saw in the sky. A forensic method can glean useful information from these archaic stories, rituals, and art that can help distinguish between alternative explanations for present conditions.

The results of this forensic research by a very few adventurous scholars are unequivocal, unexpected and disturbing. If we could see it, our prehistoric sky would stupefy us with its unfamiliarity. Mars and Venus moved close to the Earth and met in apparent combat wielding thunderbolts. The spectacular patterns of interplanetary lightning were commemorated globally in petroglyphs, monumental works and cultural traditions. Our prehistoric ancestors remembered the Earth's encounters with a furious Mars, "the god of war," as the archetypal "doomsday." That memory survives to this day in our cultures and religions, its true meaning almost universally unrecognized. We do not want to know that our beautiful Earth can be unsafe. We accept palaeontologists' stories about global extinction events provided they happened in the dim and distant past. Modern doomsayers, as if tuned into the ancient fears, try to arouse us by stories of imminent impacts. But those stories are based on the geologists' misunderstanding of impacts. Global devastation requires an encounter between planets, not puny asteroid impacts. The evidence for planetary electrical encounters is sufficiently detailed and extensive to fill several forthcoming books.

Being a small body, Mars suffered terribly in its planetary electrical exchanges. It lost most of its atmosphere in the process and gained a little in return. So present day measures of water and carbon dioxide on Mars do not represent billions of years of evolution. Indeed, the dominant constituents of its atmosphere, carbon dioxide and nitrogen, could have been predicted from the global accounts of the entanglement of Mars with the distended atmosphere of Venus. Also, it has been known since the first space probes descended into the infernal atmosphere of Venus that the measurements of isotopic ratios in its atmospheric gases contradict the standard evolutionary model of planet formation. The reason is that interplanetary discharges are powerful enough to cause nuclear transformations. In particular, they are copious generators of neutrons. So the anomalously high levels of the heavy isotopes of carbon (^{13}C), nitrogen (^{15}N) and hydrogen ^2H , in the Martian atmosphere may be understood simply as due to neutron capture in the gases stretching between Mars and Venus during one of their celebrated battles.

So, what are we to make of the orthodox dating of the channels on Mars to almost 4 billion years ago? Relative dating of surface features relies upon comparisons of crater counts on the surfaces of Mars and other bodies. Radioactive clocks are then used to pin down the age of surface rocks. We have for that purpose rock samples from the Moon and a small number of meteorites identified as originating from Mars. But if the initial states of the rocks are unknown and the clocks can be upset by energetic electrical discharges, geologists are left with little else to date the surface features of Mars other than to count craters. And that is a method based on two crucial and erroneous assumptions:

The first assumption is that the solar system has run like clockwork for 5 billion years. That has allowed a fictitious early history to be written about planets being hit by leftovers from their afterbirth. The impacts had to be late enough that the planets could record them on a solid surface, so it is called the "late heavy bombardment." Crater statistics led to a need for another episode, called the "post late heavy bombardment." This "history" is a complex fiction because (1) the "accretion by impact" model of planet development has not been shown to work; (2) the source of objects responsible for the cratering record observed on solar system bodies remains an unsolved problem. (The "Oort cloud" of comets is postulated as one source of ammunition for pockmarking planets. However, the number of comets seen does not support the existence of such hypothetical "builder's rubble" of the solar system. Nor does the theory make any sense.); and (3) random impacts do not explain either the detailed pattern of cratering nor the heavily cratered southern hemisphere and much smoother northern hemisphere of Mars.

The second assumption is that planetary craters are caused by the impacts of comets and asteroids. This assumption is clung to in the face of contradictory evidence. Researchers have admitted that it has not been possible to reproduce the features of most planetary craters with either impacts or explosions. So it is simply assumed that the craters are a result of impacts, and their features are used in an attempt to understand impact cratering! That is circular thinking, not science.

So what can be said of water on Mars in its earlier history? In the real story of Mars, the god of war, its pre-battle surface environment was likely to have been much more benign and Earth-like than it is today. On that basis I predict there was liquid water on the surface of Mars within the time of modern homo sapiens and that there is a good chance of finding fossils of complex life forms on Mars.

Keeping this in mind, let us look critically at this report from the Smithsonian researchers:

June 20, 2002

Smithsonian National Air and Space Museum

Large Former Lake, Catastrophic Flood Identified on Mars

Geologists at the Smithsonian's National Air and Space Museum have discovered a large former lake in the highlands of Mars that would cover an area the size of Texas and New Mexico combined, and which overflowed to carve one of that planet's largest valleys. The findings will appear in the June 21 issue of the journal Science.

The flood channel, Ma'adim Vallis, is more than 550 miles long and up to 6,900 feet deep, making it larger than Earth's Grand Canyon.

"Imagine more than five times the volume of water in the Great Lakes being released in a single flood, and you'll have a sense of the scale of this event," said Ross Irwin, a geologist in the museum's Center for Earth and Planetary Studies (CEPS) and the paper's lead author.

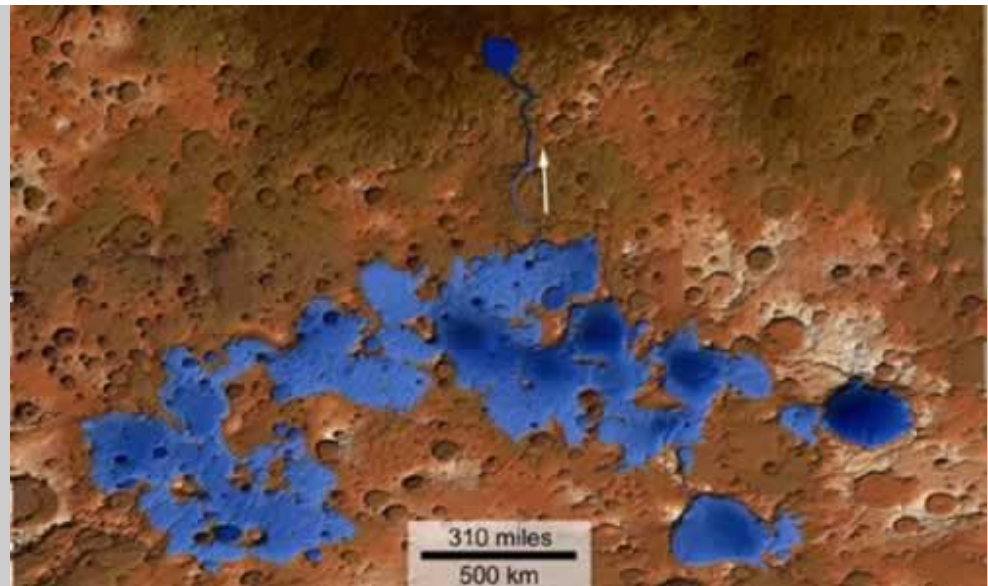


Image credit: R. P. Irwin III and G. A. Franz, National Air and Space Museum, Smithsonian Institution

False-color topographic map of the recently discovered former lakes in the cratered highlands of Mars. Lighter colors denote higher elevations. The largest of the three lakes overtopped its basin rim and the resulting outflow toward the north (arrow) carved Ma'adim Vallis, which is larger than the Earth's Grand Canyon. The basin and valleys are currently dry, but evidence of the former lake shorelines has been preserved. North is at the top.

Mars is now a cold desert planet but its many dry valleys could indicate that water once flowed on its surface. Recent results from the Mars Odyssey spacecraft have found evidence of water trapped in the near surface of the polar regions.

"The size of this lake-1,400 miles long-suggests Mars was warmer and wetter than previously thought," said Robert Craddock, a CEPS geologist and co-author of the paper. Former lakes are considered the most likely places to preserve the record of any past Martian life. Calm water would allow sediments to be deposited slowly, preventing small organisms from being destroyed.

The source of water to carve the flood channel had long been a mystery to scientists, who had known very little about Mars' topography prior to the Mars Global Surveyor mission, which has been orbiting Mars since 1997.

Detailed elevation data from the Mars Global Surveyor shows the large valley originated nearly full-size at a ridge, much like the spillway of a dam. Late in the lake's history, rising water levels overflowed the lake basin rim, releasing the huge flood as the river cut into this former dividing ridge. What remained was "some of the best geological evidence for a lake found to date on Mars, including clear indications of the former shoreline," Irwin says.

Two other smaller lake basins were identified in the region by paper co-author Alan Howard, a geologist at the University of Virginia. All three lakes shared the same water level prior to the flood, indicating the possibility of an ancient water table and suggesting the locations of other dry lake basins on Mars. Such information could be important in determining where to land robotic probes in coming years.

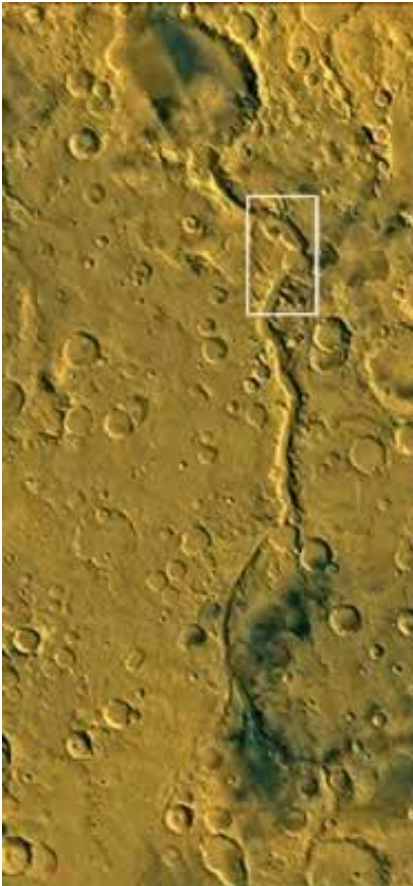
CEPS is the scientific research unit within the Collections and Research Department of the National Air and Space Museum. CEPS performs original research and outreach activities on topics covering planetary science, terrestrial geophysics, and the remote sensing of environmental change.

Comment: The geologists have not "discovered" a lake on Mars in the real sense of the word. They have discovered a cutoff level of valley networks, based on topographical maps derived from the Mars Orbiter Laser Altimeter (MOLA) data. There appears to be an "abrupt transition from bedrock to less resistant sedimentary materials" at the 1100-

metre contour. So this "shoreline" need only be reflecting the different response of the surface material to whatever erosive force shaped the area.

The major problem faced by geologists trying to explain huge valleys on dry and freezing Mars is to find a prodigious source of liquid water. With few signs of feeder streams or catchment areas, the various proposals have all required an underground source of water with unexplained episodes of heating. This paper is the first detailed proposal for a large surface reservoir of liquid water, and it requires a completely different atmospheric and temperature regime on Mars from that found today. For that reason, geologists push the event back into some imagined past epoch, called the "Noachian" era, ignoring the fact that the channels look new.

It is surely premature to declare that a former lake has been discovered on the basis of a "shoreline" and the identification of a single channel, Ma'adim Vallis, as an overflow channel that was carved by a catastrophic flood from that putative lake. An overflow of such magnitude over sedimentary material would usually be expected to produce a braided stream of many channels. This is particularly so given the cratered terrain, where crater ramparts should divert the flood. Instead of that, Ma'adim Vallis is noteworthy for the way it breaches crater walls as if they never existed. Even more damaging for the water erosion story is the fact that the channel bed itself does not show the forms expected of flowing water!

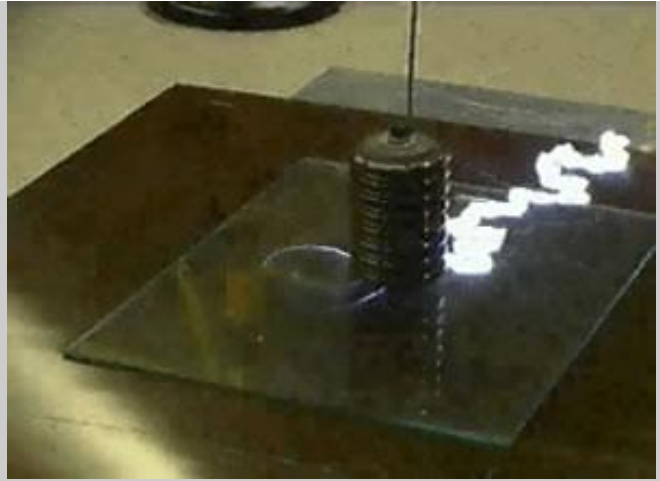


Shown here in greater detail is Ma'adim Vallis, the channel picked out in blue in the earlier picture. It is about 900 km long and varies in width from about 8 km to some 25 km near the mouth. Note that the flood is said to have originated at the bottom of the picture, where the lake is supposed to have breached an ancient crater rim. The expectation would be that the channel would be largest there but that is not the case. In fact it widens and deepens "downstream." The morphology of Ma'adim Vallis is precisely that of a sinuous rille. See also 'Mars and the Grand Canyon.'

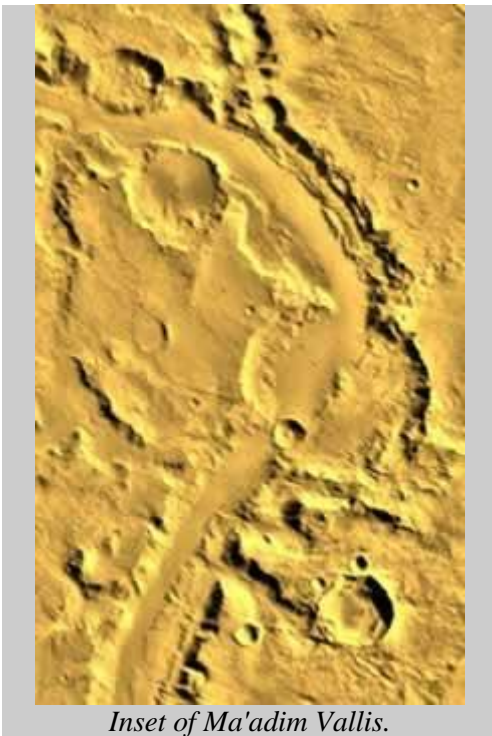
Ma'adim Vallis was formed by surface lightning, streaking across Mars toward Gusev Crater. Gusev crater is the 150 km diameter crater at the top of the valley.

Laboratory surface "lightning" snakes across a sheet of glass and bakelite. It demonstrates

the broad sinuous path taken by the discharge, its constant width over a large distance, and the lack of "tributaries."



Courtesy of Ed Bondarenko, Telstra Labs, Melbourne, Australia.

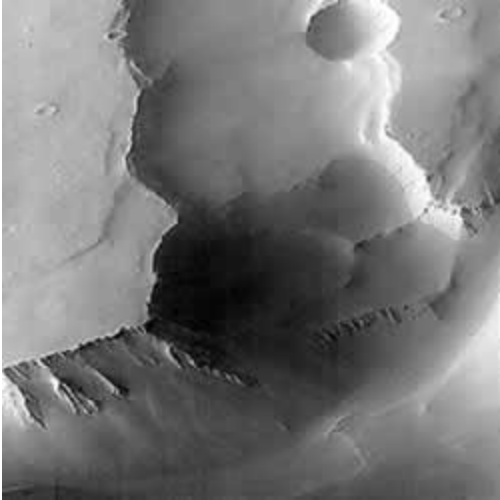


Inset of Ma'adim Vallis.

This channel is supposed to be incredibly old 3,500 million years! Yet it looks as if it was carved yesterday. If the craters are formed in the same flurry of electrical discharge activity across this hemisphere of Mars then the large crater straddling the channel may have been formed shortly before the rille was carved through it by the surface discharge.

Cathode arcs focus on local sharp high points. Having formed a crater, the tendency is then for the arc to jump to the rim of the new crater. By this means, continuous channels, composed of overlapping circular craters, may be cut into a surface. The edges of such a channel have a characteristic "cookie cutter" or scalloped appearance. This effect can be seen in the Ma'adim Vallis tributaries at lower center and top center in the picture. A small crater centered on the rim of a large crater is seen at a glance in images of any cratered planetary surface. It is an

observation that impacts cannot explain. The two dissected craters at the entrance point of Ma'adim Vallis to Gusev crater show this hierarchical effect in relation to the Gusev crater.

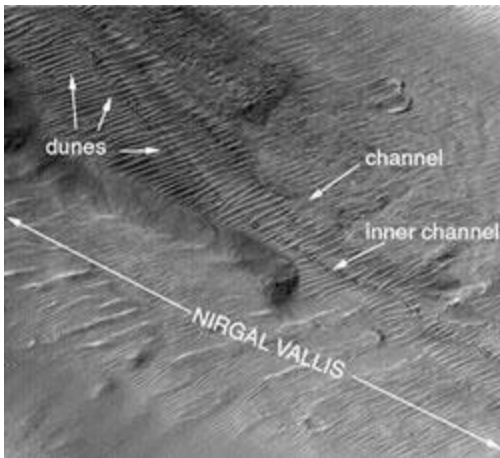


Here is an example of overlapping pits forming another huge Martian rille in Noctis Labyrinthus. Notice the crater centered on the rim and the scalloping and terracing of the rille walls. No flow of water could have cut this channel.

So, what is the story of the formation of Ma'adim Vallis? An arc cutting Gusev crater will sap electrons from the surrounding terrain by creating a strong radial electric field that begins to rip electrons from the solid surface. When breakdown begins, a lightning bolt tears across the surface, blasting soil and rock to

either side of its sinuous path. A large proportion of the excavated material is impelled electrostatically to follow the main discharge toward space. Pieces not pulled into space would fall back in a more or less random scattering all over Mars. That explains why there is little evidence of deposition inside Gusev Crater from a channel that is larger than the Grand Canyon. It is also the reason why every Mars lander has returned a vista of rubble that extends to the horizon.

Mars has many giant channels like Ma'adim Vallis. One of the mysteries of these channels is the prevalence of transverse ridges, or so-called "sand dunes." On a planet with practically no atmosphere that description seems far-fetched. Here we show an excellent example from the floor of the 700 km long Nirgal Vallis.



The picture here shows a close up of the floor of Nirgal Vallis and is 2 to 3 km on a side.

The inner channel is the path followed by the lightning discharge and is somewhat more sinuous than the excavated channel. The "dunes" are indicated. Notice how the "dunes" turn the bend to follow the inner channel. Wind would not be expected to do that.

We now turn to a photograph of the so-called "exploding wire" experiment. It is deemed to be the closest thing to real lightning achievable in the laboratory. A thin wire is suspended and a powerful electric discharge sent through it. The wire is instantly vaporized and coronal filaments radiate into the air from the plasma discharge channel. It is the radial discharges of the corona that provide the clue to the "sand dunes" on Mars. It is well known that lightning passing through dry sand will form crumbly, glassy tubes of welded sand, known as fulgurites. It seems likely that **the sand dunes in the Martian valleys are ridges of glass!** They were formed by a corona discharge from the main lightning stroke.



Exploding wire experiment. Courtesy of Ed Bondarenko, Telstra Labs, Melbourne, Australia.

The width of the Martian channel seems to be influenced by the width of the corona and depth of the discharge, which in turn is dependent on the conductivity and nature of the near-surface rock.



A "gully" in Gorgonum Chaos. The image is about 3 km square. Notice that a little liquid seems to have seeped from a stratum near the top of the south-facing channel wall.

A narrow lightning stroke at depth produces a V-shaped explosion channel. A broad corona in poorly conducting soil seems to produce a flatter floored channel. There are a few examples where a little water seems to have trickled down channel walls from a near-surface layer. That may be misleading because it could be an artifact of the electrical discharge, which seems to introduce an asymmetry in the pattern of

erosion in opposite walls. See Gorgonum Chasma and also the asymmetric erosion of the north and south walls of Valles Marineris.

So if the huge channels on Mars were not carved by catastrophic floods in the remote past, what are the chances of finding subsurface water on Mars now?

Although the giant channels on Mars were not carved by water, there is better evidence, apart from the small seepage channels, that Mars had more water in the past. It comes from the peculiar appearance of some Martian craters, where mud seems to have flowed away from the crater's rim. It is not the sort of thing that can be explained by an explosive impact. However, it is expected from an electric arc impinging on a moist anode surface. In the experiment shown here, an arc from a suspended cathode has struck a moist clay anode, representing the Martian surface. Unlike the jumping cathode arc, the anode arc

"sticks" to the spot and rotates to form a circular scar, while water comes to the clay surface and flows gently away from the rim of the scar.



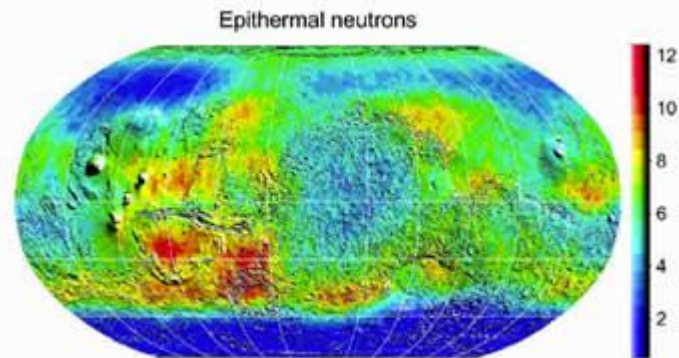
An arc striking a moist clay anode. The clay has become quite wet surrounding the arc scar. Experiment courtesy of Rod Browitt.



Here is an example from Mars. The larger, unnamed crater is 10 km across. Notice the rotary terracing effects of the spinning arc in the crater floor and the tendency in large craters to leave a central peak relatively untouched. An impact cannot explain these features, nor the lack of damage caused by one crater to the other. Ballistic emplacement of the ejecta has been ruled out by geologists. These "rampart" craters are widely distributed on Mars, which indicates a former "moist" environment over the entire planet.

Recently, the Mars Odyssey spacecraft has been measuring neutrons from the atomic debris caused by cosmic rays smashing atoms as they penetrate the Martian crust. From the neutron energies it is possible to determine the presence and rough depth of hydrogen atoms beneath the surface. The assumption is made that any hydrogen signal is due to subsurface mineral-bound water. In the diagram below, the blue areas returned the stronger hydrogen signals. As expected from the (as yet untold) recent history of Mars, the south Polar Regions have the highest abundance. There is a caution to be added however. As a report in Science* noted:

"The hydrogen signature extends willy-nilly beyond the lander targets across any number of geologic terrains.



The regions are 'very hard to reconcile with what we know about geology or topography,' says planetary scientist James Bell of Cornell University. They don't fit the distribution of particular rock types, rock abundance, dust, or even atmospheric water vapor, notes planetary scientist Bruce Jakosky of the University of Colorado, Boulder."

Plasma arcs are the most efficient means known for implanting ions into a solid surface. That could account for the lack of correlation with the geology. The problem facing NASA may well be that the hydrogen signature in the lower latitudes is mainly from implanted hydrogen ions and not from water.

Summing up: With the available evidence and some insights into the recent history of the solar system it is possible to confidently answer some of the questions about Mars:

- YES, there was some water, and probably life too, on Mars in the recent past. However, the water was mostly stripped off along with the atmosphere. There is abundant evidence of catastrophic winds, electrical erosion and hemispheric differences arising from that process.
- The carbon dioxide "ice caps" and remnant atmosphere are from an exogenous source – Venus.
- And NO, the giant channels on Mars cannot be used as evidence of a "Noachian" flood time on early Mars. When the history of Mars is finally told, the irony in the use of that name will become clear.

In an editorial, "Where's the sparkle?" in New Scientist 8 June 2002, NASA is accused of having run out of things to say. The story of water on Mars has been heard too many times, even though there was some new information. It "only served to strengthen the cynical view of NASA as an agency obsessed with spin and devoid of new ideas and goals." But to have really new ideas and goals requires new people and NASA is firmly in the grip of "old" experts. As Max Plank wrote ruefully:

*"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents. What does happen is that its opponents gradually die out, and that the growing generation is familiarised with the ideas from the beginning."***

Meanwhile, NASA's Cassini mission to Saturn is due to arrive there in 2004. Be prepared for some BIG surprises, particularly concerning Saturn's giant moon, Titan. You see, the primordial and greatest god of old was Saturn, not the Sun. Titan is a very close relative of the Earth, Mars and Venus. Sorry NASA, life's too short to wait for you!

*Science 2002 June 14; 296: 1962

** Max Planck, (1858-1947) from Scientific Autobiography, 1949.

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The Remarkable Slowness of Light

Posted on [September 2, 2002](#) by [Wal Thornhill](#)

"The more one reflects on the nature of light, matter and gravitation, the more he realizes that there are problems connected with them that are quite insoluble in terms of our current notions. But we no longer reflect intelligently on these things."

Herbert Dingle, Science at the Cross-Roads.

The following report comes from the BBC, 8 August, 2002:

Einstein's theory 'may be wrong'

The theory that the speed of light is always constant has come under fire. Australian physicists propose that it may have slowed over the course of billions of years. It's entirely possible that the speed of light would have got greater and greater as you go back towards the Big Bang. Paul Davies, the theoretical physicist said: "If true, it would mean a rethink of Einstein's theory of relativity."

The idea is floated in a brief communication in the journal Nature.

It is based on astronomical data involving light from a quasar, a very distant star-like object. Observations suggest the light has taken about 10 billion years to reach the Earth. What is more, a key constant involving the interaction of light photons and electron particles seems to have changed. It appears to have been smaller 10 billion years ago.



According to Paul Davies, a physicist at Macquarie University, Sydney, this can be explained only if the speed of light or electron charge has changed since then. "But two of the cherished laws of the Universe are the law that electron charge shall not change and that the speed of light shall not change, so whichever way you look at it we're in trouble," he says.

Star Trek hope

Studies on black holes suggest that the second option is more likely, according to Davies' team. The theoretical physicist believes the speed of light was faster six to 10 billion years ago than its current value – 300,000 km (186,300 miles) per second. "It's entirely possible that the speed of light would have got greater and greater as you go back (through time) towards the Big Bang and if so it could explain some of the great mysteries of cosmology," he says. He admits that further work on light from quasars is needed to firm up the theory. In addition, the

physics of black holes are known to be extremely shaky. But there are startling implications if the law that nothing can go faster than light is overturned.

"Maybe it's possible to get around that restriction, in which case it would enthral Star Trek fans because at the moment even at the speed of light it would take 100,000 years to cross the galaxy," says Davies. It's a bit of a bore really and if the speed of light limit could go, then who knows? All bets are off."

"It is usually taken for granted that the processes of mathematics are identical with the processes of reasoning, whereas they are quite different. The mathematician is more akin to a spider than to a civil engineer, to a chess player than to one endowed with exceptional critical power. The faculty by which a chess expert intuitively sees the possibilities that lie in a particular configuration of pieces on the board is paralleled by that which shows the mathematician the much more general possibilities latent in an array of symbols. He proceeds automatically and faultlessly to bring them to light, but his subsequent correlation of his symbols with facts of experience, which has nothing to do with his special gift, is anything but faultless, and is only too often of the same nature as Lewis Carroll's correlation of his pieces with the Red Knight and the White Queen – with the difference whereas Dodgson recognised the products of his imagination to be wholly fanciful, the modern mathematician imagines, and persuades others, that he is discovering the secrets of nature."

- Herbert Dingle, Science at the Cross-Roads, (1972) pp. 127-8.

COMMENT: For many years Prof. Dingle wrote the entry for special relativity in the Encyclopedia Britannica until he notoriously recanted. The nonsensical responses to his simple argument against Einstein led him to publish the book from which the quotes are taken. Einstein's legacy lives on. There are so many assumptions hidden beneath the thinking in the above report that it should have been published in the Star Trek Manual, not the science journal, Nature. It is the second "scientific" report to refer to Star Trek in recent months. The other, also from Australia, raised the future possibility of teleportation ("[Beam me up Scottie](#)").

Both reports exhibit the malaise in physics brought about by its disconnection from reality and the modern need to indulge in show business to gain recognition and funding.

We still have no idea what light is. Our confusion is evident when we talk about a photon in one experiment and an electromagnetic wave in another. Maxwell is supposed to have mathematically described the electromagnetic wave, but he required a medium the ether for its transmission. Einstein "thought" the ether away but no one is quite sure how he did that, even though the Michelson-Morley experiment was supposed to have clinched it.

"... Lorentz, in order to justify his transformation equations, saw the necessity of postulating a physical effect of interaction between moving matter and ether, to give the mathematics meaning. Physics still had de jure authority over mathematics: it was Einstein, who had no qualms about abolishing the ether and still retaining light waves whose properties were expressed by formulae that were meaningless without it, who was the first to discard physics altogether and propose a wholly mathematical theory."

- Herbert Dingle, Science at the Cross-Roads, pp. 165-6.

The fact remains that everything we know about electric and magnetic fields requires electric charges, in other words, a medium, as a focus for the fields. If there is to be a wave, there must be something to wave!

We know that the "vacuum" of space is teeming with neutrinos. Countless trillions of the ghostly particles pass through each square centimetre every second. Maybe neutrinos constitute the medium of "empty" space? It makes sense if, as I suggest elsewhere on this site, all particles are composed of orbiting massless electric charges. And neutrinos are the most collapsed form of particle.

"All hope to restore some unity is not lost, though. To start with, even in the absence of any theoretical or experimental proof, it is not unreasonable to assume that the particles known today are actually composites, and that their eventual description (which remains to be discovered) will involve a smaller number of new and truly elementary constituents."

- Etienne Klein & Marc Lachièze-Rey, THE QUEST FOR UNITY – The Adventure of Physics.

This brings us to the speed of light, "c." We know from experiment that "c" varies depending on the medium. More particularly, "c" varies depending on the electrical characteristics of the medium. The speed of light in a vacuum cannot then be simply declared a universal constant, because a vacuum is not empty space it is filled with vast but varying numbers of neutrinos and some other particles.

It seems more reasonable to suggest that the speed of light is the speed with which an oscillating electrical disturbance is transmitted through a dielectric medium. The speed of light is highest in a medium where the rate of charge polarization in the particles of that medium is greatest. Neutrinos, having the lowest mass, or inertia, of any particle, have the fastest rate of internal charge polarization and response to an electric field. Therefore "c" is a maximum in a vacuum, paradoxically full of neutrinos.

The notion that c was considerably faster in the past has appeal to both cosmologists and creationists. Both camps have severe difficulties in explaining the observed universe, even with their vastly different time frames, unless things happened much faster initially. Cosmologists would like to see a near infinite speed of light immediately

following the big bang and creationists about 10^{11} times "c." Both are misled by their misunderstanding of [the creation myths](#). It was no accident that a Belgian priest, Georges LeMaitre, proposed the big bang theory, as it came to be known. **Science is as much driven by culture and religion as any other human activity.**

Proof that the cosmologists are mistaken both in their speculations about light-speed and the big bang hypothesis comes from the very source referred to in the above report the light from a quasar. The above-quoted article says that the quasar is 10 billion light years distant. That is based on the most peculiar big bang theory that the volume of the universe is increasing. It follows the observation that faint objects have their spectrum shifted towards the red. The discoverer of this phenomenon, Edwin Hubble, was careful to not attribute this "redshift" to the Doppler effect of the velocity of recession of the object, but theorists were not so circumspect. The redshift velocity – distance equation quickly became another of the many dogmatic assumptions of cosmology.



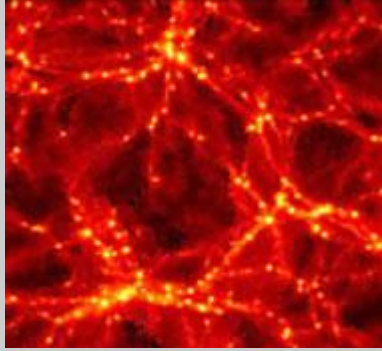
The astronomer, [Halton Arp](#), plays the role of a modern Galileo in this story. He discovered that **redshift is largely intrinsic to a quasar and is a measure of its youth, not its distance**. The faint, unresolved star-like quality of a quasar is because it is a baby galaxy, recently born with high-redshift and low brightness from a nearby low-redshift active galaxy. The quasar referred to by Davies is nearby and faint, not 10 billion light years distant. He is not looking at 10 billion-years-old light. **Such a discovery lays waste to big bang cosmology**. The response of the cardinals of astronomy, now as in Galileo's time, was to refuse to see what Arp had discovered and, in effect, to take his telescope away from him.

"The greatest part of the progress independent researchers have made in the past decades, in my opinion, is to break free of the observationally disproved dogma of curved space time, dark matter, Big Bang, no primary reference frame and no faster than light information."

- Halton Arp, The Observational Impetus For Le Sage Gravity.

The picture of the universe given to us by Arp makes far more sense than the big bang. We see only a small part of an immensity of unknown extent and origin. The objects around us are almost static and form discernible families with parent active galaxies giving birth to quasars in the jets from their cores. The quasars grow more massive with time and slow down to become companion galaxies. Their redshift decreases as they age.

The plasma cosmologists further show us that the entire process is driven electrically, the power being delivered by a vast cosmic web of power lines originating from beyond the visible universe. The galaxies are strung like beads on a string along those power lines.



Credit: Uri Keshet et al., in "Gamma-Rays from Intergalactic Shocks"

<< This computer simulation image shows large-scale structure in the universe, known as the cosmic web. Galaxies line filaments of matter like pearls on a string, and galaxy clusters arise where filaments meet.

Be aware that this image is highly distorted because the galaxies have been placed by the computer at their redshift distances. It has been responsible for the "fingers of God," illusion, where echelons of galaxies appear to point toward us. Commonsense should have sounded the alarm bells immediately for theorists, instead of reverential awe. Nonetheless galaxies do form linear chains. Such structure is not expected from

a gravity-driven formation of the Universe. However, it is expected from plasma cosmology, where galaxies form at the intersection of two intergalactic Birkeland current filaments.

Something else that is never mentioned in polite scientific company is the astounding discovery by Arp and William Tifft that the redshift of quasars and galaxies is quantized! It has led to the false impression of "great walls" of galaxies at various distances from us. That too, should have set off another loud alarm. It spotlights the inadequacy of a purely mathematical quantum theory, divorced from any classical physics underpinning, and the nonsense that it only applies to the subatomic realm. If Einstein got anything right, it was his suggestion that quantum theory pointed to some lower level of complexity in particle physics, instead of requiring the removal of the foundation stone of physics causality. His god was not a gambler.

I agree with Davies that the charge on the electron has not changed. But neither has the speed of light. Unlike Davies, it seems to me that the basis of the physical universe is electric charge, governed by a near-instantaneous electrostatic force. All forms of matter and its interactions spring from that simple basis. Every particle and collection of particles is a resonant system of orbiting charges, from which comes resonant quantum effects and the manifestation of inertial mass. Resonance explains the puzzling non-radiating ground-state of an atom. Gravity, magnetism and nuclear forces can all be understood in terms of electric dipole forces between distorted systems of orbiting charge. Einstein is not required. Space cannot be warped or expand. Time is effectively universal and has nothing to do with space. Black holes do not exist. It is an Electric Universe.



Black holes and big bangs can be found in the universe in a few odd heads.

There is no crisis of theory in an Electric Universe. The speed of light in a vacuum depends only upon the nature of the vacuum. A vacuum is not empty space. However, "c" is unlikely to vary significantly in space. "c" has no connection with the size or age of the universe. Size and age are meaningless concepts anyway, given Arp's clear-sighted view of the cosmos. But can the Electric Universe offer any explanation for the redshifts?

I think so. We know from Arp's careful observations that quasars are episodically ejected in pairs in opposite directions along the spin axis of an active galaxy. The brightness of the quasars is higher and their redshift lower the further away we find them from their parent active galaxy, and therefore the older they are. Their mass seems to increase with age and they slow down to eventually go into orbit about the parent as a companion galaxy.

Plasma cosmology provides the insights into what is going on in the centers of active galaxies. It does not require a mythical black hole, merely a plasma focus effect. A plasma focus effect is the result of a cylindrically symmetrical electrical discharge. It provides the most concentrated form of electrical energy known. It takes the shape of a tiny plasma donut, or plasmoid, lying in the plane of the spiral galaxy and at its center. The plasmoid accumulates electrical energy from along the spiral arms until it suddenly begins to break down, forming an intense jet of neutrons, particles and radiation along its axis. Electrons, being much lighter, are trapped in the focus for a longer time. The neutrons in the jet begin to decay into protons and electrons, forming hydrogen atoms and some heavier elements, by neutron capture. (Given the extreme electromagnetic environment, we should not expect the neutron decay characteristics to mimic those seen on Earth). The material in the jet forms a "knot" and becomes an electron deficient (positively charged) quasar.



The M87 galactic jet with axially ejected knots.

Meanwhile, electrons are being slowly released by the decaying galactic plasmoid and they stream in a thin beam after the quasar. They form the great radio jets seen emanating from the nuclei of active galaxies.

It seems that as the quasar attracts electrons its matter becomes progressively more polarized, or massive, as Arp found. It is similar to what we observe in particle accelerators the more a particle is distorted, or polarized, in an electric field, the more massive it appears to become. If an electron orbiting a nucleus becomes progressively more massive in a globally changing electrical environment, it will require to compensate at intervals by executing small quantum

jumps to new resonant orbits closer to the nucleus. The energy of those orbits will be higher and the result is a quantized shift away from the red end of the spectrum. The quasar becomes brighter and less redshifted. It is not closer.

"The idea then arose that it [the electron] was a sort of mist of electricity, and Eddington probably gave it the most candid description as 'something unknown doing we don't know what.' We are no wiser today; nevertheless, we speak of the mass of an electron as though it were equivalent to the mass of a lump of lead."

- Herbert Dingle, Science at the Cross-Roads, pp. 141-2.

It is the lower energy electron orbits in new quasar atoms that may give rise to the effect remarked upon by Davies and his co-workers. If so, it is due to a different inertial mass of an electron in a quasar atom, not a different speed of light 10 billion years ago. The result is simply that Planck's constant and consequently the fine structure constant will differ by a very small amount from that measured on Earth. Once again we see the trouble caused by arbitrarily assuming universality of physical constants measured on Earth.

Another serious problem faced by conventional thinking is that the quantum shifts seem to occur galaxy-wide without delay. No object has been found with two different redshifts. Yet a change propagating at the speed of light would take something like 100,000 years to traverse a galaxy. It seems that the kind of particle dipole distortions that create inertial mass and gravity propagate at the near infinite speed of the electrostatic force. So, once begun, the quantum shift in atomic orbitals could spread across a galaxy in less than a second. I suppose it could be termed "galactic quantum entanglement."

So, the good news for Star Trek fans is that Einstein's speed limit is repealed. But the Warp Drive and Teleporter are out, I'm sorry. They are illogical. Space cannot be warped. And matter can neither be destroyed nor created, despite the widespread misconception that the "m" in $E = mc^2$ means matter, and that antimatter annihilates matter. [The only possibility that I can imagine for a Teleporter would be to create an identical physical copy from materials already to hand at the receiver. But there is far more to biology than meets the scientific reductionist eye. Would the copy be alive? And if so, who, if anyone, would it be? And what do you do with the original - kill it and dispose of the body in the process?]

Despite all of these absurdities, gravitational big bang cosmology still comes out the clear winner in the science fiction category.

As for Prof. Davies recent book, How to Build a Time Machine save your money, space fans, and put it into antigravity research! As taxpayers we pay dearly for this fiction anyway.

The genius, Lou Jacobs, like many other well-publicised clowns, allows himself to be blown away by the big bang.

It is incredible that we entered the 21st century with an advanced technology that is crucially dependent upon electricity and yet a cosmology where the powerful electrical force has no role, when we know that electric charge is the foundation of all the matter in the universe.



Davies' bewilderment is understandable:

"If what we're seeing is the beginnings of a paradigm shift in physics like what happened 100 years ago with the theory of relativity and quantum theory, it is very hard to know what sort of reasoning to bring to bear."

Precisely. The revolution in thinking will not come from the present generation of theoretical cosmologists. It must come from the next generation of practical electrical engineers, plasma physicists and observational astronomers.

"...I have no doubt that there will arise a new generation who will look with a wonder and amazement, deeper than now accompany Einstein, at our galaxy of thinkers, men of science, popular critics, authoritative professors, and witty dramatists, who have been satisfied to waive their common sense in view of Einstein's absurdities. Then to these will succeed another generation, whose interest will be that of a detached and half-amused contemplation; and in the limbo of forgotten philosophies they may search for the cenotaph of Relativity."

- Arthur Lynch, The Case Against Einstein, Dodd, Mead & Co., New York, 1933.

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Sunspot Mysteries

Posted on [November 30, 2002](#) by [Wal Thornhill](#)

'If you would be a real seeker after truth, it is necessary that at least once in your life you doubt, as far as possible, all things.'

- Rene Descartes

The following report appeared in SPACE.com:

New Photos of Sun are Most Detailed Ever

By Robert Roy Britt Senior Science Writer

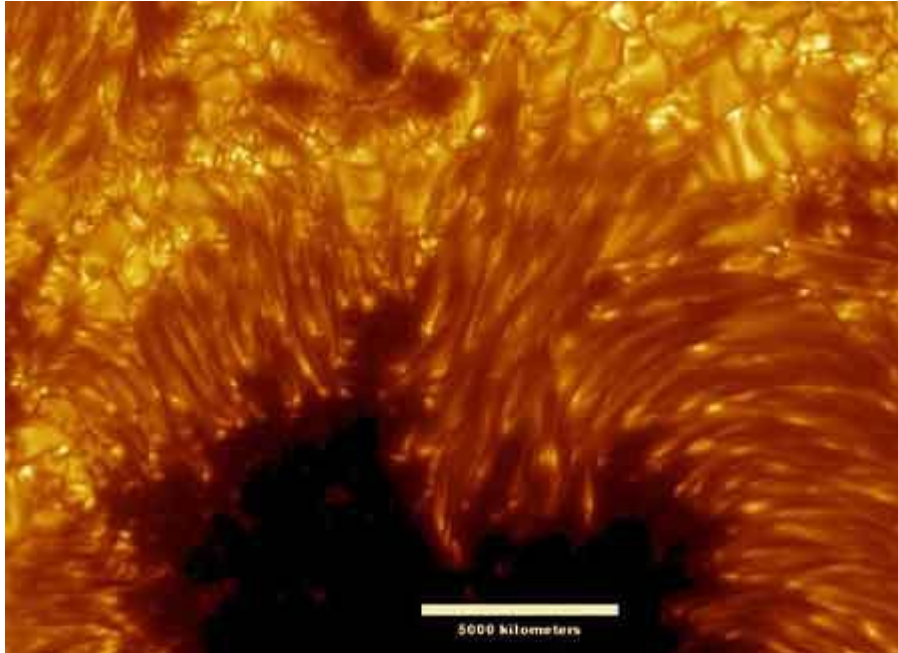
13 November 2002

The most detailed pictures ever taken of the Sun reveal the insides of striking snake-like filaments that reach from bright portions of the solar surface into the dark hearts of sunspots. The images promise astronomers a new way to reach deep into these magnetic beasts and extract their operational secrets. Made with a specially equipped ground-based telescope, the photographs reveal features never before seen on the solar surface. The images themselves, and more important the technique used to make them, promise a fuller understanding of the complex and poorly understood interplay of matter and energy that roil the hot surface, all driven by the thermonuclear reactions at the Sun's core.

Comment: Expressions of surprise and puzzlement are commonplace at new discoveries in astrophysics and the detailed sunspot photos provide their share. It is because accepted theories have proven to be spectacularly non-predictive. It is a clear signal for independent minds that an opportunity exists to clear up mysteries that have dogged our finest scientists for most of the 20th century.

As Fred Hoyle long ago pointed out; the Sun does not conform to the expected behavior of an internally heated ball of gas, simply radiating its energy into space. Instead, its behavior at every level is complex and baffling. Nowhere is it more mysterious than in a sunspot. So, without any direct evidence that the thermonuclear powered model of the Sun is correct, and with strong evidence against it, we should begin by heeding Descartes advice and doubt it. Unfortunately it is a difficult path to take because science is a powerfully consensual organization. Yet it is consensus, or general agreement, that can delay new ideas for centuries and sometimes, millennia.

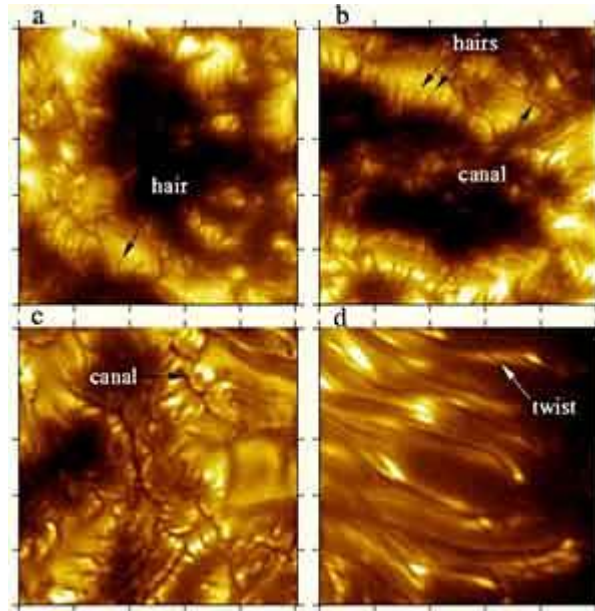
Researchers at the Royal Swedish Academy of Sciences in Stockholm, led by Goran Scharmer, discuss the images in the Nov. 14 issue of the journal Nature:



Team member Dan Kiselman told what he sees in the new views of the Sun: "A dark-cored filament looks like a glowing snake with a dark stripe painted along its back," Kiselman said. "The 'head' of the snake is often a complicated feature where the stripe splits up among many bright points."

The pictures were taken with academy's recently installed solar telescope at La Palma, in the Canary Islands off the coast of Africa. Movies made by putting sequential images together show that that the dark cores of the filaments are long-lived and possibly more stable than the brighter portions. The scientists also identified canal-like structures in the so-called penumbra of sunspots that "could also be described as a pattern of cracks," Kiselman said. The penumbra straddles a sunspots dark core and brighter regions elsewhere on the solar surface. "Whatever metaphors we use for these features, one should remember that everything is just glowing gas."

The photos were taken on July 15 and were colorized to highlight details.



Mysteries remain

Despite the detail ' the photos resolve things down to 62 miles (100 kilometers) — researchers still don't know the details of how sunspots work. "It is clear that everything we see is the result of fields and the solar gas, or plasma," Kiselman explained. "The heat of the Sun tries to push through, carried by convection currents which are hindered by the magnetic fields. But exactly what happens and why these kind of structures are formed, we don't know." Sunspots are cooler and darker than the rest of the Sun. They are launch pads for complex expulsions of plasma that race through the solar system, sometimes fueling the colorful lights near Earth's poles known as aurora.

Comment: Is it likely that the poor understanding of sunspot phenomena arises from the incorrect assumption that we know most of what goes on inside the Sun? I think so. **To have any confidence in our understanding of the Sun, and stars in general, we must first be able to explain simply the things we can see.** Therefore it is crucially important to understand a sunspot because it is the only place on the Sun that gives a glimpse below the bright photosphere. And what do we see? It is cooler down there by thousands of degrees! That is not expected at all if the Sun is trying to rid itself of heat. The sunspot center should be much hotter and brighter than its surroundings. And what of the penumbral filaments? They and their behavior bear no resemblance to any known form of convection in a hot gas, magnetic fields or no.

There are many crippling agreements that hold up progress in astrophysics. One was succinctly expressed at a recent public meeting by a professor of astrophysics who admitted:

"When we don't understand something we blame it on magnetism."

The Sun has had more features blamed on magnetism than any other celestial object. The cool sunspot center is a classic example. Certainly, strong magnetic fields are measured there but that raises questions of cause and effect. Magnetic fields are only produced by electric currents. Is there any other evidence of electrical activity on the Sun? Yes, practically every feature of the Sun can be understood in terms of electric discharge activity in plasma.

The penumbral filaments are a case in point. Electric discharges in plasma take the form of long thin filaments. Just like a neon tube, it is simply the discharge that causes the gases to glow. The penumbral filaments were observed to split near their 'footpoints' in the dark umbra and to move around. It is typical behavior of plasma filaments and can be observed in novelty plasma balls. But the greatest shock is that the penumbral filaments have dark cores! How could this be so if they are convecting gas? In that case, the filament center should be hottest and brightest.

An electric discharge offers a simple explanation. In an electric universe all bodies may receive electric current from the environment in a cosmic charging process associated with the normal development of a galaxy. And because electrical phenomena are scalable over at least 14 orders of magnitude, we may look to electric discharge phenomena in other atmospheres to gain insights into what may be happening in the Sun's atmosphere.

There is a temptation to simply equate the penumbral filaments with gargantuan lightning bolts, but the features do not match all that well.

A typical lightning flash lasts for 0.2 seconds and covers a distance of about 10 km. The penumbral filaments last for at least one hour and are of the order of 1000 km long. If we could scale a lightning bolt 100 times we might have a flash that lasted between 20 and 200 seconds and was 1000 km long. The lifetime is too short. Also, measurements of scars on lightning conductors show that the lightning channel is only about 5 mm wide. Scaling that by 100 times would have solar lightning channels far below the limit of telescopic resolution.



However, there is another familiar form of atmospheric electric discharge that does scale appropriately and could explain the mysterious dark cores of penumbral filaments. It is the tornado! Tornadoes, like the one pictured here, last for minutes and can have a diameter of the order of one kilometre. Scale those figures up 100 times and we match penumbral filaments very well. And if the circulating cylinder of plasma is radiating heat and light, as we see on the Sun, then the solar 'tornado' will appear, side on, to have a dark core.



An artificial tornado of fire shows the bright edges to the vortex near the base. © 2001, Reel EFX, Inc.

Meteorologists are not sure how tornadoes form but they do know that they are often associated with severe electrical storms. The key to understanding tornadoes is that they are the result of rapidly rotating electric charge. Just as electrons are the current carriers in the copper wires we use for power transmission, so they are in the tornado. The BIG difference is that the electrons are moving at many metres per second in the tornado while they take several hours to move one metre in copper wire! The result is that enormously powerful electromagnetic forces are in control of the tornado. The result has been called a ['charged sheath vortex.'](#)



Public science displays give the wrong impression when they equate a simple mechanical fluid vortex like this one with a tornado. A tornado is an electrical phenomenon subject to far more powerful forces created by swiftly rotating charge. If this were a true miniature tornado the young lad would be advised to not go anywhere near it. The possible damage caused by electromagnetic forces is far greater than that of a simple wind.

The shape of the vortex is strongly constrained to be long and thin with a circular cross-section. This true shape of the vortex is usually hidden in tornadoes because of the obscuring dust and clouds. The vortex itself will only be visible if it has sufficient electrical energy to ionise atoms in the atmosphere. That is clearly the case on the Sun. And some people who have survived the experience of being 'run over' by a tornado have reported an electrical glow in the inner wall of the tornado.

It is commonly thought that a tornado is a means for mechanical energy in the storm to be converted somehow to electrical power, which is then transmitted very effectively to ground by the electrical conduit of the charged sheath vortex inside the tornado. The 'somehow' arises only because no-one visualizes the electrical dimension of the solar system. Electrical power from space is partially dissipated in the mechanical energy of the encircling winds. Instead of generating the electrical effects, the tornadic winds are driven by the charge sheath vortex.

The Earth and other planets receive electrical power from space in the same way as the Sun. Obviously, we receive far less than does the Sun, which seems to be covered with tornadic charge sheath vortexes. The solar tornadoes are seen most clearly at the edge of sunspots in the form of penumbral filaments. The strong solenoidal magnetic field created by each vortex gives rise to the observed filamentary magnetic field in the penumbra.



Make no mistake, the Martian dust devils are tornadoes that dwarf their earthly counterpart. It shows that clouds are not required to generate them. They are an atmospheric electric discharge phenomenon.

Why is the Sun covered in bright 'granules?'

In his seminal papers of the 1970's on the Electric Sun, Ralph Juergens noted the possible identity of solar granules with something that the pioneering plasma physicist, Irving Langmuir, termed 'anode tufts.' Anode tufts are small, bright, secondary plasmas that form above an anode that is otherwise too small to handle the current flow into it. In his experiments, Langmuir reported the tufts as small bright spheres moving above the anode surface. It seems possible that in the stratified atmosphere of the Sun those bright discharges rather take the distinct form of the charge sheath vortex.

The granules are bright because the gases inside the charge sheath vortex have been heated by compression and radiation from the walls of the vortex. Those hot gases fountain out of the tops of the vortexes to form the granules. Also, lightning in some form will deliver power to the top of the granule, creating unresolved bright spots. Above the granules the ions recombine with electrons to form neutral gas, which absorbs light. The gas would be constrained to flow down between the granules, its motion modified by collisions with ions moving under electromagnetic influences.

This may create the dark 'canals', which have the branched pattern of electric discharges. There would be a powerful influence from the strong electric fields of the plasma sheaths (double-layers) of the anode tufts. Varying levels of lightning activity above each granule could explain the observed variation in brightness of solar granules. It is noteworthy that large faint granules have never been seen. They would not be expected on this model.

What causes a sunspot?



The solar plasmoid (Seen here from above the pole) has been imaged in ultra-violet light using data from the SOHO spacecraft.

In the electrical model, the Sun receives electrical energy from interstellar space in the form of a glow discharge. Plasma experiments show that some energy will be stored in a donut shaped 'plasmoid' above the Sun's equator.

The energy is released sporadically from the plasmoid to the mid-latitudes of the Sun. (Incidentally, plasmoid resonances may give rise to simultaneous flares on opposite sides of the central body, as recently reported on the Sun). The global tornado storm is pushed aside by more powerful charge sheath vortexes that deliver electrical energy from the plasmoid to much lower levels. The resulting holes in the tornado level, or photosphere, are what we call sunspots. Rather than being a site where energy flow has been restricted, a sunspot is a site where it is enhanced. That explains why 'they are launch pads for complex expulsions of plasma that race through the solar system.' The giant electrical tornadoes that form sunspots accelerate particles in their powerful electromagnetic fields, generating UV light and x-rays instead of visible light. However, because temperature is a measure of random motion, the field-directed motion of the particles within the sunspot vortex appears 'cool.'

This model can explain why sunspots of the same magnetic polarity are strangely attracted toward each other instead of being repelled. (Try pushing together two similar poles of two magnets). The sunspots are receiving electric current flowing in parallel rotating streams, which results in their being mutually attracted over long distances and repelled at short distances. That, in turn, explains why sunspots often seem to maintain their identity even if they come close enough to merge. There is also other evidence that suggests the presence of electric currents aligned with the magnetic field in a sunspot.

Granulation has been observed in the umbra, or dark centers of sunspots, by overexposing sunspot images. The umbral granules are more closely packed than photospheric granules. That is to be expected on this model because the current in the large charge sheath vortex forming the sunspot is being delivered to denser atmosphere at lower depths. Umbral granules should not be there if sunspots are formed by magnetic throttling of the convection process. .

The Nature article also mentions 'fainter structures in the umbra' These features are associated with the inward migration of a bright dot followed by repeated brightening and fading on a timescale of minutes. This suggests that a larger fraction of umbrae than observed so far could have faint or small-scale filamentary structure.' The nature of a

charge sheath vortex is to tend to compress material inside and lengthen the tube in both directions. Since it is also acting as a conduit for electrical energy, it seems that the moving bright dots are small-scale filamentary lightning emanating from the lower ends of the penumbral filament vortex.

"One might expect astronomers to have a firm grasp of the mechanics of our own Sun, it being by far the closest star around. "Compared to other stars, one may say that it is true," Kiselman said. "But the amazing zoo of structures and dynamic phenomena on the Sun are not well understood in general, though they have been observed for a very long time." So imagine how little is really known about other stars. 'We will never understand any other star better than the Sun,' he said."

Comment: This is a remarkably candid admission from an expert. If only the true state of our ignorance were more widely publicized instead of the hubristic pronouncements that we practically know everything, then we might find curiosity about science rekindled in our schools.

It is a fact that we do not understand the Sun. So we do not understand stars in general. Yes, we have complicated stories about them that have kept theoreticians happily engaged for centuries. But for so long as they convince themselves that they can ignore the electrical nature of all things in the universe their stories will be fiction. The electric force is the most powerful force in the universe, from which all other forces are derived, and it operates at all levels, from the subatomic to the galactic. When we understand the true electrical nature of our own star we will begin to understand the universe as it really is.

Wal Thornhill

2003

Columbia: Questions of Some Gravity

Posted on [February 8, 2003](#) by [Wal Thornhill](#)



This article contains updates added in April and June 2003

On February 1, 2003, the space shuttle, Columbia, met its fiery end in the dangerous manoeuvre of supersonic re-entry into the Earth's atmosphere. Sadly, the crew of seven was lost. U.S. President Bush said, "In an age when space flight has come to seem almost routine, it is easy to overlook the dangers of travel by rocket, and the difficulties of navigating

the fierce outer atmosphere of the Earth."

It is a prime example of the difficulties we must endure while technology far outpaces science. In fact a faulty understanding of the electrical nature of the cosmos may have been responsible for the tragedy.

In that context, a report, published on the west coast in the [San Francisco Chronicle](#), makes interesting reading:

"Top investigators of the Columbia space shuttle disaster are analyzing a startling photograph — snapped by an amateur astronomer from a San Francisco hillside — that appears to show a purplish electrical bolt striking the craft as it streaked across the California sky.

The digital image is one of five snapped by the shuttle buff at roughly 5: 53 a.m. Saturday as sensors on the doomed orbiter began showing the first indications of trouble. Seven minutes later, the craft broke up in flames over Texas."

"In the critical shot, a glowing purple rope of light corkscrews down toward the plasma trail, appears to pass behind it, then cuts sharply toward it from below. As it merges with the plasma trail, the streak itself brightens for a distance, then fades."

This report has been discounted by lightning experts. However, the atmospheric region where the shuttle broke up has been dubbed the "ignorosphere" because of the lack of knowledge about its electrical state. Suggestions were made that the shuttle might have been struck by a "red sprite" – a poorly understood form of lightning seen above large thunderstorms. But that has been discounted as being too diffuse a discharge to do any damage. Besides, there were no thunderstorms beneath the shuttle at the time.

Conventional wisdom has it that red sprites are powered by the storms beneath them. That is wrong. They are [powered from above, from space](#). And it is that electrical power, collected over a vast region that drives the lightning storms below. Further evidence of that regional discharge from space was actually provided by the ill-fated astronauts when they photographed a huge arc of light above thunderstorms in Africa.

The Earth is enveloped in a cosmic discharge, centered on the Sun. So it is no surprise in an electric universe to have lightning from space follow the ionised trail of Columbia. The dense plasma trail left by the shuttle is an ideal "lightning rod" of vast dimensions that could easily give rise to the reported corkscrewing rope of purple light blazing down from above. The sudden brightening of the streak shows that power was being concentrated into a destructive arc near the shuttle.

It seems that conditions in the ionosphere led to a powerful lightning discharge to Columbia – a rare "bolt from the blue" – which may have damaged a critical component or surface of the space shuttle. The lightning would be practically silent in the thin atmosphere and it would burn like a plasma torch. And insulating material, like the shuttle tiles or their adhesive, may shatter or explode when struck by lightning.

The metallic surfaces of aircraft hit by lightning may show a little damage but it does not impair their airworthiness. Columbia, struck by a super-bolt while travelling at 12,000 mph, was terribly vulnerable. NASA might be advised to send a tiled wing panel for testing to a lightning research facility.

****UPDATE 2 April****



The Columbia Accident Investigation Board released this photograph on Feb 27 of an area near the left main landing gear door - an area of intense interest. "The heat shield tiles appear almost lava like in appearance, certainly melted looking, indicating exposure to extreme heating."

The tiles do exhibit the kind of etched and melted appearance that might be expected from a plasma arc.

The upper atmosphere jet streams are an important consequence of the electrical energy input from space. When the earth encounters blasts of charged particles from the Sun, auroras increase, and the jet streams move south. Both are indicative of an increased electric current to the Earth. My colleague, Amy Acheson, noted that the edge of the jet stream was right over San Francisco about an hour before the alleged "lightning bolt" photo of the shuttle was taken. It may be useful to examine the position of jet streams with reference to thunderstorms in order to get a clearer picture of the electrical connection.

In 1998 it was reported by [Professor Louis Frank and colleagues](#) from the University of Iowa that auroras mysteriously show a tendency to hug coastlines. They write:

"... coastline arcs can be as thin as tens of miles, align along coastlines for several hundred miles, and last several minutes. The phenomenon normally occurs during the early phase of an auroral storm. Though scientists cannot yet explain why this coastline effect occurs, part of the answer seems to lie in the knowledge that ground currents are much greater off shore because sea water is a better conductor of electricity than the land." "It would appear," notes Frank, "that at certain times the ionosphere is primed for the generation of the thin arcs over the coastlines and that the arcs are tickled into brightening by the magnetic

or electric fields from the ground currents. This is quite remarkable because these auroral lights are occurring at altitudes of 60 to 200 miles above the shores."

This discovery indicates the possibility that a high altitude discharge could have been triggered near the U.S. coastline by a rare combination of circumstances.

I agree with NASA experts who discount the possibility of damage to the shuttle wing upon takeoff from a piece of lightweight foam.

A report in the NY Times of 1 April says that new information retrieved from Columbia's flight recorder suggests that the reinforced carbon-carbon leading edge panels on the left wing may have already been damaged before the shuttle began re-entry. The reason is that severe heating was registered by one of the sensors (up to 450 degrees Fahrenheit before it failed) while the shuttle was still at an altitude above 50 miles, where the atmosphere is exceedingly thin.

But there is another possibility. Columbia may have been undamaged before it was struck by a powerful cosmic discharge during re-entry. Then the most concentrated damage would occur where the plasma formed around the craft on re-entry was most dense – at a point, or points, along the leading edges of the wings or nose of the craft. The carbon composition of the leading edge panels might act as a poor lightning conductor and cause them to suffer sudden extreme heating and explosive ablation. The loss of a panel or panels from the leading edge of the wing is very likely in this scenario. Aerodynamic heating and possible ignition of aluminum structural members exposed inside the wing could plausibly follow and result in the shuttle's demise, only minutes later.

Of course this possibility is not being investigated because experts know it can't happen.

END OF UPDATE

UPDATE 7 June

Sound Waves Rule Out Meteor Impact in Columbia Disaster

[Houston Chronicle, 4 June 2003](#)

By ERIC BERGER

Researchers who measured sound waves outside space shuttle Columbia during its return to Earth helped rule out a meteor impact or lightning strike as a cause for its demise.

A team that studied low-frequency sound waves from the shuttle's turbulent passage through the atmosphere Feb. 1 at speeds above Mach 20 released their preliminary results Wednesday.

You will notice that the researchers were recording low-frequency sound waves. That presupposes that the origin of the lightning was in the denser atmosphere below the spacecraft. What I am suggesting is that the strike came from above, which is not considered a possibility by earth scientists.

A strike from above would produce very little sound in the extremely thin atmosphere at the Shuttle's height. What is more, the frequencies associated with it would have been high, more like a hiss than a thunderous rumble. Rustling or swishing sounds have been reported in the far north from low auroras, a well-known form of upper atmospheric electrical discharge.

Using a dozen sensor arrays spread across the United States and Canada, the researchers said they were unable to definitively say whether Columbia exploded or broke up more slowly.

"Most of what we were able to contribute to NASA was to rule out things that people had hypothesized," said Henry Bass, a University of Mississippi professor who led the research team.

Had Columbia been struck by lightning or a meteor, the event would have produced a characteristic sound the arrays would have picked up, Bass said. There were no such signals.

If the reported images snapped by an amateur astronomer from a San Francisco hillside are genuine then they still remain to be explained by experts. That lightning was specifically addressed in this report suggests that the images are genuine and should be released for public scrutiny. Dismissing the phenomenon and losing the data in a filing drawer because you don't believe it possible is an all-too-common failing of science. My explanation is the only one I am aware of that relates such a crucial observation to a possible cause of the Columbia disaster.

"It is really quite amazing by what margins competent but conservative scientists and engineers can miss the mark, when they start with the preconceived idea that what they are investigating is impossible. When this happens, the most well-informed men become blinded by their prejudices and are unable to see what lies directly ahead of them."

- Arthur C. Clarke

****END OF UPDATE****

The Columbia disaster seems to have prompted an opportunistic article in WIRED magazine. The article highlights a new technology that is said to make possible a science-fiction idea publicized by Arthur C. Clarke in his 1978 novel, *Fountains of Paradise*, – the space elevator. Theoretically, it could provide a far cheaper method of reaching space. But is this technology too far ahead of the science?

To the Moon in a Space Elevator?

By Steve Kettmann

[See story](#)

02:00 AM Feb. 04, 2003 PT

The Columbia disaster could spur faster development of a radically different approach to reaching outer space: the space elevator.

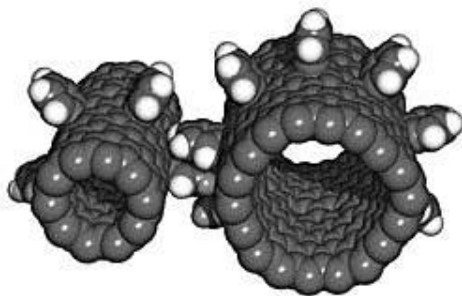


Artist Pat Rawling's concept of a space elevator viewed from the geostationary transfer station looking down along the length of the elevator toward Earth.

[More information](#)

Long imagined by science-fiction writers but seen by others as hopelessly far-fetched, the space-elevator concept has advanced dramatically in recent years along with leaps forward in the design of carbon nanotubes. Using the lightweight, strong carbon material, it's feasible to

talk of building a meter-wide "ribbon" that would start on a mobile ocean platform at the equator, west of Ecuador, and extend 62,000 miles up into space.



Carbon nanotube (CNT) is a new form of carbon, equivalent to a flat graphene sheet rolled into a tube. CNT exhibits extraordinary mechanical properties: the Young's modulus is over 1 Tera-Pascal and the estimated tensile strength is 200 Giga-Pascals.

An elevator could be attached to this

ribbon to ferry materials such as satellites and replacement parts for space stations — or even people — up into space. The project could become a reality as soon as 15 years from now, experts say.

"Technically it's feasible," said Robert Cassanova, director of the NASA Institute for Advanced Concepts. "There's nothing wrong with the physics."

Here we have another example where technology has outstripped science.

So, when Robert Cassanova says "There's nothing wrong with the physics" we may be sure that he means the old, electrically sterile physics applied to the cosmos.

The continual cosmic discharge, which powers the storms on Earth, must be considered when placing long conductors radially to the Earth. Some years ago, the tethered satellite experiment suffered a plasma discharge that severed the tether cable as it was being reeled out from the space shuttle. That phenomenon will be repeated on a grand scale in any attempt to stretch a conducting elevator cable from Earth into space. The power that drives regional thunderstorms will be concentrated into a single cataclysmic thunderbolt, destroying the elevator cable like a thin fuse wire. In the worst scenario, the 50km high ground station will be replaced by a neat, circular crater, like those seen elsewhere in the solar system and attributed, erroneously, to meteoric impacts.

Gravity is the problem, understanding it is the solution.

The space shuttle is a technological marvel that must harness brute chemical and aerodynamic forces in order to overcome the weak force of gravity. The reason for such an approach is that we do not understand gravity. When we finally understand it, it is likely that we will find much gentler means of leaving the Earth and returning. Until that time, manned space travel will remain ridiculously expensive and hazardous.

But wait a minute, didn't Einstein give us our understanding of gravity? The physicist, Herman Bondi, put it most succinctly: "Wherever gravitation can be seen in action, it is well described by the theory, but its logical contact with the rest of physics is dubious." Bondi also asked a crucial question, "if it [gravitation] is something so fundamental to matter, one might hope that one day it will throw light on the constitution of matter and on the nature of the elementary particles and forces from which it is composed. However, no relevant experiments are possible because the gravitational forces due to minute particles are so utterly minute."

That is a curious insight, given that Einstein's theory of gravitation makes the gravitational field a property of space, rather than matter. It is little wonder that after close to a century of concentrated effort, including that of Einstein himself, no connection has been possible between gravity and the quantum behavior of matter or between gravity

and the electromagnetic atomic forces. Einstein's view dismisses the idea that anti-gravity is possible and has powerfully discouraged serious investigation of the subject.

I believe Bondi was both right and wrong. He was right in that we should look to a fundamental property of matter for the origin of the gravitational force. He was wrong when he wrote that no relevant experiments are possible. The famous Millikan oil drop experiment was one in which the gravitational force of the entire Earth upon a tiny oil drop was balanced by the electrical force on a single electron. Sensitive gravitational experiments on atomic particles are possible when we use the entire mass of the Earth as the source of the test gravitational field. This is essentially what is done in anti-gravity experiments.



Einstein published his theory of gravitation, or general theory of relativity, in 1916. And so a new paradigm, or set of beliefs, was established. It was not until 1930 that Fritz London explained the weak, attractive dipolar electric bonding force (known as Van der Waals' dispersion force or the "London force") that causes gas molecules to condense and form liquids and solids. Like gravity, the London force is always attractive and operates between electrically neutral molecules. And that precise property has been the most puzzling distinction between gravity and the powerful electromagnetic forces, which may repel as well as attract.

So it seems the clue about the true nature of gravity has been available to chemists – who are not interested in gravity – and unavailable to physicists – who are not interested in physical chemistry (and view the world through Einstein's distorting spectacles). Look at any average general physics textbook and you will find no reference to Van der Waals' or London forces. What a different story might have been told if London's insight had come a few decades earlier? Physics could, by now, have advanced by a century instead of being bogged in a mire of metaphysics.

An excellent illustrated lesson on the London force, or Van der Waals' dispersion force is given at: www.chemguide.co.uk/atoms/bonding/vdw.html

The London force originates in fluctuating electric dipoles caused by slight distortion of otherwise electrically neutral atoms and molecules. The tiny electric dipoles arise because the orbiting electrons, at any given instant, cannot shield the positive charge of the nucleus equally in all directions. The result, amongst a group of similar atoms or molecules is that the electric dipoles tend to resonate and line up so that they attract each other.

Obviously, gravity is distinct from the London force. It is much, much weaker. That should be a clue. What if we are looking at gravity being due to a similar electrostatic distortion effect in the far smaller constituents of each atom? Of course, this is heresy because the electron is supposed to be a fundamental particle, with no smaller constituent

particles. However, there are experiments that challenge this belief. What is more, this model of an electron offers a simple mechanism to explain quantum theory and the relationship between magnetism and the electric force.

It explains the puzzling observation that electrons don't simply radiate their orbital energy away and crash into the nucleus. It is because electrons in an atom store and release internal energy during each orbit in the form of varying electric dipole distortion. So a stable orbit is achieved simply when the energy exchange between the electron and the nucleus sums to zero over each orbit. It is the resonant electron orbits that determine the quantum nature of atomic interactions. The same resonances apply within the compound atomic nucleus. If we apply the London force model, both protons and neutrons form resonant structures of electrostatic dipoles that are powerfully attractive because of their closeness, unlike a simple Coulomb electrostatic model that would have the positively charged nucleus fly apart. It explains the need for neutrons to give stability to a compound nucleus. And in the process, it allows the normally unstable neutron to adopt a stable resonant configuration. Such a model suggests that a neutron star is a theoretical figment of overzealous mathematicians.

If gravity is an electrostatic induced dipole-dipole force between the fundamental particles of normal matter, then it cannot be shielded because all matter, whether charged or not, will participate. And herein lies the difficulty for antigravity devices. How to modify the strength of those fundamental particle dipoles, or better, to invert them? I have discussed some attempts that seem to have succeeded in offsetting the dipoles slightly from the Earth's radius. See [Antigravity?](#)

There is another important consequence of taking into account atomic electric dipole effects. A ponderous body will introduce an additional dipole effect, that of the gravitational offset of the heavy nucleus from the centre of the atom. This effect can set up a radial electric field that may lead to charge separation and stratification in the conducting interior of a body, particularly stars and gas giants. In that case, electrostatic repulsion between similar charges will serve to offset compression due to gravity. The usual determination of density will therefore tell us nothing about the internal structure and composition of such a body. Certainly, such powerful electrical forces will prevent gravitational collapse and the formation of mythical neutron stars and black holes. The evidence presented for the existence of such objects is already explained by cosmic electric discharge activity.

A new technology based on the obvious electrical nature of matter will look quite different from that based upon our Victorian vintage science. As Arthur C. Clarke wrote;

"Any sufficiently advanced technology is indistinguishable from magic."

We are long overdue for some magic!

Wal Thornhill

SETI – The Search for Extraterrestrial Intelligence

Posted on [April 9, 2003](#) by [Wal Thornhill](#)

"Next we come to a question that everyone, scientist and non-scientist alike, must have asked at some time. What is man's place in the Universe?"

- The Nature of the Universe, Fred Hoyle.

In March this year 13,000 people from across the U.S converged on Philadelphia for the largest meeting of science educators in the world. Many teachers there remarked that their students are always asking about [SETI](#) and astronomy. Kids have a keen interest in astronomy and the search for extraterrestrial intelligence. What's out there? Are we alone?

The first question we need to ask before we look for life on other worlds is how did intelligent life come to form on this planet? Are these unique circumstances, or are they common? Which stars are most likely to harbour worlds like ours?

It is a question involving a broad mix of cosmology, mythology, geology and biology. Unfortunately, viewpoints today are polarized into only two choices, both requiring miracles. These choices are the creationist story and the evolutionist story. Subscribers to each camp have dug in for a fight to the death. Each side has quite sound arguments against the dogma of the other. Neither side allows the possibility that the answer may be found in no-man's land.

Religions have adopted a literal belief that the creation stories of myth explain the origin of the Earth and the universe. However, mythical creation stories required human observers. They have nothing to do with the question of how the Earth began, much less how the universe was formed. Nor are they about how life and intelligent life originated. They are the story of the most recent in a series of cosmic cataclysms that have visited the Earth in its long and chequered career. Those cataclysms are recorded in the tortured strata and buried flora and fauna of the Earth.

Science has adopted its own evolutionary mythology of Earth's history that largely discounts cosmic cataclysms unless they happened in the remote, unfathomable past (although in recent years there has been a grudging acceptance that the dinosaurs may have been wiped out by a hypothetical asteroid impact). The dogma has been expressed by Dr. Maxine Singer, President of the Carnegie Institution of Washington, when she wrote:

"Evolution is the framework that makes sense of the whole natural world from the formation of atoms, galaxies, stars and planets..."

The religious story gives us no clue about where to look for extraterrestrial life. But the dogma of evolution also limits our thinking about SETI. Success is unlikely if our beliefs about our origin and place in the universe are wrong. This is demonstrated clearly in the following bleak excerpt from New Scientist.

Earth was a freak

New Scientist 29 March 2003

HAZEL MUIR

BAD news for people hunting extraterrestrials: the cosy, rocky planets that are essential for supporting life might be rare, cosmological freaks. The only reason we are here is because a nearby star happened to explode next to our young Sun just as the Solar System was forming, claims an applied mathematician. Thomas Clarke at the University of Central Florida in Orlando predicts that the vast majority of planets in the Milky Way are frigid gas giants like Jupiter, with hostile atmospheres and no solid surfaces to walk around on. "On average, a solar system will consist of an extensive rocky asteroid belt and some gas giant planets and moons," says Clarke. "It's kind of a dismal conclusion."

Astronomers agree that the planets and moons of our Solar System formed in a swirling disc of gas and dust around the Sun. In the outer regions, cold, slushy gases condensed into the giants Jupiter, Saturn, Uranus and Neptune. And in the inner regions, dusty particles melted and stuck together, forming hot blobs of rock that cooled and merged to make Mercury, Venus, Earth and Mars.



TYPICAL SOLAR SYSTEM: Debris in the asteroid belt will not form rocky and potentially hospitable planets unless there is an additional heat source.

But it is not clear why the rock melted – the Sun then was not much hotter than it is now. Astronomers believe that the extra heat may have come from radioactive aluminium-26 that was sprayed out of a star that exploded up to 50 light years away when the planets were forming. Decay products of the isotope, which has a half-life of 720,000 years, have been found in meteorites.

At last week's Lunar and Planetary Science conference near Houston, in Texas, Clarke suggested that without the heat from the aluminium, the Earth would not

have formed. While asteroid-sized rocks would have aggregated in the inner Solar System, they would not have melted and clumped together to form planets.

According to Clarke's calculations, the solid rocks would simply zoom past each other or collide and recoil like snooker balls. Only molten, squidgy rocks would deform and lose energy in a collision, he says, allowing them to stick together and grow.

Debris in the asteroid belt will not form rocky and potentially hospitable planets unless there is an additional heat source.

But the chance of a star exploding at just the right time and place is very much against the odds. Stars only explode three or four times a century in our Galaxy. Clarke estimates that the probability of a supernova happening within 50 light years of any new solar system that is busy forming planets is only about 1 in 100. "So only a small fraction of planetary systems would be expected to have terrestrial planets," says Clarke.

"Trouble comes, however, when what we think to be knowledge is actually no more than illusion. Education then serves to transmit illusions from generation to generation, with the situation getting worse all the time. ..wrong ideas eventually become so deeply entrenched as to become unshakeable dogma."

- Our Place in the Cosmos – Fred Hoyle & Chandra Wickramasinghe.

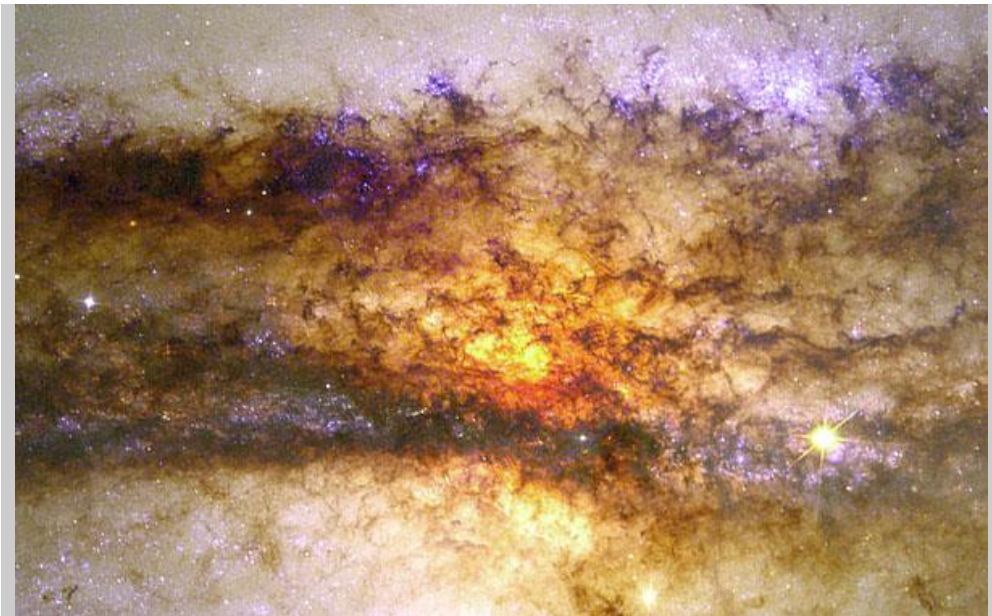
The failure of the SETI project to find signs of extraterrestrial intelligence may indicate the Earth is a freak. Or it might indicate that many of the things confidently asserted by scholars like Thomas Clarke are far from the truth. For example, the fact that "astronomers agree that the planets and moons of our Solar System formed in a swirling disc of gas and dust around the Sun," does not make it so. It is probable that consensus about the so-called "nebular hypothesis" has been achieved simply because no astronomer has come up with a more plausible alternative. Clarke indicates one of the problems – how do you form a planet from a ring of dust stretching clear around the solar system? Astronomers were surprised to find that moonlets in Saturn's rings on commensurate orbits merely swap orbits without colliding. So the ad hoc proposal making objects like that hot and "squidgy" will not help them to stick together if they never come into contact.

In an electric universe there is a far more plausible explanation for the genesis of planets. It has almost biological overtones and is appealing in its simplicity – one measure of a good theory. It explains why gas giants have been found recently in large numbers orbiting their parent star far closer than expected by the nebular hypothesis. But first we must deal with the origin of the parent stars.

ELECTRIC STARS

The electric universe model assumes, based on good evidence, that the universe is not electrically neutral. So electric currents flow through the thin plasma of deep space in the form of giant filaments, detectable by their magnetic fields. These cosmic filaments take the form of "twisted pairs," well known to electrical engineers. Plasma physicists call them "Birkeland currents," after a pioneering scientist in the field. Observations and experiments support this model. Birkeland currents are ultimately responsible for the formation of stars.

These cosmic electric currents are the most efficient scavengers of dust and gas in space. Matter is squeezed or "pinched" toward the current axis by a strong force that varies inversely with radial distance from the axis. Contrast that with the weak force of gravity, which falls off rapidly with the square of distance. Stars are formed like beads strung along a cosmic power line with their rotation axes aligned along the current filaments. Evidence for that model comes from the alignment of the spin axes of stars with the magnetic field in giant molecular clouds. The effect is rather like the old toy spinning tops, with the helical thread plunger passed through them to impart spin. The strong electromagnetic coupling between the proto-star and its environment is also capable of removing angular momentum during collapse – a severe problem for the gravitational collapse model of stars.



The Hubble telescope offers a stunning unprecedented close-up view of a turbulent firestorm of star birth along a nearly edge-on dust disk girdling Centaurus A, the nearest active galaxy to Earth. It shows spectacularly the filamentary nature of molecular clouds from which stars are born.

The electric universe model is a major departure from conventional views about how stars shine. It proposes that stars, after they have formed, continue to receive power from

galactic Birkeland currents. Eddington wrote in his famous work, *The Internal Constitution of the Stars*:

"In seeking a source of energy other than contraction the first question is whether the energy to be radiated in future is now hidden in the star or whether it is being picked up continuously from outside. Suggestions have been made that the impact of meteoric matter provides the heat, or that there is some subtle radiation traversing space which the star picks up."

It is the second possibility that is true in an electric universe model.

But Eddington did not pursue it because he was convinced that a star must collapse under its own gravity unless supported from within by an energy source. That was an incorrect assumption because gravity induces charge separation and electrical repulsion effects within a star – something that Eddington dismissed. The simple fact that a proton weighs almost 2000 times as much as an electron ensures that this will occur. Each hydrogen atom in a star will be distorted by gravity to form a tiny radial electric dipole. The resulting electric field will ensure charge separation inside the star. Free electrons will drift toward the surface and leave behind a positively charged core. (This simple fact exposes the nonsense of collapsed stars – that is, neutron stars and black holes. The phenomena attributed to them are simply explained electrically).

The resulting internal electric forces counterbalance compression due to gravity more or less uniformly throughout the star. As the gadfly British physicist, Dr. Harold Aspden, had the temerity to remark, knowing the volume of a hydrogen atom and the mass of the Sun 19th century physicists could have calculated this. He wrote:

*"...the mass density within a star is not concentrated into a non-uniform distribution by the force of gravitation. The importance of this to cosmological science cannot be overestimated. It bears upon that question of how a nuclear fusion reaction can be initiated to feed the star's energy output. **It obliges one to consider the prospect of a cold fusion process or to look for other explanations for the stellar energy source.**"*

Precisely! – the simplest of observations about the Sun supports the electric star model. By the way, the problem of short-lived radioactive isotopes is solved by the fact that stellar electric discharges manufacture all of the heavy elements seen in their spectra. A supernova is not required.

Then there is the Sun's strange atmosphere. Fred Hoyle wrote in 1955:

"We should expect on the basis of a straightforward calculation that the Sun would 'end' itself in a simple and rather prosaic way; that with increasing height above the photosphere the density of the solar material would decrease quite rapidly, until it became pretty well negligible only two or three thousand kilometres up."

Instead, the planets orbit inside its "huge bloated envelope."

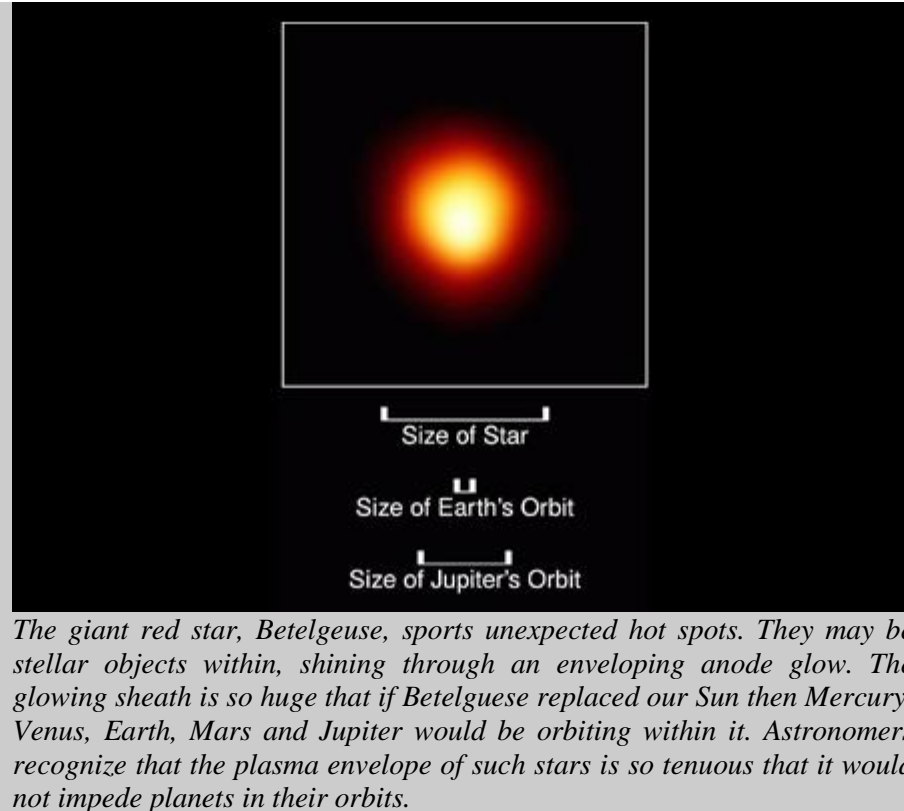
The Sun's atmosphere matches that expected from an electric discharge in a very low pressure gas – the solar "wind" accelerating away from the Sun, the million degree temperature of the solar corona above a "cool" photosphere at 6000 degrees, and the magnetic fields that reveal electric currents in space.

Where do planets fit into this picture?

Companion stars and gas giants may be formed in the initial string of stellar "beads." Or they may be "born" later from a star when electrical stresses cause the expulsion of some of its positively charged core. It is an effective way to increase surface area to relieve electrical stress. A gargantuan stellar "lightning flash," called a nova, accompanies the birth. The result is generally a close-orbiting binary system and an "expulsion disk" – in contradistinction to an accretion disk. The new companion can be a star or a gas giant. Gas giants may also undergo the same process, albeit less violently, giving birth to their rocky moons and planets. Notably, Saturn still has an ephemeral expulsion disk.

With such an unconventional scenario, where is the best place to look for extraterrestrial intelligence? The immediate answer is – not near a star like the Sun! Our situation is quite precarious – almost freakish. A small difference in Earth's orbit or radiation from the Sun could extinguish intelligent life on this planet. Earth is highly unlikely to have supported life for hundreds of millions of years in its present situation. So SETI is mistaken to concentrate its search on Earth-like planets orbiting energetic stars like the Sun.

A more helpful answer is that Earth-like planets and intelligent life are most likely to be found very close to less energetic, dim red stars. That is good news because they are the most numerous in the galaxy. It should be clear that there is no such thing as a "failed star" in an electric universe because internal nuclear energy is not the source of their radiance. It is also important to recognize that the term "dwarf" is a misnomer when applied to a dim red star. All red stars will appear much larger than the central physical body because their colour and size is largely due to a spherical anode glow at a great height above the surface. Many satellites will orbit within the glowing shell and diffuse atmosphere of a red star. That is the ideal place for life to take hold. Radiant energy falls equally over the surface of such a satellite, or planet, regardless of orbit, rotation and axial tilt. There are neither seasons nor day and night. And life-giving molecules, including water, will mist down through an atmosphere drawn from their parent star.



There is a catch however for SETI enthusiasts. Intelligent beings living on a planet in this benign environment would not see a dark, star spangled heaven. If the misty atmosphere cleared sufficiently they might see a diffuse, brighter light from their primary or possibly a nearby binary partner shining through the glowing cocoon that surrounds them. If intelligent beings living on these protected planets have learned to use radio signals, we would not detect them, because the plasma of the anode glow would act as an impenetrable shield against radio signals. Nor would they be able to detect our radio signals, for the same reason. In fact, there would be nothing to suggest the existence of an immense universe beyond the plasma glow that surrounds them. There would be no reason for them to search for extraplanetary intelligence. Unless... they discovered a way to communicate over cosmic distances that does not involve radio signals. In any case, radio signals are far too slow for sensible communication over the gulf of deep space. Having intelligent civilizations electrically "quarantined" inside their stellar wombs would satisfy the so-called "Fermi paradox," which is the question:

"If the universe is teeming with aliens, where is everybody?"

We are the freaks who have been given the opportunity to see the immensity of the universe and to live to ask the question.

Our creation myths seem to be a human memory of Earth's expulsion from the maternal womb. Surely we should mine them for insights into the real history of the Earth and the only intelligent life we know, before letting our imagination run riot. If we appear to be

alone it might simply be due to our primitive understanding of the universe, which is leading us to look in the wrong places and maybe with the wrong tools.

I believe that if SETI is to succeed we must challenge our kids with possibilities and questions, not with the overwhelming "illusion of knowledge" that modern science portrays. Because, contrary to the bleak conventional outlook, the electric universe seems designed to produce intelligent life. The search must ultimately succeed!

Wal Thornhill

Planet Birthing

Posted on [May 25, 2003](#) by [Wal Thornhill](#)

Dan Falk prefaced a recent news report in Nature, on the subject of planet formation, with these words:

"Our knowledge of planets outside our Solar System has been transformed in the past few years. But these new-found worlds don't look much like our planetary neighbours, and no one is quite sure why."

At a rough glance the traditional nebular disk model used to explain the formation of planets in our solar system seems plausible. After all, the orbits of the planets do describe a thick disk about the Sun. But could this model be wrong? It requires that the planetary orbits be in the same plane. Instead we find them tilted at substantial angles to the Sun's equator. Now that new discoveries challenge our cherished notions it is time to revisit the basic questions:

Are planets formed slowly by accretion over millions of years or "born" suddenly and violently from a larger body? Does the solar system have a more complex history?

The likelihood is extremely high that planets do not form slowly. The accretion disk model is riddled with assumptions about initial conditions and glosses over many problems that have remained stubbornly unsolved. For example, there are severe problems in getting a rotating nebula to collapse gravitationally to form a star in the first place. The large rotational momentum of a cosmic nebula has somehow to be dissipated. And an embedded magnetic field conspires to prevent collapse. The Nobel Prize winner, the late Hannes Alfvén, wrote in *Evolution of the Solar System*:

"...the 'generally accepted' theory of stellar formation may be one of a hundred unsupported dogmas which constitute a large part of present-day astrophysics."

The protoplanetary disk model assumes that the planets were formed largely where we find them now. That seems not to be true. Long-term computer integrations of physically different models of the solar system show chaotic behavior (that can mean planets being thrown out of the solar system) in an interval of 3 to 30 million years – a blink of the eye in the accepted age of the system. The authors of one study described this result as *"very striking and disturbing."* (*Chaotic Evolution of the Solar System*, Sussman & Wisdom, *Science*, Vol. 257, 3 July 1992, pp. 56-62). If this is so we cannot use the present plan of the solar system to say anything about the initial plan or its evolution.

The protoplanetary disk model also assumes that planets can accrete by collisions of particles in the disk. A recent study of hyper-velocity impacts between small objects, which assumes very different orbits of those particles, showed that the crater formed was larger than the impactor with the result that fragmentation rather than accretion is the

rule. Also, objects in similar orbits about a central mass merely swap places without colliding. For example, two moons of Saturn, Epimetheus and Janus, swap orbits every 4 years or so. These problems have resulted in a spate of additional ad hoc requirements to be added to computer models. For example, the matter in the disk must have been hot and "squidgy" to allow particles to stick together.

In fact, the very term "accretion disk" used by computer modellers begs the question about the origin of such disks observed elsewhere in the galaxy. When we see objects with strong gravitational fields ejecting huge masses of material at great speeds we must consider the possibility that we are observing "expulsion" disks. After all, it is not clear what is responsible for energetic expulsions if we are looking at systems governed solely by gravity. Explanations based upon magically conjured and trapped magnetic fields merely shove the problem out of sight within the central star or hypothetical black hole. And without exception they ignore the electrical origin of magnetic fields.

When it comes to detailed examination of the planets, theories go from bad to worse. No plausible model exists to explain the fruit salad of characteristics we find. A good theory should explain the obvious dichotomy between the rocky planets and the gas giants without requiring more ad hoc early conditions. It must explain the odd axial tilts of the planets. After all, they behave as giant gyroscopes whose spin axes will merely wobble when struck by another sizeable object. We should expect the giant planets to have their equators in the plane of the ecliptic but we have Saturn tipped over by 27 degrees and Uranus by 98 degrees!

If we are ever to be satisfied that we understand the basic principles of planet formation we must include all of the information available to us from human observations of the sky. As Alfvén wrote,:

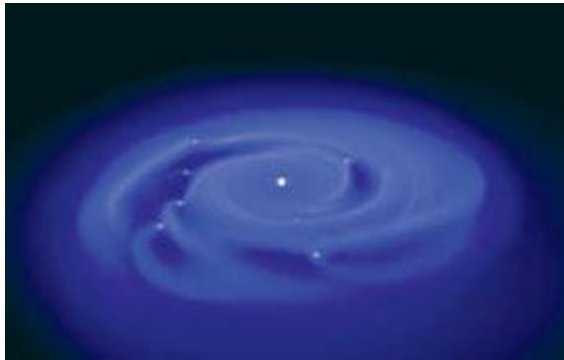
"Because no one can know a priori what happened four to five billion years ago, we must start from the present state of the solar system and, step by step, reconstruct increasingly older periods. This actualistic principle, which emphasizes reliance on observed phenomena, is the basis for the modern approach to the geological evolution of the Earth; 'the present is the key to the past.' This principle should also be used in the study of the solar system."

Even in this wise advice there is an assumption that the sky we see today is the same as that seen by our prehistoric ancestors. Recent forensic examinations of astronomical petroglyphs and global creation myths argue strongly against such a cosy assumption. The present may not be the key to the past. It should be remembered that theories of evolution, both geological and biological, are easily demonstrated by their effects but remain without plausible causes. We have progressed to the point of accepting the possibility of cosmic impacts but even they cannot explain all of the evidence. Perhaps there is a common mechanism for evolution on Earth that includes evolution of the solar system? Perhaps the solar system has a recent history? If so, attempts to explain the solar system by modelling theoretical initial conditions based on modern observations must fail.

It is worth highlighting some of the unconscious assumptions with reference to Falk's report, which follows in part. The electric universe alternative will be outlined to give an impression of its relative simplicity.

Planet Formation: Worlds Apart

(Nature 422, 659 – 660, 2003)



Cloudy picture: computer simulations have yet to nail down the finer points of planetary evolution. L. Mayer, T. Quinn, J. Wadsley, J. Stadel/Pittsburgh Supercomp. Cen.

Comment: This remark is disingenuous and demonstrates a disturbing trend to believe that computer "game playing" can reveal the truth of a theory. Even the evolution of the gross characteristics of the solar system remains to be "nailed down." Computer simulations can only help to eliminate some models if all of the variables are known. But that is practically never the case in complex, real-world situations.

Less than a decade ago, planetary scientists were working with a tiny data set: the nine members of our Solar System. But the past few years have been a boom time for planet hunters — more than 100 planets orbiting other stars have now been logged. As new detection methods come into use, this tally is certain to climb higher.

Not everyone is celebrating, however. Extrasolar planets have peculiar properties, and our understanding of how planets form, which was incomplete even before the new data became available, now looks even shakier. The newly discovered bodies have strange, highly elliptical orbits. They are also far closer to their stars than equivalent planets in our Solar System. Amid the thrill of discovery, planetary scientists are wondering how to make sense of the processes that shaped these strange new worlds.

In terms of mass, the new planets are similar to Jupiter, weighing between one-tenth and ten times as much — the majority fall between 0.75 and 3.0 jovian masses. Measuring size is more difficult, as only transit studies can provide information on the object's radius. The planet observed using the transit method

— an object orbiting a star in the constellation of Pegasus— is slightly larger than Jupiter.

But that's where the similarities end. The orbits of most extrasolar planets follow elliptical paths, in contrast to the near-circular orbits of our Solar System's giant planets. They also orbit much closer to their parent stars, most at a distance of less than 2 astronomical units (1 AU being the distance between Earth and the Sun), compared with more than 5 AU for Jupiter.

It is these properties that seem to defy popular models of planetary formation. The two main theories each start with a slowly spinning ball of gas. The hot, central part becomes a star, while the material farther out is flattened by its rotation into a cloud known as a protoplanetary accretion disk. This provides the raw materials from which planets form.

Comment: Here are two fundamental assumptions that drive all current models of stellar and planet genesis. The first is that stars form simply by gravitation from a rotating "accretion disk" of neutral matter. The second is that planets accrete later from the widely scattered leftovers. Both processes have theoretical difficulties and are the most inefficient imaginable – only 1% of the proposed nebula "leftovers" remains in the planets. Neither process has been observed in action, merely inferred.

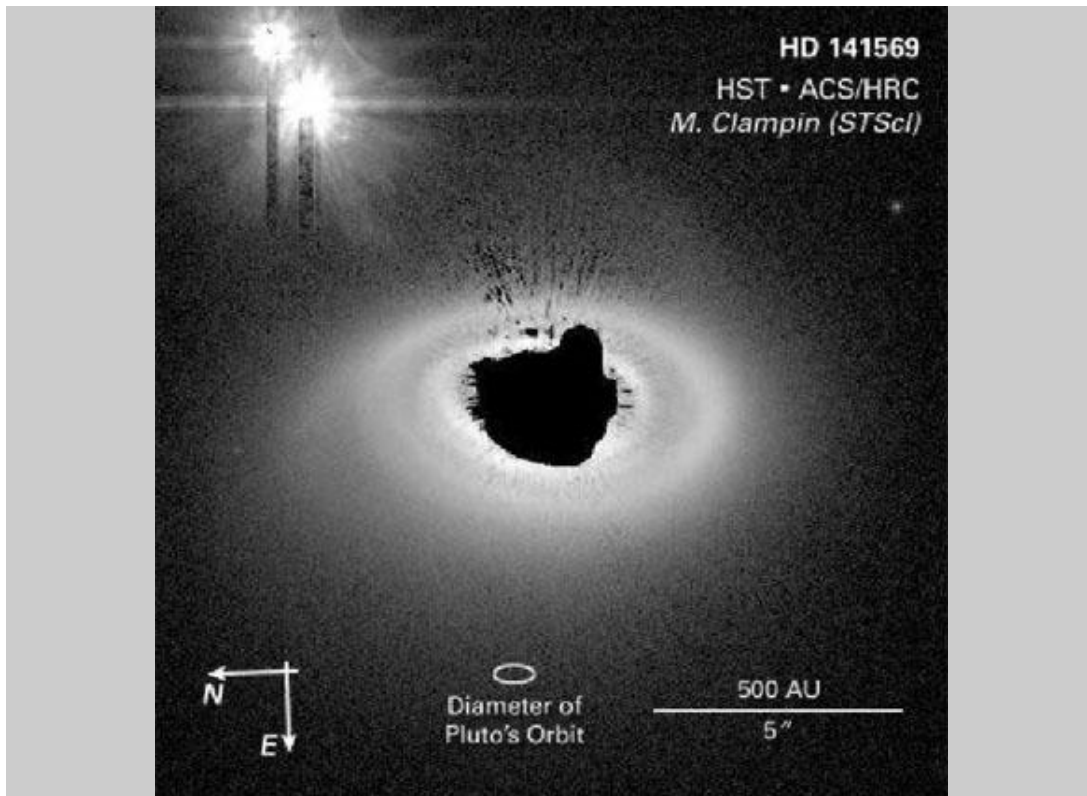
The idea of what goes on inside a star stems from the work of Sir Arthur Eddington in his famous 1926 work, *The Internal Constitution of Stars*. He made a serious error of judgement when he applied mechanical ideal gas laws to the Sun's interior. On that basis he calculated that there would be "no appreciable separation of the [electrical] charges." It was a convenient conclusion because it simplifies the standard solar model so that it is "do-able." It seems not to have been questioned since.

In fact, atoms in the Sun's strong gravitational field will distort to form small electric dipoles, with the positive nucleus offset within each atom toward the center of the Sun. The aligned dipoles will create a radial electric field that will tend to separate charge – free electrons moving toward the surface and positive ions toward the core. Gravitational compression inside the Sun is therefore offset by electrical expansion because like charges repel. Stars do not require a central furnace to maintain their size. The result is that the Sun is much the same density throughout. This was discovered decades ago by pioneering helioseismologists but not announced because it was believed that eventually a more acceptable explanation would be found in terms of the standard model! The enigma remains to this day. To accept the obvious conclusion would destroy the elaborate story of the evolution and death of stars. And another source of stellar energy would be required because nuclear fusion would be impossible in the core of an isodense star. Ah well, that's the price of progress.

However, it is acknowledged that stars can explode in a nova or supernova event because such things are regularly observed. But the explosion mechanism remains obscure. An explosion originating in the core was always expected to be spherically symmetric. But

we observe stellar explosions to be highly directional, often forming bipolar cones or even collimated jets. Plasma physicists are well aware that powerful electric discharges form thin jets, often with condensations/knots of matter along them. And a collimated jet is a prime requirement for the birth of a planet from a star. Significantly, the light curve from stellar explosions is the same as that of lightning.

There is a more simple and efficient process that fits the latest discoveries. It requires the expulsion, or "birth" of a fully formed proto-planet from the core of a star or gas giant. Astrophysicists have not seriously considered it because of their strongly held views about the internal nature of stars and the forces at work there.



HD 141569A is a five-million-year-old star 320 light-years away in the constellation Libra. Hubble's Advanced Camera for Surveys captured this visible-light image on July 21, 2002, with a coronagraph, which blocked light from the star, creating the black area in the center. Surrounding the star is a tightly wound spiral-structured dust disk with two faint arms in the outer part of the disk. One of these arms reaches toward a binary star in the upper left of the image. NASA / M. Clampin (STScI) et al. / ACS Science Team / ESA

This is the best image of a so-called accretion disk. It was produced on January 6 by a team headed by Mark Clampin of the Space Telescope Science Institute. The disk contains a tight spiral structure with two diffuse arms reaching outward like those of a spiral galaxy. It is excellent evidence for the electrical discharge nature of these disks since plasma physicists have successfully modelled galaxy formation and produced the classic spiral formation. That modelling requires electric currents flowing along the spiral arms. Notably it doesn't require invisible dark matter!

The physicist, Peter Warlow, made the colorful comment in 1982 that we assume that planets are formed outside stars "for the 'obvious' reason – that's where we find them." However, "We humans, equally 'obviously,' are outside our mothers – yet we did not start there!" It is far simpler and infinitely more efficient if planets are "born" at intervals by the electrical ejection of charged material from the similarly charged interiors of larger bodies – gas giants from stars, and rocky planets from gas giants. We have circumstantial evidence for such a proposal in the binary stars found after a nova outburst. Also most of the rocky bodies in the solar system closely orbit a gas giant. Electrical ejection in a massive internal lightning flash answers the question of the source of the energy. It is not dispersive like an explosion. The electromagnetic pinch effect will produce a jet of matter, rather like a coronal mass ejection, only on a much grander scale. The result is a proto-planet plus a stream of gases and meteoric debris.

The electrical expulsion model solves the many riddles of meteorites. They are the afterbirth of a new planet, not a star. What is the origin of tiny melted spheres of silica, called chondrules, found in many meteorites? How were they flash-heated and just as suddenly cooled? How did radioactive isotopes with half-lives measured in hours and days become trapped in meteorites? A powerful cosmic electric discharge provides simple answers. Astrophysicists in the past have suggested lightning in the accretion disk as an explanation for chondrules, but without understanding what causes lightning the idea died. The May 17 issue of *New Scientist* reports a new idea from astrophysicist Frank Shu. He argues that meteorites were formed in "furious winds that blew red-hot rock out from the Sun at hundreds of kilometres per second." Lightning creates just such "furious winds" of heated matter along the discharge channel. Shu's explanation, on the other hand, suffers the usual lack of understanding of plasma electrical behavior and relies, once more, on magnetic fields to perform the necessary miracles.

Falk's report notes that extrasolar giant planets are too close to their stars to have formed there from a protoplanetary accretion disk. Rather than question the protoplanetary accretion disk model, the obvious proposal is to have the giant planets migrate after their formation elsewhere. However, it does not explain the orbital eccentricities. In our solar system, Uranus and Neptune are too far from the Sun to have formed where we find them. Why have our giant planets seemingly migrated outward and the extrasolar planets inward? When theoretical expectations fail scientists are required to re-examine all of the assumptions in their models. However, that is not done when some assumptions have become self-evident truths.

Rocky Start

From there on, the process is open to debate, with the answer partly depending on the size of the disk. The core-accretion model, which dates from the 1960s, argues that planets start life as small chunks of rock, dust and sand-grain-sized debris that come together through collisions. As the rocky core grows, its gravitational pull scoops up more dust and gas from the disk. If the core is heavier than a few Earth masses, it accretes enough gas over a few million years to become a gas

giant like Jupiter and Saturn. Less-massive cores result in rocky planets like Earth.

This model ran into problems even before extrasolar planets were identified. For one thing, it seems to take too long. Accretion disks are thought to evaporate within a million years or so, probably as a result of the stream of electrically charged particles that all stars emit, or of bombardment from high-energy ultraviolet photons from other nearby stars.

Comment: Here is an additional assumption. Having somehow gravitationally formed an accretion disk we must follow that with a special active stellar condition to blow it away after a convenient time interval. Studies have shown that the stellar wind would merely shift the disk further away and not disperse it. Alfvén argued that the most efficient (and Nature is nothing if not efficient) method to accrete matter over cosmic distances is that of the electromagnetic "pinch effect" caused by parallel electric current filaments in plasma. The electromagnetic accretion force diminishes slowly with distance from the filament axis, rather than rapidly with the square of the distance as we find with gravity. The result is condensed, rotating objects strung along the dusty current filaments. The spin axes of stars formed in this manner are aligned with the filaments. Such alignments have been discovered in groups of stars.

The main rival theory, which also surfaced in the 1960s, avoids this problem. Known as the disk-instability model, it proposes that, in larger disks, patches of denser gas can form and pull in more gas — leading, in some cases, to a sudden collapse that forms one or more planets. Such collapses do not occur in the core-accretion model, either because the disk is not large enough to produce them, or because any small instability that forms will tend to spread throughout the disk, restoring stability.

Planets are thought to form more rapidly in the disk-instability scenario. Last autumn, Lucio Mayer, a theoretical astronomer then at the University of Washington in Seattle, described high-resolution computer simulations of protoplanetary disks using the disk-instability model. Together with colleagues elsewhere in North America, Mayer showed that giant planets could form in as little as 1,000 years. The difference in planet-forming rates is probably the most important distinguishing characteristic between the two models, and is a boost for the disk-instability idea, says Alan Boss, a theoretical astrophysicist at the Carnegie Institution of Washington.

Others urge caution. Jack Lissauer, a planetary scientist at NASA's Ames Research Center in Moffett Field, California, says that the resolution of the computer models is still too poor to give conclusive results. Perhaps more importantly, the new data on extrasolar planets do not sit happily with either theory. The models have trouble explaining, for example, why Jupiter-sized planets are created rather than brown dwarfs — objects that are intermediate in size between planets and stars. "You would expect the mass of planets to range

from Jupiter mass up to stellar masses," says Douglas Lin, an astrophysicist at the University of California, Santa Cruz. There ought to be just as many brown dwarfs as Jupiters orbiting Sun-like stars — something that observations have not turned up.

Comment: Computer simulations are fun but they have no significance if the models are wrong. The lack of brown dwarf stars is expected in the electric universe model. In that model, stars are essentially a plasma discharge phenomenon. A bright star usurps almost the entire electrical power in its vicinity. Hypothetically, if Jupiter were to be removed beyond the Sun's electrical influence it would become a more electrically active brown dwarf star. Its moons would become a small planetary system orbiting a dim star. The dull red shell, or "anode glow," of a brown dwarf would surround most of the moons. The conditions for establishment of atmospheres and life on those satellites within the glowing shell would likely be fulfilled. Just like real estate, the prime requirement to become a star is LOCATION. A brown dwarf simply won't shine when placed close to a bright star.

Unfortunately, astrophysicists and most plasma physicists never contemplate an electrically driven model because they assume strict electrical neutrality throughout the universe. Meanwhile the observational evidence shrieks of electric discharge effects in plasma. A few examples are: all X-ray sources; stupendously long glowing filaments and jets; radiant nebulae with no effective internal energy source; and compact pulsating radiation sources.

Inner Workings

Other aspects of the new data are causing problems for both models. Neither, for example, accounts for the proximity of the extrasolar planets to their stars. There isn't much material in the inner region of the disk, and the particles there should have enough energy to resist clumping. The solution, astronomers suggest, is that giant planets form farther out and then migrate inwards as a result of interactions between the disk and the planet. The mechanism differs in the two models, but the end result is that young planets sail through the disk towards the star.

But this raises another question: what stops the planet from ploughing into its parent star? Several mechanisms have been suggested. One option is that the migration ends when the disk evaporates — but it's not clear whether this can happen quickly enough, as migration occurs on a roughly million-year time scale. Another option is that the planet's gravitational pull distorts the shape of the star, and that this in turn affects the pull of the star on the planet in such a way as to balance the planet's inward movement. Finally, it could be that the star's magnetic field clears out the inner disk by repelling electrically charged particles. In this situation, says Boss, the inner 0.5 AU of the disk would be empty — and few extrasolar planets have orbital radii much smaller than this. "It's attractively simple," says Boss.

Comment: If that's simple I would not like to see a complicated explanation! There comes a time when attempts should be abandoned to reverse-engineer a doubtful model of the solar system to fit data from other planetary systems. A far simpler explanation is that gas giant planets are born by electrical expulsion from a star in a nova outburst. How else should we expect to find an extrasolar planet whipping around its parent in a few days or in an eccentric orbit? Eccentric orbits should be short-lived. They hint at recent events in those distant planetary systems; perhaps the birth of a new planet. Perhaps clockwork planetary systems that endure unchanged for billions of years do not exist?

Such explanations are plausible, but there is no way of knowing which is correct. Even if this issue is resolved, it is still unclear whether planets form by disk instability or by core accretion before they begin their migration. And on top of that, astronomers are struggling to explain why so many extrasolar planets follow elliptical paths, as both formation models predict roughly circular orbits. The best explanation so far proposed is based on the gravitational tug-of-war between different planets in a multi-planet system.

Comment: The problems arise because an inappropriate gravitational model is used in both cases. Granted that a multi-planet system is inherently chaotic if gravity is the only force operating. But in an electric universe there is a damping mechanism to limit wild excursions. It seems that exchange of charge between planets via their magnetotails (plasma sheaths) is capable of maintaining orbital spacing so as to limit further electrical interaction. This mechanism may provide a physical basis for Bode's relationship. And a planet moving eccentrically in the weak electric field of a star suffers a cometary discharge that acts to reduce the eccentricity of its orbit. The effect has been noted for tiny solar comets and mysteriously termed a "non-gravitational" force. It is more effective than tidal interactions at circularising orbits.

Science Rewrites Genesis

Present theories of the origin of the universe and the Earth have taken on the mantle of religious truth. It is as if scientists feel obliged to provide an alternative "scientific" Genesis story to replace the biblical one. All that has been achieved is a Hollywood rewrite complete with the obligatory stupendous explosion, an imaginary hell of black holes and the occasional miracle to allow the plot to continue. The story has been limited by cultural preconceptions and by restricting the "writers" to experts in one narrow specialty. The story is overdue for a shake-up. The irony is that Genesis is only one version among many of a major evolutionary event in the history of the solar system; a "re-creation" event witnessed by prehistoric man and memorialised by all of the earliest civilizations. It has much to offer in a more general approach to discovering the real history of the Earth and the origin of planets.

Meanwhile the astronomers' script for Earth history is showing its age. It comes straight from the early Industrial Revolution – it is purely mechanical and clockwork-like with nary a hint of new-fangled electrics. Indeed there are no electric lights at all! Dissenting electrical engineers and plasma physicists have been practically ignored. It has fallen to

the IEEE to establish a separate chapter of Plasma Cosmology, which now holds separate meetings.

It has not been felt necessary to check the fundamental assumption that 'the present is the key to the past.' No astronomer is qualified to do a forensic examination of the earliest planetary mythologies and depictions of the sky to see if that sky looks familiar. The fact is it doesn't! That renders all of the comfortable armchair theorizing and computer simulations a nonsense. **Mark Twain was right:**

"There is something fascinating about science. One gets such wholesale returns of conjecture out of such a trifling investment of fact."

Computer modelling is usually only possible with "a trifling investment of fact."

The Prehistoric Sky

"A man receives only what he is ready to receive. ... The phenomenon or fact that cannot in any wise be linked with the rest of what he has observed, he does not observe."

- Henry D. Thoreau



Throughout the ancient world the star between the horns of a crescent was an important religious symbol. Yet it is physically impossible if the crescent represented the Moon. What is more, the apparition was universally reported to have occupied the top of a tapering column of light in the motionless center of the northern sky – the north celestial pole – where the Moon never goes. It was often pictured as a figure with arms stretching upwards.

The north celestial "pole" was commemorated by all ancient cultures as the home of the prehistoric sun and the planetary gods. A true history of the Earth must explain these astronomical enigmas. And a true history of the Earth is necessary before we can speculate meaningfully about planet origins.

"Like a man was the sun when it showed itself, and its face glowed when it dried the surface of the earth...It showed itself when it was born and remained fixed in the sky like a mirror. Certainly it was not the same sun which we see, it is said in their old tales."

- D. Goetz & S. Morley, *Popol Vuh*, 1972, p. 188.



The detail (left) in these early renditions shows a raised central hemisphere in front of another radiating star-like body, superimposed upon a crescent.



The Bottom Line

The bottom line is that a better theory of the formation of planets requires the observational skills of astronomers, the forensic input of comparative mythologists, the theoretical input from plasma physicists and the practical experimental capabilities of electrical engineers. Most importantly, the common thread for this interdisciplinary approach is provided by the new paradigm of an Electric Universe. But we should keep in mind that the odd natures of the planets in our solar system argue for a complex history that may never be entirely amenable to computer modelling. The orbital and axial tilts of the giant planets are strong evidence for one or more capture events. Perhaps we may be able to determine a planetary genealogy?

"It is possible that this new era also means a partial return to more understandable physics. For the nonspecialists, four-dimensional relativity theory and the indeterminism of atom structure have always been mystic and difficult to understand. I believe that it is easier to explain the 33 instabilities in plasma physics or the resonance structure of the solar system. The increased emphasis on the new fields means a certain demystification of physics. In the spiral or trochoidal motion which science makes during the centuries, its guiding center has returned to these regions from where it started. It was the wonders of the night sky, observed by Indians, Sumerians, or Egyptians, that started science several thousand years ago. It was the question why the wanderers – the planets – moved as they did that triggered off the scientific avalanche several hundred years ago. The same objects are now again in the center of science – only the questions we ask are different. We now ask how to go there, and we also ask how these bodies once were formed. And if the night sky on which we observe them is at a high latitude, outside this lecture hall – perhaps over a small island in the archipelago of Stockholm – we may also see in the sky an aurora, which is a cosmic plasma, reminding us of the time when our world was born out of plasma. Because in the beginning was the plasma."

- H. Alfvén, Science 4 June 1971. From a lecture he delivered in Stockholm, Sweden, on 11 Dec 1970 when he received the Nobel Prize in Physics.

Wal Thornhill

Squashed Star Flattens Solar Theory

Posted on [June 24, 2003](#) by [Wal Thornhill](#)

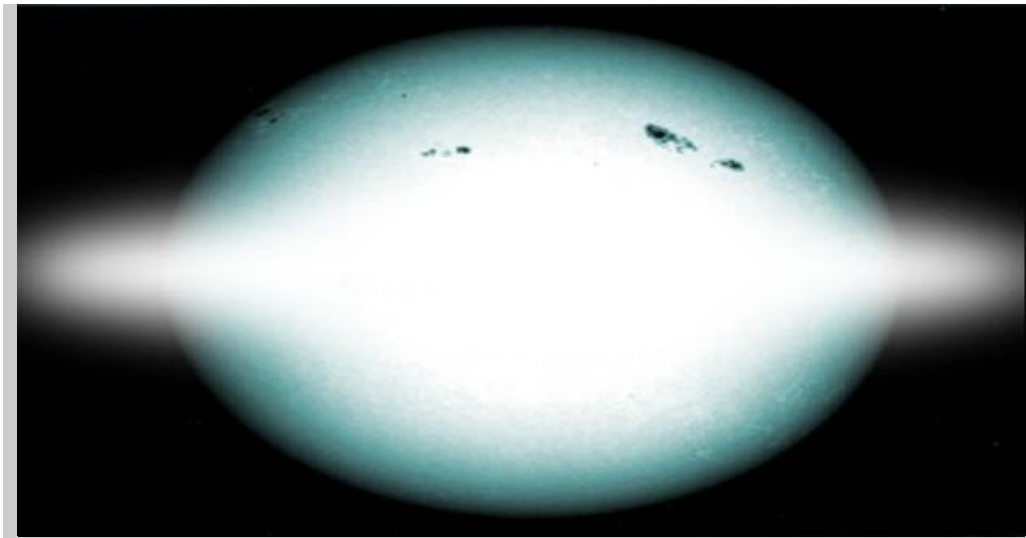
The following report appeared in New Scientist for 12 June 2003:

Flattest star puts astronomers in a spin

Danny Penman

The flattest star yet seen is forcing researchers to revise their ideas on the dynamics and structure of celestial bodies. The star, called Achernar, was observed by astronomers at the European Southern Observatory in Chile.

According to standard celestial theories, the fast spinning star should be only 20 to 30 per cent wider across its equator than from pole to pole. But Achernar, which spins at 225 km per second, has a colossal bulge around its equator and is 50 per cent wider.



Artist's impression of ACHERNAR (Alpha Eridani). Brilliant blue Achernar, the ninth brightest star in the sky, lies at the southern tip of the star-river Eridanus. It has a belt of emitting gas circling its equator. It is a member of a peculiar class of stars known as "Lambda Eridani" stars that show tiny but very regular periodic light variations.

All stars and planets that reach a critical spin velocity bulge slightly at the equator. The Earth is 40 kilometres, or 0.3 per cent, wider from east to west than from north to south. Astronomers had been confident that their calculations of this oblateness were fairly accurate. "But the new observation means that the model for fast rotating stars is not complete," says astronomer Pierre Kervella, one of the team at the European Southern Observatory. "We clearly do not know enough." "Either the core is rotating faster than the surface or the star's matter is

circulating in an unexpected way. We're not sure which possibility is correct at the moment," he told New Scientist.

The discovery was made by astronomers using the Very Large Telescope Interferometer at ESO's Paranal site in Chile. This uses two 40-centimetre reflecting telescopes to produce images which are then combined and passed through an interferometer. This permits extremely accurate measurements – the instrument could spot a one euro coin at 2500 kilometres distance.

The astronomers now plan to gather even higher resolution images using a trio of 1.8 metre telescopes. "But our immediate task will be to re-design our computer models," says Kervella. The team hopes to use the models to distinguish between the two possible explanations for the star's extraordinary flatness.

Comment: There is a third important alternative, notable for its absence from the discussion. **Perhaps we don't know how stars work!** The simplest way to explain stellar flattening due to swift rotation would be if the star were more homogeneous in density. But that would require giving up the notion of a central thermonuclear fire.

Predictive success is a key indicator of the correctness of a theoretical model. The above report demonstrates once more the predictive failure of present astrophysical models. The recommended scientific approach to such a dilemma is to question all of the assumptions that go into the failing model. However, when it comes to the question of how stars work, embodied in the "standard solar model," there is no question. Stars shine, so obviously something must be burning within the star.

But electric lights shine without consuming themselves.

In the above report, two ad hoc solutions are offered to complicate things. But this is merely tinkering with a model that is already in deep trouble according to other fundamental observations. Unfortunately it seems scientists are encouraged by their training to indulge in "confirmatory bias." That is, "the tendency for humans to seek out, attend to, and sometimes embellish experiences that support or 'confirm' their beliefs."

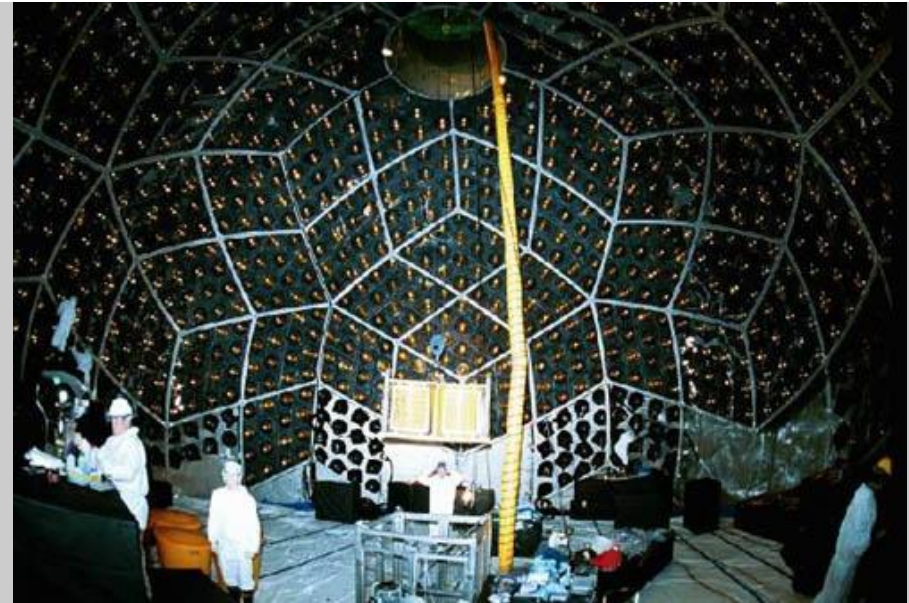
"One study found that the vast majority of scientists drawn from a national sample showed a strong preference for "confirmatory" experiments. Over half of these scientists did not even recognize disconfirmation (modus tollens) as a valid reasoning form! In another study the logical reasoning skills of 30 scientists were compared to those of 15 relatively uneducated Protestant ministers. Where there were performance differences, they tended to favor the ministers. Confirmatory bias was prevalent in both groups, but the ministers used disconfirmatory logic almost twice as often as the scientists did."

- Michael J. Mahoney, *Publication Prejudices: An Experimental Study of Confirmatory Bias in the Peer Review System Cognitive Therapy and Research*, Vol. 1, No. 2, 1977, pp. 161-175.

Two Fundamental Observations About the Sun Do Not Support the Standard Solar Model But They Have Been Minimised or Ignored.

The first is the celebrated "neutrino problem" where the neutrinos arriving from the Sun are far too few to account for the Sun's presumed thermonuclear energy output. No scientist could contemplate trashing the standard solar model so the problem had to be with the neutrinos. After decades of expensive research it was shown by the "KamLAND" experiment [see below] that neutrinos can oscillate between different forms, known whimsically as 'flavors.' Following the habit of confirmatory bias, this notion was seized upon as "proof" that the standard solar model was correct. A report in *Physics Today*, March 2003, put it this way: "After 36 years of solar neutrino experiments, the inescapable conclusion is that a large fraction of the electron neutrinos produced by nuclear processes in the Sun's core are metamorphosing into other neutrino varieties somewhere en route to the detectors on Earth." The report came to the conclusion that neutrinos were not undergoing any significant change of flavor in the vacuum of space between the Sun and Earth. Instead they were performing "an irreversible flavor change that takes place in high-density regions of the Sun." So not only does the Sun need a hypothetical hot, high-density core to have any hope of generating thermonuclear energy, it now needs a hypothetical "critical-electron-density region" as well, to fudge the neutrino results. No doubt this will give rise to a flurry of theoretical activity using neutrinos to probe the imagined interior of the Sun.

[A widely viewed site](#) on the Internet reported the KamLAND experiment in triumphal terms:



A large sphere beneath Japan has helped verify humanity's understanding of the inner workings of the Sun. ..leading astrophysicists now consider the long standing solar neutrino deficit problem as finally solved.

But neutrino metamorphosis is not an "inescapable conclusion." It is confirmatory bias with bells on! Conflicting evidence about the source region of the neutrinos is being ignored. There have been several reports of a correlation between the neutrino count, the sunspot number and solar wind strength. These are solar surface effects that should have no connection with what is going on in the Sun's core, where the hidden energy of the nuclear furnace is supposed to take hundreds of thousands of years to "leak out" to the surface.

The electric star model suggests a simpler explanation of solar neutrino observations. The Sun produces all of the neutrino flavors on the surface in more complex nuclear reactions than mere heat and pressure allows. The nuclear reactions are ignited by the plasma pinch effect in the gigantic electrical discharges that cover the star and produce starlight. Ironically, it is the same phenomenon as that employed in some laboratories attempting to mimic the Sun's energy production! In this model, the connection between neutrino count, sunspot number and solar wind is expected, because the driver for them all is the same – galactic electrical power.

The second serious challenge to the standard solar model comes from solar oscillations. In the 1970's, the Sun was unexpectedly found to ring like a bell. In 1976 Severny, Kotov & Tsap discovered a dominant 160-minute ringing mode of the Sun. They wrote:

"The simplest interpretation is that we observed purely radial pulsations. The most striking fact is that the observed period is almost precisely... the value if the Sun were to be an homogeneous sphere. ... We have investigated two possible solutions to this dilemma. The first alternative is that nuclear... reactions are not responsible for energy generation in the Sun. Such a conclusion, although rather extravagant, is quite consistent with the observed absence of appreciable neutrino flux from the Sun, and with the observed abundance of Li and Be in the solar atmosphere."

The second alternative involved force fitting the data to the standard solar model by assuming that the oscillations were not simply radial but of a more complicated form. However, the implications were so disturbing for theorists that the work was repeated in various locations and all sources of error considered. The result in 1981 was that the original oscillation was found to be the highest peak in the power spectrum, and *"one may conclude that 160-min oscillation shows mostly radial motion."* In reporting the status of solar oscillation observations in 1991 in "Solar Interior and Atmosphere", F. Hill et al mention the 160-minute oscillation without any reference to the implied homogeneous Sun. Rather, they spend half a page casting suspicion on the extensive observations and attempting to minimize its significance. The reason is only thinly veiled:

"Additional doubt comes from the difficulty of theoretically describing the nature of the oscillation ..."

The authors were merely behaving with the usual confirmatory bias.

The question of what is ringing the stellar bell has not been satisfactorily answered. It should be noted that the size of an electric star is determined by the degree of electric stress it suffers. And since the electric Sun forms part of a galactic circuit, it will exhibit resonant effects. The Sun is an electric bell as well as an electric light! It seems particularly significant that the 160-minute oscillation also appears with high statistical significance in the solar intensity, infra-red, radio and radio polarization (connected with the solar magnetic field). All of these effects are to be expected in an electric star model because they are driven by the same resonant electrical power circuit.

Kotov went on to publish a paper in 1985 that detailed a number of other significant astrophysical manifestations of this basic 160-minute resonance in the solar system, binary stars and RR-Lyrae variable stars in globular clusters. He concluded:

"beyond doubt, ..the nature of the 160-min oscillation, firstly found in the Sun and then in the solar system as a whole and then among the stars, does present a new challenging problem for astrophysics. ..the next thing to suggest is that a fundamental aspect of the physics of gravitation is not yet understood(?)."

I suggest that the problem has nothing to do with gravity. Instead, problems arise because incorrect gravitational models are used in astrophysics. The correct electrical models are much simpler and can be verified by direct observations instead of inferences about the hidden interiors of stars.

As outlined in an [earlier news item](#), an electric star is expected to be much the same density throughout. So the peculiar flattening of fast-spinning Achernar is easily understood.

In the not-too-distant future we will look back on attempts to explain the Sun in terms of a central fire with the same dismissive humor that we use for earlier notions of the Sun as some sort of fire in the sky, steadily consuming itself. What appears at first glance a perfectly natural and simple explanation fails to explain almost all of the strange solar phenomena we see. Our old fiery model of the Sun, and consequently of all stars, has become a complicated theoretical nightmare.

It seems that the leap from an old worldview to a new one is difficult for the human mind. But once achieved we can teach young children ideas that defeated the greatest minds for centuries. Our grandchildren will view it as perfectly obvious that Nature should provide us with an electric light, the Sun, powered over galactic distances by a vast network of invisible transmission lines, humming at an ultra-low frequency. Plasma physicists already know those transmission lines as Birkeland currents.

Wal Thornhill

Planet Birthing – More Evidence

Posted on [July 24, 2003](#) by [Wal Thornhill](#)



In my [May news item](#) I wrote:

"It is far simpler and infinitely more efficient if planets are "born" at intervals by the electrical ejection of charged material from the similarly charged interiors of larger bodies – gas giants from stars, and rocky planets from gas giants."

The [following report](#) is from Astronomy.com of July 23 and provides further evidence in favor of such a model:

Planets Prefer Metal

Stars with high metal content are most likely to harbor planets.
by Vanessa Thomas

When looking for planets beyond our solar system, astronomers often target stars like the sun. But they may want to refocus their attention on stars that hold more metals than our own. A new study reveals that the more metal-rich a star is, the better the chance it hosts a planet.

Extrasolar-planet hunter Debra Fischer of the University of California, Berkeley, and astronomer Jeff Valenti of the Space Telescope Science Institute analyzed the composition of 754 nearby stars and looked to see which stars had planets. They found a strong, nearly linear correlation between a star's metal content and the likelihood that it has a planet.

"We now know that stars which are abundant in heavy metals are five times more likely to harbor orbiting planets than are stars deficient in metals," says Fischer, who presented the results Monday at the International Astronomical Union meeting in Sydney, Australia. "If you look at the metal-rich stars, twenty percent have planets. That's stunning."

Fischer and Valenti examined the abundances of iron, nickel, titanium, silicon, and sodium in the spectra of more than 1,000 stars. (In astronomy, all elements heavier than helium are considered "metals.") Of these, 754 were monitored for at least two years, so the astronomers could tell whether the stars had any close-orbiting gas giant planets. (A large, orbiting planet exerts a gravitational force on a star, causing a "wobble" that's detectable in the star's spectrum.) Planets orbit 61 of the studied stars while the other 693 have no known planets.

After grouping the stars by metal content, the pair compared how many stars of each type had planets. Stars with sun-like metal abundances have a 5 to 10 percent chance of having planets. Those with three times more metals than the sun have a 20 percent chance. Metal-poor stars with only one-third as much as the sun have just a 3 percent probability. None of the 29 most metal-deficient stars of the study had planets.

"These data suggest that there is a threshold metallicity, and thus not all stars in our galaxy have the same chance of forming planetary systems," Fischer says. "Whether a star has planetary companions or not is a condition of its birth. Those with a larger initial allotment of metals have an advantage over those without."

The findings also suggest that younger stars are more likely to have planets. That's because stars born in the galaxy's early days formed from nebulae that included fewer heavy elements. As time passed, more stars exploded as supernova and heavier elements fused in their cores were scattered into the interstellar medium.

"Stars forming today are much more likely to have planets than early generations of stars," comments Valenti. "It's a planetary baby boom."

Comment: Given the orthodox notion of how planets form, it is not clear why we should expect more gas giant planets about a star simply because it has more heavy elements in its spectrum.

However, I argued in my earlier news item that stars "give birth" from time to time by electrical parturition. It occurs in a nova-type discharge from their charged interior. Unlike the hydrogen-bomb model of stars, there is no internal heating. Intense plasma discharges at the stellar surface give rise to starshine. Those discharges synthesize "metals" that continually rain into the star's depths. The heavy element abundance in a star's spectrum is not just an inheritance from old supernovae. Stellar interiors become enriched in heavy elements. The star "children" are gas giants or binary partners formed from those heavier elements after expulsion from the star.

Therefore we should simply expect from the electric star model that the longer a star has been shining the more heavy elements it will show in its spectrum and the more time it has had to "give birth." So stars forming today are not more likely to have planets than earlier generations. They probably have not had time to have planetary "children." Whether a star has planetary companions or not is NOT a condition of its birth. We should expect that below a certain metallicity (that is, age) a star will not have planets. We do not expect babies to give birth! Planet formation has more to do with the growth of internal electrical stress in a star. It can be enhanced by episodes of unusual electric stress in its environment. We should be looking closely at stars that have undergone nova outbursts.

It should be noted that plasma cosmologists have a view of star formation that allows for a number of condensed bodies to be formed in close proximity at the same time. And the separation of elements by their "critical ionization velocity" in a plasma pinch may offer an alternative explanation for differences in metallicity between the bodies. However, it is not clear to what extent this mechanism plays a role in the development of planets about a star. Certainly, it does not explain the propensity for planets to be found in higher numbers near stars of higher metallicity.

The stellar parturition model seems to offer a simple solution to:

- a) the presence of heavy elements in gas giants,
- b) a greater number of gas giants being found around stars of high metallicity, and
- c) the propensity for close orbits of the gas giants about their parent star.

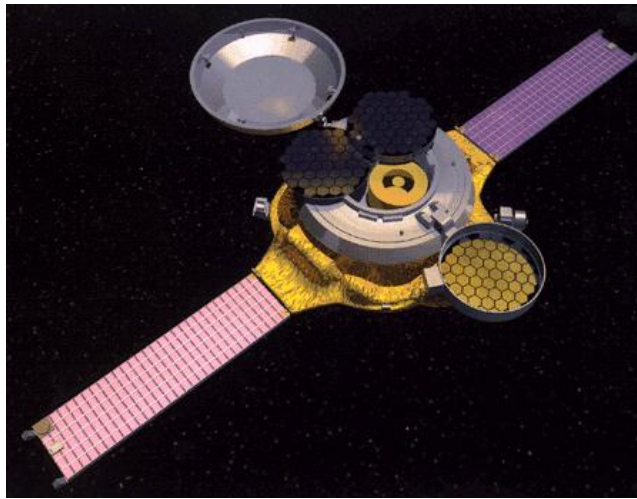
Wal Thornhill

Puzzling Star Stuff

Posted on [August 2, 2003](#) by [Wal Thornhill](#)

"Twinkle, twinkle little star. How I wonder what you are."

In a report for the New Scientist of 26 July, titled 'The Sun Catcher,' Hazel Muir writes about the daring exploits required to retrieve samples of the Sun to be returned to the Earth in 2004 by the GENESIS spacecraft. Astronomers hope that the solar samples collected on five separate 1-metre round collector arrays will shed light on the birth of the Sun and planets. I hope they are successful but **I predict that it will add to the utter confusion resulting from earlier samples from the Moon, Mars and meteorites.**



From New Scientist:

By April 2004, the arrays will have trapped only about 20 micrograms of solar material other than hydrogen and helium – the weight of a few grains of salt. That tiny amount could still be enough to revolutionise our view of the sun. To date, our best estimates of the make-up of the sun come from detailed studies of the light it emits and from spacecraft that have analysed the solar wind. In terms of mass, hydrogen and helium make up about 98 per cent of the sun, with other elements making up the rest.

Previous studies of the solar spectrum have identified the fingerprints of over 60 elements. But measuring their abundances isn't so easy and most elements come with an error of at least 10 per cent. For some, astronomers confess they can't measure the amounts at all. Even worse, the solar spectrum says nothing about the various different isotopes of a particular element in the sun. That's because the light an atom emits or absorbs depends on the energy levels of its electrons – not on the number of neutrons in its nucleus, which is what varies according to the isotope. Spacecraft measurements of isotope ratios often have uncertainties of 40 per cent or more.

With the Genesis sample safely back in the lab, astronomers will be able to analyse it with the most sophisticated equipment to hand. This will improve their measurements of solar elements by a factor of 3, and will also allow them to pin down isotope ratios with errors of just 0.1 per cent, making them tens or hundreds of times more accurate than before.

Having such a precise list of raw ingredients for the solar system might help astronomers understand all the inexplicable differences between elements on Earth, the moon and Mars. For decades researchers believed that the isotope ratios of different elements – such as the ratio of carbon-14 to carbon-12 – are the same everywhere, from the sun to the outer planets. But following the Apollo missions, it became clear that things are not that simple.

Between 1969 and 1972, astronauts on Apollo missions to the moon planted aluminium sheets on sticks into the powdery lunar surface to trap solar-wind particles. Back on Earth, scientists extracted helium, neon and argon from the metal, and found that the ratio of neon-20 to neon-22 was inexplicably 38 per cent higher than in the Earth's atmosphere.

Even on the moon's surface, the ratios of different nitrogen isotopes in a rock vary depending on its age. One possible explanation is that the nitrogen content of the solar wind has gradually changed over time, although how the sun could arrange that is a mystery.

The most dramatic variations in isotope mixes are for oxygen. The ratio of oxygen-18 to oxygen-16 is completely different in moon rocks and terrestrial rock, and in meteorites from Mars and the asteroid belt. "As time has gone by, we have found more and more differences, as measurements get more precise," says Burnett. "There are now a whole string of elements whose isotopes are known to vary in the moon, meteorites and in the Earth, and no one really knows why these variations exist."

The Genesis sample could help resolve some of these puzzles by filling in gaps in our picture of the sun's chemical make-up, and how that differs from the make-up of the Earth, Mars and the asteroids. There could be underlying patterns in this "map" that reveal why all these bodies came to be so different. That's assuming nothing goes badly wrong on the sample's return to Earth.

Comment:

"These puzzles" are manifold because astronomers' assumptions fly in the face of the data. The very name of the mission, "GENESIS," betrays the assumption that the outer layers of the Sun reflect the exact composition of the giant interstellar cloud that is presumed to have originated the solar system. This assumption, in turn, is based on the

belief that the only element that changes over time in our Sun is the hydrogen it "burns" in its core to form helium. Practically all heavier elements must remain in the same abundances and isotopic ratios as "in the beginning" of the star.

Another assumption is that the planets were born at the same time as the Sun and from the same material. If either assumption is wrong, the results of the GENESIS experiment will not make any sense.

I claim that both assumptions are wrong. At best the GENESIS results will only add more isotopic variations to those already discovered. In the worst case, astronomers will be confounded by the discovery of one or more short-lived radioisotopes in the solar wind samples. That cannot happen if the Sun works the way astronomers believe it does. However, isotopic variation is expected if the Sun is a cosmic electric discharge phenomenon.

In an electric star, both isotope ratios and heavy-element abundances would not be fixed at the time of its birth but would be "cooked up" in the outer layers by the high-energy discharges. It's ironic that physicists use an electrically driven plasma pinch in laboratory experiments to mimic the nucleosynthesis they believe occurs at the core of the Sun. The question seems never to be asked: if they find it easiest to drive nucleosynthesis using electrical power, why would Nature do it in a more difficult way? This very same plasma pinch, scaled up from the lab by many orders of magnitude, can produce the 60 elements found in the atmosphere of the Sun.

[The formation of planets by electrical expulsion](#) of part of the parent's core material also leads to nucleosynthesis in the grandiose lightning flash of a nova. That is why some of the expulsion debris, in the form of meteorites, contains the products of very short-lived radioisotopes in their flash-heated minerals. This is a far simpler explanation than to require rare supernova events nearby at just the right moment during the formation of the solar system.

The episodic expulsion of planets results in a period of readjustment within the solar system after each event. The powerful electric force mediates that process when the comet-shaped plasma sheaths of the planets interact during close approaches. The sheaths (misnamed magnetospheres) tangle and the planets abruptly "see" each other electrically. When this first happens, gargantuan electrical discharges snake between the bodies and scar their surfaces with circular craters, mounds, sinuous channels and etched terrains. These cosmic thunderbolts too are capable of inducing nucleosynthesis and radioactivity.

Apollo astronauts found radioactive hotspots on the Moon, associated with young craters. These are the signatures of cosmic thunderbolts. Atmospheric and surface materials are dumped from one body to the other, and their elemental abundances are altered in the process. Most importantly these electrical interactions limit solid body collisions and mediate capture. The Moon was not formed by a collision with Earth but was captured recently.

It should have been obvious following the Voyager missions that the solar system shows myriad signs of a chaotic history. The old fairy tale that the solar system was formed "once upon a time, long, long ago" should have been retired immediately. The chapter of imaginary early impacts is not required to explain the heavy and oddly distributed craters on Mercury, the Moon, Mars and other bodies. It is amazing the amount of evidence against these fictions. Yet space age contradictions have not been able to dispel what has become a core belief in science. The story of the condensation of the solar system is a hangover from an earlier era, the time when science was superseding religion in chronicling mankind's place in the scheme of things. It seems the human craving for certainty in the face of a violent universe took precedence. Unfortunately all we got is a new religion of science.



Artist's impression of the formation of the lunar crater Copernicus by an interplanetary arc. The features of planetary craters have not been reproducible on Earth by impact experiments. However, the tornadic cutting and removal of material by an interplanetary arc can explain all of the characteristics of circular craters.

So, what good can come from the GENESIS mission?

The greatest wake-up call would be the discovery of short-lived radioisotopes in the solar samples. That would show we don't know how stars shine. The knock-on effects would be prodigious. The entire elaborate fiction of stellar evolution would come crashing down. Our certainty about the ages of stars and galaxies would be removed. The anomalies in stellar metallicities would be revealed as pointing to the need for a complete rethink of how stars and galaxies are formed and evolve. Eventually it would require acknowledgement that we inhabit an ELECTRIC UNIVERSE.

Within the solar system, knowing the isotopic composition of the solar wind might help us to identify atmospheric gases that have come from the solar wind and those that have been transferred from one body to another in past electrical interactions. We may be surprised to find that Mars has a whiff of Venus' atmosphere, the Earth and Moon have traces of Martian noble gases, and that the new, hot planet – Venus – has an atmosphere that is changing composition as we watch, mediated by continuing surface electrical activity.

Wal Thornhill

Spiral Galaxies & Grand Canyons

Posted on [August 18, 2003](#) by [Wal Thornhill](#)

The grandest canyon in the solar system is Valles Marineris on Mars. It stretches a third of the way around the planet. But what in heaven can spiral galaxies have to do with the geology of Mars?



The great scar of Valles Marineris looks as if it has been burnt into the planet's face. Behind, a barred spiral galaxy glows from the depths of space. It is so called because the spiral arms begin from the ends of a bar rather than the center of the galaxy. About 1/3rd of all spirals are barred, including our Milky Way galaxy.

[In October 2001](#), I wrote:

"In light of more than a century's research in the field of plasma cosmology and the 20th century discoveries of the space age, we can confidently propose the celestial thunderbolt as a common cause of the formation of canyons and rilles on rocky planets and moons."

At that time I had not come to any conclusion about the details of the electrical event that created the colossal Valles Marineris canyons on Mars. Like geologists, I use a process of pattern matching when attempting to understand the processes that may have formed a feature seen on the surfaces of planets and moons. But unlike geologists, who have been seriously misled by astrophysicists and are now confused by what they see on Mars, I

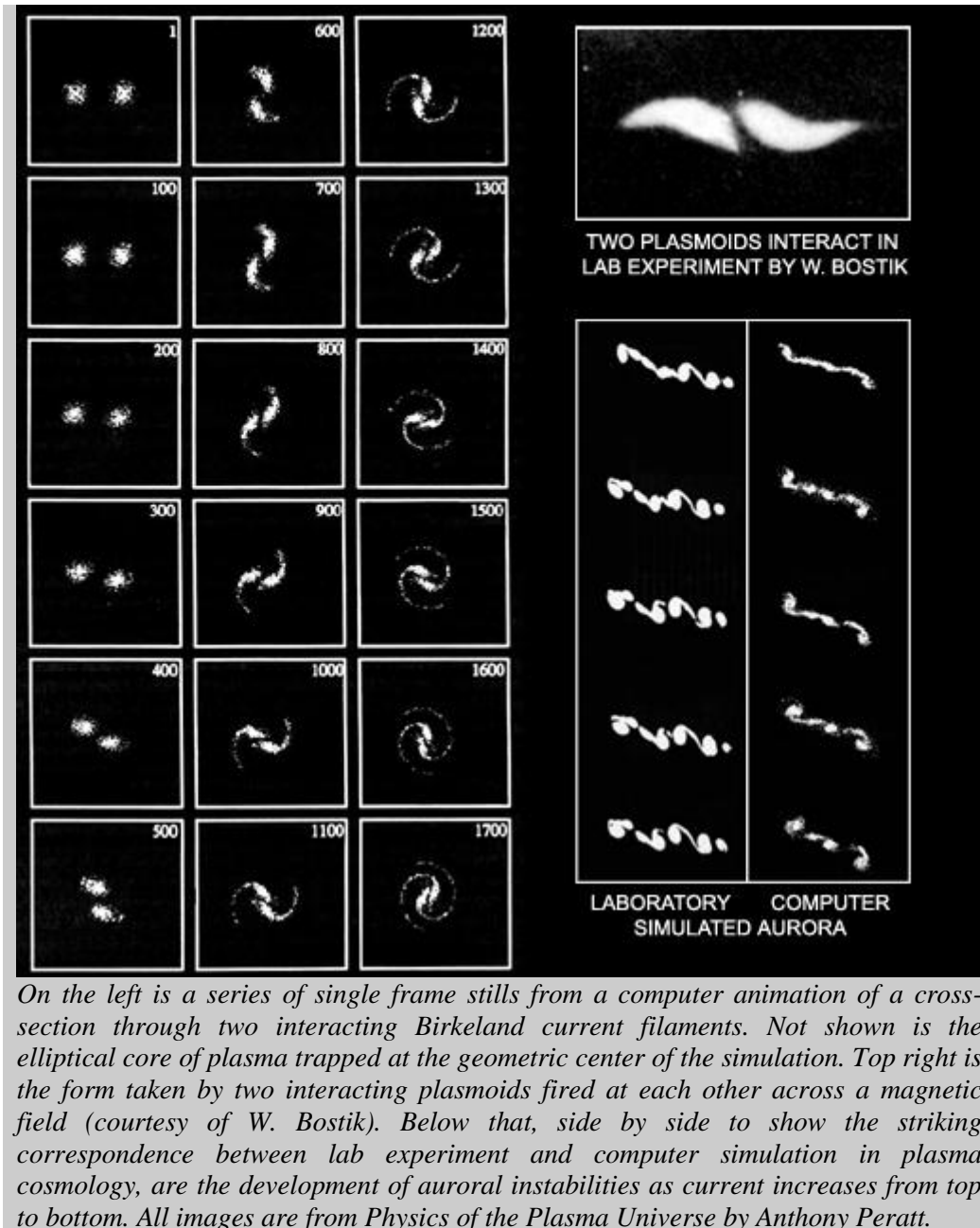
have the luxury of contemplating the effects of the most powerful erosion force in the universe – that of the electric arc.

Following the lead provided by Ralph Juergens in the 1970's I looked at the detailed morphology of Valles Marineris to conclude that it was a scar caused by a cosmic discharge. But the question remained: how did the arc move to create a chasm at least 4000 kilometres long? There is no obvious start or finish to the canyons. Indeed there is a kind of symmetry about the central region of Melas Chasma.

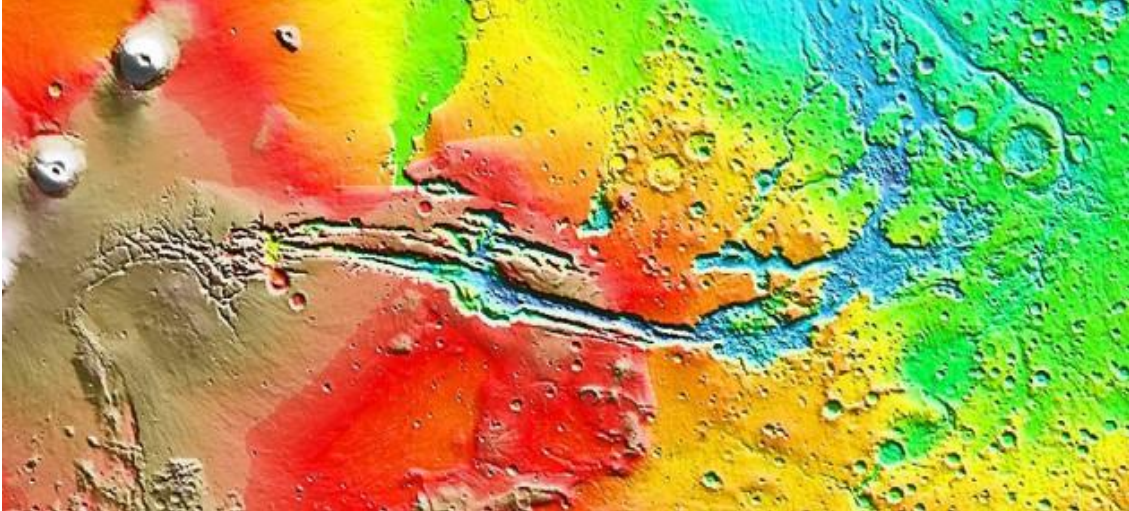
Electrical effects offer a unique advantage in being scalable over more than 14 orders of magnitude. In other words, erosion effects observed under an electron microscope provide direct insights into planetary features on a scale of hundreds or thousands of kilometres. However, I had limited my perspective by not looking at large scale galactic objects to see if there were any clues in their patterns to the much smaller features on planetary surfaces. **The connection lies in the fact that galaxies are the largest visible electric discharge phenomenon in the universe.**

That may be a controversial statement when conventional astrophysics uses the weakest force in the universe, gravity, in a fruitless attempt to explain the dynamics of galaxies. It is a glaring indictment of the way science works when a compelling competing theory is neither mentioned nor tested against an accepted theory that requires ad hoc and mysterious "dark matter" and "dark energy" in order to appear to work. It has forced plasma physicists and the IEEE to hold separate meetings and to publish papers on [plasma cosmology](#). With a very few notable exceptions, the astronomical community ignores the subject.

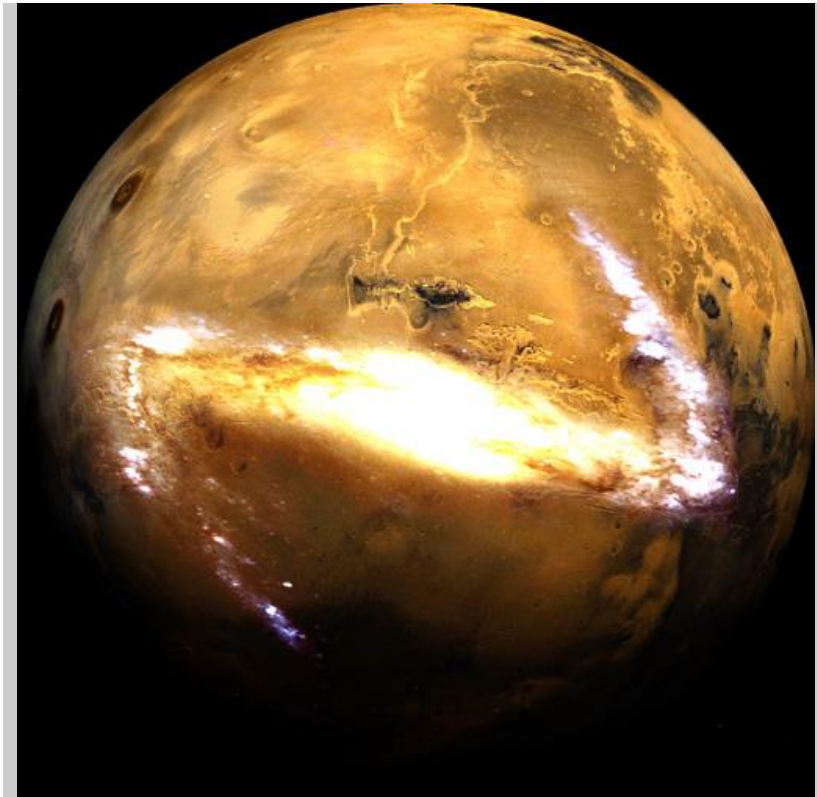
The strongest support for plasma cosmology comes from the close correspondence between observations, supercomputer simulations and experiment. It does not require any new forces, new physics or phantom particles to force a match with observations. It explains why galaxies naturally favor the beautiful spiral form. Gravity alone can only produce featureless disks. The current theory of planet formation relies on this fact.



In the simulation of the electrical formation of a spiral galaxy the two fuzzy spots in the earlier frames show where two cosmic current filaments pass vertically through the plane of the developing galaxy. The force between these cosmic current filaments is more powerful and long-range than gravity, declining linearly with distance. It leads to a natural pairing of filaments when many filaments are present in plasmas in which the magnetic field plays a major role.



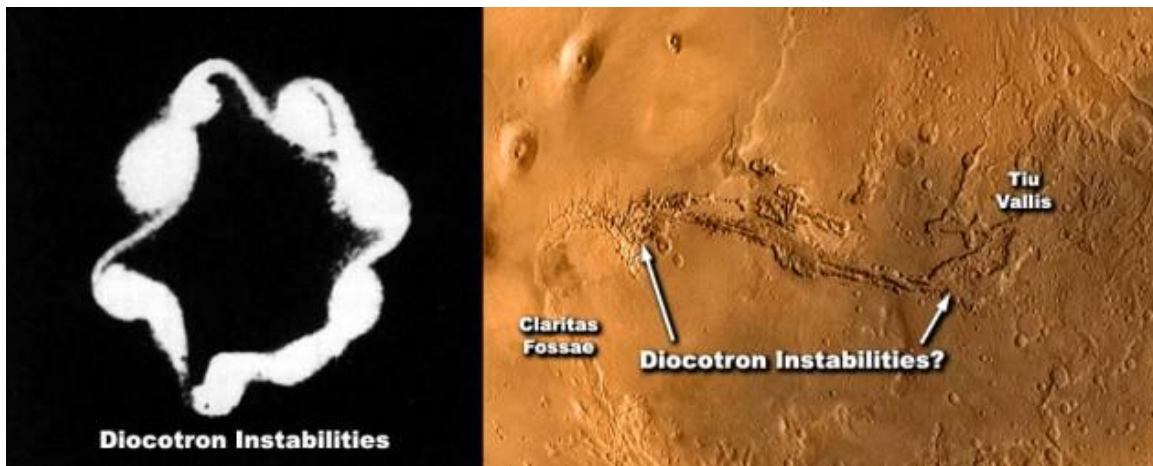
I accounted for the pairing and rotation of plasma current filaments when explaining the formation of circular craters. However, it was not until I examined the MOLA topographic map of Mars (above) that I realized the extended form of Valles Marineris and connected canyons was identical to that of a classic barred-spiral galaxy.



It seems that a cosmic thunderbolt has struck Mars with two huge filaments or plasmoids focussed on a spot now occupied by the deepest central canyons of Valles Marineris. Electromagnetic forces then constrained the discharge across the surface of Mars to the classic shape of a barred spiral.



All of the enigmatic large-scale features of Valles Marineris then have a coherent and simple explanation. Note the tendency for Ius Chasma to be concave downwards and Coprates Chasma to be concave upward. That matches the effect seen in Bostik's lab experiment above. Also many odd details make sense. For example, for the aficionados of powerful plasma discharges, the "bar" is formed by Ius Chasma to the west and Coprates Chasma to the east. At their extremities they "pinch" down before entering large chaotic regions, Noctis Labyrinthus in the west and Capri Chasma and Eos Chasma in the east. This is typical of diocotron instabilities that sometimes occur in the arms of spiral galaxies. After pinching down, the discharge curves and balloons out. The surface damage is spread over a greater area, forming chaotic etched terrain in the east and a vast system of pitted trenches in the west. The act of pinching the discharge leads to filamentation, which may be seen in the thin parallel channels at the extremities of the main canyons. The filamentation instability occurs most readily at large currents. This effect could also explain the tendency to "doubling" of the canyons, to form a central ridge.



Electrons rushed from remote regions along the outer "spiral arms" of Claritas Fossae in the west and a number of channels including Tiu Vallis in the east. In doing so they created the usual electrically scoured channels. As Michael Carr, leader of the Viking Orbiter imaging team noted, "Canyons, chaos and outflow channels are thus physically connected, and their origins may be in some way related."

There are some smaller parallel canyon systems, closed at both ends, to the north of Valles Marineris. They appear to be the result of smaller discharges of the same type as created Valles Marineris, probably immediately following the main stroke. Multiple strokes, decreasing in intensity, are a well-known characteristic of lightning.

The Accepted Model

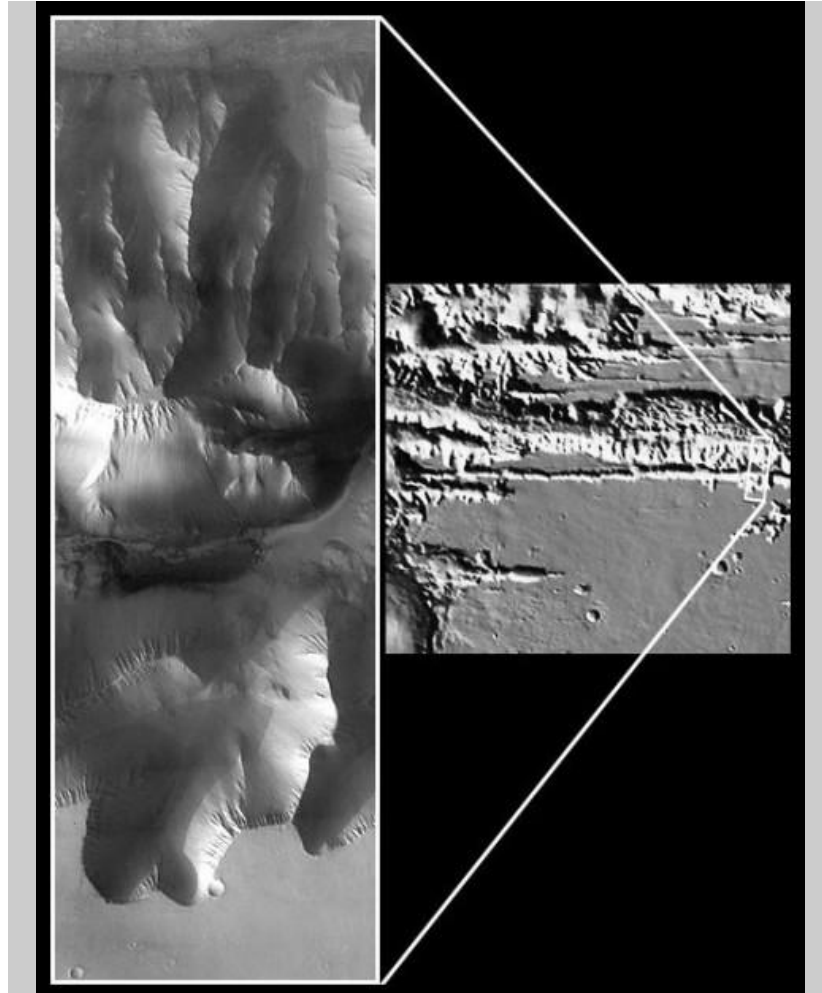
No one was there to witness the evolution of the Earth, so geologists have constructed an elaborate story about the history of the Earth. It is founded upon a simple belief that the planets were all formed at about the same time and have remained for billions of years in their present orbits. It was inevitable that chapters of the Earth's story would be translated to Mars. The result is a succession of hypothetical Martian "ages" including a "Noachian" age of deluge. And remember that this is a story about a frozen desert planet!

One of the most highly developed capabilities of the human mind is to concoct stories. Equally, we have a strong desire to be told stories and to believe them. If we believe a story to be true we have a strong tendency to accept confirming evidence and to ignore contrary evidence. Geologists are human and show the same tendencies when explaining planetary surface features.

The idea of former oceans and rivers existing on Mars came from the many scoured channels and the flat, low terrain in the northern hemisphere. This marked hemispheric dichotomy is inexplicable by any known geological or astronomical effect. It has never occurred to geologists that the agent involved was electrified plasma. Why should it? Astrophysicists tell them that we live in an electrically neutral universe in which cosmic charge separation is impossible. But if that single assumption is incorrect everything changes. If the visible universe suffers cosmic charge separation then we have a source of energy to build and shape galaxies, light stars, give birth to planets, organize stable orbits and leave the resulting scars of electrical transactions on all solid bodies.

Implications of the Plasma Model

Gigantic fresh scars show that Mars has suffered recently and terribly. Millions of cubic kilometres of jagged boulders were burnt and torn from its surface and strewn from horizon to horizon – as all of the images relayed from the surface have shown. The implications for the search for life on Mars are profound. If there was a past environment conducive to life on Mars it has been wrecked. Not only the surface suffered but also the atmosphere was stripped and exogenous gases and solids dumped on the hapless planet. Mars' orbit and climate changed drastically.



It is interesting to compare a geological story of Mars with that of the electrical. The image above has the following explanation attached: "The steep canyon walls and ridge forming layers of Valles Marineris are on display in this THEMIS picture. Landslides and gullies observed throughout the image are evidence to (sic) the continued mass wasting of the martian surface. Upon close examination of the canyon floor, small ripples that are likely migrating sand dunes are seen on the surface. Some slopes also display an interesting raked-like appearance that may be due to a combination of aeolian and gully forming processes."

[See the THEMIS website for the fullsize image of the eastern end of Ius Chasma.](#)

The term "mass wasting" for Valles Marineris is a euphemism for the disappearance of millions of cubic kilometres of rock and soil. The two mechanisms proposed for the formation of Valles Marineris are underground water erosion or massive surface rifting. Neither stand up to scrutiny. There is no mechanism available to geologists to cause mass wasting, particularly on such a gargantuan scale. The minor features are merely explained in an ad hoc fashion.

The electrical model now has a coherent explanation for the broadest features of five major and distinct landforms associated with Valles Marineris. The five features are:

1. the Valles Marineris canyons;
2. Noctis Labyrinthus;
3. Claritas Fossae;
4. the eastern chaos region;
5. the great eastern valley systems.

The missing mass (shades of the purely gravitational thinking of astronomers) was not transported or buried on Mars. It was lofted toward space by blast and electrical forces. The same kind of process operates far more quietly today on Io, lofting matter hundreds of kilometres into space. The fact that we receive martian meteorites today is solid evidence of the removal of rocks from the surface of Mars in the recent past.

The electrical model also explains the detailed features. The small ripples on the canyon floor are not sand dunes but a solid reminder of the path of the arc that blasted the canyon. They are massive "fulgurites" – the glassified sand formed by underground lightning. They are transverse to the arc because they record the corona discharge filaments associated with lightning. The same effect seems to have solidified the soil along the ridge crests into "Lichtenberg figures," which is another characteristic pattern created by lightning. Ridge crests and canyon edges would be the focus of secondary discharges. The raked appearance of the slopes are probably the result of surface lightning feeding the ridge crests with electrons to satisfy the discharges there. We find such patterns of grooves on objects as diverse as asteroids, moons and planets.

For reasons yet to be revealed, I think it likely that Mars in the recent past had an environment not much different to that of the Earth. But the extensive layering on Mars suggests the earlier environment was globally and episodically buried and electrically scarred when that changed. That could explain the detection of extensive subsurface ice, if the hydrogen signature found by the Odyssey spacecraft is due to water. Certainly, Martian craters with flow features away from their rims fit such a picture. The flows are due to electric heating of ices by subsurface currents flowing away from the arc that formed the crater.

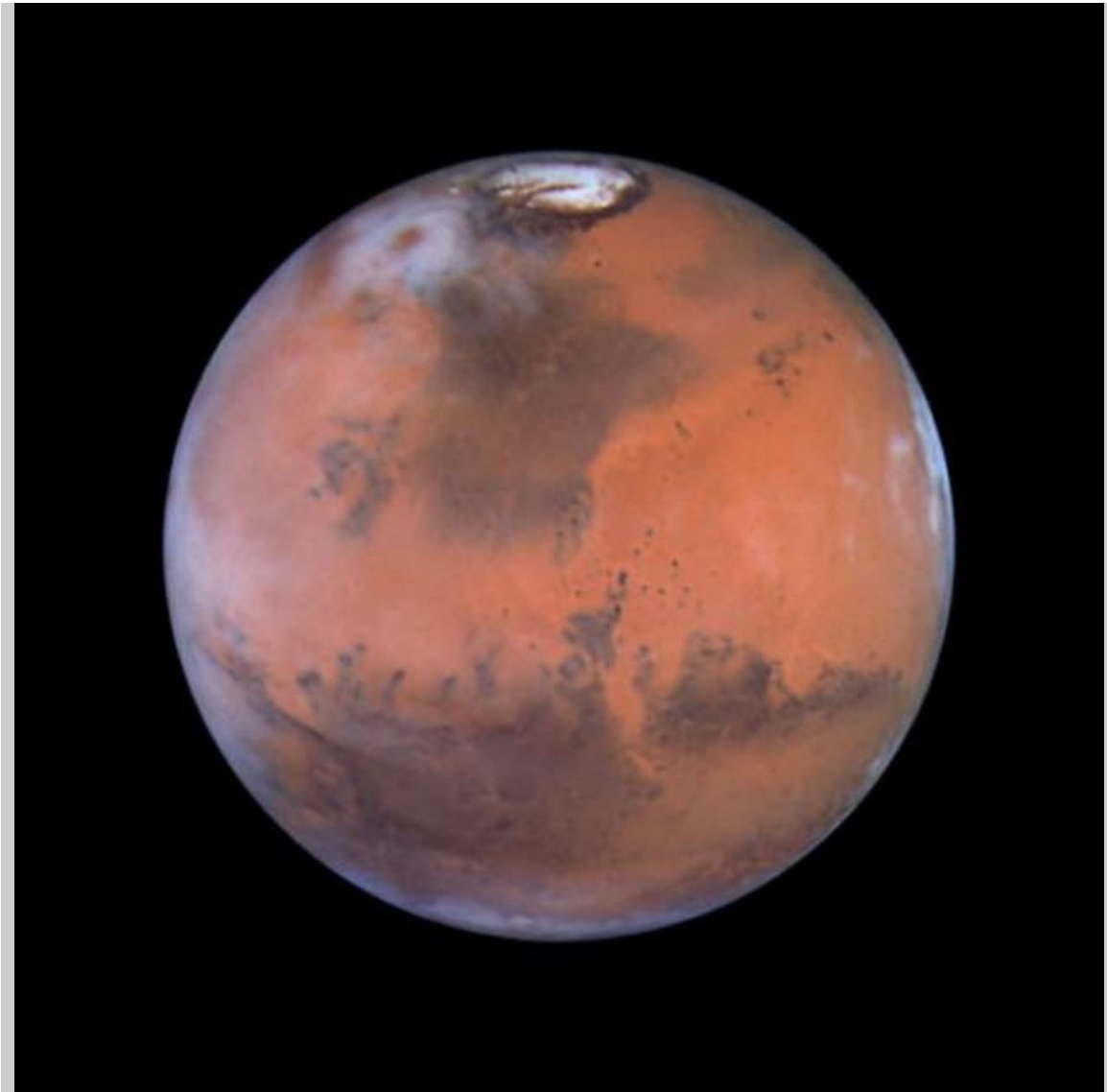
What about the Grand Canyon? As many geologists have pointed out, the Grand Canyon is the size of a mere tributary of Valles Marineris. The Grand Canyon shows detailed similarities to the canyons of Valles Marineris but the discharge that created it did not take the same striking shape. If forced to use a galactic analogy, it could be the equivalent of a dwarf irregular galaxy.

Wal Thornhill

Mysterious Mars

Posted on [August 27, 2003](#) by [Wal Thornhill](#)

Today, 27 August, at 9.51 am GMT, Mars will be a mere 56 million kilometres from Earth, the closest it has been since 57,617 BC.



Mars as seen by the Hubble Space Telescope

The claim that Neanderthals 60 millennia ago witnessed a Mars approach similar to what we are seeing today should be re-evaluated on two counts, one astronomical and one historical.

First: the equations used by astronomers produce the numbers which tell us where the planets have been (or will be) for millions of years, provided nothing has changed.

Mathematically, these equations can be trusted for only a few centuries into the past, and not at all into the future. It is only the astronomers faith in the unchanged orbits of the planets that allows them to assume that the equations will yield accurate records of where the planets were tens of thousands of years ago.

Second: to solve the mysteries of Mars astronomers must first answer the following historical questions posed by Ev Cochrane in [Martian Metamorphoses: The Planet Mars in Ancient Myth and Religion](#):

"Earthlings have long been fascinated by the planet Mars. Well before modern science fiction speculated about advanced civilizations upon Mars and the dire threat of invasion by little green men, the red planet was regarded as a malevolent agent of war, pestilence, and apocalyptic disaster. In an attempt to appease the capricious planet-god, various ancient cultures offered it human sacrifices. What is there about this distant speck of light that could inspire such bizarre conceptions culminating in ritual murder? And how do we account for the fact that virtually identical beliefs are to be found around the globe, in the New World as well as the Old?"



Cochrane continues:

"For untold millennia prior to the advent of scientific astronomy and well before there were any records which could properly be called historical, human beings recounted myths surrounding their favorite heroes and gods. Prominent themes in these sacred traditions include the Creation, the Deluge, the wars of the gods, and the dragon-combat. Despite the passage of eons and the destruction of countless cultures, such myths were committed to memory and told again and again primarily because they represented sacred knowledge regarding the history of the world. Until recently, however, such traditions have been given short shrift by scholars in general and all but ignored by mainstream science. This is most apparent, perhaps, in the modern astronomer's faith that more can be learned about the recent history of our solar system from running computer simulations than from considering what our ancestors had to say on the matter."

Precisely. The date given with computer generated accuracy for Mars' last closest approach to Earth is worthless. The computer has not been programmed with the real history of this world or that of Mars. Astronomers simply assume that the solar system is a Newtonian timepiece with no real history for billions of years. If that is wrong – and our ancestors obsessively repeat a different story – then the first law of computing applies to the computed date: Garbage in = garbage out.



An artist's picture appearing on Space.com of Neanderthals having a barbecue under the peaceful glow of a reddish spot in the sky is pure fantasy.

Cochrane again:

"...many of the greatest mythical themes reflect ancient man's obsession with the red planet. Indeed, we will attempt to show that Mars' prominence in ancient consciousness is directly attributable to the peculiar behavior of the red planet, which only recently participated in a series of spectacular cataclysms involving the Earth and various neighboring planetary bodies. If our thesis has any validity, it follows that the orthodox version of the recent history of the solar system is itself little more than a modern 'myth' and stands in dire need of revision. With implications this far-reaching, the ancient traditions surrounding the planet Mars suddenly take on new significance."

Science is supposed to consider all relevant data in attempting to find the truth. It is unscientific to ignore the references to Mars passed down by our ancestors worldwide, and which they considered of paramount significance. "We instinctively dismiss the idea that five or ten thousand years ago there may very well have been thinkers of the order of Kepler, Gauss or Einstein, working with the means at hand," wrote De Santillana & Von Dechend in Hamlet's Mill.

In addition, it is naïve to think that our infinitesimally small time window of modern scientific investigation can be extrapolated back over 60,000 years, let alone over millions or billions of years. Mars is a mystery simply because of our unscientific and naïve approach.

In New Scientist of 23 August 2003, in an article by David L. Chandler titled "All eyes on Mars," some of the mysteries faced by experts were outlined.

"...Mars is proving more enigmatic than ever at the moment. The latest images of the Martian surface taken by NASA's orbiting Mars Global Surveyor (MGS) have revealed profoundly mysterious landforms that have left geologists scratching their heads. The features include a combination of surprisingly stable dunes, canyons without craters and rapidly eroding ice caps. All point to amazingly fast processes taking place on the surface. Mars has changed considerably in the past few thousand years – in some places, even the past two years. Yet nobody knows why. Unraveling the mystery will require a radical leap in theoretical thinking, says Michael Malin, the geologist in charge of the MGS camera."

No amount of theorizing based on slow evolutionary geological principles will explain how the giant canyons on Mars are so young that they have no craters in their walls. The very formation mechanism of Valles Marineris is a mystery to geologists. However, if we make use of the forensic evidence from the past, the formation of Valles Marineris was witnessed by modern humans in late prehistory. We don't need to theorize. Mars, the god of war, was memorialized as the heroic figure in a celestial battle fought with thunderbolts. Mars was struck and a visible scar remained. **For the scar of Valles Marineris to be seen by the naked eye requires that Mars was about one hundred times closer to the Earth than it is on this closest approach!**

Unfortunately, such a radical overhaul of astronomy and geology are implied by such information that it's just not going to happen any day soon. Arthur Koestler wrote, in *The Ghost in the Machine*:

"The revolutions in the history of science are successful escapes from blind alleys. The evolution of knowledge is continuous only during those periods of consolidation and elaboration which follow a major breakthrough. Sooner or later, however, consolidation leads to increasing rigidity, orthodoxy, and so into the dead end of overspecialization – to the koala bear."

So it is left to a few adventurous seekers after the truth to scout far ahead and to find the way out of the blind alley into which science has led us.

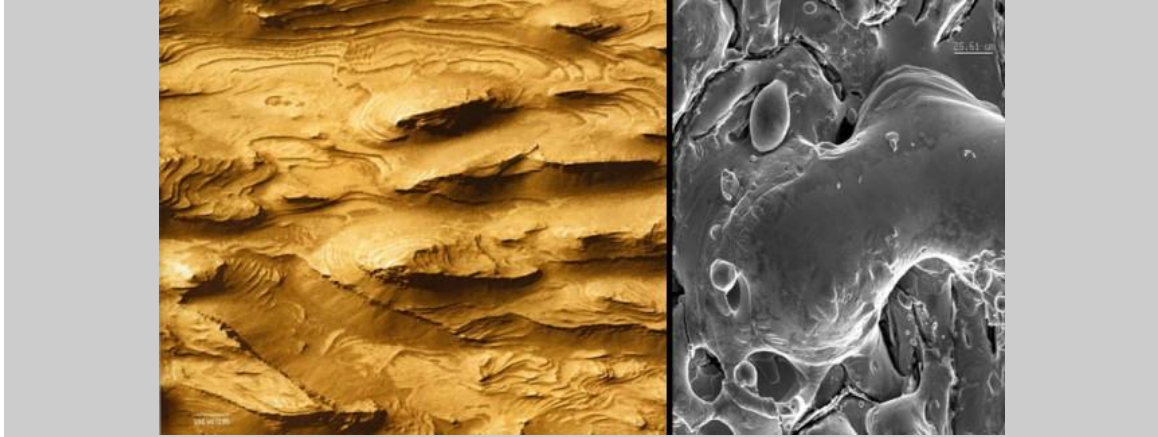
Based on an interdisciplinary approach to the mysteries of Mars, some suggested solutions to the problems follow the excerpts from the new Scientist article.

"On Mars today, it looks as if glaciers are receding after an ice age. At the planet's south pole, alternate layers of ice and dust are vanishing before our eyes. These long, sweeping, arm-like peninsulas were deposited as a result of past climate oscillations. According to MGS images from 1999 and 2001, they are eroding at a rate of 3 metres per year or more. The images show peninsulas of ice narrowing, and occasionally being pinched off into islands, with some islands disappearing altogether. By measuring the amount of erosion seen over two years, Malin calculates one entire layer will disappear within 20 years.

"We were absolutely shocked by that," said Malin when he presented his results at a meeting of the American Association for the Advancement of Science in Denver, Colorado, in February. The magnitude of the changes implies an enormous amount of energy is being pumped into the ice to melt and vaporise it. And the speed of the vaporisation has helped to resolve a long-standing controversy over whether the ice is frozen water or carbon dioxide. "Calculations showed the only material that could have changed that rapidly is carbon dioxide," says Malin. It is hard to tell from above how thick each layer of ice is, but best estimates are that with every layer eroded, the thickness of the Martian atmosphere increases by 1 per cent.

More questions remain. How many layers were there in the first place, before the erosion started? How many remain below? Nobody knows. But the implications for one of Mars's best-known surface features are astounding. "All the visible ice, all the carbon dioxide that we see in this 'permanent' ice cap could be eroded in less than a century," Malin says."

COMMENT: The fact that thunderbolts were remembered by the ancients as a cause of surface scarring on Mars opens a whole new realm of rapid electrical deposition and erosion to explain surface features. It happened yesterday in geological terms so that we may expect faster adjustments today than otherwise expected. Electric discharges tend to remove matter from the cathode and transfer it to the anode. Electrical deposition from another body would explain the global layering seen on Mars. Electric discharge machining would tend to remove surface material by an etching process. That has resulted in many weird surface features.

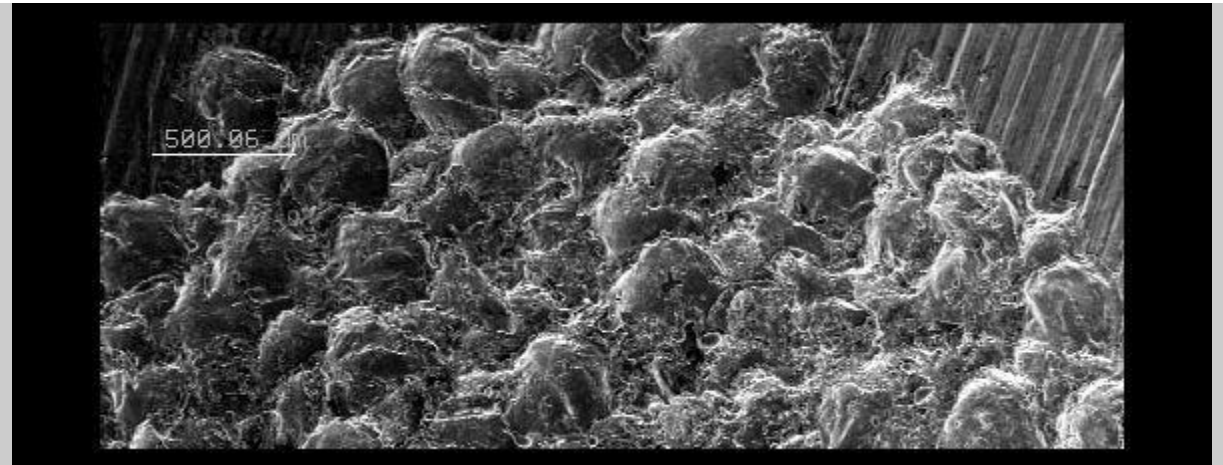


This enigmatic landform on Mars shows the extensive layering followed by powerful electric discharge etching of the surface. On the right is an electric discharge machined surface viewed under an electron microscope. The scalability law of plasma phenomena allows a direct comparison

The Earth today suffers minor electrical interaction with the solar plasma, which results in lightning at mid to lower latitudes and a diffuse auroral discharge at the poles. Another form of diffuse atmospheric electric discharge is the more energetic tornado. Mars was also depicted by the ancients as sitting within a glowing tornadic column for a period. That would explain the huge swirling erosion patterns at both of the Martian poles. It also means that the polar caps are only about 10,000 years old and probably still accommodating to Mars' "new" environment. The puzzling difference between the northern and southern hemispheres of Mars is explained simply if the north pole was the cathode in the tornadic electrical exchange. Material would then have been removed from the northern hemisphere to give the low, flat and relatively uncratered terrain found there.



On the left is the raised swirling terrain at the Martian north pole. At right, we see that the layers of the martian north polar cap are divided into upper, light-toned layers and lower, darker layers. It shows the deposition process to have been discontinuous. Streamers of dark sand join a nearby "dune field" a few kilometers away. Erosion of the lower layered unit liberates sand that was long ago deposited in these layers. The upper unit, by contrast, contains almost no sand. Wind may have created the dunes or they may have been shaped by earlier spark "pitting" of the surface. Mars Photo Credit: NASA/JPL/Malin Space Science Systems



For comparison, this surface has been pitted by the process of electric spark machining.

"Other features indicate a [recently] changing world, too. For example, huge fields of granular dunes preserve detailed features that show that they once marched across the landscape like sand dunes on Earth, blown by the wind. Yet these dunes are frozen in place, without a trace of motion over a two-year interval.

The only plausible explanation is, again, climate change. If the atmosphere was much thicker in the recent past, its winds may have been able to push along dunes that today's winds can no longer even ruffle. Mars may have lost much of that thicker atmosphere in the past and perhaps it is now regaining it from the evaporation of its polar caps."

COMMENT: It was the most catastrophic climate change imaginable involving a drastic shift of orbit as a result of the close electrical and gravitational encounters with other planets. Electrical forces in an essentially chaotic gravitational system can quickly change and stabilize planetary orbits. It renders computer orbital retro-calculations invalid. No such computation will place Mars near the Earth only 10,000 years ago! The tornadic circumpolar winds mentioned above were capable of moving heavy sand grains and forming vast fields of sand dunes around the polar caps. However, the electrical interactions were capable of stripping much of Mars' atmosphere too. The final result was a tenuous atmosphere no longer capable of moving sand dunes.

"Perhaps the most mysterious new-found feature on Mars lies inside its version of the Grand Canyon, the huge Valles Marineris, a 2000-kilometre-long canyon near the equator. In a side canyon called Candor Chasma, the floor lies 3.5 kilometres below the surrounding plateau and the walls are spectacularly layered. But there are few impact craters on Candor Chasma's floor, implying that it is less than a million years old, as it has not had time to be bombarded by many meteorites. But if it is that young, Malin asks, "how did it get exposed from under three and a half kilometres of material?" So far, there is no answer."

COMMENT: I have explained how a powerful [cosmic thunderbolt tore out the canyons of Valles Marineris](#) and the event was witnessed by humans. As for dating surfaces by crater counting, almost all of the craters on Mars are electrical. Impacts do not form such neat circular craters. Because they are electrical craters they tend to form on high points. That is why they are often seen perched on the raised rims of earlier craters (earlier possibly only by minutes) and the edges of canyons and not on the walls of existing craters and canyons.

"Altogether,' says Malin, 'we have maybe eight to ten landforms that indicate that what you see on Mars today, in terms of the environment, is not what formed the features we see.' That points to climate change, agrees planetary scientist Chris McKay of NASA's Ames Research Center in California, who viewed Malin's images at a Mars conference in Pasadena, California, last month. But until scientists develop a detailed hypothesis that describes the type of climate change and links it to the features observed, the images don't make sense, says McKay. 'We've reached a point of diminishing returns from orbital imaging,' he says.

Malin and McKay aren't the only ones feeling puzzled. 'The problems are becoming more difficult, instead of becoming easier,' said Bruce Jakosky, a planetary scientist at the University of Colorado at Boulder, who was at the meeting in Pasadena. 'People are seeing things they just don't understand, and coming up with wild ideas to try to explain them,' he says. Many suggestions invoke glaciation, but none can explain all the enigmatic features."

COMMENT: Malin is correct. The present environment of Mars did not form the features on Mars. Unfortunately, as specialists, geologists have little else to work with other than climate change to explain recent surface changes. For Koestler's "koala bears," more orbital imaging just adds to the confusion. However, continued orbital imaging remains valuable for interdisciplinary advance scouts. They have the entire remembered experience of the human race to assist their understanding of the images. They are not limited by the myths created by modern science. They can see beyond to an interdisciplinary science created by the study of myths.

We must use myths to create a new science, not science to create new myths.

"The most 'ancient treasure' -in Aristotle's words- that was left to us by our predecessors of the High and Far-off Times was the idea that the gods are really stars, and that there are no others. The forces reside in the starry heavens, and all the stories, characters and adventures narrated by mythology concentrate on the active powers among the stars, who are planets."

— Giorgio Di Santillana and Hertha Von Dechend, *Hamlet's Mill*

Wal Thornhill

Comets & Lightning Jets

Posted on [October 19, 2003](#) by [Wal Thornhill](#)

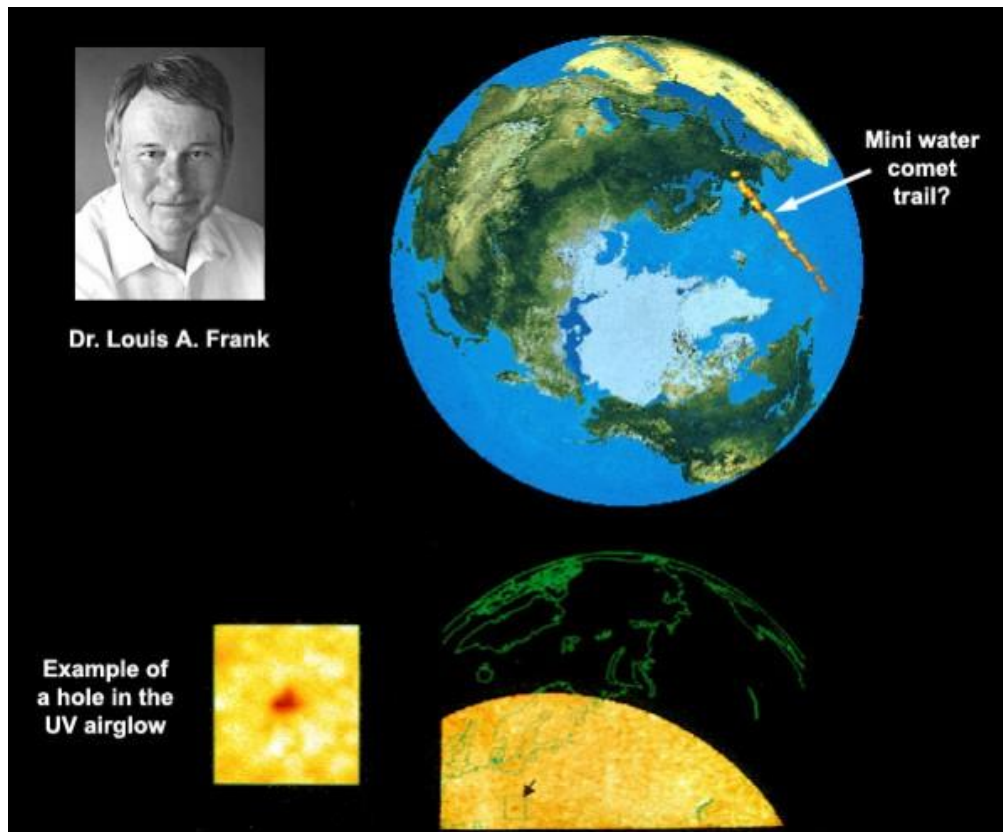
I recently picked up a second-hand book titled "The Big Splash" by Dr. Louis Frank of the University of Iowa. Although it was published in 1990, the issues it raised remain unresolved. The cover proclaims excitedly in large bold type:

"A scientific discovery that revolutionizes the way we view the origin of life, the water we drink, the death of the dinosaurs, the creation of the oceans, the nature of the cosmos, and the very future of the Earth itself."

Dr. Frank comes with impeccable credentials. He was a full professor at 32 and at the time of writing the book was reputed to have "more instruments on more spacecraft than anyone else on the planet."

The flyleaf of the book announces Frank's interpretation of his discovery of mysterious holes punched in the uppermost reaches of the Earth's atmosphere:

"Every minute, twenty 100-ton comets, made up of water and ice, slam into the Earth's atmosphere. Each is about the size of a small house. According to Frank, these comets have been dumping water on the Earth for more than 4 billion years."



But as Frank found:

"if you propose that something from out there is affecting us here and now, rather than millions of years in the past or millions of years in the future, beware the wrath of orthodox science. Science guards our isolation well."

See **Not a snowball's chance...** in New Scientist vol 155 issue 2090 – 12 July 97, page 24.

Frank's "proof" of his interpretation comes from a few images from orbiting spacecraft of glowing trails plunging toward the Earth, hundreds of kilometers above the surface. The glowing, ionized trails are said to emit the characteristic radiation of excited atoms and ions associated with water. The size of these "mini water comets" is thought to be about 5-20 meters diameter and density about 0.2g/cc, which would mean they are fluffy like a snowball.

Dr. Frank's theory was developed from observations, beginning in 1981, of "holes" in dayglow images of the Earth returned by orbiting spacecraft. Dayglow is caused by sunlight exciting oxygen atoms 100 km high in the ionosphere, which then emit invisible ultraviolet light. Frank and a co-worker noticed that the day-glow images had small blemishes in the form of dark spots. After considerable effort to determine that the spots were not just noise or errors in transmission (since the spots were often no more than a pixel wide) it was concluded that the spots were real. They grew and faded quickly and moved in a prograde fashion like meteoritic dust.

The next question was what could cause the rapid extinction and recovery of the dayglow over a circle about 30 miles (48km) in diameter? Frank considered the possibility that a meteor could heat the air below a height of 100 km and cause it to rise into the dayglow level, quenching the glow there from atomic oxygen. A simple calculation showed that it would require meteors of 70 kg or more. They are rare. If the dayglow holes are too big to be caused by a meteor, Frank decided the cause "had to be" extraterrestrial molecules forming a UV absorbing layer above 100 km. To absorb the UV light from the oxygen atoms below, it must be a cloud of water vapour. This led to the notion that comets must be the cause of the dayglow holes because comets are believed to be composed largely of water ice.

The biggest hurdle for Frank's theory is the number of holes measured, which implies that 20 comets per minute are striking the Earth. That's 10 million comet-like objects per year, up to the size of a small house!

It is understandable that people in the Spacewatch program were very concerned that they haven't seen anything of these impactors. Astronomers have rightly asked why it is that we have not detected this barrage by some other means. It should provide ample water to make the rare, stratospheric noctilucent clouds a continuous feature of our skies. It would be sufficient to give the Moon an appreciable atmosphere and cause seismic shocks and surface erosion there – none of which are apparent. Earth satellites would be expected to

have detected the plasma disturbance in their wake. It is unlikely the military would have missed them. Frank's answer to the objections is that the phenomenon is real and no one has come up with an alternative explanation. In his words, "There was no other reasonable explanation." The new photographs of the few bright trails of objects entering the Earth's ionosphere, reported widely, focussed attention on Frank's theory but in no way constitute proof.

I have an alternative explanation for the ionospheric holes. My proposal was posted on the Internet on 2nd June 1997, under the title, "Comments on Interplanetary Snowballs."

Frank noted two important characteristics of the ionospheric "holes." First, the rate of occurrence is qualitatively similar to that for radar meteors (that is, meteors whose presence can be detected by radar echoes from their ionized trail through the atmosphere). Second is that the movement of the holes showed the prograde motion characteristic of meteoritic debris. These observations provide a strong link between the holes and simple meteors. But there is another essential element to the puzzle – the connection between ionized meteor trails and electrical discharge activity in the ionosphere. The meteor trail acts as a giant lightning rod that connects the conducting ionosphere to the upper atmosphere. If the earth is an electrical body in an electrical solar system, it is the equivalent of a temporary short-circuit of a giant capacitor. The current flowing along the meteor trail gives rise to the unexplained brilliance and long-lasting glows of some meteors. It causes them to disintegrate like an exploding capacitor, high in the atmosphere. The Tunguska explosion was probably the most noteworthy example of the effect.

In an earlier news item I expressed my opinion that the [Columbia shuttle disaster](#) was a result of a rare ionospheric discharge to the spacecraft. I am not convinced by an experiment that fired foam plastic at a Shuttle wing. Experiments performed with a desired outcome can usually be made to "succeed." There are many infamous examples, along with some yet to be recognized. Airline pilots expressed disquiet about the lightning jets discovered above storms. No one knows what effect it might have on an airliner. However, due to the diffuse nature of the discharge and because airliners don't leave much of an ionized wake to act as a lightning rod, there is probably nothing to fear. Anyway, airliners do their best to avoid flying above electrical storms. It should be noted also that meteors and space shuttles entering the atmosphere from above and descending rapidly through many tens of kilometres could remove the need for a 10 km high storm below to offer a preferred electrical path through the atmosphere to the ground.

My hypothesis is a logical extension of my earlier explanation of [red sprites, blue jets and elves](#). The recent discovery of giant lightning jets [see below] provides even stronger evidence for such a link.

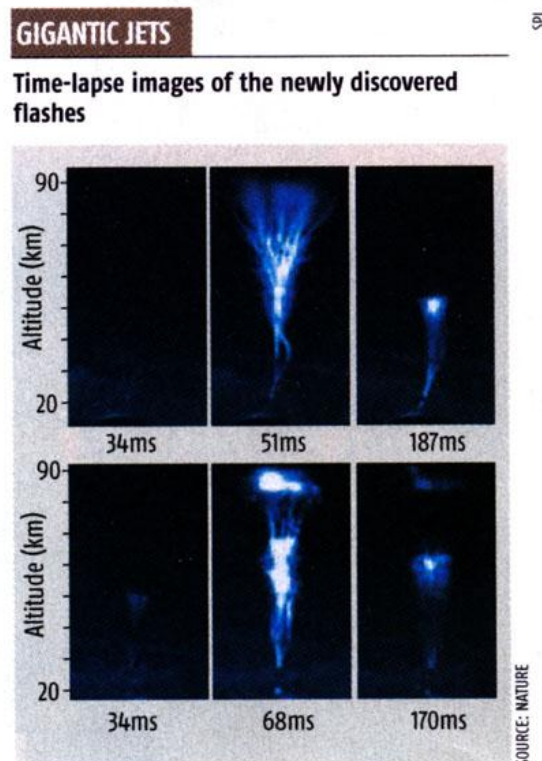
One practically unknown characteristic of lightning is its ability to compress and accelerate atmospheric ions along the discharge channel from regions of high pressure to

regions of lower pressure. In other words, it creates a roughly vertical jet of warmer air. These fountains can sometimes be seen from aircraft flying above electrical storms, protruding as filaments of cloud. Eric Crew, a colleague of the British electrical researcher, Dr. Charles Bruce, has suggested that such jets of warm, moist air into the stratosphere may be the cause of very large hailstones. The warm jet phenomenon has been reported at ground level: In July 1971 a retired general practitioner, Dr L.H. Worth, climbed to the rounded summit of the Puy Mary, 1770m, in central France. He could see a storm in the valley below him about 3km away and he heard the thunder. A few seconds later he felt a blast of hot air, so powerful that he had to lean against it, and this occurred three times in the next few seconds. That it was not an imaginary or hallucinatory experience is shown by the fact that people on the mountain near him rushed away for shelter.

GIANT LIGHTNING JETS DISCOVERED

From a New Scientist report [vol 178 issue 2401 - 28 June 2003, page 16] by Hazel Muir:

"Scientists in Taiwan have filmed five enormous lightning bolts they are calling "gigantic jets" reaching an altitude of 90 kilometres. The jets could play a vital role in dissipating the electrical charge that thunderstorms transport to the upper atmosphere."



Comment: It's true that thunderstorms transport charge in the form of electrons to the upper atmosphere. However, it is not true that thunderstorms somehow need to "dissipate" their charge to feed the ionosphere. Storm clouds can be regarded simply as an impurity in the atmosphere that serves to increase the conductivity between the charged earth and the differently charged ionosphere. The result is that electrical breakdown occurs preferentially where the clouds stretch highest. Without them we would suffer much more rare but devastating "bolts from the blue," or giant electrical tornadoes like those on cloudless Mars.

"..The jets, which lasted a few hundred milliseconds, look like hybrids of a sprite and a blue jet, with a slim lower section fanning out at the top (Nature, vol 423, p 974). ..In September 2001, Victor Pasko of Penn State University at University Park spotted a similar hybrid jet over the ocean near Puerto Rico. Su's work confirms that they are a new class of lightning. Receivers in Japan and Antarctica also detected extremely low-frequency radio waves from the jets – a sign that they were electrical discharges between the ionosphere and the clouds. Su thinks they compensate for the effects of thunderstorms, which constantly drive an upward current that keeps the ionosphere positively charged with respect to the ground.

Comment: Su's theory is guesswork since experts on lightning do not know what is "cause" and what is "effect" when looking at the electrical activity associated with storms. He is a victim of the reductionist approach to science where no one can see the big picture. Certainly, no scientist has considered that the electrical storm may be an effect caused by the giant lightning above! Nor have they considered that it is the Earth that is charged negatively with respect to the solar plasma, which means that the ionosphere appears to be mysteriously positively charged to an Earthbound observer.

"He [Su] now wants to know how common gigantic jets are. And he is mystified about why the six jets seen to date all occurred above tropical oceans. An observing programme in the Rocky Mountains has picked up nearly 10,000 sprites since 1992, but not a single gigantic jet. Su speculates that the high salinity of tropical oceans might trigger gigantic jets, although he is not sure how. 'It reminds us that our understanding of the Earth's environment is not as complete as we would like to believe,' he adds."

Comment: Precisely! It has been found that lightning occurs preferentially over the oceans and in the lower latitudes. The salty oceans of Earth make an ideal conductor to transfer charge from the Earth to space. The Earth's continents are not such good conductors and inhibit the flow of charge. However, some continental regions are better conductors than others, resulting in unusual storm and tornado activity there – like that seen in parts of the U.S. The latitudinal effect has been demonstrated in laboratory electrical plasma discharges to a magnetized sphere.

Pasko agrees. 'This field is in its infancy,' he says in an accompanying article in Nature. That could change soon, however, as there are several proposed projects to observe lightning and sprites globally from space. That would reveal just how common gigantic jets really are.

The jets might have interesting effects on the chemistry of the atmosphere, adds Pasko. Their electric fields could accelerate electrons enough to dissociate oxygen molecules, triggering a chain of reactions that leads to ozone formation."

Comment: That is likely. However, to return to the case of Louis Frank's mysterious ionospheric holes, it seems plausible that giant lightning discharges could be triggered by the ionized trail created by a meteor. The result would be a fountain of un-ionized air from lower levels that punches through the airglow level. It would cause a sudden decrease in the airglow until the newly exposed atmospheric gases can be dissociated by solar radiation. The tops of the giant lightning jets reaches the altitude of the airglow layer and their dimensions are of the right order to explain the diameters of the ionospheric holes. I expect the study of sprites from space to clear up Louis Frank's mystery.

Postscript:

This model of the electrical interaction between planetary atmospheres and comets or large meteors has a lot to tell us about the strange effects seen when comet Shoemaker-Levy 9 struck Jupiter. But that's another story.

Wal Thornhill

The Sun — Our Variable Star

Posted on [November 9, 2003](#) by [Wal Thornhill](#)

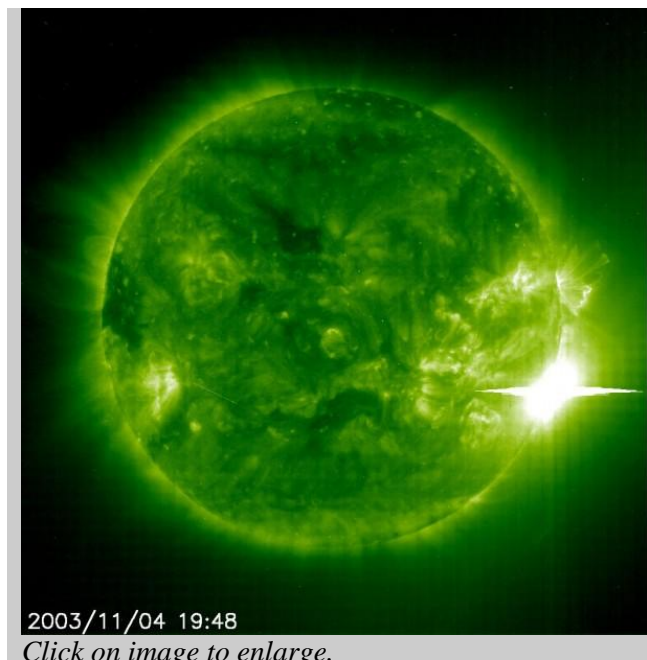
This article updated on 25 Nov 2003

"Perhaps the most remarkable aspect of the growth in our understanding of the universe is that we understand anything at all."

- Martin Harwit, from a talk given at the American Physical Society's meeting in Philadelphia in April 2003. Harwit is an emeritus professor of astronomy at Cornell University and a former director of the Smithsonian National Air and Space Museum in Washington, D.C.

But do astronomers really know what they say they know? The expressions of surprise at each new discovery hints that they don't. And their theories sound far-fetched. To make their models work they use invisible matter, invisible strange objects, dark energy, and magical magnetic fields that exist without any electrical activity. It suggests a fundamental misunderstanding of the universe. [Even the closest star, our Sun, defies their understanding.](#)

As if to highlight this fact, the last week has seen nine major solar flares ' a historically unprecedented outburst from the Sun. Moreover, this is a period of declining solar activity, when the sun should be experiencing fewer, less-energetic outbursts. With each flare billions of tons of solar matter, known as coronal mass ejections (CME's), were hurled into space at millions of kilometres per hour in defiance of the Sun's powerful gravity. The energy released in these unusual outbursts is phenomenal.



Solar super-flare amazes scientists

A flare released by the sun on Tuesday could be the most powerful ever witnessed, a monster X-ray eruption twice as strong as anything detected since satellites were capable of spotting them starting in the mid-1970's. "This is an R-5 extreme event," said Bill Murtagh, a forecaster at the center. "They don't get much bigger than this."

— Robert Roy Britt, *Space.Com*

Comment: No one has any basis for saying what the largest matter expulsions from the Sun may be. It is obvious from looking at powerful mass expulsion activity in active stars and galaxies that gravitational models are inadequate to explain what is going on. Gravity is an attractive force only. Recourse to magnetic field behavior magically divorced from electric currents serves merely to reinforce the mystical quality of modern physics without telling us anything about the true cause.

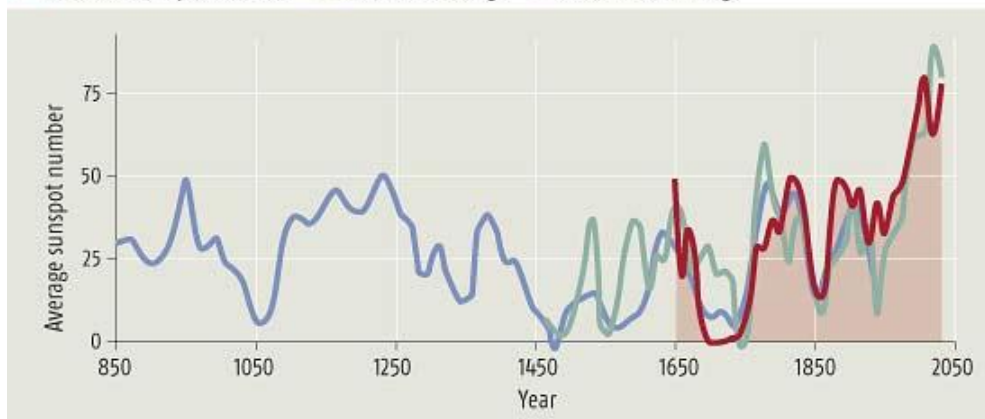
A news item by Jenny Hogan on NewScientist.com of 2 November says:

*'The Sun is more active now than it has been for a millennium. The realisation, which comes from a reconstruction of sunspots stretching back 1150 years, comes just as the Sun has thrown a tantrum. Over the last week, giant plumes of material have burst out from our star's surface and streamed into space, causing geomagnetic storms on Earth.' The history of solar activity was estimated from sunspot counts stretching back to the seventeenth century. Beyond that, the sunspot numbers were deduced from levels of radioactive beryllium-10 trapped in ice cores taken from Greenland and Antarctica. When Mike Lockwood, from the UK's Rutherford Appleton Laboratory, saw the results he said, "It makes the conclusion very stark. **We are living with a very unusual Sun at the moment.**"*

SUNSPOT ACTIVITY

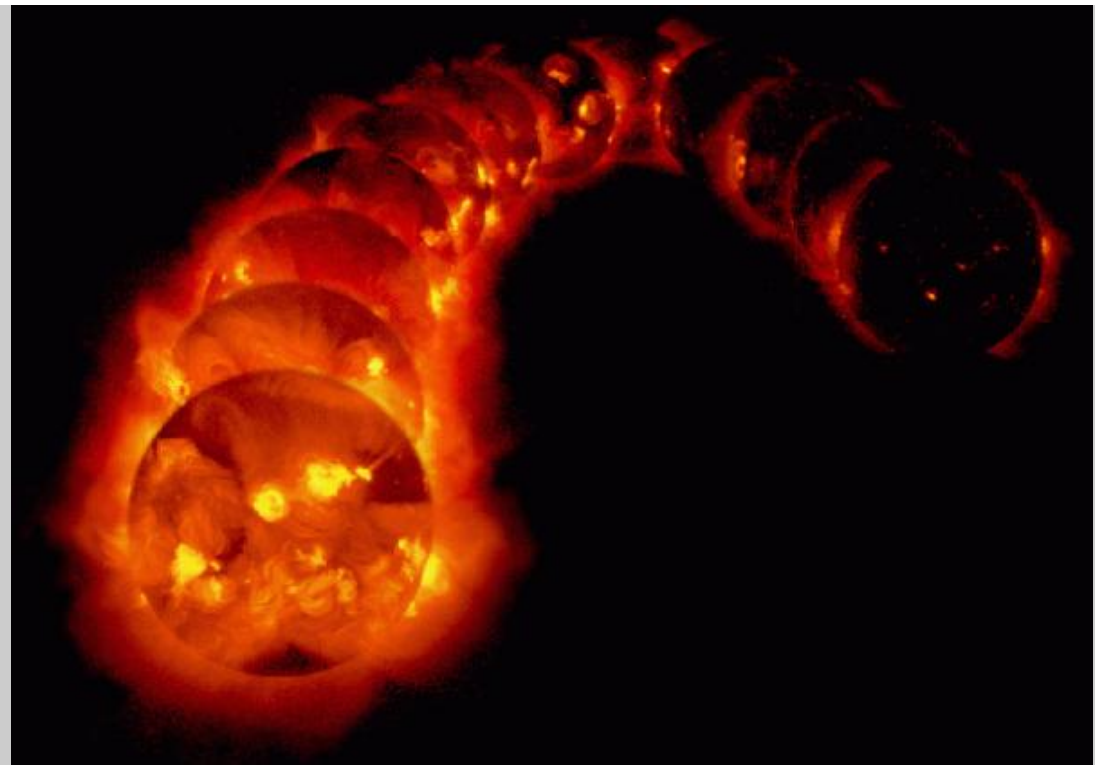
Sunspots are more frequent now than at any time for more than 1000 years

— Observed sunspot number — Antarctic readings — Greenland readings



Here is a chart of the Sun's variable sunspot behavior.

The idea that the Sun is behaving unusually is based on an assumption about what is normal for stars like the Sun. We are told that stars are self-consuming thermonuclear engines that have sufficient fuel (hydrogen) to maintain a steady output for millions or billions of years. However, while the Sun's visible light output varies by only tenths of a percent, its energy in UV and X-rays varies by a factor of 20!



Above are X-ray images of the Sun captured 4 months apart between 1991 and 1995 by the Yohkoh spacecraft.

There has never been a satisfactory explanation for this variable behavior of the Sun. The sunspot cycle remains a complex enigma that has no established connection with the thermonuclear model of the Sun. However, it has long been known that sunspots are sites of powerful magnetic fields. So theorists have spent decades unsuccessfully trying to model a hidden dynamo inside the Sun that can reproduce the complex tangle of magnetic fields seen above the Sun. This kind of thinking is reflected in the NewScientist.com report: "The dark patches on the surface of the Sun that we call sunspots are a symptom of fierce magnetic activity inside." Notice there is no mention of the powerful electric currents required to generate the magnetic fields. It is pure speculation, stated as fact, that the magnetic field of a sunspot is generated by activity inside the star.

The key to understanding our star, and the first stepping-stone to understanding the electric universe, is that stars are an electrical phenomenon!

The thermonuclear model of stars is a product of its time — the early 1900's. That it remains essentially unchanged into the new millennium is a measure of the rigidity of the peer structure and narrow focus within academia. We have since discovered that space is full of charged particles (plasma) and magnetic fields. The Sun is a ball of plasma and its behavior more complex than was dreamt a century ago. Eddington, who gave us the standard solar model, did so using gravity and ideal gas laws. He did not know that space is threaded with magnetic fields and flows of charged particles (electric currents), with the Sun as a focus. A beneficiary of Eddington's model, George Gamow, was moved to write effusively:

According to a Greek legend, Prometheus flew all the way to the Sun in order to bring back to mortals some of the heavenly fire. But even Prometheus would not risk diving into the Sun's photosphere to see what was under it. However, this feat was carried out by the British astronomer Sir Arthur Eddington, who was able to find out everything about the interior of the Sun and other stars without leaving his comfortable study at Cambridge University. "It should not be too difficult," Sir Arthur used to say, "to understand such a simple thing as a star." And he had very good reasons for that statement. Indeed, while geophysicists are still unable to agree on the exact value of the temperature in the center of the Earth, which is only about four thousand miles below our feet, astronomers can tell the temperature of the central regions of the Sun and of many other stars within a few percentage points and be quite sure about the figures they quote.

[A Star Called the Sun, George Gamow, p.93.]

I included Gamow's comments as an example of the hubris of mathematical physicists and as a warning. It can be argued that astrophysics is in worse shape than geophysics. There is absolutely no way that anyone can be sure about the temperature of the center of the Sun. Yet confident statements like this are reported daily in the media as fact. It has resulted in the science fiction cosmology of today. More caution would be welcome. The visible activity on the surface of the Sun remains a puzzle. Sunspots are an enigma. When we look through the centers of dark sunspots it is thousands of degrees cooler beneath the bright photosphere.

If we do not understand the Sun, we know nothing about the universe.

"What I believe to be the basic misconception of modern mathematical physicists – evident, as I say, not only in this problem but conspicuously so throughout the welter of wild speculations concerning cosmology and other departments of physical science – is the idea that everything that is mathematically true must have a physical counterpart; and not only so, but must have the particular physical counterpart that happens to accord with the theory that the mathematician wishes to advocate."

[Herbert Dingle, *Science at the Cross-Roads*, pp. 124-5.]

Of course, Eddington the mathematician would see a star as a simple thing. Mathematicians require simple models to allow a mathematical solution. But as spacecraft have expanded our view of the Sun it is clear that that bright ball of plasma is not 'a simple thing.' Even so, Eddington seemed to intuit that stars exhibited electrical effects:

"If there is no other way out we may have to suppose that bright line spectra in the stars are produced by electric discharges similar to those producing bright line spectra in a vacuum tube... We conclude provisionally that bright lines in the spectrum of a static star indicate that either (a) the star is greatly disturbed by 'thunderstorms,' or (b) it is a nebulous star."

[*The Internal Constitution of the Stars*, pp. 344-5.]

The problem for Eddington was that the origin of electricity in thunderstorms was, and still is, not understood. Therefore, as a mathematician, he did not pursue the problem. The simple answer is that both the earthly and the solar phenomena are due to the electrical nature of the universe. An earthly thunderstorm is mere sparks beside the global electrical storm that constitutes a star.

Eddington did momentarily consider an external source for a star's energy:

"In seeking a source of energy other than [gravitational] contraction the first question is whether the energy to be radiated in future is now hidden in the star or whether it is being picked up continuously from outside. Suggestions have been made that the impact of meteoric matter provides the heat, or that there is some subtle radiation traversing space that the star picks up."

'Subtle radiation' sounds like the kind of explanation that might be favored by modern theorists but it was dismissed immediately by Eddington. Today we know there are streams of charged particles moving in space. But Eddington had already decided what must be inside the Sun:

"Strong objections may be urged against these hypotheses individually; but it is unnecessary to consider them in detail because they have arisen through a misunderstanding of the nature of the problem. No source of energy is of any avail unless it liberates energy in the deep interior of the star. It is not enough to provide for the external radiation of the star. We must provide for the maintenance of the high internal temperature, without which the star would collapse."

There we have it. **The thermonuclear engine inside stars is required to save Eddington's mechanical stellar model!** [Yet for decades the solar neutrino counts have been telling us that that model is incorrect.](#)

If we can find a reason why the Sun is the size we see, given its mass, without requiring internal heat then an external source of energy is possible. A few pages earlier, Eddington seems to deal with electric charge in the interior of a star when he invokes the Maxwell-Boltzmann distribution law for a gas at uniform temperature in a gravitational field. It simply says that the lighter molecules will tend to rise to the top. He writes:

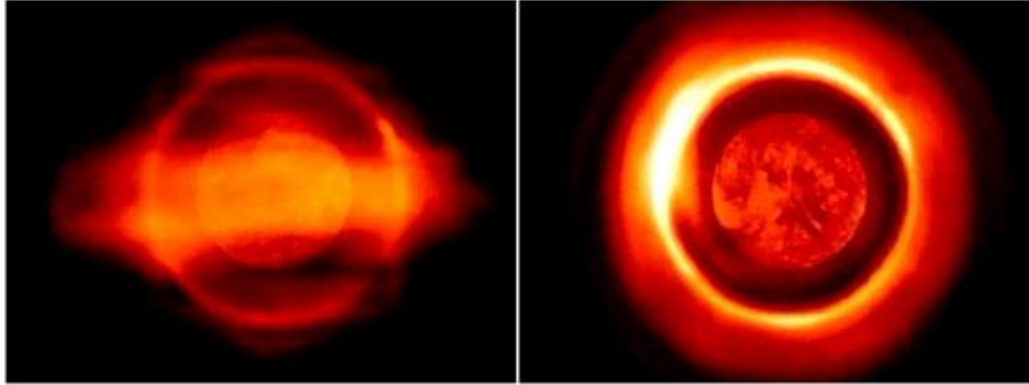
"In ionized material the electrons are far lighter than the ions and tend to rise to the top... But this separation is stopped almost before it has begun, because the minutest inequality creates a large electrostatic field which stops any further diffusion." The calculated result is "a deficiency of 1 electron in every million tons of matter. ... The electric force, which varies in proportion to gravity in the interior, is absurdly weak, but it stops any diffusion of the electron outwards."

Eddington's argument is too simplistic. It seems aimed to keep the model simple rather than realistic. Thermal ionization of hydrogen only becomes significant at a temperature of about 100,000K. Therefore, atoms and molecules will predominate through most of a star's volume, where the gravity is strongest. That applies to the entire star in the electric model. The nucleus of each atom, which is thousands of times heavier than the electrons, will be gravitationally offset from the center of the atom. The result is that each atom becomes a small electric dipole. It is significant that if you want to discover the physics of atomic and molecular dipole forces you need to turn to chemistry texts. Such is the problem with specialization. The atomic and molecular dipoles align to form a radial electric field that causes electrons to diffuse outwards in enormously greater numbers than Eddington's simple gravitational sorting allows. It leaves positively charged ions behind which repel one another. That electrical repulsion balances the compressive force of gravity without the need for a central heat source in the star.

Important Consequences of the Electric Star Model for the Sun

1. A star is formed electromagnetically, not gravitationally, and is powered thereafter electrically (by Eddington's "subtle radiation").
2. Near the Sun, galactic transmission lines are in the form of 0.3 parsecs wide rotating Birkeland filaments (based on those detected at the center of the Milky Way). Their motion relative to the Sun will produce a slowly varying magnetic field and current density –' in other words a solar activity cycle. To that extent, all stars are variable. And just like real estate, location is vital.
3. An electric star has an internal radial electric field. But because plasma is an outstanding conductor it cannot sustain a high electric field. So plasma self-organizes to form a protective sheath or 'double layer' across which most of the electric field is concentrated and in which most of the electrical energy is stored.

- It is the release of that internal stored energy that causes CME's, nova outbursts, polar jets, and the birth of stellar companions.
4. In a ball of plasma like the Sun the radial electric field will tend to be concentrated in shells or double layers above and beneath the photosphere. A double layer exists above the solar photosphere, in the chromosphere.
 5. The photosphere and chromosphere together act like a pnp transistor, modulating the current flow in the solar wind.* It has an effective negative feedback influence to steady the energy radiated by the photosphere so that astrophysicists can talk of a 'solar constant,' while the Sun's other external electrical activity (UV light and x-rays) is much more variable. Because the photosphere is an electrical plasma discharge phenomenon it also expands or contracts to adjust to its electrical environment. That explains why the Sun 'rings' like an electric bell.
 6. Double layers may break down with an explosive release of electrical energy. A nova outburst is a result of the breakdown of an internal stellar DL. Hannes Alfvén suggested that billions of volts could exist across a typical solar flare double layer.
 7. A star is a resonant electrical load in a galactic circuit and naturally shows periodic behavior. Superimposed is the non-linear behavior of plasma discharges. Two stars close together can induce cataclysmic variability or pulsar behavior through such plasma discharges.
 8. The correct model to apply to a star is that of a homopolar electric motor. It explains the puzzle of why the equator of the Sun rotates the fastest when it should be slowed by mass loss to the solar wind. (The same model applies to spiral galaxies and explains why outer stars orbit more rapidly than expected. The spiral arms of the galaxy and the spiral structure of the solar 'wind' then have an obvious connection).
 9. The current that powers the Sun can be viewed as flowing in along the [wavy polar magnetic field lines](#), then from the poles toward the equator. That current flow manifests as huge sub-photospheric flows of gas. In the mid-latitudes the circuit is completed as the current flows outward in a current sheet called incorrectly the solar 'wind.'
 10. The transfer of charge to the solar wind takes place through the photosphere. It occurs in the form of a [tightly packed global tornadic electrical discharge](#). The importance of the tornadic form for us is that it is slower than lightning, being under the tight control of powerful electromagnetic forces, and less bright than lightning. The intense, equally spaced solenoidal magnetic fields of the photospheric tornadoes gives rise to the surprisingly evenly spaced magnetic field lines of the Sun.



11. Encircling the Sun's equator is a ring current forming a doughnut-shaped plasmoid. It is visible in UV light and is a source of stored electromagnetic energy. Occasionally the plasmoid discharges directly to lower levels of the Sun, punching a hole, that we call a sunspot, through the photosphere. A sunspot group can be compared to regional lightning on Earth. Scientists were surprised when they discovered 'awesome plasma hurricanes' just beneath a sunspot. Electric discharges in a plasma naturally drive such rotation. Sunspots of the same magnetic polarity are drawn toward each other, which is inexplicable if they are simply magnetic phenomena. However, two parallel electric current filaments following the magnetic field lines are naturally drawn together.
12. Sometimes the slow discharge that forms a sunspot may trigger a stellar lightning flash, resulting in a more sudden and powerful release of stored electrical energy. An x-ray flash is the signature of such lightning. That arc may result in a CME. The corona often dims as power is withdrawn from the solar plasmoid.
13. The conventional thermonuclear story of stellar evolution is incorrect so we do not know the age of the Sun, or its character in the past or future. The inexplicable and drastic global climate changes on Earth in the past may have found an answer at last in the variable nature of stars.

The Bottom Line

Our Sun, like all stars, is a variable star. We must learn to live with the uncertainty of a star that is a product of its environment. We can expect our Sun to change when it enters regions of interstellar space where there is more or less dust, which alters the plasma characteristics. In the meantime, we can only look for reassurance by closely examining the behavior of nearby stars. A few massive CME's are the least of our concerns.

* I am indebted to [Professor Don Scott](#) for this insight. He points out that the complete shutdown of the solar wind for two days in May 1999 is understandable with his transistor model. It is inexplicable on the thermonuclear model since there was no change in the Sun's visible energy output that accompanied the phenomenon.

Update 25 November 2003:

Louis Lanzerotti, of the New Jersey Institute of Technology/Bell Labs, released the following startling report on November 14, 2003. It is a result of observations from the Ulysses spacecraft, which is orbiting over the poles of the Sun:

Data from Ulysses show that the solar wind originates in holes in the sun's corona, and the speed of the solar wind varies inversely with coronal temperature. "This was completely unexpected," said Lanzerotti. "Theorists had predicted the opposite. Now all models of the sun and the solar wind will have to explain this observation."

I missed an opportunity. This finding could have been predicted from the electrical model of the Sun.

The standard model of the solar wind has it "boiling off" the Sun so that you would expect a direct correlation between coronal temperature and solar wind speed. That is precisely the opposite of what the Ulysses spacecraft saw.

In the electric model of the Sun, where the solar electric field is strong in the coronal holes, protons of the solar wind are being strongly accelerated away from the Sun. Their random motion becomes less significant in a process called de-thermalization. Outside the coronal holes, where the coronal electric field is weaker, the protons move more aimlessly. As a result they suffer more collisions and move more randomly. The degree of random movement of particles directly equates to temperature. So the solar wind is fastest where the corona appears coolest and the solar wind is slowest where the corona appears hottest — as Ulysses found.

Wal Thornhill

The Shiny Mountains of Venus

Posted on [December 16, 2003](#) by [Wal Thornhill](#)

The astronomer Victor A. Firsoff in his book, *The Solar Planets* (1977), wrote:

"I once described Earth and Venus as 'non-identical twins.' It used to be thought that their differences were more apparent than real. But in the words of Sherlock Holmes, 'Eliminate the impossible and what is left, however improbable, is the truth.' And it would be hard to find a more improbable planet than Venus."



David Grinspoon writes in, *Venus Revealed*, (1997):

"One of the most puzzling [patterns] was this: the highest mountains of Venus are all surprisingly shiny. At altitudes above about thirteen thousand feet, the reflectivity jumps up and the ground abruptly gets very bright. Surface roughness cannot explain this, so something in, or on, the ground at these high elevations is different, making it highly reflective."

Grinspoon puts forward the idea that some chemical reaction takes place at the lower temperature found at high elevations, 820 degrees F, to form a radar reflective mineral –

fool's gold. But this requires the unlikely situation that all peaks on Venus have the same chemistry.

A more recent report from the [BBC News Online](#) science editor addresses the issue again and comes down on the side of the rocks being coated by condensing lead vapor.

Venus has 'heavy metal mountains'

By Dr David Whitehouse, 25 November 2003

The highlands of Venus are covered by a heavy metal "frost", say planetary scientists from Washington University

Because it is hot enough to melt lead at the surface, metals vaporise and condense at cooler, higher elevations. This may explain why radar observations made by orbiting spacecraft show that the highlands are highly reflective. Detailed calculations, to be published in the journal Icarus, suggest that lead and bismuth are to blame for giving Venus its bright, metallic skin.

Bright hills

Frequently seen as a brilliant point of light in the evening or morning sky, Venus has been identified with beauty by many cultures. But the truth is somewhat different. Although it is about the same size as the Earth, its closer proximity to the Sun means that it is a very different planet. Its thick atmosphere – composed chiefly of carbon dioxide – gives it an intense greenhouse effect, whereby trapped solar radiation heats the surface of the planet to an average temperature of 467 Celsius. Also, its pressure is 90 times greater than that at the Earth's surface.

Comment:

I cannot let this glib reference to the supposed Venusian 'greenhouse effect' pass without comment. The very high surface temperature of Venus of 750°K or 900°F is usually explained by the 'greenhouse effect' of a thick atmosphere of carbon dioxide, or even the 'runaway greenhouse effect,' first suggested by Fred Hoyle in 1955 and worked out in detail in the late 1960s by Ingersoll and Pollack of Caltech. Such explanations assume that both Venus and Earth have had largely parallel development (so-called twins) and that therefore something went seriously wrong with the atmospheric evolution on Venus. However, there is not a shred of evidence for the 'twin planets' theory.

As for the greenhouse effect, it is a desperate model clutched at by theorists who have no alternative ideas. Yet the astronomer Firsoff noted: "Earth's seas are not boiling hot, despite the total greenhouse effect of water and average sunlight stronger than at the ground level of Venus. Nor is it at all clear how such a condition could have become established."

Venus receives 1.9 times more solar radiation than Earth but its clouds reflect about 80% of that sunlight, so that Venus actually absorbs less solar energy than the Earth. Solar radiation measured at the surface is 10-20W/m² (compare this with 340W/m² at the Earth's surface in the tropics). Even with the maximum greenhouse effect, the effective surface temperature of Venus should be low enough to freeze water. What is being asked of the 'runaway greenhouse effect' is equivalent to expecting a well-insulated oven to reach a temperature sufficient to melt lead by having only the pilot light switched on!

The humorous but sadly apt inversion, 'I'll see it when I believe it,' seems to apply to the interpretation of results relayed to Earth from all four Pioneer lander probes as their radiometers began to give anomalous results as they descended through the atmosphere.

"Taken at face value, the anomalies suggest that parts of the atmosphere are transmitting about twice the energy upwards that is available from solar radiation at the same level."

[Pioneer Venus, NASA Report SP-461, p. 127].

Despite the obvious interpretation that the laws of thermodynamics are not being violated and that, put simply, Venus is intrinsically damned hot and still cooling, the investigators are able to blandly state in the same paragraph:

"In spite of these difficulties in interpreting some of the observations, the greenhouse effect, coupled with global dynamics, is now well established as the basic explanation of the high surface temperature."

This is merely consensus ignorance, not science.

The BBC report continues:

The only way to glimpse what lies beneath its opaque clouds is by radar, and several missions have carried our radar surveys from orbit, principally the Magellan probe which operated from 1990 to 1994.

Magellan's images astounded astronomers who were able to see the surface of Venus in detail for the first time. They showed the planet was covered in volcanic features, such as vast lava plains, fields of small lava domes, and large shield volcanoes. But the images were puzzling as well. It appeared that parts of the highlands were abnormally bright, reflecting radar beams much better than lower elevations. Several explanations were put forward ranging from the presence of a loose soil to a coating of metal – specifically, tellurium.

Lined with lead

The theory suggests at Venus's hot lower layers any metal would be vaporised and exist as a metallic mist. Only at higher elevations, where it is a little cooler,

would that metal condense to form a thin, highly reflective layer on the ground. Using detailed chemical calculations involving 660 metal compounds, Laura Schaefer and Bruce Fegley, of the Washington University in St Louis, conclude that tellurium is not responsible, but that common lead probably is. The researchers estimate that the timescale for the coating of the Venusian highlands by metallic frost is somewhere between a few thousand and a few million years, demonstrating that it is an active process. They point out that at the highest elevations on Venus there is evidence that the metallic frost is absent – possible evidence of weathering, they say. If it were possible to examine these lead deposits, from a Venus lander craft, the respective abundances of certain atom types, or isotopes, could give astronomers an estimate for the age of Venus.



In March, 1997 I wrote in response to Grinspoon's colorful suggestion that the radar bright highlands of Venus are coated with 'fool's gold':

"A much simpler answer is that diffuse electric discharge, known on Earth as 'St. Elmo's fire,' occurs preferentially at the higher altitudes of the mountains

on Venus. In that thick atmosphere it forms a highly conductive dense plasma, which is a superb reflector of radar signals."

"The density of the atmosphere at the surface of Venus is about 1/10 that of water. St. Elmo's fire is a highly ionised state involving actual discharge. Put the two together and you have dense plasma – which conducts like a metal and therefore reflects radar like a metal surface. The thickness of such a plasma would have no more effect on radar reflectivity than the thickness of a metal sheet would. Since the plasma would coat the surface rocks (whatever their composition), the radar return would be an enhanced version of that being received from nearby, uncoated, electromagnetically dissipative rocks, and would be greater than that returned from fool's gold. I consider my hypothesis is simpler than one relying on chemical or physical changes in rocks of unknown composition."

St. Elmo's fire should be prevalent at the highest elevations, so the lack of radar reflectivity there would be due to the lower plasma density. As the plasma density falls it becomes more transparent to the radar signal and tends to refract, rather than reflect it. One way to test this might be to use radar equipment at lower frequencies.

Of course, my proposal begs the question of the origin of electric discharge activity in the atmosphere of Venus.

"The most striking [the pun seems unintended] observations made by the Galileo spacecraft during its flyby of Venus was evidence of lightning."

[R. L. Guyer: 'Galileo flyby of Venus', Science 253 (1991), p. 1463.]

The surprise is curious. Earlier reports of lightning were discounted, it seems, because they did not fit the pattern of earthly lightning. The Venera spacecraft found:

"...continuous lightning activity from 32km down to about 2km altitude, with discharges as frequent as an amazing 25 per second."

[NASA News 79-12 (19.4.79), p. 1.]

The highest recorded rate on Earth is 1.4/sec during a severe blizzard. The Pioneer lander recorded 1000 radio impulses. Thirty-two minutes after landing, Venera 11 detected a very loud (82 decibel) noise which was believed to be thunder. Garry Hunt suggested at the time that:

"... the Venusians may well be glowing from the nearly continuous discharges of those frequent lightning strokes."

A 'mysterious glow' was detected coming from the surface at a height of 16km by 2 Pioneer probes as they descended on the night hemisphere. The glow increased on

descent and may have been caused by the St. Elmo's fire and/or chemical reactions in the atmosphere, close to the surface.

Lightning is poorly understood. The mechanism of charging of storm clouds remains a mystery. Because lightning is conventionally associated with violent vertical cloud movement on Earth, it was a surprise when investigators found strong evidence of lightning in the quiescent atmosphere of Venus.

"On Venus the clouds tend to resemble fogbanks, You don't see much lightning in fog."

[R. A. Kerr: 'Lightning found on Venus at last?', Science 253 (1991), p. 1492].

A planet's magnetosphere is the region in space surrounding the planet where its magnetic field dominates. Under the influence of the solar wind it is compressed on the sunward side of the planet and stretches away behind the planet like a comet's tail. The early Mariner spacecraft provided a surprise when they found an extensive 'cometary' magnetotail stretching behind Venus along the Sun-Venus line. It is longer than that found for any other planet. The 'scale length' of the tail is about 700, compared to Earth's less than 300. [The scale length is the tail length divided by the size of the planet's magnetosphere. In the case of Earth, the tail wake stretches for 3000 Earth radii (RE) and the magnetosphere varies between 10 and 15 RE]. Later, it was discovered that the tail of Venus survived to the Earth's orbit, where it was described as being composed of 'stringy things.' Those 'stringy things' are diagnostic of Birkeland currents flowing between Venus and the Earth.

The magnetic flux of the solar wind appears to interact directly with the ionosphere of Venus. This was not anticipated either, and is unlike all other planets in the solar family. Spikes in the Pioneer Venus orbiter magnetometer readings were interpreted as twisted magnetic field lines wrapped around each other like ropes. Alternatively, the magnetic field spikes may be induced in the ionosphere by electric current flows in the solar wind. Once again, the twisted magnetic ropes herald field-aligned Birkeland currents flowing between the Sun and Venus.

Another major surprise is the presence of an ionosphere on the night side of Venus. Ionospheres are thought to be formed by dissociation of atoms in the upper atmosphere by the action of solar ultraviolet (UV) radiation. It was thought that the extended Venusian night would be long enough for recombination to take place and for the ionosphere there to disappear.

Any cosmic body which is charged relative to the surrounding plasma has a plasma sheath or magnetosphere. It is a region in which electric current flows and energy is released. The sheath is generally invisible unless the current is strong enough to generate light, such as on the Sun, in auroras, and in the coma and tails of comets.

Venus, with its cometary tail, is evidently still discharging strongly today after a recent cometary past noted globally by ancient witnesses. Venus was described variously as a 'hairy star' or 'bearded star' and a stupendous prodigy in the sky. Today, Venus' comet tail operates in the dark discharge mode and is invisible. It can only be detected by magnetometers and charged particle detectors.

More evidence for the electrical nature of Venus comes from the Dutch astronomer Houtgast. He found there is a marked reduction in the solar corpuscular radiation reaching the Earth whenever Venus is interposed between it and the Sun at or near an inferior conjunction. He estimated that the effect could be accounted for on the assumption that Venus has a magnetic field about five times stronger than the Earth's [Houtgast: *Sky and Telescope* 15:8 (1955), p. 419.]. Since Venus has no measurable magnetic field, it is better explained as an electrical shielding effect.

The principal difficulty in understanding the origin of lightning is due to the assumption that the Earth and Venus are closed electrical systems with no input from the solar plasma environment via the magnetosphere. The Venusian ionosphere is directly coupled to the solar wind. Intense airglow emission in long wavelength UV was observed to occupy a large volume of the ionosphere on both the day and night sides of the planet. The intensity seems to be linked to solar activity. I would therefore expect lightning activity on Venus to be generated, not from cloud motions, but from electrical input originating in the Sun.

If charged particles are scarce in the lower atmosphere (and there are no counterparts to earthly clouds on Venus), fewer but more equally energetic lightning discharges would be expected than on Earth. There is evidence that this is so; the rate detected by the Galileo spacecraft as it swung around Venus would require 2,000 years for a strike to occur in a given square kilometre. On Earth, 7 strikes would be expected each year in a square kilometre. Six out of nine events detected by the Galileo spacecraft were strongly clustered in frequency spectrum and power, a situation not found on Earth. If the extremely rapid lightning detected by the Venera spacecraft is verified, there may be two modes of discharge on Venus: firstly, a continuous glow of St. Elmo's fire at high points on the surface with rapid, low energy lightning, and secondly, high energy superbolts which fire from the upper atmosphere – as detected by the Galileo spacecraft.

The comet-like tail of Venus would suggest that the planet has not yet achieved electrical equilibrium after a recent cometary history. That being so, lightning of considerable violence and/or frequency would be expected on Venus. It would also fit the observation that the solar wind is tightly coupled to the planet. The magnetic flux 'ropes' of the solar wind, entwined about the planet, are indicative of electric currents flowing from the solar wind directly into the planet's ionosphere. This is most simply explained by a high potential difference between the planet and its surroundings.

Another manifestation of electrical effects in the ionosphere of Venus is the well-known 'Ashen light' which is often seen as a faint illumination of the dark part of the crescent disk. Firsoff wrote:

"There can be no doubt that the true origin of the Ashen Light is electric. It is a night-sky glow, similar to that in our own sky but estimated to be 50-80 times stronger. It has a line emission spectrum sufficiently strong to be photographed..."

The associated puzzle as to why Venus maintains a nightside ionosphere, given that night on Venus lasts about 58 Earth days, may now be answered. It is known that the nightside atmosphere is bombarded by fast electrons and that there is an unexplained large, fast drift of plasma (up to 10km/sec or 23,000mph) from day to night hemispheres.

The comet-like magnetosphere, strong electrical interactions with the solar wind and intense lightning, ionospheric and atmospheric activity suggest that Venus has not yet achieved electrical equilibrium with its environment in the solar plasma.

The odd composition of the Venusian atmosphere may also be due to the high levels of heat and electrical activity at the planet's surface. Venus may once have had an atmosphere more like that of the Earth, with a preponderance of nitrogen and oxygen and water vapor. It was shown many years ago by the French scientist, Louis Kervran, that nitrogen in the presence of a hot iron surface becomes 'activated' and may be subsequently resonantly transmuted to carbon monoxide. Carbon monoxide and water vapor in the presence of heat will form carbon dioxide and hydrogen as in a well-known industrial process. The hydrogen combines with available oxygen to form more water vapor, until the oxygen is consumed. Thereafter the hydrogen tends to escape to space leaving behind a heavy carbon dioxide atmosphere. It is significant therefore that the water vapor content of the Venusian atmosphere was found by several Venera landers to mysteriously decrease near the surface of the planet. It can only mean that water is being absorbed or destroyed at the surface. What is more, the rate of disappearance could not be sustained for more than a "geological instant," Nitrogen remains the only significant constituent of the Venusian atmosphere, following carbon dioxide.

The present cometary Venusian magnetosphere lends strength to the identification of Venus as a comet by early man. If, in years to come, we can measure a steady decline in the temperature of Venus, or a steep sub-surface temperature gradient, or changes in its electrical interaction with the solar wind, then Venus may finally be recognised as the youngest planet in the Solar System and only a distant relative of the Earth.

Wal Thornhill

2004

Ockham's Beard

Posted on [January 3, 2004](#) by [Wal Thornhill](#)

Mel Acheson's thought provoking and entertaining "epistemological commercials" have enlivened the free Thoth email newsletter and many of our public meetings. I feel it is appropriate that I include, with permission, his most recent "commercial" at the beginning of this momentous year.

Why do I consider 2004 to be momentous?

First, the Cassini mission arrives mid-year to orbit for the first time the cinder of our ancient electric star – Saturn. Science is oblivious of the significance of this 'homecoming' and will be surprised as usual by new discoveries.



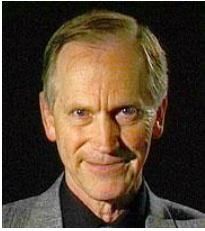
Recent view of Saturn from the approaching Cassini spacecraft

Second, a significant first book is to be published that will open the doors to a general understanding of the electric universe and the recent catastrophic history of the solar system and the human race.

It is in this context that, as Mel writes:

"It's necessary for Ockham to grow a beard of speculations that revolutionizes what we used to know."

OCKHAM'S BEARD



By Mel Acheson

Imagine a volcano. Imagine a pyroclastic flow erupting from the volcano, surging into the valley, and swirling up the opposite mountainside. Focus your attention on the concept "pyroclastic flow." It's composed of a network of ideas about hot gases and steam, pulverized and molten rock, magma pressure and gravity, fracturing and fluidization. If you're a vulcanologist, you may recall lab experiments with fracturing basalt under great pressure. If you're a layman, you may visualize an illustration of magma seeping into crevasses.



Pyroclastic flows descend the south-eastern flank of Mayon Volcano, Philippines. Maximum height of the eruption column was 15 km above sea level. Photograph by C.G. Newhall on September 23, 1984.

Virtually no one will think of plasma and electricity. Expert and layman alike will find nonsensical the proposal that a pyroclastic flow could be an electrical discharge within the earth that dissociates rock into ions and dust, creating a plasma that's heated, suspended within a double layer, and jetted across the valley by electrical forces. (Thanks to Harold Tresman for getting me to think of it). After all, a pyroclastic flow is already explained by mechanical theories. Adding on electricity only complicates things, and the principle of Ockham's Razor dictates that unnecessary assumptions be cut off. All else being equal, the simpler explanation is preferable.

But all else is not equal. Theories are not simply "after-thoughts," explanations appended to given facts. In the first place, a pyroclastic flow is not an incorrigible object of perception. The act of seeing a pyroclastic flow is not a simple matter of lenses and images, not a camera of the eye recording an image on the film of the mind. Stimuli on every 100 rods and cones in the retina are "zipped" into a stimulus on one optic nerve fiber.(1) So this first stage of perception already involves a process of classification. In the visual cortex, the classified stimuli are conflated with other stimuli and linked into networks of nervous activity. At this preconscious level the physiology of our nervous system has already determined in large part how we will understand what we see. The image of a pyroclastic flow that appears in the mind's eye is a gestalt whose relationship with the original stimuli is analogical and metaphorical.(2) Perception is both conceptual and creative. Facts are not so much "given" as "formed." We understand unities before we understand their parts.

In the second place, a plasma assumption is not added on to the existing mechanical explanation. The plasma explanation **DISPLACES** the mechanical one, dispensing with mechanical assumptions and incorporating electrical ones. It's a unity of conception and perception that organizes our experience of what we call a pyroclastic flow in a different way from the mechanical unity. The unities of understanding are more fundamental than the parts into which they can be analyzed.

With different facts, different assumptions, and different ways of understanding them, the blade of simplicity may cut the other way: Plasma may explain more with fewer assumptions than the familiar concretion of mechanical theories. But because most of the assumptions are unconscious, there's no way to count them and thus no measurable way to compare the two explanations: They are, in Thomas Kuhn's oft-repeated word, "incommensurable."

Ockham's preference for simplicity consequently reduces to a bias for familiarity. The explanations we're familiar with work for the facts as we've come to know them in part because we've come to know the facts that work for the explanations we're familiar with. (Putting the situation in this circular form makes it sound whimsical, but the history of science demonstrates that developing workable circles of concepts and facts is actually difficult and rare.)

What we really want to know is not which explanation is simplest but which is actually the case. Many painful and embarrassing experiences have taught us that our wanting can fool us with false answers. But this wanting to know the actual case fools us with a false question. We try to be dispassionate in asking our questions and to be attentive to nature's answers. But it will always be **OUR** questions that we ask, and **OUR** questions will always arise from and carry within themselves our cultural, historical, and biological determinants of what we can experience and imagine(3).

As culture evolves, as history proceeds, as biology adapts, we discover new facts and imagine new ways to understand old facts. Mechanical theories that explained well the mechanically understood facts of an age familiar with mechanical things will become

awkward and finally unimaginable as awareness of electricity throughout the cosmos renders plasma behavior familiar.

There can be no final answers because there can be no final questions apart from our experience. There have been and will be times when it's appropriate for Ockham to shave theories to their most efficient expression. There have been and will be other times when it's necessary for Ockham to grow a beard of speculations that revolutionizes what we used to know.

We are living in a time that calls for theoretical hirsuteness. Our familiar theories have enabled us to experience things that undermine those theories and expose their contradictions and limitations. With the discovery that the universe is composed almost entirely of plasma, and with the realization that conventional science knows almost nothing about the behavior of plasma, everything we thought we knew must be re-examined. We need to encourage speculations and to devise tests that will separate the promising from the disappointing. The institutions of funding and peer review need to acquire a little courage and loosen their terrified clinging to familiar theories. They need to regain confidence in empirical investigation. We are entering an age of exploration and discovery: The theoretical sciences should acquire an appropriate sense of adventure.

Mel Acheson

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FOOTNOTES:

(1) The human eye contains about 100 million light sensing cells. These are connected to the brain with only about 1 million nerve cells. This relationship is typical of neural ensembles connected to other ensembles.

(2) See Lakoff and Johnson, *Philosophy in the Flesh*, or, more accessible but somewhat dated, *Metaphors We Live By*. The first two chapters of Jaynes, *The Origin of Consciousness in the Breakdown of the Bicameral Mind*, are also enlightening. Hayek, *The Sensory Order*, reviews earlier research in perception, which has been all but forgotten but closely parallels recent discoveries.

(3) See Toulmin, *Foresight and Understanding*.

Comet Wild 2

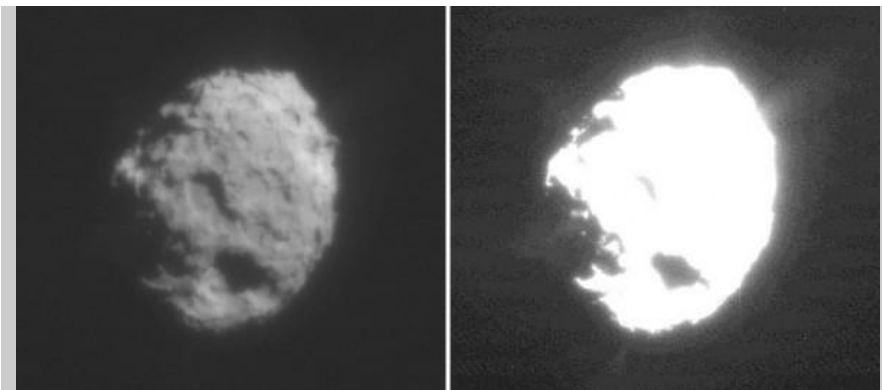
Posted on [January 6, 2004](#) by [Wal Thornhill](#)

"The remarkable properties of comets are not even remotely explicable by any of the numerous ad hoc assumptions of 'modern' comet theory."

- Prof. R A Lyttleton, *Journey to the Centre of Uncertainty, Speculations in Science & Technology*, Vol. 8, No. 5 p. 344.

NASA published the following [News Release \(2004-001\)](#) on January 2, 2004:

NASA Spacecraft Makes Great Catch...Heads for Touchdown



Comet Wild 2 is shown in this image taken by the Stardust navigation camera during the spacecraft's closest approach to the comet on January 2. The image was taken within a distance of 500 kilometers (about 311 miles) of the comet's nucleus with a 10-millisecond exposure.

Team Stardust, NASA's first dedicated sample return mission to a comet, passed a huge milestone today by successfully navigating through the particle and gas-laden coma around comet Wild 2 (pronounced "Vilt-2"). During the hazardous traverse, the spacecraft flew within 240 kilometers (149 miles) of the comet, catching samples of comet particles and scoring detailed pictures of Wild 2's pockmarked surface.

"Things couldn't have worked better in a fairy tale," said Tom Duxbury, Stardust project manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

"These images are better than we had hoped for in our wildest dreams," said Ray Newburn of JPL, a co-investigator for Stardust. "They will help us better understand the mechanisms that drive conditions on comets."

"These are the best pictures ever taken of a comet," said Principal Investigator Dr. Don Brownlee of the University of Washington, Seattle. "Although Stardust was designed to be a comet sample return mission, the fantastic details shown in these images greatly exceed our expectations."

The collected particles, stowed in a sample return capsule onboard Stardust, will be returned to Earth for in-depth analysis. That dramatic event will occur on January 15, 2006, when the capsule makes a soft landing at the U.S. Air Force Utah Test and Training Range. The microscopic particle samples of comet and interstellar dust collected by Stardust will be taken to the planetary material curatorial facility at NASA's Johnson Space Center, Houston, Texas, for analysis.

Stardust has traveled about 3.22 billion kilometers (2 billion miles) since its launch on February 7, 1999. As it closed the final gap with its cometary quarry, it endured a bombardment of particles surrounding the nucleus of comet Wild 2. To protect Stardust against the blast of expected cometary particles and rocks, the spacecraft rotated so it was flying in the shadow of its "Whipple Shields." The shields are named for American astronomer Dr. Fred L. Whipple, who, in the 1950s, came up with the idea of shielding spacecraft from high-speed collisions with the bits and pieces ejected from comets. The system includes two bumpers at the front of the spacecraft — which protect Stardust's solar panels — and another shield protecting the main spacecraft body. Each shield is built around composite panels designed to disperse particles as they impact, augmented by blankets of a ceramic cloth called Nextel that further dissipate and spread particle debris.

"Everything occurred pretty much to the minute," said Duxbury. "And with our cometary encounter complete, we invite everybody to tune in about one million, 71 thousand minutes from now when Stardust returns to Earth, bringing with it the first comet samples in the history of space exploration."

Scientists believe in-depth terrestrial analysis of the samples will reveal much about comets and the earliest history of the solar system. Chemical and physical information locked within the cometary particles could be the record of the formation of the planets and the materials from which they were made.

COMMENT:

Congratulations to the technologists who achieved this remarkable engineering feat! However, the news release shows that NASA scientists are no closer to understanding the true nature of comets than they were when the Deep Space 1 spacecraft snapped images of Comet Borrelly more than 2 years ago.

On 18 October 2001 I featured a news item about that earlier successful comet encounter. (See [Comet Borrelly rocks core scientific beliefs](#)). That headline was taken from a syndicated newspaper article which trumpeted, "*comet Borrelly will revolutionise our understanding of these frozen wanderers.*" It hasn't. The same set of beliefs about comets is being repeated today. My 2001 item outlined some of those core scientific beliefs and why they are mistaken and concluded:

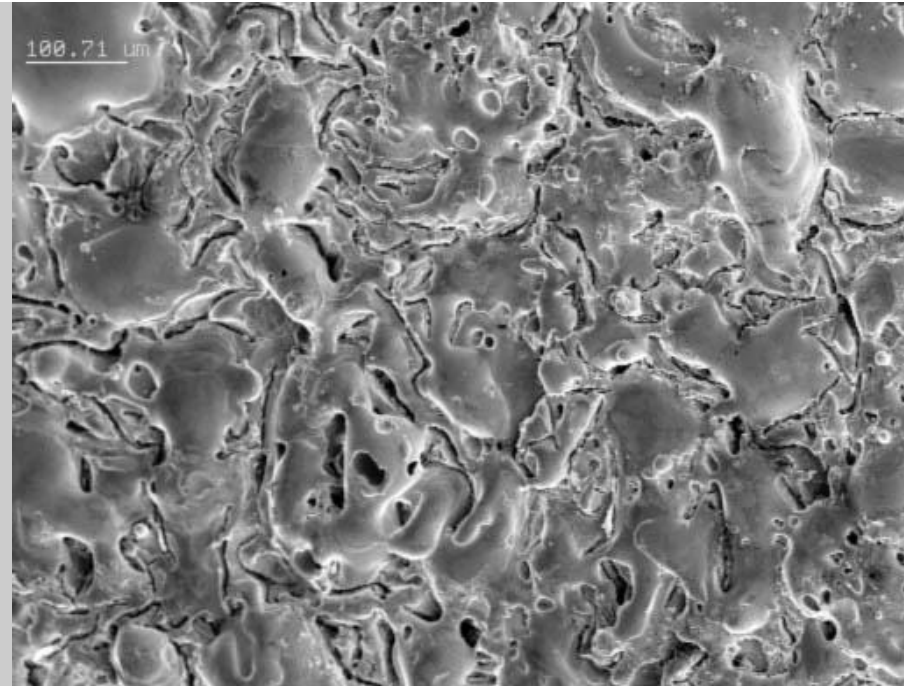
"A revolution in our understanding of comets will only occur when the unconscious core beliefs are questioned."

The NASA report shows that scientists remain unconscious of the beliefs that are preventing progress in astrophysics and astronomy. So their comet catechism is repeated.

"Comets will unlock the secrets of the origin of the Earth."

That may be so. But it will not happen until we really understand what a comet is and where it comes from. All we have at present is a story that has become accepted opinion through endless repetition. Accepted opinion is a belief. And firmly held beliefs are the major roadblock to scientific advancement.

This is an ideal opportunity to examine the picture of Wild 2 from the perspective of the electric universe model of comets. Briefly, in that model a comet is a highly negatively charged body with respect to the Sun. Like all charged bodies in plasma, a comet will be enveloped in a plasma sheath (the coma) that limits the reach of the comet's electric field. A forbidden oxygen line was discovered in Comet Austin's coma. "Forbidden lines" are spectral signatures that are not expected in space because here on Earth they are found only within strong electric fields. To astronomers' surprise, forbidden lines are common in space, not only in comets, but in nebulae and galaxies. A cometary display is produced when the nucleus discharges at a rate sufficient to generate a visible tail. The dust and gases that form the comet's tail are not evaporated by the heat of the sun, but instead are electrically 'machined' from the nucleus by cathode arcs. Laboratory examination of cathode arcs shows that they jump around on the cathode surface, removing surface material in jets to form small circular craters. The industrial process of Electric Discharge Machining (EDM) uses this feature to erode a surface to accurate depth. To the naked eye, the EDM surface looks remarkably smooth. However, when viewed at high magnification, the peculiarities of the machined surface become clear. The tendency for the cathode arc to erode one high point then move to the next high point tends to generate chains of flat-floored craters. The finished surface appears as if someone used a circular cookie cutter to produce extended depressions and channels with scalloped edges. Variations in arc current will produce a layered or terraced effect both within craters and between adjacent craters. Below is an example of EDM scarring.



Scanning Electron Microscope image of a surface subjected to EDM.

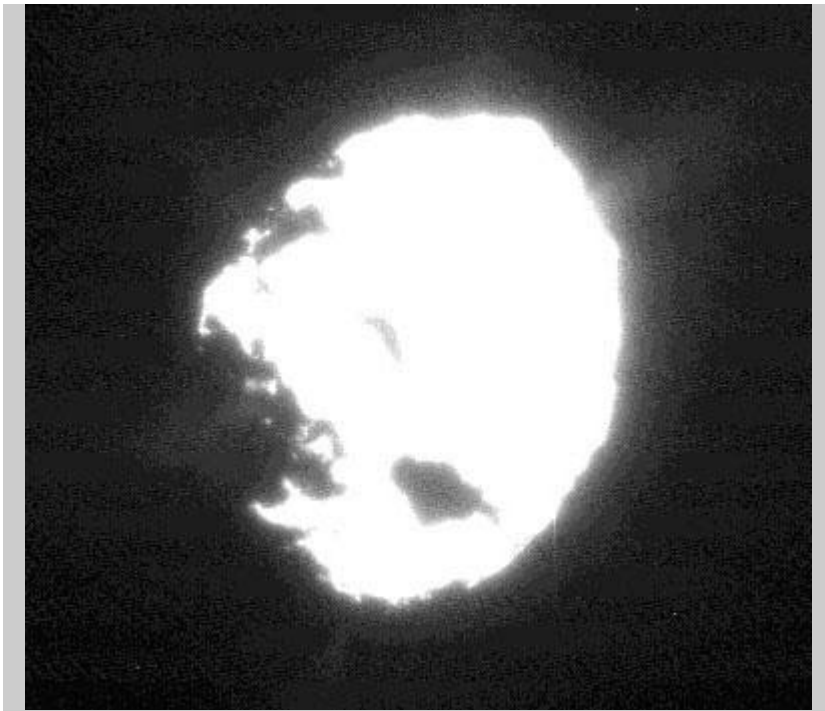
The picture below of Comet Wild 2 was taken at a distance four times closer than that of Comet Borrelly. The surface features are therefore seen more clearly. Or they should be. It is odd that the picture released by NASA lacked contrast and was fuzzy. A simple digital correction provides a much clearer image.



Enhanced image of the nucleus of Comet Wild 2.

Here we see clearly the hallmarks of electric discharge machining of the comet nucleus. We see the circular pitting and flat floors of the pits. Pits overlap to form crater chains with scalloped edges and layering or terracing. Compare it with the earlier EDM microscope image.

The position of the active jets is shown in an overexposed image provided by NASA. It is noteworthy that the comet nucleus is brightest in the region where the brightest jet seems to originate.



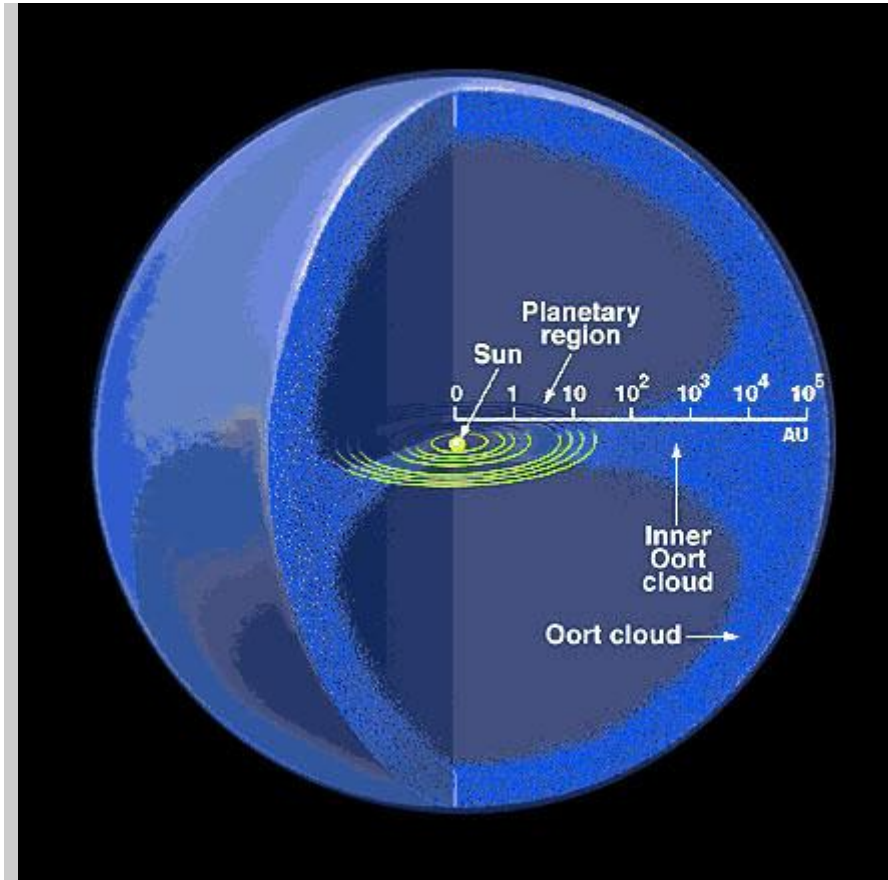
A prominent jet can be seen at the 2-o'clock position.

There is a bright region at the 2 o'clock position on the nucleus where the prominent jet is seen. In the electric theory, unresolved bright spots are to be expected where the cathode arcs impinge on the nucleus and give rise to the cathode jets. The dirty snowball theory of comets expects to find jets where material is heated more, which suggests jets from darker areas.

So how does the current theory of comets fit this picture?

- Comets are conventionally described as ‘dirty snowballs’ – dust and lumps of rock glued together by ices. Their orbits take them far from the Sun most of the time.
- As a comet nears the Sun, its surface warms up. Ice sublimates from its surface and forms a tenuous atmosphere, called a coma, which can span a million kilometres. Solar radiation and a steady flow of charged particles called the solar wind push material from the coma away from the Sun, forming a long, glowing tail.

- Comets probably formed at the same time as the Sun and planets, about 4.5 billion years ago. But many of them were somehow removed far from the Sun by interactions with the outer planets. Astronomers suspect that as many as one trillion of these objects reside in a shell, called the Oort Cloud, that extends as much as a light-year from the Sun. No one has ever seen anything in the Oort Cloud. It is too far away for any 21st century space instrument to observe. Its existence is based on many assumptions, including how the solar system was formed, how long the solar system has been in its present stable configuration, and how a comet works.



"The Oort-shell, ..has become widely regarded as a firmly established triumph of 'modern cometary theory' when in fact, it is a piece of trash heralded as one of the corner-stones of cometary 'science'."

Prof. R A Lyttleton, Journey to the Centre of Uncertainty, Speculations in Science & Technology, Vol. 8, No. 5 p. 343.

- The Oort cloud is understood to be the source of comets that reach the inner solar system. If that is so, there is a severe deficit in the number of comets observed in short-period orbits like Comet Halley.
- None of the comets imaged so far look anything like a dirty snowball. They look like the blackest of asteroids ‘ a lump of cratered rock that originated from a larger, differentiated body. Indeed, they have been described as ‘complex worlds’

in their own right. There is no reason to assume that they are primordial samples left over from the formation of the solar system.

- The cratering of comets and asteroids remains an enigma for astronomers. Craters are supposedly formed by impacts, but many tiny comets and asteroids have craters so large that their nucleus should have been shattered if an impact had formed them.
- The low density attributed to comets and asteroids, despite their appearance of being solid rock, is based on gravitational perturbation measurements. Electric Universe theory suggests that we do not understand the true nature of gravity and that Newton's universal constant of gravitation, 'G,' is neither constant nor universal. (The penny should have dropped long ago when measurements on Earth showed G to be the most variable 'constant' in physics).
- Sublimation of ices from the comet nucleus by solar heating is not expected to form the distinctive circular craters or well-collimated jets. The surface features of Comet Wild 2 are inexplicable by out-gassing.



Fanciful depiction of out-gassing from a comet nucleus. Why it should be concentrated from a few spots is not explained. Why it always forms vertical jets is not explained. The velocity of the jets cannot be explained by simple heating.

- Solar heating should be least where the comet nucleus is brightest. We should least expect jets from a bright region of the nucleus.
- Comet Borrelly showed no trace of the water ice needed to account for the amount of dust emitted from the nucleus. It was described as 'dry and hot.' Out-gassing doesn't seem to bear any relationship to the surface area of a comet.
- Halley produced a 'major surprise' in the amount of finest dust being emitted. Before the comet flybys the dust population was expected to peak at a certain size, then tail off toward smaller particles. Giotto swept up specks no larger than a millionth of a centimeter; only 100 atoms in diameter.
- Comet dust collected in the Earth's stratosphere contains tiny grains of annealed silicates that were formed at a temperature of about 1600K.
- Copious X-rays were discovered by accident coming from a comet. No one expected them from an inert body rushing through the solar wind. An ad hoc

explanation was devised that required protons from the Sun to combine with electrons from the comet. No one sensed the irony. That moving protons combining with electrons is the defining characteristic of an electric current flowing between the Sun and the comet.

And how does the electric universe model fit this picture?

- The electric universe model of comets has a simple, coherent explanation for all of the features and behavior of comets.
- Comets are not leftovers from the formation of the solar system. Present theories of the formation of planetary systems cannot explain our solar system anyway.
- Just as there is no invisible dark matter required in the galaxy to save the electric universe theory, there is no invisible Oort cloud of comets required to provide a theoretical comet source. In the electric universe – what you see is all you need.
- Comets are the result of electrical discharge machining of planetary bodies that occurs in the catastrophic evolution of planetary orbits. It is far too simplistic to assume that the planets were formed along with the Sun and remained in their present orbits ever since.
- In addition to removing dust, the gargantuan electric forces of an interplanetary thunderbolt are able to loft entire mountains into space from the surface of a planet. Comets and asteroids can be formed this way.
- And the same discharge that gives birth to comets and asteroids may burn them black and leave distinctive birthmarks in the form of large arc craters. That is how asteroids, like Mathilde, can be covered in gigantic craters without suffering any disruption.
- Density calculations based on gravitational perturbation theory are worthless. Gravity is a weak dipole electric force between subatomic particles. So the charge distribution in a body affects gravity strongly. Comets are highly charged bodies and will exhibit anomalous gravity. Newton's gravitational 'constant,' G , is a dependent variable. It is dependent on the electrical state of a body.
- So-called non-gravitational accelerations exhibited by comets are due to the electrical interaction of a comet with the Sun's weak radial electric field (which affects deep space craft like [Pioneer and Voyager](#)) and the electrical interaction within the plasma sheaths (magnetospheres) of the outer planets. The non- G accelerations have nothing to do with the cometary jets, which are far too weak to have any significant effect.
- Powerful internal stresses caused by redistribution of charge within an actively discharging comet are responsible for their observed tendency to fragment. The effect is like an exploding condenser. It is not due to the comet being a weakly coherent rubble pile. (There is a lesson here for geologists about earthquakes). Many comets fragment at large distances from the Sun, which argues against heating and dynamic stresses being responsible.
- One comet disappeared after fragmenting. This is contrary to expectations of the icy comet theory because the sudden increase in surface area exposed to the Sun would be expected to create a spectacular outburst. However, the dispersal of an

electrically charged comet would be expected to reduce or extinguish the visible discharge phenomena.

- Comet jets, being cathode arcs, will always jet vertically from the surface. Because they constitute an electric current, the jet streams will remain separate and coherent over vast distances. Comet Hyakutake's tail was detected by the Ulysses spacecraft half a billion kilometres away!



Cometary filaments cannot be explained by outgassing. They are definitive evidence for the electrical nature of comets and the solar environment.

- The trajectory, velocity and filamentary nature of the comet's ion tail conform to that known experimentally as a 'plasma gun.'
- X-rays are generated naturally by high-voltage discharges.
- Electric discharge machining of the comet nucleus will produce the extremely fine dust observed in the Comet Halley fly-by.
- Electric discharge machining of the comet nucleus will produce annealed silicate grains.
- Comet jets, being an electric discharge phenomenon, do not require solar heating. That explains cometary flare-ups beyond the orbit of Saturn, where a comet is in 'deep freeze.'

A book could be written comparing the two theories of comets. The points briefly mentioned above merely give a glimpse of the possibilities. The electrical theory opens up new ways of interpreting the comet dust samples when they are returned to Earth. We should compare the elemental ratios of comet dust with that of Martian meteorites. We should look for signs of flash heating of dust particles in an electric arc, like the chondrules seen in many meteorites. Meteorites are formed in the same process as comets. That is why we have meteor showers when a comet disintegrates. We should look for isotopic anomalies in the comet dust and the presence of short-lived radionuclides generated by an interplanetary thunderbolt. No nearby supernova is required.

Comets have nothing to tell us about the origin of the solar system but they do carry important information about its recent catastrophic history!

Postscript – Scars show comet has ‘solid’ centre

New Scientist vol 181 issue 2430 – 17'January'2004, page 14:

THE latest analysis of pictures taken by NASA's Stardust probe during its headlong plunge through comet Wild 2 on 2 January has revealed a big surprise: the comet's icy nucleus is covered in what look like impact craters.

In its first bulletin last week on the mission's findings, the Stardust team reported that the jets of gas producing the comet's spectacular coma and tail appear to be emanating from pits on the surface of the nucleus (New Scientist, 10 January, p 11).

Now the team has studied more detailed pictures from the probe and found that as well as sinkholes apparently caused by ice vaporising below the surface, the nucleus is covered in what look like well-preserved impact craters. That is completely unexpected because comets are believed to be loose aggregations of dust and ice that would shatter on impact.

"I don't think any of us ever really considered the possibility of impact craters," says Ray Newburn of NASA's Jet Propulsion Laboratory in Pasadena, California. If the pits are craters, the surface of the comet nucleus must be much stronger than experts thought. "It may be a well-cemented rubble pile, but it's definitely not a loose powdery surface," he says.

Wal Thornhill

Spirit Chases a Martian Mirage

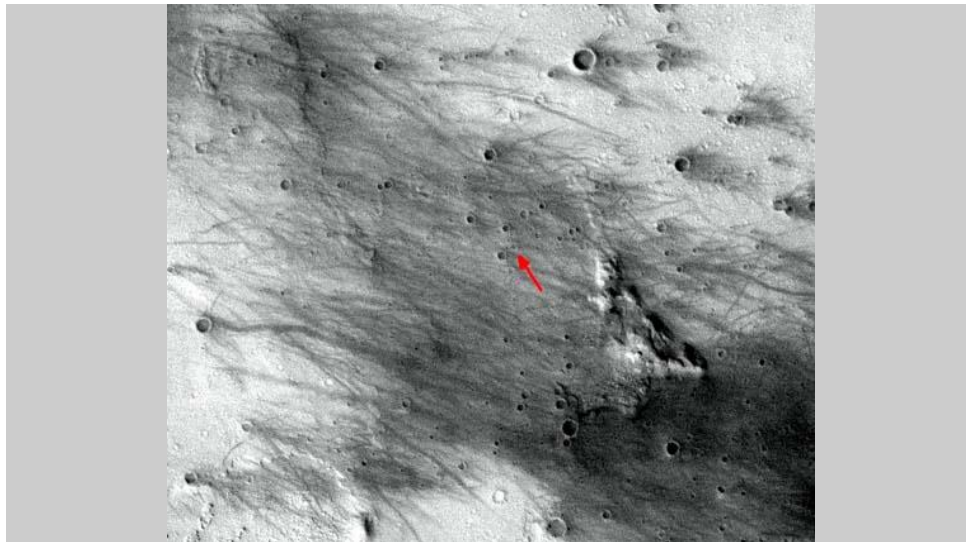
Posted on [January 23, 2004](#) by [Wal Thornhill](#)

While this report was being written came worrying news that the Mars Exploration Rover, Spirit, is not functioning normally.

On January 21, 2004 ground controllers were able to send commands to Spirit and received a simple signal acknowledging that the rover heard them, but they did not receive expected scientific and engineering data during scheduled communication passes during the rest of that martian day.

Project managers have not yet determined the cause, but similar events occurred several times during the Mars Pathfinder mission. The team is examining a number of different scenarios, some of which would be resolved when the rover wakes up after powering down at the end of the martian day (around midday Pacific time Wednesday).

As discussed later in this report, Spirit is moving about in an area where there are frequent dust devils. The dust devils are not simply rotating winds caused by rising warm air. They are the form lightning takes in the thin Martian atmosphere. So they are a great hazard to surface craft, with their powerful electrostatic and electromagnetic effects. Just as the Galileo spacecraft suffered repeated computer glitches when it flew too close above the plumes of the electrical jets on Io, it is possible that Spirit has become a lightning rod and suffered internal arcing – with possibly serious consequences for its onboard electronics. I sincerely hope not!



On the evening of January 3, the MER lander Spirit came to a safe landing right in the middle of Gusev Crater (shown by red arrow). This is an area riddled with dust devil tracks in the summertime (note the many dark streaks). With some luck those dust devils have scoured the surface clean of dust, exposing the underlying rocks which hold the secrets of Mars' past. NASA/JPL

The official caption shows the problem of perception facing scientists who are trained to believe that planets are electrically inert bodies and that weather is caused largely by solar heating. The MER engineers have done a great job within the limitations of what scientists have told them to expect. And therein lies the greatest weakness in our exploration of space.

Postscript January 29, 2004

"We're back on track now, after getting a pretty serious scare from Spirit. Spirit's problems seem to have been caused by little more than a fouled-up computer file system... not too different from what can happen when you hit the power button on your computer accidentally and corrupt a bunch of files on your hard drive. The JPL flight software team is hot on the trail of this thing now, and I'm hoping that Spirit will make a full recovery."

- From Mars Mission News by Steve Squyres at Cornell University.

Since no Martians have been spotted gazing into Spirit's cameras, we must assume there was no extraterrestrial digit to 'hit the power button.' But you can get the same effect on your home computer when lightning strikes in the neighborhood.

Mars is not a hospitable planet. In August last year I wrote: "Gigantic fresh scars show that Mars has suffered recently and terribly. Millions of cubic kilometres of jagged boulders were burnt and torn from its surface and strewn from horizon to horizon – as all of the images relayed from the surface have shown. The implications for the search for life on Mars are profound.

If there was a past environment conducive to life on Mars it has been wrecked. Not only the surface suffered but also the atmosphere was stripped and exogenous gases and solids dumped on the hapless planet. Mars' orbit and climate changed drastically."

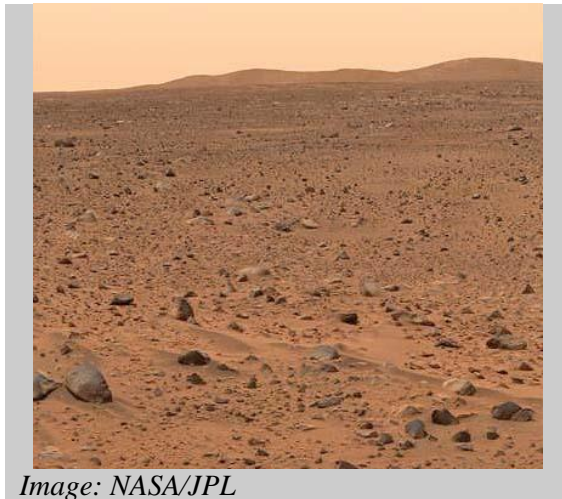
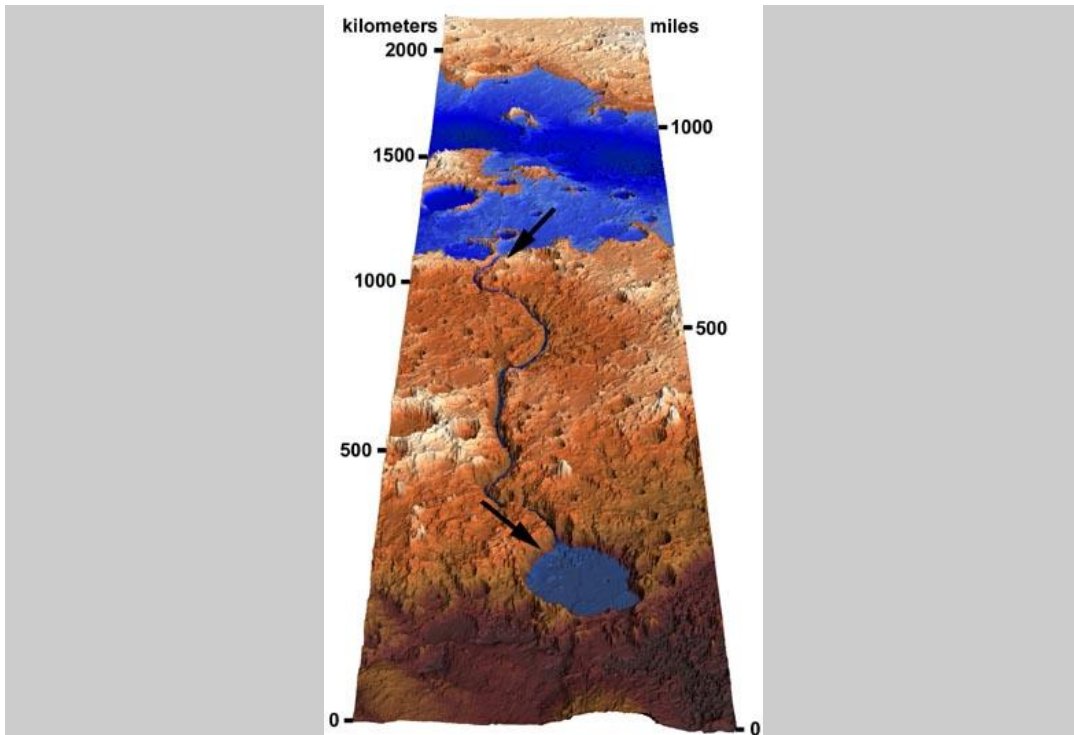


Image: NASA/JPL

The Mars Exploration Rover, Spirit, is adding to the weight of evidence for this catastrophic scenario. Once again we saw a rock-strewn vista when Spirit first "opened its eyes." Over the coming months, while Mars comes under intense investigation, both from orbit and rovers on the surface, it is a great opportunity to predict what will be found and to compare the conventional view of Mars with that of the Electric Universe.

Spirit is examining the floor of Gusev Crater, which terminates a large channel called Ma'adim Vallis. I wrote about Ma'adim Vallis in July 2002, in "[Water on Mars?](#)": ".. what is the story of the formation of Ma'adim Vallis? An arc cutting Gusev crater will sap electrons from the surrounding terrain by creating a strong radial electric field that begins to rip electrons from the solid surface. When breakdown begins, a lightning bolt tears across the surface, blasting soil and rock to either side of its sinuous path. A large proportion of the excavated material is impelled electrostatically to follow the main discharge toward space. Pieces not pulled into space would fall back in a more or less random scattering all over Mars. That explains why there is little evidence of deposition inside Gusev Crater from a channel that is larger than the Grand Canyon. It is also the reason why every Mars lander has returned a vista of rubble that extends to the horizon." See [Carving Ma'adim Vallis](#) for a conventional explanation.



A perspective view, with exaggerated vertical relief, facing south and looking up Ma'adim Vallis. The channel runs into Gusev Crater (foreground), which is the Spirit landing site. In the background is the supposed lake that burst through to form Ma'adim Vallis. Why the valley is narrower at its source and why there is no sign of outwash from the channel are just two of the many mysteries unanswered by this theory. Image credit: R. P. Irwin III and G. A. Franz, National Air and Space Museum, Smithsonian Institution

Already scientists have begun to express surprise at the information streaming back from Spirit.

From the press release of 19 January:

Scientists chose Adirondack to be Spirit's first target rock rather than another rock, called Sashimi, that would have been a shorter, straight-ahead drive. Rocks are time capsules containing evidence of the environmental conditions of the past, said Dr. Dave Des Marais, a rover science-team member from NASA Ames Research Center, Moffett Field, Calif. "We needed to decide which of these time capsules to open."

Sashimi appears dustier than Adirondack. The dust layer could obscure good observations of the rock's surface, which may give information about chemical changes and other weathering from environmental conditions affecting the rock since its surface was fresh. Also, Sashimi is more pitted than Adirondack. That makes it a poorer candidate for the rover's rock abrasion tool, which scrapes away a rock's surface for a view of the interior evidence about environmental conditions when the rock first formed. Adirondack has a "nice, flat surface" well suited to trying out the rover's tools on their first martian rock, Des Marais said.

"The hypothesis is that this is a volcanic rock, but we'll test that hypothesis," he said.

Comment: Most of the soil and rock found on Mars has been recently excavated from the depths of craters, canyons and channels, like Ma'adim Vallis, elsewhere on Mars. To gain some perspective, the Valles Marineris canyons are up to 9 kilometers deep. Mars is a major source of meteorites and asteroidal bodies (just two of the latter remain as Mars' tiny moons, Phobos and Deimos). If the rocks are "time capsules" from the past it is a very recent past. They have had no time to weather. And the story they have to tell will not fit any conventional geological theory.



The scattered rocks are not likely to be volcanic. Many will have suffered plasma heating and shock effects from a cosmic electric discharge. The holes in some of the rock surfaces may be plasma arc craters or they may be due to trapped gases being explosively released by hot plasma.

Unweathered surface mineral

From the press release of 20 January:

"We're starting to put together a picture of what the soil at this particular place in Gusev Crater is like. There are some puzzles and there are surprises," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the suite of instruments on Spirit and on Spirit's twin, Opportunity.

One unexpected finding was the Moessbauer spectrometer's detection of a mineral called olivine, which does not survive weathering well. This spectrometer identifies different types of iron-containing minerals; scientists believe many of the minerals on Mars contain iron. 'This soil contains a mixture of minerals, and each mineral has its own distinctive Moessbauer pattern, like a fingerprint,' said Dr. Goestar Klingelhofer of Johannes Gutenberg University, Mainz, Germany, lead scientist for this instrument.

The lack of weathering suggested by the presence of olivine might be evidence that the soil particles are finely ground volcanic material, Squyres said. Another possible explanation is that the soil layer where the measurements were taken is extremely thin, and the olivine is actually in a rock under the soil.

Comment: Olivine is a common mineral found on Earth in recent lavas and meteorites. However, it rapidly breaks down when exposed to water and weathering. The soil and rocks on Mars have lain exposed for a mere few thousand years, not millions or billions of years. They have not been exposed to water or had time to weather.

Cohesive Soil

The news item continues:

"Scientists were also surprised by how little the soil was disturbed when Spirit's robotic arm pressed the Moessbauer spectrometer's contact plate directly onto the patch being examined. Microscopic images from before and after that pressing showed almost no change. "I thought it would scrunch down the soil particles," Squyres said. "Nothing collapsed. What is holding these grains together?"

Comment: Gusev crater is situated in the heavily cratered southern highlands of Mars. Crater floors are formed not by impact but by a rotating arc that neatly machines the

circular crater, leaving a flat floor. Many smaller craters were subsequently burnt into the floor of Gusev crater. Today, the area where Spirit landed is covered with the trails of so-called "dust devils." Normal earthly lightning cannot occur in the thin atmosphere of Mars, Instead it takes the slower diffuse form of a tornado. We should expect the electrical activity on the Martian surface, both in the past and in the present, to produce glassified soil with the cohesive strength of a fulgurite (sand loosely fused by lightning). Electric discharges are sometimes used to immaculately clean a surface. The dark paths left by the Martian dust devils should show microscopic signs of having been cleaned by a corona discharge. I would urge the Spirit team, if possible, to include one of the dark trails in their traverse.

Chlorine and Sulfur

The news item continues:

"Information from another instrument on the arm, an alpha particle X-ray spectrometer, may point to an answer. This instrument "measures X-ray radiation emitted by Mars samples, and from this data we can derive the elemental composition of martian soils and rocks," said Dr. Johannes Brueckner, rover science team member from the Max Planck Institute for Chemistry, Mainz, Germany. The instrument found the most prevalent elements in the soil patch were silicon and iron. It also found significant levels of chlorine and sulfur, characteristic of soils at previous martian landing sites but unlike soil composition on Earth.

Squyres said, "There may be sulfates and chlorides binding the little particles together." Those types of salts could be left behind by evaporating water, or could come from volcanic eruptions, he said. The soil may not have even originated anywhere near Spirit's landing site, because Mars has dust storms that redistribute fine particles around the planet. The next target for use of the rover's full set of instruments is a rock, which is more likely to have originated nearby."

Comment: The presence of chlorine and sulfur in the Martian soil is of special interest because sulfur is commonly formed in cosmic discharges by fusing two oxygen atoms together. It is happening today on Io in cathodic arc jets (mistaken for volcanoes) so that its surface is buried in sulfur. (Io was probably an icy satellite originally, like the other Galilean satellites of Jupiter). But there was another more direct source of these elements for the Martian soil – the clouds of Venus!

Venus was identified by the ancients as having discharged spectacularly to Mars for an extended period. For this reason the thin Martian atmosphere still has a whiff of the Venusian atmosphere, with its carbon dioxide and nitrogen. The Russian lander, Venera 12, found that the clouds of Venus hold 20 times as much chlorine as sulfur. This discovery was "so difficult to reconcile with other measurements that American researchers have tended to ignore or discount them, although no one has explained why they should be in error." [Venus Revealed, D Grinspoon, p. 120.] The Martian soil seems

to retain a record of the encounter with Venus. It may also extend to the hematite deposits at the site of Spirit's twin, Opportunity.

In addition there is a long-standing puzzle concerning the origin of the chlorine in our salty oceans. There is far too little chlorine in rocks to account for it. However, chlorine and sodium are strongly related in low-energy nuclear transformations of light elements, so both Mars and the Earth must have had chlorine added to their surface inventory from external energetic plasma discharge events.

Concentrated plasma discharges are known to produce large numbers of neutrons. We should therefore expect anomalous levels of heavy isotopes formed by neutron capture. So we find the deuterium to hydrogen ratio (D/H) on Venus is "phenomenally high" at 120 times greater than on Earth. On Mars it is enriched 6 times the terrestrial value. It may represent the varying exposures of the three planets to recent cosmic discharge activity. And as was found on the Moon, anomalous radioactivity on Mars may be found to be associated with the focal points of those discharges – recent craters and other electrical scars.

Spirit Finds Carbonates

On Earth, carbonates such as limestone often form in liquid water. But one of the biggest Mars mysteries deals with "missing carbonates." Orbital images show valleys that look like dry riverbeds, suggesting that liquid water existed on an early Mars that had a thicker atmosphere and a warmer climate. If true, large quantities of carbon dioxide should have dissolved out of Mars's atmosphere into the water and chemically reacted with other materials to form carbonates. But orbital data from Mars Global Surveyor's instrument reveal much lower carbonate abundances than predicted.

[From SkyandTelescope.com]

Comment: Spirit has found the telltale signature of carbonates. The problem is to know what tale it is telling. Mars has changed so drastically in the recent past that its story may be indecipherable. But it is certain that it cannot be used to prove that a hypothetical greenhouse existed on Mars aeons ago. Any exogenous interference with Mars' atmosphere and surface material would tear up this particular history book.

Hollow Mystery for Mars Rover

A close-up image of an undisturbed patch of Martian soil has revealed a large number of hollow spheres or tubes. The Mars rover Spirit has completed its first full set of scientific measurements with the instruments on its robotic arm, revealing mysterious hollow grains in the soil. The one-metre arm used its microscope to take a close-up image of an undisturbed patch of soil next to the NASA rover. It shows mostly sand-sized particles, but with a large number of apparently hollow spheres or tubes.

Such grains were completely unexpected. But John Grotzinger, a geologist at the Massachusetts Institute of Technology, says they closely resemble formations he has seen in soils in the southwestern deserts of the US. "There are little tubes that build up by capillary action," he told New Scientist, as salty water evaporates from the nearly-dry soil. The Martian grains must also be strong enough to withstand the region's strong winds and perpetual scouring by dust devils – tornado shaped vortexes that can tower to heights of kilometres.

[From NewScientist.com]

Comment: The lunar surface has been subjected to electrical cratering and channel formation like that on Mars. (The only difference is that scientists have given up the idea that channels, or rilles, on the Moon were formed by water). A report by scientists studying a lunar dust sample remarked upon the large number of small glassy spherules and cylinders. It was their opinion that:

"they must have been formed free from restraints, perhaps blown from a melt as fine droplets or perhaps as a spray of molten glass; thus they were able to solidify in free flight under influence of surface tension forces. ..it is safe to conjecture that the cylindrical object in its initial molten state was part of a breakup of a thin jet.. A number of the grayish metallic-like spherules exhibit vacuole regions within their otherwise solid interiors.."

[Science, Vol. 167, No. 3918, pp. 742-3.]

A cathode arc melts a surface and forms a jet of the melted material. **The first microscopic investigation of the Martian soil supports the Electric Universe model.** As for the southwestern deserts of the US, they were formed by the same electrical erosion processes that shaped the surface of Mars. We should expect to find many parallels.

The European Space Agency and Mars Express

"In the testing of hypotheses lies the prime difference between the investigator and the theorist. The one seeks diligently for the facts which may overthrow his tentative theory. The other closes his eyes to these, and searches only for those which will sustain it."

- Grove Karl Gilbert, Chief Geologist of the US Geological Survey, 1895.

In the search for water on Mars there is a powerful human tendency to see only what you expect to find. Contrary data is forgotten or dismissed from consideration. Mirages are easily mistaken for water. For example, while MER is trundling about the surface the European Space Agency (ESA) has Mars Express in orbit about the red planet. ESA has

chosen to use one of the most spectacular sights in the solar system – the colossal canyons of Valles Marineris – to publicize their success. Image data from Mars Express has been used to generate a perspective view that is like looking out of an aircraft window.



ESA's news report says:

"One looks at a landscape which has been predominantly shaped by the erosional action of water. Millions of cubic kilometres of rock have been removed, and the surface features seen now such as mountain ranges, valleys, and mesas, have been formed."

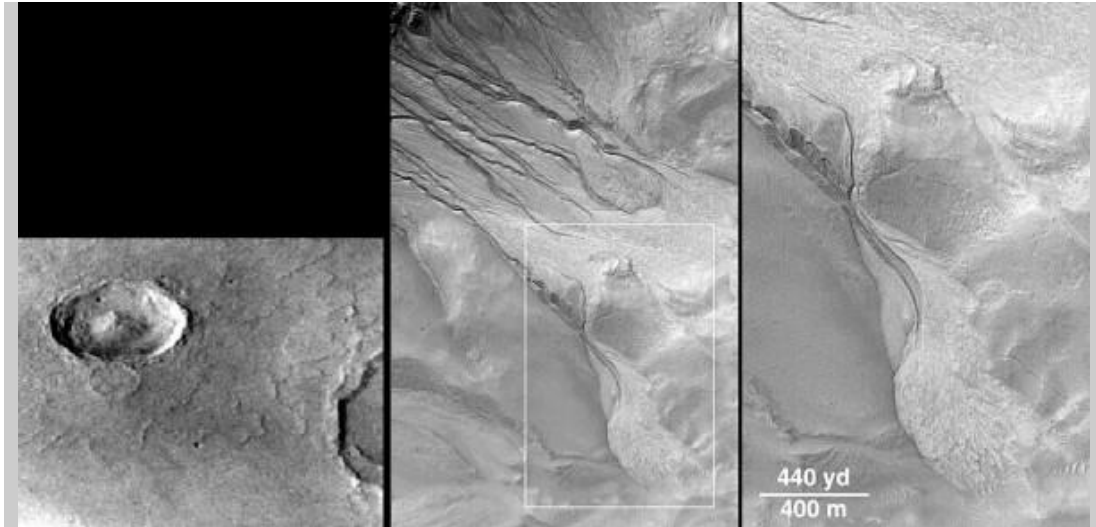
This offhanded statement from ESA is not supported by any of the geologists who have studied Valles Marineris. All now attribute the formation of its canyons to faulting of the Martian crust. The experts go on to admit:

"However, why the Valles Marineris were faulted to form deep troughs is not known."

It is a mystery because the answer lies outside the expertise of geologists. It was explained in [Mars and the Grand Canyon](#) and [Spiral Galaxies & Grand Canyons](#).

News releases like the one above are untruthful and self-serving. It seems that both NASA and ESA are dominated by theorists with one eye on funding, not impartial investigators. The great canyons and channels on Mars were not carved by water. There

is no need for large volumes of water hidden beneath the surface to explain their peculiar features. The few gullies found in crater walls look as if they have been etched into the wall, not eroded by water. Mars had surface moisture or ice in the recent past as shown by "sloppy" electrical craters but seems to have lost most of it in the energetic events that caused the cratering.



The images above are from the ESA website.

On the left the caption reads:

"Crater formed in soft, probably water-logged ground. Note the splatter marks (lobate flows) around it."

Impact splatters do not form lobate flows. However, the heat from an electric discharge does cause moisture to 'sweat' to the surface and flow slowly away from the crater.

On the right the caption reads:

"Channels in a Martian crater probably formed by relatively recent running water."

In this example the channels were not formed by running water. The close-up on the right shows clearly that the large channel is V-shaped in cross-section with a narrow channel at its base and has transverse striations. The narrow inner channel remains remarkably constant in width. And one channel has crossed another with no sign of any diversion of material into the earlier channel. These features are hallmarks of powerful near-surface electric discharges travelling up the wall of the crater. The fans at the bottom of the channels must then have an electrical origin too, taking the form of diffuse corona discharge streamers.

Sadly, much of the educational information on the ESA website is theory not necessarily supported by observations. We need more people like geologist G. K. Gilbert, who understand the difference between investigator and theorizer.

"The one seeks diligently for the facts which may overthrow his tentative theory. The other closes his eyes to these, and searches only for those which will sustain it."

Potentially billions of dollars are about to be wasted chasing the mirage of hidden water on Mars. But the search for water is only the first step in a quest of mythical proportions – to land humans on Mars. If only scientists understood the origin of the myths about Mars, the planetary god of war, they might begin to see parallels with earlier irrational human feats to reach the home of the gods – as witness the great pyramids. They might also perceive that the shrapnel covered and blasted hero "died" in a battle involving cosmic thunderbolts.

Comparative mythology gives us precise clues about what we should be looking for on Mars and what to expect. It has been far more predictive and explanatory than speculative theories about an undisturbed planet and long-extinct oceans. It gives us a 'big picture' of the catastrophic forces that recently shaped the planet's surface. Meanwhile, bewildered geologists are crying out for a big picture to make sense of the images from Mars orbiters. More urgently, comparative mythology is the key to our dimly remembered astronomical past and offers clues about unanticipated physical and electrical hazards facing Mars explorers. Only with the broad interdisciplinary perspective of the electric universe will wisdom have a chance to prevail in our exploration of space.

Wal Thornhill

Opportunity Favors the Heretic

Posted on [February 4, 2004](#) by [Wal Thornhill](#)

“.. modern science seems to have exploded into a multitude of highly specialised areas and distinct disciplines that may at times be interconnected, but that by and large ignore one another. There appears to be an overwhelming trend toward a proliferation of distinct and autonomous “subdivisions”. Researchers in different fields often experience great difficulties understanding each other.”

- Etienne Klein & Marc Lachièze-Rey, THE QUEST FOR UNITY – The Adventure of Physics

The Mars Exploration Rover, Opportunity, is about to begin its voyage of discovery on the surface of Mars. It is an opportunity for heretics to test their expectations in light of the new information pouring in from Mars. Otherwise, interpretations of new discoveries will be fashioned to fit stories created long ago and uncritically disseminated among separate disciplines. For example, astronomers tell geologists that the planets were formed about 4.5 billion years ago. Geologists tell astronomers that craters were formed primarily by impacts of comets, asteroids and meteors. Astronomers tell geologists that there is an invisible reservoir of objects that caused the impacts. Physicists tell geologists that the process of radioactive decay can be trusted as a reliable clock to date rocks. The geologists assure the particle physicists that nothing could have happened in the past to upset these radioactive clocks. Physicists tell astronomers that most of the stable elements which make up the planets and stars were formed primordially in a series of supernova events.

These are all simply stories. Countless facts don't fit the stories but they are not allowed to spoil the telling. Astronomers have not been able to show theoretically or empirically that the elements came from supernovas or that the planets came from a collapsing nebula. Pointing to evidence of 'accretion disks' around some stars simply begs the question. We know from observation that stars can expel matter (which defies gravitational theory). The disks are therefore more likely to be 'expulsion disks.' Similarly, geologists have never witnessed a crater formed by cosmic impact. Their attempts to replicate the features of planetary craters by high-velocity impacts or explosions have failed – but the story remains. Products of short-lived radioactive isotopes found in some meteorites contradict the 4.5 billion year story. The elements that would have formed primordially in supernovas don't match the elements found on solar system bodies. Supernovas are rare events that disperse matter.

The resulting rickety edifice of fact and fiction is sold under the name of planetary science. Like the game in which a story is made up by adding disconnected sentences together, it does not make much sense and no one can predict where it is leading. In this 'Alice in Wonderland' environment each new discovery must be a surprise. Then the story is simply amended, not rewritten. It clearly demonstrates the dysfunctional nature of over-specialized science.

The only recourse in this situation is to return to the empirical approach to science – that is, to work from the observable present back through time as far as reliable information can be extracted and to undertake laboratory experiments to test ideas. Do not assume old gravito-mechanical theories are relevant in a plasma universe. Accept that theorists do not understand gravity, or electrical effects in plasma. Unfortunately, to take this approach in the age of the theoretician and computer modeller is to brand oneself a heretic.

From Astrobiology Magazine come the following report excerpts:

Depth to Bedrock, Zero

by Astrobiology Magazine staffwriter

The first impression of the Opportunity landing site in color is the light, exposed area about ten meters from the rover's location inside a crater. The region has by now accumulated a plethora of adjectives and names: bizarre, alien, hummocky, layered, crater-rim, outcrop, stratigraphic slice, tabular, segmented, slabby.

But what has scientists most intrigued is that the slabs are bedrock. Bedrock is the solid, intact part of the planet's crust. ..To find bedrock is to know geologically that the history of this location is free from rock and boulder transport, mainly by wind, water, lava and impact debris. Whatever happened on Mars over billions of years, that hummocky slab bears its records.

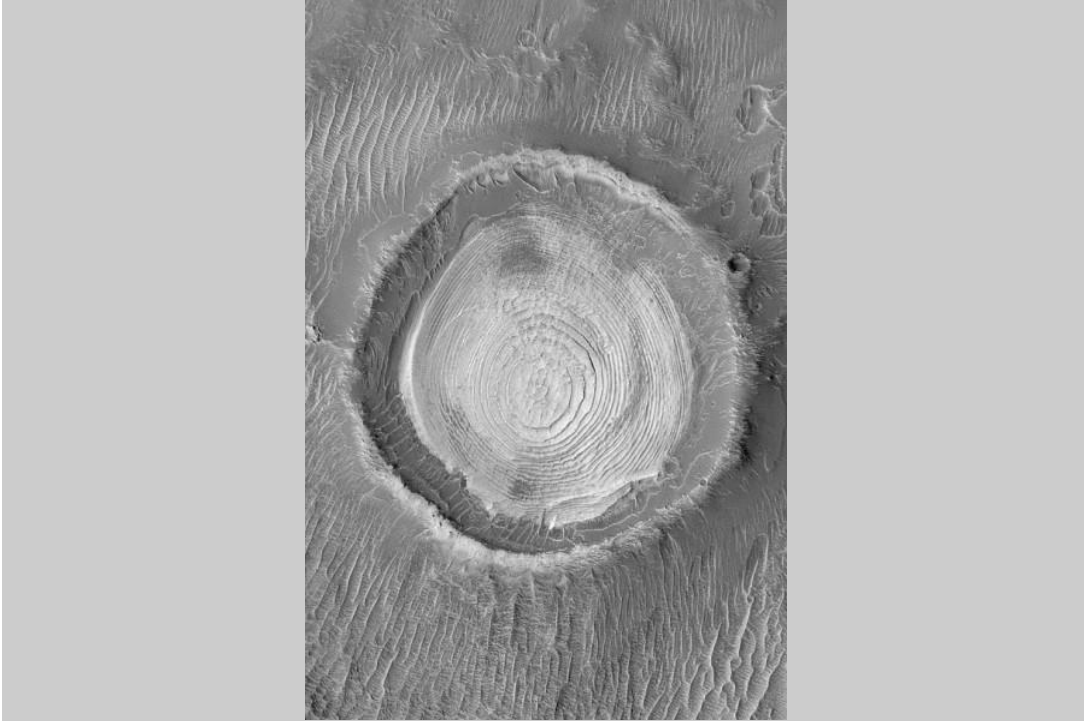


Outcrop about 10 meters from the rover's landing spot. The vertical slices of segmented bedrock may offer geologists a layered record of past Martian epochs. Credit:NASA/JPL

The assumptions in the assured statements above are manifold. All we have is a terrestrial theory of how planetary crusts are formed that glosses over many questions and anomalies. Sediments accumulated by the action of wind and water are supposed to account for a great deal of the stratification seen on Earth. Patches visible in the layers of the Martian rocks appear to contain pebbles and other small stones. So scientists argue by analogy that the Martian layers could have formed in water. Drifting volcanic ash or wind-borne sediments also could have built up the thin layers. However, the great depths of layered material (up to 9 km in Valles Marineris) found on Mars, a desert planet with little atmosphere, must call into question conventional ideas about the origin of sedimentary material and its metamorphism into layered rock. The Moon and some asteroids, where wind and water never existed, also show evidence of layering. Back on Earth, many mineral deposits defy orthodox explanations.

It is bold speculation that "...the history of this location is free from rock and boulder transport, mainly by wind, water, lava and impact debris." and that "whatever happened on Mars over billions of years, that hummocky slab bears its records." We live in the space age now. **We must look beyond a terrestrial model for the formation of planetary surfaces, including the surface of our own planet, Earth.**

The Mars Exploration Rover, Opportunity, landed in a 20 meter wide crater in Planum Meridiani. The surrounding region has some of the most spectacular etched surfaces seen on Mars. Just east of Terra Meridiani is a 470-km diameter circular depression known as Schiaparelli Basin. In June 2003 Mars Global Surveyor imaged a small crater in that Basin that exhibits most of the strange Martian features that challenge geologists when using terrestrial analogies. If we can explain those features simply and coherently it should help us to understand the exposed bedrock that Opportunity is about to investigate.



Official caption: Schiaparelli sedimentary rocks. Some of the most important high resolution imaging results of the Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) experiment center on discoveries about the presence and nature of the sedimentary rock record on Mars. This old meteor impact crater in northwestern Schiaparelli Basin exhibits a spectacular view of layered, sedimentary rock. The 2.3 kilometer (1.4 miles) wide crater may have once been completely filled with sediment; the material was later eroded to its present form. Dozens of layers of similar thickness and physical properties are now expressed in a wedding cake-like stack in the middle of the crater. Sunlight illuminating the scene from the left shows that the circle, or mesa top, at the middle of the crater stands higher than the other stair-stepped layers. The uniform physical properties and bedding of these layers might indicate that they were originally deposited in a lake (it is possible that the crater was at the bottom of a much larger lake, filling Schiaparelli Basin); alternatively, the layers were deposited by settling out of the atmosphere in a dry environment. This picture was acquired on June 3, 2003, and is located near 0.9°S, 346.2°W. NASA/JPL

Sorry, the explanation above just doesn't hold water. It is a series of ad hoc mechanisms linked together with 'may' and 'might.' To begin, it is baldly stated that the feature is an 'old meteor impact crater.' That is an opinion, not a fact. The floor of an impact crater is supposed to be formed of shattered rock. This crater floor is layered rock. So the crater 'may have once been completely filled with sediment' – or else the assumption is mistaken. Regular, episodic sedimentation is called upon to produce such even layering. Some method of cementation is also required to form each distinct layer. Whatever happened had to have repeated more than 20 times with precision to give such a regular appearance. Finally, 'the material was ..eroded to its present form.' We should like to know how that miracle was performed. Neither wind nor water moving across the landscape could produce the circular symmetry seen here. And it does not attempt to explain the strange landscape surrounding the crater.

There is a better explanation. In an electric universe, surfaces and atmospheres of rocky planets are exchanged in the process of their electrical 'birth' from a gas giant planet and in subsequent electrical interactions with other moons and planets in the process of achieving a stable orbit. Both Jupiter and Saturn have moons that would be classified as planets if they orbited the Sun. Saturn's moon, Titan, has an atmosphere heavier than Earth's. Later this year, when the Cassini spacecraft and Huygens probe arrive to observe it first-hand, Titan may have much to teach us about a planet that didn't manage to leave home.

The birth of planets by expulsion, followed by accretion of the 'afterbirth,' leaves significant scars and layering on their surfaces, as does establishing a stable planetary orbit. Orbital dynamics tells us that two planets, which began in close association, will come together again at regular intervals. This would make the process of electrical deposition and erosion between the planets episodic and regular for a short time (geologically speaking). The result is a global 'onion skin' build up of crustal materials together with various erratic mineral deposits. Superimposed are the effects of electrical erosion that occurs only upon the closest approaches between two planets (the same electrical forces that caused the initial expulsion preclude impacts). Electrical erosion tends to be concentrated hemispherically because of the short duration of closest approach. It also leaves the most dramatic scars. They take characteristic forms of circular craters (universally mistaken for impact craters), raised blisters (often mistaken for volcanoes), sinuous channels (usually mistaken for water or lava erosion channels), and etched or 'fretted terrain' (no conventional explanation).

The crater above can be explained simply by using the electric universe model. The layering predated the crater. The crater is electrical, not impact. The so-called erosion was an integral part of the formation of the crater, caused by rotating Birkeland filaments. Birkeland filaments twist in pairs to form a rope-like Birkeland current. It is the form in which electrical energy is transported across the cosmos. The current density is highest in the Birkeland filaments themselves so the erosion rate falls off toward their center of rotation – the center of the crater. The result, in the sedimentary layers, is a neatly terraced central peak, the untouched remains of previously existing sedimentary layers.

A note in passing: the small circular craters on the eastern lip of the large crater illustrate a recurring pattern in electrical cratering. Lightning is attracted to high points so subsequent discharges will tend to form craters centered on the rim of an existing crater. It is a pattern that is inexplicable by impacts. Also, in the upper right side of the image are some typical electrically etched, or "fretted" depressions with the circular 'cookie cutter' effect in the walls produced by cathode arcs. It is a pattern that the Galileo orbiter saw being formed on Jupiter's electrically active moon, Io.

But that is not all that we can glean from this remarkable image. There is a procession of linear ridges running approximately north-south. They are given a feathered appearance by myriad short orthogonal ridges. The electrical explanation is simple. All of the ridges are soil metamorphosed and hardened by lightning coursing just below the surface. On Earth they would be classed as fulgurites. The north-south ridges show the direction of

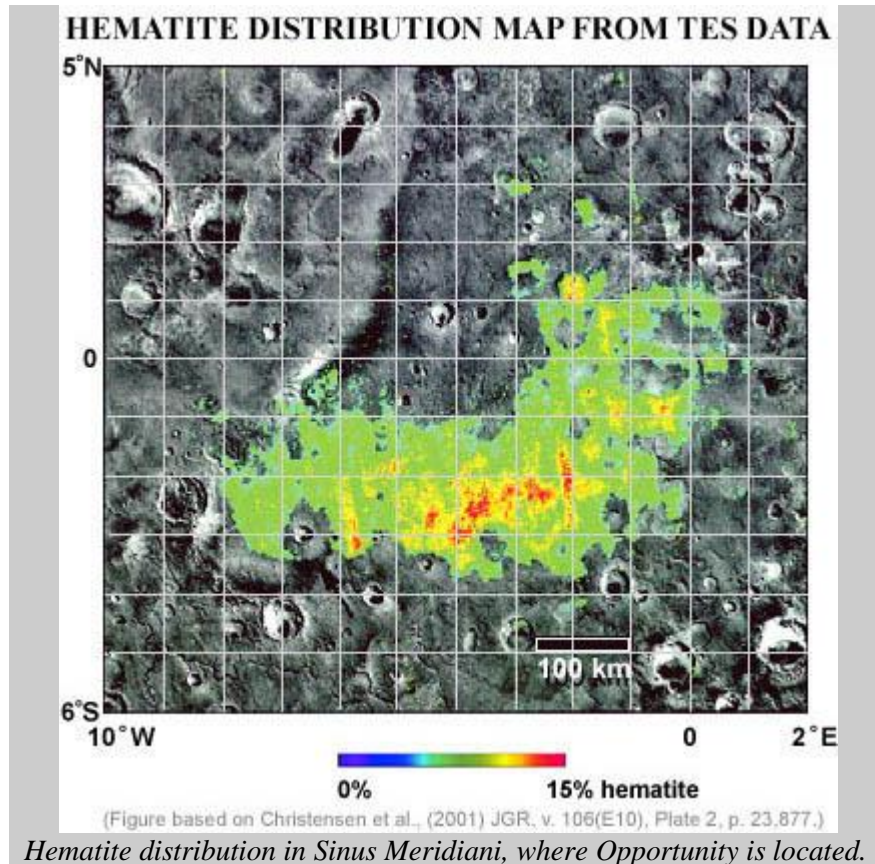
the global electric field that gave rise to the lightning. The stubby orthogonal ridges are the result of the corona discharges feeding the main lightning channels. The entire area then seems to have been electrostatically "cleaned" or etched free of loose soil, exposing the ridges of metamorphosed rock. Since the electric field was predominantly horizontal, the pattern shows the usual disregard for topography. The pattern can be traced down into the crater, up across the central peak and out the other side.

Returning to the Mars Rover, Opportunity, we can see that it is sitting in a small electrically etched crater and the exposed 'bedrock' will be layered and show signs of modification by an electric arc. The vertical faces of some of the exposed rocks look as if they were cut. The kinds of things to watch for are pitting, surface glassification or a burnt appearance, damage caused by the explosive release of trapped gases, shock metamorphism, and isotopic and elemental anomalies. A few of these characteristics can also be produced by an impact explosion. However, these rocks are layered, not shattered. One thing to look for, if shocked crystals are found and their orientation determined, is the direction from which the blast originated. Electrical cratering has a blast center that moves below ground and around the crater's center. An impact has a stationary blast center above ground that coincides with the crater's center. An example on Earth of shocked minerals oriented to a subterranean moving blast center can be found in the giant Vredefort Dome structure in South Africa.

The report continues:

The rover will look at the fine soil nearby, in hopes of finding out why this particular region is rare on Mars in being rich with iron-oxides. The surface soil's top layer is grey, much more grey than anything seen on Mars before. On the surface, Meridiani is the darkest color yet visited. But this dark layer gave way when the airbags were retracted revealing a deep maroon layer underneath. Steve Squyres [principal investigator for rover science] described the competing theories as either "we have soil with two distinct components of coarse, grey grains on top of fine red soil—or we have aggregates that are grey but when squished, the red comes out."

Since orbital images of the landing area shows three distinct color gradations, a first guess is that once outside this crater, the view will suddenly change to what is expected to be lighter colored soil. The brightest areas seen orbitally are the crater rims, followed by the flat plains, then the darkest interior to the craters, where Opportunity now is snapping charcoal-grey scenery. Since the horizon's range is mainly restricted to 10 meters for now, once outside this crater the startling picture of a dark grey Mars will likely change yet again.



Comment: Researchers think the hematite could have formed on Mars by thermal oxidation of iron-rich volcanic eruptive products during eruption or it could have formed by chemical precipitation when iron-rich water circulated through the pre-existing layers of volcanic ash. No volcano has been identified as a possible source and the pattern does not look like wind-blown fallout. And why is hematite concentrated in this one small region on Mars?

The Nobel nominee, the late Prof. Louis Kervran, had heretical views on the low-energy transmutation of common elements to form anomalous mineral deposits. He wrote:

"There is no need to look for iron's origin in the centre of our planet; it is a "surface formation" at the level of the earth's crust. There is no connection between the core and the mineral strata; but all the classical theories speak of "concentration," of water-borne materials, of hydrothermal eruptions and of deposits. Even if all of this is accepted, these theories presuppose the existence of iron accumulated in certain locations. Therefore the iron existed but where did it come from?"

Without necessarily subscribing to Kervran's ideas about the origin of the earthly iron deposits, powerful electric discharges through other common elements, like carbon and oxygen, can form iron deposits.

"On the surface, and often at a certain depth, superficial alterations have transformed the carbonate into a pure hematite, a formation difficult to explain since a mere ordinary and superficial alteration should give limonite [hydrated iron oxides] and not hematite."

[F. Blondel. Chronique des Mines Coloniales, Sept. 1955.]

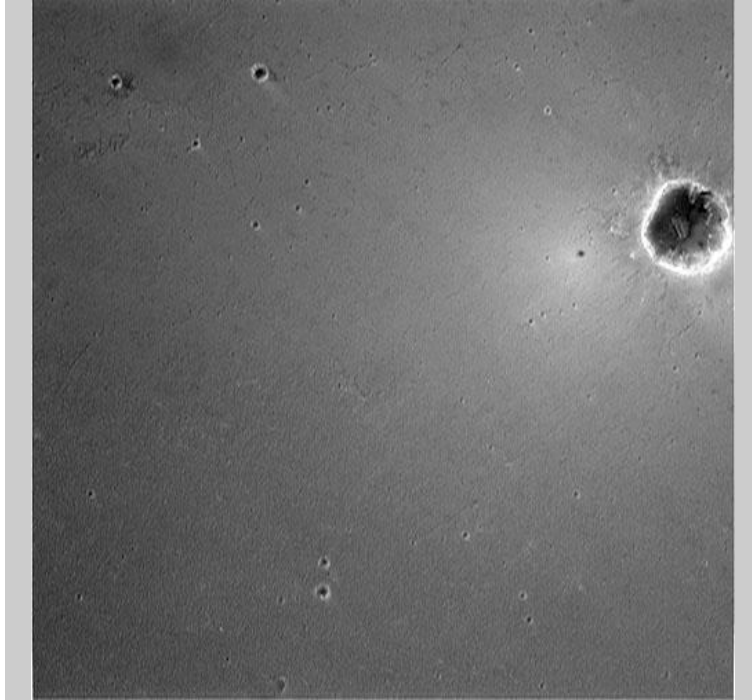
He goes on to say:

"The hematite production on the surface is not well-clarified."

I suggest that water played no part in the Martian hematite deposition. The splash of iron oxides on this part of Mars is best explained as a recent exogenous deposit. It is recent in the sense that the deposit seems to have buried the fields of boulders strewn across the planet by the earlier electrical event that scoured Valles Marineris. The outlines of the distribution pattern shown above conform to that of other electrically etched surfaces, notably the 'calderas' on Io. The pattern need not be related to topography as we should expect if a lake were involved.

The dark grey surface inside the small crater is probably an electrically modified version of the deep maroon soil underneath, itself a fine-grained hematite deposit. The most likely modification would be physical, in some form of melting and glassification of the hematite. That effect was seen by Apollo astronauts in the soil and centers of small craters on the Moon. Next would be a heat induced chemical change, possibly to metallic iron. It is also possible for surface ion implantation to occur, with hydrogen being the most likely atomic addition. Or it may show evidence of nuclear transmutations – after the manner of Kervran. The combination of possibilities allowed in the electrical scenario is so diverse that it is difficult to predict precisely what will be found. However, it is probable that the surface has undergone a change from the soil beneath requiring a source of energy not to be found today on Mars.

On descent, a crater was imaged near Opportunity's landing site. It shows clearly the dark crater floor and lighter surrounding surface. Squyres said the science team *"looks to 'head for the big one' – a 150 meter wide crater, probably 10-15 meters deep at least and about half-a-mile away. The bright rim of that crater may well be another remnant of bedrock or something different altogether."*



Descent image (DIMES) of the 150 m wide crater likely to be an important science target. Credit: NASA/JPL/EDL Team

The larger crater should show more evident signs of electrical activity than the modest crater Opportunity finds itself in. The heretics welcome Opportunity and wish it success!

"Thus the task is, not so much to see what no one has yet seen; but to think what nobody has thought, about that which everybody sees."

- Erwin Schrödinger (1887-1961)

Wal Thornhill

Black Holes Tear Logic Apart

Posted on [March 7, 2004](#) by [Wal Thornhill](#)

"It seems that every practitioner of physics has had to wonder at some point why mathematics and physics have come to be so closely entwined. Opinions vary on the answer. ..Bertrand Russell acknowledged.."Physics is mathematical not because we know so much about the physical world, but because we know so little." ..Mathematics may be indispensable to physics, but it obviously does not constitute physics."

– Etienne Klein & Marc Lachièze-Rey, *THE QUEST FOR UNITY – The Adventure of Physics.*

News reports about black holes seem to arrive about one per week. The claims are usually as outrageous as the concept of a black hole itself. Yet astronomers believe that a supermassive black hole exists at the center of every galaxy in the universe. In the BBC news report below it is headlined that a "huge black hole tears apart star." Another [report](#) just out claims that black holes are "stringy fuzzballs."

It is not a star but common sense that is being torn apart. Black holes are not 'stringy' or 'fuzzy.' They are a mathematical figment. They don't exist. There was no need to invent them if the electrical nature of matter and the universe had been considered. The 'black hole' concept is a classic example of the malaise afflicting modern physics. Mathematicians dominate the discipline. And it is a common mistake to assume that to be very clever at mathematics is to somehow be a genius across the board. One past expert on Special Relativity took a very different view:

"It is usually taken for granted that the processes of mathematics are identical with the processes of reasoning, whereas they are quite different. The mathematician is more akin to a spider than to a civil engineer, to a chess player than to one endowed with exceptional critical power. The faculty by which a chess expert intuitively sees the possibilities that lie in a particular configuration of pieces on the board is paralleled by that which shows the mathematician the much more general possibilities latent in an array of symbols. He proceeds automatically and faultlessly to bring them to light, but his subsequent correlation of his symbols with facts of experience, which has nothing to do with his special gift, is anything but faultless, and is only too often of the same nature as Lewis Carroll's correlation of his pieces with the Red Knight and the White Queen – with the difference whereas Dodgson recognised the products of his imagination to be wholly fanciful, the modern mathematician imagines, and persuades others, that he is discovering the secrets of nature."

– Professor Herbert Dingle, *Science at the Crossroads* (1972).

The astrophysicist, Dingle, knew what he was talking about. He wrote the entry on Special Relativity for the Encyclopaedia Britannica for some years before he realized [the logic was flawed](#). His many attempts to find an expert who could answer his simple question without resorting to metaphysics or answering some other less awkward question convinced him of the danger we face if we continue to allow mathematical theorists to dominate physics – hence the title of his book. But the juggernaut of science sped through the crossroads, unheeding of the red lights.

There are fundamental problems facing physicists. First, the real world is a complicated place so simplifying assumptions have to be made in choosing a mathematical model. The choice is crucial for the following steps. Second, mathematical rules are applied to the symbols as a tool that may provide insights into the physical phenomenon under investigation. Third, the results must be translated back into ordinary language.

In steps one and three physicists are generally far from perfect. In the first step, the "when all you have is a hammer, everything looks like a nail" tendency is a trap. For example, Eddington applied an inappropriate model of gas behavior inside stars that allowed him to dismiss electrical effects. In the second step there is a tendency in astrophysics for the mathematics to run into infinities. A process euphemistically called "renormalization" is used to deal with this problem. But as any high school student knows, there is nothing normal about infinity. Introducing infinity into an equation, effectively dividing by zero, allows you to "prove" that $1 = 2$.

Running into infinities in mathematical models should result in questioning the appropriateness of the model and the limits of its applicability. However, astrophysicists simply plug in a measured result and carry on. But it is the last step that exposes physicists at their worst. Here, they use words or phrases, which have real meaning, in a whimsical or sloppy way when they mean something more mathematically abstruse. For example, using the word "dimension" when referring to more than the three spatial dimensions, as if a ruler can also be used to measure the extra dimensions. It gives rise to terms like four-dimensional "warped space" and "space-time," or sometimes that weird cloth, the "fabric of space-time." We also have the logically indefensible "parallel universe." None make physical or logical sense.

The black hole is a choice example where all three steps have failed. In the first step, gravity is the only tool considered. For example, from a graduate textbook on astrophysics*: "No known physical force can stop the self-swallowing of mass that makes a black hole." That is a model-dependent declaration. The force of gravity is effectively zero when compared to the electric force. If you allow for the electrical structure of matter, the almost 2,000 fold difference in mass of the electron and proton will ensure that in a strong gravitational field charge separation will operate to prevent compression. Charge separation prevents the collapse of stars. Exotic theoretical objects like neutron stars and black holes are impossible. Even internal nuclear fires are unnecessary to sustain a star. The standard model of stars fails if the wrong tool, gravity, is used exclusively.

In the second step, one infinity is used to counter another. Infinities abound in the literature on black holes. The infinitely weak force of gravity is balanced by postulating an almost infinitely dense object – the black hole. Playing with infinities like this can give you any result you desire. It sidesteps the fact that we do not understand the real nature of gravity, or the relationship between mass and matter, or the electrical response of matter to gravity, or the electrical nature of the universe. That's a great deal of ignorance to be swallowed up, even by a hypothetical black hole!

The third step involves the language describing black holes. All four of the examples given earlier are used when referring to black holes. For example, the textbook goes on:

"A black hole is a region of spacetime in which gravity is so strong that nothing, not even light, can escape it."

The phrase, "region of spacetime" is physically meaningless and results from a confused use of the word "time" and a nonsensical notion that gravity is a property of empty space instead of matter.

But most damning is that the narrow training of astrophysicists does not allow them to "see" the powerful electric discharge effects at the centers of galaxies. The x-rays, gamma rays, jets and radio lobes cry out for an electrical model. By simply invoking the electrical force, which is a thousand trillion trillion trillion times stronger than gravity, we can return to the realm of normal objects, normal physics, and common sense electrical engineering. The gravitational black hole model is fictional and worthless.

Without the checks and balances of experiment and direct observation of black holes, astrophysicists long ago slipped their leash. As exhibit, this [recent story from BBC News](#):

Huge black hole tears apart star

Published:

2004/02/18

Astronomers claim they have observed a super-massive black hole ripping apart a star and consuming part of it.



The findings are the best evidence yet of the theory, say astronomers.

Comment: There is no way that astronomers can claim to "have observed a super-massive black hole," far less "ripping apart a star and consuming part of it." As we shall see, all they have observed is a burst of x-rays from the center of a galaxy.

Scientists think the doomed star drifted too close to the giant hole and gradually fell under the influence of its enormous gravity. The tidal forces of the black hole pulled on the star, stretching it until it broke up. The black hole then swallowed some of the matter left behind, causing a flare of X-rays that was detected on Earth.

Comment: This fabricated account relies on the model astronomers have chosen initially. If that choice is wrong all conjectures based on that model will be worthless. If something else is causing the X-ray burst, the whole theoretical edifice comes crashing down.

The phenomenon has long been predicted by theory and similar X-ray spikes have been seen before.

Comment: In this case, prior prediction does not help prove whether this particular theoretical model is correct because alternatives have not been considered and a means of falsifying the theory established. Many astrophysical models are practically unfalsifiable, and therefore worthless, because they are capable of being adapted to fit each 'surprising' new discovery.

'Brilliant flare'

But astronomers claim the new data, from the European Space Agency's XMM-Newton observatory and Nasa's Chandra X-ray observatory, is the best evidence yet that these events do happen.

Comment: Such evidence would not stand up in a court because no limits are placed on the black hole model as a source of gravitational energy. It is like a theoretical spring that

can be stretched to infinity without breaking. A theory that can ignore practical limits is fundamentally flawed.

The X-ray outburst is one of the most extreme ever detected and was caused by gas from the destroyed star being heated to millions of degrees.

Comment: Here is a bold statement of fact that is entirely model dependent. Using gravity to heat gas is the most unlikely method imaginable to produce X-rays. We use almost infinitely more efficient electric power to do it. And Nature is not known for being inefficient.

The black hole is at the centre of a galaxy known as RX J1242-11 and is estimated to have a mass about 100 million times that of the Sun. RX J1242-11 is an estimated 700 million light-years away from Earth. "This unlucky star just wandered into the wrong neighbourhood," said Dr Stefanie Komossa, of the Max Planck Institute in Germany.

Comment: This is where the theorists overstep the mark by translating their theoretical model into real objects (one of them 100 million times more massive than the Sun!! That's really stretching that spring!!) and discussing imagined events as if they actually took place.

"The centre of the galaxy flared up in a brilliant burst of X-rays thousands of times brighter than all of the billions of stars of this galaxy taken together."

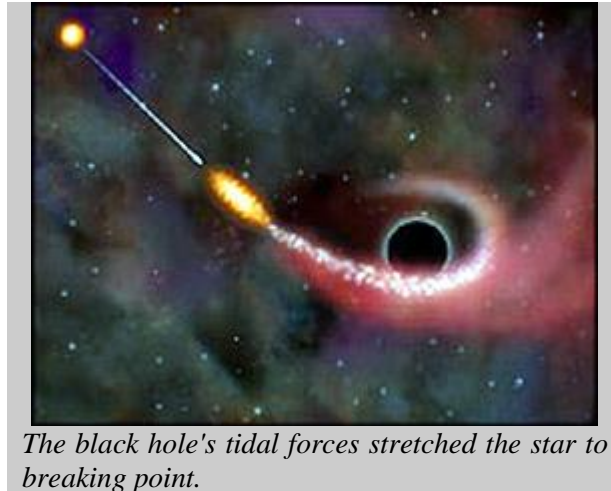
Comment: This is the only factual statement in the entire news release.

Dr Komossa said the emission's wide spread of energy was characteristic of matter very close to a black hole.

Comment: This language is misleading. It gives the impression that "matter very close to a black hole" has been observed directly or there is no other way that the spread of X-ray energy could be achieved. A "characteristic" of something is the "aggregate of qualities that distinguish it from others." But no "others" have been considered. More important information would be other qualities of the emission that don't quite fit the model. Scientists are prone to ignore disconfirming evidence or, if the evidence cannot be ignored, to continually fiddle with the model rather than re-examine all of the assumptions underpinning their model.

"The gravity of that black hole is strong enough to swing around the stars in the centre and in the vicinity up to speeds of several thousands of kilometres per second," Professor Guenther Hasinger, also of the Max Planck Institute, told a news conference in Washington DC, US. It is estimated that about one-hundredth of the mass of the star was ultimately consumed by the black hole.

Comment: These descriptions of the extreme behavior expected in the gravitational model should be viewed in the context of the inability of theorists to explain the motion of stars in a spiral galaxy using Newtonian theory without conjuring up invisible matter placed where needed in order to save the model. Modern astronomy has the reek of Ptolemaic epicycles about it.



This small amount is consistent with predictions that the momentum and energy of the process by which the star is consumed would fling most of the star's gas away from the black hole.

Comment: A major adjustment of the black hole model was required to explain how matter could be flung out in polar jets at near light speed from an object from which there was supposed to be no escape. As usual, magnetism was called upon to rescue the gravitational model. No mention was made about the electric currents required to produce the magnetic fields.

One puzzle was how the jets can maintain their narrow trajectory over a million light years. The Chandra x-ray astronomy website offers this:

"The best bet at this point is that a tightly coiled magnetic field is spun out with the particles. One team of scientists exploring this line of reasoning has concluded that black holes may be the primary source of magnetic energy in the universe. This could be highly significant because, as is known from observations of solar flares, magnetic energy can readily change into other forms of energy."

It is quite strange to witness this blind-spot that does not allow astrophysicists to see that magnetism is a secondary effect of electric current, and not a primary cause. The most simple method of creating a filamentary, glowing jet in plasma is to cause an electric discharge through it. Novelty store plasma balls show the effect clearly. Plasma physicists note that plasma filamentation is known to occur over at least 14 orders of magnitude of current, from microamperes to multi-megaamperes.

"Every galaxy contains a black hole, and there are millions or billions of galaxies. In principle, we are expecting these events to happen all the time," said Professor Hasinger.

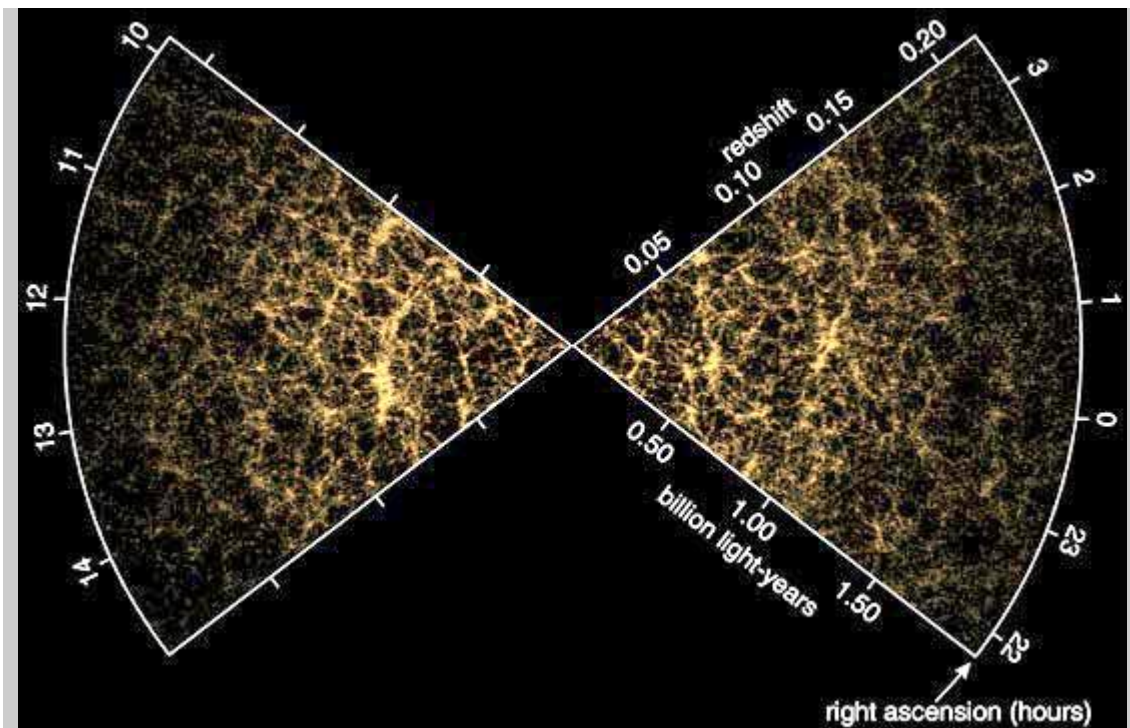
Comment: A final confident statement with no qualifications:

"Every galaxy contains a black hole."

A fanciful model is made fact by fiat.

The Plasma Gun at Galactic Centers

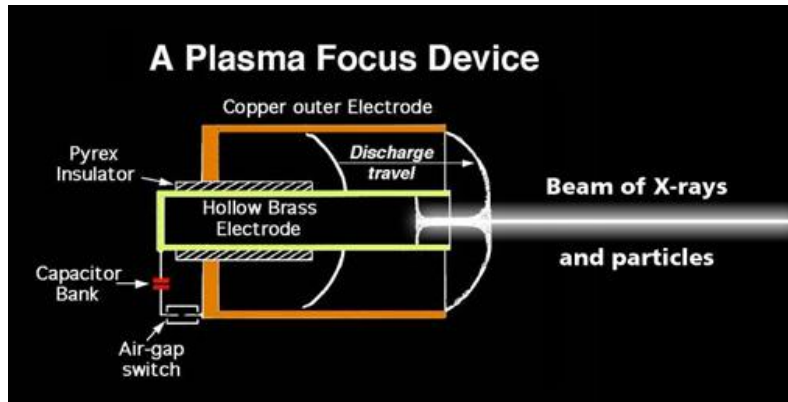
While astrophysicists have left the real universe for metaphysics, we must turn to practical engineers for some answers. The prestigious Institute of Electrical and Electronics Engineers (IEEE) has recognized the subject of plasma cosmology for some years. Plasma cosmology has no problem explaining the ubiquitous spiral shape of galaxies and reproducing it in the plasma laboratory. All that is required to produce the phenomenon is electrical power. Galaxies are threaded like pinwheels on invisible cosmic threads of electric current. Those cosmic threads are fundamental to the web-like appearance of the visible universe.



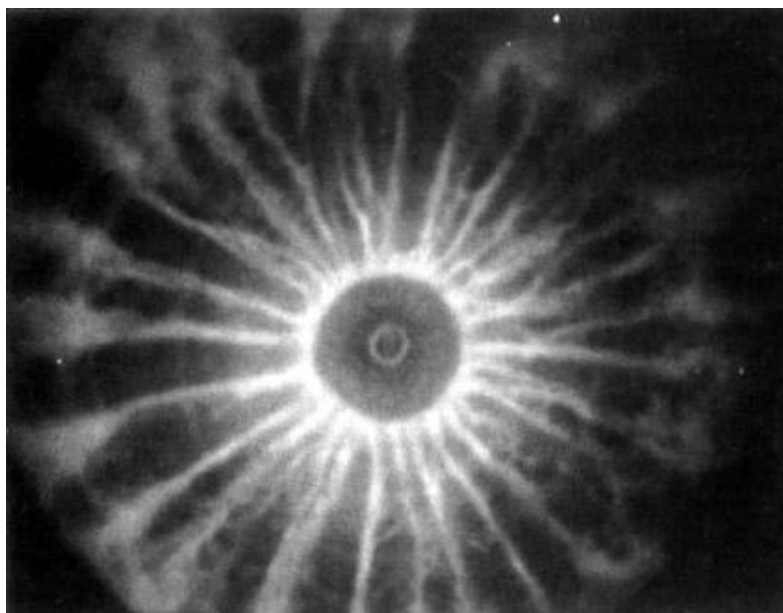
Survey of the nearby universe maps the distribution of about 75,000 galaxies (small orange dots). The Earth is located at the intersection of the two wedges. The galaxies clearly trace a network of filamentary structures. Image courtesy of the 2dF Galaxy Redshift Survey team.

Although operating in "dark current" mode in deep space, the presence of cosmic (Birkeland) currents is demonstrated by their magnetic fields. A galaxy like ours is effectively a giant homopolar motor, with current flowing along the spiral arms toward the galactic center and then out along the polar axis.

There is a simple device known as a dense plasma focus, or "plasma gun," that mimics what is going on in active galactic nuclei, or AGN's. It shows what happens when converging current streams along the galactic arms are focussed into a very small volume at the galactic center.

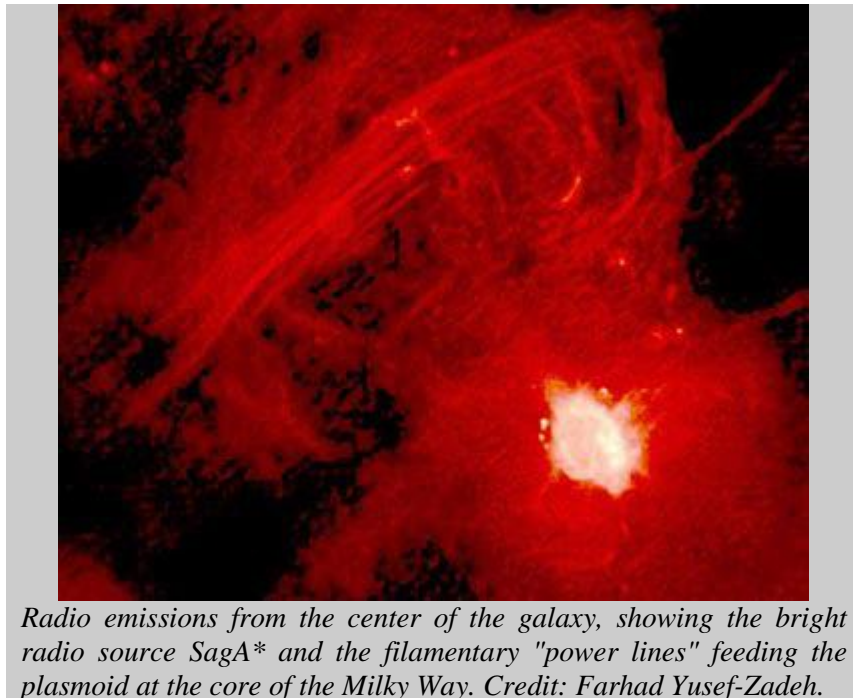


The dense plasma focus, first invented in 1954, consists of two coaxial cylindrical electrodes usually less than 30 cm in all dimensions in a gas-filled vacuum chamber connected to a capacitor bank. It is capable of producing high-energy X-ray and gamma-ray radiation and intense beams of electrons and ions, as well as abundant fusion reactions. In operation, the capacitors discharge in a several-microsecond pulse, the gas is ionized and a current sheath, consisting of pinched current filaments, forms and runs down the electrodes.



The radial, pinched current filaments can be seen here as we look down the barrel of the dense plasma focus.

When the sheath reaches the end of the inner electrode (the anode), the filaments pinch together, forming a dense, magnetically-confined, hot spot or plasmoid. The plasmoid emits soft X-rays with energy in the range of several kiloelectron volts. X-ray pinhole images have demonstrated that the plasmoids are tiny, with radii of a few microns to tens of microns. These plasmoids emit intense beams of accelerated ions and electrons. Fusion neutrons are emitted from the device in large quantities. Simple plasma scaling laws allow us to see why it is that the source of the prodigious outpouring of energy from an active galactic center is so small.**



Radio emissions from the center of the galaxy, showing the bright radio source SagA and the filamentary "power lines" feeding the plasmoid at the core of the Milky Way. Credit: Farhad Yusef-Zadeh.*

No peculiar physics, strange matter or singularities (infinities) are involved in the plasma focus model of galactic centers. Black holes are not required. Matter in the vicinity of the galactic center is under the control of powerful electromagnetic forces. Gravitational calculations of stellar masses and motions in the galactic center are inappropriate and misleading. During the time that energy is being efficiently stored in the tiny central plasmoid, the galactic center is quiescent. Jets are only produced when the plasmoid becomes unstable. The periodic outbursts from a galactic plasmoid can briefly release more energy than all of the stars in the galaxy. Precisely the same effect is achieved in the high-energy plasma lab, like that at Los Alamos, where more instantaneous power than is available from all of the power stations on Earth can be released in a volume the size of a baked bean can. Who, in their right mind, would try to achieve a similar effect by (in effect) dropping a great mass from a great height?

The fact that the center of a galaxy is the "anode" in a galactic discharge supports the electric universe model of stars as tiny secondary anodes formed and sustained in a galactic discharge. Stars cannot simply attract all of the electrons they need to achieve electrical neutrality and then "wink out" because the entire galaxy is a part of a far greater circuit. A galaxy and its stars are continually playing "catch up" with an unknown universal power source. And just as our power stations are usually out of sight of the cities that they light up, so the universal power source seems to be beyond the visible universe.

The situation with modern cosmology raises disturbing questions about physics training and the way science is conducted today. In physics, mathematical methods are emphasized and students are almost exclusively tested on their mathematical ability. For many the subject has become sterile and abstract. Mathematical cleverness counts for more than common sense, empirical observation and historical research. The inevitable result is that we now have a cosmology that is an oxymoron – scientific creationism, and a universe that has been called "the ultimate free lunch." Tens of billions of dollars are being spent to satisfy the search for imaginary particles, objects and energies dreamt up by mathematicians. It seems the more preposterous the claim, the more chance of being heard when it comes to funding. We have unsuitably trained scientists foisting upon us the most super-expensive experiments: particle colliders to try to reproduce an imagined big bang; gravity wave telescopes, when we don't understand the first thing about gravity; and seriously misguided space experiments. **A flood of data returning from space probes is being analysed by a generation of researchers who do not comprehend what they are looking at.**

The astronomer Halton Arp summed up the situation:

"After all, to get the whole universe totally wrong in the face of clear evidence for over 75 years merits monumental embarrassment and should induce a modicum of humility."

– *What has Science Come to? – Journal of Scientific Exploration, Vol. 14, No. 3.*

The last word, from half a century ago, goes to Professor Herbert Dingle. In his Presidential Address to the Royal Astronomical Society in 1953 he said:

"No great scientific work, it is true, has been done without the free and bold use of imagination, but let its products be properly assessed before they are announced as discoveries of the order of nature. Even idle speculation may not be quite valueless if it is recognized for what it is. If the new cosmologists would observe this proviso, calling a spade a spade and not a perfect agricultural

principle, one's only cause for regret would be that such great talents were spent for so little profit.

But I am not yet convinced that facility in performing mathematical operations must inevitably deprive its possessor of the power of elementary reasoning, though the evidence against me is strong. Let our younger cosmologists forget cosmology for the space of three years – the universe is patient – it can wait, and instead read the history of science – I mean, the work of the great scientists themselves. After asking themselves what meaning it has for the work of today, let them return to cosmology and give their attention again to the great problems into which they have prematurely rushed.

I do not enjoy the task of arraigning those whose mathematical facility greatly exceeds their judgement of scientific authenticity, and who have in consequence exercised this facility on any premises that will give it scope. But one who, however unworthy, accepts the honor of presiding over one of the foremost scientific societies of the world, accepts a responsibility. The ideas to which we give publicity are accepted as genuine scientific pronouncements and as such influence the thinking of philosophers, theologians, and all who realize that in no intellectual problem, however fundamental, can scientific research now be ignored. And so when it happens we have published, in the name of science, so-called 'principles' that in origin and character are identical with the 'principles' that all celestial movements are circular and all celestial bodies immutable, it becomes my duty to point out that this is precisely the kind of celebration that science was created to displace."

– *Observatory*, 73, 42.

Wal Thornhill

* Zeilik & Smith, *Introductory Astronomy & Astrophysics*, p. 303.

** Acknowledgement to Eric J. Lerner of Lawrenceville Plasma Physics for detailed information on the dense plasma focus in his paper, "Towards Advanced-fuel Fusion: Electron, Ion Energy >100 keV in a Dense Plasma".

Mystery of Mars' Polar Spirals

Posted on [March 30, 2004](#) by [Wal Thornhill](#)

"Before each revolution, all the pegs seemed square and all the holes round. In each case, it was not until it was realized that one had to discard the whole frame of reference and seek another that answers came in a flood. ..It is not our methods nor our observations that have been wrong, but our whole attitude."

- J. Tuzo Wilson

There is an attitude in geology, a legacy of James Hutton in the 1780's and later the lawyer, Sir Charles Lyell, which says 'the present is the key to the past.' It is a complacent mantra of uniformity that allows trivial forces such as surface erosion to be extrapolated back over stupefying time spans to give the illusion that geologists understand the processes that have shaped the Earth. This attitude is now being applied to Mars. It resulted last week in a claim to have solved the mystery of the spiral patterns at that planet's poles. The real mystery is why anyone considers a simple computer model that produces spiral patterns solves the many puzzling details of the Martian polar caps. Furthermore the claim comes too late. The explanation was outlined last August on this website (see below).

The geologists' uniformitarian creed has become anachronistic. As soon as they accepted that the Earth has suffered global catastrophes in the dim past the attitude should have changed to **THE PRESENT IS NOT THE KEY TO THE PAST**. Instead it has been business as usual. After all, geology becomes very rickety when that central support is taken away. So the computer model mentioned above extrapolates a slow process back in time over millions of years. The result is trivial because no one is going to be able to verify it and it is easy to falsify.

It will be the unusual, one of a kind event that upsets such complacency. And some of the strangest reports come down from antiquity. Given the extremely short time we have been making modern scientific observations, it seems plain good sense to make use of human experience of the natural world as far into the past as we can. Such an investigation must be forensic in style and not restricted to geology or astronomy. It should rely on observation over theory. When that has been done we can perhaps have more confidence in theories about the Earth and other planets.

In December 2003, one of the most important scientific papers ever published appeared in IEEE TRANSACTIONS ON PLASMA SCIENCE, VOL. 31, NO.6. It is titled Characteristics for the Occurrence of a High-Current, Z-Pinch Aurora as Recorded in Antiquity, by Anthony L. Peratt, Fellow, IEEE.



Anthony Peratt

You may be forgiven if you missed it. Hidden behind the usual unexciting academic title is a bombshell for science. **It provides definitive evidence for the electrical nature of the Earth and the solar system.** But the biggest surprise for geologists and astronomers is that modern prehistoric humans witnessed in the heavens a cosmic scale electrical discharge involving the Earth. How can we be so certain? The author is an authority on the behavior of the most powerful electrical discharges unleashed by man. Such discharges develop instabilities (the kind of thing that has defied all attempts at producing hot fusion power). Plasma physicists know them as 'Peratt instabilities.' The importance of these Peratt instabilities for our forensic investigation is that they evolve through extremely complex and distinctive shapes. Globally, prehistoric man preserved those forms on rock in the form of petroglyphs, like still frames from a movie. The petroglyphs show a highly unusual event ' a cosmic electrical catastrophe. And because the instabilities are three dimensional, it is possible to determine their location in the sky through the perspective depicted. The discharge was polar, hence the 'aurora' in the title.

Abstract: The discovery that objects from the Neolithic or Early Bronze Age carry patterns associated with high-current Z-pinches provides a possible insight into the origin and meaning of these ancient symbols produced by man. This paper directly compares the graphical and radiation data from high-current Z-pinches to these patterns. The paper focuses primarily, but not exclusively, on petroglyphs. It is found that a great many archaic petroglyphs can be classified according to plasma stability and instability data. As the same morphological types are found worldwide, the comparisons suggest the occurrence of an intense aurora, as might be produced if the solar wind had increased between one and two orders of magnitude, millennia ago.

Peratt uses carbon dating and a recent plasma extraction dating method by Rowe and Steelman for pictographs to estimate that the intense auroras 'occurred within a time period of 10,000 BC'2,000 BC.'

Peratt's paper has ramifications far beyond plasma physics, but because it does not support the attitude adopted by other specialist fields, I predict we will not see it featured in Nature or Science anytime soon. The author sidesteps the highly contentious question about the origin of the intense auroral current by attributing it to the solar wind. But an increase in solar electrical activity by several orders of magnitude would be accompanied by an increase in solar radiation of the same order. The Earth and its prehistoric artists would have been char-grilled! The serious researcher must search for a more realistic explanation of global events.

It is known, but not widely reported, that gravity acting alone can only produce a chaotic solar system. The solar system cannot be a Newtonian clockwork. But the question of what stabilizes planetary orbits has not been asked. Meanwhile, for those who understand the ancient mythic theme of planetary gods hurling thunderbolts, we now have rock-solid human evidence that gargantuan cosmic electric discharges have occurred prehistorically between the Earth and another planet. And it is this hidden electrical nature of planets and the solar system that ensures its stability. It is hidden because plasma in space is capable of electrical shielding, provided two bodies remain far enough apart. The electric shields are given the misleading name of magnetospheres because they trap the planet's magnetic field inside too. **In extremis the electric force prevents impacts between planets, but the price is high. Interplanetary thunderbolts cause terrible electrical damage in the form of cratering; huge canyons like Valles Marineris; and raised lightning blisters like Olympus Mons. Mars is a battle-scarred planet ' as befits the ancient god of war.**

With this additional background, my statement, in [Mysterious Mars](#) (August 2003) gains firm support.

"...Mars was also depicted by the ancients as sitting within a glowing tornadic column for a period. That would explain the huge swirling erosion patterns at both of the Martian poles. It also means that the polar caps are only about 10,000 years old and probably still accommodating to Mars' 'new' environment. The puzzling difference between the northern and southern hemispheres of Mars is explained simply if the north pole was the cathode in the tornadic electrical exchange. Material would then have been removed from the northern hemisphere to give the low, flat and relatively uncratered terrain found there."



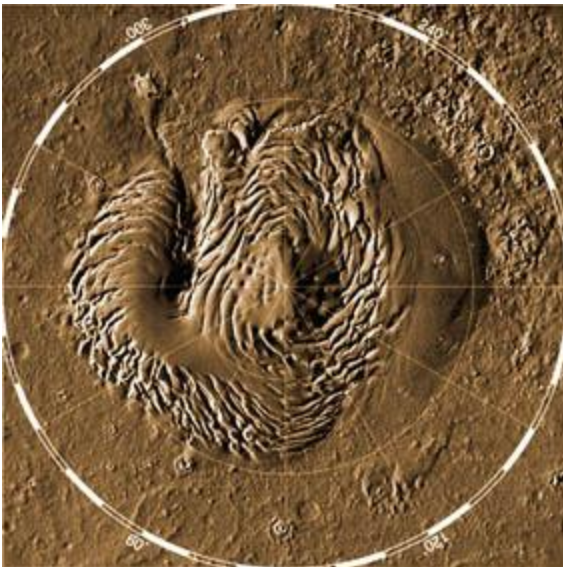
The south pole played an anode role and would have suffered deposition. It sits on top of a high altitude dome and tends to have equator-facing scarps instead of canyons. The south polar deposit (SPD) is delicately layered. An 'unexpected finding' was abundant small pits close to the bounding scarp of the SPD. Some have been neatly overlaid by the SPD. There is no sign that the bounding scarp has moved like a glacier or weathered to fill the pits. The abundant circumpolar pits in the south lack the raised rims expected of impacts. They exhibit the alignments of so-called 'secondary crater chains.' There are no such things. All linear arrangements of craters are the result of an arc moving across a surface. Both the pits beneath and the delicate layering are the kinds of things we should expect if the SPD was electrically deposited.

The SPD is quite distinct from the circum-polar sand and layered deposit at the north pole. The difference between the two polar caps is very important. Bruce Murray of Caltech wrote:

'The increasing recognition of differences between the two caps has progressively made a straightforward global alternation in aeolian deposition of suspended sediment between the two poles (driven by obliquity and eccentricity changes) a less likely explanation, though it once seemed so appealing. However a new paradigm has not yet emerged to explain the rapidly growing body of information.'

(Icarus 154, 80-97 (2001))

The differences between the north and south poles on Mars make a single geological explanation for them both unworkable.

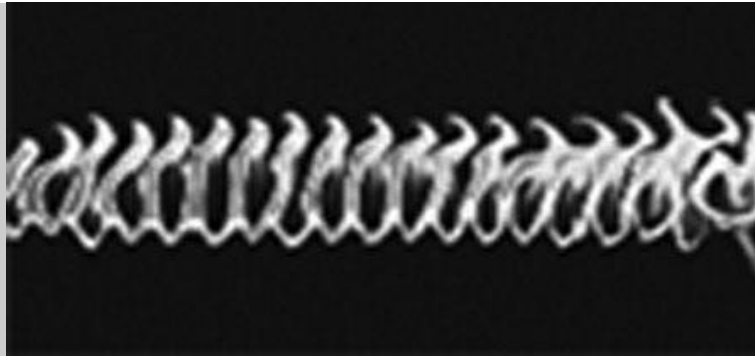


The north pole of Mars sits on top of a dome that is almost 3km above the surrounding surface but is still 2km below the average elevation at the equator. A colossal amount of material has been machined from the northern hemisphere. In effect, the polar cap is the central peak of a hemispheric-sized crater. The enigmatic grooves and 'chasma' in the polar caps are a natural consequence of travelling arcs. They have been carved up to a kilometre deep into the polar caps. Their marked difference in size is explained by differences in the power of the arc. Their tendency to a spiral form is due to the rotating Birkeland currents that form the arc.

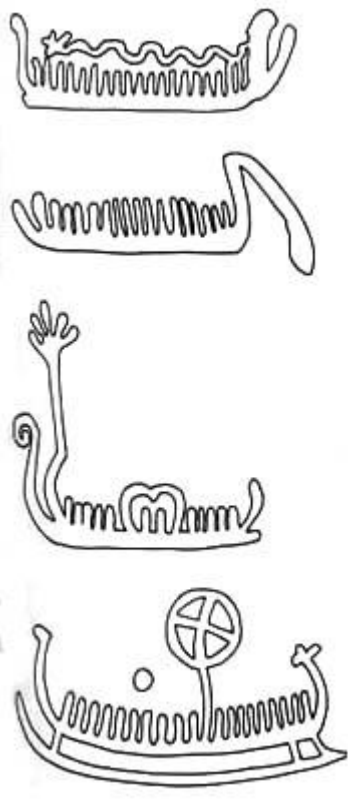
There are other examples of a spiral or corkscrew effect in craters on Mars and the Moon. Unconformities have been noted in the exposed layering of the north polar deposit (NPD). That discounts the idea that it was formed like a 'layer cake' by cyclic deposition due to some unspecified climatic oscillation effect. It is a remnant of exposed subsurface

rock like that found as peaks in the centers of most large craters. The NPD has been described as resembling cottage cheese, with a flat pitted and etched surface. As I showed in the earlier news item, such pitting and etching is characteristic of a cathode surface.

As an example of the possibilities of this interdisciplinary pattern matching approach, here are three images:



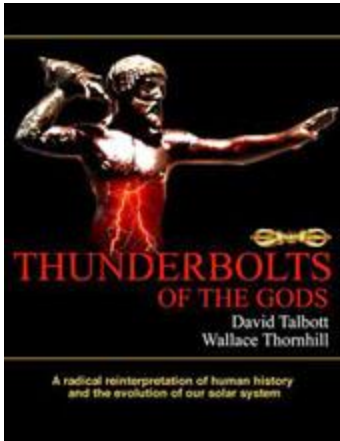
This is a "heteromac" type plasma discharge instability. Heteromacs can include filamentary, cellular, and bubble-like clusters.



These are Scandinavian petroglyphs of the "ship of heaven." You can also find examples in North America and elsewhere, even away from any water.



Here, numerous layers are seen in the south polar region. The pattern has no geological explanation but it matches closely the heteromac instability pattern.



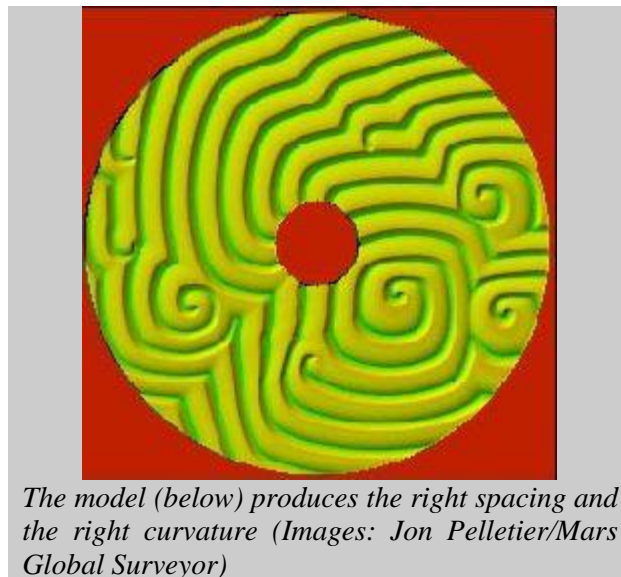
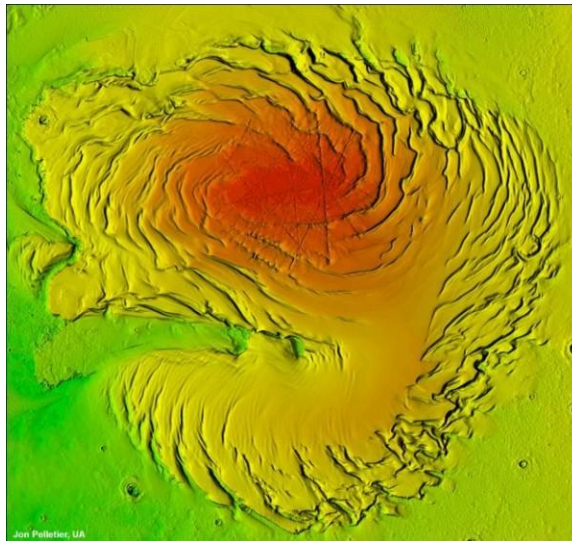
For more information see the introductory draft of the forthcoming book [THUNDERBOLTS OF THE GODS](#).

This recent [news report](#) is offered for the reader to judge who has solved the 'mystery.'

Mystery of Mars's giant icy spirals solved

18:33 26 March 04

NewScientist.com news service



The model (below) produces the right spacing and the right curvature (Images: Jon Pelletier/Mars Global Surveyor)

Giant, icy spirals found uniquely on Mars's polar caps are the result of the red planet's peculiar combination of temperature, tilt, and thin atmosphere, suggests a new computer model. The concentric whorls, hundreds of kilometres long, were first spotted by NASA's Viking spacecraft in 1976, but scientists did not know how they formed.

Now, Jon Pelletier, a geomorphologist at the University of Arizona, US, has developed a surprisingly simple model that reproduces the spiral shapes nearly perfectly. "They had the right spacing, the right curvature and the right relationship to one another," he says. "These things have always been a puzzle," says John Murray, a Mars geologist at the UK's Open University. Previous theories involving wind and shifting ice caps "don't really explain the spiral pattern", he says, but explanation provided by Pelletier's model "seems the most likely".

Freeze and thaw

The average annual temperature at the martian poles is a frosty -40 degrees Celsius, but for a few days every summer, the temperature rises enough for ice to vaporise. Pelletier's model ignores wind and shifting ice, focusing instead only on how sunlight heats and vaporises small cracks in the ice. Because Mars is tilted on its axis, the sunlight falls mostly on one side of the crack, vaporising the ice. Some of this water vapour then refreezes on the shaded side of the cracks. But the overall effect is the cracks widen and deepen over time and – crucially – migrate towards the pole, merging with one another as they go.

In his model, the cracks began as randomly distributed points that lengthened into individual spirals and a jumble of shapes. Over a simulated five million years – the same amount of time estimated for the real spirals to form on Mars – they merged into one giant spiral. The spiral arms appear to move about one kilometre per million years. "I wanted to show the model self-organises," Pelletier told *New Scientist*. "I put in something completely random and got out a system similar to what we see today."

Thin atmosphere

While the underlying physical reasons why the spirals form remain unclear, one factor that is likely to be important is the fact that temperatures decrease steadily to their lowest point at the poles, meaning less ice vaporises there. Another factor, says Pelletier, "is the cracks want to line up along the equator – they get the most solar radiation when facing that way".

And no spirals might form at all, if it was not for Mars's thin atmosphere. Very little heat gets transferred around the planet via air currents, meaning the localised melting on one side of each crack in the polar ice is the dominant mechanism. Pelletier got the idea for his model when he saw the spiral shape of a slime mould in a biology book.

Maggie McKee

Details of the computer simulations are in the April issue of the journal *Geology*.

The simulations do not include wind, which some previous studies had suggested might contribute to the spirals.

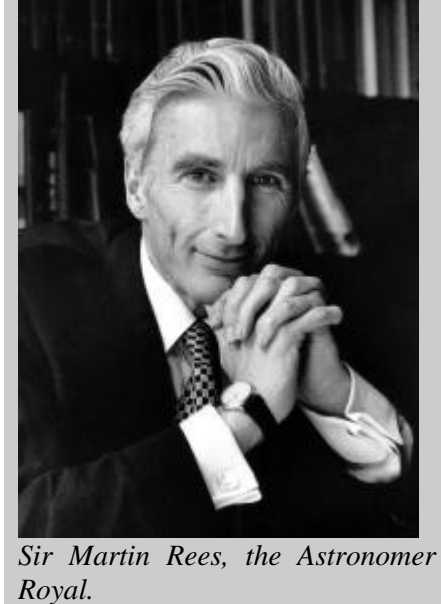
Visiting the author's website at the University of Arizona Department of Geosciences we are told that 'Landforms on Earth's surface are sculpted by flowing water in the form of rivers and glaciers and by the wind and windborne particles' and 'the focus of the group is currently in computational modelling and analysis of digital topographic data.'

In an electric universe these simplistic assumptions are hopelessly inadequate. So the computer modelling that is based upon them will be misleading or trivial. It is disturbing to see geologists adopting the physicists' fad of computer modelling. Science is becoming a 'virtual reality' computer game.

Wal Thornhill

An Open Letter to Closed Minds

Posted on [April 12, 2004](#) by [Wal Thornhill](#)



Sir Martin Rees, the Astronomer Royal.

Everything astronomers can see, stretching out to distances of 10 billion light-years, emerged from an infinitesimal speck.

- *Martin Rees, Our Cosmic Habitat (2001).*

"A widely-accepted foundation stone of scientific logic involves a process of elimination, requiring all available possibilities to be considered with incorrect ideas discarded when they fail to predict experimental results. Just as the police must consider all possible suspects during an investigation, so a scientist must, as a matter of professional responsibility and competence, consider all possible explanations when forming his conclusions. However, some scientists are able to ignore these duties, while the safeguards built into the scientific bureaucracy, supposedly to ensure quality, do not prevent such malpractice but rather enable it."

- *John Hewitt, [A Habit of Lies](#).*

The open letter exhibited here is addressed to the scientific community by a leading group of concerned scientists. It questions a core belief – the belief in the so-called big bang theory. So it will be instructive to watch the behavior of that community in response. Already, the first line of defense – censorship – has held. The journal *Nature* rejected the letter for publication. *New Scientist*, the more populist magazine, on 22 May 2004 finally published the letter under the title "Bucking the big bang." [Note: This news

item was temporarily withdrawn while waiting for publication of [the final version of the letter.](#)]

"You could write the entire history of science in the last 50 years in terms of papers rejected by Science or Nature."

– Paul C. Lauterbur, winner of the Nobel Prize for medicine, whose seminal paper on magnetic resonance imaging was originally rejected by Nature.

That scathing commentator on errant human behavior, John Ralston Saul, has compared the scientific community to the medieval church. Some of the signatories to the open letter would agree with him. We humans, at least the males it seems, have a penchant for setting up organizations – political, religious, and scientific – that with time become authoritarian, exclusive and dogmatic. Despite this we are led to believe that scientists are somehow trained to be above such human failings. The deception only succeeds because there is no effective investigative reporting of science.

A challenge to orthodoxy tends to be ignored at first. But if it gains popular support, the first move is to discredit and silence the challenger. The protectors of the scientific faith often parade the "scientific method" like a holy icon to warn off evil, heretical spirits. And the demand is made that "extraordinary claims demand extraordinary evidence." However, as Robert Matthews in the New Scientist of 13 March 2004 notes:

"Over the years, sociologists and historians have often pointed out the glaring disparity between how science is supposed to work and what really happens. While scientists routinely dismiss these qualms as anecdotal, subjective or plain incomprehensible, the suspicion that there is something wrong with the scientific process itself is well founded. The proof comes from a rigorous mathematical analysis of how evidence alters our belief in a scientific theory."

"Belief" is the crux of the matter. The usual declaration that extraordinary claims demand extraordinary evidence is merely a smokescreen for the fact that no amount of evidence will change the consensus view until a sufficient number "convert" to a belief in the new theory. **Science is therefore a political numbers game based on subjective beliefs.** Max Planck was right when he said:

"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents. What does happen is that its opponents gradually die out, and that the growing generation is familiarized with the ideas from the beginning."

Matthews continues:

"It gets worse. As the evidence accumulates, the two camps will not only fail to reach consensus but actually be driven further apart – propelled by their different

views ..And worst of all, there is no prospect of such a consensus unless the two sides can agree about the cause of the data."

Such a conclusion bodes ill for any attempt to change the status quo. **Meanwhile, the big bang theory continues to make extraordinary claims based upon little or no evidence.**

An Open Letter to the Scientific Community

(Published in New Scientist, May 22, 2004)

The big bang today relies on a growing number of hypothetical entities, things that we have never observed— inflation, dark matter and dark energy are the most prominent examples. Without them, there would be a fatal contradiction between the observations made by astronomers and the predictions of the big bang theory. In no other field of physics would this continual recourse to new hypothetical objects be accepted as a way of bridging the gap between theory and observation. It would, at the least, raise serious questions about the validity of the underlying theory.

But the big bang theory can't survive without these fudge factors. Without the hypothetical inflation field, the big bang does not predict the smooth, isotropic cosmic background radiation that is observed, because there would be no way for parts of the universe that are now more than a few degrees away in the sky to come to the same temperature and thus emit the same amount of microwave radiation.

Without some kind of dark matter, unlike any that we have observed on Earth despite 20 years of experiments, big-bang theory makes contradictory predictions for the density of matter in the universe. Inflation requires a density 20 times larger than that implied by big bang nucleosynthesis, the theory's explanation of the origin of the light elements. And without dark energy, the theory predicts that the universe is only about 8 billion years old, which is billions of years younger than the age of many stars in our galaxy.

What is more, the big bang theory can boast of no quantitative predictions that have subsequently been validated by observation. The successes claimed by the theory's supporters consist of its ability to retrospectively fit observations with a steadily increasing array of adjustable parameters, just as the old Earth-centred cosmology of Ptolemy needed layer upon layer of epicycles.

Yet the big bang is not the only framework available for understanding the history of the universe. Plasma cosmology and the steady-state model both hypothesise an evolving universe without beginning or end. These and other alternative

approaches can also explain the basic phenomena of the cosmos, including the abundances of light elements, the generation of large-scale structure, the cosmic background radiation, and how the redshift of far-away galaxies increases with distance. They have even predicted new phenomena that were subsequently observed, something the big bang has failed to do.

Supporters of the big bang theory may retort that these theories do not explain every cosmological observation. But that is scarcely surprising, as their development has been severely hampered by a complete lack of funding. Indeed, such questions and alternatives cannot even now be freely discussed and examined. An open exchange of ideas is lacking in most mainstream conferences. Whereas Richard Feynman could say that "science is the culture of doubt", in cosmology today doubt and dissent are not tolerated, and young scientists learn to remain silent if they have something negative to say about the standard big bang model. Those who doubt the big bang fear that saying so will cost them their funding.

Even observations are now interpreted through this biased filter, judged right or wrong depending on whether or not they support the big bang. So discordant data on red shifts, lithium and helium abundances, and galaxy distribution, among other topics, are ignored or ridiculed. This reflects a growing dogmatic mindset that is alien to the spirit of free scientific enquiry.

Today, virtually all financial and experimental resources in cosmology are devoted to big bang studies. Funding comes from only a few sources, and all the peer-review committees that control them are dominated by supporters of the big bang. As a result, the dominance of the big bang within the field has become self-sustaining, irrespective of the scientific validity of the theory.

Giving support only to projects within the big bang framework undermines a fundamental element of the scientific method — the constant testing of theory against observation. Such a restriction makes unbiased discussion and research impossible. To redress this, we urge those agencies that fund work in cosmology to set aside a significant fraction of their funding for investigations into alternative theories and observational contradictions of the big bang. To avoid bias, the peer review committee that allocates such funds could be composed of astronomers and physicists from outside the field of cosmology.

Allocating funding to investigations into the big bang's validity, and its alternatives, would allow the scientific process to determine our most accurate model of the history of the universe.

*Initial signers:
(Institutions for identification only)*

Halton Arp, Max-Planck-Institute Fur Astrophysik (Germany)
Andre Koch Torres Assis, State University of Campinas (Brazil)
Yuri Baryshev, Astronomical Institute, St. Petersburg State University (Russia)
Ari Brynjolfsson, Applied Radiation Industries (USA)
Hermann Bondi, Churchill College, Cambridge (UK)
Timothy Eastman, Plasmas International (USA)
Chuck Gallo, Superconix, Inc.(USA)
Thomas Gold, Cornell University (emeritus) (USA)
Amitabha Ghosh, Indian Institute of Technology, Kanpur (India)
Walter J. Heikkila, University of Texas at Dallas (USA)
Michael Ibison, Institute for Advanced Studies at Austin (USA)
Thomas Jarboe, Washington University (USA)
Jerry W. Jensen, ATK Propulsion (USA)
Menas Kafatos, George Mason University (USA)
Eric J. Lerner, Lawrenceville Plasma Physics (USA)
Paul Marmet, Herzberg Institute of Astrophysics(retired) (Canada)
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Anthony L. Peratt, Los Alamos National Laboratory (USA)
Bill Peter, BAE Systems Advanced Technologies (USA)
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Malabika Roy, George Mason University (USA)
Sisir Roy, George Mason University (USA)
Konrad Rudnicki, Jagiellonian University (Poland)
Domingos S.L. Soares, Federal University of Minas Gerais (Brazil)
John L. West, Jet Propulsion Laboratory, California Institute of Technology (USA)
James F. Woodward, California State University, Fullerton (USA)

What is the Real Problem with Cosmology?

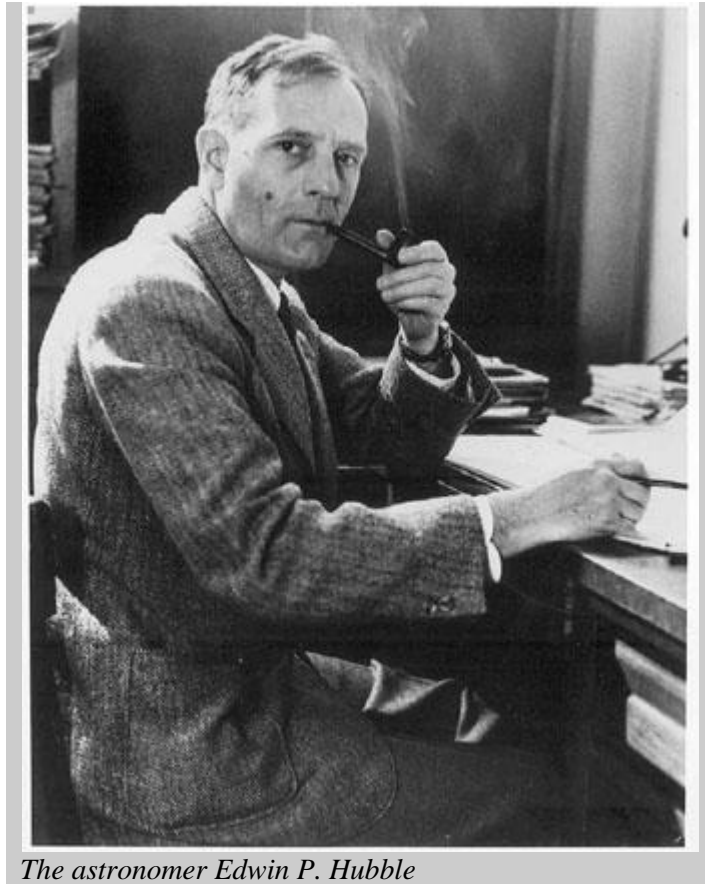
The sentiments expressed in the open letter are welcome. However, I don't think it will result in any change. The proposal that "the peer review committee that allocates such funds could be composed of astronomers and physicists from outside the field of cosmology," is a small step in the direction that science generally should be taking. However, many astronomers and physicists outside the field of cosmology believe in the

big bang theory or have a vested interest in it. It would be preferable if there were a kind of jury system with educated people from engineering and the humanities as well. Any proposal that could not be explained simply to such an audience would demonstrate that the author did not understand it either. In addition, arguments against a proposal should be admissible from any quarter.

The modern problem with cosmology began with an assumption about the nature of the redshift in the spectrum of faint extragalactic objects, discovered by Edwin Hubble. Hubble wrote:

"If the redshifts are a Doppler shift ... the observations as they stand lead to the anomaly of a closed universe, curiously small and dense, and, it may be added, suspiciously young. On the other hand, if redshifts are not Doppler effects, these anomalies disappear and the region observed appears as a small, homogeneous, but insignificant portion of a universe extended indefinitely both in space and time."

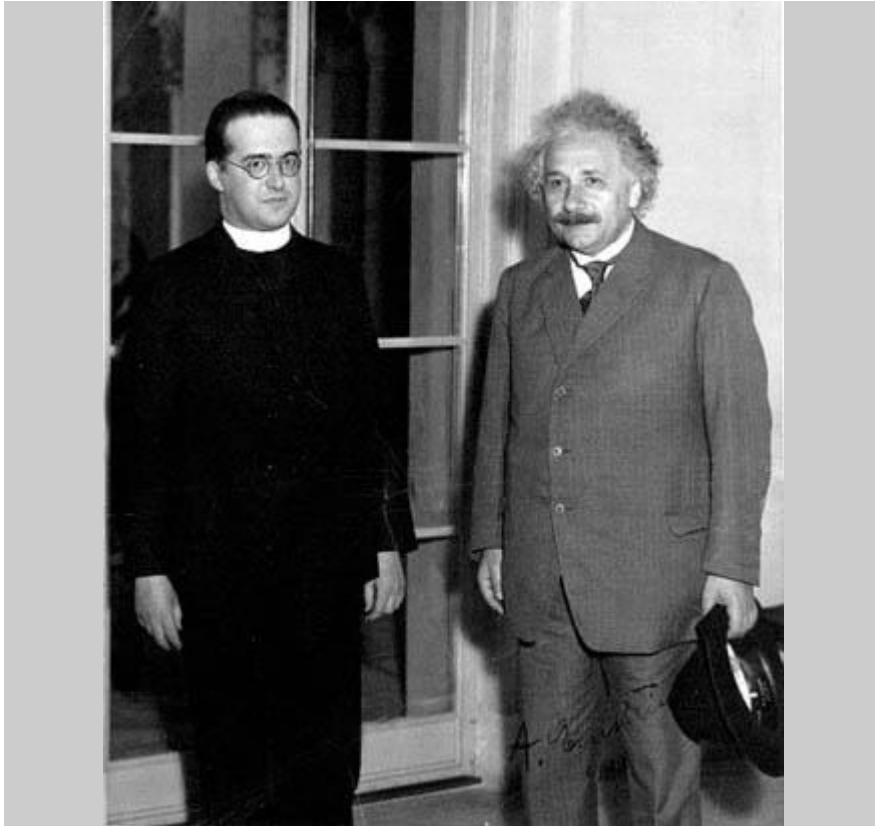
(Royal Astronomical Society Monthly Notices, 17, 506, 1937).



The astronomer Edwin P. Hubble

Hubble's logical scientific attitude toward the phenomenon of extragalactic redshift is in stark contrast to the illogical and nonsensical opening quotation from the Astronomer

Royal. The big bang theory sprang from a theoretical preference for Hubble's first possibility. Hubble's brilliant student, Halton Arp, later confirmed that the second possibility was correct. But by then the big bang theory had become dogma. Arp was effectively "excommunicated" for his heresy.



Abbé Georges Lemaitre, astrophysicist and a monsignor in the Catholic church, with Einstein in 1933.

The medieval church of science now has its own miraculous version of creation, partly because the astronomer who first proposed the Big Bang, Georges Lemaitre, wanted to reconcile the creation of the universe to Genesis. It is reported that after the Belgian detailed his theory, Einstein stood up, applauded, and said, "This is the most beautiful and satisfactory explanation of creation to which I have ever listened." But the great surrealist artist, Salvador Dali, has effectively parodied Einstein's appreciation of aesthetics. Einstein also said, "When I examined myself and my methods of thought, I came to the conclusion that the gift of fantasy has meant more to me than my talent for absorbing positive knowledge." Is it any wonder that big bang cosmology is a fantasy?

Modern astronomers have never understood what the ancients meant when they talked about "creation." It is clear from comparative religion that creation stories are NOT about the origin of the universe. In fact, our modern view of the concept of "creation" would be incomprehensible to the authors of the religious texts. What they were memorializing was the "re-creation" of a new cosmic order in the skies following apocalyptic chaos.



We have stared annihilation from heaven in the face and it has deeply scarred us. It fuels our irrational fear of comets and imagined impacts from space. It colors our cosmology as we desperately seek to understand the cosmos in reassuring terms.

So my misgivings about cosmology run much deeper than the theories written in scientific journals. My concern is with human fallibility in observing and interpreting the cosmos. I consider that the human psyche and therefore our cosmological beliefs are deeply affected by the past, which science has chosen not to recognize. It is a past of cosmic catastrophe. Recent genetic research has shown that the entire human race "*may have been in such a precarious position that only a few thousand of us may have been alive on the whole face of the Earth at one point in time, that we almost went extinct, that some event was so catastrophic as to nearly cause our species to cease to exist completely.*" It is therefore not surprising that ALL religious symbolism relates back to the heavens, the home of the capricious gods of chaos.



This could help explain the tendency for cosmologists to be drawn into a theory that has much in common with the biblical creation story and little to do with science. Ironically, if astronomers took the time to understand the earliest information we have about the heavens we would be closer to seeing the universe clearly for the first time. Observation and experience should come first, not theory. Until we understand our own planet's history and that of our solar system a lot better we cannot hope to chart the history of the universe. And that, necessarily, will require a wider perspective than the current tunnel vision predominating in astronomy and physics. But first we must understand ourselves.

Electric Dust Devils

Posted on [April 25, 2004](#) by [Wal Thornhill](#)

"...it may sometimes be that not to know one thing that is wrong could be more important than knowing a hundred things that are right.

– Halton Arp, Quasars, Redshifts & Controversies

The electrical character of dust devils and tornadoes is rarely mentioned. In fact, researchers only recently began to examine the electrical nature of dust devils in an effort to understand what is happening on Mars. Mysteries still surround electrical activity in our atmosphere. For example, the Earth has a vertical electric field, in the order of 100 volts per meter in dry air, whose origin is unknown. And scientists do not know what causes the most obvious electrical phenomenon in the atmosphere – lightning. See '[The Balloon goes up over lightning!](#)' for a discussion of the Electric Universe model of lightning.

However, last week saw another success for the Electric Universe model. It's now official that dust devils on Earth exhibit strong electric fields, in excess of 4,000 volts per meter. They generate magnetic fields as well. The researchers who made the discovery added the qualification "on Earth" because the discovery was a surprise. They cannot be certain that it applies to the dust devils on Mars because their purely mechanical model did not predict the electrical effects found in earthly dust devils. However the tentative connection was made and resulted in the following artist's impression of what an electrified Martian dust devil might look like.



The artist seems to have intuitively included a glow discharge near the base of the dust devil. Credit: University of Michigan

In July, 1999, I wrote:

"The 5 mile high dust devils on Mars and the global Martian dust storms are, I believe, a manifestation of electric discharges on Mars. In the very low atmospheric pressure lightning would be more like a diffuse auroral glow. The problem of generating dust storms on Mars is how to get the particles on the surface to 'saltate,' or leave the surface, with such little force in the wind. Electrostatic forces could easily do the job."

Several years ago, the electrical nature of dust devils and tornadoes was suggested on this website in the [Electric Universe Synopsis](#). And a fuller explanation of the electromagnetic effects of a tornadic electric discharge was presented in [Sunspot Mysteries](#). There I wrote:

"Make no mistake, the Martian dust devils are tornadoes that dwarf their earthly counterpart. It shows that clouds are not required to generate them. They are an atmospheric electric discharge phenomenon."

More recently I suggested that the Mars Exploration Rover, Spirit, which landed in a dust devil scarred area, [suffered electrical interference](#) severe enough to cause computer problems.

Now in a report from Astrobiology Magazine, Dr. William Farrell of NASA's Goddard Space Flight Center says:

'Dust devils are common on Mars, and NASA is interested in them as well as other phenomena as a possible nuisance or hazard to future human explorers.' 'If martian dust devils are highly electrified, as our research suggests, they might give rise to increased discharging or arcing in the low-pressure martian atmosphere, increased dust adhesion to space suits and equipment, and interference with radio communications.' Farrell is the lead author of the paper about this research published in the Journal of Geophysical Research.

'Two ingredients, present on both Earth and Mars, are necessary for a dust devil to form: rising air and a source of rotation,' said Dr. Nilton Renno of the University of Michigan, Ann Arbor, Mich., a member of the research team and expert in the fluid dynamics of dust devils. "Wind shear, such as a change in wind direction and speed with altitude, is the source for rotation. Stronger updrafts have the potential to produce stronger dust devils, and larger wind shear produces larger dust devils," Renno said.

Comment: In the words of Halton Arp, 'not to know one thing that is wrong could be more important than knowing a hundred things that are right.' In this case it is the confusion of cause and effect. It is simply assumed that the Earth and its environment in space is electrically neutral. Therefore some energy is required to cause charge to separate and produce the strong electric field in the dust devil. The only energy available

is solar radiation and the movement of air (fluid dynamics). However, in an electrified universe charge is already separated on the macroscopic scale and **the movement of air in a dust devil is an effect of charge recombination, not a cause of charge separation.**

Dust particles become electrified in dust devils, when they rub against each other as they are carried by the winds, transferring positive and negative electric charge the same way you build up static electricity if you shuffle across a carpet. Scientists thought there would not be a high-voltage, large-scale electric field in dust devils, because negatively charged particles would be evenly mixed with positively charged particles, so the overall electric charge in the dust devil would be in balance.

Comment: It is clear from laboratory experiments that different size dust grains can charge to opposite polarities upon collision. However, the electric force between oppositely charged grains would tend to prevent their separation. That is what scientists expected and it explains their surprise when the opposite was found. But it may not be so surprising if we stop treating a dust devil as a fluid dynamics problem and consider it instead as weakly ionized plasma subject to the Earth's vertical clear-air electric field. In such circumstances the electric field may be strongest (and the electric field reversed) at the base of the dust devil due to the formation of a plasma 'double layer' or 'virtual cathode.'

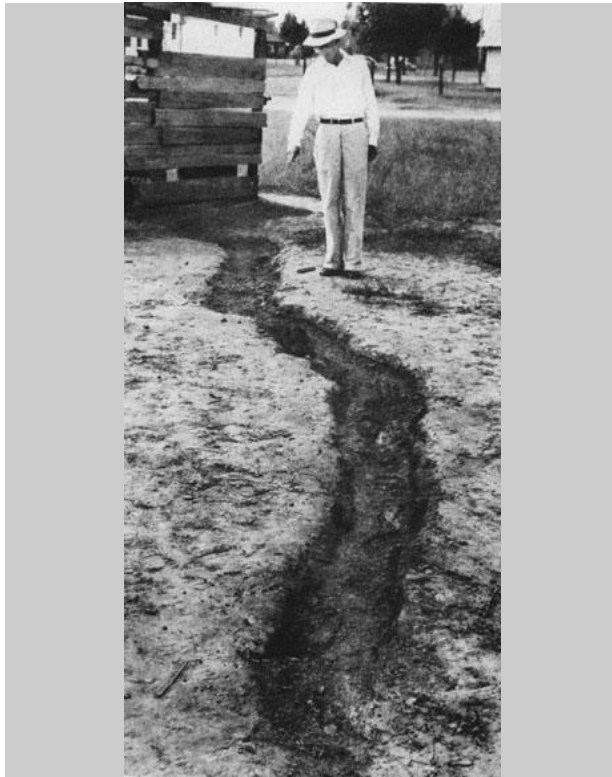
However, the team's observations indicate smaller particles become negatively charged, while larger particles become positively charged. Dust devil winds carry the small, negatively charged particles high into the air, while the heavier, positively charged particles remain near the base of the dust devil. This separation of charges produces the large-scale electric field, like the positive and negative terminals on a battery. Since the electrified particles are in motion, and a magnetic field is just the result of moving electric charges, the dust devil also generates a magnetic field.

Comment: The earth and all other bodies in the universe are not isolated and electrically inert. They are intimately connected to and influenced by the Electric Universe. This means that dust devils are not a local event, but are driven like motors by a cosmic current. Dust devils and storm clouds do not act as 'batteries' or 'dynamamos' to provide power to a global atmospheric circuit. As for the magnetic effects of a tornado or dust devil, they will be very strong because the charges are moving at meters per second instead of centimeters per hour, as happens in a current-carrying wire.

If martian dust grains have a variety of sizes and compositions, dust devils on Mars should become electrified the same way as their particles rub against each other, according to the team. Martian dust storms, which can cover the entire planet, are also expected to be strong generators of electric fields. The team hopes to measure a large dust storm on Earth and have instruments to detect atmospheric electric and magnetic fields on future Mars landers.

Comment: In the electrical model of the solar system, all planets must contrive to supply electrons to the positively charged Sun. Mercury probably does it in a similar way to our Moon, through photoelectric and cold-cathode emission. Occasionally the emission may be strong enough at certain 'hot spots' to cause the anomalous glows seen on the Moon. The next planet from the Sun, Venus, has an ionosphere entwined in current 'ropes' from the solar wind. It causes powerful 'super bolts' of lightning to fly between the planet's ionosphere and the surface. It seems the electric field at Venus' hot surface is so strong that above a certain altitude the atmosphere hugging the surface glows with a surface discharge known as St. Elmo's fire. Being dense plasma it reflected the radar signal from the Magellan Orbiter as if the mountains of Venus were plated with metal, much to the puzzlement of planetary scientists.

On Earth we have water clouds to charge up between the ionosphere and the Earth and spare us the super bolts of Venus. Although there are rare reports of 'bolts from the blue,' the Earth contrives to discharge in two stages, by lightning from ground to cloud and by glowing jets from the cloud to the ionosphere. The latter stage has only recently been recognized and the flashes given whimsical names like 'sprites,' 'elves' and 'gnomes,' which probably reflects the scientists' disbelief before they were finally acknowledged. On rare occasions, a powerful lightning bolt strikes directly from the cloud tops to Earth. Such super bolts rip electrons violently from the earth and may form small-scale furrows like those seen on all other solid bodies in the solar system.



This 40 foot rille was torn out by lightning. The more tortuous path of the narrow lightning stroke can be seen as a groove in the bottom of the trench. Credit: National Geographic, June 1950.



This is a section of a prominent lunar rille, Schröter's Valley, which also shows the tortuous path of the lightning along the floor of the wider trench.

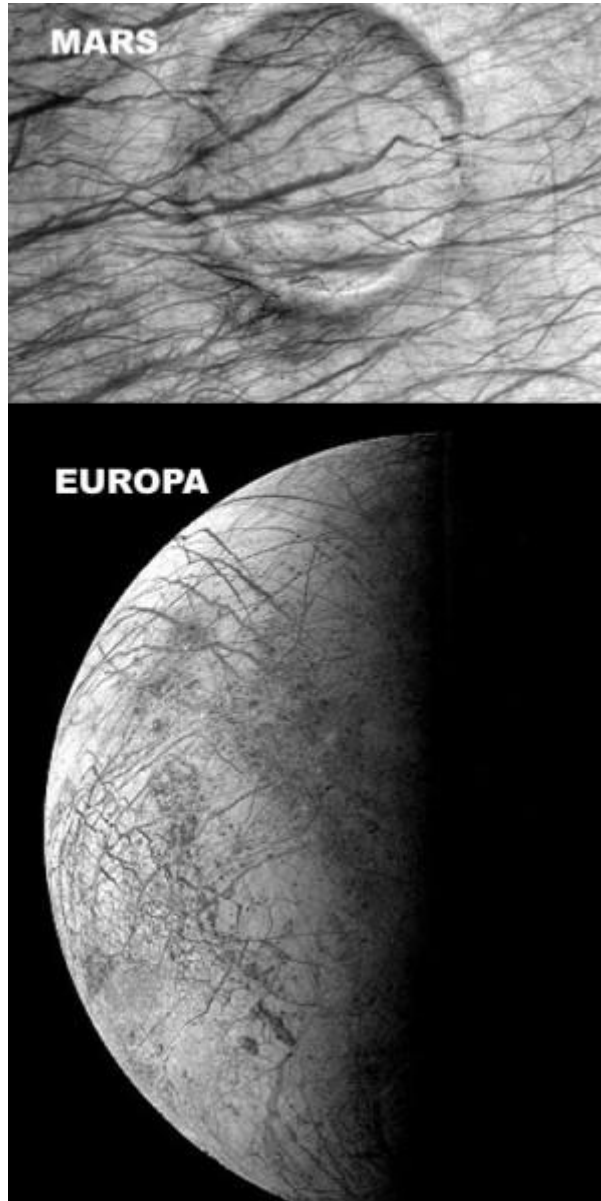
Usually the cloud to ground discharge takes the form of the multiple sparks we call lightning. However, in some parts of the world the lightning switches to the slower discharge of the tornado. Then, instead of the electric charge rushing directly between the ground and the cloud along a thin lightning channel, it is constrained by powerful electromagnetic forces to rotate in a long, thin cylinder or vortex. Measurement of the magnetic field and earth current near touchdown of a tornado shows that it is electrically equivalent to several hundred storm cells. It is this concentrated electrical power in the central vortex that creates damage far in excess of that possible for a simple wind vortex. It also explains the burnt surfaces and objects sometimes found after the passage of a tornado.

The thin dry atmosphere of Mars and the large temperature gradient near the surface is certainly conducive to the formation of dust devils. However, like the other planets, Mars has to supply electrons to the solar discharge. The high electron density above Mars was remarked upon when the first orbiting spacecraft arrived there. Images from Mars landers of a dust laden pink sky were also a surprise. Scientists expected a deep blue-black sky because the atmosphere is about a hundred times thinner than ours and less able to hold dust suspended. In the thin, practically cloudless air of Mars, the dust devils provide the best means of moving electrons from the surface toward the Martian ionosphere. The dust particles, becoming charged, would be suspended in Mars atmospheric electric field to give the pink sky. In other words, Martian dust devils are more akin to tornadoes. Towering up to 8 kilometers into the sky their destructive capability at the surface would be far more powerful than that of a simple spinning wind in Mars' thin air.

When these Martian tornadoes pass over the surface of Mars, they often leave dark, criss-crossing streaks on the land. It is simply assumed that the wind removes bright dust from the terrain, revealing a darker surface underneath. It is possible however, that electrical damage to the surface, and therefore erosion, is being caused by the Martian tornadoes.

They certainly pose a much greater risk to landing craft and future visiting astronauts than scientists expect.

Meanwhile there is another example of an electrically damaged body whose surface patterns bear a strong resemblance to those formed by the electric tornadoes on Mars. It is Jupiter's moon, Europa.



Traveling discharges [created giant furrows on Europa](#) reflecting the great strength of those wandering arcs compared to the diffuse discharges on Mars today. The furrows on Europa are not cracks in the ice. They are instead a frozen record of the catastrophic power of Jupiter's thunderbolt, when unleashed by that electrical powerhouse of a planet.

The Electric Universe model provides a unifying concept for understanding the solar system by simply accepting the overwhelming evidence for the primary role of electricity and the electric force in the mechanism of the cosmos. Future historians will find the science of the 20th century extraordinary for its insistence on a cosmology based on pre-industrial-revolution thinking. Electricity was a mystery then and remains so into the 21st century for astronomers and geologists. Once again, to not know this simple fact is more important than all things they do know.

Wal Thornhill

Electric Weather

Posted on [May 30, 2004](#) by [Wal Thornhill](#)

The following excerpts come from a [report](#) that appeared in the Institute of Electrical and Electronics Engineers (IEEE) magazine, SPECTRUM, for April. The report demonstrates that when science has lost its way, engineers must use their intuition to make progress.

Electric Rainmaking Technology Gets Mexico's Blessing

But for now, doubters prevail north of the border.

From at least the early 1940's to the end of the 20th century, it always rained more in the state of Jalisco, in central Mexico, than in its neighbor Aguascalientes. But in 2000, on a patch of parched pasture in Aguascalientes, workers from Mexico City-based Electrificación Local de la Atmósfera Terrestre SA (ELAT) erected a peculiar field of interconnected metal poles and wires somewhat resembling the skeleton of a carnival tent. Since then, about as much rain has fallen on the plains of Aguascalientes as on its more lush neighbor.

The brainchild of a fractious group of Russian emigré's, the poles and wires are in fact a network of conductors meant to ionize the air. If the technique is done properly, the thinking goes, the natural current between the earth and the ionosphere is amplified, leading — through a mechanism that is not fully understood — to rainfall. There are now 17 such installations in six states in Mexico, and in January, federal government agencies decided to back construction and operation of 19 more by 2006, potentially altering the weather in much of parched north and central Mexico. Meanwhile, by May, ELAT's competitor Earthwise Technologies Inc., of Mexico City and Dallas, could win the right to establish ionization stations in southwest Texas's water-starved Webb County, which would make it the first such installation in the United States.



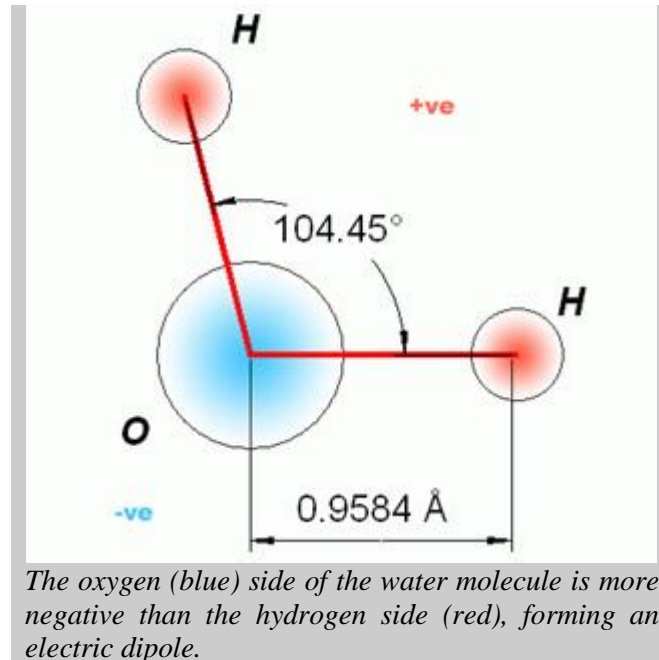
STORM CLOUDS GATHER: Scientists and authorities differ over whether ionizing the air can bring on big weather changes.

But some atmospheric scientists aren't so sure the Russians aren't selling snake oil. "[Ionization] is highly unconventional and in my realm of experience, I have seen no concrete evidence published in a refereed journal, nor have I seen sufficient credible eyewitness verification that the technology works as touted," says George Bomar, the meteorologist charged by the Texas government with licensing the state's weather modification projects.

Comment: This is the common phenomenon of cognitive dissonance in science. The Russians are performing a weather experiment which should fail according to accepted theory. So the scientist complains that he has "seen no concrete evidence published in a refereed journal." But the complaint reduces to a matter of belief. Scientists do not believe electrical power is input to weather systems. Referees who believe atmospheric electricity is an effect, rather than a cause of weather, would almost certainly find grounds for rejecting funding for, or publication of, such an experiment. The same applies to the publication of reports from credible eyewitnesses. For decades airline pilots witnessed strange lightning above storms but were discouraged from reporting it. The objection is unfair and unscientific. Advances come from challenging established beliefs.

Ionization technology is called either IOLA (ionization of the local atmosphere) by Earthwise or ELAT (electrification of the atmosphere) by the company ELAT. IOLA and ELAT compete with conventional cloud seeding, which — though it also remains scientifically unproven — is used in more than 24 countries and 10 U.S. states. Cloud seeding usually involves dispersing a chemical agent such as silver iodide into cloud formations, which helps ice crystals form, leading, it is thought, to bigger clouds and more precipitation than without seeding. The ionization approach, according to Bissiachi, now ELAT's vice president of R&D and operations, does a similar job but twice over. Ions attract water in the atmosphere, creating the aerosol that produces clouds, and they also charge the dust already in the air, making particles become more attractive nuclei for water droplets, which coalesce and fall to the ground as rain.

Comment: It seems that the basic problem in gaining acceptance for ionization technology is the facile description of what causes rain. And that is a problem inherited from the experts — the meteorologists and atmospheric scientists. The water molecule is fascinating because, unlike the nitrogen and oxygen molecules in the air, it is electrically polarized.



In an electric field, the water molecule will rotate to line up with the field. When it condenses in a cloud the average electric dipole moment of a water molecule in a raindrop is 40 percent greater than that of a single water vapor molecule. This enhancement results from the large polarization caused by the electric field induced by surrounding water molecules. In the atmospheric electric field the water molecules will be aligned with their dipoles pointing vertically and in a sense that is determined by the charge polarization in the cloud. It is interesting to note that the tops of storm clouds are positively charged and the base is negative. That is the reverse of the radial charge polarization within the Earth itself. And it is this charge polarization that gives rise to the low-order attractive force we call gravity. **So it is proposed that water droplets in clouds experience an [antigravity effect](#). It appears to be related to the 'Biefeld-Brown Effect,' where a charged high-voltage planar capacitor tends to move in the direction of the positive electrode. That effect may explain how millions of tons of water can be suspended kilometres above the ground, when cloud droplets are about 1,000 times denser than the surrounding air.**

Of course, this raises the issue of charge separation in clouds. The conventional 'isolated Earth' view is that positive and negative charge is 'somehow' separated by vertical winds in clouds and that this process in thunderstorms is responsible for charging up the ionosphere and causing the atmospheric electric field. But this begs the question of cause and effect. Recent high-altitude balloon flights find that charge is not built up in the cloud, it already exists in the ionosphere above. In January 2002 I argued the [electric universe model](#):

"Thunderstorms are not electricity generators, they are passive elements in an interplanetary circuit, like a self-repairing leaky condenser. The energy stored in the cloud 'condenser' is released as lightning when it short-circuits. The short-

circuits can occur either within the cloud or across the external resistive paths to Earth or the ionosphere. The charge across the cloud 'condenser' gives rise to violent vertical electrical winds within the cloud, not vice versa."

This view accords with a recent report (17 November 2003) in Geophysical Review Letters by Joseph Dwyer of the Florida Institute of Technology, which says that according to conventional theory electrical fields in the atmosphere simply cannot grow large enough to trigger lightning.

"The conventional view of how lightning is produced is wrong."

And so:

"The true origin of lightning remains a mystery."

Water vapor in rising air cools and condenses to form clouds. The conventional explanation for rising air relies upon solar heating. The electrical weather model has an additional galactic energy source (the same that powers the Sun) to drive the movement of air. It is the same energy source that drives ferocious high-level winds on the giant outer planets, where solar energy is extremely weak. Once the water vapor condenses into water droplets it is more plausible that millions of tons of water can remain suspended kilometres above the Earth by electrical means, rather than by thermal updraughts. The clouds would act to reduce thermals.

Returning to the article, can we explain how "the natural current between the Earth and the ionosphere is amplified" and how that might increase rainfall? It seems to follow naturally from the electric weather model because the ion generators are supplying mobile charge carriers into the dielectric or atmosphere, which increases the leakage current between the Earth and the ionosphere. The vertical leakage currents drive vertical motion of the air. In some instances these invisible currents are probably responsible for that unseen danger to aircraft — clear air turbulence. And we find the most severe vertical winds in thunderstorms, where electrical power is dramatically evident.

Earthwise's installations are structures about 7 meters high, shaped like short open-topped air-traffic control towers, that house proprietary ion generators and blowers to lift the ions. Separate antennas amplify the ionization by manipulating the local electric and electromagnetic fields. ELAT's installations work in the same manner but are more primitive in appearance, consisting of a 37-meter high central tower surrounded by 8-meter posts arranged hexagonally at a distance of 150 meters. The tower and posts are interconnected by wires, which when set to a high dc voltage by a 2-kilowatt generator, ionize air molecules such as nitrogen and oxygen. According to Bissiachi, as the ions waft upward, they produce about 1 milliampere of current. This current swamps the Earth's natural current — about 1 picoampere — and can affect the weather up to 200 kilometers from the station, he says.

Summing up all its tests from 2000 to 2002, ELAT and its U.S. and Canadian counterpart Ionogenics, in Marblehead, Mass., claim that ionization led to about double the average historical precipitation stimulating, among other things, a 61 percent increase in bean production in Mexico's central basin in the last three years. Cloud seeding, in comparison, typically claims only a 10-15 percent improvement in rainfall.

Despite the claimed successes, ionization has its critics. Atmospheric scientists contacted for this article noted that even the four years of testing was too brief a period to prove that the effects seen were not due to some sort of extraordinary variability in the local weather. Bissiachi claims that the criticism goes to a deeper prejudice. "Meteorologists are not used to thinking that electrical phenomena could be important to the normal hydrodynamic model," he says.

Weather modification technology has always had a hard time standing up to rigorous scientific scrutiny. Ross N. Hoffman, a vice president at Atmospheric and Environmental Research Inc. in Lexington, Mass., helped complete a scientific review of cloud seeding, which was released by the U.S. National Research Council, Washington, D.C., in November 2003. It found that even after more than 50 years of use, cloud seeding remained unproven from a scientific standpoint. "[Ionization] faces the same problems cloud seeding does," he says. Among those are uncertainty about the natural variability of precipitation, the inability to accurately measure rainfall, and the need to randomize and replicate experiments. The last is particularly troublesome, since weather modification companies are typically hired to induce rain whenever they can. Randomly turning on or off the system to prove a point is not in the customer's interest, Hoffman notes.

Ionization also suffers doubts about its basic plausibility. Brian A. Tinsley, a physicist at the University of Texas, Dallas, and an expert on the effects of ions and current in the atmosphere, points out that the ionosphere is about 250,000 volts positive compared with the ground. But the effect of the resulting current, and changes to it from cosmic rays and other phenomena, on droplet formation and precipitation is "relatively small" and restricted to certain types of clouds in specific locations, he says. Considering the size of the natural voltage and the modesty of its impact on rainfall, effective weather modification using ionization, he believes, would require enormous power input and hundreds of square kilometers of antenna arrays.

SAMUEL K. MOORE

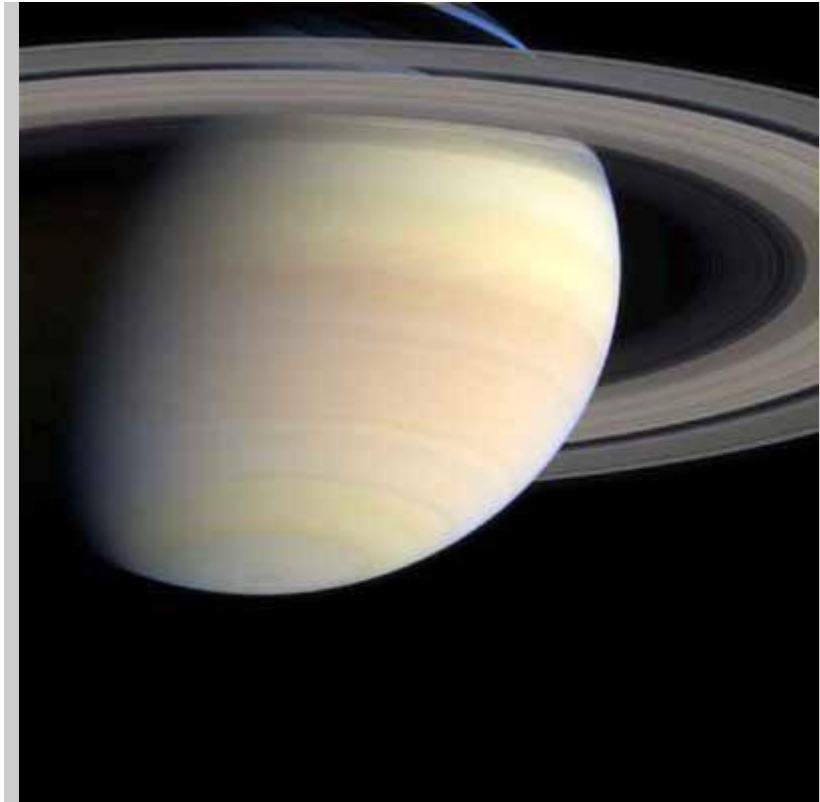
Comment: If conventional theory fails to explain electrical storms it cannot be used to discount the results of ionization experiments. Instead, conventional theory suffers doubts about its basic plausibility. Weather experts have a limited view of the electrical nature of the Earth and its environment. The "enormous power input" is freely available from the galaxy. That galactic electrical power drives the weather systems on all of the planets and even the Sun. So the ionization experiment is rather like the control gate in a transistor,

where a small current into the control gate influences the entire power output of the transistor. This method of weather control should eventually force the critics to think again.

Wal Thornhill

Cassini's Homecoming

Posted on [June 19, 2004](#) by [Wal Thornhill](#)



Cassini closes in on the beautiful ringed planet — Saturn. Credit: NASA/JPL/Space Science Institute

"Nothing so evokes gasps of delight as Saturn's ring. The reason I think, is a collision of the expected and the improbable. A ringed sphere is the archetypal planet of our childhood, familiar from a thousand comic strips, coloring books, classroom poster boards, stickers, rubber stamps, birthday cards — you name it. So, when we see Saturn, there is a kind of instant recognition, like meeting a relative one knows only from the family photo album. But there is also the shock of reality, a sense of 'Oh my God, it actually exists!'"

— Chet Raymo.

From the NY Times of June 15, 2004:

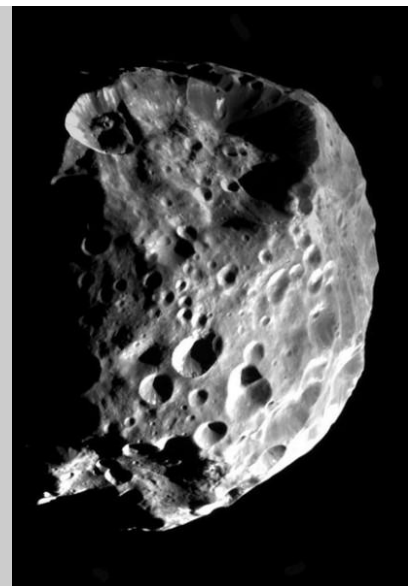
"The Saturn system represents an unsurpassed laboratory, where we can look for answers to many fundamental questions about the physics, chemistry and evolution of the planets and the conditions that give rise to life," Dr. Edward J. Weiler, associate administrator for science at NASA, said in a statement.

Scientists dare not predict the discoveries waiting to be made as the spacecraft focuses its cameras and instruments repeatedly on Saturn and its signature rings and takes the measure of the icy moons during at least 76 orbits.

"Prepare to be amazed," Dr. Carolyn Porco, head of the mission's imaging team, said in an interview last week.

— John Noble Wilford

Scientists hope that the US\$3.7 billion spacecraft will solve many of Saturn's mysteries. However, if the Galileo mission to Jupiter is any guide, Cassini will discover more mysteries during its extended visit to Saturn. Scientists "dare not predict the discoveries waiting to be made" because their success rate in the past has been appalling. The catch phrase "it's back to the drawing board" has been worn out. The old drawings are merely scribbled over. The problem for scientists analyzing the flood of data to be returned from Cassini and its probe to Titan is the set of unshakeable beliefs they bring to the task. The belief in the nebular accretion theory of formation of the solar system colors every confident assertion. For example, the official caption for this close-up of Saturn's moon, Phoebe, reads:



"Phoebe's true nature is revealed in startling clarity in this mosaic of two images taken during Cassini's flyby on June 11, 2004. The image shows evidence for the emerging view that Phoebe may be an ice-rich body coated with a thin layer of dark material. Small bright craters in the image are probably fairly young features. This phenomenon has been observed on other icy satellites, such as Ganymede at Jupiter. When impactors slammed into the surface of Phoebe, the collisions excavated fresh, bright material — probably ice — underlying the surface layer. Further evidence for this can be seen on some crater walls where the darker material appears to have slid downwards, exposing more light-colored material. Some areas of the image that are particularly bright — especially near lower right — are over-exposed. An accurate determination of Phoebe's density — a forthcoming result from the flyby — will help Cassini mission scientists understand how much of the little moon is comprised of ices." Credit: NASA/JPL/Space Science Institute

That the craters on Phoebe were formed by impact is stated as a fact. Instead, it is a supposition unsupported by observation or experiment. The electric universe model explains the craters as Phoebe's birthmarks. It is a model supported by examination of spark-machined surfaces. Just as stars are observed to do, gas giant planets may also expel a jet of matter during periods of electrical instability. Accretion of matter in the jet is mediated by the electromagnetic pinch effect and electrostatic deposition. Both of these mechanisms are far superior to accretion by impacts (tending to shatter and scatter instead of to accrete). Electrostatic deposition easily creates the layering seen in all rocky objects to date. Electrical discharges between the parent and departing child carve out the circular craters. Because they are not formed by a sudden mechanical impact, the craters are neat and do not cause disruption to adjacent craters or fill them with debris — as we see on Phoebe. That is not to say that Phoebe was born from Saturn. Its retrograde orbit suggests capture by Saturn.

Other limiting beliefs concern gravity and the electrical neutrality of celestial objects. Either one is sufficient to cause misleading or wrong deductions about Saturn and Titan,— the two major targets of the Cassini mission. Newton's famous law of gravitation relates the force between two bodies to the product of their masses and the square of the distance between their centers. But 'mass' and its relation to matter remains a metaphysical concept. However, we know from particle accelerator experiments that the mass of a particle of matter increases when subjected to acceleration in an electromagnetic field. So the internal electromagnetic state of a planet or a star may alter its apparent mass. Yet scientists calculate the mass of Saturn or its moon, Phoebe, by measuring the gravitational force and assuming a universal constant of gravitation, written 'G.' In an electric universe 'G' is neither universal nor constant. **We cannot simply calculate the density of celestial bodies by estimating mass using Newton's law of gravity.**

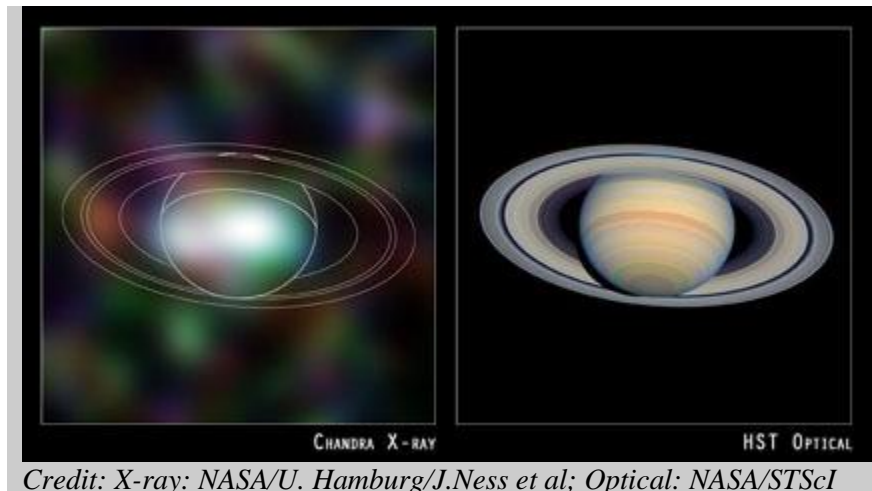
In Saturn's case, using Newton's law, it is calculated that it is 95 times more massive than the Earth, which gives it a mean density only 0.7 that of water. Given a big enough bath, Saturn would float! The electric universe model suggests that Newton's law will not give a true picture of the planet's density and therefore of its composition. Saturn may have considerably more heavy elements than its gravity would suggest. Low gravity suggests low internal electric stress. And that may tell us something about Saturn's recent history.

The belief in the electrical neutrality of the universe has led to the theory that stars must generate their energy by feeding on themselves. Despite decades of ad hoc adjustments, the theory still fails to explain most of the observed features of the Sun. The electric model of stars shows that the classification of stars and gas-giant planets on the basis of their calculated mass is incorrect. Stars are an electrical phenomenon and rely on their electrical environment for their mass, appearance and classification. Their cores do not burn with a thermonuclear fire and they are much cooler than the hot plasma discharge that envelops them. **The Sun is stone cold compared to its corona.** That is why the interior of the Sun, seen through its sunspots, is much cooler than the electrical storms that rage above in its photosphere. The bright plasma shell of a star, particularly giant stars, may be much larger than the solid core that is the focus of the cosmic discharge.

Stars and gas giants may occasionally reduce internal electrical stress by ejecting some of their charged core, usually equatorially, in a nova type outburst. The light curves of novae show the typical rapid onset and slow decay of lightning. The result of the outburst is an expulsion disk and closely orbiting companions.

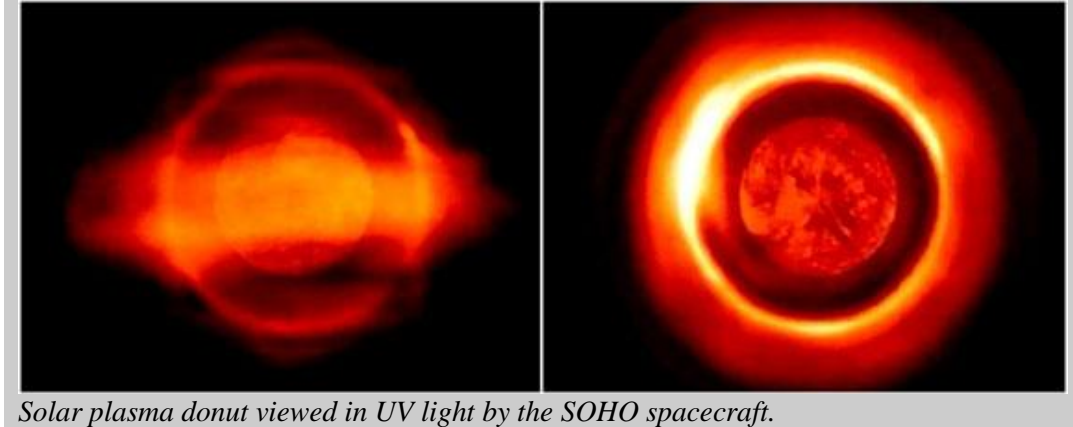
With that picture of an electric star in mind, the following scenario is proposed, stripped of the volumes of evidence available to support it. The test will be to see how predictive it turns out to be:

Until recently Saturn was an independent brown dwarf star with its own entourage of close-orbiting small planets. As a small star approaching the Sun, Saturn flickered like a faulty electric light when the two stellar magnetospheres (plasma sheaths) touched. Saturn's electrical power was usurped by the Sun and its appearance changed dramatically. Such rapid variability in the appearance of stars is well documented. Before dimming forever, Saturn would have flared up to relieve the stresses caused by the sudden change in electrical environment. Saturn's present low internal electrical stress, as indicated by its low apparent mass, suggests ejection activity. But even so, the core of the electric star has not completely cooled — Saturn still radiates more than twice the heat it receives from the Sun. And we have a simple explanation for the origin of Saturn's mysterious short-lived rings.



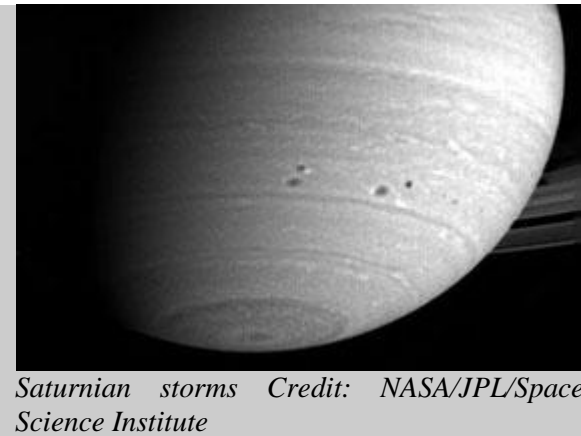
Credit: X-ray: NASA/U. Hamburg/J.Ness et al; Optical: NASA/STScI

Like the Sun, Saturn radiates X-rays strongly from near its equator. This is quite different to Jupiter where the X-rays come from polar auroral discharges. Saturn's X-ray spectrum is like the Sun's, which led scientists to say that X-rays from the Sun were being reflected by Saturn's atmosphere. That seems unlikely given the similarities between Saturn and Jupiter. It would require that Saturn reflect X-rays 50-times more efficiently than the Moon! Instead, Saturn still shows stellar characteristics. Saturn's X-rays are concentrated, like the Sun's, at low latitudes. Voyager 2 also found an immense, hot donut of plasma encircling Saturn that is believed to be the hottest in the solar system, 300 times hotter than the solar corona. (Temperature estimates are misleading if particle motions are non-random, which is the case in electric discharges).



Solar plasma donut viewed in UV light by the SOHO spacecraft.

Saturn's rings form part of the circuit that feeds energy into its plasma donut, where it is stored before discharging into Saturn's ionosphere and generating X-rays. The Sun has a similar plasma donut that discharges to the Sun, causing sunspots and solar flares. We might then expect Saturn's storms to show similar behavior to sunspots, which are the Sun's electrical 'storms.'



Saturnian storms Credit: NASA/JPL/Space Science Institute

Saturn occasionally 'burps,' creating a great white spot 3 times the size of the Earth. It is inexplicable on standard models. However, it is the kind of thing to be expected following an exceptionally powerful lightning discharge deep into Saturn's atmosphere. The discharge forms a vertical jet of matter from the depths that spouts into the upper atmosphere. Saturn's high-speed equatorial winds are also driven electrically and they have been observed to diminish in speed from 1,700 km/hr to 1,000 km/hr since the

Voyager flybys. That may tie in with the disappearance of the mysterious 'spokes' in Saturn's rings that were discovered in Voyager images in the early 1980's. Radial lightning, 10,000 times as powerful as lightning bolts on Earth, form the spokes across the rings to Saturn's ionosphere. Reduced electrical activity at Saturn would be expected to reduce the occurrence of ring spokes and to slow the equatorial winds.

Saturn's ephemeral rings are strong evidence in favor of recent ejection. The term "recent" in relation to Saturn's ring structure means tens of thousands of years. That's how long astronomers calculated it would take for gravity to cause them to rain down upon Saturn. However, there is more to the ring structure than gravity can explain. If a 1-meter wide model of Saturn were made the rings would be 10,000 times thinner than a razor blade! Equatorial currents at Saturn are responsible for the thinness and odd dynamics of the rings, so gravity-based calculations of their age are misleading. More evidence for recent ejection came when Voyager 1 discovered radio discharges that were diagnosed as a continuous electrical storm stretching over 60 degrees in longitude near Saturn's

equator! Something much larger than Phoebe must have erupted from Saturn, creating the rings and leaving a scar on the surface (like Jupiter's Great Red Spot) that has not yet healed. If so, where are Saturn's children now?

By this stage, cognitive dyspepsia will have taken its toll of those readers who have faith in the established fairytale of a solar system formed gravitationally 5 billion years ago, with the planets in the same order and roughly the same orbital spacing as we find them now. For them there is much more that could be written to prepare the way for this radically new paradigm. That task will be undertaken by a new website called thunderbolts.info. For the moment, a scenario follows that is so [alien](#) to any conventional theory of Saturn's history that it should be easily tested against information gained from the Cassini mission. It shows striking connections between many seemingly unrelated facts about certain planets. That is something that conventional cosmogony has not been able to do.

Saturn and the Recent History of the Solar System

The challenge to convention begins with the use of the words "Recent History." The solar system is not supposed to have a recent history. We assume that the dinosaurs roamed under the same Sun we see in the sky today. But no, in round figures I am talking about changes in planetary orbits only 10,000 years ago. The changes occurred during the era of the earliest human art in the form of petroglyphs, or rock carvings. The petroglyphs are not merely prehistoric doodles on rock. They required a prodigious global effort by our distant ancestors to produce. The breakthrough in decoding them came when the strange petroglyphs were compared with powerful electrical discharge phenomena. [My earlier news item, [Mystery of Mars' Polar Spirals](#), outlines some recent results in the search for the true meaning of petroglyphs.]

It is now clear that petroglyphs are an enduring record of the frightening collapse of a former cosmos. It has taken 10,000 years for us to be able to see in laboratory plasma discharge experiments what our forebears saw in awesome cosmic proportions in the sky. We can now understand why the first civilizations were obsessed with the capricious and warring planetary gods, who fought with thunderbolts, when today we can hardly identify those planets in the sky. With a real perspective of chaos in the solar system in prehistoric times we can see why the astronomer-priests of old were so powerful in their societies. They knew planets had had a dramatic impact on humanity and the Earth. And Saturn was remembered as the most prominent. **The solar system as we see it today is less than 10,000 years old!**

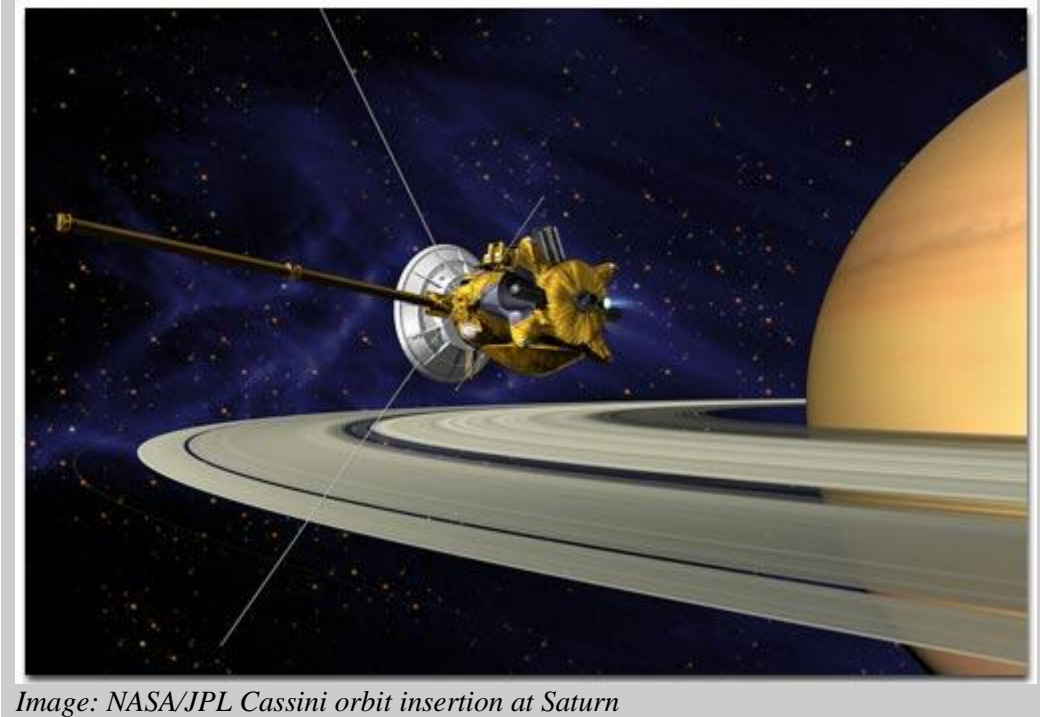
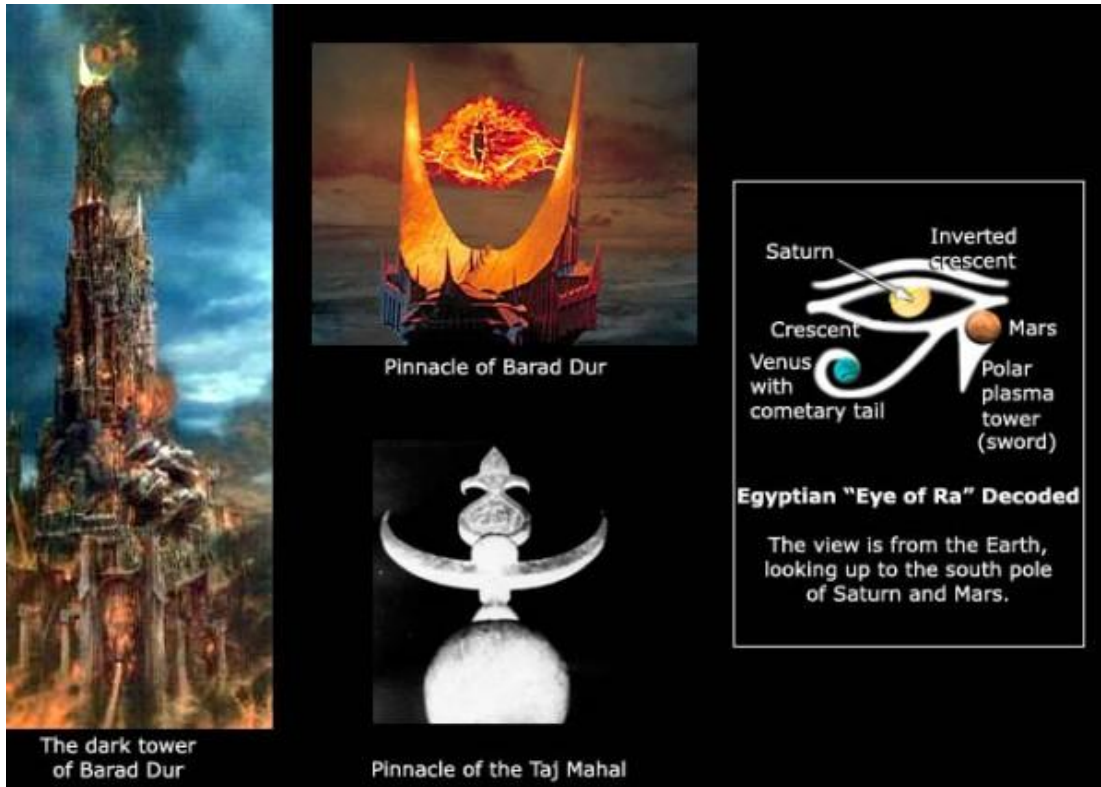


Image: NASA/JPL Cassini orbit insertion at Saturn

All being well, Cassini is due to arrive at Saturn on July 1. Only a select few on Earth recognize the event as a kind of homecoming; a homage to our most ancient Sun god ' Sol, Ra, Helios. All of these names were originally given to the planet Saturn. Yet Saturn today is an unremarkable speck in the sky, less bright than many of the brightest stars.

In recent news reports, Saturn has been called the original 'Lord of the Rings.' There is a profound truth behind such a glib by-line. But it wasn't until the advent of the telescope that Christian Huygens, in 1656, was able to suggest that Saturn had a ring. So how do we explain that Saturnian symbolism of the ring pervades our cultures? The halo of the saints, the royal crown, and the ring given in marriage are Saturnian symbols, as are the circled or Celtic cross, the Egyptian ansate cross, or ankh, the "Eye of Ra," and the star inside the crescent. The star at the top of the Christmas tree, covered in lights, is pure Saturnian imagery. It is truly amazing that we are still haunted by prehistoric archetypes. It helps us to understand the extraordinary subconscious attraction of Tolkien's fantasy of Lord of the Rings. J. R. R. Tolkien was well versed in mythology.



In December, 1999, I wrote in [Other stars, other worlds, other life?](#)

"If the following sounds like science fiction, so be it. Science fiction writers are far better than experts at predicting future knowledge. What then might be the Earth's history? The distant orbits from the Sun suggest that we were captured along with our Brown Dwarf parent. In the process, the electric power that drove our parent star was usurped by the Sun. As well as turning out the primordial light, the Sun stripped the Earth from its mother's womb along with the Moon. Night fell for the first time and stars appeared. Ice ages began suddenly. The polar caps formed. High latitudes became uninhabitable. It is worth adding that many of the moons, or remaining offspring, of the gas giants have surprisingly icy surfaces and some have atmospheres. Life may have existed once on Mars and some of those moons."

As the ancients observed, Saturn was our primordial parent star. Of course we must be careful in our identification. But there is one physical characteristic that links the parent with its offspring. It is the axial tilt. Like our moon, satellites tend to orbit their primary with the same face always turned toward it. If they orbit in the equatorial plane, their spin axis will be aligned with that of the primary. As gyroscopes, the satellites will retain the same tilt even if jolted from their orbit, although the process may induce a wobble of the spin axis. **It is therefore highly significant that two key planets identified by the ancients — Saturn and Mars — have axial tilts closely similar to that of the Earth. The tilt of Saturn, at 27 degrees to the ecliptic plane, is itself an enigma — unless it formed independently from the Sun.**

But Venus was also identified as a spectacular discharging comet in the ancient congregation of planets. What can be made of that? It can be explained if Venus was the latest child of Saturn. As explained earlier, Saturn shows the symptoms of having given birth recently. The birth would be triggered by a sudden change in Saturn's electrical environment when it crossed from interstellar space into the Sun's plasma envelope, or heliosphere. The voltage drop across the Sun's plasma sheath would almost equal the full driving potential of the Sun, measured in tens of billions of volts. Rather than being an anode in the galactic discharge, Saturn would become a cathode in the Sun's environment and subject to forming cathode jets. Saturn could be expected to 'spit the dummy' in such a circumstance! Venus was one such 'dummy,' ejected from the equator of Saturn. Saturn's swift rotation delivered a 'slap on baby's bottom' to Venus giving it a slow retrograde spin. The magnitude of the axial tilt of Venus to the ecliptic is much less than Saturn's, which suggests that the Venusian orbit was tilted away from Saturn's equatorial plane due to electrical capture forces acting on that dying star. We have abundant pictorial evidence that Venus was wrenched from its orbit in a polar direction shortly after it was born. (See the Egyptian "Eye of Ra" above).

This account explains many odd things about Venus; its slow retrograde spin; its hellish temperature, having being born recently from the core of a brown dwarf star; its thick atmosphere inherited from the brown dwarf and subsequently modified by cosmic discharges; and its equatorial scars caused by spectacular radial discharging, which was faithfully recorded by the petroglyph artists. Venus carried away significant charge from its parent so that it still has a 'cometary' magnetotail and its mountains glow with plasma discharges. Venus also shows a surprisingly young surface that gave rise to ad hoc theories of resurfacing events. They are unnecessary. Venus is a baby.



Planet-girdling filamentary scars on Venus are due to equatorial cosmic discharges through a thick atmosphere.

What can we expect Cassini to find, based on this dramatic recent history of Saturn? We should expect to see family traits amongst the members of the Saturnian family — including the departed Earth, Mars and Venus. For example, the moon Titan, which is larger than the planet Mercury, seems to be a close sibling of Venus, probably born from Saturn at about the same time. That Titan may be young is hinted at by its eccentric orbit, which cannot have persisted for billions of years. So we should be alert to similarities between Titan and Venus. It is already known that Titan has the densest atmosphere of any terrestrial planet, after Venus. That is a huge puzzle for scientists. After all, two of Jupiter's moons, Ganymede and Callisto, have no atmosphere yet they are of similar size. So it would not be surprising if Titan had warm spots over the poles, like Venus. Titan also has a global layered haze like Venus. (Haze layers seem to be the condensed form that non-polar molecules take in an electrified atmosphere. They are quite distinct from the vertically moving clouds that polar molecules, like water, form). And just as Mars has a whiff of the Venusian atmosphere, with carbon dioxide and nitrogen as major constituents, we may expect to find that the Titan atmosphere has some of the smell of Venus about it. Both Venus' and Titan's atmospheres, being very young, will not yet be in equilibrium. So calculations about atmospheric constituents that assume equilibrium as a starting point will be wrong. The methane found in Titan's atmosphere is quickly destroyed by sunlight so it has to be replenished. That has led to the suggestion that Titan must have a hydrocarbon ocean for the methane to have lasted for the conventional age of the solar system. However, radar, infrared and radio observations of Titan have not found signs of a hydrocarbon ocean. In fact one radar return was "of a type that we would expect to get back from Venus." **Titan is most likely a baby brother of Venus!**

We should not overlook the fact that so many of the satellites are comprised of a large proportion of water ice, as are Saturn's rings. It offers an explanation for the origin of the Earth's amazing abundance of water. So we should not be surprised if, under the orange haze, that Titan has copious ice or water. We must await the descent of the Huygens probe into Titan's atmosphere for answers. That raises the obvious question; why doesn't Venus have much water? When performing comparisons, we must allow for the fact that the Venusian atmosphere is being modified continually by electric discharge activity on the surface of that planet. It has increased the carbon dioxide content of the Venusian atmosphere at the expense of nitrogen and water vapor. Scientists think that most of Venus' water must have split into hydrogen and oxygen and all the hydrogen was lost to space. But if so, where is the oxygen that was left behind? The four Pioneer probe craft didn't find it in the atmosphere. The answer is that it has combined with carbon monoxide to form a heavy atmosphere of carbon dioxide. The process I envisage is this:

Venus probably began with an atmosphere more like Titan's and the Earth's, where nitrogen dominates, and with more water. It suggests that Saturn must have considerable nitrogen at depth in its atmosphere. The icy rings and satellites of Saturn and abundant water on Earth also point to water on Saturn. On the Venusian surface, nitrogen molecules are converted to carbon monoxide molecules by a catalytic nuclear reaction in the presence of red-hot iron. The brilliant French chemist, Louis Kervran, when investigating carbon monoxide poisoning of welders, discovered this surprising nuclear transformation. The carbon monoxide reacts at the hot surface of Venus with water vapor

to form carbon dioxide and hydrogen. It is a well-known industrial process. The hydrogen produced escapes from Venus. This process explains the puzzling discovery made by Venus-landers that the water vapor concentration diminished as they approached the Venusian surface. A purely chemical approach to the puzzles of the Venusian atmosphere is not likely to work.

Like Venus, surface temperatures are globally uniform on Titan within a few degrees. It is thought that there is a greenhouse effect operating on Titan. However, the heat of Venus is due to its origin and has nothing to do with a greenhouse effect. The same will likely be true for Titan. Like Venus, Titan seems not to have a magnetic field and yet it has a distinct magnetotail. Titan's electrical plasma interactions may be like those of Venus. Titan shines on the dayside in UV light too brightly to be explained by solar radiation. It should be very interesting as Titan swings in and out of Saturn's magnetosphere. The plasma sheath crossings could provide some surprises.

There is much more that could be written about Saturn's other moons. But there are enough outrageous claims here to add spice to the anticipated revelations from Cassini's extended visit to Saturn and the Huygens probe to Titan.

Wal Thornhill

Comets Impact Cosmology

Posted on [July 20, 2004](#) by [Wal Thornhill](#)

"Comets are important, they could be the key to the universe ...maybe."

– *Burt Lancaster, in the movie Local Hero.*



Comet Hale-Bopp

From Nature, 5, 174, December 28, 1871:

"Encke's Comet and the Supposed Resisting Medium," by Professor W. Stanley Jevons.

"The observed regular diminution of period of Encke's comet is still, I believe, an unexplained phenomenon for which it is necessary to invent a special hypothesis, a Deus ex machina, in the shape of an imaginary resisting medium.

...It is asserted by Mr. R. A. Proctor, Prof. Osborne Reynolds, and possibly others, that comets owe many of their peculiar phenomena to electric action.

... I merely point out that if the approach of a comet to the sun causes the development of electricity arising from the comet's motion, a certain resistance is at once accounted for."

From Scientific American, July 27, 1872:

"Professor Zöllner, of Leipsic, in a lately published work on the nature of comets, makes it his purpose to explain the remarkable phenomena they present by an application of the established principles of physical science alone.

...The self-luminosity of comets he sets down to electrical excitement...

...the nuclei of comets, as masses, are subject to gravitation, while the vapors developed from them, which consist of very small particles, yield to the action of the free electricity of the sun.

...It is therefore sufficient to attribute to the sun an electrical energy no greater than that supposed to account satisfactorily for the appearances presented by cometic trains..."

From English Mechanic & World of Science, 11 Aug 1882, pp. 516-7:*COMET'S TAILS*

"...There seems to be a rapidly growing feeling amongst physicists that both the self-light of comets and the phenomena of their tails belong to the order of electrical phenomena."

From Nature, No. 1370, Vol. 53, Jan 30, 1896, p. 306:*Theory of Comet's Tails*

"It has long been imagined that the phenomenon of comet's tails are in some way due to a solar electrical repulsion, and additional light is thrown on this subject by recent physical researches.

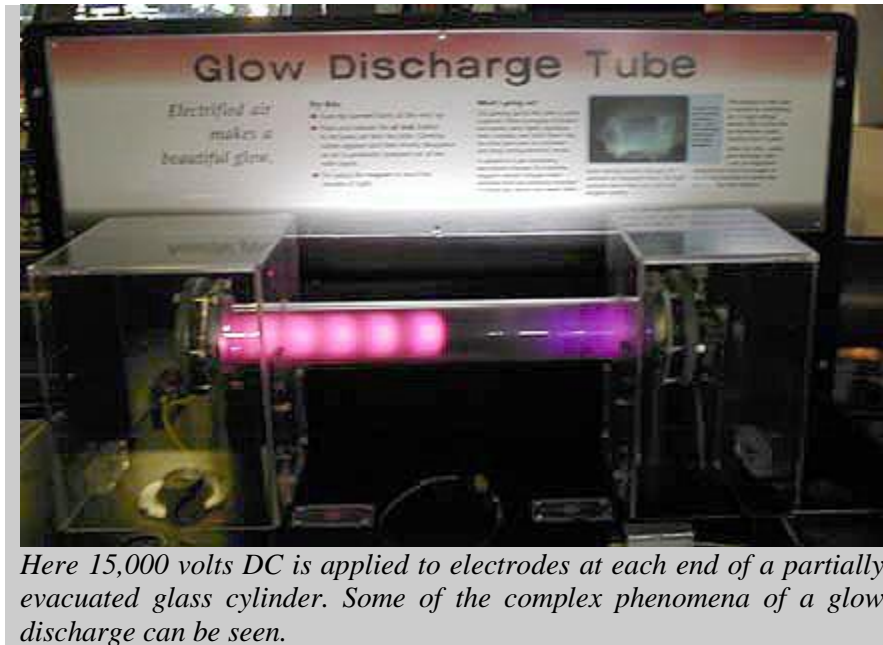
... Prof. Fessenden suggests that negatively charged particles are emitted from that side of a comet which is turned towards the sun..."

(Astrophysical Journal, vol. iii. No. 1)

Science at the end of the 19th century was closer to the truth about comets than we are now!

Astronomy throughout the ages has been dogged by beliefs about the universe that have dictated how facts are to be interpreted. **Modern astronomy is crippled by the belief that although there is electricity in space, it doesn't do anything.**

At the end of the nineteenth century there was considerable interest in electricity and the phenomena of electric discharges in evacuated glass tubes.



Scientists of the day could see the many parallels between the behavior of the luminous comet and a laboratory glow discharge. But in the following decades they abandoned that vision. Electrified comets required an electrified Sun. Astronomers in the 20th century were never taught the physics of gas discharges, and the idea of electricity in space was anathema to them. They turned their eyes away from the signs of electrical activity and adapted the older mechanical theories to explain comet behavior as buffetings in a solar "wind." The gas discharge model was passed over for Fred Whipple's 'dirty ice ball' model of comets.

In January this year I wrote about the initial reports coming from the closest flyby ever of a comet nucleus, that of [Comet Wild 2](#). Recently, the first scientific reports of that encounter were published. As anticipated, Comet Wild 2 provided more puzzling questions for astronomers while adding confirmation to the Electric Universe model.

On 18 June, Nature magazine printed a special section: 'Stardust at Comet Wild 2.'

Anny-Chantal Levasseur-Regourd writes in 'Cometary Dust Unveiled' (p. 1762):

"Cometary nuclei are unique objects that have preserved the primitive matter out of which the solar system was born. They are conglomerates of ice and dust...."

Although these statements are presented as fact, they are opinion ... opinion that Comet Wild 2 defies. In fact, all of the recent discoveries about comets contradict the "gravity-dominated" consensus.

Harold Weaver, writes in Not a Rubble Pile? (p. 1760):

"New in situ observations of a comet are demonstrating once again how little we understand about these dark and mysterious planetesimals. Just when a consensus was being reached that cometary nuclei are gravity-dominated 'rubble piles,' stunning images of the nucleus of Comet Wild 2 ...are challenging that paradigm."

Weaver refers to a new textbook, Comets II, from the U. of Arizona press. The continued use of textbooks that uncritically peddle the old consensus, when there is so much opposing evidence available, is a condemnation of science education.

"Astronomers as a class they hug caution and are as fearful of having their dogmas upset as a witch-doctor his magic."

– Comyns Beaumont, *The Mysterious Comet*, 1932.

Again in the June 18th issue of Nature, Weaver asks:

"Why was the surface so littered with features if sublimation was peeling off layers every time the nucleus passed through the inner solar system where its ices were heated by the Sun? ...the implication is that the nucleus of Wild 2 has substantial strength and that gravity plays little role in the shaping of the features, which is contrary to the conventional wisdom that cometary nuclei are gravity-dominated rubble piles."

As usual, the pits and craters are ascribed to impacts, with no evidence whatsoever.

Weaver goes on:

"The rubble pile proponents can still point to the tidal disruption of comet Shoemaker-Levy 9 during its close approach to Jupiter in 1993, and to the frequent and apparently spontaneous disruptions of many other cometary nuclei..."

That comets can be tidally disrupted is pure supposition. It is the most ineffectual model imaginable and fails to explain the suddenness and violence of the observed disruptions, or the fact that some occur far from the Sun. I wrote in January:

"Powerful internal stresses caused by redistribution of charge within an actively discharging comet are responsible for their observed tendency to fragment. The effect is like an exploding condenser. It is not due to the comet being a weakly coherent rubble pile."

Comet Wild 2 conforms to the electric model of comets, which sees them as complex planetary fragments instead of pristine primordial matter.

Referring to the three comets that have had their nucleus imaged by spacecraft, Halley, Borrelly and Wild 2, Weaver writes:

"The surfaces of all three nuclei appear to be mantled with non-volatile material, and the infamous activity of comets seems to be confined to very localized portions of the surface, or possibly, even subsurface geysers."

The only reason for suggesting the comets are 'mantled with non-volatile material' is that the dirty ice ball model demands it. They are 'the darkest objects in the solar system' so, ipso facto, the bright ices must be hidden inside. Comet Wild 2 is supposed to have been diverted into its current orbit by Jupiter only 30 years ago so it is surprising that it seems to be as dark as comet Halley, which is thought to have passed through the inner solar system hundreds or thousands of times.

The dark mantle hypothesis is symptomatic of pathological science, where ad hoc adjustments are made to save a theory and the adjustments are not testable. The observation that comet Borrelly was 'dry and hot' can be regarded as evidence that comets do not have a mantle. Comet surface features and composition are indicative of their bulk composition. Electrical arcs burning the surface may explain their remarkable darkness. A similar effect can be seen on Io, where wandering cathode arcs similarly cause dark depressions, Io's so-called 'volcanic calderas'.

Weaver goes on:

*"Detailed geometrical analyses of the jets have been used to identify **the sources of activity on the nucleus, which is one of the outstanding unresolved issues in cometary science.** Surprisingly, the largest depressions on the surface of Wild 2 are apparently devoid of activity. ...most of the jets apparently originate near the latitude of the subsolar point and nine of the jets appear to rise from two depressed regions on the surface."*

These are not surprises in the electrical model. Cathode arcs tend to strike from high points or sharp edges, in preference to flat surfaces. They will tend to strike where the electric field is strongest, at the subsolar point. The depressions are caused by steep arc erosion of the crater edges. One of the research articles (p. 1764) states:

"The flat floors [of the depressions, bounded by nearly vertical cliffs] seem to be inert at the present time and resistant to sublimation because none of them are detectably associated with observed jets."

Later, (p. 1766) we find:

"...it is not clear why sublimation processes, driven by solar illumination on a spinning body, would form globally distributed circular structures."

There is only one process that will do that – electric arc machining!

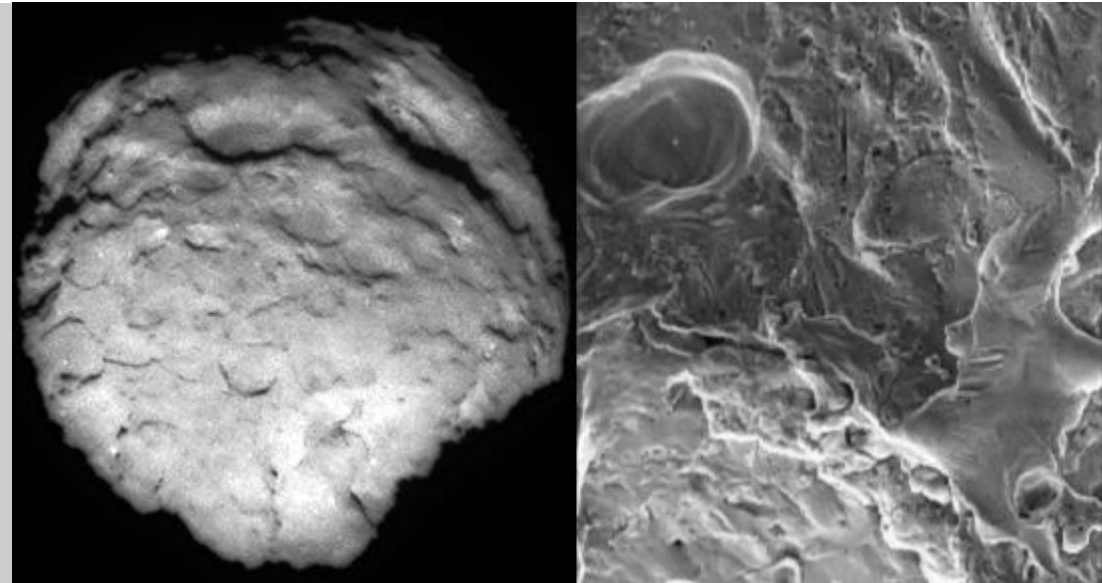
The electrical model is more precise about where to look for the source of the observed jets. In January, I wrote:

"In the electric theory, unresolved bright spots are to be expected where the cathode arcs impinge on the nucleus and give rise to the cathode jets"

What do we find? On page 1768:

"The most significant albedo, or at least brightness, features are rare small bright spots that occur in multiple images at different phase angles ...ruling out the possibility that it is a phase effect or image artifact. In stereoimages, it [a <50-m bright spot at the edge of a flat-floored depression] has no height. There is an adjacent shadow-like dark spot that could be the shadow of an optically thick jet... The bright spots are small and rare, suggesting that they may be short-lived."

Some of the jet sources are reported as tending *"to coincide with the locations that are brighter than average."*



Left. The closest image of Comet Wild 2. The bright spot mentioned can be seen near the terminator in the 11.00 o'clock position. Other bright spots can be seen at the edges of depressions. We are seeing the electric discharge machining (EDM) of the nucleus of Comet Wild 2 in progress. Right is a scanning electron microscope view of a surface that has been exposed to EDM in the lab. The same process is occurring constantly on Io where the cathode arcs were also seen to be eroding crater edges.

The spacecraft:

"...encountered regions of intense swarms of particles, together with bursts of activity corresponding to clouds of particles only a few hundreds of meters across. This fine scale structure can be explained by particle fragmentation."

(p. 1776).

Here we see another ad hoc explanation for a discovery that surprised the investigators. In the electric model, cathode jets carry electric current. The current generates a magnetic field that 'pinches' the jet and maintains its constriction over great distances. In January I wrote:

"Because they constitute an electric current, the [cathode] jet streams will remain separate and coherent over vast distances. Comet Hyakutake's tail was detected by the Ulysses spacecraft half a billion kilometres away! Cometary filaments cannot be explained by outgassing. They are definitive evidence for the electrical nature of comets and the solar environment. The trajectory, velocity and filamentary nature of the comet's ion tail conform to that known experimentally as a 'plasma gun'."

In short, we should expect the dust detection to occur in bursts with nothing in between the bursts. On page 1778, it is reported that:

*"The swarms consist of short bursts of impacts, a fraction of a second in duration. Some bursts are seen as single events of duration less than or equal to 0.1 s, surrounded by a relatively silent period lasting up to several seconds. **Structure on such a short time scale (i.e., small physical scale in the coma) was unexpected and offers insight into the physical mechanisms at work in the coma.**"*

It certainly does, provided you choose the right model. Unfortunately, astronomers choose a mechanical 'three-dimensional fluid-dynamical coma model.' This brings to mind the comment by an astronomer who has suffered for demonstrating the big bang theory is based on false assumptions:

"If you take a highly intelligent person and give them the best possible, elite education, then you will most likely wind up with an academic who is completely impervious to reality."

The above-mentioned model fixes it so that the troublesome jets are not jets at all. They are:

*"shocks resulting from nonradial gas flow and depend critically on the nucleus shape and topography (but do not require discrete active regions). This implies that the dust particles in the inner coma are also concentrated along the gas flow discontinuities, **creating the visual impression of jets** even though the dust may originate from different areas on the nucleus."*

The ingenuity of such nonsense is breathtaking. So how does one account for the short intense bursts of impacts with such a model? The paper continues airily:

"All can be explained by grain fragmentation. The very high level, but short duration, bursts are the result of the spacecraft passing through a compact cloud of fragmentation products."

Nowhere are we told what might cause the mysterious delayed fragmentation, hundreds of kilometres from the comet nucleus. There is no visual evidence for it. It is another ad hoc notion to pile on top of all the others.

I repeat my opening question: How many failures of the 'dirty ice ball' theory does it take before it is falsified?

The Electric Comet and its Impact on Cosmology

Comets are important, they are the key to the universe!

If comets are essentially an electrical phenomenon then the implications for cosmology are profound. It means that everything we believe about the Sun, and therefore all stars, is wrong. Rather than assuming the universe is electrically dead, it raises the possibility that Nature is at least as smart as we are and finds electrical energy extremely useful in creating and energizing the structures we see in space. Already the plasma cosmology section of the IEEE has published many papers on the natural formation of spiral galaxies by the interaction of intergalactic plasma current filaments, or 'Birkeland currents.' It does not require invisible matter or mysterious forces to produce the spiral patterns. Yet astronomers ignore the subject. Plasma cosmology has a beautiful symmetry with our everyday experience of electric power. Just as we light our cities with electric power generated hundreds or thousands of miles distant, so galaxies are lit by cosmic transmission lines that seem to extend beyond the visible universe.

Positive ions (protons) are accelerated from the Sun, which indicates that the Sun is positively charged. Yet the solar wind is electrically neutral (within the limits of our measurements, it contains equal numbers of positive ions and electrons), so how can a comet exhibit electrical effects?

The answer, as always, is to go back to the proposed model to see how it fits with the data, or to see if the experiments performed so far can actually answer the question. In classic 'Back to the Future' style, Ralph Juergens proposed in the 1970's that the Sun was the anode focus of a glow, or corona discharge. It simply requires the Sun to be a body positively charged relative to its galactic environment. Welcome back to the nineteenth century!

Juergens wrote:

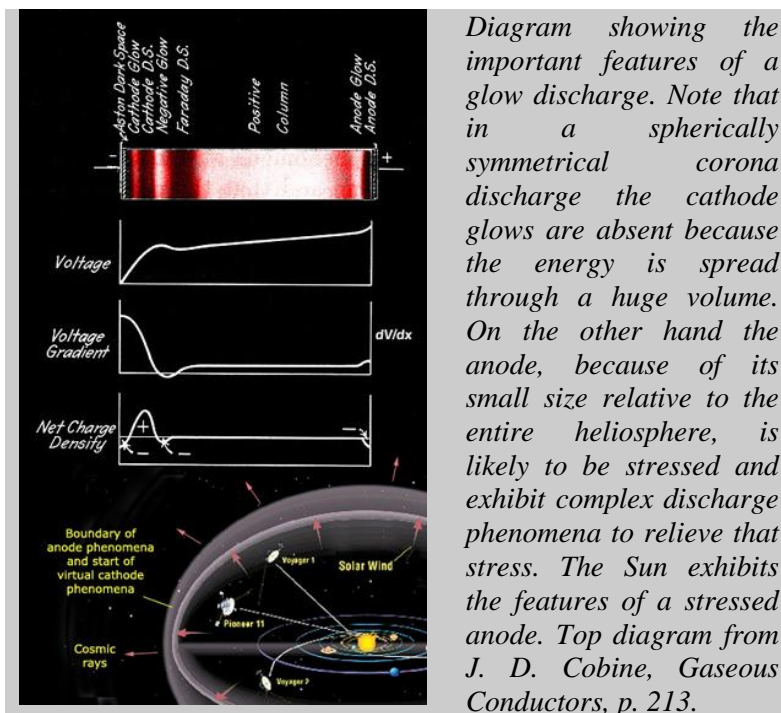
"Transmission lines carrying high-voltage direct current – electric trolley wires, for example – discharge almost continuously to the surrounding air. In the case of

a positive (anode) wire electrons ever present in the Earth's atmosphere drift toward the wire, attracted by its positive charge. As they penetrate the increasingly intense electric field close to the wire, the electrons gain energy from the field and are accelerated to energies great enough to initiate electron avalanches as they collide with and ionize air molecules. The avalanching electrons, in turn, intensify the ionization immediately surrounding the wire. Positive ions, formed in the process, drift away from the wire in the electric field. In this way, a more or less steady discharge is maintained, although there is no tangible object other than the surrounding air that can be considered a cathode."

Electric Discharge As The Source Of Solar Radiant Energy, KRONOS Vol 8 No. 1, Fall 1982.

In the second installment (KRONOS Vol 8 No. 2.), Juergens wrote:

"The postulated discharge – though focused on a central solar anode – would appear to embrace a vast region of space, most of it devoted to cathode mechanisms. The solar corona, and its extension through interplanetary space and beyond, finds an analog in the "negative glow" region of a glow discharge. The chromosphere we shall interpret as the inner limit of this negative glow. Only the photosphere, at the inner limit of the vast discharge cavity, will be assigned an anode function in this model."



The 'negative glow' region can be seen to have a strong electric field. People objected to Juergens' model because we don't find relativistic electrons, accelerated by a strong radial field in interplanetary space, rushing toward the Sun. But plasma phenomena in a glow

discharge are complex, so appeals to simplistic models based on electrostatics are irrelevant. Instead, I propose that Juergens' model be modified and that interplanetary space is the extensive 'positive column' region of a glow discharge. Cobine writes:

"The positive column is a region of almost equal concentrations of positive ions and electrons and is characterized by a very low voltage gradient."

This model, with planets orbiting within the anode discharge of a star, is of extreme importance when considering [life on other planets](#).

The most important feature of the positive column region of a glow discharge is that the plasma is quasi-neutral. That is, sampling will reveal equal numbers of positive ions and electrons. And that is what we find in the solar 'wind.' It merely forms the conducting plasma medium between the cathode region at the heliospheric boundary and the anode region near the Sun. So looking for excess relativistic electrons rushing toward the Sun is no more sensible than looking at a current-carrying wire and asking where are all the excess electrons rushing from one end of the wire to the other.

The next most important feature of the positive column region of a spherical glow discharge is that throughout most of its volume the plasma maintains a weak but constant radial electric field. That field is what accelerates protons from the Sun to produce the solar 'wind' and it assists the drift of electrons to the Sun. That field also creates a mystery for astrophysicists in their discovery of the small but constant radial deceleration of spacecraft that are moving in the solar plasma. The discovery of that deceleration was a striking confirmation of this glow discharge model of the Sun. See ['Mystery Solved.'](#)

Having described the solar electrical environment we can go on to answer the question posed earlier:

"How can a comet exhibit electrical effects?"

A comet's tail arises from the interaction between the electric charge of the comet and the solar discharge plasma. The comet spends most of its time far from the Sun, where the plasma charge density and voltage with respect to the Sun is low. The comet moves slowly and it easily accumulates enough charge to balance the ambient voltage.

As the comet approaches the Sun, the nucleus moves at a furious speed through regions of increasing charge density and voltage. The comet's surface charge and internal polarization, developed in deep space, respond to the new environment by forming cathode jets and a visible plasma sheath, or coma. The strong electric field in the comet's plasma sheath generates x-rays. The cathode discharge hot spots characteristically jump about the nucleus, and the comet may shed and grow new tails. Or the comet may explode like an overstressed capacitor, breaking into separate fragments or simply giving up the ghost and disappearing. The 'non-gravitational' forces observed perturbing comet orbits are simply due to these electrical interactions.

None of these phenomena were expected from an inert object. The dirty ice ball model was never tenable and has been discredited. It has profound implications for theories of the origin of the solar system and cosmology.

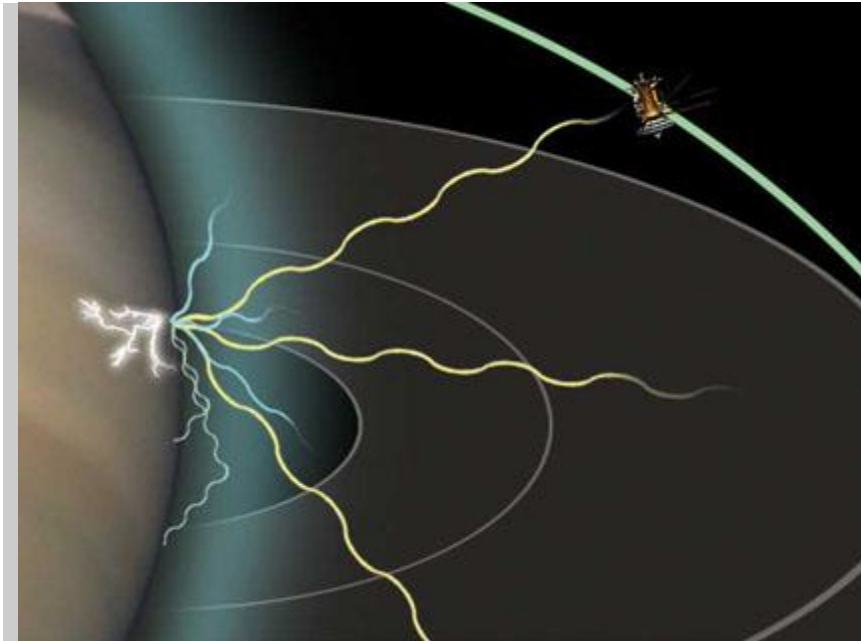
Wal Thornhill

Electrifying Saturn

Posted on [August 8, 2004](#) by [Wal Thornhill](#)

From NASA and PhysOrg.com comes the following report:

Cassini detects Lightning and Radiation at Saturn and Titan's Glow



This artist concept shows how Cassini is able to detect radio signals from lightning on Saturn. Image Credit: NASA/JPL/University of Iowa

The spacecraft's radio and plasma wave science instrument detected radio waves generated by lightning. "We are detecting the same crackle and pop one hears when listening to an AM radio broadcast during a thunderstorm," said Dr. Bill Kurth, deputy principal investigator on the radio and plasma wave instrument, University of Iowa, Iowa City. "These storms are dramatically different than those observed 20 years ago."

Cassini finds radio bursts from this lightning are highly episodic. There are large variations in the occurrence of lightning from day to day, sometimes with little or no lightning, suggesting a number of different, possibly short-lived storms at middle to high latitudes. Voyager observed lightning from an extended storm system at low latitudes, which lasted for months and appeared highly regular from one day to the next.

Comment: This observation fits the electrical model outlined on June 19 in [Cassini's Homecoming](#) where I wrote:

"Saturn's rings form part of the circuit that feeds energy into its plasma donut, where it is stored before discharging into Saturn's ionosphere and generating X-rays. The Sun has a similar plasma donut that discharges to the Sun, causing sunspots and solar flares. We might then expect Saturn's storms to show similar behavior to sunspots, which are the Sun's electrical 'storms.'"

In other words, short-lived storms at higher latitudes at solar minimum and extended storms at low latitudes during solar maximum.

Furthermore, in a NASA news report of July 1 we are told,

"During approach to Saturn, Cassini was greeted at the gate,' said Dr. Bill Kurth, deputy principal investigator for the radio and plasma wave science instrument onboard Cassini. 'The bow shock where the solar wind piles into the planet's magnetosphere was encountered earlier than expected. It was as if Saturn's county line had been redrawn, and that was a surprise.' Cassini first crossed the bow shock about 3 million kilometers (1.9 million miles) from Saturn, which is about 50 percent farther from the planet than had been detected by the Pioneer, Voyager 1 and Voyager 2 spacecraft that flew past Saturn in 1979, 1980 and 1981."

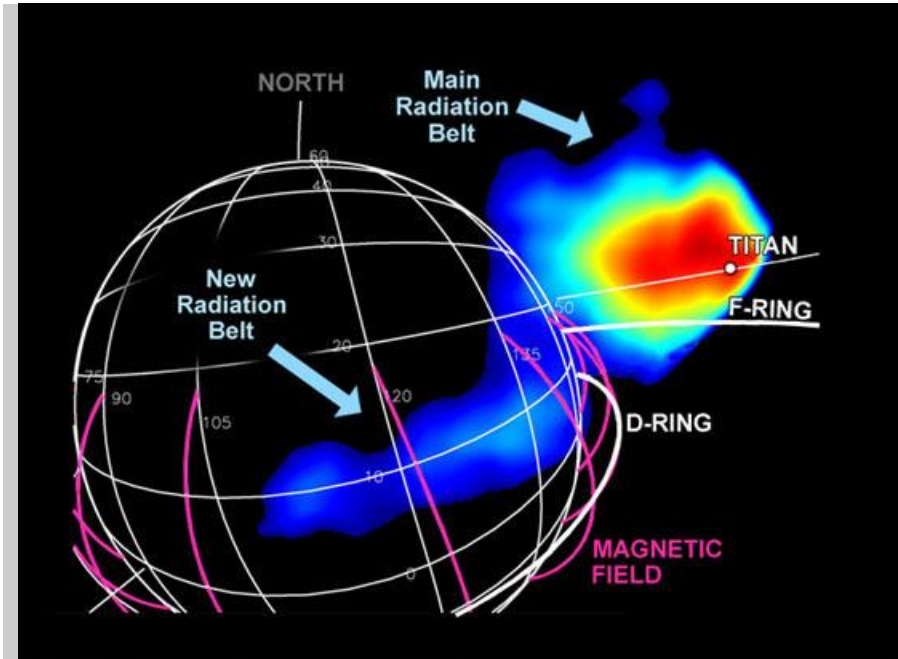
Instead of treating Saturn's magnetosphere conventionally like an inert cosmic windsock flapping in the solar wind, the electric model views a magnetosphere as a Langmuir plasma sheath that expands and contracts in response to the electric stress imposed on the planet inside it. Saturn, now at solar minimum, is under less electrical stress than when the Voyager spacecraft whizzed by. That explains why the Saturnian magnetosphere is 50 percent larger and why lightning has shifted to higher latitudes and reduced in intensity. The Physics.org report continues:

The difference in storm characteristics may be related to very different shadowing conditions in the 1980s than are found now. During the Voyager time period when lightning was first observed, the rings cast a very deep shadow near Saturn's equator. As a result, the atmosphere in a narrow band was permanently in shadow — making it cold — and located right next to the hottest area in Saturn's atmosphere. Turbulence between the hot and cold regions could have led to long-lived storms. However, during Cassini's approach and entry into Saturn's orbit, it is summer in the southern hemisphere and the ring shadow is distributed widely over a large portion of the northern hemisphere, so the hottest and coldest regions are far apart.

Comment: Lightning has little to do with solar heating. Remember that Saturn is about ten times further from the Sun than the Earth. Solar heating is one hundred times less effective at that distance. That has made the high-speed equatorial winds on Saturn, which have dropped in speed since the Voyager encounters from 1,700 km/hr to 1,000 km/hr, very difficult to explain. The ring shadow explanation must be viewed in this context. Solar heating is totally inadequate to explain weather phenomena on Saturn. The

Saturnian lightning and equatorial winds are directly linked to the electrical energy input to Saturn and not to solar heating. Changes in both are therefore related to the solar electrical energy cycle, as reflected by sunspots. This leads us to another discovery that was a surprise for the conventional model of magnetospheres and trapped radiation belts:

A major finding of the magnetospheric imaging instrument is the discovery of a new radiation belt just above Saturn's cloud tops, up to the inner edge of the D-ring. This is the first time that a new Saturnian radiation belt has been discovered with remote sensing.



The magnetospheric imaging instrument onboard Cassini recently discovered a new radiation belt just above Saturn's cloud tops, up to the inner edge of the D-ring. Before this discovery, it was not anticipated that such a trapped ion population could be sustained inside the rings. Image Credit: NASA/JPL/APL

This new radiation belt extends around the planet. It was detected by the emission of fast neutral atoms created as its magnetically trapped ions interact with gas clouds located planetward of the D-ring, the innermost of Saturn's rings. With this discovery, the radiation belts are shown to extend far closer to the planet than previously known.

"This new radiation belt had eluded detection by any of the spacecraft that previously visited Saturn. With its discovery we have seen something that we did not expect, that radiation belt particles can 'hop' over obstructions like Saturn's rings, without being absorbed by the rings in the process," said Dr. Donald G. Mitchell, instrument scientist for the magnetospheric imaging instrument at the Johns Hopkins University Applied Physics Laboratory, Laurel, Md.

Comment: As I wrote on June 19:

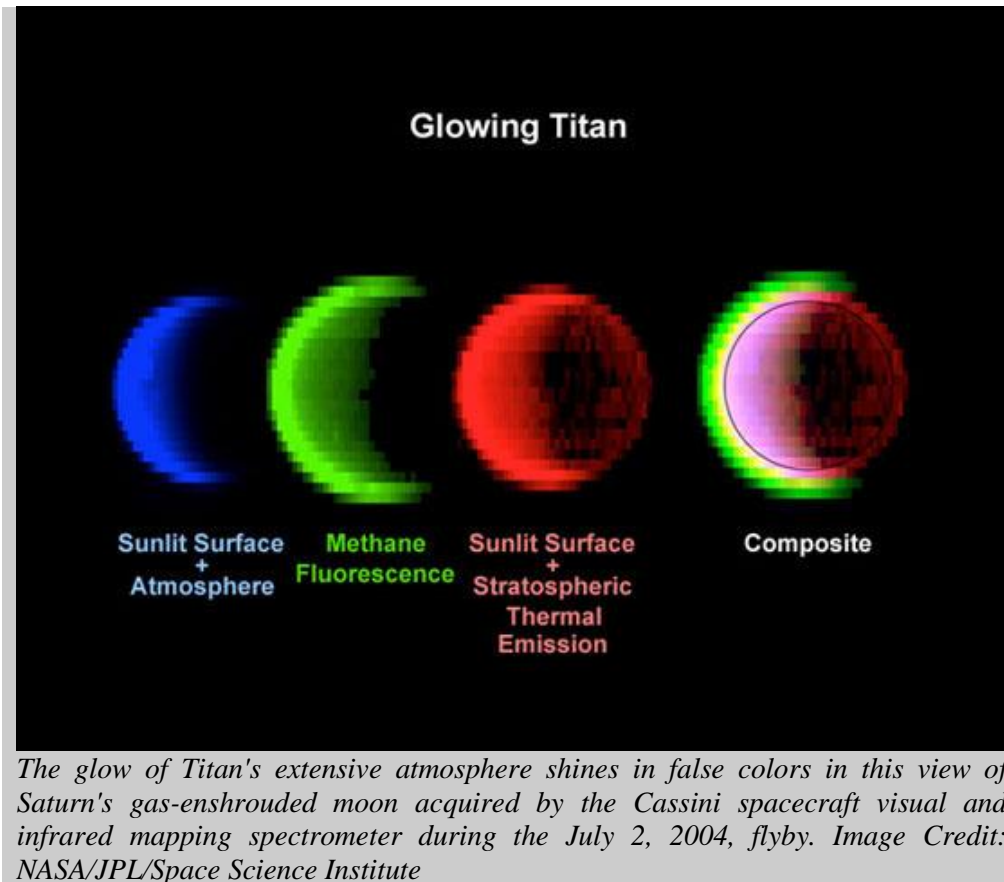
"The test will be to see how predictive it [the electrical model of Saturn] turns out to be."

And:

"Saturn's rings form part of the circuit that feeds energy into its plasma donut, where it is stored before discharging into Saturn's ionosphere and generating X-rays."

Score one for the electrical model. It predicted this finding of an inner radiation belt. However, the term "radiation belt" is misleading. The belt is a donut-shaped "plasmoid," which stores electromagnetic energy in the form of circulating high-energy charged particles. Radiation belt particles do not need to "hop" over Saturn's rings to magically appear above the cloud tops. An electric current drifts radially inward across the rings. At solar maximum, when the Voyager spacecraft sailed past, that radial current took the form of discharges across the rings – forming the enigmatic "spokes." As shown in laboratory experiments, the inflowing electric current forms a plasma donut where the electrical energy is stored. It is that energy that drives the winds and lightning on Saturn. Meanwhile Saturn's giant moon, Titan, orbits in Saturn's electrical environment. The report continues:

Saturn's largest moon, Titan, is also shining for attention. Cassini's visual and infrared mapping spectrometer captured Titan glowing both day and night, powered by emissions from methane and carbon monoxide gases in the moon's extensive, thick atmosphere.



"Not only is Titan putting on a great light show but it is also teaching us more about its dense atmosphere," said Dr. Kevin Baines, science team member for the visual and infrared mapping spectrometer at JPL. "What is amazing is that the size of this glow or emission of gases is a sixth the diameter of the planet."

The Sun-illuminated fluorescent glow of methane throughout Titan's upper atmosphere – revealing the atmosphere's immense thickness and extending more than 700 kilometers (435 miles) above the surface, was expected. However, the night time glow, persistently shining over the night side of Titan, initially surprised scientists.

"These images are as if you were seeing Titan through alien eyes. Titan glows throughout the near-infrared spectrum. If you were an alien it would be hard to get a good night's sleep on Titan because the light would always be on," said Baines.

Comment: Another surprise for the electrically sterile picture of the solar system! On June 19 I wrote, "Titan's electrical plasma interactions may be like those of Venus." I based this view on evidence presented in that news item that Titan and Venus had the same recent origin and that Titan may have received some of Venus' primordial atmosphere. Now that we have discovered that the entire moon is bathed in infrared light, we can turn to Venus for some insights.

Venus actually glows in the visible spectrum on the night side of the planet. Peter Cattermole writes in his book, VENUS:

"Schröter also observed the 'ashen light,' a faint luminosity observed on the night side of the planet, inside the crescent. This effect has been seen by many hundreds of observers since and there can be little doubt as to its authenticity. Explaining exactly what it is, however, is more difficult. In the light of what we now know about Venus, there is every likelihood that the effect is in response to electrical effects in Venus's atmosphere, that is, to aurorae. Early support for this idea came from spectrograms of the night side of the planet obtained in 1955 by N. Kozyrev at the Crimean Astrophysical Observatory. Kozyrev reported spectral bands due to ionized nitrogen at wavelengths of 3914 and 4278 Angstroms – exactly what is observed during terrestrial airglow. Three years later, Newkirk, at the High Altitude Observatory in Colorado, obtained further spectrograms of the night side of Venus, which went some way to corroborating the earlier results."

The associated puzzle as to why Venus maintains a night side ionosphere, given that night lasts 58 Earth days, has not been answered. It is known that fast electrons bombard the night side atmosphere and there is an unexplained large, fast drift of plasma (up to 10 km/sec or 23,000 mph) from day to night hemispheres. The night sky of Venus is lit electrically.

Like Venus in the solar electrical environment, Titan in the less energetic electrical environment of Saturn is responding in a similar manner. That means for Titan the night side glow is just below the visible spectrum, in the infrared.

It will be interesting to see if carbon monoxide is also present in Titan's lower atmosphere in more than the trace amounts measured in the upper atmosphere. The nebular hypothesis requires that nitrogen and carbon monoxide are swept from the sub-nebula of the giant planets before their moons were formed and after those molecules have reacted with solar hydrogen to form ammonia and methane. Such a specific and ad hoc requirement of the nebular hypothesis seems very unlikely to be met. As the leading planetary scientist Dr. S. Ross Taylor notes:

"There is a general problem accounting for the high abundance of methane and for the presence of nitrogen in Titan."

But as I wrote on June 19:

"...we may expect to find that the Titan atmosphere has some of the smell of Venus about it."

This was based on a forensic approach to the history of the solar system, which identified the birth of Venus from the giant Saturn in recent prehistory. Support for this seemingly outrageous claim now comes from experimental high-energy plasma physics. To continue:

"On the Venusian surface, nitrogen molecules are converted to carbon monoxide molecules by a catalytic nuclear reaction in the presence of red-hot iron. ...The carbon monoxide reacts at the hot surface of Venus with water vapor to form carbon dioxide and hydrogen. It is a well-known industrial process."

Now, Titan does not have the surface conditions to convert carbon monoxide to carbon dioxide so the dominance of nitrogen and the presence of carbon monoxide in its atmosphere may be explained as a whiff of the newborn Venusian atmosphere when nitrogen was more abundant. Carbon monoxide and hydrogen would also react at the hot Venusian surface to form hydrocarbons, including methane and ethane. They would be another expected contribution to Titan from Venus, or from the parent, Saturn.

So far, so good for the Electric Universe model. But just how many surprises does it take for the conventional model of the solar system to be discredited? It seems, to paraphrase Carl Sagan:

Extraordinary beliefs require extraordinary failures to discredit them.

Wal Thornhill

The True State of the Universe

Posted on [October 27, 2004](#) by [Wal Thornhill](#)

“... almost the entire body of astronomers can go wrong in a way that, in later years, seems absurd. To hear scientists talk today, you would think the first moment in human history in which nonsensical views are not widely held is now.”

- Fred Hoyle, Home is Where the Wind Blows.

Those who profess to understand it do not know the true state of the universe.



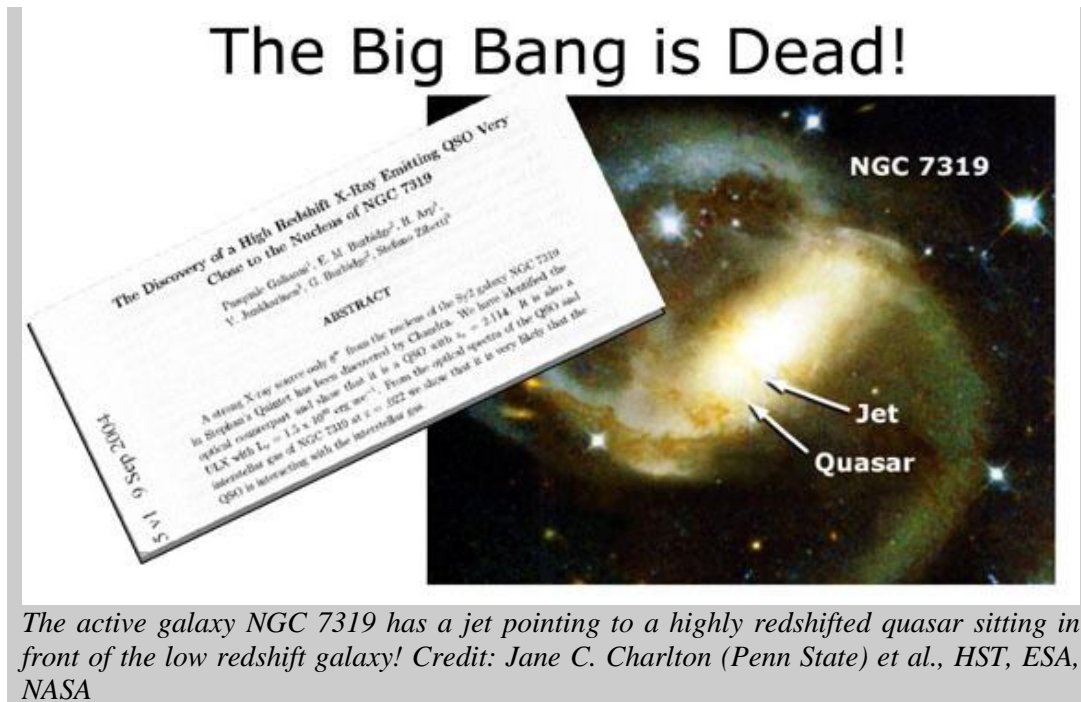
In recent months two of the most popular science magazines have produced special supplements. Scientific American published ‘**The Secret Lives of Stars.**’ New Scientist published ‘**State of the Universe.**’ Like most publications on astronomy they are predominantly speculative fantasy. The reason is simple: the unquestioned belief in the big bang theory. In the big bang theory cosmologists discard such basic principles of physics as “no creation from nothing” and “every effect must have an antecedent cause.” **These principles of physics are inviolate rules. Any contradiction is tantamount to magic, a miracle, or the supernatural. So belief in the big bang theory is no more**

scientific than the religious belief in a creation event. The obscurantism of mathematicians merely supplants that of high-priests.

There is a musty smell of Ptolemaic epicycles about modern astronomy. New discoveries are explained by adding new epicycles to an already complicated model of the universe. New forces and exotic, unseen forms of matter are dreamt up almost weekly and applied where necessary to patch up the model. The patches, or epicycles, obscure the real state of the universe. Big bang cosmology is not predictive. It is not scientific.

For decades empirical evidence has been mounting that removes the foundation of the big bang: 'the redshift-distance equation. It seems that the visible universe is not expanding and it is not as big as we think.

Then, on October 2, 2003, the big bang was proved wrong. Again!



This milestone paper was presented by Margaret Burbidge at the January 2004 AAS meeting in Atlanta. The response, according to Halton Arp, was "overwhelming silence."

The paper has been submitted to astronomical journals. The referees recommended extensive editing. Now it sits awaiting an editorial decision on whether it should be published.

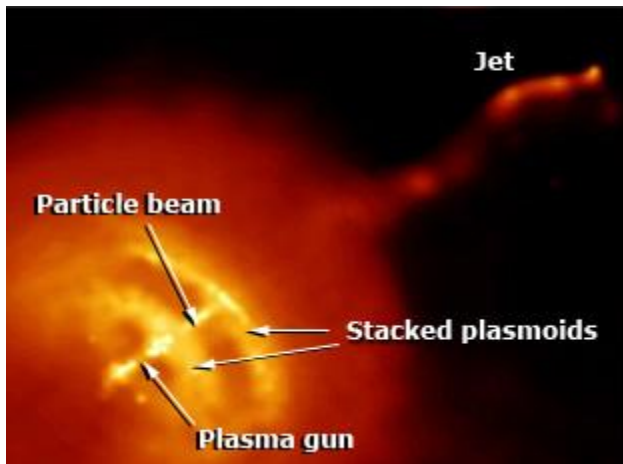
And it sits, and sits...

Arp has placed the [article](#) in the astro/ph archive where those who may be interested can read it, whether or not it is accepted for publication.

The major significance of this paper is that there can be no evasion about connections between galaxies and a nearby redshifted quasar. **In this paper a highly redshifted quasar is shown to sit in front of an opaque low redshift active galaxy, NGC 7319. It means that the redshift of the quasar cannot be a measure of its distance. The redshift of the quasar must be largely an intrinsic property.**

In an attempt to sustain the myth of the big bang it has been suggested that the meaning of this discovery for cosmological models remains uncertain until a mechanism for the generation of quasars from active galaxies and the quasar's intrinsic redshift is understood. That is nonsense. We accept many things as being true and self-evident without understanding the mechanism behind them.

It seems a delaying and self-serving tactic because it is the plasma gun (or [plasma focus](#)) effect that explains quasar ejections from the cores of active galaxies, not imaginary black holes. We can turn to the much closer and equally imaginary 'neutron star remnants' of supernova outbursts for a look at the cosmic plasma gun in action.



The Vela Pulsar Credit: NASA/PSU/G.Pavlov et al.

The official [report](#) describes this image as:

"...striking, almost unbelievable, structures consisting of bright rings and jets of matter. Such structures indicate that mighty ordering forces must be at work amidst the chaos of the aftermath of a supernova explosion. Forces can harness the energy of thousands of Suns and transform that energy into a tornado of high-energy particles that is called a 'pulsar wind nebula.'"

Astronomers know nothing about the surprising phenomena associated with the plasma focus or plasma gun. That is why the image above is 'unbelievable.' However, the stacked plasmoid rings structure is familiar to those experimenting with high-energy electric discharges. It requires electrical energy to be supplied to the star, not vice-versa. The star at the focus of the plasma discharge is not the prime source of the prodigious power output. And the star is not rotating impossibly several times a second. The pulsed power

from Vela is typical of a relaxation oscillator circuit, where electrical energy is stored for a time then released suddenly, in bursts. In this case, electrical energy pouring toward the star is stored in an equatorial plasmoid ring until it is suddenly switched into polar jets. Plasma instabilities in the axial discharge may form stacked polar plasmoids and bright knots of matter in the jet. The corkscrew shape of the jet is diagnostic of a polar electric discharge.

Electromagnetic forces between cosmic current streams, which obey a $1/r$ law and are far stronger and more far-reaching than gravity, govern the dynamics of the system. So calculations of movement of matter based on Newtonian gravitational physics will give wildly exaggerated answers about the mass of the central object.

As this example hints, plasma cosmology is firmly grounded in electrical engineering principles and has no need for unobserved black holes, neutron stars or dark matter to explain the observed universe. Plasma cosmology doesn't need to invent new forces or new physics to save its models. But it does expose our ignorance about an origin of the universe, whatever that means.

Let me return to the highly redshifted quasars. It is my view also that none of the mechanisms proposed to date will explain intrinsic redshift because it hinges on understanding the phenomenon of mass and the real cause of quantum effects. It is obvious the two are intimately connected because quasars have been shown to increase in mass as their redshift decreases in quantized jumps. Unfortunately for physicists, their minds have been warped by Einstein's nonsensical, geometrical view of gravity and their impossible leap of meaning for Einstein's famous equation, $E=mc^2$. The 'm' represents mass, not matter. Matter cannot be 'created' from energy. The matter in the universe could not have formed from the energy of an explosion.

The real answers in cosmology will require us to return to the fundamental principles of physics. That may take a long time for it seems principles in physics are seriously out of vogue. It is the price we will continue to pay for so long as mathematicians remain the fashion leaders in physics. For mathematicians have no such principles. To them physics is an intellectual game like Lewis Carroll's 'Alice in Wonderland.' And like Carroll's famous book, the more reality is bent out of shape the better the media and the public seem to like it. And funding pours in for Mad-Hatter ideas.

A quick thumb through the topics in the magazines mentioned clearly demonstrates the sorry state of cosmology. Comments from the Electric Universe perspective are appended:

The First Stars in the Universe by Richard B. Larson and Volker Bromm.

Exceptionally massive and bright, the earliest stars changed the course of cosmic history

The history of the universe is a concocted fiction based on the big bang model. When we look at faint, high-redshift objects we are not looking back to a time near the big bang. Also we are not looking at stars that are at the great distances inferred from their redshift. So their exceptional brightness is a miscalculation based on a falsified model. Bright stars result primarily from their electrical environment rather than their mass. The puzzling over-abundance of metals (elements heavier than hydrogen and helium) in present-day stars and x-ray emitting intergalactic gas is easy to explain in the electrical model of stars where all of the heavy elements seen in stellar spectra are formed right where we see them -' at the stellar surface. The notion of recycling stellar detritus to increase metallicity was always a flight of fancy, given the vast distances separating stars and the few exploding stars.

Fountains of Youth: Early Days in the Life of a Star by Thomas P. Ray

To make a star, gas and dust must fall inward. So why do astronomers see stuff streaming outward?

Stars cannot be formed by gas and dust falling inward. Rotational energy will put a stop to it. Molecular clouds, from which stars are supposed to form, show no signs of collapsing. And it has never been shown how planets can form from a dusty disk encircling a star. Instead, stars are formed by the strong electromagnetic 'pinch effect,' like beads on a string, along a discharge in a dusty plasma. Each string is a cosmic Birkeland current, which scavenges gas and dust at long range with its $1/r$ electromagnetic 'pinch' force. Unlike gravity, the electric force can strongly repel as well as attract. So there is no mystery about 'stuff streaming outward' from stars. Nor is it surprising that the streams take the form of thin jets. A thin jet is the hallmark of an electric discharge. Planets, too, are formed not by separate accretion but by electrical expulsion of core material from larger bodies.

Companions to Young Stars by Alan P. Boss

The surprising finding that even the youngest stars commonly exist in sets of two or three has revised thinking about the birth of star systems

Double star systems are common amongst mature stars. Multiple star systems were thought to be due to capture, long after the stars were formed. So it was a surprise when young stars were found to have companions. But this finding is not a surprise if all stars are born in a cosmic electric discharge. The simplest way for a star to reduce electrical stress as it grows is to increase its effective surface area by electrically fissioning. The result is a companion star or a gas giant. It explains why gas giants are found in tight orbits about nearby stars. It helps explain the large number of brown dwarf stars being discovered.

Also, the usual ideas about the ages of stars are invalid for electrically powered stars. A star can change its spectral type and luminosity overnight if it is electrically disturbed. In that sense too, it is no surprise that there is no distinction between stars characterized

incorrectly as mature or young. That also means that estimates of the age of the Sun, its longevity and future behavior are invalid.

Another issue is that of 'accretion disks' about some stars. Accretion disks are used to explain the formation of planetary systems. The electrical model of stars suggests that they are more likely to be expulsion disks, since matter can be electrically expelled from a star equatorially or in polar jets. A similar phenomenon is seen in active galaxies where quasars are sometimes emitted from the nucleus in the plane of the galaxy, rather than along the spin axis.

The Discovery of Brown Dwarfs by Gibor Basri

Less massive than stars but more massive than planets, brown dwarfs were long assumed to be rare. New sky surveys, however, show that the objects may be as common as stars

If stars are powered electrically there is no lower limit to the mass of a star. They do not require central thermonuclear reactions to produce light and heat. So brown dwarfs do not gradually fade away as they lose internal heat. Their mass and temperature do not indicate their age. All bodies in the universe receive electrical energy to some degree. So our definition of a star will need to be revisited.

The Stellar Dynamo by Elizabeth Nesme-Ribes, Sallie L. Baliunas and Dmitry Sokoloff

Sunspot cycles—on other stars—are helping astronomers study the sun's variations and the ways they might affect Earth

Stellar magnetic fields are not generated magically out of sight by problematic dynamos inside stars. As every schoolchild knows, magnetic fields are caused by electric currents. The same electric currents that light the star generate stellar magnetic fields and cause sunspots where the current density is high. Electric stars are cooler inside so no tricks are required to explain why sunspots, which punch a hole through the star-wide electrical storm, show a cooler interior.

Sunspot cycles are an indicator of the variability of a star's source of electrical energy and therefore the radiant energy arriving at the Earth. Stellar discharges contrive to restrict the variability more to x-ray output. The sunspot patterns are cyclical probably because of the structure of galactic Birkeland current filaments and their movement relative to the Sun. Also, being a part of a galactic power circuit, there will be fluctuations. The important lesson for us on Earth is that there are no guarantees about our future climate. The study of sunspot cycles on other stars may teach us a great deal when we apply the electrical model.

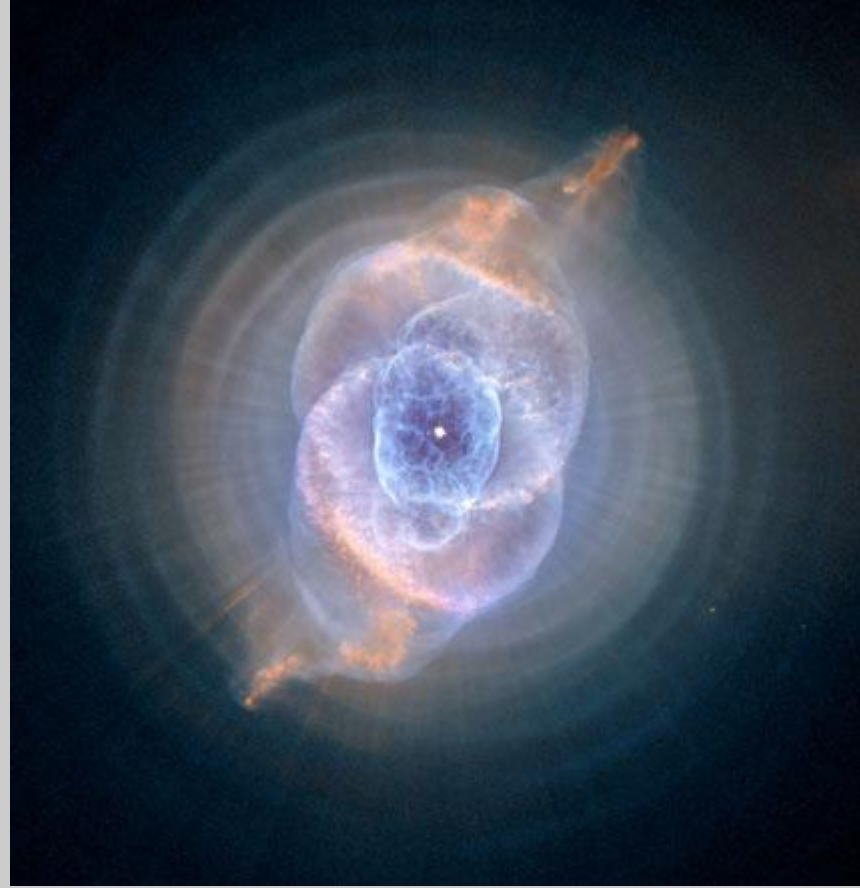
When Stars Collide by Michael Shara

When two stars smash into each other, it can be a very pretty sight. Once considered impossible, these occurrences have turned out to be common in certain galactic neighborhoods



Image: Scientific American

Stars do not smash into one another. The artist's rendition of a white dwarf colliding with the Sun is entirely fanciful. Stars are overwhelmed by electrical interactions long before physical contact can be made. Gravity plays an insignificant role. Instead, stars will discharge cataclysmically, emitting x-rays and smaller bodies such as companion stars or gas giants. Electrical forces also mediate capture and circularization of orbits.



Cat's eye nebula Credit: NASA, ESA, HEIC, and The Hubble Heritage Team (STScI/AURA)

Stellar plasma discharges are often very beautiful, forming bipolar filamentary and cellular patterns typical of electrified plasma but not of mechanical winds, collisions and explosions.

X-ray Binaries by Edward P. J. van den Heuvel and Jan van Paradijs

When ultradense neutron stars feed on their more sedate companions, the binary systems produce outpourings of x-rays and drastically alter the evolution of both stars

The electric force is one thousand billion billion billion billion times more powerful than gravity and consequently ultradense objects are not needed to explain compact sources of energy. Furthermore we have no evidence that ultradense objects exist, much less an object made of unstable neutrons. Orbital calculations of a close electrical binary star system using the ultra-weak force of gravity will give wildly inflated gravitational masses. Stars do not 'evolve' by consuming themselves or transferring matter gravitationally. Their brightness and spectral type are determined largely by the electrical stress in their environment. X-ray bursts and regular pulses from binary stars are the result of electric discharges. They are a natural feature of low-pressure electrical

discharges. To suggest that they are due to matter 'falling' from one star on to another is laughable.

***Magnetars** by Chryssa Kouveliotou, Robert C. Duncan and Christopher Thompson*

Magnetized so intensely, some stars alter the very nature of the quantum vacuum

The quantum vacuum is a fictitious construct, like the grin of Lewis Carroll's Cheshire cat, arising from the probabilistic and therefore, non-physical, nature of quantum theory. It is reminiscent of Zaphod Beeblebrox's spaceship with the 'infinite improbability drive.' Douglas Adams was an acute observer of the nonsense in science and religion. The quantum vacuum also violates the physics principle of 'no creation from nothing.' The beam of radiation from a stellar plasma gun effect offers a more plausible real-world explanation for the effects attributed to a magnetar (a strongly magnetized neutron star). NASA exclaimed: "When you have eliminated all other possibilities, Sherlock Holmes instructed, whatever remains, however improbable, must be the answer." As usual, NASA chose the improbable rather than looking for real possibilities from plasma cosmology.

***Supersoft X-ray Stars and Supernovae** by Peter Kahabka, Edward P. J. van den Heuvel and Saul A. Rappaport*

Supersoft sources—which spew unusually low-energy x-rays—are now thought to be white dwarf stars that siphon matter from their stellar companions and then, in many cases, explode

X-rays are the hallmark of electric discharges. There is no more improbable way of generating x-rays than to drop matter from a great height onto a star. Nature can't be that stupid. In the case of binary star systems that emit copious soft x-rays, it would seem that there is a steady form of plasma discharge taking place between the stars that is the source of the radiation, rather than the stars themselves. In such a circumstance, a plasma instability could lead to a stellar explosion, or supernova.

It has never been shown satisfactorily how a star can explode against the force of its strong gravity. The rebounding implosion model is as far-fetched as x-rays from falling objects. What is worse for that model, it cannot explain the exquisite bipolar filamentary and cellular planetary nebulae that often result from stellar explosions (see earlier picture). The electrical model of stars has a simple explanation for all of these features.

***Binary Neutron Stars** by Tsvi Piran*

The inevitable collapse of these paired stellar remnants generates runaway heating that, for a few weeks, emits more light than an entire galaxy

Commonsense shrieks at us that you cannot have an object weighing more than the Sun stuffed into the size of an asteroid and spinning thousands of times a second! But that's a neutron star. So here we have two theoretical figments in orbit and generating light as they coalesce to form a black hole in 'a tiny fraction of a second.'

Plasma discharge features more simply and realistically explain all of the phenomena associated with so-called neutron stars. And it is the sudden release from stars of stored internal electric energy that gives rise to supernova outbursts. The release is easily triggered by an electrical instability in a binary system.

The Brightest Explosions in the Universe by Neil Gehrels, Luigi Piro and Peter J. T. Leonard

Every time a gamma-ray burst goes off, a black hole is born

The simple plasma gun concentrates electrical power to produce the most powerful beam of gamma and particle radiation known on Earth. As discussed earlier in relation to the Vela pulsar, Nature is quite able to perform that trick. It does not signify the birth of that impossible object, the black hole.

So much for Scientific American Fiction.

Let's see how the New Scientist supplement, 'The State of the Universe' fares.

It begins with a foreword by England's Astronomer Royal, Martin Rees, grandly titled "Welcome to the New Age of Enlightenment." He writes:

"even the more cautious among us are confident that we now know some of the key cosmic numbers, and are grasping at least the outlines of how stars and galaxies emerged. Astronomers can trace the evolutionary story back long before our solar system formed 4.5 billion years ago; we can now observe galaxies that are so far away that their light set out 12 billion years ago."

Those who, like Martin Rees, are up close to the action in astronomy are not necessarily best placed to judge whether we are in a new enlightened era. If they could be called as expert witnesses and cross-examined before a jury of engineers there are many basic questions I would like to ask. For example, "how do you create matter?" "What causes the phenomenon of mass?" "What causes the phenomenon of gravity?" Objections would be raised to any answers that violated the principles of physics, appealed to authority, or were based upon unfalsifiable assumptions. I have no doubt that the testimony would be dismissed. There is no more effective way to deal with the hubris of experts.

Of course, asking probing questions is more properly the role of investigative journalism. But as Halton Arp wrote:

"Investigative journalism so far as science is concerned is clearly dead in the water. The media generally take the easy path of handouts and opinions from authoritative sources. No hard work of checking facts and conflicts of interest."

[Seeing Red, p. 260.]

The warning signs are huge that there is something rotten at the core of cosmology. Rees continues:

"We have extended the frontiers of our knowledge, and new mysteries have come into focus; we're still perplexed, but at a deeper level than before. As we compiled a more complete inventory of what is out there in space, for example, something very surprising has emerged: 96 per cent of the universe is unaccounted for. Everything that shines – stars, galaxies and glowing gas – amounts to just 4 per cent of all that's there. 'Most of the gravitational force that holds each galaxy together comes not from the stars and gas we see, but from "dark matter" – probably a swarm of particles, whose nature remains unknown, left over from the big bang."

That is hardly enlightenment! We are told the visible universe is composed of objects moving predominantly under the influence of gravity. That is an assumption. It follows a belief that 'electricity doesn't do anything in space' and can be ignored. If that is wrong, it is a remarkable oversight. It seems prudent to question that belief before spending billions of dollars on particle experiments looking for chimera required by a theory that cannot explain the most basic observations of the heavens. Rees argues:

"...there is a symbiosis between cosmology and physics."

There is – in the sense that wild conjectures about the big bang, dark matter and ultradense objects fuels a scandalous waste of research funds in both fields.

Rees also writes:

"When a theory breaks down, or confronts a paradox, we need a new unifying idea that transcends what went before."

But then he continues:

"For example, Einstein's theory and the quantum theory are both superb within limits – indeed they are the foundation of 20th-century physics – but these theories cannot be meshed together: at the deepest level they are contradictory."

Surely, a man of his intelligence can see that those contradictions are at the heart of the problems facing cosmologists? Maybe those theories are not as superb as advertised. Unfortunately for experts like Rees, history shows that the answers are likely to come

from others untrained in the field who bring to the problem a beginner's mind. Experts have not taught them what to believe.

When Time Began by Paul Davies

'What makes us so sure there was a big bang? Just rewind the universe and there's only one conclusion..'

In a typically glib opening line the assumption that the universe can be 'just rewound' in time is stated as a fact, without question. The paper by Burbidge about the quasar in front of NGC 7319 shows it cannot be done. Davies goes on:

"Direct evidence for a cosmic origin in a big bang comes from three observations. The first, and most direct, is that the universe is still expanding today. The second is the existence of a pervasive heat radiation that is neatly explained as the fading afterglow of the primeval fire that accompanied the big bang. The third strand of evidence is the relative abundances of the chemical elements, which can be correctly accounted for in terms of nuclear processes in the hot dense phase that followed the big bang."

Following Arp, the Burbidges and others, the evidence for universal expansion is no more. The so-called heat radiation is more neatly and accurately predicted by plasma cosmology. And the relative abundances of chemical elements was not predicted from the big bang theory. It was arrived at by working backwards from the observations and twiddling countless knobs on the model to arrive at some sort of match. In the [Open Letter to the Scientific Community](#) it was put this way:

"..the big bang theory can boast of no quantitative predictions that have subsequently been validated by observation. The successes claimed by the theory's supporters consist of its ability to retrospectively fit observations with a steadily increasing array of adjustable parameters, just as the old Earth-centred cosmology of Ptolemy needed layer upon layer of epicycles."

Davies proceeds from this opening misinformation to indulge in a mathematician's discussion of meaningless concepts like: "...gravity is a warping of space-time," and "the speck from which space emerges is not located in anything. It is not an object surrounded by emptiness. It is the origin of space itself, infinitely compressed. Note that the speck does not sit there for an infinite duration. It appears instantaneously from nothing and immediately expands." Douglas Adams eat your heart out!

From there it is a short step to "form a more fruitful meeting ground for science and theology," which is the subtext for much of Davies' work and for which he won the Templeton Prize. That prize is 'for progress toward research or discoveries about spiritual

realities,' and it is currently valued at 795,000 pounds sterling. The title of his prize-winning address? It was "Physics and the Mind of God."

I have news for the Templeton Prize committee (Davies was once a committee member too). Big bang cosmology and religion were never separated! The prize is meaningless as far as cosmology is concerned and the committee incestuous with past prize-winners and fellow astrophysicists as members. If cosmology is ever to become a science it must be wrested from deluded mathematicians who consider God to be one of them. By their dominance, physics has become a cuckoo's nest.

Real 'progress toward research or discoveries about spiritual realities' will only be possible when the electrical nature of the universe and the recent history of the solar system are properly investigated. All creation myths are earthly "re-creation" stories following dramatic electrical events within our planetary system. They have nothing to do with the creation of the universe. 'Fiat lux' did not signal that our ancestors knew, or were somehow told, about the big bang. Common sense tells us that's impossible.

Meanwhile the writing is already on the wall (pardon the pun) when a leading plasma physicist can decipher the true meaning of prehistoric petroglyphs. They demonstrate unequivocally that our ancestors witnessed catastrophic cosmic plasma discharges that involved the Earth. If anyone deserves the Templeton Prize, it is he.

Without exception, the subsequent articles in State of the Universe are no better and deserve no comment. They relish all of the fantastic possibilities of the unreal universe of the big bang, leaving no singularity unturned. This tiny part of the universe is all showbiz.

So what is the true state of the universe?

The works of the astronomers, Halton Arp and his colleagues Geoffrey and Margaret Burbidge, Sir Fred Hoyle, Jayant Narlikar, Jack Sulentic and others, show that the visible universe is small and static. That means the larger universe is of unknown age and extent.

Plasma cosmologists show that the visible universe is threaded with cosmic power lines, known as Birkeland currents. Their origin beyond the visible universe is a mystery. This electrical power source renders thermodynamic arguments about the age of the visible universe and its fate invalid. The visible universe is not a closed system.

Galaxies are the largest plasma discharge formations in the visible universe. Stars are the cosmic electric street lamps that light them.

Arp has also shown that active galaxies give birth to quasars, which in turn become companion galaxies. He has shown that the intrinsic redshift of galaxies is quantized. That strikes at the very heart of contradictory 20th century physics, with its worship of Einstein and quantum theory.

It is evident that a revolution in thinking is required before we can even begin to ask the right questions about the state of the universe. It requires humility in the face of our ignorance and a beginner's mind. Cosmology attempts to paint the biggest picture of our existence. In my opinion it must be an interdisciplinary pursuit in an attempt to avoid the pitfalls of the present closed-shop mentality and indoctrinated belief systems.

I leave the last word to Halton Arp, who has been called the latter day Galileo, following the refusal of other astronomers to look at his discoveries that refute the big bang:



"After all, to get the whole universe totally wrong in the face of clear evidence for over 75 years merits monumental embarrassment and should induce a modicum of humility."

- Halton Arp, What has Science Come to? Journal of Scientific Exploration.

Wal Thornhill

Titan Puzzles Scientists

Posted on [November 29, 2004](#) by [Wal Thornhill](#)

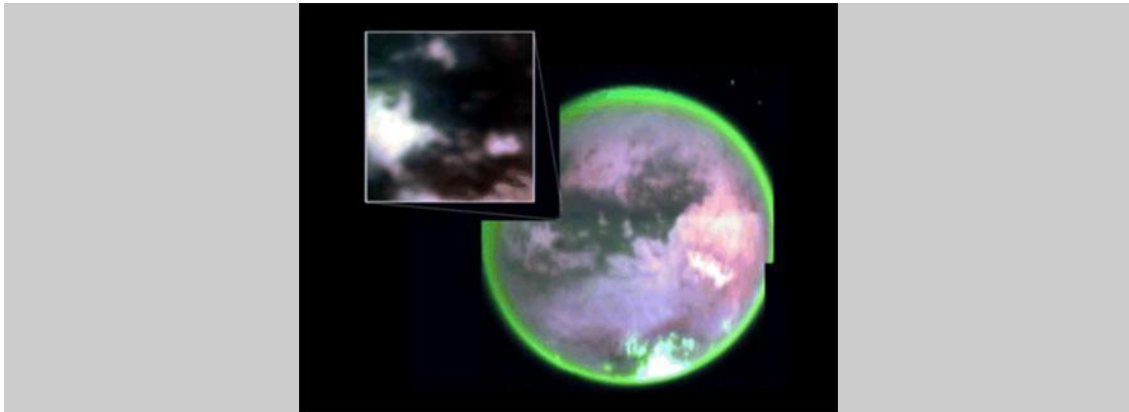
On October 26, NASA's Cassini-Huygens spacecraft swung by Titan at a distance of less than 1200 kilometers, the first of many fly-bys planned in the next few years.

Titan is Saturn's largest moon and the second largest moon in the solar system, after Jupiter's Ganymede. Titan is an enigma, having a massive atmosphere mainly of nitrogen with a pressure at the surface 1.6 times that of the Earth's air at sea level. Its atmosphere also contains methane and at least nine other organic molecules. The methane is being continually destroyed by solar photolysis, which raises a further problem about its source of resupply. Unfortunately, the organic molecules in Titan's atmosphere cause a global orange haze that has prevented us from seeing surface features. So, like the Magellan orbiter that allowed us to "see" the surface of Venus, Cassini is equipped with haze penetrating radar and infrared scanners.

On this first close flyby of Titan, Cassini's radar mapped about one percent of Titan's surface. The radar survey covered a strip 120 kilometers (75 miles) wide and 1,960 kilometers (1,200 miles) long in Titan's northern hemisphere. Cassini also imaged Titan's surface features through the haze using an infrared spectrometer. The result? The Dallas Morning News reported:

"When the \$3 billion Cassini spacecraft sailed past Titan three weeks ago, it was supposed to clear up many of the mysteries about Saturn's largest moon. Instead, it has left scientists more befuddled."

The new Cassini images do not support previous theories about Saturn's moon.



This image taken by Cassini's visual and infrared mapping spectrometer clearly shows surface features on Titan. It is a composite of false-color images taken at three infrared wavelengths: 2 microns (blue); 2.7 microns (red); and 5 microns (green). A methane cloud can be seen at the south pole (bottom of image). This picture was obtained as Cassini flew by Titan at altitudes ranging from 100,000 to 140,000 kilometers (88,000 to 63,000 miles), less than two hours before the spacecraft's closest approach. The inset picture shows the landing site of Cassini's piggybacked Huygens probe. Credit: NASA/JPL/University of Arizona

This report should be read in conjunction with my news item in [June](#), which argues a different history of the solar system and, in particular, Saturn. It is time to reexamine the predictions I made there about Titan:

We should expect to see family traits amongst the members of the Saturnian family — including the departed Earth, Mars and Venus. For example, the moon Titan, which is larger than the planet Mercury, seems to be a close sibling of Venus, probably born from Saturn at about the same time. That Titan may be young is hinted at by its eccentric orbit, which cannot have persisted for billions of years. So we should be alert to similarities between Titan and Venus. It is already known that Titan has the densest atmosphere of any terrestrial planet, after Venus. That is a huge puzzle for scientists. After all, two of Jupiter's moons, Ganymede and Callisto, have no atmosphere yet they are of similar size. So it would not be surprising if Titan had warm spots over the poles, like Venus. Titan also has a global layered haze like Venus. (Haze layers seem to be the condensed form that non-polar molecules take in an electrified atmosphere. They are quite distinct from the vertically moving clouds that polar molecules, like water, form). And just as Mars has a whiff of the Venusian atmosphere, with carbon dioxide and nitrogen as major constituents, we may expect to find that the Titan atmosphere has some of the smell of Venus about it. Both Venus' and Titan's atmospheres, being very young, will not yet be in equilibrium. So calculations about atmospheric constituents that assume equilibrium as a starting point will be wrong. The methane found in Titan's atmosphere is quickly destroyed by sunlight so it has to be replenished. That has led to the suggestion that Titan must have a hydrocarbon ocean for the methane to have lasted for the conventional age of the solar system. However, radar, infrared and radio observations of Titan have not found signs of a hydrocarbon ocean. In fact one radar return was "of a type that we would expect to get back from Venus." Titan is most likely a baby brother of Venus!

So what has been discovered in this first close flyby of Titan?

In New Scientist of November 6, 2004, **Titan images add to moon's mystery**, Stephen Battersby reported:

The world got its first peek at the surface of Saturn's moon Titan last week. The images were taken as NASA's Cassini-Huygens spacecraft swept past the moon... The images show a landscape that is clearly still being shaped. Although Titan must have suffered numerous meteor impacts in the past, its surface today is largely crater-free. Somehow these scars must have been eroded or filled in." "We are seeing a place that is alive, geologically speaking," says Charles Elachi, head of the team running Cassini's radar instrument.

Comment: That is precisely what was said about Venus when the Magellan Orbiter revealed that planet's surface. It is only supposition that Titan's surface is "still being shaped." It is based on the belief that "Titan must have suffered numerous meteor impacts in the past" and therefore something must have occurred from within the moon to fill the craters. However, like Venus, there may have been no impact craters to fill. No one has witnessed a crater formed by a celestial impact. The relationship between craters and impacts is a hypothesis that has been accepted without considering another common form of cratering — that of electrical cratering. And electrical cratering has the virtue of explaining all of the curious features of planetary craters, particularly their circularity and tendency to occur in chains, with little disturbance of one crater by its neighbor.

We must therefore allow that Venus and Titan may both have new surfaces if planets and moons are not formed through accretion by impacts billions of years ago. The "befuddlement" and "mystery" may prove to be the result of an unquestioned belief in that hypothesis. Predictions based on that story have had no success in the space age. So we may be confident that planets did not accrete from a solar nebula.

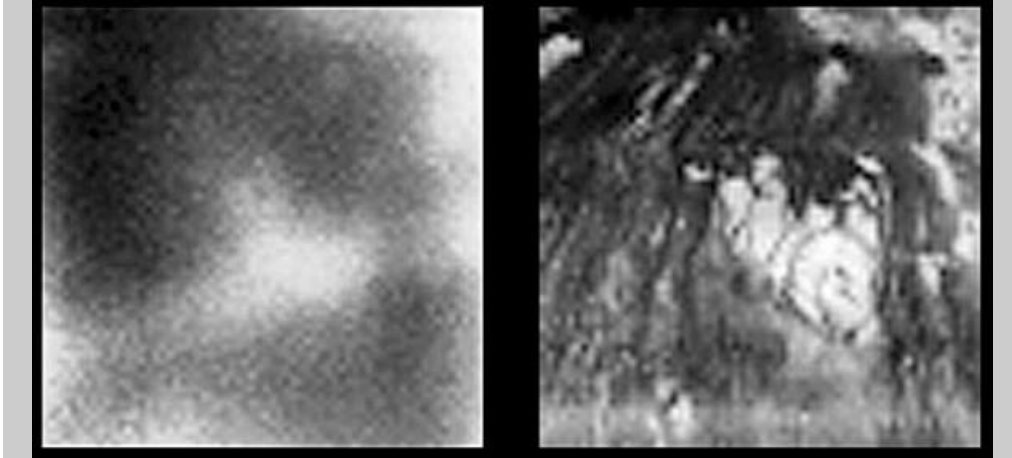
Professor William H. McCrae wrote:

"It is impossible to discover the origin of the solar system by observing it now, and working steadily backwards in time in order to infer the whole of its past history."

While agreeing with this statement, we must nevertheless make use of all available human observations of the sky before working forward from some hypothetical beginning. One of the greatest, albeit unheralded, surprises of the 21st century will be that the last chapter of the development of the solar system was witnessed and recorded by modern humans in prehistory. A forensic attitude to that evidence, as outlined in the earlier news item, can yield far more reliable predictions about what we will find in space than the purely hypothetical approach.

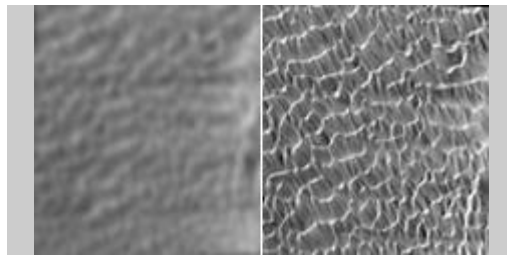
The New Scientist report continues:

Titan's surface has thrown up other puzzles too. Infrared and radar images reveal bright "islands" surrounded by darker material, often crossed by long narrow features. These long lines – perhaps canyons, ridges or cracks – are up to 100 kilometres long but less than 200 metres wide. Just what these features are and how they formed is the focus of intense discussion.



These images show the surface of Titan at two different infrared wavelengths. They were captured by the visual and infrared mapping spectrometer onboard Cassini as the spacecraft flew by at an altitude of 1200 kilometers (745 miles) -- Cassini's closest approach yet to the hazy moon. The image on the right, taken at a wavelength of 2 microns, is the most detailed picture to date of the Titan's surface. It reveals complex landforms with sharp boundaries, which scientists are eager to further study. The image on the left was taken at a wavelength of 1 micron and shows approximately what a digital camera might see. Credit: NASA/JPL/University of Arizona

Unless they are artifacts of the imaging, the lines in the right hand image seem to be chains of craters. Venus too is covered with "long, narrow features" of constant width over very long distances, often featuring a chain of craters. They are identical to chains of craters on the Moon that are thought to be the result of fluidization of surface materials by venting of gases along presumed fault lines. But there are many problems associated with such explanations. The electrical explanation sees these narrow linear features formed by cosmic lightning, traveling across the surface. It explains the length of the channels, their constant width and on-channel cratering. We may expect many of the channels to have raised levees built up by ejecta from the trench. The channels may run uphill as well as down, discounting the channel having been cut by a flow of liquid.



Martian dune field with blurred image on the left shows how the left hand infrared image of Titan could be a result of a similarly pitted or etched surface.



This radar image of the surface of Saturn's moon Titan was acquired on October 26, 2004, when the Cassini spacecraft flew approximately 1,200 kilometers (745 miles) above the surface and acquired radar data for the first time. It reveals a complex geologic surface thought to be composed of icy materials and hydrocarbons. A wide variety of geologic terrain types can be seen on the image; brighter areas may correspond to rougher terrains and darker areas are thought to be smoother. A large dark circular feature is seen at the western (left) end of the image, but very few features resembling fresh impact craters are seen. This suggests that the surface is relatively young. Enigmatic sinuous bright linear features are visible, mainly cutting across dark areas. The image is about 150 kilometers (93 miles) wide and 250 kilometers (155 miles) long, and is centered at 50 N, 82 W in the northern hemisphere of Titan, over a region that has not yet been imaged optically. The smallest details seen on the image are about 300 meters (984 feet) across. Image credit: NASA/JPL

On November 10 the NewScientist.com news service ran another report by Stephen Battersby titled: "**Titan has no breaking waves.**"

Ideas about the nature of Saturn's moon Titan are going through a total revolution as a result of new observations from the Cassini space probe. For many years, the prevailing view has been that Titan, hidden under perpetual cloud cover, was the only place in the solar system other than Earth whose surface was dominated by large liquid lakes or oceans up to three kilometres deep. But close-ups of the surface completely rule out such widespread liquid bodies, say scientists in the Cassini team.

The liquid was thought to be hydrocarbons such as ethane rather than water, because of Titan's frigid -179°C surface temperature. There had been hope that these bodies of liquid might harbour early stages in the development of biological molecules, and perhaps even simple forms of life. All that has changed, according to planetary scientist Robert Nelson of NASA-JPL. "That paradigm has been shaken to its foundations," he said on Tuesday at the American Astronomical Society's Division of Planetary Sciences annual meeting.

Dry as a bone

As recently as 2003, Earth-based radar observations provided strong evidence that as much as three-quarters of Titan's surface was wet. But the new close-ups, while they only cover a portion of the surface, have completely ruled this out and make it highly unlikely that there is any liquid on the surface at all. Images taken by Cassini on 26 October, from a distance of just 1200 kilometres, failed to show any signs of the mirror-like reflections that would be expected from a liquid surface, even though the angles were right to see such reflections from at least four locations. Photometric profiles showed considerable variations across dark areas previously identified as possible lakes or seas. A liquid surface would have been more uniform. Radar imaging also showed variations in reflectivity. "There is no evidence of oceans," says Carolyn Porco, Cassini imaging team leader. But project manager Dennis Matson cautions that "we've only seen part of Titan." While extensive liquid bodies are ruled out, it is still possible there may be some much smaller bodies. "Perhaps more likely," he suggests, "is a kind of slushy ice surface."

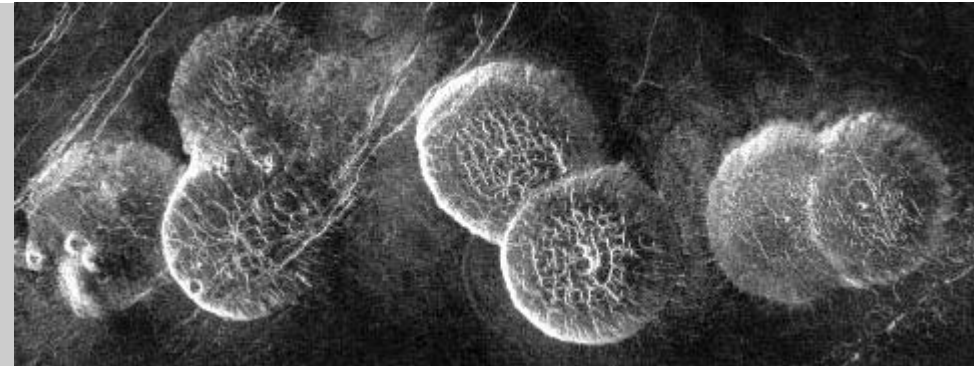
Comment: The idea that Titan may have a considerable amount of low density liquids or ices came originally from calculations of its density. However, estimates of the composition of celestial bodies assume that we understand the real nature of gravity. We obviously don't. So there is no reason to assume that the gravitational constant, 'G,' is the same for all bodies in the universe, particularly when it is the most elusive "constant" to measure on Earth. So we cannot be confident about the calculated ratio of rock to ices on Titan. But the presence of methane in Titan's atmosphere seemed to require an ocean of liquid hydrocarbons as a reservoir that could provide a source of that gas lasting for the conventional age of the solar system. However, the radar image of Titan fits more closely (as we shall see) with some of those returned by the Magellan Orbiter from dry and rocky Venus. The methane puzzle has not been solved.

The report continues:

Suggestions of an active, dynamic surface on Titan are beginning to emerge. Not a single crater has been identified yet, which means the surface must be young and active. And there are some indications of volcanic activity produced by liquid water. Such cryovolcanism has been seen on other icy moons. One large circular feature, suspected of being a crater until closer examination showed it to be flat, closely resembles the pancake domes seen on Venus that are produced by magma welling up to produce a bubble that then slumps down to a nearly flat profile. On Titan, because of the temperatures, the features would be produced by flowing ice rather than molten rock. Other features resemble the lobes of some surface lava flows. But while the old view of Titan fades, scientists do not know what will take its place.

"We don't understand what we're looking at," Matson says. "Titan is going to be a real challenge."

Comment: The surprise about the lack of craters and Titan's apparent "active, dynamic surface" mirror the comments made about Venus when radar images were first returned. The large flat circular feature on Titan does resemble the pancake domes seen on Venus.



Pancake domes on Venus. They are about 25 km in diameter and up to 1 km high. Note the small central pits.

However, these domes were not formed by volcanic action. It would require an unacceptably large number of coincidences to produce such circularity in just one of these domes. The surface must be absolutely horizontal and the flow from the central vent must be perfectly even in all horizontal directions. But there are many domes on Venus.

In the Electric Universe model, the domes are more simply explained as the raised blisters sometimes caused by cosmic lightning. Small-scale circular raised blisters have been found following a negative cloud-to-ground lightning strike to a lightning conductor cap. They are called 'fulgamites.' The shape of the mounds and the central crater seems to be due to the magnetic pinch effect. Even more telling, perhaps, is the rough concentric and radial pattern on top of the domes ' features also seen in photomicrographs of tiny fulgamites. A good further test of this hypothesis would be to determine if the surface around the domes is sunken. Fulgamites show this characteristic "borrow pit" effect where the material has been drawn inwards and up to form the raised blister. It is not something to be expected from a volcanic upwelling.

Inexplicably, in terms of the volcanic model, where two domes overlap the relief of the underlying dome does not disturb the overriding dome. This, and the chain formation seen above, is typical of electrical scarring in general where one crater is often centered on the rim of another with little disturbance of the existing crater. In cratering, the surface tends to be the cathode rather than the anode. **With fulgamites, one mound often occurs on top of another as a result of multiple strokes within the lightning flash.**

The branched sinuous features running diagonally across the image are also typical of filamentary discharges across a planetary surface. In places these channels will be seen to be a chain of pits. They are consistent with the linear features seen in the infrared image.

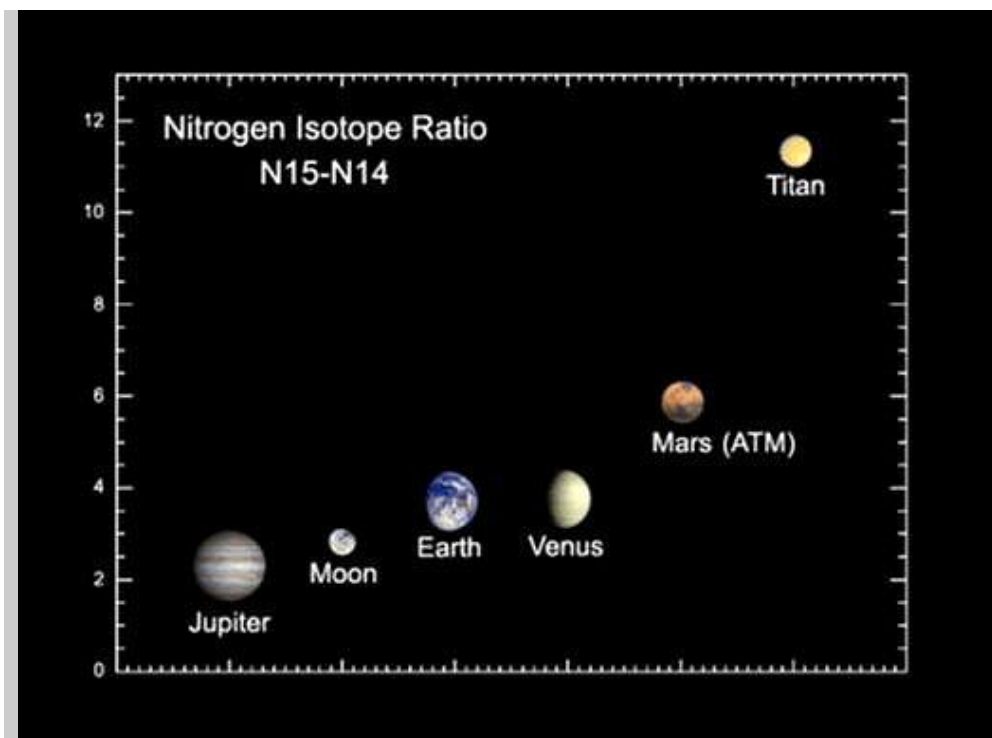
Cryovolcanism is the eruption of water or gas onto the surface of a planet or moon due to internal heating. It has only been observed on Triton, the largest moon of Neptune, during

the flyby of Voyager 2. However, the plume seen on Triton may be of the same electrical nature as the plumes on Io, in which case it is not strictly cryovolcanism since it has nothing to do with internal heating of ices. Cryovolcanism on other icy moons has merely been inferred. The energetic events that shaped Titan's surface ceased only thousands of years ago and probably included normal rock volcanism. Titan's surface, like that of Venus, is young but no longer active.

So it seems that the images of Titan's surface returned by Cassini so far are predictable based on forensic evidence that "we should be alert to similarities between Titan and Venus." And "Titan is most likely a baby brother of Venus!"

This brings us to the other major puzzle about Titan — its atmosphere. Titan's atmosphere is believed by many scientists to be similar to Earth's early atmosphere, billions of years ago. Toby Owens, principal scientist at the Jet Propulsion Laboratory, said:

"What we've got is a very primitive atmosphere that has been preserved for 4.6 billion years. Titan gives us the chance for cosmic time travel ... going back to the very earliest days of Earth when it had a similar atmosphere."



This data is from Cassini's ion and neutral mass spectrometer, which detects charged and neutral particles in the atmosphere. The graph shows that the amount of light nitrogen in the atmosphere of Titan is much less than that around other planets. Scientists believe this nitrogen was lost over large geologic times scales for reasons that remain unknown. Credit: NASA/JPL/University of Michigan

From New Scientist, November 6:

*"Titan appears to have lost much of its original atmosphere. The moon has an unusually high abundance of nitrogen-15, compared with the lighter isotope nitrogen-14. That could be explained if most of the atmosphere had evaporated into space, a process in which the nitrogen-14 would have escaped more easily than nitrogen-15. **What could cause such a loss is unknown, but it would mean that Titan once had an atmosphere 40 times as thick as Earth's – making it a dwarf version of a gas planet. "This bizarre world may be far more complex than we have begun to imagine,"** says Larry Soderblom of the US Geological Survey in Flagstaff, Arizona."*

[Emphasis added]

Comment: Titan's atmosphere is primitive, but not in the sense that it is 4.6 billion years old. Instead, there has not been time for young Titan to lose much atmosphere. The striking disparity in nitrogen isotopes is telling us something about the way planetary atmospheres are formed rather than how they evolve. Hannes Alfvén wrote in *Evolution of the Solar System* (NASA SP-345, 1976):

"...the Laplacian concept of a homogeneous gas disc provides the general background for most current speculations. The advent of magnetohydrodynamics about 25 years ago and experimental and theoretical progress in solar and magnetospheric physics have made this concept obsolete but this seems not yet to be fully understood."

While acknowledging Alfvén's point, it is possible to go a step further and invoke the electrical behavior of plasma, not just its magnetic behavior. There are several processes available in the plasma discharge model of planet birth that will have significant effects on planetary atmospheres, including that of new moons like Titan. The primary effect comes from the source and depth of the ejection from the flaring parent dwarf star or gas giant. Flaring red dwarf stars are extremely common and are an unexplained phenomenon in conventional stellar theory. They are the equivalent of a stellar lightning flash but they may produce the equivalent of 10,000 times as many x-rays as a comparably energetic flare on the Sun.

The x-rays are thought to be lethal to any life forms on planets near the dwarf star. However, the source of the x-rays in the 'z-pinch' effect and the position of the dwarf's planets are probably not what is expected, using the Sun and our planetary system as a model. See "[Other stars, other worlds, other life?](#)" And it seems, from the geological record, that such flares do not sterilize a planet but may cause sudden extinctions and the appearance of new species. The episodic flaring and ejection of matter from the dwarf star would also account for the sedimentary layering of bodies, even those without atmospheres— like the Moon. On Earth it could account for subsequent burial and fossilization of the victims of such catastrophic electrical events.

How could this electric discharge model affect Titan's atmosphere? To begin, there is sorting of chemical elements in the discharge according to their critical ionization velocity. Also isotopes will separate in the combined electric and magnetic fields of the cosmic plasma discharge. Lastly, the plasma gun effect (seen now ejecting material from Io into space) is known from laboratory tests to be a copious source of neutrons. The neutrons may be captured to form heavy isotopes and short-lived radioactive species. We find evidence of that in some meteorites that are also formed in this birth process. The variable combination of all of these effects suggest that it would be unlikely for any two bodies in the same 'family' to have the same initial atmospheres. Subsequent electrical interactions between planets and moons would serve to transfer surface materials and atmospheres, transmute elements, and further complicate the picture. That fits generally with the irregular elemental and isotopic signatures found in the atmospheres of our planetary system. For example, nitrogen in lunar soils is 10 times more abundant than one may expect from the concentrations of solar wind rare gases.

There are some other mechanisms that could also contribute to the lack of nitrogen-14 in Titan's atmosphere. For example, nitrogen-14 can capture an electron to become carbon-14. Carbon-14 decays by very weak beta decay back to nitrogen-14, with a half-life of approximately 5,730 years. If the age of Titan's atmosphere can be measured in thousands of years instead of billions, then a significant amount of nitrogen-14 may still be locked up on the surface as carbon-14.

Also, the intrinsic energy difference between the nitrogen molecule and the carbon monoxide molecule is quite small. In a hot plasma and the presence of a catalyst like iron, it has been demonstrated that nitrogen-14 molecules can convert to carbon monoxide molecules. Both carbon monoxide and carbon dioxide have been discovered in Titan's atmosphere.

To suggest that "Titan once had an atmosphere 40 times as thick as Earth's – making it a dwarf version of a gas planet," only complicates the plainly impossible standard model of formation of the solar system. It does not explain why other large moons do not have substantial residual atmospheres. It seems far more plausible to suggest that Titan is a much newer moon than Jupiter's Ganymede or Callisto. Titan simply hasn't had time to lose its atmosphere — just as Saturn hasn't had time to lose its rings following its last discharge.

The new Scientist report (11/6) also says:

Titan is thought to have a thick crust of water ice mixed with ammonia, but evidence is emerging that this may be covered by another layer of organic material. During the fly-by on 26 October, Cassini picked up microwaves from the surface that look like the thermal glow of hydrocarbon molecules. 'Titan really is covered in organics,' says radar team member Ralph Lorenz of the University of Arizona in Tucson. Scientists believe these hydrocarbons are created in the atmosphere when methane is broken down by sunlight and its

components recombine into more complex molecules – a theory supported by the detection last week of benzene and acetylene high in the atmosphere.

Comment: If the Venusian surface were much cooler it would probably be covered in organic material too. There are many mysteries remaining about the atmosphere and clouds of that planet. There have been various claims that hydrocarbons exist in Venus' atmosphere but there seems to be a reluctance to pursue such a possibility despite the fact that model atmospheres with sulfuric acid clouds cannot explain all of the features of the clouds on that planet. On Feb. 26, 1963, making known the results of the Mariner probe, Dr. Homer Newell of NASA announced that, in his judgment of those responsible for that part of the program:

"Venus is enshrouded in an envelope of hydrocarbon gases and dust, 15 miles thick, 45 miles above the ground of the planet."

The conclusion was based on the work of L. D. Kaplan, who noted that lower cloud layers on Venus were homogeneous from top to bottom over a temperature range of 160C. His conclusion was that only compounds with multiple C-H (carbon-hydrogen) bonds have the same physical characteristics over such a temperature range.

Finally, there was news this week of the first hard evidence of methane on Mars. It raises the same issue as it does on Titan. What is the origin of the methane given that it is broken down by sunlight on Mars in a few hundred years? I would suggest that the methane on Mars and Titan had the same origin, since they interacted electrically with Saturn and Venus only thousands of years ago. Saturn has methane as a major constituent of its atmosphere, following hydrogen and helium. On Mars the methane was probably incorporated with surface material by ion implantation during a cosmic plasma discharge, which would possibly explain its patchy distribution and association with implanted hydrogen. The hydrogen discovered on Mars does not necessarily indicate the presence of subsurface water or ice, as is commonly thought.

Without doubt, many more surprises await scientists when the Huygens probe descends into Titan's atmosphere and Cassini flies past Titan 44 more times over the next four years. The old paradigm is failing completely.

Wal Thornhill

Megalightning at Saturn

Posted on [December 25, 2004](#) by [Wal Thornhill](#)

As NASA's Cassini spacecraft approached Saturn last July it found evidence that lightning on Saturn is roughly one million times stronger than lightning on Earth. "That's just astonishing to me!" said University of Iowa Space Physicist Don Gurnett, who notes that some radio signals have been linked to storm systems observed by the Cassini imaging instrument.



Also, variations in Saturn's radio rotation rate came as a surprise. Based upon more than one year of Cassini measurements, the rate is 10 hours 45 minutes and 45 seconds, plus or minus 36 seconds. That's about six minutes longer than the value recorded by the Voyager 1 and 2 flybys of Saturn in 1980-81. Scientists use the rotation rate of radio emissions from the giant gas planets such as Saturn and Jupiter to determine the rotation rate of the planets themselves because the planets have no solid surfaces and are covered by clouds that make direct visual measurements impossible.

Gurnett suggests that the change in the radio rotation rate is difficult to explain. "Saturn is unique in that its magnetic axis is almost exactly aligned with its rotational axis. That means there is no rotationally induced wobble in the magnetic field, so there must be some secondary effect controlling the radio emission. We hope to nail that down during the next four to eight years of the Cassini mission."

One possible scenario was suggested nearly 20 years ago. Writing in the May 1985 issue of "Geophysical Research Letters," Alex J. Dessler, a senior research scientist at the Lunar and Planetary Laboratory, University of Arizona, argued that the magnetic fields of gaseous giant planets, such as Saturn and Jupiter, are more like that of the sun than of the Earth. The sun's magnetic field does not rotate as a solid body. Instead, its rotation period varies with latitude. Commenting earlier this year on the work of Gurnett and his team, Dessler said, "This finding is very significant because it demonstrates that the idea of a rigidly rotating magnetic field is wrong. Saturn's magnetic field has more in common with the sun than the Earth. The measurement can be interpreted as showing that the part of Saturn's magnetic field that controls the radio emissions has moved to a higher latitude during the last two decades."

Comment: Dessler is right. Saturn is more like the Sun than the Earth. And the idea of a rigidly rotating magnetic field is wrong. The beliefs that limit our understanding are that lightning is generated by the input of solar heat energy into an atmosphere and that magnetic fields come from deep within a star or planet. The latter belief requires that magnetic fields rotate rigidly with the body. But experts admit that we still do not understand how earthly lightning is generated or how cosmic magnetic fields originate.

It seems obvious to propose that a stellar or a planetary magnetic field is a combination of the field due to a rotating charged body and the field due to moving electric currents impinging on that body. The interplay between the two, together with the effects of uneven and moving distribution of charge within the rotating body, gives rise to the complex and changing fields that we observe. This obvious suggestion never gained acceptance because to provide the Earth's magnetic field, for example, a current of one billion amperes is required. That would imply a tremendously strong electric field at the Earth's surface, which does not exist. But the fallacy in that argument lies in the use of an idealized electrostatic model with the Earth moving in a perfect vacuum and a zero potential at infinity. The Earth moves in plasma. The clear air electric field of the Earth shows that the Earth is charged. The Earth's electric field is confined within the Earth's plasma sheath (double layer) at the magnetospheric boundary. The potential difference between the solar plasma and the Earth is largely confined to the plasma sheath. And certainly the solar plasma is not at zero potential (however that is measured).

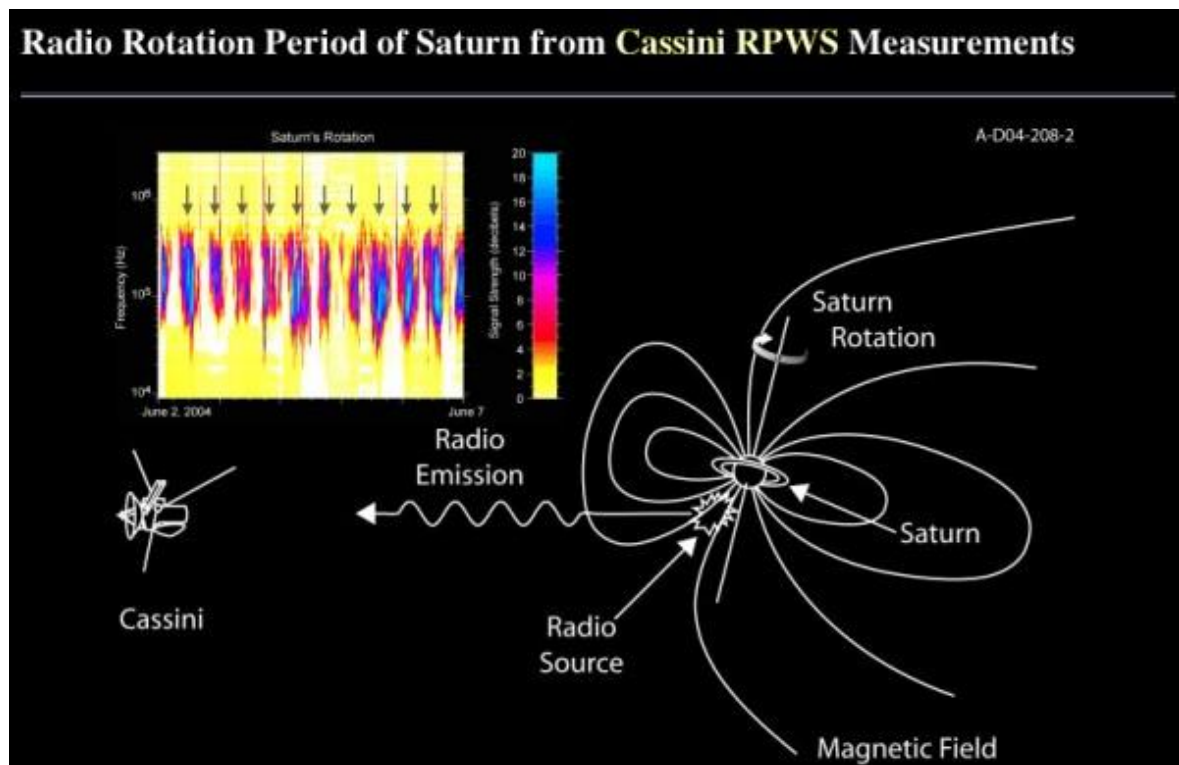
One of the best arguments in favor of external electric effects is the surprisingly even distribution of the Sun's magnetic field lines from pole to pole. It is distinct from a simple dipole field, where the field lines are more concentrated at the poles. Field aligned currents tend to space themselves evenly over the surface of an electrode. So the current flowing into the Sun's photosphere along magnetic field lines causes the solar magnetic field to be evenly distributed. In other words, the galactic electric current impinging on the Sun controls its magnetism. The enigmatic sunspot cycle and magnetic reversals are therefore strongly affected by the Sun's galactic electrical environment.

The behavior of sunspots comes from the way electric power is stored in an equatorial plasmoid, or donut, encircling the Sun. Laboratory experiments show that the energy

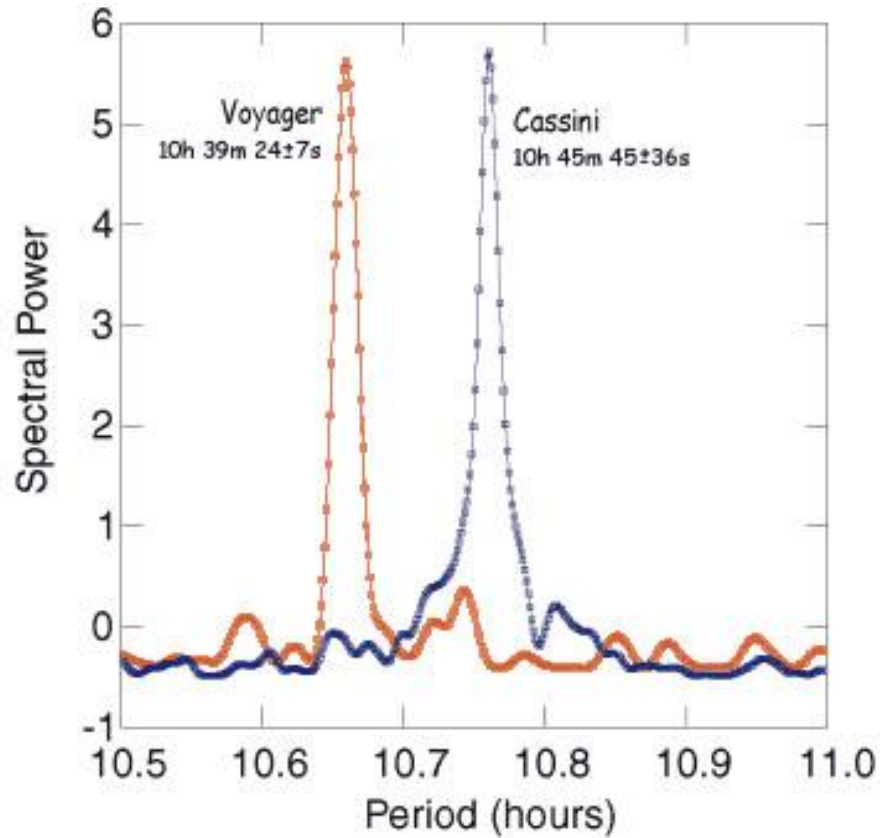
stored in such a plasmoid may be delivered discontinuously to the central body in electrical discharges to high-latitudes. As the input power is increased the discharges move to lower latitudes. On the Sun, those discharges punch a hole through the global electrical storm we call the photosphere to form dark sunspots. The simple fact that sunspots are cool and dark, not hot and bright, demonstrates that the Sun (and all stars) are not powered internally. Nature knew how to make electric lights long before us!

What does this mean for the observations of megalightning on Saturn? Saturn is a body that participates in an electrical discharge with its solar environment. And like the Sun, Saturn stores electrical energy in an encircling plasmoid. In fact, Saturn has two plasmoids. One is outside the rings, the other inside the rings. Discharges to Saturn must cross the rings. The Voyagers arrived at Saturn during solar maximum and witnessed the effect of such "lightning" discharges. Radial Birkeland currents moved material out of the ring plane which then cast shadows on the bright rings to create "mysterious" dark spokes. Cassini reached Saturn at solar minimum so a steady drift of charge is now shunting the electrical energy across the rings. There is no lightning across the rings. Cassini has seen no ring spokes. However, as solar activity increases we may expect to see the ring spokes return.

The last step in the planetary discharge is to Saturn's ionosphere and atmosphere – causing megalightning. Such powerful lightning punches lower atmosphere matter upwards into the stratosphere where it appears as great white spots and streaks, or storms. That explains the apparent connection between the Saturnian storms and radio signals from the megalightning.



Finally, we come to the change in rotation rate of Saturn as measured by Saturn's kilometric radiation (SKR), which is modulated at a rate tied to the rotation of the planet's magnetic field. See www-pw.physics.uiowa.edu/space-audio/cassini/sat-rotation/sat-rotation-java.html It is assumed that the magnetic field is generated in the body of Saturn and represents the planet's true rotation rate.



However, it is known that the SKR period is significantly longer than the averaged period for atmospheric features. Just as the Sun is driven fastest at the equator, so the Faraday motor effect of the encircling plasmoid drives Saturn's atmosphere faster at the equator than at higher latitudes. This mechanism would also account for the striking north-south symmetry of Saturn's wind systems. It seems that between the Voyagers' visits in November 1980 and August 1981, and Cassini's arrival in July 2004, the electrical energy input to Saturn's Faraday motor has eased and the motor slowed. Saturn's fierce winds have decelerated at all latitudes along with the rotation of the planet's magnetic field, to which the source of the SKR seems tied. Saturn's slowdown is apparent, not real.

It is interesting that the SKR was observed to disappear in the 2 to 3 days following the Voyager 2 encounter. It correlated with the immersion of Saturn in Jupiter's magnetotail or plasma sheath. Saturn had been temporarily unplugged from its electrical power source!

Wal Thornhill

2005

Titan – A Rosetta Stone for early Earth?

Posted on [January 30, 2005](#) by [Wal Thornhill](#)

The original Rosetta Stone is a compact basalt slab (114x72x28 cm) that was found in July 1799 in the small Egyptian village of Rosette (Raschid), which is located in the western delta of the Nile. Today the stone is kept at the British Museum in London. It contains three inscriptions that represent a single text in three different variants of script. It enabled the French scholar Jean Francois Champollion (1790-1832) in 1822 to decipher the hieroglyphs, which gave a window into the world of the ancient Egyptians.



The name of the stone, Rosetta (seen at left), has been given to an interplanetary mission to investigate comet 67/P Churyumov-Gerasimenko (illustration on right). Comets are thought to be pristine "Rosetta Stones" from the time of the origin of the Solar System. So the Rosetta mission is expected to provide a window into the formation of the planets. That may prove to be so, but like the tales told by the ancient hieroglyphs the meaning may be unfathomable. The reason in both instances is that we insist on imposing our preconceived theories onto the raw data.

The same interest—and preconception—accompanies the Huygens probe's arrival on the surface of Saturn's major moon, Titan. We have been told that Titan should show us what the Earth looked like in its early youth. It seems that every comet, asteroid, moon and planet we visit is expected to tell us something about the Earth's history. In this sense all missions are attempts to decipher Rosetta Stones. But translating the words or data without knowing the context only leads to contradictions and surprises when new information is uncovered. Titan sprang many surprises on researchers. It should warn us that our theories about the environment and circumstances of planetary birth/formation are far off the mark.

Of course, hearty congratulations are due to the engineers who built the Huygens probe and successfully guided it to the surface of Titan. And thanks to the scientists who designed and operated the many experiments aboard the probe. Unfortunately, those same scientists will employ the context of the 200-years-old solar nebula story of planetary formation to interpret the returned data. To paraphrase the astronomer Tom Van Flandern: The solar nebula theory:

"...no longer makes testable predictions wherein proponents agree that a failure would falsify the hypothesis. Instead, the theory is continually amended to account for all new, unexpected discoveries. Indeed, many young scientists now think of this as a normal process in science! They forget, or were never taught, that a model has value only when it can predict new things that differentiate the model from chance and from other models before the new things are discovered. Explanations of new things are supposed to flow from the basic theory itself with, at most, an adjustable parameter or two, and not from add-on bits of new theory."

The old solar nebula model has no successful predictions to its name.

By way of stark contrast, the Electric Universe views Titan in a radically different context. Titan is not a body more than 4 billion years old. Titan is a young mini-planet born perhaps only tens of thousands of years ago. It was the baby of a planetary family that included the Earth. The Electric Universe conceptual model can claim a number of successful predictions. Most importantly it was [the only model to predict](#) the surface features of smog-shrouded Titan before they were revealed in detail by Huygens.

How could this be? It was possible because the Electric Universe concepts were based on a verifiable, instead of a theoretical, context for the recent history of the Earth and the solar system. The concepts were developed to explain prehistoric eyewitness representations of a sky that would be frighteningly unrecognisable to us. It is only in the last few decades that the most powerful electric discharge experiments on Earth have revealed an astonishing evolutionary pattern of plasma instabilities when a man-made thunderbolt is unleashed. The patterns are reproducible and have been named "Peratt instabilities" after the physicist who studied and classified them. The most amazing discovery of the 21st century is that millions of representations of those instabilities have been faithfully engraved on rocks around the world in the form of petroglyphs.

Petroglyphs are the "Rosetta Stones" of the recent history of the solar system. The monumental effort involved in carving them and their common orientation to the sky show that what was happening in the celestial arena was of paramount concern to the prehistoric artists. It was a concern that still has echoes in our doomsday nightmares.

For the first time, a few scholars have combined this concrete evidence of intense electrical activity in the prehistoric sky with a forensic approach to the mytho-historical record of all ancient cultures. Immanuel Velikovsky pioneered and exemplified the latter technique in his controversial opus, *Worlds in Collision*. It received unscientific vilification because a recently chaotic solar system was believed to be impossible

according to Newtonian mechanics. But in 1950 Velikovsky had thrown down a gauntlet that no scientist was willing to pick up. He wrote:

"The accepted [Newtonian] celestial mechanics, notwithstanding the many calculations that have been carried out to many decimal places, or verified by celestial motions, stands only if the sun ... is as a whole an electrically neutral body, and also if the planets, in their usual orbits, are neutral bodies."

(WinC, p. 387.)

The Australian philosopher, David Stove wrote later:

"Newtonian physics is a guarantee against the occurrence of – just about anything disagreeable.... That this belief survived to some extent even up to the mid-20th century, is strongly suggested by the irrational hostility with which Immanuel Velikovsky's theories were received in 1950."

That belief and the irrational hostility to his theories still survive. Velikovsky was effectively ambushed at the 1974 AAAS conference in San Francisco where he again explained to those who weren't paying attention the first time:

"I was greatly surprised to find that astronomy, the queen of sciences, lives still in the pre-Faraday age, not even in the time of kerosene lamps, but of candles and oil."

Nothing has changed; so powerful is the Newtonian ideology.

David Stove was right. Astronomers have adopted a pseudo-religious role, calming our fears of cosmic annihilation with their model of a clockwork solar system that has been undisturbed for an age beyond human comprehension. But in another sense the astronomers and David Stove were wrong. A Newtonian planetary system is in fact not stable. Although rarely acknowledged, the many-body gravitational model is subject to "wild" motions, and it requires a force in addition to gravity to suppress them and to prevent chaos.

Velikovsky and his engineer colleague, Ralph Juergens, inspired the pursuit of an electrical cosmology that could explain how the solar system could look so peaceful today after a recent cosmic traffic accident. Juergens' 1970's electric corona discharge model of the Sun was a good one. It was quite specific, with few adjustable parameters, and it was easily falsifiable. Since then only minor corrections to Juergens' model of the Sun have been required. The electrical model has been able to explain the anomalous accelerations of comets and of the Pioneer spacecraft. It is the only model to do that using standard physics. More importantly, it is an effect that could operate to damp radial movement of planets, or wild motions.

Mytho-historians have shown that it is possible to reconstruct the dramatic recent geological history of the Earth. It is fortunate that we have confirmation from an independent source in the study of high-energy electric discharges because the reconstructed history bears no resemblance to astronomers' bland computer retro-calculations. We now know that the powerful electric force operated between certain close-moving planets in the past. The true history of the Earth is more astounding than any science-fiction writer could have dreamed. The story is outlined in [Cassini's Homecoming](#) where I wrote:

"A scenario follows that is so alien to any conventional theory of Saturn's history that it should be easily tested against information gained from the Cassini mission. It shows striking connections between many seemingly unrelated facts about certain planets. That is something that conventional cosmogony has not been able to do."

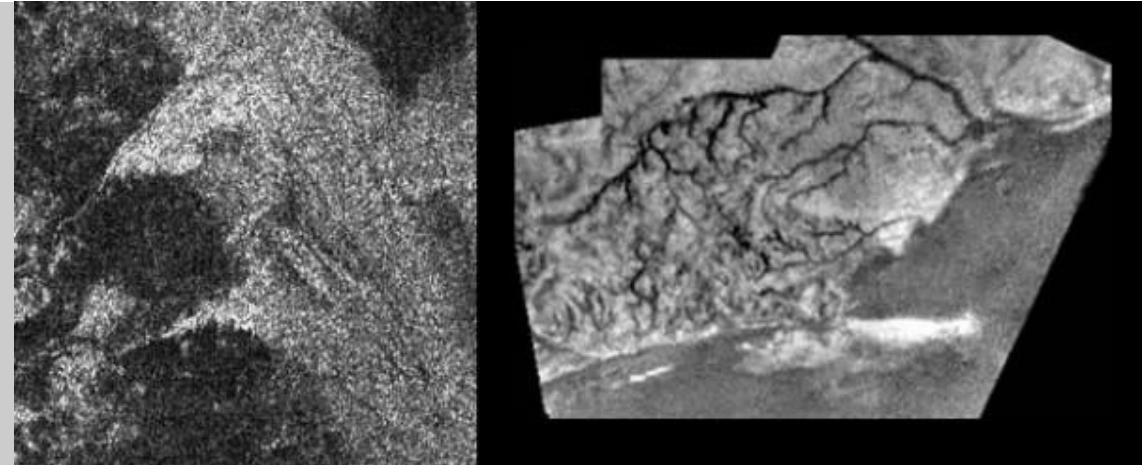
The planets were identified as Saturn, Venus, Mars and the Earth.

The context in which we should view Titan as a Rosetta Stone for an earlier Earth had been firmly established before Cassini arrived at Saturn. Venus, Earth and Mars were close planetary partners in a former stellar system that was recently captured by the Sun. They were originally satellites of the independent brown dwarf star, proto-Saturn. Titan, in that context, was simply another small planet orbiting proto-Saturn. All stars electrically eject matter in defiance of gravity. Ejection of charged matter is required to maintain electrical balance with their environment. The Sun has its "solar wind" and coronal mass ejections. In extremis, a star may eject a fragment of its interior in a stellar megalightning flash, or nova outburst, to form a close orbiting companion. The mytho-historical record identifies the planet Venus as such a new-born fragment of proto-Saturn. It was born when proto-Saturn flared up in the alien electrical domain of our present Sun.

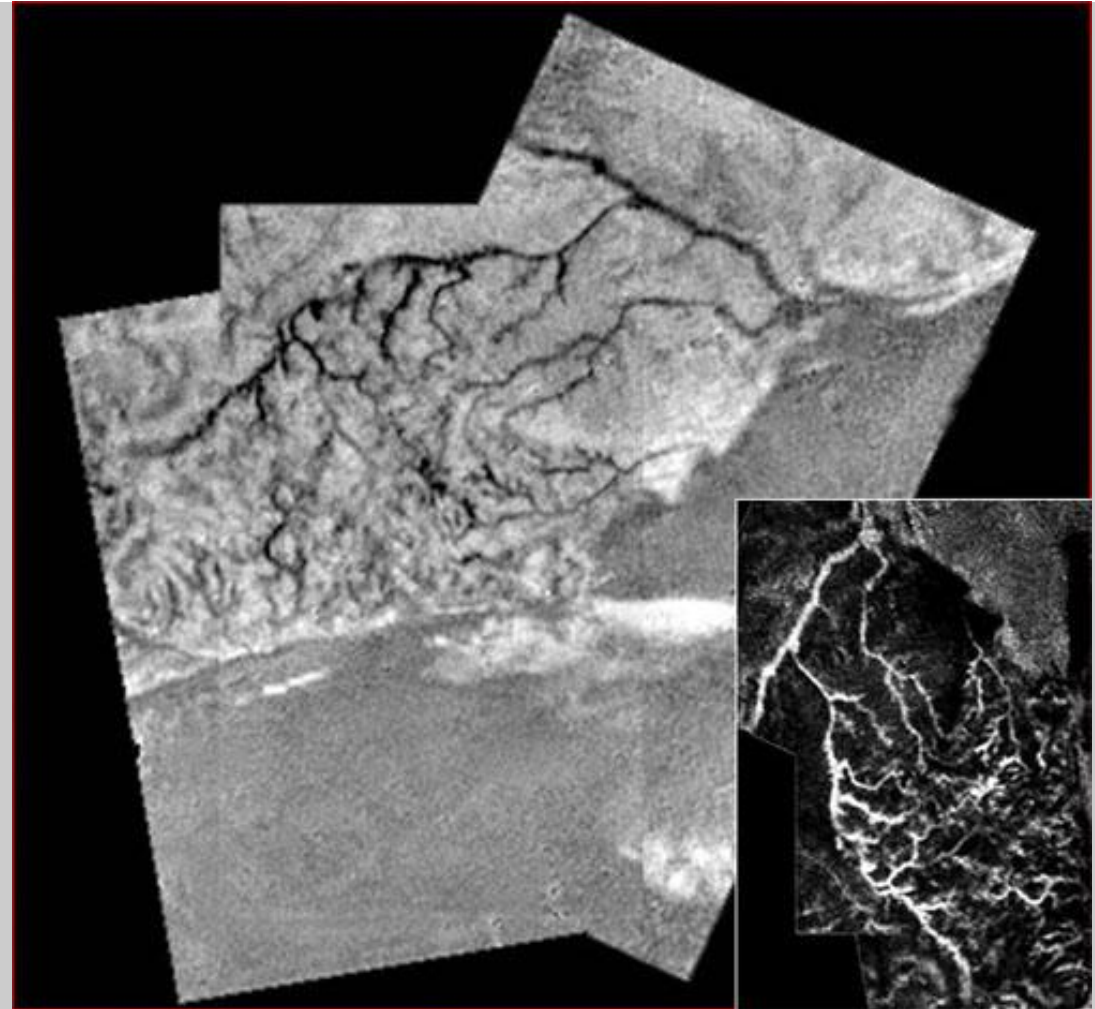
Being highly charged and of much smaller surface area than proto-Saturn, Venus discharged brilliantly in the prehistoric sky. The Sumerians revered Venus as the goddess Inanna, whose "tempestuous radiance" caused fear and trembling in mankind. In their hymns they depicted the goddess "raining the fanned fire down upon the nation." The Babylonians knew the same planet as Ishtar, "who is clothed with fire and bears aloft a crown of awful splendor." She was the "blazing fire which rains upon the hostile land." Inanna's Egyptian counterpart Sekhmet was a star "scattering its flame in fire ... a flame of fire in her tempest." "The fear of me is in their hearts, and the awe of me is in their hearts," the goddess proclaims. In more than one land Venus was said to rival the Sun in brightness. The most prominent feature discovered on Venus is a planet-girdling pattern of blisters and spidery channels that resulted from this prolonged cosmic discharge into its thick atmosphere. Venus' extreme heat and heavy atmosphere is due in large part to that electrical discharge and recent birth.

Huygens' descent to Titan's surface was an acid test of this reconstruction of events. In particular, the expectation of channels carved by cosmic lightning, similar to Venus, was confirmed. The channels on Titan bear the hallmarks of cosmic lightning imprinted on

the surface. Also, the lack of a methane ocean was predicted because Titan's atmosphere is very young and a vast reservoir of the gas is not needed to make good the losses expected over the 4.7 billion years required by the solar nebula model. Titan is a Rosetta Stone for planetary history 'once the context is understood. The hieroglyphs on the original could be deciphered when it was realized they repeated what was said in Greek. Titan's surface – and the other bodies in the solar system – can be deciphered when it's realized they repeat what is "said" in plasma discharges. Titan is not a document scribed by gravity attesting to an ancient nebula but a document etched by electricity proclaiming a recent birth.



Some initial comments by Cassini team members accompanying the picture (left) of Titan from the descending Huygens probe reflected the Venus-like appearance of features on Titan: "These remind me of what we have observed in the past on Venus." "In the bright areas, some have a curved or lobate appearance to them, similar to what has been seen on Venus where there are lava flows." On the right, "We now have the key to understanding what shapes Titan's landscape," said Dr Martin Tomasko, Principal Investigator for the Descent Imager-Spectral Radiometer (DISR), adding: "Geological evidence for precipitation, erosion, mechanical abrasion and other fluvial activity says that the physical processes shaping Titan are much the same as those shaping Earth." This demonstrates the problem of interpretation when the context is wrong. Images credit: ESA/NASA/JPL/Univ. of Arizona.



Viewed in its correct context, the surface of Titan shows a characteristic lightning pattern (inset is a rotated negative of the original). Credit: ESA/NASA/JPL/Univ. of Arizona.

Wal Thornhill

Saturn's Strange Hot Spot Explained

Posted on [February 5, 2005](#) by [Wal Thornhill](#)



Mosaic false-color image of thermal heat emission from Saturn and its rings taken on February 4, 2004, with the Keck I telescope at 17.65-micron wavelength. This wavelength is sensitive to temperatures in Saturn's upper troposphere. The black square at 4-o'clock represents missing data. Image credit: W. M. Keck Observatory/NASA/JPL-G. Orton.

The following excerpt is from the [Keck Observatory News](#):

MAUNA KEA (February 4, 2005) Astronomers using the Keck I telescope in Hawaii are learning much more about a strange, thermal "hot spot" on Saturn that is located at the tip of the planet's south pole. In what the team is calling the sharpest thermal views of Saturn ever taken from the ground, the new set of infrared images suggest a warm polar vortex at Saturn's south pole — the first to ever be discovered in the solar system. This warm polar cap is home to a distinct compact hot spot, believed to contain the highest measured temperatures on Saturn. A paper announcing the results appears in the Feb. 4th issue of "Science."

A "polar vortex" is a persistent, large-scale weather pattern, likened to a jet stream on Earth that occurs in the upper atmosphere. On Earth, the Arctic Polar Vortex is typically located over eastern North America in Canada and plunges cold arctic air to the Northern Plains in the United States. Earth's Antarctic Polar Vortex, centered over Antarctica, is responsible for trapping air and creating unusual chemistry, such as the effects that create the "ozone hole." Polar vortices are found on Earth, Jupiter, Mars and Venus, and are colder than their surroundings. But new images from the W. M. Keck Observatory show the first evidence of a polar vortex at much warmer temperatures. And the warmer, compact region at the pole itself is quite unusual.

"There is nothing like this compact warm cap in the Earth's atmosphere," said Dr. Glenn S. Orton, of the Jet Propulsion Laboratory in Pasadena and lead author of the paper describing the results. "Meteorologists have detected sudden warming of the pole, but on Earth this effect is very short-term. This phenomenon on Saturn is longer-lived because we've been seeing hints of it in our data for at least two years."

The puzzle isn't that Saturn's south pole is warm; after all, it has been exposed to 15 years of continuous sunlight, having just reached its summer Solstice in late 2002. But both the distinct boundary of a warm polar vortex some 30 degrees latitude from the southern pole and a very hot "tip" right at the pole were completely unexpected.

'If the increased southern temperatures are solely the result of seasonality, then the temperature should increase gradually with increasing latitude, but it doesn't,' added Dr. Orton. 'We see that the temperature increases abruptly by several degrees near 70 degrees south and again at 87 degrees south.'

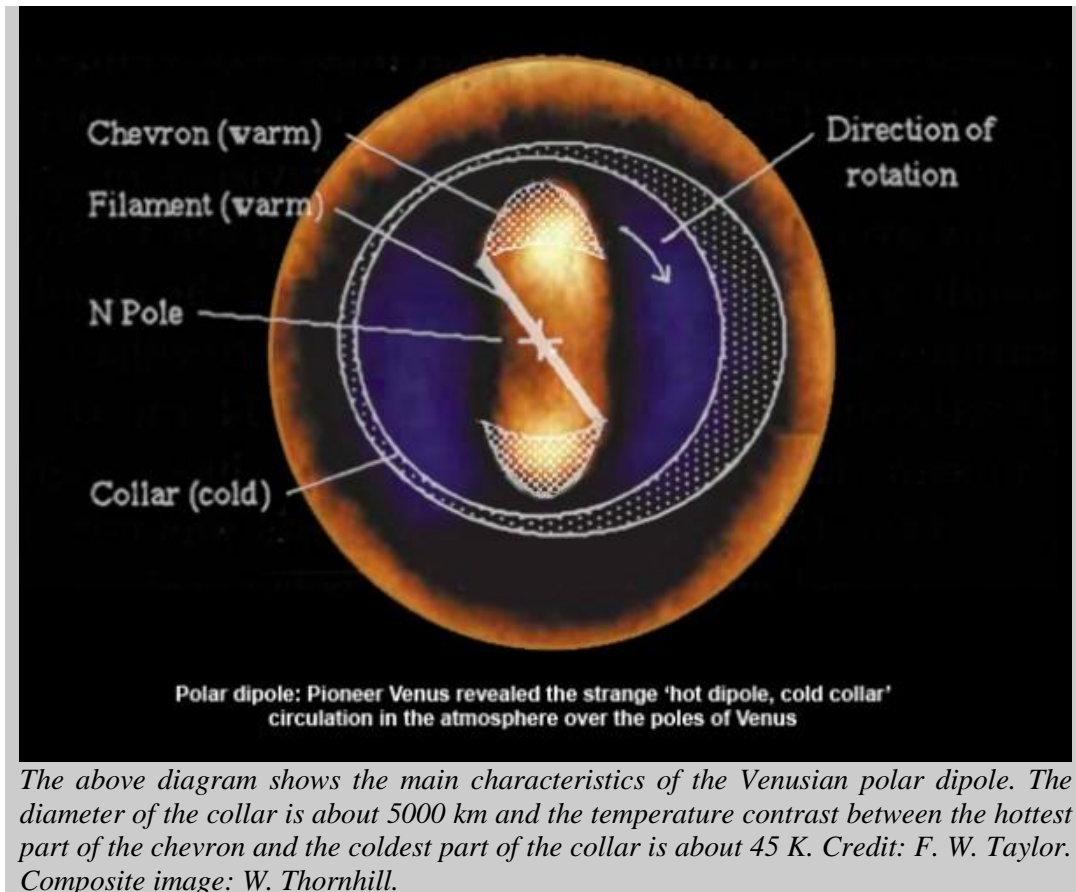
The abrupt temperature changes may be caused by a concentration of sunlight-absorbing particulates in the upper atmosphere which trap in heat at the stratosphere. This theory explains why the hot spot appears dark in visible light and contains the highest measured temperatures on the planet. However, this alone does not explain why the particles themselves are constrained to the general southern part of Saturn and particularly to a compact area near the tip of Saturn's south pole. Forced downwelling of relatively dry air would explain this effect, which is consistent with other observations taken of the tropospheric clouds, but more observations are needed.

More details may be forthcoming from an infrared spectrometer on the joint NASA/ESA Cassini mission which is currently orbiting Saturn. The Composite Infrared Spectrometer (CIRS) measures continuous spectral information spanning the same wavelengths as the Keck observations, but the two experiments are expected to complement each other. Between March and May in 2005, the CIRS instrument on Cassini will be able to look at the south polar region in detail for the first time. The discovery of the hot spot at Saturn's south pole has prompted

the CIRS science team, one of whom is Dr. Orton, to spend more time looking at this area.

"One of the obvious questions is whether Saturn's north pole is anomalously cold and whether a cold polar vortex has been established there," added Dr. Orton. "This is a question that can only be answered by the Cassini's CIRS experiment in the near term, as this region can not be seen from Earth using ground-based instruments."

Comment: The report states the "warm polar vortex at Saturn's south pole is the first to ever be discovered in the solar system." Keck researchers don't seem to have done their homework. Or maybe things that can't be explained get forgotten! Saturn's "warm polar vortex" is NOT "the first to ever be discovered." The Pioneer Venus Orbiter (PVO) discovered a warm "giant vortex of surprisingly complex structure and behaviour located in the middle atmosphere at the north pole of the planet, with a similar feature presumed to exist at the south pole also."*



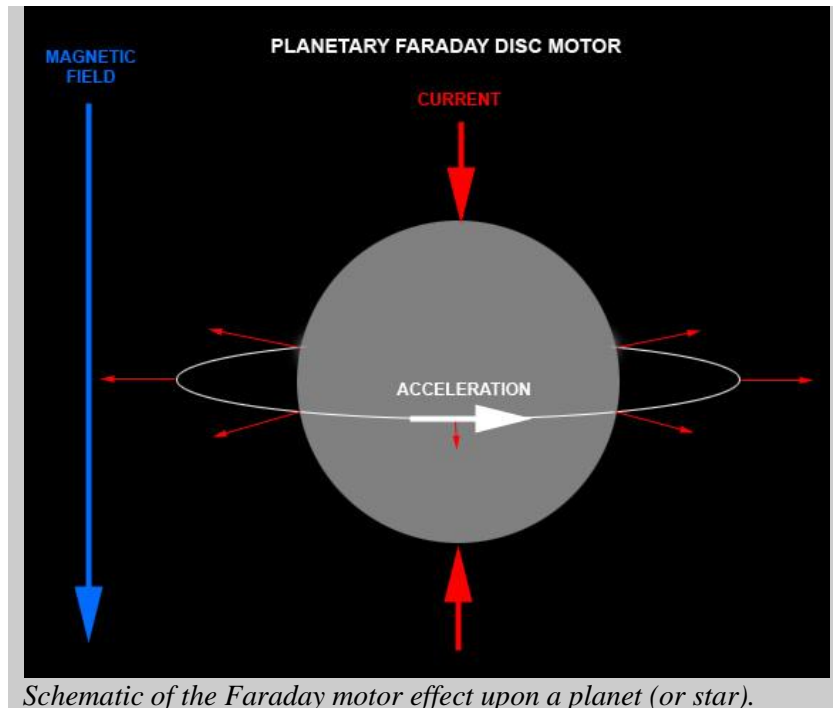
Just as was found in the very hot "tip" at the pole on Saturn, the polar vortex on Venus is the hottest spot in the planet's upper atmosphere!

Professor Fred Taylor of the University of Oxford Atmospheric, Oceanic and Planetary Physics Department wrote about the Venusian polar vortex:

*"The absence of viable theories which can be tested, or in this case any theory at all, leaves us uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."**

This situation will not be changed until the electrical nature of the universe is acknowledged and scientists studying the solar system and deep space are appropriately trained. The Venusian polar dipole is immediately recognizable to a plasma cosmologist. But plasma cosmology is a paradigm only recently recognized by the electrical engineering fraternity of the IEEE. No university on Earth presents a course in the subject. Metaphysics is preferred in cosmology over sound engineering principles.

The Electric Universe takes plasma cosmology a step further in proposing that a star is primarily an electrical phenomenon, forming a focus within a galactic "glow discharge." Planets are minor "electrodes" within a stellar discharge envelope. The electrical energy is delivered to stars and planets in the manner of a simple Faraday motor.



The electromotive power is deposited mostly in the upper atmosphere at mid to low latitudes and gives rise to its "super rotation." That is, the atmosphere races around the planet faster than the planet turns. It is a phenomenon observed on Venus and Titan and remains unexplained by the usual atmospheric physics, which relies mainly on solar heating. It is the cause of the phenomenal winds on the gas giant planets in the outer solar system, where solar heating is minimal. It has implications for the jet streams and weather patterns on Earth as well.

It is obvious, looking at the diagram, that there is a concentrated current flow at the planet's poles. Plasma cosmologists explain that electric current is transferred over vast distances in space by cosmic current filaments. And the filaments tend to organize into "twisted pairs" according to the Biot-Savart force law. It is known as the principle of "doubleness" in current-conducting plasmas. It is intuitively pleasing to see that Nature uses this (well-known to electrical engineers) twisted pair arrangement of conductors to minimize losses. Such filament pairs are called "Birkeland currents."

So we should expect to see evidence of the twisted pair configuration at the poles of Venus, if the input current is sufficiently strong and this model is correct. And that is precisely what was discovered. The two hot spots are the footprints of cosmic Birkeland currents. The Venusian polar dipole shows the precise configuration and motion of Birkeland current pairs in plasma discharge experiments. That includes a surrounding spiral vortex.

The enhanced infrared emission from the polar dipole is due to the dissipation of electrical energy in the upper atmosphere of Venus. The polar dipole has a variable rotation rate and it varies the position of its axis of rotation with respect to that of the planet. It was observed to move 500 km from the Venusian pole in less than a day and return just as quickly. The variable nature of the electrical input to Venus via the Sun and the snaking about of the Birkeland currents explain both these characteristics.

Of particular interest are the linear filaments sometimes seen connecting the opposite sides of the hot spots. Taylor writes:

"It is virtually impossible, even with complete license, to begin to speculate in any detail as to what mechanism could give rise to such a curious effect."

The answer, in the Electric Universe model is simple. They are a feature seen in simulations of the behavior between two interacting Birkeland current filaments where plasma becomes trapped in the elliptical core between them.**

Spiral galaxies are the grandest cosmic plasma discharge phenomena in the universe. The Venusian polar dipole exhibits the morphology of the early stages of development of a spiral galaxy from the interaction of two intergalactic Birkeland current streams. And that includes a filamentary connection between the two current "hot spots" in the manner observed on Venus. The enormous scalability of plasma phenomena allow for such a comparison.

* F. W. Taylor, "The Venusian Polar Dipole," Middle Atmosphere of Venus, Akademie-Verlag Berlin, 1990, pp. 93-7.

See also: www.pparc.ac.uk/frontiers/pdf/19F1.pdf

Professor F. W. Taylor is Halley Professor of Physics at Oxford University.

** Anthony L Peratt, "Physics of the Plasma Universe," Springer-Verlag, 1991.

Returning to Saturn's polar very hot "tip", it should be found on closer inspection to exhibit a similar structure to the Venusian polar dipole. Its compactness is due to the electromagnetic pinch effect where it enters Saturn's atmosphere. The hot spot's behavior should be variable like that on Venus and correlated with the appearance of Saturn's ring spokes, which are a visible manifestation of a heightened equatorial discharge in that part of Saturn's Faraday motor circuit. The Electric Universe also predicts, *experimentum crucis*, that BOTH poles should be hot, not one hot and the other cold.

Similarly, I expect Titan to exhibit polar hot spots because its electrical response to its environment is very active and similar to that of Venus – as mentioned earlier, Titan's atmosphere super rotates. Electrically hyperactive Venus and Titan are both recent children of Saturn, carrying some of their parents' excess charge.

Verification of any of these predictions should serve notice that plasma cosmology and the electric model of stars is the cosmology of the future.

Wal Thornhill

Columbia Downed by Megalightning

Posted on [February 8, 2005](#) by [Wal Thornhill](#)

The second anniversary of the Columbia disaster passed almost unnoticed on February 1. Recent news reports said that the astronauts assigned to the first space shuttle mission since then were confident the mistakes and technical problems that led to that accident were in the past.

Disturbingly, the astronauts' confidence in the revamped Shuttle is misplaced. **Shuttle engineers caught the blame for a scientific failure. NASA scientists seem unwilling to admit they do NOT understand the cause of lightning and so were unfit to judge whether Columbia was struck a fatal blow by a super-bolt of lightning from space, now referred to as MEGALIGHTNING.** Instead they have managed to convince themselves and the public that Columbia was mechanically damaged on takeoff. By doing so they risk the lives of astronauts in future. It is a high price to pay.



A week after Columbia's demise I wrote the news article [Columbia: Questions of Some Gravity](#). I stand by the conclusion I reached in that article. Columbia was mortally damaged during re-entry by a bolt of megalightning. I have now seen the [image](#) [link updated 2012] referred to in the San Francisco Chronicle.* A characteristic corkscrew trail of lightning appears at very high altitude "out of a clear blue sky." It is seen to brighten as it joins the ionized reentry trail of Columbia. Experts who checked the San

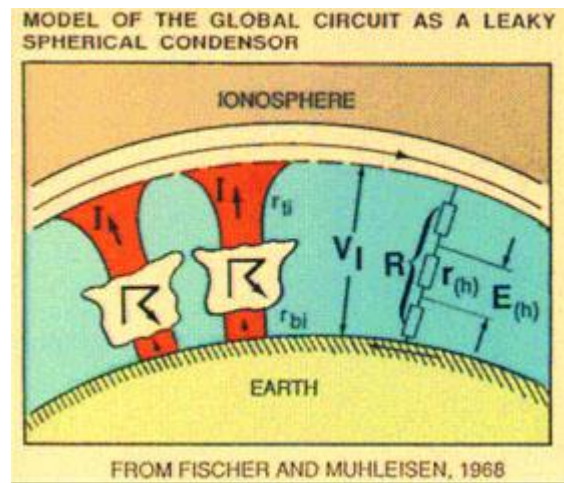
Francisco photo concluded the time-lapse image of lightning was caused by a camera wobble! But there is no sign of wobble in the Columbia trail or in other similar photographs taken on the same camera at the time. I estimate the elevation above the northern horizon to have been a little less than 40 degrees.

The possibility of destruction by megalightning became front page news in the San Francisco Chronicle. The camera and the photographic evidence was examined by NASA. Professor Umran Inan of Stanford University said:

"Our conclusion was that there was no evidence for any electrical activity at the altitudes that the shuttle went through ...there was a camera shot. It turned out to most likely be an artefact of the particular camera."

NASA's probe into the shuttle lightning strike was never made public. Unfortunately it is an area where there is considerable ignorance, which would be embarrassing to expose to the media spotlight. Walt Lyons, a meteorologist with FMA Research of Colorado, in 1996 reported to NASA on the dangers of sprites. He concluded that their vast size spread out their energy, making them unlikely killers – but cautioned not enough was known to be certain they were harmless.

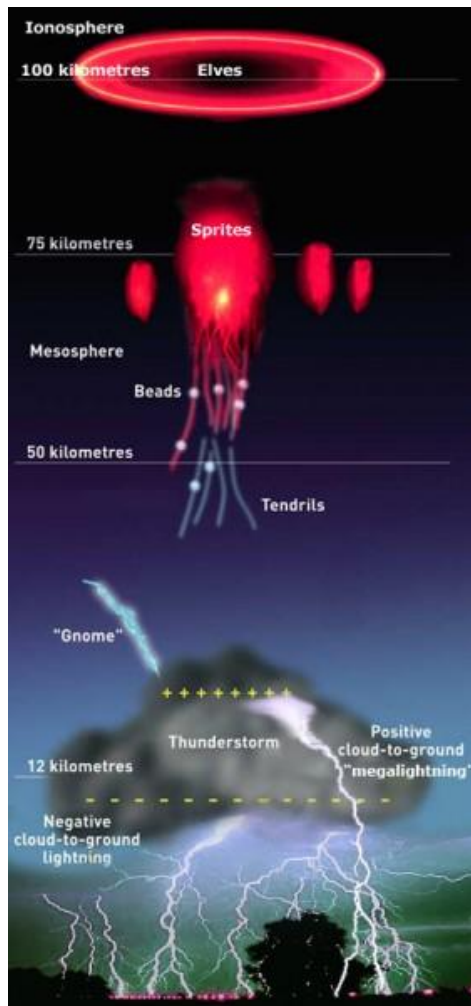
America's expert in the detection of distant atom bomb tests, Dr Alfred Beddard confirmed an unusual earthquake-like sound using his infra-sonic array, which was listening when the Columbia went down. The sound came from the area of its re-entry path.



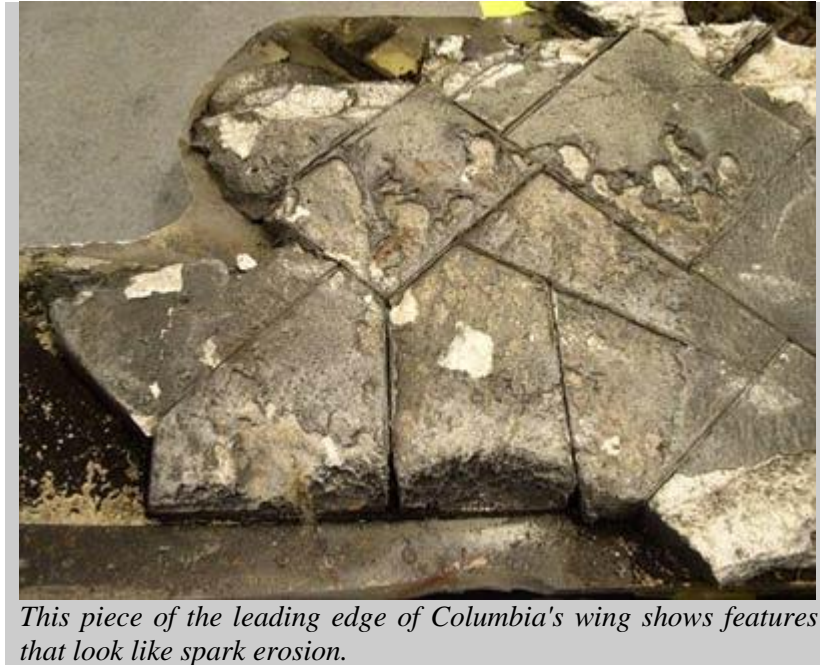
The photographic evidence presented to experts was dismissed primarily because there were no thunderstorms in the area and scientists **do not believe** that lightning can occur in a clear blue sky or at that altitude. The irony is that Israeli astronaut Ilan Ramon, who had been tasked with studying the strange transient luminous events above thunderstorms, found an unprecedented red flash in the ionosphere 1000 kilometers from the nearest lightning. Yoav Yair of the Open University of Israel and his colleagues reported it several months later.

Meteorologists have a major problem. They acknowledge that the Earth's atmosphere acts like a leaky, self-repairing capacitor (condensor). However, they assume that this spherical capacitor is charged from within by thunderstorm activity because they have been told that the Earth is an uncharged body flying through an uncharged solar wind. But it has never been shown precisely how the thunderstorm charging process works. And it cannot explain the recent discoveries of [strange discharge phenomena above thunderstorms](#), stretching up into space.

The electric universe model argues that the solar system is not electrically "dead." The Sun, like all stars, is a focus for a galactic discharge. Earth is a charged body that continually transfers charge from space to maintain equilibrium with the solar electrical environment. Thunderstorms are generated by a breakdown of the insulating layer of atmosphere between the Earth's surface and the ionosphere. Leakage currents CAUSE the vertical winds in a thunderstorm and the charge build-up in the cloud. Occasionally, a bolt of megalightning streaks from the top of a large storm instead of its base. This 10-kilometres-high short-circuit throws the switch for a further powerful discharge to the ionosphere. The result is a towering diffuse discharge at very high altitudes – a "red sprite" or "blue jet."



Walt Lyons was not justified in dismissing the danger of sprites simply because they appear diffuse. The electromagnetic "pinch" effect will ensure that the energy of that sprite will be focussed onto any large electrical conductor that blunders into its domain – as we see in the time-lapse photograph. The brightening of Columbia's trail where the lightning joined it is due to the sudden release of energy in the more dense plasma of that trail. It is that kind of energy that was released over a few square centimetres of Columbia's wing. Temperatures of tens of thousands of degrees would have resulted. The Shuttle's tiles are designed to withstand 2900C.



This piece of the leading edge of Columbia's wing shows features that look like spark erosion.

In a sense, we are lucky to have water clouds on Earth because they act as a conduit through the lower atmosphere for the leakage current from space. They spread the lightning discharge activity in both time and space. That is why lightning activity is sometimes linked in separate storms covering a large area. We have many low-energy bolts of lightning and very few powerful strikes. Venus has no water clouds and the charge builds up to a much higher level than on Earth before being released straight from the ionosphere to ground as "super-bolts." When discovered by the Galileo spacecraft as it swung by Venus on its way to Jupiter, the super-bolts surprised researchers. They were few in number and their power was very similar. That is expected from this model. But it highlights the problem that Venus has no equivalent to our thunderclouds. So, based on the earthly model of lightning generation, its lightning is an enigma.

It has been discovered that meteors can trigger sprites. Meteors leave an electrically conducting trail, like a lightning rod, from the ionosphere into the lower atmosphere. A spacecraft re-entering the atmosphere creates a similar ionized trail. Megalightning is six times more powerful than passenger planes are designed to withstand.

Prof. Edgar Bering, a physicist at the University of Houston in Texas, heads a team from NASA's National Scientific Balloon Facility to study sprites by flying a high-altitude balloon above major thunderstorms. Bering's balloon flights suggest that the currents responsible for sprites may carry far more oomph than anyone had suspected. Previous estimates suggested that the sprite-inducing current carries about 3000 amperes. Bering's data, on the other hand, puts the figure nearer 12,000 amperes. This is not surprising if sprites provide most of the power that drives the storm. Whether this huge current could pose any direct physical danger to anyone is unknown. Airliners don't fly in the mesosphere, but sprites can reach down into the cloud tops. **And it is certainly possible that sprites could affect spacecraft**, Bering suggests. Sprites are the prime suspect in the unexplained downing of a high-altitude balloon a few years ago.

Furthermore, Bering found that:

"The charge that produces sprites is not below in the cloud, it's in the mesosphere itself? None of the existing models will survive when people finally pay attention to what our data actually says."

[Emphasis added.]

But the charge in the mesosphere has to come from somewhere. It comes from space via the ionosphere above.

On 29 January 2002, I wrote:

The Earth is enveloped in a cosmic discharge, focussed on the Sun. So it is no surprise in an electric universe to have lightning from space follow the ionized trail of Columbia. The dense plasma trail left by the shuttle is an ideal "lightning rod" of vast dimensions that could easily give rise to the reported corkscrewing rope of purple light blazing down from above. The sudden brightening of the streak shows that power was being concentrated into a destructive arc near the shuttle.

It seems that conditions in the ionosphere led to a powerful lightning discharge to Columbia – a rare "bolt from the blue" – which may have damaged a critical component or surface of the space shuttle. The lightning would be practically silent in the thin atmosphere and it would burn like a plasma torch. And insulating material, like the shuttle tiles or their adhesive, may shatter or explode when struck by lightning.

The metallic surfaces of aircraft hit by lightning may show a little damage but it does not impair their airworthiness. Columbia, struck by a super-bolt while travelling at 12,000 mph, was terribly vulnerable. NASA might be advised to send a tiled wing panel for testing to a lightning research facility.

I doubt that such testing ever happened. NASA's perception of reality is governed by ideology and politics, not science. Heaven help the astronauts.

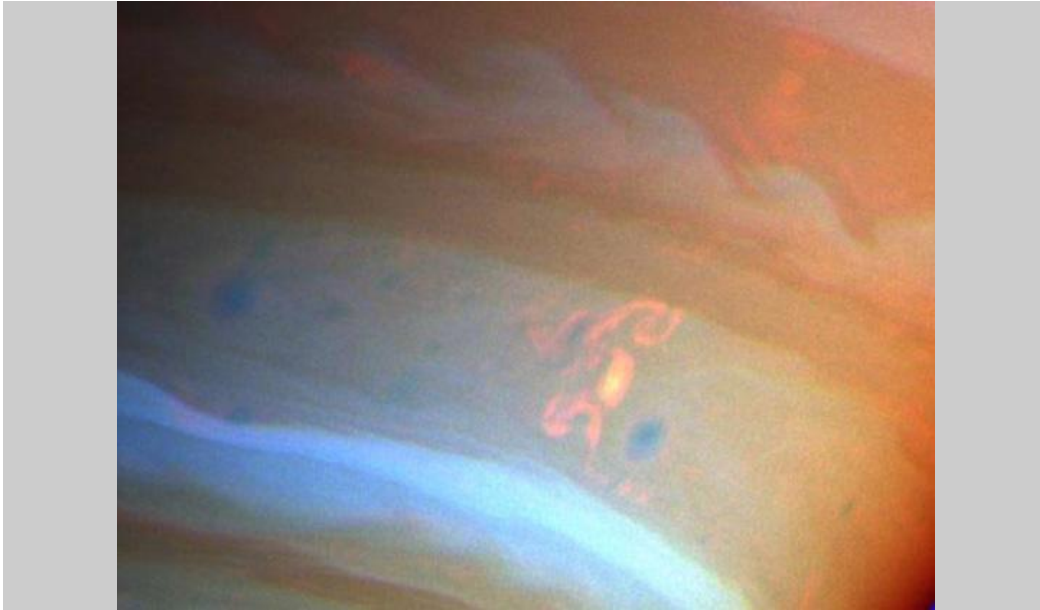
Wal Thornhill

* Copies of the Megalightning video may be obtained from:
David Monaghan Productions
390A Hackney Road
London E2 7AP
ENGLAND

The Dragon Storm

Posted on [March 26, 2005](#) by [Wal Thornhill](#)

A news item headlined "The Dragon Storm" appeared on the Cassini mission website on February 24.



Saturn's atmosphere and its rings are shown here in a false color composite made from Cassini images taken in near infrared light through filters that sense different amounts of methane gas. Portions of the atmosphere with a large abundance of methane above the clouds are red, indicating clouds that are deep in the atmosphere. Grey indicates high clouds, and brown indicates clouds at intermediate altitudes. The complex feature with arms and secondary extensions just above and to the right of center is called the Dragon Storm. It lies in a region of the southern hemisphere referred to as "storm alley" by imaging scientists because of the high level of storm activity observed there by Cassini in the last year. Image Preparation: John Barbara. Figure Caption: Andrew Ingersoll, Carolyn Porco.

The imagery of the celestial dragon in this context is an unconscious nod to an electrified universe. The new science of plasma behavior emphasizes the dominant role of the electric force and its powerful effects in the electrically charged matter that makes up 99 percent of the universe. Plasma science is re-writing the textbooks on galactic, stellar, and planetary evolution. And it throws new interdisciplinary light on the ancient "doomsday" dramas involving a celestial dragon and the "thunderbolt of the gods." This dragon storm on Saturn connects the modern science with the ancient dramas.

A few thousand years ago, ancient artists around the world carved similar complex images on stone. The meticulous research of plasma scientist Anthony Peratt, a leading authority on the forms taken by high-energy electrical discharges in plasma, has confirmed that these images pictured heaven-spanning forms seen in the ancient sky.

Stories and rituals in all ancient cultures, memorializing a catastrophe that involved heaven-shattering battles of planetary "gods" and monsters, parallel these images. Most common is the story of the fiery serpent or dragon attacking the world.

Such archetypal images seem to be burned into our collective subconscious. For example, ringed planets often feature in a young child's primitive drawings about space. Yet they have no experience of them. In the same way, scientists seem unconsciously to draw on archetypes. And the results are often equally surprising.

The Electric Universe model may explain the connection between the dragon of legend and the storm seen in this image. But first we should hear what Cassini mission scientists had to say:

A large, bright and complex convective storm that appeared in Saturn's southern hemisphere in mid-September 2004 was the key in solving a long-standing mystery about the ringed planet. The Dragon Storm was a powerful source of radio emissions during July and September of 2004. The radio waves from the storm resemble the short bursts of static generated by lightning on Earth. Cassini detected the bursts only when the storm was rising over the horizon on the night side of the planet as seen from the spacecraft; the bursts stopped when the storm moved into sunlight. This on/off pattern repeated for many Saturn rotations over a period of several weeks, and it was the clock-like repeatability that indicated the storm and the radio bursts are related. Scientists have concluded that the Dragon Storm is a giant thunderstorm whose precipitation generates electricity as it does on Earth. The storm may be deriving its energy from Saturn's deep atmosphere.

One mystery is why the radio bursts start while the Dragon Storm is below the horizon on the night side and end when the storm is on the day side, still in full view of the Cassini spacecraft. A possible explanation is that the lightning source lies to the east of the visible cloud, perhaps because it is deeper where the currents are eastward relative to those at cloud top levels. If this were the case, the lightning source would come up over the night side horizon and would sink down below the day side horizon before the visible cloud. This would explain the timing of the visible storm relative to the radio bursts.

The Dragon Storm is of great interest for another reason. In examining images taken of Saturn's atmosphere over many months, imaging scientists found that the Dragon Storm arose in the same part of Saturn's atmosphere that had earlier produced large bright convective storms. In other words, the Dragon Storm appears to be a long-lived storm deep in the atmosphere that periodically flares up to produce dramatic bright white plumes which subside over time. One earlier sighting, in July 2004, was also associated with strong radio bursts. And another, observed in March 2004 and captured in a movie created from images of the atmosphere (PIA06082 and PIA06083) spawned three little dark oval storms that broke off from the arms of the main storm. Two of these subsequently merged with each other; the current to the north carried the third one off to the west, and

Cassini lost track of it. Small dark storms like these generally get stretched out until they merge with the opposing currents to the north and south.

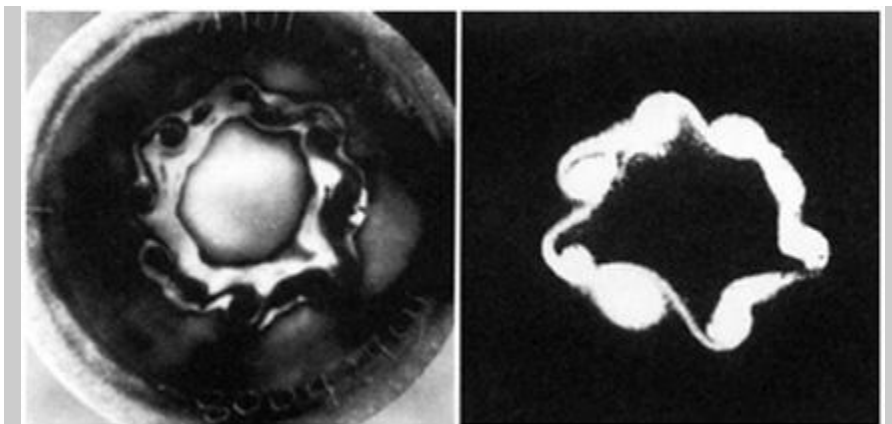
These little storms are the food that sustains the larger atmospheric features, including the larger ovals and the eastward and westward currents. If the little storms come from the giant thunderstorms, then together they form a food chain that harvests the energy of the deep atmosphere and helps maintain the powerful currents.

Cassini has many more chances to observe future flare-ups of the Dragon Storm, and others like it over the course of the mission. It is likely that scientists will come to solve the mystery of the radio bursts and observe storm creation and merging in the next 2 or 3 years.

Credit: NASA/JPL/Space Science Institute

Calling the dragon storm "a giant thunderstorm whose precipitation generates electricity as it does on Earth" explains nothing. The generation of lightning on Earth remains a mystery to meteorologists. It is thought to derive from vertical movement of droplets in a thundercloud "in a way or ways not yet fully understood" [Lightning, Martin A. Uman, Dover Publications]. Hence the notion that "the storm may be deriving its energy from Saturn's deep atmosphere." As discussed [elsewhere](#) on this website, thunderstorms are electric discharge phenomena driven by the circuits that link planets to stars and stars to the galaxy. The electrical effects at Saturn have already been outlined in an earlier Electric Universe [news item](#).

The report does not discuss the complex shape of the dragon storm. But that shape indicates an external origin of electrical power. Similar forms occur in plasma instabilities when an intense beam of electrons strikes a 'witness plate.'



Credits: LH image H. Davis, RH image H. F. Webster. From Physics of the Plasma Universe by Anthony Peratt, Springer-Verlag 1992.

These two images show in cross-section what happens to a beam of electrons that is following an axial magnetic field. The image on the left is due to a 90 kiloamp current striking a carbon witness plate. The other image is due to a 58 microamp current striking a fluorescent screen. So in the laboratory the effect is scaleable over 12 orders of magnitude of beam current!

The same effect occurs in the Birkeland currents that drive the aurora on Earth and is responsible for the undulating auroral curtains. Scaling up from the size of Earth's auroras to the storm on Saturn is no problem. The two prominent "spiral galaxy" formations in the dragon storm are likely the effects of the interaction of Birkeland current pairs. In other words, plasma phenomena may be scaled up from the laboratory to planetary, and even to galactic, dimensions.

Like Jupiter's Great Red Spot, the dragon storm on Saturn seems to be a long-lived storm center that occasionally flares up. The clock-like regularity of the radio emissions from storms on Saturn is used to judge the great planet's actual rotation rate beneath the clouds. But this behavior is enigmatic. Why should an electrical storm attach itself to a particular spot on a planet's surface, particularly when that surface is thought to be liquid?

The Electric Universe model of stars and planets provides the possibility of a solid surface on the giant planets. And as we find on Earth, a solid surface allows for regional electrical differences that favor electrical storm activity in one region over another. A good example is "tornado alley" in the southern U.S.A.

The Electric Universe accepts the plasma cosmology version of star formation, which postulates that a star is formed in a 'z-pinch' in a galactic electric discharge. It is a model that can be shown experimentally to work. In contrast, the gravity cosmology version, which postulates that a star is formed by the collapse of a cloud of gas, cannot be demonstrated experimentally nor can a collapsing cloud be identified observationally. Furthermore, this 'nebular theory' is beset with theoretical contradictions of angular momentum and magnetic field distribution.

In the Electric Universe, stars do not "consume themselves" to fuel their radiant output. The same galactic currents that formed them remain to light them. This means that stars are born electron deficient with respect to their galactic environment. It also means that galaxies be born similarly electron deficient with respect to their environment. It is the slow galactic charging process that maintains the steady glow of their countless starry electric lights.

Early in the Twentieth Century astronomers dismissed the notion of an external power source for stars because they thought a star would swiftly collapse under its own weight unless there was a central source of radiation pressure to prevent it. But this argument fails if charge separation occurs in massive bodies. This possibility of charge separation was considered, but it was discarded by arguing, using the ideal gas laws, that the light electrons would not rise to the top to any significant degree in a hydrogen atmosphere.

This is a prime example of an inappropriate model rendering all further theorizing worthless. The physicists would have been well advised to look to the chemists for a better model – one in which the electric dipole force between atoms and molecules plays a dominant role. Because the atoms in a strong gravitational field will be distorted, the heavy positively charged nucleus will be offset from the center of the atom toward the center of the star. The result is that each neutral atom becomes a small radial electric dipole. The effect on free electrons is to cause them to drift toward the surface, leaving positively charged ions behind in the interior. The repulsive forces among these positively charged ions prevent the gravitational collapse of the star.

Furthermore, the visible "surface" of a star, or photosphere, is an electric discharge phenomenon and therefore not controlled by gravity. The standard model of stars assumes that gravity and radiation pressure determine the size of a star. That is not so in the electrical model. So conventional calculations of the density of stars and their internal composition have no real meaning.

But there is more. Physicists assume that Newton's law of gravity has a "universal" gravitational constant, "G," which is the same for all bodies in the universe. But "G" is the most elusive constant in physics. It seems to be different every time the same apparatus measures it on Earth. The Electric Universe takes a different view. "G" depends on the internal electric stress of the body and is different for every body in the universe. This effect can be seen in particle accelerators where matter apparently gains in mass in response to the amount of electrical stress that is applied to it.

So deducing the composition and structure of stars and planets by measuring their gravitational fields and assuming "G" to be a fixed value will give misleading results. Conventional models assume planets are accreted from a hypothetical primordial solar nebula. They also assume that hydrogen is compressed to a metallic state in the cores of gas giants. These assumptions too are invalid in an Electric Universe.

Planets are "born" fully formed from larger bodies. They are not accreted. The process of having planetary "children" is that of electrical expulsion of a part of the positively charged matter from beneath the surface of a disturbed star or gas giant. That is why the gas giants have satellite systems that are like miniature solar systems. The British physicist Peter Warlow was moved to write:

All of the existing theories of planet formation have taken material from the surface of the Sun or from a cloud of dust outside the Sun in order to form the planets, for the 'obvious' reason that planets are on the outside of the Sun. We humans, equally 'obviously,' are outside our mothers – yet we did not start there."

[The Reversing Earth, 1982].

Some measure of the internal composition of stars can be seen in their "children" – the gas giants. But all we can see and measure is the upper atmospheres and clouds of the gas giants. To delve deeper we need to look at the "children" of gas giants – the rocky planets

and moons. Clearly, each planet and moon may have a complex history. All were not formed at about the same time in a single event. And the larger bodies must have evolved discontinuously with each birth. So it was with Saturn!

The ancients knew Saturn as "the Sun of night." The archaic words we now associate with the Sun—Ra, Helios, Shamash, etc.—originally referred to Saturn. Saturn's core is still hot (Saturn radiates more than twice the energy that it receives from the Sun) because of Saturn's recent history as a radiant body. This suggests that beneath Saturn's clouds is a large, hot, solid body practically indistinguishable in composition and physical state from Venus or Earth. Its positively charged core prevents hydrogen from being compressed to the metallic state. With a solid core and having "given birth" fairly recently – as evidenced by the ephemeral icy rings – Saturn probably still bears the birth scar, hidden beneath the clouds. We might expect some preference for continued electric discharge from that scarred region.

Saturn is the most oblate planet in the solar system. Its equatorial winds are four times faster and the "jets" twice as wide as Jupiter's. These factors suggest an atmosphere of great depth. This may explain why the radio noise associated with the dragon storm seems to precede the storm. The tornadic discharge to the surface of Saturn must be skewed over a considerable distance by the high-speed winds and great depth of the atmosphere. Only the powerful electromagnetic forces that control a tornadic discharge could maintain the integrity of the discharge column under the onslaught of tremendous vertical wind shear. (The winds in the upper atmosphere have been estimated to exceed 1000 mph.)

The Electric Universe model provides a connection between the dragon of legend and the storm seen in the Cassini image. The model was built, not from theoretical considerations alone but from an interdisciplinary inquiry into the images of planets (represented as disks) and cosmic plasma phenomena that our ancestors felt were so important to remember. They chiselled millions of uniquely diagnostic patterns, known as petroglyphs, into solid rock. But with the context long gone, these petroglyphs have become a mere curiosity.

Meanwhile the physical clue for an intimate relationship in the past between Saturn, Mars and Earth lies in their similar axial tilts of 26°, 24° and 23°. The axis of a rapidly spinning planet has a gyroscopic stability that resists change due to external forces. The normal result of disturbance is merely to cause the axis to slowly precess.



The first civilizations sprang up in reaction to the dramatic prehistoric events. The activities of those civilizations—their organization, art, architecture and rituals—were directed toward the memorialization of the former celestial drama. It is there we first meet the inexplicable, capricious planetary gods and the world-threatening, fire-breathing celestial dragon or serpent. So it is fitting that scientists today should unconsciously associate the dragon image with a powerful plasma discharge on Saturn. However, the connection will only become consciously apparent when the electrical nature of the universe is acknowledged. Only then may scientists solve the mysteries of Saturn's dragon storm.

Wal Thornhill

The Deep Impact of Comet Theory

Posted on [July 3, 2005](#) by [Wal Thornhill](#)

(I hope my readers will forgive the absence of news items for the past few months while I took a break and gave some presentations in Europe on the Electric Universe. I did manage to keep an editorial eye on the Thunderbolts website, where my colleagues dealt very well with breaking news).

This news item deals with the Deep Impact mission to Comet Tempel 1, hours before the copper projectile is due to strike the comet's nucleus.



Artist's conception of the Deep Impact spacecraft observing the birth of the new crater on Tempel 1. Image: NASA/JPL/UMD (art by Pat Rawlings)

There is more riding on this mission than may be apparent from regular news sources. At issue is the assumption of an electrically neutral universe, upon which every conventional astronomical theory rests. The story of the formation of the solar system from a cloud of gas and dust – and comets as the leftovers – is a work of fiction that has never predicted anything useful. Like Alice chasing the White Rabbit down its hole, each surprising new discovery has resulted in an increasingly absurd story.

In the Electric Universe comets are not primordial. They are debris produced during violent electrical interactions of planets and moons in an earlier phase of solar system history — a phase that persisted into early human history. Comets are similar to asteroids, and their composition varies. Most comets should be homogeneous, their interiors will have the same composition as their surfaces. They are simply "asteroids on eccentric orbits."

A comet is a negatively charged object moving through the extensive and constant radial electric field of the positively charged Sun (see below). A comet becomes negatively charged during its long sojourn in the outer solar system. As it speeds into the inner solar system, the increasing voltage and charge density of the plasma (solar "wind") cause the comet to discharge electrically, producing the bright coma and tails.

It is this electrical dimension to comets, the Sun and the solar system (in other words, the Electric Universe) that may be revealed by this daring experiment. An electric comet would forever change the picture of the solar system and eventually force astronomers to consider the overwhelming evidence that electricity lights not only our Sun but also all the stars in the heavens. Moreover, this would only be the beginning of a more sweeping revolution touching all of the theoretical sciences and in the end recasting our understanding of earth history and the human past.

If impact is achieved it will be a singular success story for the engineering team of Deep Impact. However, no thanks will be due to the science team. Under their misguided view of the nature of comets, the spacecraft and its impactor section will be subject to an electrical environment that could cause failure of the guidance electronics and result in a near miss rather than a bulls-eye.

In October 2001 I wrote a news item titled "Comet Borrelly rocks core scientific beliefs." At the end I said:

In future: There is a plan for a comet mission called Deep Impact. Scheduled for July 2005, Deep Impact's spacecraft will arrive at comet Tempel 1 and become the first mission to impact the surface of a comet. A 350-kg (770-lb) copper mass impactor will create a spectacular football field-sized crater, seven stories deep on a comet 6-km (approximately 4 miles) in diameter. This is the first attempt to peer beneath the surface of a comet to its freshly exposed material for clues to the early formation of the solar system.

Given the erroneous standard model of comets it is an interesting exercise to imagine what surprises are in store for astronomers if the plan is successful. The electrical model suggests the likelihood of an electrical discharge between the comet nucleus and the copper projectile, particularly if the comet is actively flaring at the time. The projectile will approach too quickly for a slow electrical discharge to occur. So the energetic effects of the encounter should exceed that of a simple physical impact, in the same way that was seen with comet Shoemaker-Levy 9 at Jupiter. Changes to the appearance of the jets may be seen before impact. The signature of an electrical discharge would be a high-energy burst of electrical noise across a wide spectrum, a "flash" from infra-red to ultraviolet and the enhanced emission of x-rays from the vicinity of the projectile. The energy of a mechanical impact is not sufficient to generate x-rays.

If the arc vaporizes the copper projectile before impact the comet will not form the crater expected. On the other hand, any copper metal reaching the surface of the comet will act as a focus for an arc. And copper can sustain a much higher current density than rock or ice. There would then be the likelihood of an intense arc, with possibly a single jet, until the copper is electrically "machined" from the comet's surface. Copper atoms ionized to a surprisingly high degree should be detectable from Earth-based telescopes. Electrical discharges through the body of a poor conductor can be disruptive and are probably responsible for the breakup of comets. It is not necessary for them to be poorly consolidated dust and ice and to simply fall apart. So there is some small chance that astronomers will be surprised to see the comet split apart, if the projectile reaches the surface of the comet and results in an intense arc.

The Deep Impact mission seems rather pointless when the cathode arcs are doing the job of exposing the comet's subsurface. However, if comets are an electrical phenomenon and have nothing to do with the formation of the solar system then astronomers are bound to be baffled once more. And that could be worth every dollar NASA spends on Deep Impact.

These predictions remain but the intensity of the electrical effects depend upon the degree to which the comet is charged with respect to the solar plasma at the impact point. So it is disappointing that NASA chose a short period comet that only ranges between the orbits of Jupiter and Mars. Long period comets spend more time travelling slowly in the lower voltage regions of the outer solar system. So when they rush toward the Sun their electrical display is more energetic than the short period comets. Also, the same electrical circuit that drives the Sun energizes comets. The Sun's activity is near minimum, so we may expect reduced cometary activity. Of course, none of these electrical considerations figured in NASA's thinking.

COMPETING THEORIES

With the imminent arrival of the Deep Impact spacecraft at the comet Tempel 1, it is time to test competing theories on the nature of comets. The predictions and lines of reasoning offered here will set the stage for future analyses of the electric comet model.

To facilitate clarity here is a brief outline of the two theoretical models. As for predictions, NASA scientists seem to have retreated from such an essential scientific practice.

DIRTY SNOWBALL MODEL

- Comets are composed of undifferentiated "protoplanetary debris," dust and ices left over from the formation of the solar system billions of years ago.

- Radiant heat from the Sun sublimates the ices (turns them directly into vapor without the intermediate step of becoming liquid). The vapor expands around the nucleus to form the coma (head of the comet) and is swept back by the solar wind to form the tail.
- Radiation damage over billions of years in the "deep freeze" of a hypothetical distant Oort cloud, or reservoir of comets, blackens their surface.
- Over repeated passages around the Sun, the Sun's heat vaporizes surface ice and leaves a 'rind' of dust.
- Where heat penetrates the surface of a blackened, shallow crust, pockets of gas form. Where the pressure breaks through the surface, energetic jets form.

ELECTRIC COMET MODEL:

- Comets are debris produced during violent electrical interactions of planets and moons in an earlier phase of solar system history — a phase that persisted into early human history. Comets are complex, differentiated bodies similar to asteroids, and their composition varies. Most comets should be homogeneous — their interiors will have the same composition as their surfaces. They are simply "asteroids on eccentric orbits."
- Comets follow their eccentric orbits within a weak electrical field of constant strength, centered on the Sun. (See "[A Mystery Solved – Welcome to the Electric Universe!](#)". They develop a charge imbalance with the higher voltage and charge density near the Sun that initiates discharge and the formation of a glowing plasma sheath – appearing as the coma and tail.
- The observed jets of comets are electric arc discharges to the nucleus, producing "electrical discharge machining" (EDM) of the surface. The excavated material is accelerated into space along the jets' observed filamentary arcs.
- Intermittent and wandering arcs erode the surface and burn it black, leaving the distinctive scarring patterns of electric discharge machining. The primary distinction between a comet and an asteroid is that, due to its elliptical orbit, electrical arcing and 'electrostatic cleaning' will clean the nucleus' surface, leaving little or no dust or debris on it.

ELECTRIC MODEL PREDICTIONS FOR DEEP IMPACT:

- Tempel 1 has a low-eccentricity orbit. Therefore its charge imbalance with respect to its environment at perihelion is low. (It is a 'low-voltage' comet.) Electrical interactions with Deep Impact may be slight, but they should be measurable if NASA will look for them. They would likely be similar to those of Comet Shoemaker-Levy 9 prior to striking Jupiter's atmosphere: The most obvious would be a flash (lightning-like discharge) shortly **before impact**.
- The impactor may form a sheath around it as it enters the coma, becoming a 'comet within a comet.' The plasma sheath could interfere with communications in the same way as experienced by the Space Shuttle during reentry.

- Internal electrical stress may short out the electronics on board the impactor before impact. That could compromise the guidance system and the success of the mission.
- More energy will be released than expected because of the electrical contributions of the comet. (The discharge could be similar to the "megalightning" bolt that, evidence suggests, struck the shuttle Columbia).
- The electrical energy will be released **before impact**.
- X-rays will accompany discharges to the projectile, which will not match X-ray production through the mechanics of impact. The intensity curve will be that of a lightning bolt (sudden onset, exponential decline) and may well include more than one peak.
- If the energy is distributed over several flashes, more than one electrical crater on the comet nucleus could result – in addition to any impact crater.
- Any arcs generated will be hotter than can be explained by mechanical impact. If temperature measurements are made with sufficient resolution, they will be much higher than expected from impact heating.
- The discharge and/or impact may initiate a new jet on the nucleus (which will be collimated — filamentary — not sprayed out) and could even abruptly change the positions and intensities of other jets due to the sudden change in charge distribution on the comet nucleus.
- The impact/electrical discharge will not reveal "primordial dirty ice" but the same composition as the surface.
- The impact/electrical discharge will be into rock, not loosely consolidated ice and dust. The impact crater will be smaller than generally expected .
- An abundance of water on or below the surface of the nucleus (the underlying assumption of the "dirty snowball" hypothesis) is unlikely.

Following are some of the issues considered:

MISSING WATER

For the survival of the standard model, nothing is more crucial than finding an abundance of ices on or below the surface of the nucleus of Tempel 1. It is not sufficient to find water merely in the comet's coma. Negative oxygen ions from cathodic etching of rock minerals in the nucleus will combine with protons from the solar wind to form water in the coma and tail. Spectra of comets already reveal the presence of negative oxygen ions. Moreover, the ions exhibit forbidden lines characteristic of a strong electric field. There is no conventional explanation for these observations.

There is a high probability that scientists will find less water ice and other volatiles than expected, both on the surface and beneath the surface of Tempel 1. It will not be surprising if the impactor exposes a subsurface with little or no ices. For popular comet theory this would be disastrous, since it now calls upon volatile ices beneath the surface to drive the comet's jets and create the glowing coma. This requirement is due to the

surprising discovery, through prior comet probes, of dry surfaces. The surface of Comet Borrelly, for example, was parched.

But the problem for comet theory is more severe, since evidence for subsurface volatiles also ranges from minimal to non-existent. Examination of Shoemaker-Levy 9 after the comet broke apart revealed no volatiles. When comet Linear disintegrated astronomers were astonished by the absence of meaningful water content. Comets do not "disintegrate" by solar heating but explode electrically like an overstressed capacitor.

There are plenty of icy moons in the solar system. So if comets and asteroids are part of the 'afterbirth' of electrical expulsion of planets and moons from their parent primary it does not exclude the possibility of water ice on Tempel 1. But it is not required in the electrical model of comets for the production of jets, comas and tails.

SHARP SURFACE RELIEF

The electric model claims that the comas and tails of comets are generated by cathode arcs excavating surface material from the nucleus, in the fashion of electrical discharge machining (EDM) in industrial applications. The model predicts a sculpted surface, distinguished by sharply defined craters, valleys, mesas, and ridges — the opposite of the softened relief expected of a sublimating "dirty snowball ." (A chunk of ice melting in the Sun loses its sharp relief.) Surprisingly sharp relief was discovered in the closest images taken to date of a comet nucleus – Comet Wild 2. See "[Comets Impact Cosmology.](#)"

BLACK SURFACES

The first photographs of comet nuclei astonished astronomers with the blackness of the surfaces. The nuclei were darker than copier toner. This observation alone should have called into question the "dirty snowball" hypothesis. But an ad hoc adjustment of the theory followed, arbitrarily assuming that comets were parked for billions of years in deep space, where they suffered radiation damage that conveniently blackened their surfaces.

Electric discharge machining 'burns' and darkens the rocky comet surface. It requires no additional hypotheses or contrived history of the comet. We see examples of the darkening effect from electrical discharge on Jupiter's moon Io and the dust devils on Mars.

ANOMALOUS X-RAYS

The comet is rushing toward the copper projectile at almost 23,000 mph, which will not give time for the copper projectile in the exceedingly thin cometary plasma to balance its electrical potential with that of the more negative comet nucleus.

If (and it's the biggest "if") Tempel 1 is sufficiently electrically active before impact, we may see the usual non-linear behavior of plasma when subjected to increasing electrical

stress. That is, there will be a sudden electric discharge, or arc. An electric discharge between the comet cathode and the copper projectile anode will result in X-ray emission, just as in any X-ray machine on Earth. Such X-rays are easily identifiable and in large amounts would be anomalous for a mere impact.

So, before physical impact occurs, we may expect a sudden discharge between the comet nucleus and the copper projectile. It will have the characteristic light-curve of lightning, with rapid onset and exponential decay. The question is, will it be a mere spark or a powerful arc?

Whether due to impact or electric arc, positively charged copper ions may be expected to produce radiation by recombination with free electrons. A small proportion of that radiation may be in the x-ray region. But the spectrum and intensity curve for radiation from an impact should be quite different from the flash of an electric arc impinging on a copper anode.

The arc should also give a restricted, almost point, source for the radiation from the target sites on the impactor and the comet nucleus. This is quite different from anything expected from distributed explosion products.

Because electric arcing causes the craters seen on comets, there is the possibility that the Deep Impact projectile will form an electrical crater as well as, or instead of, an impact crater.

When the impactor arrives, it is likely that active jets will move or switch off, since the comet's electrical field will have been suddenly disturbed. The simple thermal out-gassing model does not expect this.

ANOMALOUS DISCHARGE

Outbursts from comet nuclei frequently occur, giving rise to expressions of astonishment from comet observers. Such events do not fit well with a model of sublimating ices. The cause remains mysterious, though cometologists speculate about heating processes inside the comet. In the electrical model, energetic outbursts are expected due to the non-linear behavior of plasma in the changing electrical environment of the solar "wind." Comets have flared beyond the orbit of Jupiter, even beyond the orbit of Saturn, where known icy bodies do not sublimate under solar radiation. A potentially embarrassing, ad hoc proposal has been put forward that attributes the outbursts to collisions with meteoric material.

COLLIMATED AND FILAMENTARY JETS

Despite years of photographs showing collimated jets (narrow filaments that maintain their coherence across considerable distances), the artists' conceptions of comets still show jets as geyser-like eruptions, spraying out into space. An expanding jet is the expected behavior of neutral gas and dust entering a vacuum. But it is not characteristic

of an electric discharge in plasma. A good look at the jets of Tempel 1 reveals the characteristic features of a plasma discharge, with coherent current filaments that do not obey the physics of neutral gas jets. A look at a novelty-store plasma ball demonstrates the effect nicely.

JET ENERGIES AND VELOCITIES

There is a huge problem for the sublimating ices model of jet production on cometary nuclei. Expanding gases carrying dust cannot produce the observed filamentary and highly collimated jets that are observed. A heated gas in the vacuum of space must rapidly disperse.

The Electric Universe model argues that the so-called 'volcanoes' on Jupiter's innermost large satellite, Io, are active cathodic jets. Professor Tommy Gold in 1979 first identified Io's supersonic volcanic jets as a plasma arc phenomenon. Further theoretical work by Peratt and Dessler in 1987 confirmed the identification and also showed that the jet features could be accurately modelled by the 'plasma gun' experiment. The speed of cometary jets matches closely that of the plasma gun.

HEAVY ELEMENTS

If an arc is struck between the comet nucleus and the projectile, we may expect to see metals such as Li, Na, K, Ca, Mg and Fe in a flash spectrum before impact. They will have been etched from the rocky comet in the cathode arc.

The sulfur molecule S₂ is one of the great unsolved mysteries of comet chemistry. It has been identified in several, but not all, comets. The molecule has a very short lifetime and sublimates at a higher temperature than those found on cometary surfaces or grains. It is not the equilibrium form of the molecule either. But S₂ is the kind of molecule that could be produced from rocky minerals in the extreme electrical environment of a plasma arc.

NEGATIVE IONS

Negative ions were discovered in the inner coma of Comet Halley with densities 100 times greater than expected from conventional theory. NASA investigators should look for an abundance of negative ions in the impact ejecta. This would be an obvious signature of a negatively charged comet. Forbidden spectral lines from negative oxygen ions have been detected spectroscopically in comet comas in the past. They indicate the presence there of a strong electric field.

It is advisable that investigators look at water abundances both close to the nucleus and in the far coma to see to what extent water is being formed away from the nucleus by the combination of negative oxygen ions with protons from the solar wind. The concern is that these reactions will give inflated values for the water ice abundance in the comet nucleus.

IMPACTOR LIGHTNING STRIKE

The copper projectile has a camera that is supposed to be active until impact. There is some doubt that the camera will be able to provide images closer than a few tens of kilometers to the nucleus because of anticipated damage to the lens by high-velocity dust particles. However, transmissions should continue until impact, according to NASA investigators. But if an arc to the projectile occurs, transmissions will cease before impact.

IMPACT SITE TEMPERATURES

A mechanical impact will not produce the temperatures of an electric arc, which can be tens of thousands of degrees over a very small area. The problem will be whether temperature readings will have the resolution to be able to distinguish a very high temperature over a tiny area or merely an average over a large impact area. Anomalous high temperature readings could precede physical impact, accompany impact, and follow impact. An indicator of arcing would be the presence of atoms ionised to a higher degree than can be explained by the energy of the impact.

COMET BRIGHTNESS

Tempel 1 is a magnitude dimmer than — less than half as bright as — expected from previous approaches to the Sun. Conventional theory has no explanation for this lower energy. The electrical model notes that the Sun is approaching the minimum in its sunspot cycle, which means that the solar electrical energy input is at a minimum. Because the comet's brightness depends on electrical energy from the Sun's circuit, the effect is analogous to turning down the dimmer switch on an electric light. This lower energy level unfortunately reduces the likelihood of 'electrical fireworks' during Deep Impact's encounter.

Wal Thornhill

Comet Tempel 1's Electrifying Impact

Posted on [July 13, 2005](#) by [Wal Thornhill](#)



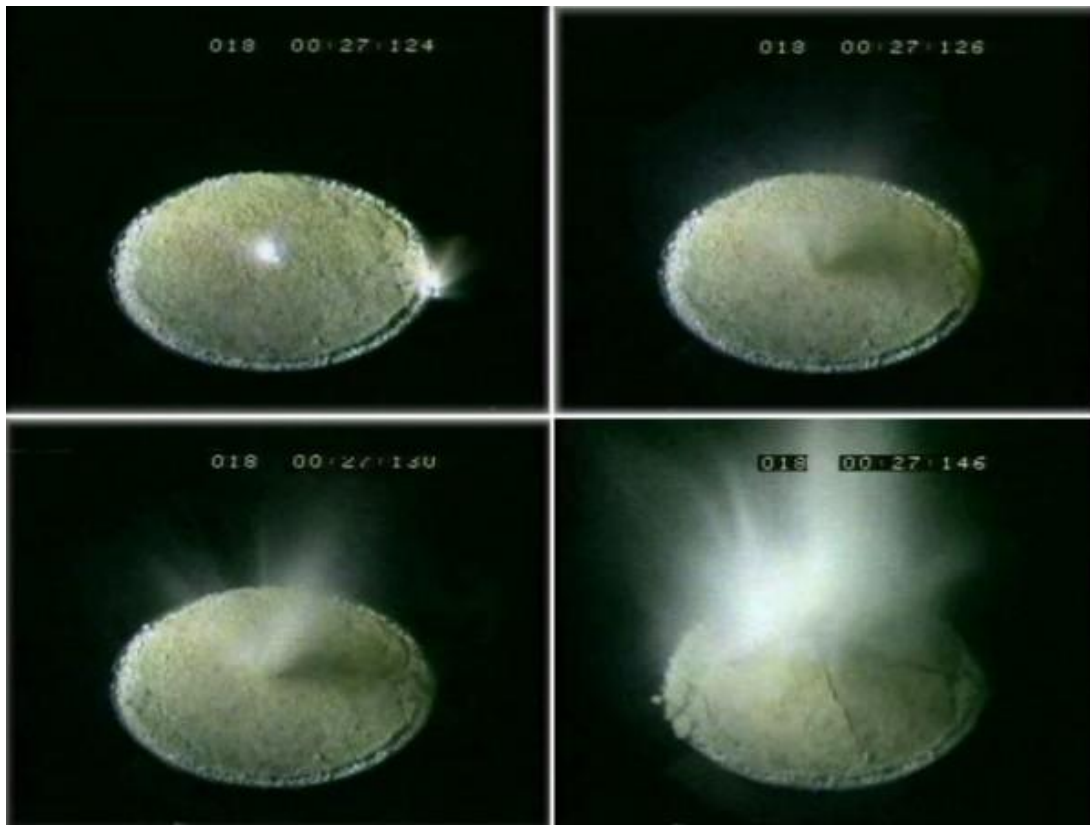
This spectacular image of comet Tempel 1 was taken 67 seconds after it obliterated Deep Impact's impactor spacecraft. The image was taken by the high-resolution camera on the mission's flyby craft. Scattered light from the collision saturated the camera's detector, creating the bright splash seen here. Linear spokes of light radiate away from the impact site, while reflected sunlight illuminates most of the comet surface. The image reveals topographic features, including ridges, scalloped edges and possibly impact craters formed long ago. Image credit: NASA/JPL-Caltech/UMD

It is now little more than a week since the spectacular hyper-velocity meeting of Comet Tempel 1 with a copper projectile sent from Earth. Preliminary results of the Deep Impact experiment are being reported from telescopes in space and around the world. However, it may be months before a detailed assessment of the experiment is publicised. It is to be hoped that the delay is not due to experts' need to be seen as capable of explaining everything in terms of their beliefs about the nature of comets.

Meanwhile, how did the Electric Universe model of comets fare? The two major predictions that the outburst upon impact would be more energetic than expected and the comet is rocky, with little water in its interior, have been supported.

Before the impact scientists were concerned that there might be little to see. That is understandable when you look at impact experiments performed on Earth. Below is the initial sequence from a movie showing a high-speed impact into a frozen comet-like material (dust, ice, window cleaner and Worcestershire sauce) over a highly porous target (garden perlite).

See the movie at: deepimpact.umd.edu/science/cratering.html Credit: NASA



Compare the lower-left frame with the image at the top of this news item and you will understand why the reaction to the Deep Impact by NASA scientists was "unbelievable." The blast was "considerably more energetic than I expected." "The big question is how did we make such a big splash?" "I'm at a loss to explain it." The reaction was universal.

Another spectacular impact – Comet Shoemaker-Levy 9 at Jupiter

However, the brilliant outburst was expected by the electrical comet model. In October 2001 I predicted:

"..the energetic effects of the encounter should exceed that of a simple physical impact, in the same way that was seen with comet Shoemaker-Levy 9 fragments at Jupiter."

It is worth reviewing that earlier event because the astronomical community has learned nothing in the 11 years since the crash of Comet Shoemaker-Levy 9 into Jupiter. The old dirty snowball comet model remains intact. We forget that some astronomers discouraged the public from trying to see SL-9 impact Jupiter.

"You won't see anything. The comet crash will probably amount to nothing more than a bunch of pebbles falling into an ocean 500 million miles from Earth."

But as Sky & Telescope reported:

"When Fragment A hit the giant planet ...it threw up a fireball so unexpectedly bright that it seemed to knock the world's astronomical community off its feet."

Sound familiar?

The electrical effects at Jupiter of Comet SL-9 were prodigious for "a bunch of pebbles." The Hubble Space Telescope (HST) detected a flare-up of fragment G **before impact at a distance of 2.3 million miles from Jupiter**. It occurred as the fragment crossed Jupiter's plasma sheath, or magnetospheric boundary. A plasma sheath, or "double layer," is a region of strong electric field, so the outburst there of an electrified comet nucleus is expected. The outburst was a surprise to astronomers. Hubble's Faint Object Spectrograph (FOS) recorded strong emissions from fragment G of ionised magnesium but no hydroxyl radical (OH), expected from water ice. Also, after the flare-up in magnesium emissions there was a "dramatic change in the light reflected from the dust particles in the comet."

These observations cast doubt in the minds of astronomers whether SL-9 was a comet or an asteroid. Astronomers believe the key difference is that comets are largely icy and asteroids are not because the latter formed too close to the Sun. The simple answer is that only their orbits distinguish comets and asteroids. Comets have more elliptical orbits than asteroids, which subjects the comets to a changing electrical influence from the Sun. The tails and comas of comets are simply electrical discharge phenomena and are not governed by the composition of the nucleus or solar heating. (One large asteroid, Chiron, has been observed to change into a comet and grow a coma). And several comets have flared up beyond the orbit of Saturn, where they are in deep freeze. The confusion between asteroids and comets only arises because of astronomers' tenacity in clinging to a disconfirmed theory of comets.

Just after the impact of SL-9 fragment "K," HST detected unusual auroral activity that was brighter than Jupiter's normal aurora and outside its normal area. Radiation belts were disrupted. There were unexpectedly bright X-ray emissions at the time of impact. But one mystery was never explained satisfactorily:

Early impact events were hidden from the Earth behind Jupiter's limb. However, the Galileo spacecraft was positioned 150 million miles away from Jupiter at an angle that gave it a ringside seat for these events. But Earth-based observatories saw some of the impacts start at the same time Galileo did. *"In effect, we are seeing something we didn't think we had any right to see,"* said Dr. Andrew Ingersoll of Caltech. *"...it seems clear that something was happening high enough to be seen beyond the curve of the planet,"* said Galileo Project scientist Dr. Torrence Johnson of JPL.

None of these discoveries is surprising if comets are highly electrically charged with respect to their environment. Radio astronomers had expected radio emissions from Jupiter at high frequencies to drop because dust from SL-9 fragments absorbs electrons from the radiation belts, where the electrons emit synchrotron radiation. Instead, they were surprised to find that emissions around 2.3 Ghz rose by 20-30%. *"Never in 23 years of Jupiter observations have we seen such a rapid and intense increase in radio emission,"* said Michael Klein of JPL.

"Extra electrons were supplied by a source which is a mystery."

It never occurred to anyone that the charged comet was the source of the electrons.

A charged comet is likely to be destroyed before impact by a massive electrical discharge, or "cosmic thunderbolt." That explains the mystery of the flashes that should have been obscured by Jupiter's limb and the intense burst of radiation seen from Earth. The strange dark fallout rings observed on Jupiter after the "impacts" were caused by the cosmic thunderbolts driving matter from lower levels upwards through Jupiter's atmosphere, not by fireballs following impact. It is the same "plasma gun" effect seen on Io, where the "volcanic" fallout is also electrically constrained to form rings.

Returning to Tempel 1 and Deep Impact

The radiance of the blast *"saturated the camera's detector."* The same kind of camera detector overload has occurred before at Jupiter with SL-9 and at Io when the Galileo Orbiter tried to take a close up image of a "volcano" on Io. It is purely an assumption to attribute all of the radiance of the Tempel 1 ejecta to scattered sunlight. *"The major surprise was the opacity of the plume the impactor created and the light it gave off,"* said Deep Impact Principal Investigator Dr. Michael A'Hearn of the University of Maryland, College Park.

That suggests the dust excavated from the comet's surface was extremely fine, more like talcum powder than beach sand. And the surface is definitely not what most people think of when they think of comets – an ice cube."

Well, who gave most people that idea? Unlike the impact experiment, there is no shadow evident in the blast cone, which we should expect given that NASA's Swift satellite X-ray data indicates "several tens of thousands of tons" of dust has been blasted into the coma.

The question was immediately posed:

"How can a comet hurtling through our solar system be made of a substance with less strength than snow or even talcum powder?"

The answer is that it cannot. Scientists had already commented on the circular craters, dark linear scarp-like features and flat areas on Tempel 1. And earlier, when NASA's Stardust probe took its headlong plunge through comet Wild 2 in January, 2004, Ray Newburn of NASA's Jet Propulsion Laboratory in Pasadena, California, said *"I don't think any of us really considered the possibility of impact craters. If the pits are craters, the surface of the comet nucleus must be much stronger than experts thought."* *"It may be a well-cemented rubble pile, but it's definitely not a loose, powdery surface,"* he said. So Tempel 1 highlights the contradictions created by the conventional theory of comets because it has craters. Yet the material blasted from it appears to be mostly fine powder. Another contradiction is that a deep covering of dust on the comet is the best insulation against solar radiation and should prevent ice sublimation, making jets impossible.

The Gemini North telescope on Mauna Kea successfully captured the dramatic fireworks display produced by the collision of NASA's Deep Impact probe with Comet Tempel 1. It shows a strong increase in silicates in the mid-infrared region of the spectrum. *"The properties of the mid-infrared light were completely transformed after impact,"* said David Harker of the University of San Diego, co-investigator for the research team.

"In addition to brightening by a factor of about 4, the characteristics of the mid-infrared light were like a chameleon and within five minutes of the collision it looked like an entirely new object."

Harker's research partner Chick Woodward of the University of Minnesota speculated further:

"We are possibly seeing crystalline silicates which might even be similar to the beach sand here in Hawaii!"

This is consistent with the rocky appearance of all close-up images of comet nuclei. Researchers at the Gemini North telescope concluded that there was strong evidence for silicates or rocky material exposed by the impact. However it requires something with the concentrated energy of an electric discharge to convert rock into finely divided annealed silicates – like talcum powder – seen in the coma. The production of an unexpected

abundance of extremely fine dust, some of it comprised of only 100 atoms or so, was an unsolved puzzle of the fly-bys of comet Halley.

The electrical model of comets simply explains the "chameleon"-like change in the spectrum of the comet. Normally, the spectrum is integrated over the coma where there has been time for negative oxygen ions, which have been discovered in surprising abundance by earlier fly-bys through comet comas, to combine with solar wind protons. The OH formed gives the appearance that water is a major constituent of the comet's nucleus. Simple sublimation of water molecules by solar heating will not produce short-lived negative oxygen ions. Another observation from the Odin telescope in Sweden may prove to fit this model. They found that the total amount of water seemed to decrease after the impact – as the researchers said – "oddly enough."

More recently, Smithsonian astronomers using the ground-based Submillimeter Array (SMA) in Hawaii and NASA's orbiting Submillimeter Wave Astronomy Satellite (SWAS) report seeing only weak emission from water vapor and a host of other gases that were expected to erupt from the impact site. Astronomer Charlie Qi of the Harvard-Smithsonian Center for Astrophysics expressed surprise at these results. He explained that short-period comets like Tempel 1 have been baked repeatedly by the sun during their passages through the inner solar system. The effects of that heat are estimated to extend more than three feet beneath the surface of the nucleus. But the Deep Impact indicates that these effects could be much deeper. *"Theories about the volatile layers below the surface of short-period comets are going to have to be revised,"* Qi said.

We have come to expect nothing more from astronomers than ad hoc revisions of existing theories. Meanwhile the contradictions pile up at their observatories. A major prediction of the electrical model of the late birth of comets (and asteroids) from well differentiated planets is that their composition will vary depending on their source but they will tend to be homogeneous and rocky. Measurements of their density will give misleading estimates of their composition because they are based on an assumption about the universality of the gravitational constant, 'G.' Gravity is a weak electric dipole force like the "London force" between molecules. So 'G' is a variable dependent upon the electrical stress within the comet. It is those electric stresses that cause comets to suddenly and mysteriously disintegrate.

What about the size of the crater? That was to be an important measurement in determining the solidity of the comet. Because the plume of gas and dust from the impact was much bigger, brighter and less transparent than expected, the crater is probably undetectable in the optical images taken by the flyby spacecraft. So the science team must resort to indirect methods. For example, it is thought the crater should be cooler than the surface if it exposed new ices. It could be revealed by the infrared images. The electrical model expects exposed bedrock which has been recently "spark machined" so that it may not be cooler than the surface. The best option seems to be to measure the width of the shadow at the base of the plume.

The electrical model of the comet predicted changes in existing jets and/or the addition of extra jets as a result of the large disturbance to the topography of the comet and the sudden addition of 840 kilograms of highly conductive copper. The jets from the blast did appear briefly to originate from two close centers, which was predicted as a strong possibility by the electric model. One crater would be electrical and the other impact generated (see below). The emergence of several extra and more pronounced jets was seen after the impact by the 2.5m NOT telescope at El Roque de los Muchachos observatory (La Palma, Spain). It should be noted that the reason for comets having well defined jets at all is not clear from the sublimating ices model.



This image was obtained 16 seconds after impact. It appears to show jets emanating from two centers.

Close-up images from the impactor showed bright spots on the comet nucleus, similar to those seen on Comet Wild 2. They may be the expected bright coronal discharge points that feed into the cometary jets. If so, they are the sites of electrical "cathode sputtering" like the bright spots and linear features seen along the edges of "caldera" walls on Io. These "cathode arc spots" are responsible for etching the sharp relief seen on comet nuclei. And like we see on Io, they leave a darkened, exposed surface when they move on. That would explain the darker rims of the craters and scarps. It is salutary to note that Kristian Birkeland, an outstanding pioneer of the Electric Universe, demonstrated the bright spots and sputtering of metals from an electrified sphere in his famous Terrella experiments. That was more than a century ago!

There was a small flare seen before the main flash. If so, it may be the electric discharge predicted by the electrical model to occur an instant before impact. NASA expert, Peter Schultz, suggested that the flare indicates a layered structure for the comet.

"My guess is there was soft layering on top, [the impactor] went down, and finally got in contact with ices."

It is suggested that analysis of the shape of the plume will give information about the depth of the crater. However, the results will be misleading if the plume is subject to focussing electromagnetic forces. It is interesting to note in Schultz's experiment that the top left frame also has a bright flash before material is ejected. There is also a bright flash from the edge of the target opposite the light source, which suggests that a piezoelectric effect from the concussion may have generated an electric spark in that experiment. Schultz's complicated guess for the origin of the flare is less likely than an electric discharge between the impactor and the comet an appreciable time before they made contact. An accurate assessment of the timing of the flash with the expected time of impact may provide the answer. The flashes and apparent early failure of the impactor camera deserve explanation also.

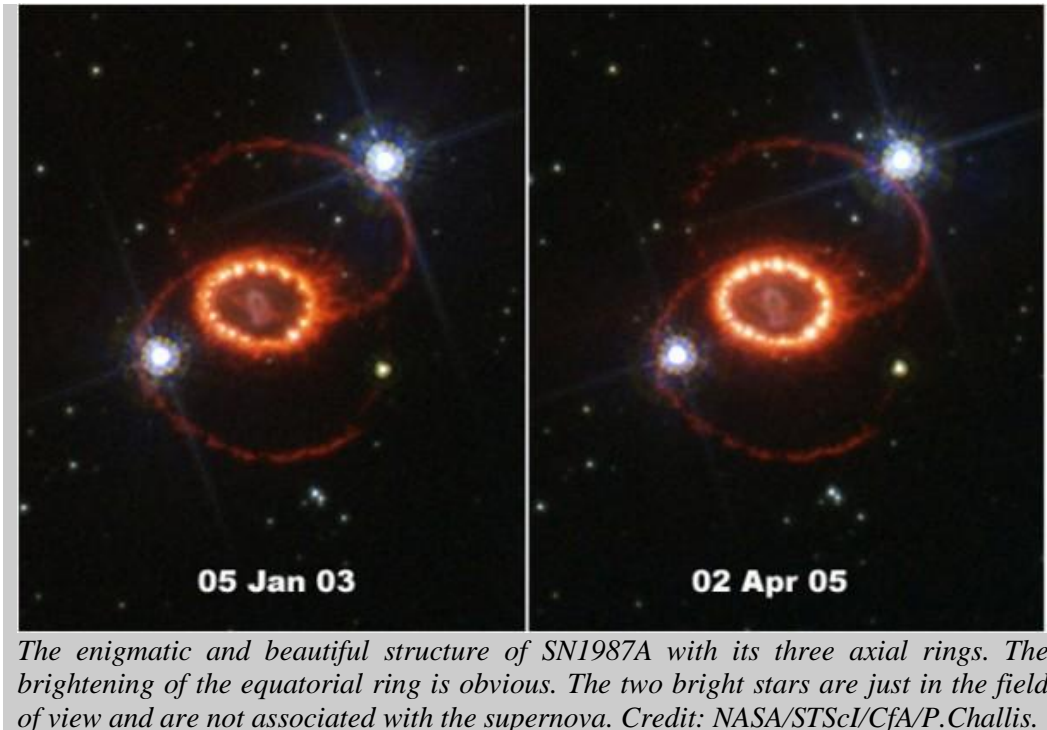
In stark contrast to NASA scientists, who seem to be perpetually surprised, the adherents of an electrical model of comets have seen many of the quite specific predictions satisfied. How many surprises and disconfirmations of cherished beliefs about comets will it require before a fundamental rethink occurs, instead of mere revision of old ideas? Science works best when there is a plurality of ideas. The present establishment monoculture of ideas is crippling scientific progress.

Wal Thornhill

Supernova 1987A Decoded

Posted on [August 24, 2005](#) by [Wal Thornhill](#)

Supernova 1987A is the closest supernova event since the invention of the telescope. It was first seen in February 1987 in the nearby Magellanic cloud, a dwarf companion galaxy of the Milky Way, and only 169,000 light years from Earth. Close observation since 1987 has now provided proof that supernovae are catastrophic electrical discharges focused on a star.



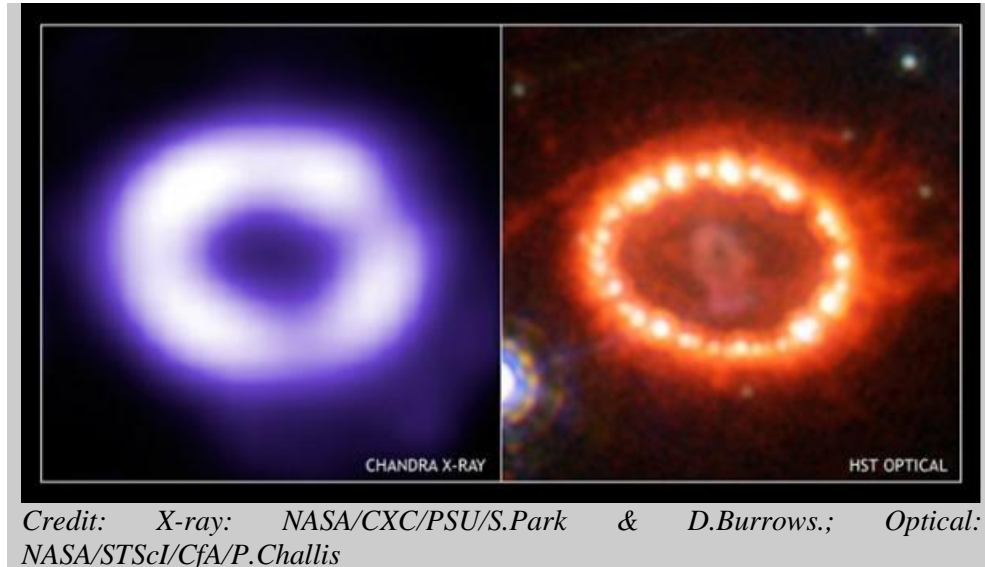
A supernova is one of the most energetic events witnessed in the universe. **The accepted explanation** is that it occurs at the end of a star's lifetime, or red giant stage, when the star's nuclear fuel is exhausted. There is no more release of nuclear energy in the core so the huge star collapses in on itself. If sufficiently massive, the imploding layers of the star are thought to "rebound" when they hit the core, resulting in an explosion, and the blast wave ejects the star's envelope into interstellar space. The bright equatorial ring is caused by the collision of exploded matter from the star with the remnants of an earlier stellar "wind." The two faint rings are a problem. The best that theorists have been able to manage is to postulate some kind of rotating beam from an assumed supernova remnant, sweeping and lighting up a shell of gas expelled at an earlier epoch. The ad hoc nature of these explanations is obvious.

The detection of a pulsar remnant after some supernovae is explained by the implosion of the stellar core to produce a neutron star. Pulsars emit bursts of radiation up to thousands of times a second. It is believed that a pulsar must be a super-collapsed stellar object that

can spin up to thousands of times a second and emit a rotating beam of X-rays (like a lighthouse). Commonsense suggests that this mechanical model is wrong when some pulsars rev beyond the redline, even for such a bizarre object.

A recent example of conventional thinking can be seen on the Chandra website. On August 17, [a news story](#) was posted:

Supernova 1987A: Fast Forward to the Past.



Recent Chandra observations have revealed new details about the fiery ring surrounding the stellar explosion that produced Supernova 1987A. The data give insight into the behavior of the doomed star in the years before it exploded, and indicate that the predicted spectacular brightening of the circumstellar ring has begun.. The site of the explosion was traced to the location of a blue supergiant star called Sanduleak-69° 202 (SK-69 for short) that had a mass estimated at approximately 20 Suns.

Subsequent optical, ultraviolet and X-ray observations have enabled astronomers to piece together the following scenario for SK-69: about ten million years ago the star formed out of a dark, dense, cloud of dust and gas; roughly a million years ago, the star lost most of its outer layers in a slowly moving stellar wind that formed a vast cloud of gas around it; before the star exploded, a high-speed wind blowing off its hot surface carved out a cavity in the cool gas cloud.

The intense flash of ultraviolet light from the supernova illuminated the edge of this cavity to produce the bright ring seen by the Hubble Space Telescope. In the meantime the supernova explosion sent a shock wave rumbling through the cavity. In 1999, Chandra imaged this shock wave, and astronomers have waited expectantly for the shock wave to hit the edge of the cavity, where it would

encounter the much denser gas deposited by the red supergiant wind, and produce a dramatic increase in X-radiation.

The latest data from Chandra and the Hubble Space Telescope indicate that this much-anticipated event has begun. Optical hot-spots now encircle the ring like a necklace of incandescent diamonds. The Chandra image reveals multimillion-degree gas at the location of the optical hot-spots. X-ray spectra obtained with Chandra provide evidence that the optical hot-spots and the X-ray producing gas are due to a collision of the outward-moving supernova shock wave with dense fingers of cool gas protruding inward from the circumstellar ring.

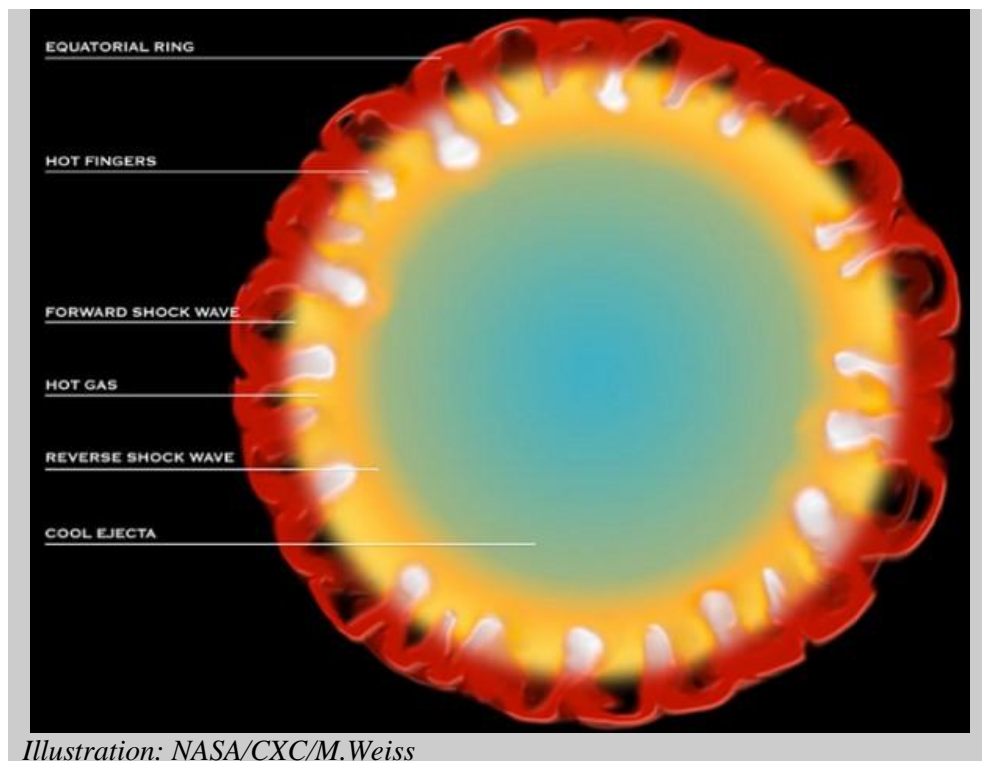


Illustration: NASA/CXC/M.Weiss

These fingers were produced long ago by the interaction of the high-speed wind with the dense circumstellar cloud. The collision of the outward-moving supernova shock wave (yellow) with the dense fingers of cool gas produce bright spots (white) of optical and X-ray emission. The expanding debris (blue) of the exploded star lags behind the shock wave and, except for a thin shell around the outer edge (gold), is too cool to produce X-rays.

The dense fingers and the visible circumstellar ring represent only the inner edge of a much greater, unknown amount of matter ejected long ago by SK-69. As the shock wave moves into the dense cloud, ultraviolet and X-radiation from the shock wave will heat much more of the circumstellar gas.

Then, as remarked by Richard McCray, one of the scientists involved in the Chandra research, "Supernova 1987A will be illuminating its own past."

On the contrary, Supernova 1987A illuminates only how poorly the theory of supernova explosions fits the observations.

The official explanatory illustration above is conjectural and relies (again) on invisible matter that the star is supposed to have conveniently pre-released in just the right places and filamentary form to produce the observed effects. To say, "*the predicted spectacular brightening of the circumstellar ring*" is disingenuous. Neither the presence of the three rings nor the pattern of bright "beads" in the equatorial ring was predicted from theory. "*The Hubble images of the rings are quite spectacular and unexpected,*" said Dr. Chris Burrows of the European Space Agency and the Space Telescope Science Institute in Baltimore, Maryland, when first discovered.

"This is an unprecedented and bizarre object. We have never seen anything behave like this before."

The pattern of brightening is not explained by an expanding shock front.

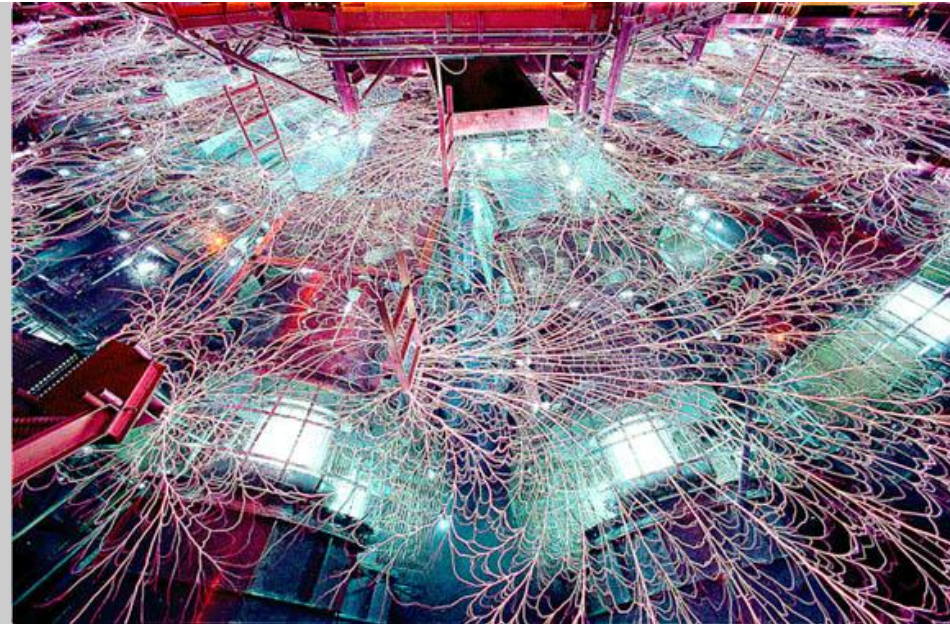
There is a more fundamental problem with SN1987A. The star at the center was found to have been a "blue supergiant." But a supernova explosion is thought to require a ten-times bigger red supergiant star. There is no evidence that SK-69 was a red supergiant star, emitting a massive stellar wind. The history of the star is not based on observation, it is a fabrication required by the theory.

The axial shape of SN1987A is that of a planetary nebula. Fifty years ago a British scientist, Dr. Charles E. R. Bruce (1902-1979), argued that the bipolar shape, temperatures and magnetic fields of planetary nebulae could be explained as an electrical discharge. Bruce was ideally situated to make the discovery, being both an electrical engineer versed in high-energy lightning behavior and a Fellow of the Royal Astronomical Society. He was ignored.



C. E. R. Bruce indicating examples of planetary nebulae which are clearly not simply expanding shells around a central star. Courtesy of E. Crew.

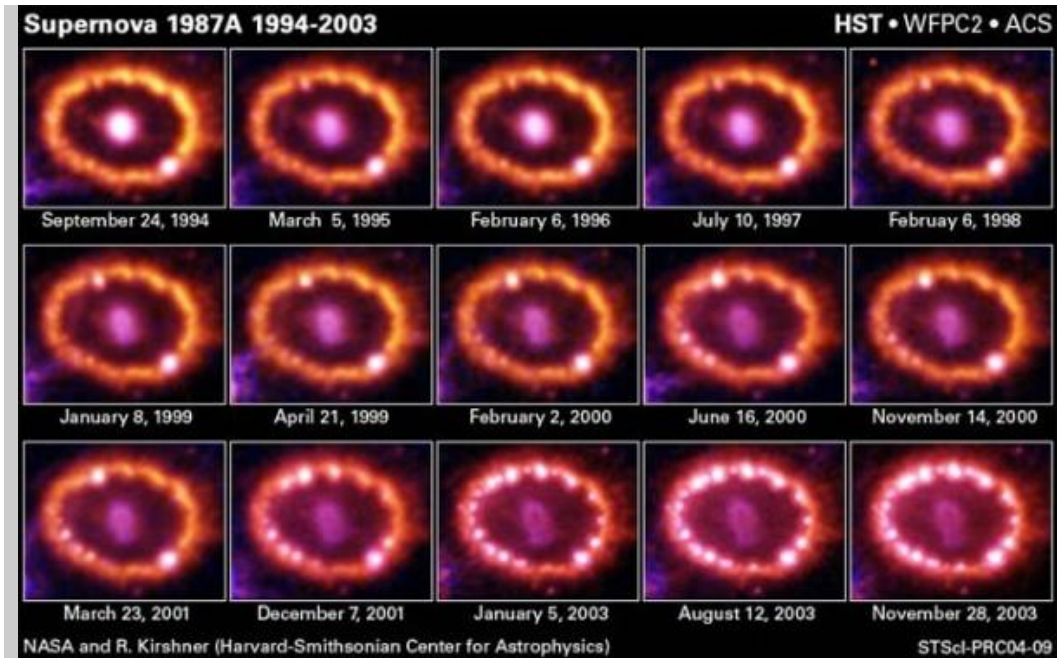
The place to look for real answers is not in abstract astrophysical theory but in the practical experiments and supercomputer simulations of some plasma cosmologists. They unleash the most powerful man-made electrical discharges on this planet. The result is called the "z-pinch." The term "z-pinch" comes from the usual representation of a current flowing along the z-axis, parallel to the magnetic field. With a strong enough current, the plasma formed by the discharge electromagnetically "pinches" into a string of sausages, donuts and plasma instabilities, along the z-axis.



Electrical discharges (Lichtenberg figures) illuminate the surface of the Z machine, the world's most powerful X-ray source, during a recent accelerator shot. The most recent advance gave an X-ray power of about 290 trillion watts for billionths of a second, about 80 times the entire world's output of electricity.

Since Bruce, and following the pioneering work of Hannes Alfvén on an electric circuit model of stars, it has become clear to plasma cosmologists that the electrical z-pinch effect is instrumental in forming stars. Once formed, stars continue to be lit by electrical power delivered throughout the universe by cosmic transmission lines known as Birkeland current filaments. These giant filaments can be traced by their radio transmissions. Stars also trace the Birkeland currents in galaxies in the same way that electric streetlights trace the routes of electrical cables.

Stars are an electrical, not a thermonuclear, phenomenon. Consequently, a star's size, color and spectrum tell us nothing about its age. A red supergiant star is huge because it is under low electrical stress. It is not at the end of its life. And being under low stress it is not expected to explode. However, a blue star is under extreme electrical stress. We do not have to advance the ad hoc postulate that SN1987A was a red supergiant before it exploded.



Here we see the changes in the equatorial ring over time. Some astronomers wrote, "The origin of the circumstellar ring is the outstanding mystery of SN 1987A. Why is the ring so thin, and so nearly circular? Why is it expanding so slowly? Today we have no clear answers to these questions. But we do know that the ring around SN1987A is not unique. Many planetary nebulae have remarkably similar bipolar structures."

How does a star explode? The conventional "implosion followed by explosion" model has many shortcomings. An electric star, on the other hand, has internal charge separation which can power a star-wide, expulsive lightning-flash. The star relieves electrical stress by fissioning or blowing off charged matter. A star also has electromagnetic energy stored in an equatorial current ring. Matter is ejected equatorially by discharges between the current ring and the star. Our own Sun does it regularly on a small scale. However, if the stored energy reaches some critical value it may be released in the form of a bipolar discharge, or ejection of matter, along the rotational axis. The remnant of SN 1987A shows such a bipolar ejection in the form of two blobs of matter (inside the bright ring).

A companion star may initiate a stellar discharge that results in fissioning. It is significant in this context that an unexplained and much-disputed "Mystery Spot" appeared along the line joining the two blobs and was seen briefly a couple of months after the explosion and then quickly faded from sight. The spot was too far away to have been ejected by the supernova and its brightness (10% of the supernova) was too great to be explained by reflection off a cloud of matter. It may have been a faint companion that triggered, or was a part of the circuit of the electrical supernova discharge.

The bright beaded ring shows that matter has been ejected equatorially. However, the ring is not expanding. The other two fainter rings are also arranged above and below the star on the same axis and show similar but fainter "bright spots" .

Conventionally, a shock wave from an exploding star should show spherical, rather than axial, symmetry. And there is no particular reason why the shock front should form a ring of bright spots. We should expect some visible indication of the spherical cavity.

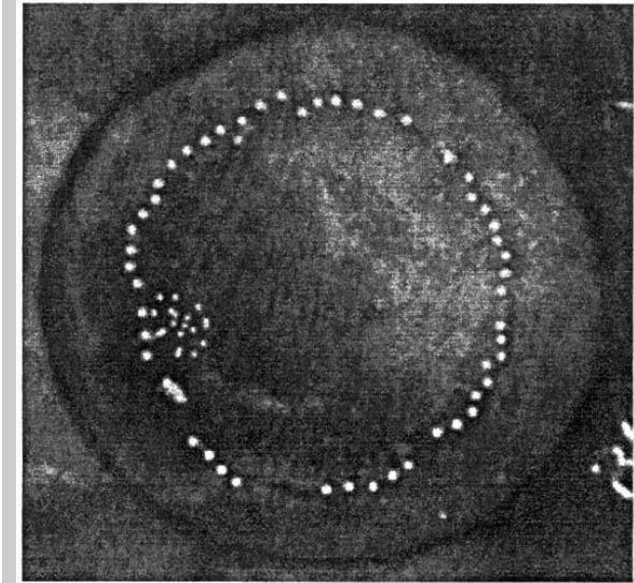
Stars are an electrical plasma discharge phenomenon. Electrical energy produces heavy elements near the surface of all stars. The energy is transferred over cosmic distances via Birkeland current transmission lines. The energy may be released gradually or stored in a stellar circuit and unleashed catastrophically. It is these cosmic circuits that are the energy source for the supernova explosion – not the star. That is why the energy output of some nebulae exceeds that available from the central star. See [Shocks from Eta Carina](#).

The electrical energy released in supernova fissioning is prodigious, so it is no surprise that there is an abundance of heavy elements and neutrinos dispersed into space by the stellar "lightning flash."

The crucial evidence for the electrical nature of supernovae must come from experiment and observation.

Anthony L. Peratt, Fellow, IEEE, published a seminal paper in the IEEE Transactions on Plasma Science, Vol. 31, No. 6, December 2003. It was titled "[Characteristics for the Occurrence of a High-Current, Z-Pinch Aurora as Recorded in Antiquity](#)." In it he explained the unusual characteristics of a high-energy plasma discharge. He discussed mega-ampere particle beams and showed their characteristic 56- and 28-fold symmetry. He wrote:

"A solid beam of charged particles tends to form hollow cylinders that may then filament into individual currents. When observed from below, the pattern consists of circles, circular rings of bright spots, and intense electrical discharge streamers connecting the inner structure to the outer structure."



This photograph shows a 0.6-mm-thick titanium witness plate that has been placed 15 cm in front of a 100 kilo-Gauss, sub-megaampere charged particle beam. Initially, the particle beam was cylindrical but after traveling the 15 cm has filamented. In the sub-gigaampere range, the maximum number of self-pinched filaments allowed before the cylindrical magnetic field will no longer split into "islands" for the parameters above has been found to be 56.

These results verify that individual current filaments were maintained by their azimuthal self-magnetic fields, a property lost by increasing the number of electrical current filaments. The scaling is constant for a given hollow beam thickness, from microampere beams to multi-megaampere beams and beam diameters of millimeters to thousands of kilometers.

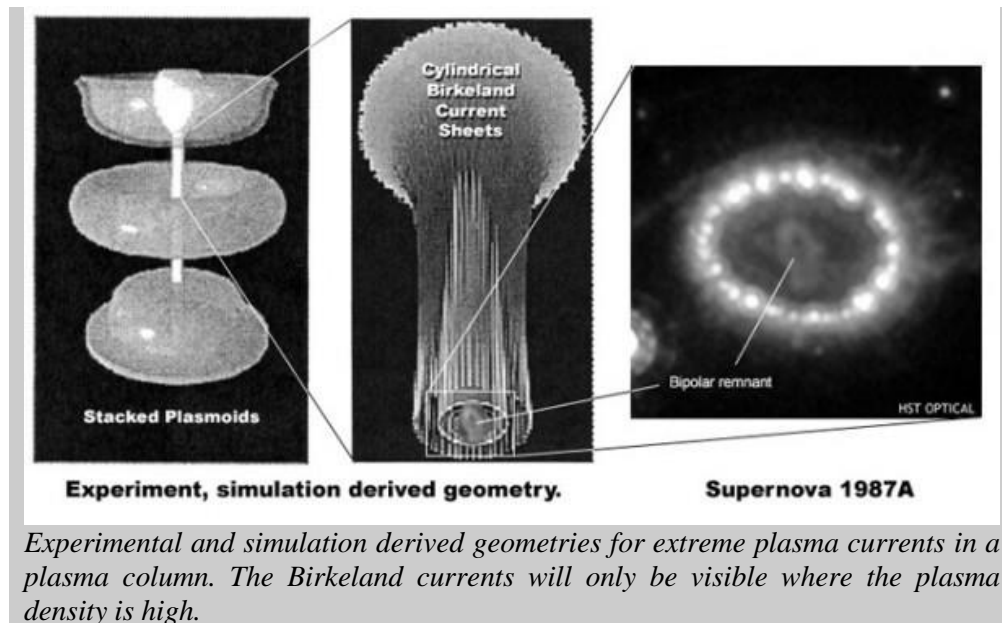
This scaling of plasma phenomena has been extended to more than 14 orders of magnitude, so the bright ring of supernova 1987A can be considered as a stellar scale "witness plate" with the equatorial ejecta sheet acting as the "plate" for the otherwise invisible axial Birkeland currents.

Peratt adds:

"Because the electrical current-carrying filaments are parallel, they attract via the Biot-Savart force law, in pairs but sometimes three. This reduces the 56 filaments over time to 28 filaments, hence the 56 and 28 fold symmetry patterns. In actuality, during the pairing, any number of filaments less than 56 may be recorded as pairing is not synchronized to occur uniformly. However, there are 'temporarily stable' (longer state durations) at 42, 35, 28, 14, 7, and 4 filaments. Each pair formation is a vortex that becomes increasingly complex."

The images of SN 1987A shows the Birkeland currents around the star have paired to a number close to 28. The bright spots show a tendency toward pairing and groups of three. This witness plate model explains why the glowing ring is so nearly circular and is expanding very slowly – unlike a shock front. It is more like a cloud at night moving through the beams of a ring of searchlights.

If the equatorial ring shows the Birkeland currents in the outer sheath of an axial plasma current column, then the supernova outburst is the result of a cosmic z-pinch in the central column, focused on the central star. It is important to note that the z-pinch naturally takes the ubiquitous hourglass shape of planetary nebulae. No special conditions and mysteriously conjured magnetic fields are required.



It is also the shape of SN1987A with its three rings. It will be instructive for plasma cosmologists to watch closely the development of SN1987A's "necklace of incandescent diamonds." I do not expect the ring to grow as a shock-wave-produced ring would be expected to. Some bright spots may be seen to rotate about each other and to merge. It is an opportunity more rare and valuable than a diamond to be able to verify the electric discharge nature of a supernova. Supernova 1987A will be illuminating the future of plasma cosmology!

Plasma cosmologists have not ignored the pulsar, sometimes found in a supernova remnant. Healy and Peratt in "[Radiation Properties of Pulsar Magnetospheres: Observation, Theory and Experiment](#)," concluded:

"the source of the radiation energy may not be contained within the pulsar, but may instead derive either from the pulsar's interaction with its environment or by energy delivered by an external circuit.... [O]ur results support the 'planetary magnetosphere' view, where the extent of the magnetosphere, not emission points on a rotating surface, determines the pulsar emission."

In other words, we do not require a hypothetical super-condensed object to form a pulsar. A normal stellar remnant undergoing periodic discharges will suffice. Plasma cosmology has the virtue of not requiring neutron stars or black holes to explain compact sources of radiation.

This completes the electrical sketch of supernova 1987A.

Postscript:

This discovery of the electrical nature of supernovae has implications back here on Earth. The extensive interdisciplinary scope of the Electric Universe model is highlighted by Peratt's recent discovery that objects from antiquity manifest 56- and 28-fold symmetry. These range from concentric petroglyphs around the world to geoglyphs (stone-rings), megaliths, and other constructs. The most renowned of the 56-fold symmetric megaliths is Stonehenge.



An Aerial View of Stonehenge. The view includes the circular bank, ditch, and counterscarp bank. A number of the Aubrey holes are also visible. The Heel Stone can be seen in the lower right.

Our ancestors witnessed a cosmic electrical discharge up close. It raises fundamental issues about the recent history of the Earth and its cargo of life.

The explosion in new understanding will be an intellectual and cultural supernova!

Wal Thornhill

Further reading:

W. Thornhill, [The Z-Pinch Morphology of Supernova 1987a and Electric Stars](#)

ISSN : 0093-3813

INSPEC Accession Number: 9618789

Digital Object Identifier : 10.1109/TPS.2007.895423

Date of Current Version : 13 August 2007

Issue Date : Aug. 2007

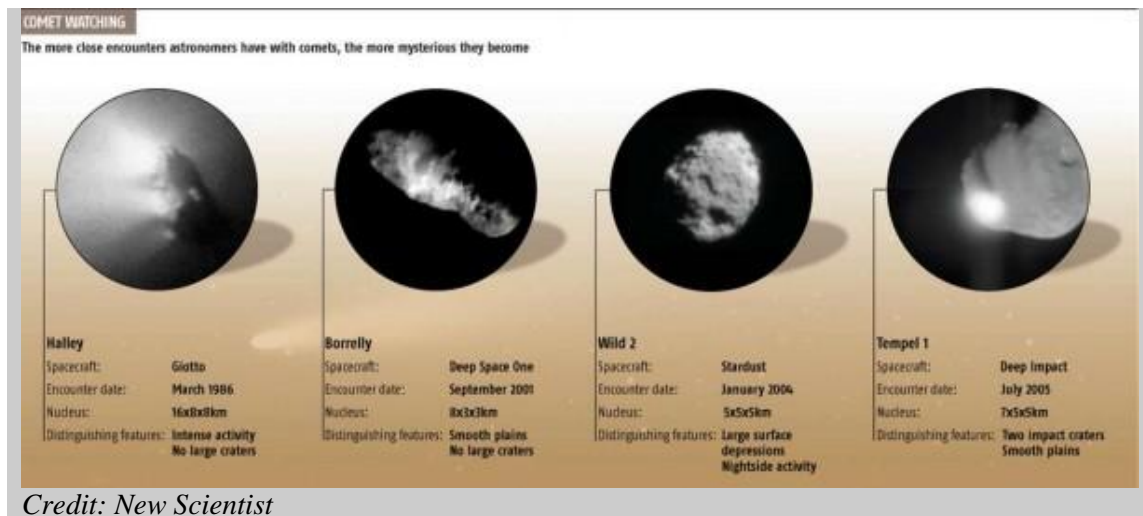
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Comet Tails of the Expected

Posted on [September 13, 2005](#) by [Wal Thornhill](#)

Specific predictions were made almost four years ago on this website about the possible effects to be observed in the Deep Impact experiment. Key predictions were that there would be a flash just before impact and that the outburst accompanying the event would be more energetic than expected from a mechanical collision. These predictions were quite contrary to the concern expressed by some NASA astronomers that there would be little or nothing to see.

Unusual predictions that succeed are the hallmark of a good theory. But, to this day, having a good theory considered fairly remains a huge problem if it calls into question prevailing dogma.



On the 9th of September 2005, the NewScientist.com news service published "Comet tails of the unexpected" by Stuart Clark. The author prefaces the printed article with:

"There's nothing as confusing as a comet."

In other words, following a number of close encounters, no one yet has been able to figure out these so-called "Rosetta Stones" left over from the formation of the solar system.

ON 4 JULY, the world's TV screens were filled with high-fiving NASA astronomers celebrating the Deep Impact mission's direct hit on comet Tempel 1. It was an extraordinary achievement, and fully merited the celebrations. A few weeks later, though, when the cameras had gone, the astronomers were left scratching their heads in confusion.

The Deep Impact team had hoped that, when the impactor spacecraft hit Tempel 1, it would kick up a relatively small cloud of dust, expose an area of pristine icy material underneath, and instigate some spectacular jet activity. This is exactly what didn't happen. The dust cloud was more than 10 times bigger than expected, and the effect on Tempel 1's activity was almost nil.

We have now had four close encounters with comets, and every one of them has thrown astronomers onto their back foot. This week, at the American Astronomical Society's Division for Planetary Sciences meeting in Cambridge, UK, the Deep Impact team will report that comets are defying all attempts to understand them. "We really need to think differently," says Peter Schultz of Brown University in Providence, Rhode Island, a member of the Deep Impact team. "They are like no other bodies in the solar system."

Comment: The "need to think differently" has been expressed with monotonous regularity in the space sciences. But the actions are always "business as usual." This seems to be explained by the prime motivation of any organization – its own perpetuation. To really think "outside the box" is daunting because it threatens to change the individual. And that could lead to the breakdown of the organization.

Comets have a special place in the hearts of astronomers. These balls of ice, rock and dust originated in the frozen wastes of the outer solar system, but were nudged by the gravitational fields of the giant planets – and even passing stars – into the inner solar system. Comets are thought to be related to the icy building blocks that formed the giant planets Jupiter, Saturn, Uranus and Neptune. Many of the moons of these worlds, not to mention the planet Pluto itself, can be thought of as super-sized comets because they, too, are composed mainly of ice and rock.

But unlike planets, comets are far from stable. Each time one passes close to the sun, the heat makes material such as water and carbon dioxide evaporate away into space, creating a tail of dust and gas that stretches behind it for millions of kilometres. Their surfaces also display intermittent "activity", shooting out jets of dust and gases. "The best way to think of them is that they are in a constant state of disintegration," says Schultz.

Comment: Thinking differently requires that we stop repeating unsubstantiated dogma about the origin and decay of comets. Astronomy indulges in too many invisible or undetectable objects in space in order to satisfy theory. A noted astronomer, R. A. Lyttleton, described the theory of the origin of comets as "a piece of trash." And the sharp surface relief and unexplained jets have discredited the notion that comets gently sublime away in the heat of the Sun. It is an assumption to state that comets "disintegrate." It implies a passiveness that is belied by their activity. If we are to think differently, shouldn't we consider external machining of a comet's surface?

But the details of that disintegration are proving ever more perplexing. Prior to the European Space Agency's Giotto mission to study Halley's comet in 1985, for

example, astronomers believed that as sunlight fell onto a comet, its spin would mean that the heat evaporates a more or less even layer, revealing more icy material beneath. Giotto showed that this idea was hopelessly simplistic. "As soon as we saw the nucleus it was clear that activity was confined to individual jets and not coming from the whole surface," says Giotto project scientist Gerhard Schwehm of the European Space Agency. In fact, only 15 per cent of Halley's total surface area was expelling material at the time of the fly-by. The observation has shown astronomers that they are in the dark about even the basics. "We still do not know what drives comet activity," says Schwehm.

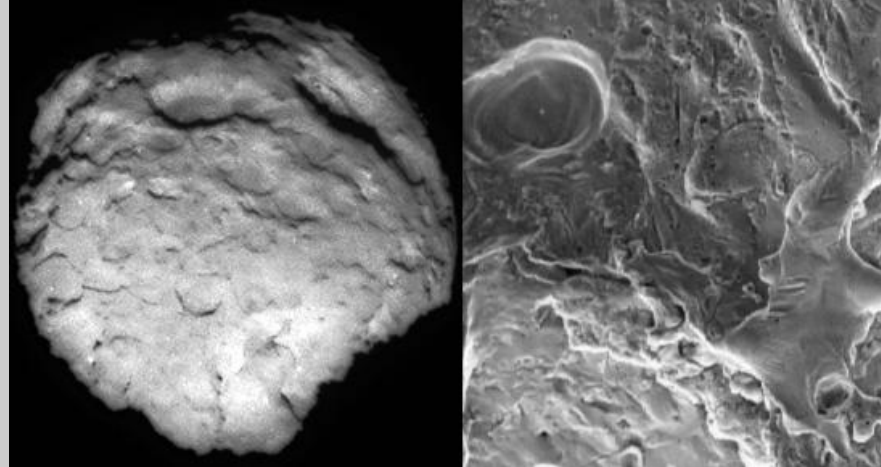
Donald Brownlee of the University of Washington in Seattle goes further. "It's a mystery to me how comets work at all," he says. Brownlee has good reason to make this claim. He is the principal investigator on NASA's Stardust mission, which flew past comet Wild 2 on 2 January 2004. The fly-by images showed 20 active jets spread across the comet's sunlit side. So far, so good. Then they saw something that added a new twist to the mystery. Two of the jets were on the night side of the comet.

Astronomers had expected that the jets would simply turn off when the comet turned them away from the warming rays of the sun. For Brownlee it seems to be pointing to an inescapable conclusion. "I think that some process is allowing heat to get down below the surface of a comet and drive the activity from the inside out," he says.

The clue might be in the dark surface layers of the comets. Though it is hardly what you would expect of icy bodies, the exteriors of both Halley and Wild 2 are as black as coal, and these dark layers absorb heat. At the time of the Stardust encounter, when the comet was almost twice as far away from the sun as the Earth, the surface of Wild 2 was a comfortable 18°C. Its interior would have been much colder, well below 0°C in fact, so heat would naturally flow inwards. That's as far as the explanation goes at present. "I have no idea about the details of the process," Brownlee admits.

Comment: The problems associated with the passive heating model of comet behaviour are highlighted in these comments. The burnt-black appearance of comet nuclei is the first problem for the dirty snowball model. The sharp surface relief is another. A comet losing icy material in the Sun's heat should look like a melted ice-cream. And the loss of material in the form of jets makes no sense whatsoever in this model.

If the NASA scientists really wanted to think "differently," the presence of jets on the dark side of the comet nucleus should have highlighted the possibility that there is an energetic process going on that is independent of solar heating. And there is a well-known process in industry that naturally gives rise to jets in the process of eroding a surface. It is known as electric discharge machining, or EDM. Myriad tiny cathode jets etch the surface. I showed in an [earlier news item](#) how the surface of Comet Wild 2 was directly comparable in appearance to an EDM etched surface.



Comet Wild 2 is shown in closeup left. Right is a microscopic view of an EDM surface. The flat floored depressions with steep scalloped walls and terracing. The small white spots on the comet can then be reasonably identified as the active cathode arcs which produce the cometary jets.

Enter Deep Impact. The NASA scientists hoped their impactor would not only eject material for them to analyse but also kick-start a new area of research by exposing an area of pristine, icy material inside the comet. And maybe that would provide a few clues to what drives comet activity. Unfortunately, things didn't quite go according to plan. The Deep Impact team thought their 370-kilogram impactor would liberate about a month's worth of dust, based on normal emission rates, but it now seems more likely that a whole year's worth escaped the comet. "If I had to choose just one surprising result from this encounter, it would be the amount of material thrown up," says Schultz.

Comment: This result was predicted in October 2001, based on the electric discharge model of comet activity. It requires that a discharging comet be strongly charged with respect to the solar plasma. The sudden encounter with the Deep Impact projectile, which is at the same potential as the solar plasma, would suddenly release considerable electrical energy.

Deep mystery

The ease with which the dust lifted into space suggests that the comet has a remarkably fragile surface, says Michael A'Hearn of the University of Maryland at College Park, Deep Impact's principal investigator. "The surface material can have no more strength than lightly packed snow, otherwise we would not have seen that amount of dust."

Comment: The dust was not "lifted" into space. It was jetted into space electrically. The effect is known as "cathode sputtering." It accounts for the surprising fineness of the dust particles. (Ironically, it is a process used to coat astronomical telescope mirrors with a thin metallic reflective surface). If comets were formed by accretion we should expect a wide range of particle sizes.

Cathode sputtering can strip material, atom by atom, from a solid surface. It does not require that comet Tempel 1 be lightly packed dust or ice.

And there was another surprise in store for the team. As the impactor hurtled towards Tempel 1's nucleus at over 10 kilometres per second, it returned pictures of two craters, each a kilometre across. Though they seem to be ubiquitous on every other solid surface in the solar system, craters have never before been seen on a comet. When Giotto flew by Halley's comet in 1986 and returned the first ever pictures of a comet's icy nucleus, no craters were revealed. Twenty-five years later, NASA's Deep Space One flew past comet Borrelly and revealed another surface devoid of craters. Wild 2 did have large numbers of circular depressions on its surface, but their unusual shape suggested to astronomers that these were not created in collisions. "We had given up the hope of seeing craters on comets," says A'Hearn.

So where did the holes in Tempel 1 come from? Well, as with Wild 2, they might not be impact craters at all. The depressions have flat floors and their walls appear like giant staircases, and this suggests that they were caused by an explosion within the comet, rather than a hit from outside, according to Laurence Soderblom of the US Geological Survey in Flagstaff, Arizona.

Comment: As explained above, the irregular craters with stepped or terraced walls are a natural feature of an EDM surface. But a strong arc will always create a neat circular crater. Here we strike a dogma that has resisted any "thinking differently." Astronomers attribute circular craters to impacts without any observational evidence to back up the theory. No impact has ever been witnessed. And attempts to reproduce the detailed appearance of craters by impacts have not met with success.

The theory of impact cratering has persisted simply because no one was able to "think differently" enough. Yet Brian Ford first put forward experimental electrical cratering evidence matching the features on the Moon in the Journal of the British Interplanetary Society, Spaceflight, Vol VII, No. 1, January 1965. The problem that Ford and others face in proposing such ideas is that astronomers have been indoctrinated in the unshakeable belief that while "there might be electricity in space, it doesn't do anything." This belief, like the earlier one about a flat Earth, is destined to become the standard joke about astronomy and cosmology of the 20th century.

Brownlee believes the porous structure of the comet might allow light to penetrate beneath the surface and heat the interior. The dark layers stop heat escaping, and pressure builds up, eventually resulting in an explosion – and an unusually shaped crater. It's a pretty vague explanation, but the Deep Impact astronomers are looking for some evidence to back it up. A'Hearn reckons the numerous jets that they saw as the spacecraft approached Tempel 1 might hold some clues, though it is proving difficult to trace them because no one knows what the features that release jets look like, or how big they are. They could be nothing more than fissures, too small to be picked out by Deep Impact's cameras.

Comment: "A pretty vague explanation" is putting it kindly. Astronomers seem unable to "think differently." Their training drives them to the same old mechanical approach that has dogged theorists ever since they dismissed Kristian Birkeland. Birkeland was an outstanding pioneer of the early 20th century who demonstrated by observation and experiment the electrical nature of the Sun and the solar system.

So, for the moment, the team is short on clues as to what makes a comet tick. Their detective work has been made even more difficult by the fact that Tempel 1 seems unperturbed by the impact. A week of follow-up observations using the European Southern Observatory's Very Large Telescope in Chile revealed that after the initial outburst the comet's activity levels remained very much as they were before the encounter. The new jet they had hoped to trigger simply did not materialise. A'Hearn believes the amount of dust ejected and the lack of follow-on activity indicate the crater might be wide but not deep, and that the impact merely blasted off the desiccated surface layers without making any serious impression on the icy material buried beneath.

Comment: The electrical discharge triggered by the Deep Impact projectile would be transient and insufficient to alter the charge on the comet to any significant degree. It would not be expected to alter the comet's activity levels. Also, if the comet is solid rock, the impact would not have caused more than a superficial physical disturbance.

Unfortunately, the amount of dust released, combined with a focusing fault on Deep Impact's high-resolution camera means that the images the team hoped to take of the newly formed crater may now elude them. There may be no way to confirm what happened.

If this is the case, the team will fail in the first two of its stated mission objectives: to observe how the crater forms, and to measure its depth and diameter. They partially succeeded in the third, which is to analyse the composition of the interior of the crater and its ejecta: they've analysed the ejecta, but can't see the crater. Objective four, which is to determine the changes in the quantity of material ejected by the impact, has been met, even if the answer seems to be a big fat zero.

Comment: The irony is that EDM naturally achieves what Deep Impact was meant to do. The electrical discharges are cratering the comet. It is another example of a poorly designed and expensive experiment, based on false ideas about the origin and nature of comets. Furthermore, if the crater could have been seen, the interpretation would have been invalid because it was not formed solely by impact but was modified by powerful electrical activity.

It's disappointing, but it's not all bad news. The big cloud the impact kicked up promises a potential science first: a hint of the comet's internal structure. "By watching the movement of the ejecta cloud with the fly-by spacecraft, we think we can determine the distribution of mass inside the comet," says A'Hearn. Such

information will show whether it is a solid object or a conglomeration of pieces, and reveal whether the rock and ice are uniformly mixed throughout the comet, or separated into distinct regions. The Deep Impact researchers are continuing to sift through the images and spectroscopic data transmitted from the spacecraft to piece together all the information they can about Tempel 1.

Comment: The comet's internal structure will not be found by applying purely mechanical and gravitational considerations. A comet is fundamentally an electrical phenomenon. This was commonly accepted, if not understood, before the end of the nineteenth century. It was not until Sidney Chapman dogmatically rejected Birkeland's work and the notion of electrical transactions between the Sun and the Earth that this obvious idea about comets was killed off.

The determination of the density of celestial bodies by gravitational perturbation rests on a number of unexplored assumptions. In the past it has suggested that many rocky-looking asteroids and comets are insubstantial objects. In my view the visual evidence should take precedence.

We may learn a little more about comets next January, when the Stardust mission brings dust from Wild 2 to Earth, but many astronomers are now pinning their hopes on the European Space Agency's Rosetta mission to comet Churyumov-Gerasimenko. "Rosetta will be the key to understanding comet activity because it will not be just another snapshot of a comet, it will watch it continuously," says Brownlee. Upon arrival in 2014, Rosetta will enter orbit around the 2-kilometre-wide nucleus and monitor the comet for two years, during which time it will make its closest approach to the sun and begin to head back out again. Once Rosetta has mapped the comet, a small lander called Philae will descend to the surface. Equipped with harpoons to anchor itself to the comet's surface, Philae will examine the composition and structure of the surface in fine detail.

Comment: This ambitious mission has little chance of success because the electrical nature of comets has not been considered. There is a high probability of crippling plasma discharges to the spacecraft and the lander.

With so much left unknown about the nature of comets, that nine-year wait for Rosetta is going to feel like an eternity to the astronomers meeting in Cambridge this week. And it's possible, of course, that Churyumov-Gerasimenko will throw up another set of surprises. When it comes to comets, there's only one clear message: expect the unexpected.

Comment: Expecting the unexpected is a tacit admission that comet theory is "a piece of trash."

Comet conundrums

1: Why do they disintegrate?

If heat from the sun can become trapped inside a comet, driving later activity, it may also explain one of the most puzzling cometary observations: why some of them simply fall to pieces when they are nowhere near the sun.

About 50 comets are known to have split up in this way. The latest was comet 2005k2 LINEAR, which split into two in June over 100 million kilometres from the sun. Others have broken up much further away. Astronomers think that trapped heat melts the comet from the inside out, increasing the pressure under the frozen surface until finally the comet explodes.

Tempel 1 could be next, if one tentative observation is confirmed. "We see a feature running across the nucleus that almost looks like a fault line. But how can that exist? Perhaps Tempel 1 was almost shattered sometime in its past and large blocks are just resting together," says Michael A'Hearn of the University of Maryland at College Park. "That's off the top of my head speculation," he adds.

If Tempel 1 is really a jumble of blocks of ice and rock resting lightly on top of one another, it would not take much to force them apart. But the major puzzle is still how heat can be channelled and trapped inside a comet in the first place.

Comment: The "fault line" on Tempel 1 is probably a channel formed by a plasma discharge travelling across the surface. Such "rilles" are commonly found alongside electrical cratering. It is the kind of surface scarring that occurs in electrical transactions between two bodies in close proximity. It is the situation that is proposed to occur during the electrical "birth" of a comet from a larger body. So the tentative identification of a linear feature on the comet as a fault line is most unlikely.

A comet spends most of its time in deep interplanetary space where it comes into balance with the plasma voltage there. But when it hurtles toward the Sun, the rapidly increasing voltage difference between the comet nucleus and the solar plasma gives rise to the plasma discharge phenomenon that we call a comet. Unexpected cometary outbursts far from the Sun have been observed and correlated with solar activity. It is such sudden changes in the comet's electrical environment that cause it to behave like a leaky capacitor, where sudden induced currents within the dielectric material of the comet may cause an explosion, rending the comet into fragments.

2: *What are they made of?*

IF our understanding of asteroids is anything to go by, the solid material in comets could be carbonaceous, siliceous or metallic. But, as yet, we simply don't know enough about comets to generalise about what they are made of. And that's a shame because it might tell us more about their history. Donald Brownlee of the University of Washington in Seattle imagines a scenario in which large objects, perhaps as big or bigger than Pluto, formed deep in the outer solar system during the general planet-forming process. Such bodies would generate enough internal heat, by natural radioactivity, for the denser material to sink to the centre, leaving the lighter material to rise to the top. Collisions between these objects could shatter them, creating a shower of comets, all with different compositions depending on where they originated.

If Brownlee is correct it means that astronomers might need to rethink their ideas about comets. Instead of thinking of them as the raw material for new planets, perhaps comets are better described as the debris from failed ones.

Comment: The story of the formation of the solar system also requires us to "think differently" if we have left out powerful electromagnetic influences. Plasma cosmologists have shown that stars do not form by gravitational accretion. Stars form in a cosmic discharge, inside a plasma z-pinch. The dusty disks seen about some stars may not be due to gravitational accretion but are more likely to be matter expelled electrically by the central star. Electrical expulsion can also explain the formation of the observed close orbiting gas giants. In a hierarchical fashion, comets can be seen as the debris, or afterbirth, of a planet. They are not primordial.

3: *Where are the impact craters?*

SEISMIC tremors caused by small impacts could disturb the surface material on a comet enough to "fluff it up", burying or even destroying any craters or other features and creating the smooth plains, suggests Laurence Soderblom of the US Geological Survey, who was a member of the Deep Space One team. "The gravity is so low on a comet that it wouldn't take much to move the surface material around," he says.

But if that's the case, why do two craters survive on Tempel 1? "That's part of the mystery that we have to solve. Perhaps they are not old but young craters," says Soderblom.

Comment: As explained earlier, the dust from Tempel 1 is best explained as electrically sputtered rock particles. The material in the comet jets is not unaltered surface material. Past observations of the presence of negative ions of oxygen and forbidden spectral lines are both evidence for electrical activity at a comet's surface.

The two craters strongly suggest that Tempel 1 is rocky. They also argue against crater formation by impact because in the region beyond Pluto's orbit, where it is supposed comets are "stored," relative velocities are very low. Yet neatly circular craters are supposed to be caused by an explosion following hypervelocity impacts.

There are many diagnostic features of electric arc cratering that cannot be matched by impacts. Electric arcs always impinge vertically on high points of a surface. That ensures circularity of the resulting crater. It explains the puzzling fact that small craters are often found neatly centered on the raised rim of a larger crater. That is also why craters are not found in the steep walls of large craters when there should be many found if craters are caused by impacts from all directions.

Comets today are not subject to the intense arcing that accompanied their birth. Instead, their surfaces are subject to a slow "spark machining" or cathode erosion. The odd white spots seen on Tempel 1 and Wild 2 are probably the focus of electrical discharges, feeding the cathode jets. Slow cathodic erosion tends to take place along the walls of existing craters, producing odd-shaped craters. That effect was seen on Io, where a line of bright cathode spots was observed strung along a "caldera" wall. The machining left a sharp "cookie-cutter" appearance to the cliff faces. When imaged closeup by the Galileo Orbiter, the arcs burnt out many pixels, which moved NASA to color them in as if they were lava fountains. Such is the power of our beliefs to color what we see.

The electric discharge nature of the plumes on Io were identified by plasma physicists, Peratt and Dessler, in 1987 following an earlier suggestion by Professor Thomas Gold in 1979. The plumes formed by cometary jets are of the same electrical nature. So it was amusing to see a description of an encounter with one of the jets from Comet Wild 2 as like being "struck by a thunderbolt."

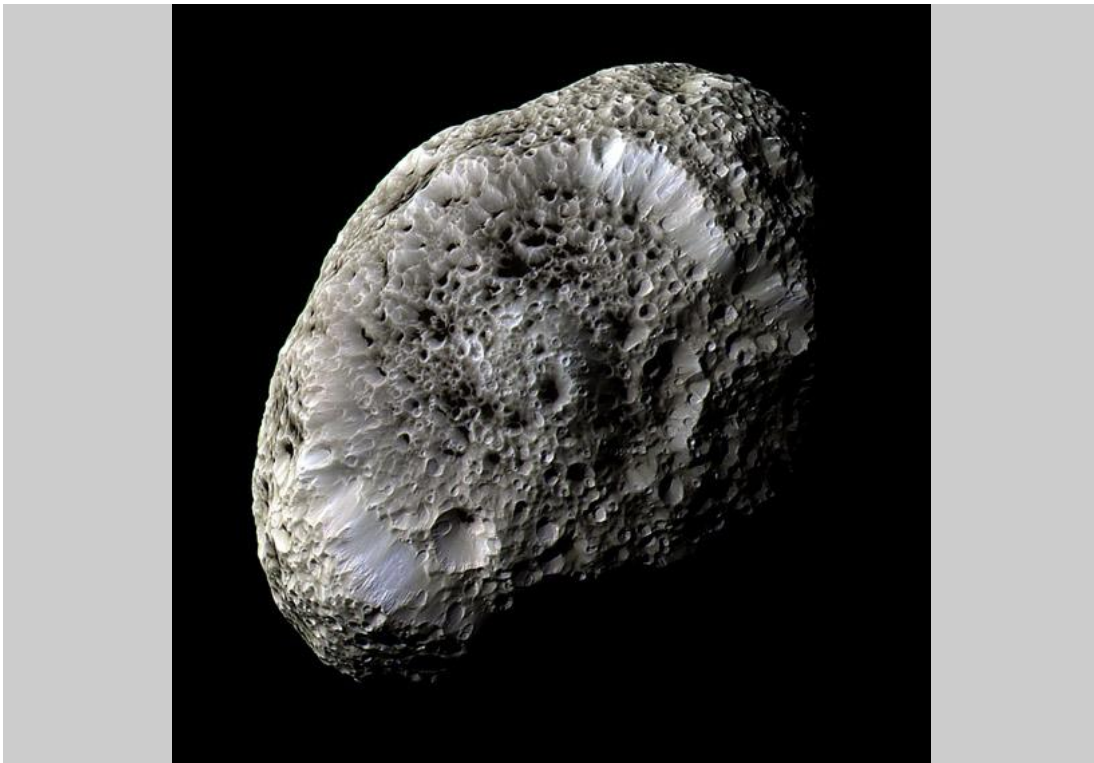
Wal Thornhill

Hyperion's History

Posted on [October 7, 2005](#) by [Wal Thornhill](#)

On September 26th, Cassini successfully performed its closest flybys of Saturn's moons Tethys and Hyperion. Hyperion (seen below in false color) is a strange, spongy-looking body with dark-floored craters that speckle its surface.

The image of Hyperion evoked the same surprised reaction felt when electron microscopes began to reveal in detail the delicate structures of biological specimens. And there lies a clue. In an Electric Universe, where plasma effects can be scaled over more than 14 orders of magnitude, we may look to plasma-etched surfaces, viewed under an electron microscope, to provide an insight into Hyperion's scars. If those scars are electrical, the history of Hyperion is different from anything we have been led to believe.



Cassini flew by Hyperion at a distance of only 500 kilometers (310 miles). Hyperion is 266 kilometers (165 miles) across, has an irregular shape, and spins in a chaotic rotation. Much of its interior is empty space, explaining why scientists call Hyperion a rubble-pile moon. Images of Hyperion taken on Sept. 26 show a surface dotted with craters and modified by some process, not yet understood, to create a strange, "spongy" appearance, unlike the surface of any other Saturn moon. This false-color image of Hyperion reveals crisp details and variations in color across the strange surface that might represent differences in the composition of materials. Hyperion has a notably reddish tint when viewed in natural color. Dark material fills many craters on this moon. Features within the dark terrain, including a 200-meter-wide (650-foot) impact crater surrounded by rays and numerous bright-rimmed craters, indicate that the dark material may be only tens of meters thick with brighter material beneath. - Credit: NASA/JPL/Space Science Institute

The standard mantra of the formation of the solar system, some 4 billion years ago, requires that planets and moons form by impact and accretion of leftover material from the Sun. It is a theory that suffers many difficulties and has proven useless at predicting what would be found as space probes examined each planet closely. The principal evidence for the theory, the obvious cratering of solid planets and moons, is subject to interpretation. It has never been observed happening. Or – it should be said – **cratering has been observed in action but was unrecognized because it didn't require an impact event. Our prior beliefs determine what we see.** The early arguments over the causes of cratering have been forgotten and many anomalous features of craters ignored in order to sustain the belief that planetary cratering is caused by impacts.

If we admit the electrical nature of the universe the picture becomes much clearer. We may confidently reconstruct Hyperion's history. But first we must adopt a new story for the Sun based on the emerging discipline of plasma cosmology.

Stars are formed efficiently in a cosmic plasma discharge known as a Z-pinch. A Z-pinch electromagnetically scavenges diffuse matter over a large volume of space with a force that diminishes directly with distance, not the much weaker square of the distance due to gravity. The Z-pinch forms a string of separate plasmoids, which become stars. It is the Z-pinch effect that generates the intense winds seen coming from star forming regions. As the discharge weakens and becomes unstable the stars are scattered like buckshot from their linear arrangement. The initial linear configuration could explain why some nearby stars tend to have similar axial alignments to that of the Sun.

Beyond plasma cosmology we enter the realm of electrical stars and electrical cosmogony. The history goes as follows: after their formation in a Z-pinch, stars continue to receive electrical energy from the galaxy. The gravitational field inside a star distorts atoms in the star to form tiny electric dipoles. These atomic dipoles align to produce a weak radial electric field. Under the influence of that field, electrons tend to drift toward the surface, leaving a positively charged interior. It is the mutual repulsion of the positive charge within a star that supports the bulk of its envelope against gravity. A central fire is not necessary. However, a star's apparent size is purely an electric discharge phenomenon, dependent on its environment, and bears little relationship to its physical size. The best example is a red giant star, which has a low energy glow discharge so far from the central star that it can envelop an entire planetary system.

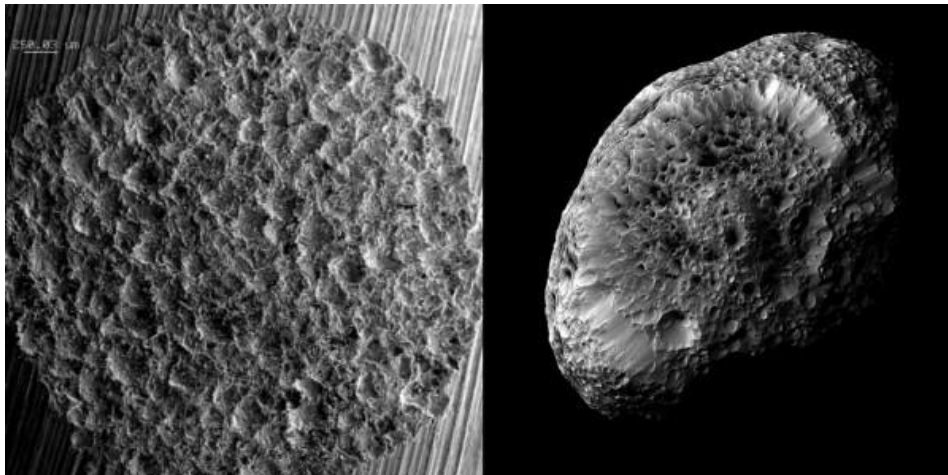
External electrical or gravitational stresses on a star may cause some of its internal positive charge to be offset from the center of the star. And since like charges repel, the offset charge will tend to accelerate toward the surface. It is a form of internal lightning. This process may lead to the expulsion of a substantial portion of the positively charged interior of the star. The visible result is a nova, or star-wide lightning flash, as electrons in the stellar atmosphere rush toward the emerging positively charged matter. The ejected material constitutes a powerful electric current, which generates its own magnetic field. That magnetic field constricts the charged matter to form a jet. The leading matter is neutralized and stops accelerating, causing the following charged matter to pile into it. So

is born a companion star or gas giant planet. This explains why so many stars have been found to have extremely close-orbiting gas giant planets.

Planets do not grow by hypothetical impact accretion of widely dispersed "leftovers." Rocky planets and moons are formed episodically from gas giant planets by the same electrical expulsion process. It is this planet birth model, with its biological overtones of parents and offspring, that accounts for some of the diversity of objects in the solar system. It helps us understand why the gas giants have so many satellites, some large enough to be classed as planets in their own right. It helps us understand the presence of Saturn's ephemeral rings, which cannot have lasted for 4 billion years. Saturn's rings are the remains of an expulsion disk accompanying the birth of the latest child in the solar system. The rings of the other gas giants are similar "afterbirth" material. The rings remain rings as they gradually decay. They do not form moons. Similarly, a ring of dust around the Sun will not form a planet.

Where does this leave the craters? Craters are a signature of cosmic electric discharge. Cratering occurs in a sudden flurry during the birth process and later through brief close encounters with other bodies, in the process of achieving a stable orbit. These short episodes account for the common hemispheric differences in cratering patterns. Just like the impact model, lightning has an explosive effect on a planetary surface. However, the energy is released over a longer period, causing less collateral damage and physical (chiefly melting), chemical and nuclear modification of the crater floor. Cosmic lightning is less disruptive than an impact and it tends to loft the debris into space, leaving a cleanly machined surface.

Some asteroids and moons exhibit huge craters, any one of which should have destroyed the target if it were due to impact. Yet each crater hardly disturbs existing craters. (See the asteroid Mathilde above). Also, lightning always strikes a surface vertically, causing the observed circularity of craters and lack of small craters embedded in steep crater walls. Impacts, on the other hand, may come from any elevation and should create many non-circular craters and holes in walls. But non-circular craters are very rare and often can be seen to comprise a number of near-coincident circular craters. And craters in cliff faces are even scarcer.



Returning to Hyperion's strange surface, it shows clear evidence of having been electrically spark machined. It is saturated with circular craters. For comparison, the electron microscope image on the left is of a metal surface that has been subjected briefly to electric spark machining. The floors of the craters on Hyperion are dark for the same reason that comet nuclei are dark and the "calderas" on Io are dark. They have all been electrically etched. The large, roughly circular feature on Hyperion may be the result of a single powerful discharge in which a large but characteristic number of Birkeland current filaments around the axis of the main discharge may excavate small craters to give a scalloped or fluted appearance to the walls of the main crater.

What about the low density calculated for Hyperion? Determinations of the densities of cosmic bodies rely on a purely geometric theory of gravity. The theory cleverly avoids asking the hard question of why inertial mass and gravitational mass is equivalent. But a geometric theory of gravity cannot be the correct answer because it takes no account of the fundamental electrical nature of matter and its interactions. So the deduction that Hyperion's interior is mostly empty space, based on gravitational perturbation of spacecraft, should be discounted. Hyperion seems solid and is able to sustain sharp relief, including what appears to be the remnant of a very large crater.

Dating of a surface by crater counting is a simplistic and flawed notion. Even the source of the impactors is not clear in that model. So although Hyperion is saturated with craters, the tiny moon can be as young as Saturn's rings. The intense machining of its surface suggests that it was a fragment that did not coalesce with a newborn planetary "child of Saturn." Instead, it probably got caught in the electrical exchanges between parent and child and remained in orbit about Saturn.

This dynamic and evolutionary picture of the development of the solar system family of planets has support from some scholars in other disciplines who are deciphering the earliest human memories of a different sky. It is a reconstruction that allowed the only [successful and accurate prediction](#) of what would be found beneath Titan's thick clouds. It shows that Earth, Mars and Saturn are of one family and that Venus was the child. We may find that Hyperion is a dark reddish hue (the redness has been reduced in the NASA image) for the same reason that Mars is a red planet.

Confirmation of this history will have to wait until we have many samples from many bodies in the solar system. Then, by a process similar to DNA matching, we may be able to figure out the genealogies of the planets. But first it will require that we give up our attachment to the familiar children's fairystory:

"Once upon a time, long, long ago there was a solar nebula..."

Wal Thornhill

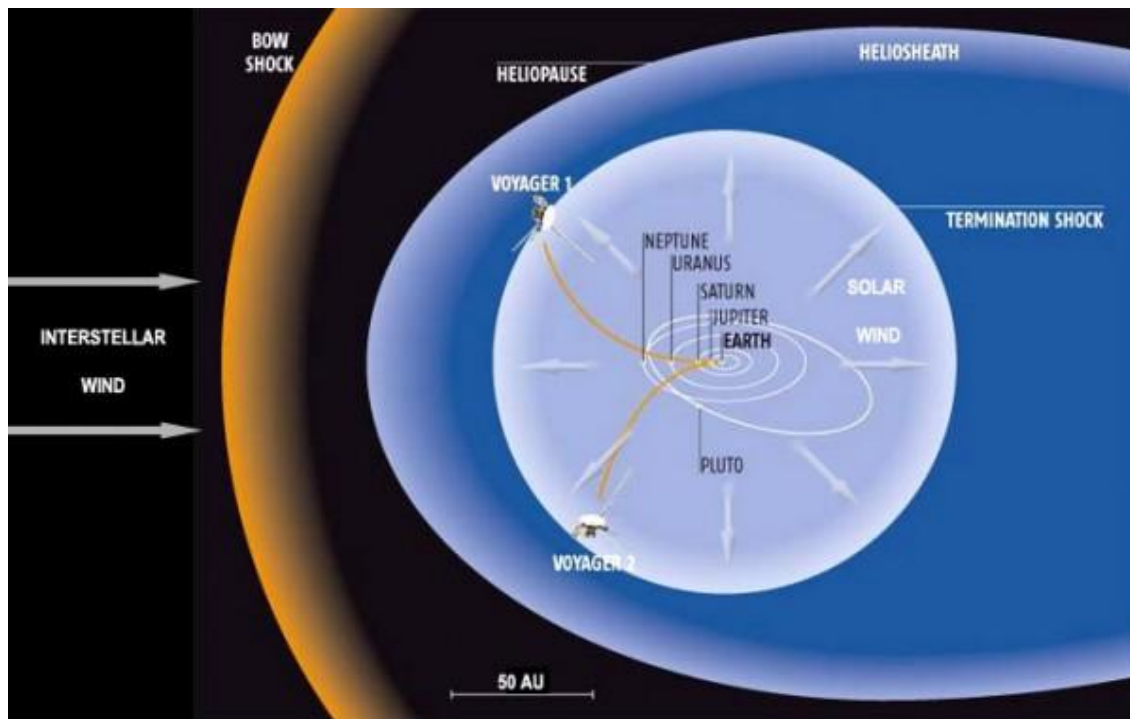
Voyager 1 at the Edge – of What?

Posted on [November 13, 2005](#) by [Wal Thornhill](#)

"The observations that are not explainable by current scientific theories are the most valuable, for they may propel the field forward in the next cycle of innovation, possibly to a paradigm shift."

– Don L. Jewett, *What's Wrong With Single Hypotheses? –It's time to eschew enthrallment in science*, *The Scientist*, Volume 19, Issue 21

It's official! In *Science* magazine of September 23 are reports that Voyager 1 has passed an important milestone. The spacecraft, at more than 94 times the distance of the Earth from the Sun, has "crossed the termination shock," where the solar wind is supposed to slow down before merging with the local interstellar medium.



This diagram shows the present position of the two Voyager spacecraft in relation to the solar system. The termination shock is where the solar wind speed drops from supersonic to subsonic. The heliosheath is the more dense region between the shock and the heliopause. It is deformed because of the ambient flow of the interstellar gas, forming a comet-like tail behind the Sun. The heliopause is where the solar wind is stopped by interstellar particles. And the bow shock is where the interstellar wind runs into the solar atmosphere. To complicate matters, the magnetic field of the Sun is wound up in the solar wind like a clock spring.

As usual, all is not well with this picture. In a commentary, Len Fisk of the University of Michigan summarized the reports in Science:

"Once again the mantra of space exploration is fulfilled: When we go somewhere that is new, we find the unexpected."

Is this because astrophysicists work with a single hypothesis – of an electrically dead universe?

The terminology used when describing the diagram above sounds more relevant to supersonic aircraft in our electrically neutral atmosphere than it does to the ionized and magnetized solar environment. There is no acknowledgement that only electric currents generate magnetic fields. It is a false doctrine in astrophysics that magnetic fields can be "frozen in" to plasma. Hannes Alfvén, the father of plasma physics, pointed this out in his Nobel Prize acceptance speech in 1970! It should, at least, have formed the basis of a second working hypothesis that acknowledged an electrical dimension to the problem. But scientists often don't follow their own rules of "best practice."

The problem of sticking with a single hypothesis was noted as long ago as 1897 by T. C. Chamberlin in the Journal of Geology, *"Studies for students: the method of multiple working hypotheses."* He wrote:

"The moment one has offered an original explanation for a phenomenon which seems satisfactory, that moment affection for [one's] intellectual child springs into existence, and as the explanation grows into a definite theory [one's] parental affections cluster about [the] offspring and it grows more and more dear ... There springs up also unwittingly a pressing of the theory to make it fit the facts and a pressing of the facts to make them fit the theory..."

This is the pattern of astrophysics.

Once established, the belief in and affection for one's intellectual child seems to override considerations of commonsense and sometimes the principles of physics. Not surprisingly, there is a marked lack of interest in "killing" one's "intellectual child." Yet searching for alternative hypotheses and devising crucial tests is supposed to be the cornerstone of good science. Instead, when confronted with discordant data, the existing model is usually bent to fit or we are told that the problem will be fixed real soon. There are myriad problems in astrophysics waiting for a solution. We rarely hear about them. We see instead science-fiction headlines like today's: ***"Phantom energy may fuel universe-eating wormhole."*** [New Scientist 11/11/2005].

There is an alternative hypothesis about what we will find at the outer limit of the Sun's domain. It has had plenty of time to percolate its way into the consciousness of astrophysicists, if they cared to look up from their mathematical computer models.

In a paper, supported in part by NASA, Alfvén writes:

"Since the time of Langmuir, we know that a double layer is a plasma formation by which a plasma—in the physical meaning of the word—protects itself from the environment. It is analogous to a cell wall by which a plasma (in the biological meaning of the word) protects itself from the environment.

"If a plasma is inhomogeneous so that the chemical composition, density, and/or electron temperature differs in different parts of the plasma, the plasma may set up double layers which split the plasma into two or more regions, each of which becomes more homogeneous."

[IEEE Transactions on Plasma Science, Vol. PS-14, No. 6, Dec 1986.]

In the above paper, Alfvén did a study of the most used textbooks on astrophysics and how they treated important concepts such as double layers, critical velocity, pinch effect and circuits. He found that:

"Students using these textbooks remain essentially ignorant of even the existence of these concepts, despite the fact that some of them have been known for half a century (e.g., double layers, Langmuir, 1929; pinch effect, Bennet, 1934). [Make that three quarters of a century now.] The conclusion is that astrophysics is too important to be left in the hands of astrophysicists who have gotten their main knowledge from these textbooks. Earthbound and space telescope data must be treated by scientists who are familiar with laboratory and magnetospheric physics and circuit theory, and of course with modern plasma theory."

The solar plasma and that of interstellar space are two different plasmas, which must therefore have a "double layer" or Langmuir plasma sheath between them. So to treat the heliospheric boundary simply as a magnetohydrodynamic shock problem is naïve. **A second hypothesis to be considered when looking at the data from Voyager 1 is that the spacecraft is entering the Sun's plasma sheath, which is protecting it and the planets from the interstellar environment. There is a very important reason for submitting this second hypothesis to rigorous tests. It is crucial to the electric Sun model.** If the Sun is the local focus of a galactic discharge then the heliospheric double layer forms the "virtual cathode" to the Sun's corona discharge current. Almost the entire voltage drop between the Sun and the interstellar plasma will occur across this distant plasma sheath.

Already we have strong evidence that the solar plasma conforms to the expectations of this model. It is the only model that can explain the strange constant deceleration of Pioneer 10 as it moved away from the Sun. See [Mystery Solved](#). It is the only model that can explain the continued acceleration of the solar wind out among the planets. It is the only model that naturally requires a hot corona above a cool surface of the Sun. And there is much more.

What things should we be looking for from Voyager 1? A double layer forms part of an electric circuit. It carries current and has regions of positive and negative charge density

between which is a strong electric field. Alfvén notes some important properties of a double layer:

1. it very often, perhaps always, produces noise and fluctuations. The noise production is often associated with strong currents through plasmas.
2. it broadens the energy spectrum of electrons.
3. the noise is often incorrectly called 'turbulence.' It is such an important property of plasmas that theories which do not take it into consideration run some risk of being irrelevant.

Item 3 is important because astrophysicists believe they are dealing with mechanical shock turbulence at the termination shock boundary. Indeed, outside the termination shock, Voyager 1 saw that cosmic rays were coming from all over rather than from specific directions. Inevitably it was attributed to shock turbulence.

What has Voyager 1 found in its new environment?

From the report in Science:

1. *"All the observations support a shock crossing. The magnetic field strength increased as a result of the compression at the shock, and there was a change in the properties of the turbulence; there were plasma waves characteristic of shock crossings; and the intensity of low-energy particles increased abruptly."*
2. It was the finding that anomalous cosmic rays (ACR's) were unaffected by the termination shock that was the biggest surprise. ACR's are thought to be produced by neutral atoms in interstellar space that:
 - leak into the heliosphere;
 - get ionized by solar UV radiation or charge exchange with the solar wind;
 - are picked up by the solar wind and convected back to the outer heliosphere;
 - are accelerated by the solar wind termination shock; and
 - diffuse and drift into the inner heliosphere as cosmic rays.

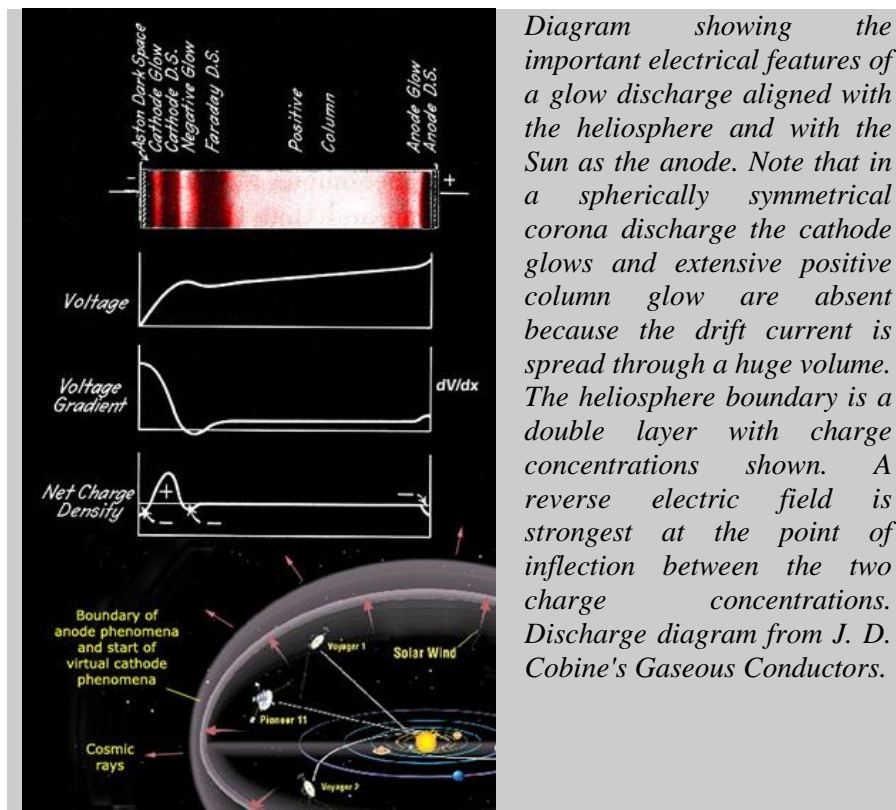
The Science report states:

"This acceleration is the issue. Immediately upon ionization, the interstellar particles are picked up by the solar wind and acquire energies on the order of 1 keV/nucleon. They must be accelerated by four orders of magnitude to the observed energies of greater than 10 MeV/nucleon. The termination shock has long been considered the likely location for the acceleration. Indeed, the termination shock should be an accessible example of shock acceleration at work, just like the acceleration at supernovae shocks that is postulated to produce galactic cosmic rays. However, at the location of the termination shock seen by Voyager 1, there is no evidence of acceleration of the traditional ACR's. Low-energy ions, below 3 MeV/nucleon, are clearly and indeed abruptly accelerated,

but the higher energy ACR's, which we have been observing for decades, are unaffected by the termination shock.

"The termination shock doesn't perform as we expected; it is clear it is a shock, but not the prodigious accelerator we expected. Indeed, as Voyager 1 flies downstream from the termination shock, the intensity of ACR's continues to grow, as if its source still lies ahead."

The surprise concerning ACR's is of cosmological importance because it throws into question the model of mechanical shock acceleration of cosmic ray particles. Commonsense suggests that electrical particle acceleration in a double layer is far more effective. See Supernova 1987a Decoded to find that supernovae are not what astrophysicists think they are.



It is easy to see that we have within the solar plasma sheath a weak but constant electric field that accelerates solar protons away from the Sun in the form of the solar wind and causes electrons to drift toward the Sun (and causes negatively charged spacecraft, like Pioneer 10, to accelerate anomalously backwards toward the Sun). The overall result of the charge drifts in opposite directions is the current that lights the Sun. Throughout almost the entire volume of the heliosphere the solar plasma is quasi-neutral. That is, sampling will reveal equal numbers of positive ions and electrons in the solar "wind." The solar plasma forms the conducting medium between the cathode region at the heliospheric boundary and the anode region near the Sun. When we get to the solar double layer, or plasma sheath, we see that the electric field reverses and solar wind

protons are decelerated and bunch up. This will give the impression that we have reached the hypothetical termination shock. At the same time, ACR particles are accelerated from further out. This seems to fit with the Voyager 1 observations. It does not require a mechanical shock. The powerful electrical force dwarfs mechanical forces.

However, the most interesting effects may be found on the outer side of the solar plasma sheath where we should see a powerful electric field that has been estimated to accelerate solar wind protons away from the Sun at cosmic ray energies of the order of 10 billion electron volts. All stars generate cosmic rays in this way with energies that reflect the driving voltage of the star.

At the same time, electrons accelerated inward from interstellar space toward the solar sheath should provide the energy necessary to ionize neutral interstellar gas drifting through the solar plasma sheath. Depending upon the charge on the spacecraft, Voyager 1 itself should experience anomalous accelerations.

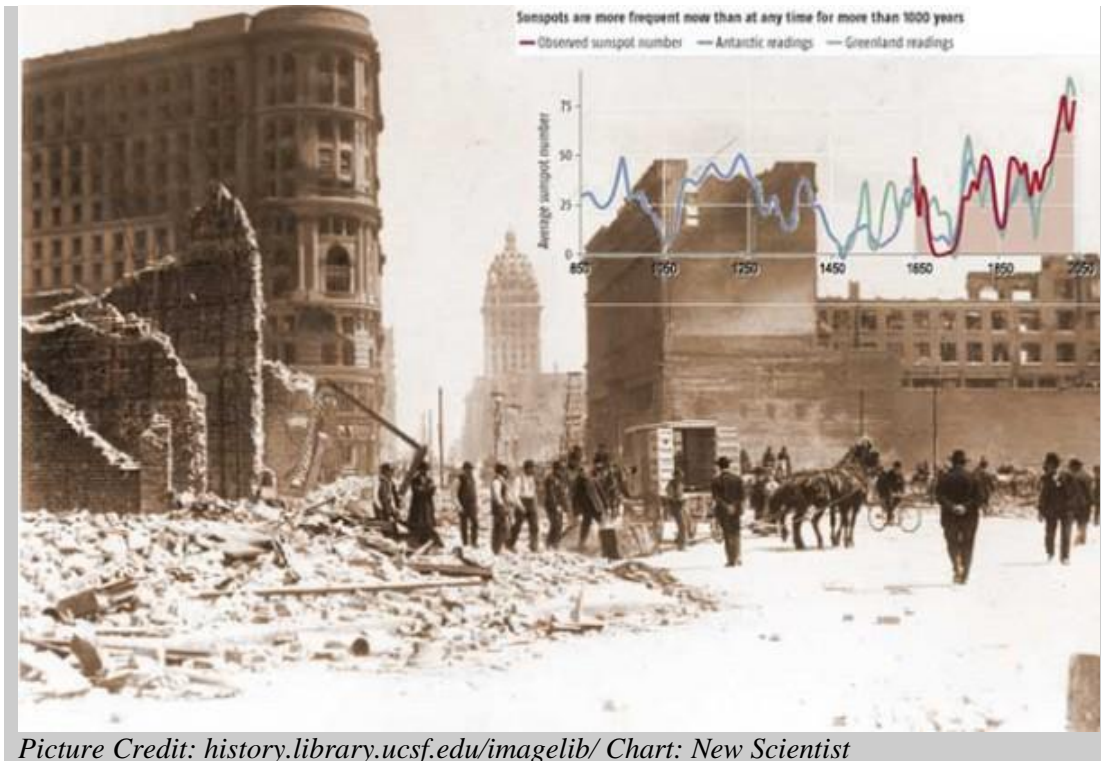
It would seem that even at this preliminary stage of the investigation of the edge of the solar system there should be room for more than one hypothesis. Maybe Voyager 1 will demonstrate what's wrong with single hypotheses? Whatever, it's high time to "eschew enthrallment in science!"

Wal Thornhill

Electric Earthquakes

Posted on [December 21, 2005](#) by [Wal Thornhill](#)

Civilization's interest in predicting the location and time of damaging earthquakes is clear. The potential for devastation of property that otherwise could be secured, and the loss of life that otherwise could be prevented, are powerful reasons to find predictive factors.



Some scientists have become aware of a correlation between sunspots and Earthquakes and want to use the sunspot data to help predict earthquakes. The theory is that an intensification of the magnetic field can cause changes in the geosphere. The NASA and the European Geosciences Union have already put their stamp of approval on the sunspot hypothesis, which suggests that certain changes in the sun-earth environment affects the magnetic field of the earth that can trigger earthquakes in areas prone to it. It is not clear how such a trigger might work.

In the *Journal of Scientific Exploration*, Vol. 17, No. 1, pp. 37–71, 2003, there is an excellent report that addresses the more down-to-earth problems facing geophysicists trying to understand earthquakes. The paper is titled, *Rocks That Crackle and Sparkle and Glow: Strange Pre-Earthquake Phenomena*, by Dr. Friedemann T. Freund, a professor in the Department of Physics, San Jose State University, and a senior researcher at NASA Ames Research Center. Dr. Freund writes:

"Many strange phenomena precede large earthquakes. Some of them have been reported for centuries, even millennia. The list is long and diverse: bulging of the Earth's surface, changing well water levels, ground-hugging fog, low frequency electromagnetic emission, earthquake lights from ridges and mountain tops, magnetic field anomalies up to 0.5% of the Earth's dipole field, temperature anomalies by several degrees over wide areas as seen in satellite images, changes in the plasma density of the ionosphere, and strange animal behavior. Because it seems nearly impossible to imagine that such diverse phenomena could have a common physical cause, there is great confusion and even greater controversy."

Freund outlines the basic problem:

"Based on the reported laboratory results of electrical measurements, no mechanism seemed to exist that could account for the generation of those large currents in the Earth's crust, which are needed to explain the strong EM signals and magnetic anomalies that have been documented before some earthquakes. Unfortunately, when a set of observations cannot be explained within the framework of existing knowledge, the tendency is not to believe the observation. Therefore, a general malaise has taken root in the geophysical community when it comes to the many reported non-seismic and non-geodesic pre-earthquake phenomena. There seems to be no bona fide physical process by which electric currents of sufficient magnitude could be generated in crustal rocks."

Freund makes an excellent attempt to explain all of the phenomena in terms of rock acting like a p-type semi-conducting material when placed under stress. Normally rock is a good insulator. For example, the emission of positive ions from the Earth's surface may act as nuclei for the ground-hugging fog that sometimes occur prior to earthquake activity. And although the surface potential may only be in the 1–2-Volt range, the associated electric field across a thin surface layer can reach hundreds of thousands of volts per centimeter, enough to cause corona discharges, or "earthquake lights." Thermal anomalies seen from space before an earthquake may be due to the emission of infra-red light where the semi-conductor charge recombines at the surface. Disturbed animal behavior may be due to the presence of positive ions in the air.

As Freund says, this theory places an explanation in the realm of semiconductor physics, which means that geoscientists are not the best people to judge it. That explains why the paper appears in a speculative journal. Freund laments:

"The peer review system often creates near-insurmountable hurdles against the publication of data that seem contrary to long-held beliefs."

Freund has identified a source of charge in stressed rocks that was not believed possible. He says:

"Once fully told and understood, the 'story' [of p-holes] is basically so simple that many mainstream geoscientists are left to wonder why it has taken so long for

them to be discovered. If they are so ubiquitous as they appear to be, why did p-holes go unnoticed for over a hundred years?"

Confronted with this question, by a twist of logic, many 'mainstreamers' succumb to the impulse to reject the p-hole concept out of hand. Other geologists find it hard to believe that positive holes liberated so deep down could flow to the Earth's surface and collect there without being reabsorbed. However, earthquake lights are a real phenomenon, and some kind of mechanism must be creating them. Whatever it is, says Chris Marone, who works on the physics of rock deformation at Pennsylvania State University in University Park, it will involve maintaining charge over surprisingly large distances.

"This is a very, very hard problem."

The difficulties encountered in connection with p-holes are similar to others that have punctuated the history of science. The discovery of the p-holes as dormant yet powerful charge carriers in the Earth's crust calls for a new paradigm in earthquake research and beyond. More often than not, any call for a new paradigm elicits opposition. Freund closes with a quote from the philosopher Arthur Schopenhauer:

"All truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident."

If Freund has a problem getting such a simple idea accepted, how much more difficult is it going to be to get both astronomers and geoscientists to accept that the Earth is a charged body in an Electric Universe?

The missing link between the sunspots and earthquakes is the fact that the electric discharges to the Sun that cause sunspots can also affect the Earth's ionosphere. The ionosphere forms one "plate" of a capacitor, while the Earth forms the other. Changes of voltage on one plate will induce movement of charge on the other. But unlike a capacitor, the Earth also has charge distributed in rock beneath the surface. And if the subsurface rock has become semi-conducting because of stress, there is an opportunity for sudden electrical breakdown to occur through that rock. We should expect similar processes to occur underground as is found in atmospheric lightning. There will be precursor electromagnetic effects due to the small-scale travelling of charge – rather like "stepped leaders" between cloud and ground. That may be the limit of activity in small tremors. But in a large earthquake, the entire circuit may be involved, from below the Earth, through the atmosphere to the ionosphere. This would explain the massive disturbance of the ionosphere over a large area accompanying a major earthquake.

The mystery of the source of the current is solved – it comes from a charged Earth. And the link with sunspots via the ionosphere is exposed. Subterranean lightning causes earthquakes! Seismic waves are the rumble of underground thunder. The energy released may be equivalent to the detonation of many atomic bombs but only a small proportion need come from the release of strain in the rocks. Most of it comes from the Earth's stored internal electrical energy.

The latest issue of the IEEE journal, SPECTRUM, features an article based on Freund's work that looks at ways of predicting earthquakes. Once again, it seems that scientific advances fare better today in the hands of electrical engineers.

See www.spectrum.ieee.org/dec05/2367.

There is a corollary to this story, which concerns the mysterious fragmentation of comets. The observation of more than 20 cases of comet fragmentation led to the thought that comet nuclei are poorly cohesive rubble piles. But comet nuclei that have been imaged closely show that they are cohesive, rocky bodies with sharp relief (notwithstanding theoretical speculations about their origin from dust and erroneous densities derived from gravitational theory). Comet Tempel 1 was no exception yet surprising quantities of extremely fine dust were seen in the Deep Impact experiment. The dust came from electrical sputtering of the rocky comet surface. An impact will dislodge much larger particles.



The Hubble picture shows that the comet Linear nucleus has been reduced to a shower of glowing "mini-comets" resembling the fiery fragments from an exploding aerial firework. Credit: NASA, Harold Weaver (the Johns Hopkins University), and the HST Comet LINEAR Investigation Team.

So, being rocky bodies like the Earth and in the same electrical environment of the solar system, comets will carry significant electrical charge distributed throughout the nucleus. However, unlike the Earth, conducting plasma is in contact with the comet nucleus so that electrical discharges reach right down to the surface where they are concentrated in cathode jets, seen emanating from the nucleus.

The rocks in the comet nucleus are not under mechanical stress so they are good insulators. However, the increasing loss of charge from the surface of the comet nucleus, as it rushes toward the Sun, develops electrical strain within the nucleus. If a subsurface discharge results, the comet suffers a "cometquake," which may disrupt the nucleus. The small velocities imparted to rocks by the quake are sufficient for them to escape the gravity of the nucleus.

Wal Thornhill

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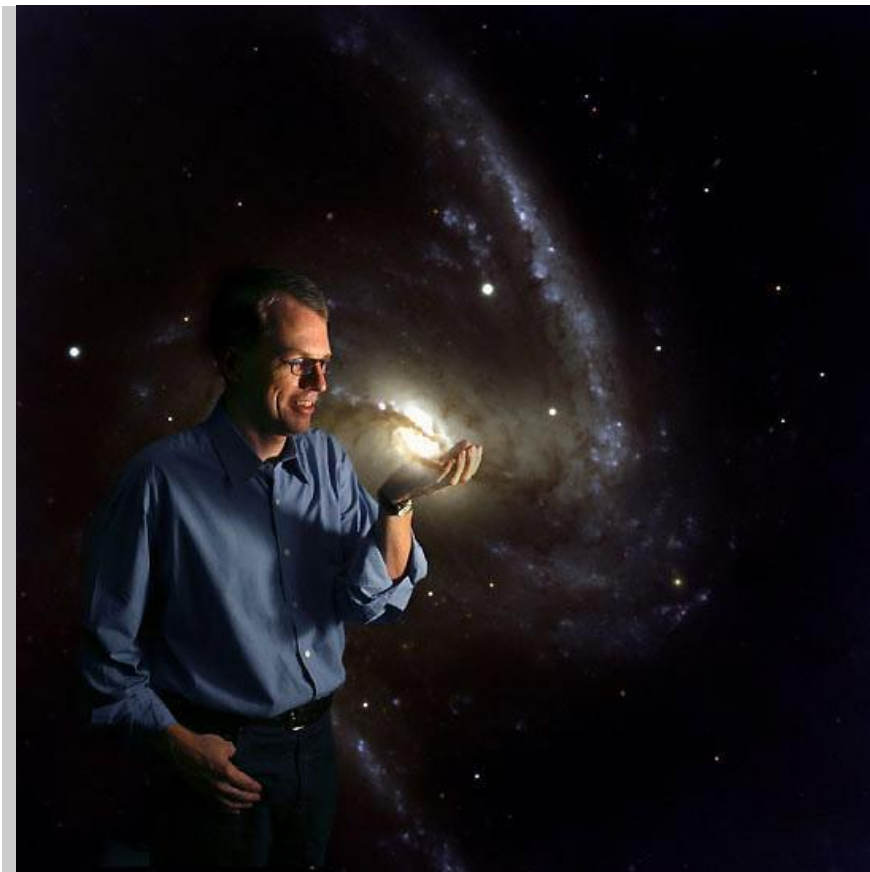
A Real 'Theory of Everything'

Posted on [January 1, 2006](#) by [Wal Thornhill](#)

The editorial of New Scientist of 10 December 2005 is headlined:

"Ideas needed: The hunt for a theory of everything is going nowhere fast."

It underlines the parlous state of theoretical physics in its inability to reconcile relativity and quantum theory and so find what is grandly called a "theory of everything."

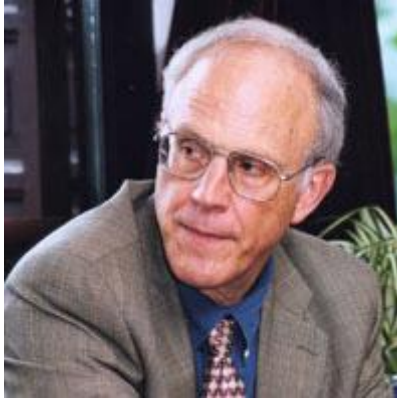


Until we have a sensible theory that can explain the natural spiral shape of galaxies without invoking unseen matter and strange forces, we have no right to claim we have the ability to deduce a "theory of everything."

It has been said that the human talent for self-delusion is our most highly developed faculty. The very notion that some scientists are within grasp of a "theory of everything" is a fantasy on a par with the flat Earth theory. It is not possible to have a theory of everything until we know everything about the universe. And given the almost continual surprises from space, we evidently know very little. However, we will continue to use the

term within its limited scope as a mathematical game, attempting to reconcile the irreconcilable.

The NS editorial is revealing:



Physics' greatest endeavour has ground to a halt. We are in "a period of utter confusion", said Nobel laureate David Gross [above], summing up last week's prestigious Solvay conference on the quantum structure of space and time. That is worrying because the topic is central to finding a "theory of everything" that will describe every force and particle in nature.

Einstein's relativity, which reigned supreme for a century, is a flawed basis for such a theory. Although it deals with gravity, it tells us nothing else about the nature and interactions of matter. Crucially, general relativity is incompatible with quantum theory. Since the 1960s, theorists have struggled to solve this problem, so far to no avail. And the trouble is we have nothing to put in relativity's place.

The great hope, string theory, which views particles as emanating from minuscule strings, has generated myriad mathematical descriptions linked to the dance of particles. But these equations tell us nothing about where space and time come from and describe nothing we would recognise. At best, string theory depicts the way particles might interact in a collection of hypothetical universes.

For decades, string theorists have been excused from testing their ideas against experimental results. When astronomers discovered the accelerating expansion of the universe, which string theory fails to account for, many string theorists took shelter in a remarkable excuse: that their equations describe all possible universes and should not be tied to matching data in just one of them.

But when the theory does not match the one data set we have, is it science? There is a joke circulating on physics blogs: that we can, after all, call our universe unique. Why? Because it is the only one that string theory cannot describe. Should we laugh or cry?

There is a growing feeling that string theory has run into the sand. Gross thinks we are missing something fundamental. We need a leap in understanding, though where it will come from is not clear. Many of the greatest minds in physics were there at last week's conference, and none had an answer.

We are approaching the end of Einstein's centennial year – a celebration of physics. While some lesser-known areas of the subject are flourishing, the search for a theory of everything is in a sorry state. Unless string theory gets a radical

shake-up, gifted but frustrated minds will begin to drift into other areas of science.

A Theory of Nothing

A theory of everything must underpin cosmology, the "queen of the sciences" as it has been called. Cosmology is supposed to provide the story of "life, the universe, and everything." It should provide a seamless big picture that encompasses all our knowledge from the subatomic to the galactic. If it is wrong, the view of our place in the universe may be more warped than that of the flat-Earth era.

Our present cosmology is known as "the big bang" theory. It grew out of the assumption that the redshift of faint objects in deep space is due to the Doppler effect of their recession from us. Extrapolating these velocities backward gave an origin in time and gave rise to the concept of the universe having been created in a primeval explosion. Einstein wrote equations that attempted to describe the behaviour of this expanding universe. His equations pointed to its probable instability. Gravitation was either strong enough to counteract its expansion or too weak to prevent its expansion forever.

"In spite of the fact that we call it the big bang theory, it tells us absolutely nothing about the big bang. It doesn't tell us what banged, why it banged, or what caused it to bang. It doesn't allow us to predict the conditions immediately after the bang."

– Alan Guth in the BBC Horizon program, Parallel Universes.

At the other extreme of scale is quantum theory, which describes the behavior of subatomic particles. But the theories of gravity and quantum behavior are incompatible. "String theory" was supposed to provide a theory of everything by unifying the incompatible theories of relativity and quantum mechanics. The problem is that there is not just one string theory, there are many. Now the push is on to develop "M Theory," which means the "[Mother of all Theories!](#)" This endeavor would be comical if it weren't so costly and misguided. The ill effects of such nonsense have spread throughout western science and culture over the last century. The problem seems to have sprung from the worship of Einstein, who was the first to discard verifiable physical laws altogether and propose a wholly mathematical theory.



Mathematics ain't Physics

Those who would aspire to a theory of everything are told they must undertake "the gruelling complex and abstract mathematics" required for the task. Who says so? Mathematicians of course. It is a chronically narrow view, like looking through the wrong end of the telescope and imagining you see stars. This view has led to elitism in physics based on mathematical ability. Most bizarre have been those who claim to see God in their own image – as a mathematician.

One expert on relativity theory attempted to discourage such hubris. He publicly exposed an inconsistency in Einstein's special theory of relativity. Following his experience of other leading experts deliberately misinterpreting and misrepresenting the problem he posed, he wrote:

"I am not yet convinced that facility in performing mathematical operations must inevitably deprive its possessor of the power of elementary reasoning, though the evidence against me is strong." [1]

The same expert was later moved to declare:

"The mathematician is more akin ..to a chess player than to one endowed with exceptional critical power. The faculty by which a chess expert intuitively sees the possibilities that lie in a particular configuration of pieces on the board is paralleled by that which shows the mathematician the much more general possibilities latent in an array of symbols. He proceeds automatically and faultlessly to bring them to light, but his subsequent correlation of his symbols with facts of experience, which has nothing to do with his special gift, is anything but faultless, and is only too often of the same nature as Lewis Carroll's correlation of his pieces with the Red Knight and the White Queen – with the difference whereas Dodgson recognised the products of his imagination to be wholly fanciful, the modern mathematician imagines, and persuades others, that he is discovering the secrets of nature."

To be gifted in mathematical ability does not imply comparable gifts in perception and critical reasoning. We perpetuate a popular delusion, fostered by mathematicians, by equating the two. As a result, theoretical physics has gone nowhere for the past century.

Where have the natural philosophers and epistemologists gone? Relativity theory, quantum theory and string theory cannot even claim to be physics. That the equations may appear to work says nothing about the validity of the concepts involved. We need to distinguish between mathematical representations and physical concepts, and we need to subordinate the former to the latter. Often, interpretation of data using these theories involves circular reasoning. Or the analysis may switch unnoticeably between incompatible models, for example between a wave and a particle; or between Einstein's and Lorentz's relativity theory.

A growing number of scientists are now questioning the hero worship of Einstein, not least because the Michelson-Morley experiment did not give a null result for the existence of the æther. That tells us that the earlier Lorentz relativity theory, which has the same form as Einstein's, is more empirically correct.

"... Lorentz, in order to justify his transformation equations, saw the necessity of postulating a physical effect of interaction between moving matter and æther, to give the mathematics meaning. Physics still had de jure authority over mathematics: it was Einstein, who had no qualms about abolishing the æther and still retaining light waves whose properties were expressed by formulae that were meaningless without it, who was the first to discard physics altogether and propose a wholly mathematical theory." [2]

Einstein's general theory of relativity continued this trend. The theory has nothing to say about why matter should affect empty space. Clearly, the mathematical concept of three dimensions being warped in a fourth dimension is meaningless in the real three-dimensional universe. String theory is far worse, proposing up to 26 mathematical dimensions. But a real physical dimension can be measured with a ruler. So time is not a dimension and the term "spacetime dimensions" is exposed as meaningless gobbledygook. It is no wonder that the layman is confused when countless books have been written on the subject of relativity by those superior minds who imagined they glimpsed some profound meaning on the other side of "Alice's Looking Glass."

*Nature and Nature's laws lay hid in night,
God said, "Let Newton be!" and all was light.
It did not last; the Devil, howling "Ho!
Let Einstein be!" restored the status quo.
– Anon*

Likewise, quantum theory is purely mathematical and has no connection between cause and effect. A given atom in a radioactive element decays for reasons unknown. It is a probabilistic theory. Einstein was unhappy with quantum theory because of its probabilistic nature. So it is no surprise that quantum theory and relativity theory are

incompatible. The noted science fiction author Douglas Adams hilariously parodied quantum metaphysics with his spaceship driven by an "infinite improbability drive." Neither theory has any concept of matter that can explain the effects we observe. This kind of thinking has allowed theoreticians to propose almost anything they can imagine as having some finite probability of occurring. When mathematicians dismiss the physics principles of "every effect must have a preceding cause" and "no creation ex nihilo," we can understand why modern physics and cosmology reads like science fiction.

So the recent news from the 23rd Solvay Conference in Physics came as no surprise. David Gross, who received a Nobel Prize for his work on the strong nuclear force and who is a leading light of string theory, admitted "*we don't know what we're talking about.*" "*Many of us believed that string theory was a very dramatic break with our previous notions of quantum theory,*" he said. "*But now we learn that string theory, well, is not that much of a break.*"

He compared the state of physics today to that during the first Solvay conference in 1911. Then, physicists were mystified by the discovery of radioactivity. The puzzling phenomenon threatened even the laws of conservation of mass and energy, and physicists had to wait for the theory of quantum mechanics to explain it. "*They were missing something absolutely fundamental,*" he said.

"We are missing perhaps something as profound as they were back then." [3]

It seems not to have occurred to attendees at the Solvay conference that quantum mechanics explains nothing. It merely provides mathematical probabilities of experimental outcomes. Mathematics can only advance science when the physical concepts are correct. If we want physics to become a real science of the natural world once more, we should not allow mathematicians to take the lead. Mathematics is a useful tool once the physical concepts are correct. Mathematics ain't physics.

Toward a *Real* Theory of Everything



"We feel clearly that we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole, but, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it. I can see no other escape from this dilemma (lest our true aim be lost for ever) than that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of them – and at the risk of making fools of ourselves."

– Erwin Schrödinger, *Mind and Matter* (1944).

Thanks to theoreticians like Gross, we are no further advanced in fundamental understanding of the universe than we were a century ago. If we deal with the real universe of our senses, augmented by modern technology, we stand the best chance of developing the physical concepts leading to a "real theory of everything." Here "everything" is limited in the sense of "everything we can detect and know about at present." For there is a limit to what we can detect and know, not only at the smallest and the largest of scales but also with regard to what we pay attention to and what we overlook at all scales.

Neither Einstein's relativity nor quantum mechanics are physics so we cannot use them as a foundation for our new model (although we should find that the mathematics that works in the real world still applies). We have to discard "modern" physics and return to the classical physics of a century ago. This, perhaps, is the greatest hurdle – to discard our training and prejudices and to approach the problem with a beginner's mind.

The "something absolutely fundamental" that is missing in our explanation of gravity and quantum behavior is the electrical structure of matter. Here we are not talking about negative electrons and positive atomic nuclei. We must "go down" one more level and propose that all subatomic particles, including the electron, are resonant structures of electric charges of opposite sign that sum to the charge on that particle.

The electron is not a fundamental, point-like particle.⁴ It must have structure to provide its dipole magnetic field. There must be orbital motion of charges within the electron to generate the magnetic dipole. The transfer of electrical energy between the charges in their orbits must be resonant and near-instantaneous for the electron to be a stable particle. The same model applies to the proton and the neutron. This model satisfies Einstein's view that there must be some lower level of structure in matter to cause resonant quantum effects.

We cannot have a theory of everything until we have a workable concept of the structure of matter that satisfies the observation that inertial and gravitational mass are equivalent. When we accelerate electrons or protons in an electromagnetic field they become less responsive to the fields the more they are accelerated. This has been interpreted as an increase in mass. However, charges have no mass. So how do they give the electron, proton and neutron the property of mass?

The accelerating electromagnetic field will distort the orbits of charges within the electron or proton. It seems the more distorted a particle becomes, the more easily the energy supplied to accelerate the particle is assimilated in further distortion rather than in acceleration. Hence the apparent increase in mass. The inertial mass of a particle is a measure of the degree to which it responds to an electric field by distorting rather than accelerating. It implies the charge centers of a proton at rest have to be separated more than those in an electron at rest. That allows the proton to distort more readily than an electron in the same electric field and accounts for their differences in size and mass.

"What we call mass would seem to be nothing but an appearance, and all inertia to be of electromagnetic origin."

– *Henri Poincaré, Science and Method.*

A neutron combines the charges from a proton and an electron in a barely stable resonance, which decays in minutes. Its decay must have a cause and may involve an interaction with a neutrino. However, when combined with protons it seems neutrons form a new stable resonant structure that serves to bind the protons electrically despite the overall positive charge on the nucleus.

The notion that matter can be annihilated when normal matter meets antimatter is a confusion of language. Matter can neither be destroyed nor created nor can matter be exchanged for energy. Einstein's $E = mc^2$ refers to mass, a property of matter, not matter itself. The mathematical relationship represents the restructuring of resonant systems of charge. What seems to happen in "annihilation" is that the complementary resonant charge structures of a particle and its antiparticle combine so that almost all of the internal energy is radiated away and the combined charges form a new collapsed particle of low internal energy.

The most collapsed form of matter is the neutrino, which has a vanishingly small mass. However, the neutrino must contain all of the charges required to form two particles – a particle and its antiparticle. This symmetry explains why a neutrino is considered to be its own anti-particle. A neutrino may accept energy from a gamma ray to reconstitute a particle and its anti-particle. "Empty space" is full of neutrinos. They are the repositories of matter in the universe, awaiting the burst of gamma-radiation to expand them to form the stuff of atoms. The weird "zoo" of short-lived particles created in particle accelerators and seen in cosmic rays are simply unstable resonant systems of charge.

The equivalence of inertial and gravitational mass implies that gravity is also an electrical force. Before Einstein, some noted scientists were suggesting that the gravitational force between neutral particles might ultimately be due to electrical polarization within the particles. In 1882, Friedrich Zöllner wrote in the introduction to his book, *Explanation of Universal Gravitation through the Static Action of Electricity and The General Importance of Weber's Laws*, "we are to conclude that a pair of electrical particles of opposite signs, i.e. two Weberian molecular pairs attract each other. This attraction is Gravity, it is proportional to the number of molecular pairs." Indeed, gravity can be represented as the sum of the radially aligned electric dipoles formed by all subatomic particles within a charged planet or star.

This new electrical concept suggests that Newton's "universal constant of gravitation," or "G," is a dependent variable. G depends upon the charge distribution within a celestial body. Highly charged objects like comets look like solid rock, yet they have a gravitational field that suggests they are fluff-balls. And as they discharge they suffer what is euphemistically called "non-gravitational" accelerations. The extreme weakness of the force of gravity, compared to the electric force, is a measure of the minuscule electric dipolar distortion of nucleons. Gravity cannot be shielded by normal electrostatic shielding because all subatomic particles within the gravitational field respond to the dipolar distortion, whether they are metals or non-metals.

What about magnetism? Ampere's law for the magnetic force between two current carrying wires is found to be equivalent to the transverse electric force caused by the distortion of electrons in an electric field. This distortion causes them to form tiny collinear electric dipoles. That is, the magnetic force is simply another manifestation of the electric force.

This simple electrical model of matter has the great virtue of reducing all known forces to a single one – the electric force. However, it has a price. We must abandon our peculiar phobia against a force acting at a distance. And we must give up the notion that the speed of light is a real speed barrier. It may seem fast to us, but on a cosmic scale it is glacial. Imposing such a speed limit and requiring force to be transmitted by particles would render the universe completely incoherent. If an electron is composed of smaller subunits of charge orbiting within the classical radius of an electron, then the electric force must operate at a speed far in excess of the speed of light for the electron to remain a coherent object. In fact, it has been calculated that if released, the subunits of charge in the electron could travel from here to the far side of the Andromeda galaxy in one second!

We have direct evidence of the superluminal action of the electric force, given that gravity is a longitudinal electric force. Indeed, Newton's celebrated equation requires that gravity act instantly on the scale of the solar system. It has been calculated that gravity must operate at a speed of at least 2×10^{10} times the speed of light, otherwise closely orbiting stars would experience a torque that would sling them apart in mere hundreds of years. Similarly, the Earth responds to the gravitational pull of the Sun where it is at the moment, not where the Sun was 8 minutes ago. If this were not so, the Earth and all other planets in the solar system would be slung into deep space within a few thousand years. Gravity is therefore an electrical property of matter, not a geometrical property of space.

What is the nature of light? Einstein's special theory of relativity was disconfirmed right at the start by the Michelson-Morley experiment, which showed a residual due to the æther. This was later confirmed by far more rigorous repeats of the experiment by Dayton Miller. But by then popular delusion and the madness of crowds had taken hold and contrary evidence would not be tolerated. [The Dayton Miller story](#) makes interesting reading. If it weren't for the extraordinary power of self-delusion, commonsense would tell us that a wave cannot exist in nothing. So Maxwell was right, light is a transverse electromagnetic wave moving through a medium, the æther.

But what is the æther? In the vacuum of space, each cubic centimetre is teeming with neutrinos. And since neutrinos are resonant orbiting systems of charge, like all matter, they will respond to the electric force by distorting to form a weak electric dipole aligned with the electric field. The speed of light in a vacuum is therefore a measure of the delay in response of the neutrino to the electric force.

What about the bending of starlight by the Sun, which discovery raised Einstein to megastar status? The residual found in the Michelson-Morley experiments shows that the Earth and all ponderable bodies "drag" the Æther along with them. The bending of starlight near the Sun is simply the effect expected of an extensive neutrino atmosphere held to the Sun by gravity. Light will be slowed in the denser medium – causing normal refraction or bending of light.

What about time? With all bodies in the Milky Way galaxy communicating their positions effectively in real time through the electric force of gravity, it means there is a

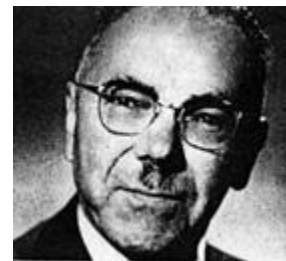
universal time. There can be no time distortion or time travel – something that common sense always told us.

What about black holes? They are a mathematical fiction, a near-infinite concentration of mass, required to explain concentrated sources of energy seen at galactic centers, by employing the weakest force in Nature – gravity. It is the high-school howler of dividing by zero. Plasma cosmology shows that where electrical energy is concentrated at the center of a galaxy, gravity can be ignored in favor of far more powerful electromagnetic forces. The collimated jets of matter coming from that focus are also replicated to scale in plasma labs. The jets are inexplicable if a black hole is supposed to be a cosmic sink for matter.



The implications for biological systems in this electrical model of matter are profound. A method of near-instantaneous signalling between resonant molecular structures within cells and on cell walls seems plausible and may provide a way of looking at the mind-body connection and other communications external to the body. It may provide a link between classical physics and the pioneering work of the biologist, [Rupert Sheldrake](#), in biological morphogenesis and telepathy.

Also, the work of the outstanding French biologist, [Louis Kervran](#), may gain a working physical model to explain how biological enzymes are capable of transmuting chemical elements at body temperatures. It seems that by exquisite tuning, one resonant system of nuclear charges may be transformed into another. And like the decay of the neutron, ubiquitous neutrinos are implicated as a catalyst. It may be that the answer to our future power needs will be answered when we understand how to extract nuclear energy resonantly instead of by using brute force as we do now. The New Jersey based company, Black Light Power, seems to have stumbled upon a similar process using a resonance between hydrogen and the iron atom. It is interesting that biological systems also use heavy elements like iron and magnesium to perform their minor miracles of transmutation of elements.



The electrical relationship between matter and mass allows us to understand how quasars can be newborn objects that have low mass and brightness and high intrinsic redshifts. With time, their mass increases and their intrinsic redshift decreases in quantum jumps. This shows that quantum effects also occur on a galactic scale. It is another powerful argument for the near infinite speed of the electric force. The electrical nature of the universe reveals the currently accepted life story of stars as an elaborate fiction. Stars do not self-immolate. Plasma cosmologists identify cosmic electrical power lines of unknown origin that shape galaxies and light the stars in our small corner of the universe. These findings about intrinsic redshift and electric stars explodes the big bang myth: The universe we can see is not expanding; it is only a small part of the universe that is of unknown extent and unknown age.

This outline may seem like the basis for a "theory of everything" but in truth the greatest mysteries remain. We cannot talk sensibly about a beginning of the universe since the mystery of the origin of electric charge and the nature of the electric force remain.

Meanwhile, the good news for us on this tiny blue planet is that we are not isolated by time and space in a universe of dark matter that we cannot sense. We are an integral part in real-time of this sensible electric universe.

Wal Thornhill

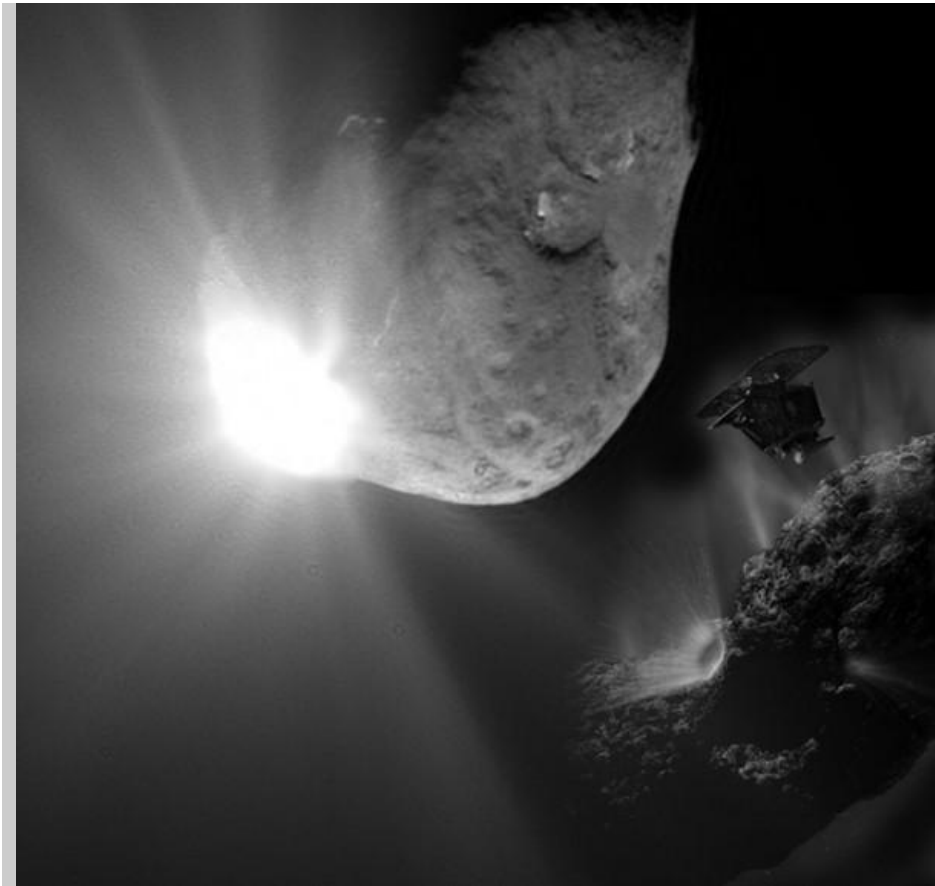
- [1.](#) Professor H. Dingle in his Presidential Address to the Royal Astronomical Society in 1953.
- [2.](#) Herbert Dingle, Science at the Cross-Roads.
- [3.](#) From New Scientist, "Nobel laureate admits string theory is in trouble," 10 December 2005.
- [4.](#) R. Sansbury, Electron Structure, The Journal of Classical Physics, Jan 1982. (I am indebted to Ralph for his ideas on electron structure and the electrical origin of magnetism and gravity).

First Evidence of Comet Ice – What Does it Mean?

Posted on [February 13, 2006](#) by [Wal Thornhill](#)

"There is more riding on this mission than may be apparent from regular news sources. At issue is the assumption of an electrically neutral universe, upon which every conventional astronomical theory rests. The story of the formation of the solar system from a cloud of gas and dust – and comets as the leftovers – is a work of fiction that has never predicted anything useful. Like Alice chasing the White Rabbit down its hole, each surprising new discovery has resulted in an increasingly absurd story. "

– Wal Thornhill, [The Deep Impact of Comet Theory](#)



This montage shows the dramatic difference between what NASA expected (artist's impression, lower right) and what actually happened upon Deep Impact (main image). Just before impact, investigators in the control room were worried they might not see anything. Meanwhile, it had been predicted on this website that the results of the impact would be far more energetic than expected. Image credit: NASA/JPL/UMD (art by Pat Rawlings).

Before the Deep Impact probe struck comet Tempel 1, I wrote:

"There is a high probability that scientists will find less water ice and other volatiles than expected, both on the surface and beneath the surface of Tempel 1."

As reported on February 2, 2006, NASA's Deep Impact Team claims to have the first definitive evidence of small patches of surface ice on a comet. It is woefully inadequate to explain the water signal detected in the comet's coma.

New Scientist reports:

"The water ice is present in surprisingly small amounts, covering less than 1% of Comet Tempel 1's surface. The finding suggests the comet's surrounding cloud of gas and dust may largely be fed by underlying ices, rather than by gas streaming off its surface."

The technical report in the journal Science is more specific:

"A surface area of 1.3 km² of 100% water ice is therefore required to account for the ambient outgassing of water, ... The observed 0.5 km² of 6% water ice, ~0.03 km² of pure water ice, is significantly less than this. Thus, while they may be associated with natural outbursts, the water ice deposits detected on the surface of Tempel 1 reported here are not the dominant sources of outgassing. Therefore, assuming that the distribution of ice on the unobserved parts of the nucleus are broadly similar to those observed, the ambient outgassing observed for Tempel 1 likely has significant sub-surface sources."

The assumption that most of the water detected in the comet's coma probably comes from water ice buried out of sight inside the comet seems quite reasonable. After all, where else could it come from?

But what does this discovery really mean? *"We have known for a long time that water ice exists in comets, but this is the first evidence of water ice on comets,"* said Jessica Sunshine, Deep Impact co-investigator and lead author of the Science article. The findings help satisfy one of the major goals of the Deep Impact mission: Find out what is on the inside – and outside – of a comet.

Aren't we in danger here of assuming what we have yet to prove? How does a little ice on the surface of Tempel 1 tell us what is inside the comet? "We have known for a long time" that solar heating causes water ice to sublimate from the comet surface into the vacuum of space. That doesn't seem to be happening. So how can most of the water be coming from inside the comet? Maybe our story of comets is wrong. Is there another source for the signal we interpret as water from the comet?

Unfortunately, scientific objectivity fails when firmly held beliefs, and funding, are at stake. Almost every news report about comets carries the benediction that comets are "Rosetta Stones" that, once decoded, will tell the story of the Earth's formation. This comet myth regards them as the "icy remnants" left over from the birth of the solar system. They are "stored" and maintain their primordial ices for billions of years in a cold outer region of the solar system known as the Oort cloud. Comets must, therefore, be composed of loosely bound ices and dust. Somehow, billions of years later, some comets are "perturbed" into the inner solar system for our amusement, consternation and puzzlement.

Never mind that the Oort cloud has never been observed. And comet orbits deny such an unlikely origin. Now the ices are proving difficult to find. Despite this, the inertia of prior beliefs insists that all new discoveries be interpreted according to the myth.

Astronomers know next to nothing about comets and their origins. It is all guesswork based on the single problematic theory of comet formation in an imagined early solar nebula. It is a theory that was described by the astronomer Ray A. Lyttleton as "a piece of trash." In fact, Oort himself maintained that an origin for comets inside the solar system, perhaps connected with the formation of the asteroid belt, was more likely. It is a possibility eloquently argued by the astronomer Tom Van Flandern in his book, *Dark Matter, Missing Planets & New Comets*.

How do we know water is coming from a comet?



Fred Whipple, in his book *The Mystery of Comets*, writes:

"The inner coma of a comet is a chemical factory! This leaves us confused as to whether the materials we detect come unchanged directly from the nucleus or were manufactured near the surface. Fortunately, the tools for analysing this horrendously complicated problem have become available in recent decades."

Supercomputers are used to track more than a hundred species of atoms and molecules and a thousand and more possible reactions among them. The spectroscopic observations of the comet's coma are then used to estimate what ices and minerals are coming from the comet nucleus. Whipple continues:

"From our vantage point on Earth, which is so distant from comets, we can observe only the end products of the chemical factory after they have escaped hundreds or thousands of kilometres into space, where the gas is so rare that collisions no longer count. Thus the complicated gas-phase chemistry disguises the composition of the original ices in a comet."

But if this concept is wrong then the data from Deep Impact is being misinterpreted and misrepresented to the public.

There is another possibility that remains unexamined. It takes account of the obvious electrical nature of comets, which is the only model to successfully [predict what would be found by the Deep Impact experiment](#).

The flaw in the conventional approach is that only gas-phase chemical reactions and reactions induced by solar radiation (photolysis) are considered. The far more energetic molecular and atomic reactions due to plasma discharge sputtering of an electrically charged comet nucleus are not even contemplated [see below]. Yet this model solves many comet mysteries that are seldom mentioned.

The hydroxyl radical, OH, is the most abundant cometary radical. It is detected in the coma at some distance from the comet nucleus, where it is assumed that water (H₂O) is broken down by solar UV radiation to form OH, H and O. It is chiefly the presence of this radical that leads to estimates of the amount of water ice sublimating from the comet nucleus. The comas of O and OH are far less extensive than the H coma but have comparable density.

The negatively charged oxygen atom, or negative oxygen ion, has been detected close to cometary nuclei. And the spectrum of neutral oxygen (O) shows a "forbidden line" indicative of the presence of an "intense" electric field. The discovery at comet Halley of negative ions puzzled investigators because they are easily destroyed by solar radiation. They wrote:

"An efficient production mechanism, so far unidentified, is required to account for the observed densities."

And the intense electric field near the comet nucleus is inexplicable if it is merely an inert body ploughing through the solar wind.

Let's see how the electrical model of comets explains these mysteries. The electric field near the comet nucleus is expected if a comet is a highly negatively charged body, relative to the solar wind. Cathode sputtering of the comet nucleus will strip atoms and molecules directly from solid rock and charge them negatively. So the presence of negative oxygen and other ions close to the comet nucleus is to be expected. Negative oxygen ions will be accelerated away from the comet in the cathode jets and combine with protons from the solar wind to form the observed OH radical at some distance from the nucleus.

The important point is that the OH does not need to come from water ice on, or in, the comet. Of course, some water is likely to be present on a comet or asteroid. It depends upon their parent body. And since there are many moons in the outer solar system and the rings of Saturn with copious water ice, we may expect some smaller bodies like comets and asteroids to have some too. But what is obvious from the closeup images of comet nuclei is that they look like dark, burnt rocks. They do not look icy. Their appearance fits the electrical model and not the poorly consolidated dirty ice model.

In 1980, a report on cometary science in the journal Nature outlined some of the mysteries and anomalies. It concluded:

"Cometary scientists need to consider more carefully whether H₂O-ice really does constitute a major fraction of comet nuclei"

The warning went unheeded. So the myth lives on and the mysteries grow with each new discovery.

One of the mysteries about comets is their gigantic enveloping comas. Multiple "fountains" directed from the comet nucleus toward the Sun are used to explain them. The solar wind, with its magnetic field pushes the fountains back to form a dusty coma and tails. The coma, visible in reflected light, may measure hundreds of thousands of kilometres across. Early in 1970, comets were first observed in UV light from fluorescing hydrogen atoms and found to have an "almost unbelievable" coma of hydrogen atoms (15 million km diameter in the case of comet Bennett). How can a small body, a few kilometres across, entrain an envelope of hydrogen atoms many millions of kilometres in diameter? But there were mysteries within this mystery. Small and unexciting comets had comas as large as the more active comets. Yet the outgassing from a comet nucleus should vary with its surface area.

The first important thing to note about the hydrogen coma is that we are talking about neutral hydrogen atoms. That is, a proton combined with an electron. The solar wind provides the protons, which are attracted to the negatively charged comet. The comet has copious electrons and negative ions, which are being ejected from the nucleus in cathode jets. (The emission of matter from comets in the form of jets is another mystery for the

standard model of comets). Bring the protons and electrons together and you have a giant envelope of hydrogen atoms about the comet. The size of the coma is essentially an electrical plasma phenomenon, independent of the size of the comet nucleus.

The activity in a comet coma should be viewed in terms of low-pressure gas discharge phenomena, not simply gas-phase chemistry and photolysis. If more evidence were needed that this is so, we need only remember the baffled surprise of astronomers when an orbiting x-ray telescope was accidentally pointed at a comet and strong x-ray emissions found. An explanation was cobbled together after the discovery. It involved the recombination of solar wind ions with electrons from the comet. But that constitutes an electric current between the comet and the solar wind.

Electric currents in plasma take a filamentary form. So it is instructive to record some of the comments made when the US International Cometary Explorer (ICE) spacecraft flew by the comet Giacobini-Zinner. John C. Brandt, comet scientist for the ICE mission, said:

"The extremely fine structure is a surprise, the lack of a traditional bow shock is a surprise and the richness of the high-energy phenomenon [sic] is a surprise."

Robert Hynds, head of the proton detector team, reported that in the comet tail:

"Ions around the spacecraft were very highly collimated in narrow beams ..."

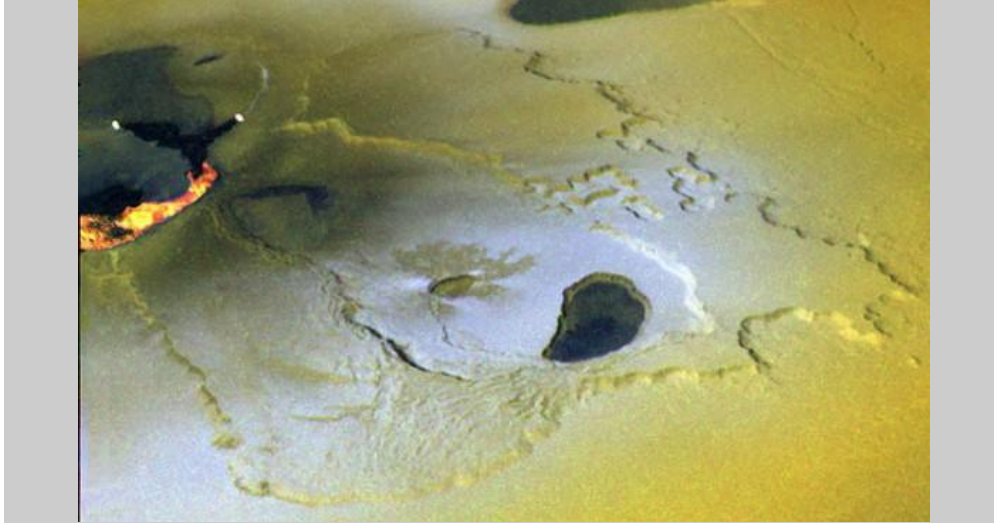
Other spacecraft have detected these current filaments in comet tails stretching across the solar system.

A charged comet nucleus moving through the solar plasma will form a number of plasma sheaths or double layers, where the comet's electric field is concentrated. The Giotto mission to comets Halley and Grigg-Skjellerup were surprised by their sharp plasma boundaries and one "mystery" boundary. There should be no mystery when they are considered as electrical plasma sheaths and not simply mechanical "bow shocks." The so-called "near nucleus ion pile-up" is simply a manifestation of a cometary plasma sheath, or double layer. It is a region with a strong electric field and consequently capable of generating strong x-rays. The cometary x-rays were found coming from a region that didn't conform to simple hydrodynamic collision calculations. It was remarked that it was like finding the shockwave from a supersonic aircraft several kilometres to one side of the aircraft. A plasma sheath is controlled by electromagnetic forces and is not expected to conform to bow-shock physics.

Surface Erosion

Sputtering is recognized as one of the forms of space weathering, a process that changes the physical and chemical properties of airless bodies, such as asteroids and our Moon. It is a slow, diffuse effect due to the mechanical impact of solar wind ions. Cathode sputtering, on the other hand, disintegrates the substance of a cathode by the bombardment of energetic ions in an electric discharge. It concentrates the cathode

erosion in small spots, which give rise to rapid surface erosion in the form of steep-walled craters. Movement of the cathode arc creates a familiar "etched" look to a surface. The sputtered material is accelerated from the cathode in well-collimated cathode jets. Cometary jets and the so-called "volcanoes" on Io are prime examples.



Tvashtar Catena on Io is supposed to be the site of an active volcanic eruption on Jupiter's moon Io. White and orange areas on the left side of the picture are false colors representing infrared emission, orange being the coolest and white the hottest material. In fact, the two small white spots are where cathode arcs are in action, eating away at the steep cliff faces. The larger orange and yellow ribbon is a cooling surface more than 60 kilometers long, recently etched by cathode arcs. The moving arcs have lately burnt the blackened areas. Older etched areas, that have been lightened by sulfur fallout from the jets, stand out. Image Credit: NASA

Significantly, a paper in *Science*, last October, argued that shocks caused by ion sputtering sharpen steep surface features. It was found that high slopes propagate over large distances without dissipating the steepest features. Also cathode arcs tend to impinge on sharp edges because of the higher electric field found there. The white spots seen on comets Wild 2 and Tempel 1 should be considered in this way. It would account for the surprising sharp features and craters seen on comets, particularly on [comet Wild 2](#). Surface heating and sublimation, on the other hand, tends to soften sharp features.

There are many other mysteries about comets and their behavior. One that deserves mention, following the analogy between the surface of Io and comet nuclei, is the mystery of very short-lived diatomic sulfur, S₂, found only in comets IRAS-Araki-Alcock and Hyakutake (both came very close to Earth). In the book *Comet Science: The study of remnants from the Birth of the Solar System* by Crovisier and Encrenaz, we find:

"It is not known what might be the origin of this molecule. Sulfur will only sublime at relatively high temperatures, which would not generally be attained on cometary surfaces or cometary grains. Moreover the equilibrium form of its vapor is S₈ rather than S₂. The origin of sulfur in these comets thus remains enigmatic."

It is no more enigmatic than the pizza-colored moon of Jupiter, Io, which has powerful cathode jets operating continuously somewhere on its surface. The other Galilean moons of Jupiter have copious water ice on their surfaces. So it would not be asking much to suggest that Io also once had a predominantly water ice surface. The interesting possibility is that two oxygen atoms, removed from water molecules by a cathode arc, would be in a sufficiently energized state to combine to form an atom of sulfur. The sulfur takes a colorful molecular form in the cathode jet before returning to the surface of Io. Precisely the same process on a comet could provide the "enigmatic" sulfur.

The discovery of only a little water ice on the surface of a comet should not allow researchers to simply push the problem out of sight in order to maintain their myth about comets. To suggest that the water ice has come from inside the comet raises more problems than it solves. And it does nothing to clear up the many other mysteries of comets.

Wal Thornhill

Stardust Comet Fragments Solar System Theory

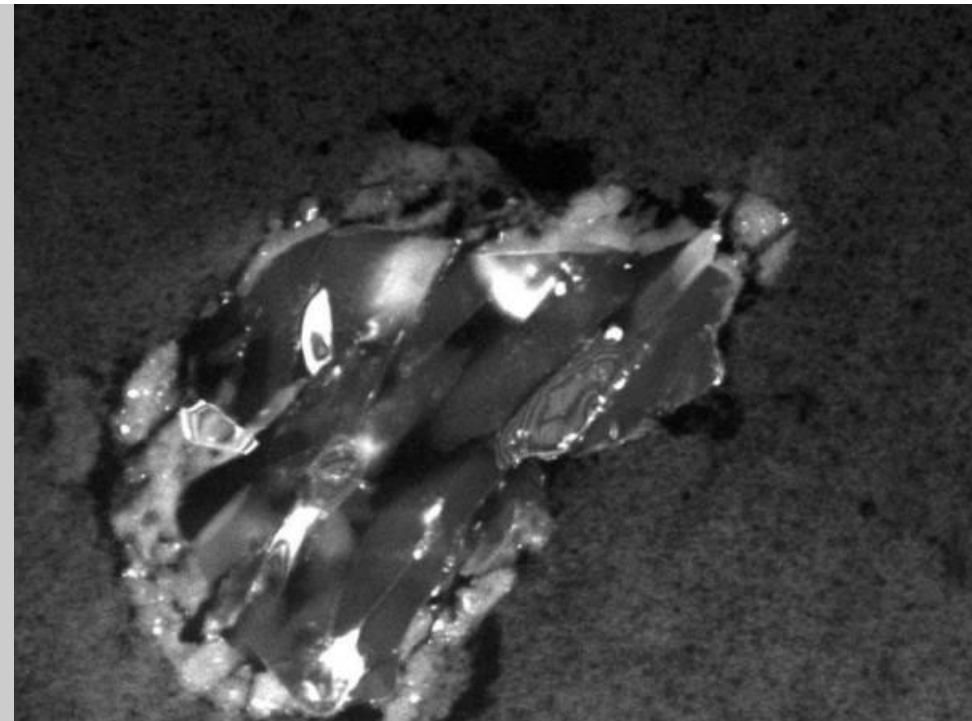
Posted on [March 14, 2006](#) by [Wal Thornhill](#)

"History has a way of showing that what was once acceptable is complete nonsense."

– Bono

From the NASA Stardust mission website we read:

"The primary goal of Stardust was to collect dust and carbon-based samples during its closest encounter with Comet Wild 2. The successful Stardust mission also brought back samples of interstellar dust, including recently discovered dust streaming into our Solar System from the direction of Sagittarius. These materials are believed to consist of ancient pre-solar interstellar grains and solar nebular grains that include remnants from the formation of the Solar System. Analysis of such fascinating celestial specks is expected to yield important insights into the evolution of the Sun its planets and possibly even the origin of life itself."



This image shows a comet particle collected by the Stardust spacecraft. The particle is made up of the silicate mineral forsterite, also known as peridot in its gem form. It is surrounded by a thin rim of melted aerogel, the substance used to collect the comet dust samples. The particle is about 2 micrometers across. Image Credit: NASA/JPL-Caltech/University of Washington

But NASA researchers announced on March 13 another in the long procession of surprises about comets. The grains from comet Wild 2, trapped in aerogel and returned to Earth, were much larger than expected and made from the same high-temperature minerals as found in the most abundant meteorites. This discovery was so unexpected that an early sample was thought to be contamination from the spacecraft.

Once again, rather than revisiting the assumptions about the origin of comets, NASA scientists introduced another ad hoc addition to comet theory. Now the Sun must somehow eject material from inside Mercury's orbit into the far reaches beyond Pluto's orbit where it somehow accretes to form comets. The word 'somehow' is overworked to death in comet theory.

Michael Zolensky, Stardust curator and co-investigator at NASA's Johnson Space Center, Houston, said:

"We have found very high-temperature minerals, which supports a particular model where strong bipolar jets coming out of the early sun propelled material formed near to the sun outward to the outer reaches of the solar system."

A reporter from Astrobiology at the NASA briefing asked pointedly whether anyone had actually proposed such a model of comets *before* this discovery. The point is that there is no good gravitational explanation for accretion, which has never been observed, nor for bipolar jets, which defy gravity.

The only ring that has been observed in the process of generation is that of Saturn's E-ring – and that is produced by the electrical machining of water ice from the surface of Enceladus. In other words, disks of dust have only been observed to form by ejection and not by accretion. And as for bipolar jets, their magnetic fields and dynamics show that they are an electric discharge phenomenon.

If successful predictions are a hallmark of a good theory, standard comet theory rates nowhere.

Meanwhile, on this website the electrical model of comets has been presented and quite specific and unusual predictions made, based on that model. They have been successful. If science worked as advertised, the electric model should be top of the agenda for NASA.

Two years ago I [explained](#):

- *Comets are the result of electrical discharge machining of planetary bodies that occurs in the catastrophic evolution of planetary orbits. It is far too simplistic to assume that the planets were formed along with the Sun and remained in their present orbits ever since.*
- *In addition to removing dust, the gargantuan electric forces of an interplanetary thunderbolt are able to loft entire mountains into space from the surface of a planet. Comets and asteroids can be formed this way.*

Last year I [wrote](#):

"...Plasma cosmologists have shown that stars do not form by gravitational accretion. Stars form in a cosmic discharge, inside a plasma z-pinch. The dusty disks seen about some stars may not be due to gravitational accretion but are more likely to be matter expelled electrically by the central star. Electrical expulsion can also explain the formation of the observed close orbiting gas giants. In a hierarchical fashion, comets can be seen as the debris, or afterbirth, of a planet. They are not primordial."

Now we have the evidence, delivered to Earth directly from a comet. They are made from the same minerals we find in meteorites and asteroids. They are composed of rocky, planetary material. They are not primordial.

What does this mean?

Comets are supposed to be 'Rosetta Stones,' left over from the birth of the solar system. The irony is that instead of being 'dirty snowballs' they really are stony. We have been told ad nauseum that the study of comets will unlock the secrets of the birth of the solar system. But that assumes what has yet to be proven – that the solar system was born in the way we have been told and that comets have been preserved for more than 4 billion years.

In fact, the conventional story of the formation of the Sun and the planets from a gravitationally collapsing molecular cloud is no more than a comforting fable. It lulls us into a childlike sense of security when it begins:

"Once upon a time, 4.5 billion years ago..."

It emphasizes a clockwork regularity over aeons that is no more than wishful thinking. Experts in celestial dynamics tell us that more than two gravitating bodies in orbit is a chaotic system. We have no reason to expect the present solar system to look anything like it did in the dim past.

This raises the unexplained issue of mankind's instinctive fear of celestial apocalypse; of doomsday. It traces to the earliest memories of mankind, at the dawn of civilization. And it surfaces whenever a bright, wandering comet is seen in the heavens. Is it possible that our science instinctively fulfils a need to provide some reassurance in the face of the immensity and capriciousness of the universe? If so, logic and commonsense are pitted against fearful beliefs.

In an Electric Universe *any body* on an elongated orbit within the influence of an electric star will become a comet. A cometary display is simply an electrical discharge phenomenon.

So what do we make of the fact that all of the original words used to describe the planet Venus were those applied to comets? When the space-age discovery was made that the Venusian magnetosphere sweeps over the Earth when the two planets are closest, scientists described it as "the cometary tail of Venus." There is abundant forensic evidence available that connects the fear of the comet, and doomsday, with the planet Venus.

The obvious conclusion is that the solar system is not Newtonian clockwork. If Venus was a stupendous, threatening comet within the memory of mankind there must be another force at work, as well as gravity, which operates to quickly restore stability. The result is the solar system we see today, which gives no clue to a recent turbulent history.

The answer, once again, can be found if we accept that the Sun is the focus of a galactic discharge. All of the planets and comets are charged bodies orbiting within the Sun's plasma sheath. Bodies on cometary orbits experience visible electric discharge and 'non-gravitational' forces. Charge exchange occurs between bodies when their cometary plasma sheaths intersect. If it is a close encounter, 'non-gravitational' electrical forces dominate. The result is that planets effectively space themselves apart by roughly their plasma tail's length. **Collisions are avoided and celestial order maintained electrically.**

The insights that comets can provide relate to the energetics of planetary electrical encounters. Their compositions may allow us to identify which bodies they came from. Their orbits, and those of the asteroids, may identify where planetary encounters took place in the recent past.

Comets are youngsters. They are 'Rosetta Stones' for the recent history of the solar system. Only when we understand that history will we have any basis for confidence about theories of the earliest times.

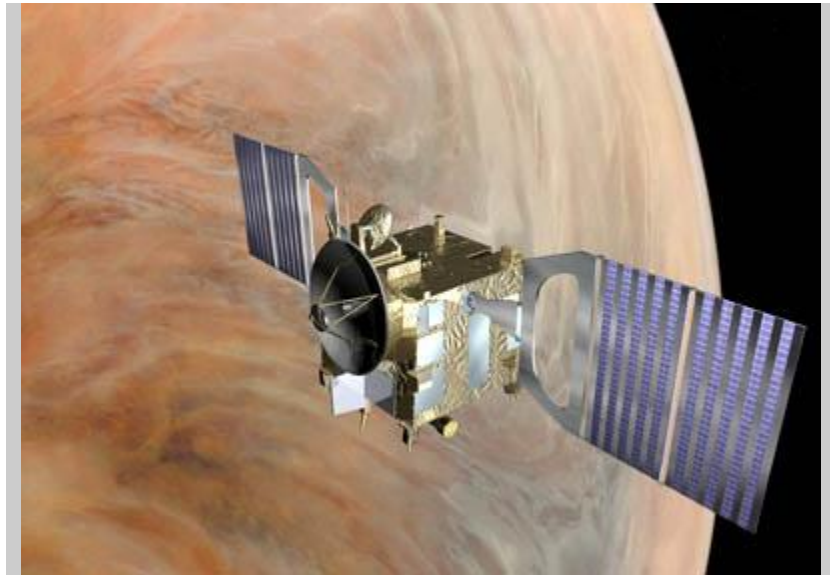
Wal Thornhill

Venus isn't our twin!

Posted on [April 22, 2006](#) by [Wal Thornhill](#)

"You are not looking at a twin [Venus] to the Earth at all. There are very many substantial differences, ..the differences are so great it makes you wonder whether you could ever produce a twin of the Earth in some other solar system when you can't do it in your own."

– S. Ross Taylor, Venus: a twin planet?



Artist's impression of Venus Express, now orbiting Venus. Credit: ESA

The following excerpts are from a report by Robin McKie in the Observer, April 9:

This week a European spacecraft will arrive for a date with Venus, our closest planetary neighbour. Scientists hope the mission, made on a shoestring budget, will reveal vital lessons on how unchecked greenhouse gases can turn a world into a blistering Hades. Venus Express – will study the planet's acid clouds, searing heat, crushingly dense atmosphere and hurricanes to find out why Earth's nearest neighbour has become a place of insufferable heat and poison. 'Venus is very like Earth in that it is the same size and has an orbit round the Sun close to ours,' said David Southwood, head of science at the ESA. 'Yet Venus went wrong. We did not. We want to find out why Venus became our evil twin.'

Venus and Earth are almost identical in size. In addition, both orbit the Sun in 'the Goldilocks zone', a swath of space in which conditions are considered by astronomers as being not too hot and not too cold to prevent the evolution of life. Venus should make ideal planetary real estate, in other words. Yet it is the solar system's most inhospitable planet. ...the planet's principal problem – from a

human point of view – lies with its greenhouse effect, scientists now realise. Venus's thick atmosphere traps solar radiation and heats the world to boiling point. Prospects of finding life here have since been rated – not surprisingly – as vanishingly low, and astronomers' keenness to study Venus has waned.

Comment: Science is evidence based. However, our beliefs filter what is acceptable as evidence. The scientists involved bring to this mission a number of unwavering beliefs and assumptions that jeopardize their inquiry from the very outset. Their keenness to study Venus would benefit from a broader view. The first assumption has become an *idée fixe*: that Venus is a twin of the Earth – that they are the same age and have a similar history. This unproven notion has become a 'fact' by consensus of opinion and incessant repetition. The astronomer V. Axel Firsoff remarked;

"...my impression has been that much of what Thomas Kuhn has called 'normal science' has degenerated into mindless support of orthodoxy and the so-called 'consensus of opinion', which is arrived at by a process of one scientist repeating what another has said in a kind of mirror-gallery regression for the fear of falling out with his (or her) colleagues. In the end nobody seems to know how this 'consensus' has originated, but anything that is out of step is ruthlessly suppressed."

However, most of the greatest discoveries in history came about because an individual broke with the consensus. In 1950, years before the space age, Immanuel Velikovsky concluded from his extensive interdisciplinary research that the planet Venus was remembered from the time of the dawn of civilization as a brilliant cometary body. He concluded in his best-selling book, ***Worlds in Collision***, that:

"The night side of Venus radiates heat because Venus is hot. The reflecting, absorbing, insulating and conducting properties of the cloud layer of Venus modify the heating effect of the sun upon the body of the planet; but at the bottom of the problem lies this fact: Venus gives off heat."

Here we had two cherished beliefs being demolished at once – that something the size of a planet could be a comet, and that Venus recently had a different orbit. Velikovsky was "ruthlessly suppressed." Although later findings from space probes supported his conclusion, they made no difference to the consensus opinion.

Astronomers minimized the importance of Velikovsky's remarkable claim or simply dismissed it as a 'lucky guess', although one noted scholar acknowledged at the time that Velikovsky had a remarkable record of successful predictions and no failures. The discovery that Venus was almost red hot made it imperative for scientists to invent an explanation. The result was the "enhanced" or "runaway" greenhouse effect. Rupert Wildt originally proposed the greenhouse theory more than 60 years ago. He predicted that Venus would be warmer than the Earth by a few tens of degrees Celsius due to the trapping of infrared radiation in the planet's lower atmosphere. After the Venera and Mariner probes to Venus showed how unearthly are the temperatures there, Carl Sagan

proposed the "enhanced greenhouse effect" in 1960. This was followed by a "runaway greenhouse effect" postulated by S. I. Rasool and C. de Bergh in 1970. According to James Pollack, for the enhanced greenhouse effect to work, a vital 0.1 per cent water vapour as well as 0.02 per cent sulphur dioxide and some unspecified heat absorbing particles in the clouds are required in addition to 96 per cent carbon dioxide in the Venusian atmosphere.

The fact is that Venus is an unearthy planet. As Dr. Ross Taylor says, Venus is not a twin of the Earth at all. It simply doesn't fit the consensus view. And if the view about 'twinship' is mistaken, then the theory about common origins is questionable. What if the idea of an uneventful history of the solar system is merely a comforting fiction? We can't assume that the Earth and Venus were 'born' at the same time and have existed peacefully, for the most part, where we now find them. We cannot be sure what the Sun has done in the past. Differences between the two planets cannot be attributed to small causes growing gradually into a large effect over aeons. It makes a nice story but it is unlikely, wishful thinking. Time spans of billions of years appeals to armchair theorists and computer modelers who can extrapolate present conditions backwards in time – providing a pretence of scientific rigor. The pretence comes about because the theorists and modelers ignore the acknowledgement by orbital experts that the many bodies of the solar system are subject to chaotic motion if gravity is the only force at work.

That sweeps the rug from under the second assumption – that we know the origin and history of the solar system. Sure, we have an elaborate and unsubstantiated theory, which appears convincing from endless repetition as 'fact.' But that theory ignores many inconvenient facts and difficulties. It cannot explain the countless differences between the planets. We have no evidence that Venus was born at the same time as the Earth, or that the two planets have always occupied their present orbits. In our hubris, we choose to ignore mankind's early obsessions with the odd appearance and behavior of the planets. The accounts make plain that the planet Venus was the archetypal comet. It was the unnatural 'fire-breathing dragon' in the sky. These facts are simply ignored by modern science. It messes up their neat story. But if we allow all human testimony of the planets to speak for itself, we find that [Venus has a quite different history](#) from that of the Earth. Comparisons with the Earth will lead nowhere. Nothing "went wrong" on Venus or "went right" on Earth. The two planets are not the same age and are only distantly related. There is no message for us from the study of Venus for an imagined evolution of Earth's climate into a hothouse.

That brings us to the assumption that the infernal heat of Venus is due to a greenhouse effect. That could only be so if we ignore everything we know about greenhouses. *"The much ballyhooed greenhouse effect of Venus's carbon dioxide atmosphere can account for only part of the heating and evidence for other heating mechanisms is now in a turmoil,"* confirmed Richard Kerr in Science magazine in 1980. Nothing has changed since then. The greenhouse theory does not explain the even surface temperatures from the equator to the poles: *"atmospheric temperature and pressure in most of the atmosphere (99 percent of it) are almost identical everywhere on Venus – at the equator, at high latitudes, and in both the planet's day and night hemispheres. This, in turn, means*

the Venus weather machine is very efficient in distributing heat evenly," suggested NASA News in April 1979. Firsoff pointed out the fallacy of the last statement:

"To say that the vigorous circulation (of the atmosphere) smooths out the temperature differences will not do, for, firstly, if these differences were smoothed out the flow would stop and, secondly, an effect cannot be its own cause. We are thus left with an unresolved contradiction."

In another paper, Firsoff argues that Venus's high albedo results in the absorption of less solar energy than does the more transparent atmosphere of the Earth.

"Increasing the mass of the atmosphere may intensify the greenhouse effect, but it must also reduce the proportion of solar energy reaching the surface, while the total of the available energy must be distributed over a larger mass and volume. Indeed, if the atmosphere of Venus amounts to 75 air-masses, as is assumed by Rasool and de Bergh, the amount of solar energy per unit mass of this will be about 0.01 of that available on the Earth. Such an atmosphere would be strictly comparable to our seas and remain stone-cold, unless the internal heat of Venus were able to keep it at temperatures corresponding to the brightness temperatures derived from the microwave emission."

The extraordinary high temperature of Venus was perhaps one of Velikovsky's most outrageous and successful predictions. In his "Challenge to Conventional Views in Science" delivered at the symposium, "Velikovsky's Challenge to Science," held in San Francisco on February 25, 1974, under the auspices of the American Association for the Advancement of Science, Velikovsky said:

"I may have even caused retardation in the development of science by making some opponents cling to their unacceptable views only because such views may contradict Velikovsky — like sticking to the completely unsupported hypothesis of greenhouse effect as the cause of Venus' heat, even in violation of the Second Law of Thermodynamics."

The second law of thermodynamics is a general principle, which places constraints upon the direction of heat transfer. To maintain the high surface temperature of Venus there should be no net flow of heat through the atmosphere. However, when the Pioneer Venus probes looked at the amount of radiant energy passing through the atmosphere, each one found more energy being radiated up from the lower atmosphere than enters it as sunlight. And, if this were not enough, the night probe site was shown to be about 2K warmer than it was at the day probe site. The Russian probes, Vega 1 and 2, also "recorded a pronounced upward radiation flux." **These findings simply show that Venus' surface is hot and still cooling.**

Velikovsky may have overstated his case (and mistakenly created a false historical context), based on ancient reports of Venus appearing as brilliantly incandescent as the Sun. That brilliance, like that of the Sun, may have had a predominantly electrical origin.

Coal-dark comet nuclei are known to exhibit a star-like brilliance when discharging strongly. However, powerful electric currents flowing in the crust of a cometary Venus would generate heat near the surface very effectively.

"It's very disturbing that we do not understand the climate on a planet that is so much like the Earth," said Professor Fred Taylor, a planetary scientist based at Oxford University and one of the ESA's chief advisers for the Venus Express mission. "It is telling us that we really don't understand the Earth. We have ended up with a lot of mysteries."

Comment: Taylor's confession is refreshingly candid. However, such confessions of ignorance from astronomers and planetary scientists never seem to result in questioning fundamental theoretical assumptions. For example, the most violent winds in the solar system are found on the most distant planet – Neptune. It shouts to us that the driving energy of weather systems is not simply radiant solar heating. Of course, internal heat is invoked. But that doesn't explain the ferocious upper atmosphere winds. On Venus, surface winds are less than walking pace. However, the upper winds speed about the planet in four days, while the planet rotates backwards in 243 days. Such atmospheric 'super-rotation' is a mystery. It is telling us we don't understand weather on any planet. This fact should give pause to those who think they know that 'global warming' of the Earth is a fact and that human activity is responsible.

Such puzzles are recent, however. Throughout history, Venus has simply been seen as the heavenly embodiment of a deity. Intriguingly, this was invariably a female one. For example, the Babylonians, Ancient Greeks and Romans all linked it with their goddesses of love. Venus was later revealed to be a planet, one that was assumed to be more or less the same as Earth. Only its permanent cloud covering prevented astronomers from working out the details of these similarities. Even in the Fifties, popular science books depicted a mist-shrouded world either of deserts or of swamps and ferns. A few more fanciful versions had dinosaur-like creatures lumbering about in the background.

Then the first robot spacecraft – built by Russia and the US – reached Venus and sent back data that astounded astronomers. The planet [atmosphere] was unbelievably hot, dense, and had virtually no oxygen. Russia tried landing probes on the surface. All were crushed flat by the atmosphere's incredible pressure. 'On Earth, atmospheric pressure is one ton per square foot,' said Taylor. 'On Venus, it is 100 tons.'

Earth's sister was also found to have a surface temperature of 450C and a covering of thick clouds of sulphuric acid. As a vision of Hades, it could hardly be beaten. On top of these disturbing discoveries, scientists also found that a day on Venus – the time the planet takes to make one full rotation – is the equivalent of 243 days on Earth. By contrast, a Venusian year – the time it takes to make one

revolution of the Sun – is a mere 225 days. Thus, on Venus a day is longer than a year. The planet also rotates on its axis in the opposite direction to the Earth, so the Sun – if it could be seen through the Stygian gloom beneath its thick cloud – would appear to rise in the west and set in the east.

Comment: This recital of the unearthly features of Venus should be sufficient to dispel any idea that the planet is a twin of the Earth. The offhand classical 'goddess' reference exposes the ignorant and dismissive attitude of astronomers toward ancient stories about the planetary gods. It is this failing that allowed Velikovsky to brazenly walk through a doorway in their hallowed halls they never noticed. Ancient stories about the planets were never before examined critically or forensically. It suited theoretical astronomers to assume that the planets always moved like clockwork and to regard early reports about planetary gods and their celestial power struggles as fantasy.

The clue to the feminine attribute of Venus is found in the descriptions of the planet's long, flowing cometary 'hair.' Venus was described as a 'hairy star,' a 'star that smoked' and as 'a stupendous prodigy in the sky.' So it is significant that one of the earliest space-age discoveries about Venus was its "cometary magnetotail," in the form of invisible "stringy things," or plasma current filaments, stretching as far as the Earth's orbit. A power surge in those filaments today would cause them to glow, and Venus would form a 'stupendous' cometary apparition in the sky. The forensic evidence would stand up in court, showing that Venus was a comet within human memory. Therefore, the solar system must have a far more lively history than the "once upon a time, long, long ago" story we have been taught. And we should not forget the ambivalent attitude of the ancients toward Venus. Not only was she the beautiful goddess of love, but also her alter ego was Medusa the Gorgon, with her (cometary) hair of writhing snakes and petrifying countenance. She was also the demonic witch, riding her broomstick (comet) across the sky.

How can a planet be a comet? The answer is simple once we acknowledge that a comet is an electrical plasma discharge phenomenon, independent of the size of the comet nucleus. In the nineteenth century, astronomers believed space was a vacuum that could not carry electric currents. In the space age, astronomers found that space is not empty, it is an electrically conducting plasma environment. So the argument was inverted: because plasma is a near perfect conductor, voltage differences could not be sustained between objects in space. This naïve view persists today.

However, the pioneers of plasma science knew, for example, that a negatively charged body in diffuse neutral plasma draws positively charged particles toward it, leaving behind an outer sheath of negatively charged particles. The electric field between the separated charges forms a stable 'double layer,' which has across it most of the voltage difference between the body and the space plasma. The 'double-layer' serves to form an insulating sheath, or 'plasmosphere,' so that there is no electrical interaction with other charged bodies, so long as their plasma sheaths do not touch. The 'magnetospheres' of planets are actually cometary plasmospheres, which happen to trap a magnetic field inside. The Sun also sits at the focus of its plasmosphere. Within each plasmosphere the

electric field is weak, but any body on an eccentric cometary orbit encounters a rapidly changing plasma voltage as it races toward or away from the Sun. The comet deals with this situation by discharging in the characteristic form of plasmasphere glow and cathode jets. (There is no sensible conventional explanation for comet jets or their huge coma.) The jets curve away from the Sun to form the familiar comet tails.



In the electrical model of the solar system, *any* body on a sufficiently eccentric orbit about the Sun will exhibit cometary features. For ancient people to have seen Venus as an Earth-threatening comet, Venus must have had an eccentric orbit that brought the planet near to Earth. Electrical discharging heated the crust of the planet and created the filamentary electrical scars wreathed about it. Lightning occurring in a high-pressure gas causes this filamentary "Lichtenberg" pattern. At low atmospheric pressures, cratering is more common – as we see on the Moon. The lack of craters on Venus led planetary scientists to conclude conventionally that the surface is very young. If Venus *were* as old as the Earth, it required a recent volcanic overturning of the entire Venusian crust.

Such an unlikely and ad hoc event is unnecessary in the electrical model. The emerging sciences of plasma cosmology and the electric universe provide the mechanism by which rocky planets like Venus are born from the core of a dwarf star or gas giant undergoing electrical and/or dynamical stress. When a planet is born, it discharges fiercely to its parent in its new electrical environment. Venus is a newborn planet with a heavy atmosphere still shedding its natal heat. It also suffered electric crustal heating in

encounters with the plasmaspheres of other planets and in exchange for orbital energy in the Sun's electric field.

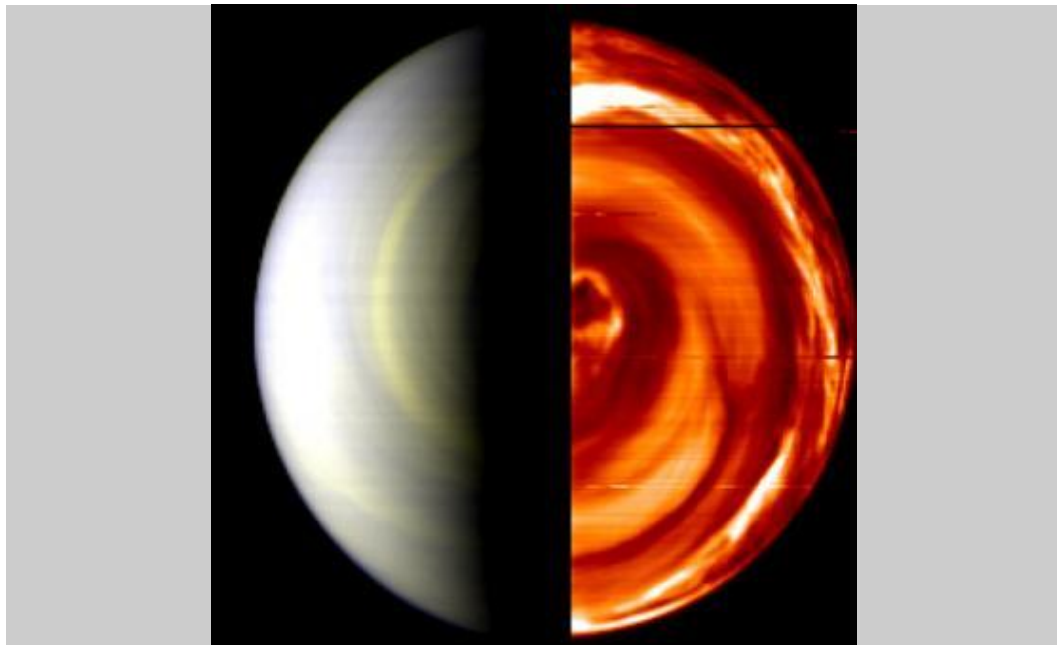
So we watch with great interest the data coming back from the Venus Express spacecraft. Already, in the first images from Venus, we find confirmation of an earlier prediction. On [February 5, 2005](#), in explaining the mysterious **north polar** vortex on Venus, I wrote:

"...we should expect to see evidence of the twisted pair configuration at the poles of Venus, if the input current is sufficiently strong and this model is correct." "The Venusian polar dipole shows the precise configuration and motion of Birkeland current pairs in plasma discharge experiments. That includes a surrounding spiral vortex."

Professor Taylor had written earlier about the Venusian north polar vortex:

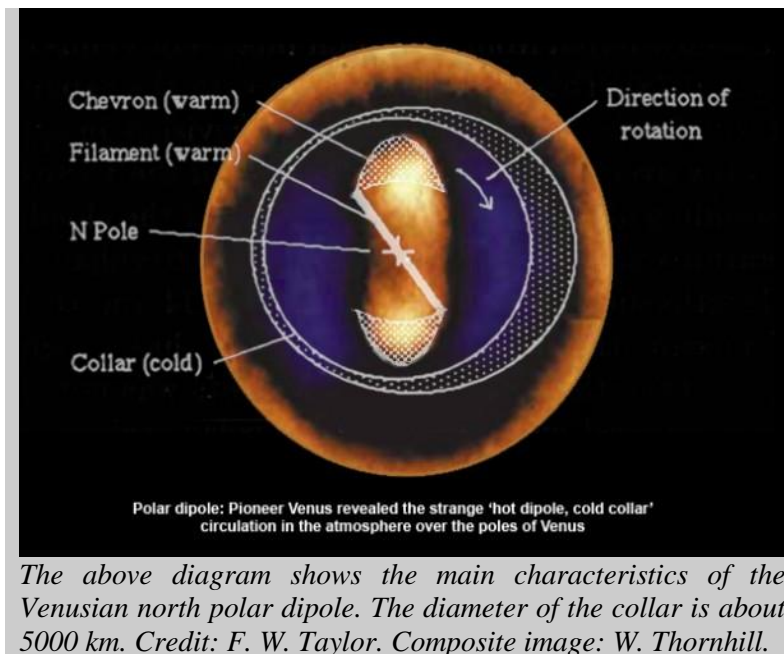
"The absence of viable theories which can be tested, or in this case any theory at all, leaves us uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."

So there was no reason, other than an appeal to symmetry, for scientists to expect a similar vortex at the south pole of Venus.



Credits: ESA/INAF-IASF, Rome, Italy, and Observatoire de Paris, France ESA's Venus Express has returned the first-ever images of the hothouse planet's south pole from a distance of 206,452 kilometres, showing surprisingly clear structures and unexpected detail. The images were taken on April 12 during the spacecraft's initial capture orbit after successful arrival on April 11, 2006. Captured by the Virtis (Visible and Infrared Thermal Imaging Spectrometer) and Venus Monitoring Camera (VMC) onboard Europe's Venus Express probe, the image shows a "vortex" over the hothouse planet's south pole.

Mission scientists are already intrigued by a dark "vortex" feature, which can be clearly seen in one image. The false-colour VIRTIS composite image shows Venus's dayside at left and nightside at right, and corresponds to a scale of 50 kms per pixel. The day half is a composite of images taken via wavelength filters and chiefly shows sunlight reflected from the tops of clouds, down to a height of about 65 km above the planet's surface. The more spectacular night half, shown in reddish false color, was taken via an IR filter at a wavelength of 1.7 microns, and chiefly shows dynamic spiral cloud structures in the lower atmosphere, around 55 km altitude. The darker regions correspond to thicker cloud cover, while the brighter regions correspond to thinner cloud cover, allowing hot thermal radiation from lower down to be imaged.



Venus Express science team members say they want to know how these vortices remain stable and where they get their energy. This goes to the heart of what drives the super-rotating upper atmosphere of Venus. So I repeat and expand here some of the closing comments from my Feb 5, 2005 article.

Venus, as shown by its cometary magnetosphere (plasmasphere), is still discharging strongly to the solar plasma. The enhanced infrared emission seen from the polar dipole is due to the dissipation of electrical energy in the upper atmosphere of Venus. The polar dipole has a variable rotation rate and it varies the position of its axis of rotation with respect to that of the planet. It was observed to move 500 km from the Venusian pole in less than a day and return just as quickly. The variable nature of the electrical input to Venus via the Sun and the snaking about of the Birkeland currents explain both these characteristics.

Of particular interest are the linear filaments sometimes seen connecting the opposite sides of the hot spots. Taylor writes:

"It is virtually impossible, even with complete license, to begin to speculate in any detail as to what mechanism could give rise to such a curious effect."

The answer, in the Electric Universe model is simple. They are a feature seen in simulations of the behavior between two converging Birkeland current filaments where plasma becomes trapped in the elliptical core between them.

Spiral galaxies are the grandest cosmic plasma discharge phenomena in the universe. The Venusian polar dipole exhibits the same morphology as the early stages of development of a spiral galaxy from the interaction of two intergalactic Birkeland current streams. And that includes a filamentary connection between the two current "hot spots" in the manner observed on Venus. The enormous scalability of plasma phenomena allow for such a comparison.

The report concludes:

Yet several tantalising questions remain unanswered about our strange planetary neighbour and, as technology has progressed, instruments that can probe the planet through its thick cloud veil have been developed. 'You can think of this mission as the Return to the Forgotten Planet,' added McCoy. 'We are going back to find answers to questions that are a lot more important to Earth today than they were 30 years ago.'

In particular, scientists want to understand how Venus became the victim of its greenhouse effect. 'Venus is the queen of the greenhouse,' said Dimitri Titov, a mission scientist for Venus Express. 'On Earth our atmosphere traps a little heat, and keeps us nice and warm. Morning on Earth would be freezing cold if it was not for our greenhouse warming, which adds about 40C to average temperatures. But on Venus it adds several hundred degrees.'

It is not simply that our wayward sister gets more solar radiation than Earth, scientists stress. Yes, it is closer to the Sun, but the energy differential is not that great. Something else is involved – and the obvious candidate is carbon dioxide. Venus's thick atmosphere is almost entirely made of CO₂, which is known to be highly effectively at trapping and holding the Sun's heat. Hence Earth's impending climate crisis as man-made emissions build up in our atmosphere.

Comment: As we saw earlier, carbon dioxide is insufficient to create a greenhouse effect that will raise the surface temperature of Venus to that of molten lead. This argument cannot be used to suggest an impending climate crisis on Earth. The Sun, in its response to the local galactic electrical environment, controls our climate. Human activity on Earth is insignificant in comparison.

But why has Venus got so much carbon dioxide? 'The answer may be that it lost its water some time in the remote past,' said Taylor. 'On Earth, carbon dioxide is absorbed by the oceans, where it forms carbonate minerals and over the millennia is deposited as rock. That process was arrested early on Venus when it lost its oceans.' In other words, it was Earth – not Venus – that changed. Billions of years ago both had thick atmospheres of carbon dioxide but, thanks to our oceans, which continue to absorb the gas, we lost ours. Venus – with no oceans – kept its carbon dioxide. 'We should not be too complacent,' added Taylor. 'As temperatures rise, seas become less and less able to hold on to carbon dioxide. Soon they will absorb less of the gas and may eventually start to give it off. That will have a very serious impact on our planet.'

Comment: Here we see assumption heaped upon assumption coming to a conclusion that is entirely unjustified. The conventional histories of both planets and their atmospheres are completely speculative. On the other hand, see [Titan – A Rosetta Stone for early Earth?](#) for an outline of the recent histories of both planets.

As to the cause of the disappearance of Venus's water, a key theory – to be tested by Venus Express – centres on the idea that the planet's upper atmosphere is battered by solar storms. Without a magnetic field like Earth's to protect it from these solar particles, water vapour was lost to space. Essentially the planet's oceans boiled dry.

Comment: I answered this question "why doesn't Venus have much water?" in [Cassini's Homecoming](#) in June 2004:

"When performing comparisons, we must allow for the fact that the Venusian atmosphere is being modified continually by electric discharge activity on the surface of that planet. It has increased the carbon dioxide content of the Venusian atmosphere at the expense of nitrogen and water vapor. Scientists think that most of Venus' water must have split into hydrogen and oxygen and all the hydrogen was lost to space. But if so, where is the oxygen that was left behind? The four Pioneer probe craft didn't find it in the atmosphere. The answer is that it has combined with carbon monoxide to form a heavy atmosphere of carbon dioxide. The process I envisage is this:

"Venus probably began with an atmosphere more like Titan's and the Earth's, where nitrogen dominates, and with more water. It suggests that Saturn must have considerable nitrogen at depth in its atmosphere. The icy rings and satellites of Saturn and abundant water on Earth also point to water on Saturn. On the Venusian surface, nitrogen molecules are converted to carbon monoxide molecules by a catalytic surface nuclear reaction in the presence of red-hot iron. The brilliant French chemist, Louis Kervran, when investigating carbon monoxide poisoning of welders, discovered this surprising nuclear transformation. The carbon monoxide reacts at the hot surface of Venus with water vapor to form carbon dioxide and hydrogen. It is a well-known industrial

process. The hydrogen produced escapes from Venus. This process explains the puzzling discovery made by Venus landers that the water vapor concentration diminished as they approached the Venusian surface. [It also explains the steady stream of hydrogen escaping from the top of Venus's atmosphere at present and the 'phenomenally high' proportion of 'heavy hydrogen' (deuterium) in its atmosphere.] A purely chemical approach to the puzzles of the Venusian atmosphere is not likely to work."

[The report again:]

And there is the question of those sulphuric acid clouds. Accounting for these takes more effort, though again scientists believe they have answers. Venus is assumed to be highly volcanic and is frequently racked by massive eruptions that vent vast amounts of material into the atmosphere, with sulphur a key component. Mixed with other gases, this falls as gentle sulphuric acid drizzle.

'We can see volcanoes on Venus from the radar images sent back by previous probes,' said Taylor. 'But these do not show if there are plumes of ash coming out or if molten lava is streaming down the sides of their calderas, so we don't know if the volcanoes of Venus are active. However, the infra-red detectors on Venus Express will show up features like that. Then we can start to understand Venusian volcanoes and the planet's internal structure.' In the end, however, it will be Venus Express's studies of the planet's runaway greenhouse effect that will dominate the probe's research activities.

Comment: Most of the 'volcanoes' on Venus are electrical scars. That may be why no obvious lava flows occurred during the Magellan Orbiter radar surveillance of the planet. A steady fall in sulfur dioxide levels detected by the Pioneer Orbiter over a time span of several years may have been due to a giant volcano erupting shortly before. But it also possible that another simple nuclear reaction is taking place at the surface of Venus, involving the combination of the two atoms of oxygen in an oxygen molecule to form one atom of sulfur. It is a process occurring today in plain view on Jupiter's moon, Io. In any case, volcanoes are an electric discharge phenomenon so that the discovery of active volcanoes on Venus cannot be used as a distinguishing test for or against the electrical model of Venus.

'The Apollo mission had a huge impact on people in the Sixties,' said Taylor. 'For the first time, we could see Earth from distant space. You could see how small and finite it was. That affected people's thinking about the world.

'Venus should now have a similar impact on the public imagination,' he added. 'We are going to see – graphically – what happens when greenhouse heating runs out of control on a planet. That should concentrate a lot of minds.'

Comment: It is hard to imagine what evidence would be accepted as falsifying the belief in the conventional history of the solar system, other than the entry of another dwarf star

into the Sun's electrical domain. Good science requires that a theory make specific predictions that can be tested. So much the better if the claims are unusual. Almost every space probe is launched with the promise that it will unlock the secrets of the solar system. Yet astronomers are always surprised by their discoveries. The nebular theory of solar system formation has turned out to be hopelessly non-predictive. Under these circumstances, it is rational and scientific to question the assumptions that underpin the theory and to consider alternatives. That is not done. It seems we are dealing with irrational beliefs. Like biblical exegesis, the scripture remains untouched while the interpretation is adjusted to fit new, discordant data. And there is no more discordant astronomical data than the infernal heat of Venus.

Believing the greenhouse effect is responsible for the high temperature of Venus will ensure that any conclusions drawn will be wrong. Believing that Venus is a twin of the Earth will ensure the continuance of a fictional history of both planets. I look forward to Venus Express providing more information to one day blow the roof off the greenhouse.

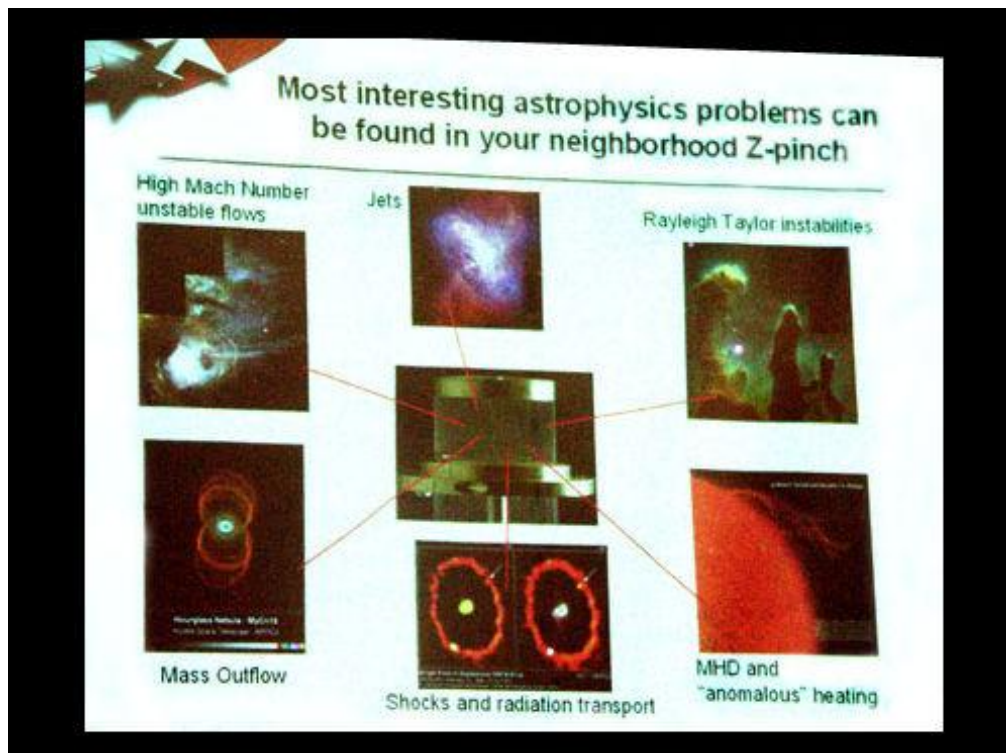
Wal Thornhill

The IEEE, Plasma Cosmology and Extreme Ball Lightning

Posted on [June 30, 2006](#) by [Wal Thornhill](#)

This is a report on a few aspects of the Institute of Electrical and Electronics Engineers (IEEE) International Conference on Plasma Science (ICOPS 2006), held in Michigan earlier this month. The IEEE is the world's leading professional association for the advancement of technology, with more than 365,000 members. The labours of these large numbers of professionals have driven technological progress in the twentieth century. Their success has often been equated with scientific progress, which has allowed the stagnation in the hard sciences to be overlooked. It is engineers who have made space exploration possible, and their precision probes and navigation skills have returned data that routinely surprises space scientists. After each surprise the scientists scuttle back to their drawing boards but they only touch-up the old picture. Perhaps it is time for engineers to bring new concepts to the drawing board.

Members of the IEEE Nuclear and Plasma Sciences Society began to show the way to a new understanding of the universe several decades ago. Their practical experience with plasma, the stuff from which almost the entire visible universe is composed, contrasts strongly with the purely theoretical approach of astrophysicists. Astrophysicists need to invent black holes, dark matter, strange matter and dark energy simply to salvage their theoretical models based on big bang assumptions and the puny force of gravity. Their language has lost touch with the newly perceived reality.



This slide, shown at the IEEE ICOPS 2006 conference, refers to a "Z-pinch," which is the compression of an electric discharge in plasma by its own induced magnetic field. The canister in the center of the slide has a number of fine tungsten wires stretched between the top metal cap and the lower cap. An intense current pulse is sent through the wires causing them to vaporize and form plasma. The current generates a powerful cylindrical magnetic field that squeezes the plasma inwards toward the vertical axis of the canister. The fact that the plasma is "pinched" along the z-axis gives rise to the term "Z-pinch."

The slide is important because it reveals the peculiar fact that although plasma physicists can see the obvious application of their high-energy laboratory Z-pinches to cosmic phenomena, most seem to assume the electrical Z-pinch is transitory, like their experiments. So they go on to apply incorrect magnetohydrodynamic (MHD) concepts – such as "flows," "jets" and "shocks" to the cosmic phenomena. Magnetohydrodynamics ignores electricity and relies on magnetic fields being "trapped" in plasma. The "father" of plasma physics, the late Hannes Alfvén, showed decades ago that the concept of "frozen in" magnetic fields in space plasma is an invalid concept. He called for primary consideration of the electric circuits, which must be present to sustain the magnetic fields.

It is the contention of the Electric Universe model that all stars are the focus of a continuous Z-pinch effect. Where the discharge becomes sufficiently violent, the familiar Z-pinch morphology becomes apparent in glowing bipolar planetary nebulae (such as the one in the lower left image). And, for example, at bottom center the beaded rings of [supernova 1987a](#) are a manifestation of an ongoing Z-pinch and have nothing to do with shocks.

A few IEEE plasma cosmologists do get the picture. With a continuous source of current into a Z-pinch it is possible to mimic the formation and movement of spiral galaxies and the unexpected bipolar shapes of planetary nebulae. No weird science is called for. The crucial requirement is that an uninterrupted cosmic source of electrical power be available. Yet no textbook on astronomy or astrophysics dares to mention electricity. Magnetic fields are mysteriously conjured up without electricity.

The most disturbing thing is that science has become so specialized and insular that astrophysicists do not attend meetings of the IEEE Nuclear and Plasma Sciences Society. They would be shocked if they did. The freewheeling exchange of ideas at ICOPS was quite an eye opener for someone who also attends the monoculture of "big bang" astrophysics/astronomy meetings.

A notable presentation at the conference was by a well-known radio astronomer who gave an invited paper to the Space Plasmas audience. He was moved to depart from his prepared talk by an exciting discovery he had made in consultation with others at the conference. Radio astronomy enables plasma scientists to map the "cosmic power lines" that thread the universe. The difference between the Electric Universe and the "shorted out" universe of astrophysics could not be starker. The discovery, which I hope to report on soon, puts the lid firmly on unscientific big bang cosmology.

Extreme Ball Lightning



The earliest eyewitness sketch of a ball lightning fatality?

For me, one of the highlights of the IEEE Plasma Sciences meeting was a Plenary Talk by J. Pace VanDevender, Vice President Emeritus of Sandia National Labs, titled "**Ball Lightning: New Physics, New Energy Source, or Just Entertainment.**"



Pace VanDevender at the IEEE ICOPS 2006 meeting. Photo: Wal Thornhill

Dr. VanDevender is a Senior Member of the IEEE and a Fellow of the American Physical Society and the American Association for the Advancement of Science.

VanDevender does not consider ball lightning as "just entertainment." He has launched into what he calls "**High Risk Research at the Boundary of Denial and Superstition.**" His interest focuses on "Extreme Ball Lightning." The term "extreme" distinguishes it from ordinary ball lightning, which lasts less than 10 seconds and is benign. Ordinary ball lightning is probably "normal plasma." It is the kind of ball lightning produced in the laboratory. It spontaneously appears in the open-air, closed rooms, aircraft at altitude, and was seen in at least one submarine. It appears before, during or after lightning. About 5% are seen in clear weather.

However, VanDevender distinguished extreme ball lightning (EBL) by the following characteristics:

- • it glows in air;
- • it originates from nothing visible;
- • it lasts between 10 and 1200 seconds;
- • it floats at about 1 meter/second;
- • it is lethal or potentially lethal;
- • it causes significant damage;
- • it contains energy estimated at 100,000 to 1 billion Joules, far in excess of the energy density attributable to chemicals or electrostatics;
- • it penetrates walls, glass and metal, generally without leaving a hole;
- • it induces large currents but is in radial force equilibrium;
- • it leaves black streaks on corpses without the spasm of electrocution;
- • it can excavate tons of earth.

An EBL in County Donegal, Ireland, on August 6, 1868 travelled about 1.6 km and excavated ~200 cubic meters of water saturated peat in ~ 1200 second. VanDevender followed up a reputable report by Michael Fitzgerald to the Royal Society with a visit to the site. He confirmed the essentials, insofar as it was possible so long after the event. It was evident that the conductive peat would immediately neutralize any charge, so EBL cannot be electrostatic.

Many ideas have been suggested. Radio frequency excitation by a thunderstorm; polymer threads carrying large electric charges; tiny black holes; and antigravity (offered by Carl Sagan from unspecified physics). But to date, no theory addresses the characteristics of EBL. It is an intriguing problem. VanDevender said:

"It seems to require new physics."

My view is that explaining EBL doesn't require new physics. The answer may be obscured by mistaken concepts in particle physics. The clue comes from the observed ability of EBL to penetrate solid material. VanDevender noted that EBL "*may be subatomic and electrically neutral to not violate impenetrability of matter.*" There is one

stable subatomic particle that has the ability to pass through solids without any appreciable effect – the neutrino. But how can energy be stored in neutrinos?

A neutrino has a vanishingly small mass which allows it to change "flavours." If we do away with the misleading and inappropriate language of particle physics, we may view the neutrino "flavours" as different resonant states of an orbiting system of near-massless charges within the neutrino. This simple concept that all subatomic particles, including the electron and neutrino, are composed of various resonant configurations of smaller units of charge was discussed in "[Toward a Real Theory of Everything](#)." There I wrote:

The most collapsed form of matter is the neutrino, which has a vanishingly small mass. However, the neutrino must contain all of the charges required to form two particles – a particle and its antiparticle – in a process known as "pair production." This symmetry explains why a neutrino is considered to be its own anti-particle. A neutrino, in the presence of an atomic nucleus, may accept energy from a gamma ray to reconstitute a particle and its anti-particle. "Empty space" is full of neutrinos. They are the repositories of matter in the universe, awaiting the burst of gamma-radiation to expand them to form the stuff of atoms.

In this model of neutrino structure, neutrinos may have intermediate, unstable resonant states between their ground state and the state at which they split to form a particle and anti-particle (pair production). Therefore, EBL may be a rare phenomenon because it would require an exquisitely tuned resonant environment to "pump up" the internal energy of a population of neutrinos that happen to be "passing through."

It is known that pair production requires the presence of an atomic nucleus to catalyze the reaction. It seems likely that in the presence of an excited nucleus a neutrino may accept a lower level of energy than required for pair production and form a stable "heavy neutrino."

I envisage, for example, a lightning bolt striking a mineral that contains a concentration of some heavy element, which acts as a nuclear catalyst. In other words, the heavy element has a resonance within its nucleus that matches a high-energy one in adjacent neutrinos. There may be other ways to excite this resonance.

The model I envisage for EBL goes like this:

1. A heavy element within the environment has a resonance within the nucleus excited by lightning, cosmic-rays or some other means.
2. Ubiquitous neutrinos drifting through the excited atoms accept energy resonantly from a number of such excited nuclei.
3. Following the usual relationship between mass and stored electrical energy, $E = mc^2$, the mass of the neutrino increases.
4. Such "heavy" or excited neutrinos are distorted to form tiny electric dipoles, which will tend to clump together since they have zero net repulsive charge.

5. The energy required to split a neutrino into a positron-electron pair is considerable – about a million electron volts. That provides us with an upper limit of the energy that may be stored within a single neutrino without splitting it in two. It satisfies the requirement that the stored energy in EBL exceeds that available by chemical or electrostatic means.
6. The heavy neutrinos in the EBL would need to have a total mass of a mere hundredth of a milligram to provide a gigajoule of energy.
7. The radial electric field within the tiny sphere of heavy neutrinos may be sufficiently intense to disrupt (ionize) atoms they encounter. This may explain the glow and movement of EBL.
8. Heavy neutrinos respond only weakly to gravity and have no buoyancy since they do not displace matter but pass right through it. This explains how EBL may pass through "walls, glass and metal, generally without leaving a hole."
9. The heavy neutrinos will tend to release their stored energy upon encounters with any atomic nuclei capable of resonant interactions with them.
10. Considerable energy is available from transitions of the heavy neutrinos back to the ground state. Low-energy intermediate transitions may power the glow and movement of the EBL. A sudden, explosive release of energy may be triggered by chemical elements in the environment that can accept energy resonantly from the EBL. High-energy transitions leading to sudden heating and explosion are observed.
11. This model explains why electrostatic effects are not found. Victims are burnt or blackened and not electrocuted.

There are electromagnetic phenomena associated with EBL that need to be investigated and the mode of energy transfer to the environment needs more study. The question also arises whether it is likely that heavy neutrinos might have been observed in the laboratory. Neutrinos are the most common and the most elusive particles in the universe – even more elusive than extreme ball lightning.

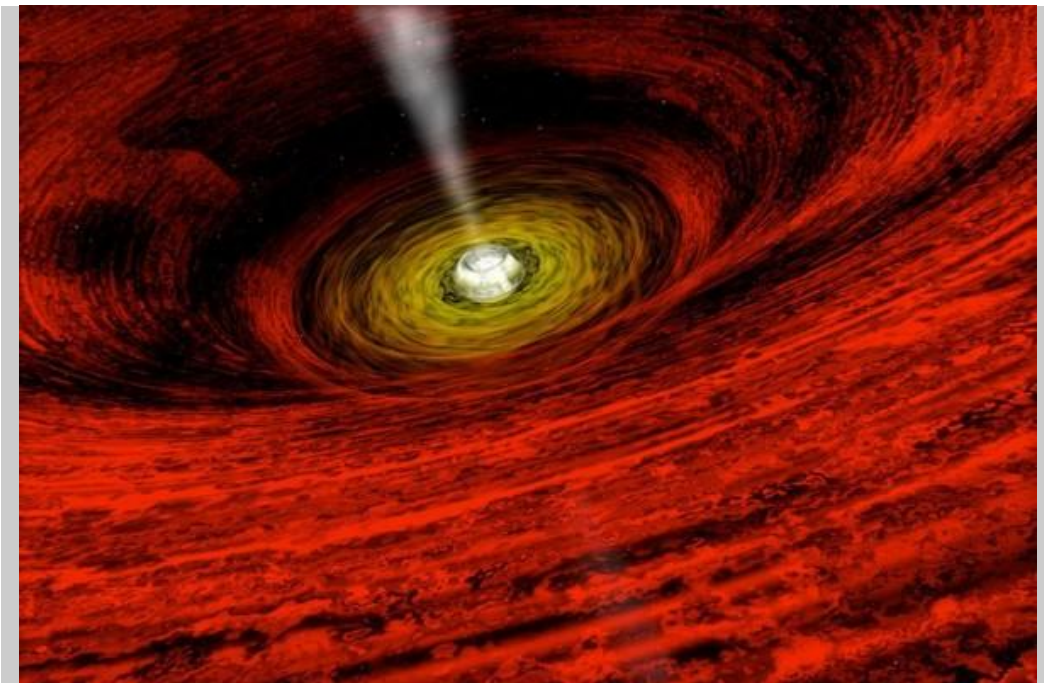
Wal Thornhill

The Madness of Black Holes

Posted on [July 30, 2006](#) by [Wal Thornhill](#)

"We find that whole communities suddenly fix their minds upon one object, and go mad in its pursuit; that millions of people become simultaneously impressed with one new delusion, and run after it, till their attention is caught by some new folly more captivating than the first. ... Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, and one by one."

— Charles Mackay, *Extraordinary Popular Delusions and the Madness of Crowds*, 1852



GRO J1655-40: Evidence for a Spinning Black Hole. Drawing Credit: A. Hobart, CXC

According to the caption from [Astronomy Picture of the Day \(APOD\)](#):

"In the center of a swirling whirlpool of hot gas is likely a beast that has never been seen directly: a black hole. Studies of the bright light emitted by the swirling gas frequently indicate not only that a black hole is present, but also likely attributes. The gas surrounding GRO J1655-40, for example, has been found to display an unusual flickering at a rate of 450 times a second. Given a previous mass estimate for the central object of seven times the mass of our Sun, the rate of the fast flickering can be explained by a black hole that is rotating very rapidly. What physical mechanisms actually cause the flickering — and a slower quasi-periodic oscillation (QPO) — in accretion disks surrounding black holes and neutron stars remains a topic of much research."

The astronomer Fred Hoyle once wrote of the herd mentality in his profession:

"The trouble with conformity is that the process has strong positive feedback. The baaing starts up at a volume low enough to permit stronger-minded animals to think for themselves without too much trouble. Progressively, however, we break down one-by-one, losing all power of sensible judgement, to the point where we can do nothing but add our own baaing to the uproar, which eventually rises to such monumental proportions that nothing remains for the flock except the butcher's shop."

Scientists are people and not immune to the madness of crowds. Ideas that appear folly initially may with time and a growing clamour of consensus delude people into believing it is a new "truth." Such is the story of black holes. Two years ago I criticised the theory of black holes and from the correspondence I receive, some scientists and engineers are "recovering their senses slowly, one by one."

Black holes highlight a situation, common today in astrophysics, where the object under investigation cannot be seen directly. This situation is pure heaven for the crowd of mathematical theorists who have hijacked physics from the natural philosophers and experimentalists. The sainted Einstein seems to have initiated the hijacking with that oxymoron, the "thought experiment." But problems arise when thoughts are governed by a limited set of beliefs or dogmas and unchecked by direct observation or experiment. The result can be – and generally is – science fiction. University libraries and popular science magazines are full of it at the start of this new millennium.

The eminent theoretical physicist Paul Dirac exemplifies the mathematical theorist. He said:

"I like to play about with equations, just looking for beautiful mathematical relations which maybe don't have any physical meaning at all. Sometimes they do."

I have heard many physicists eulogize the exquisiteness of mathematical expressions. Are we in danger of losing the plot? Unfortunately the subjective beauty of an equation gives no clue to the objective correctness of any physical meaning it may have. If mathematics is an art, where are the art critics? After all, it is they who are responsible for discerning the relationships between artistic expression and experiential reality. Simply broadcasting the subjective visions of mathematical experts may foster only "extraordinary popular delusions."

The central dogma of astrophysics requires the puny force of gravity to generate stars and galaxies. So very small and powerful sources of radiation in deep space require almost infinite concentrations of mass to provide the gravitational force to drive them. The mathematics says so, so it must be true. But it is equivalent to the schoolboy howler of dividing by zero. A near infinite concentration of mass involves speculative physics that cannot be tested in the laboratory. Taken to its extreme — the black hole, which

swallows even light — such a concentration swallows commonsense as well. Even Eddington, who produced the gravitational model of stars that inspired Chandrasekhar (who originated the black hole idea), could not swallow it. "*A reductio ad absurdum*," he called it.

"I think there should be a law of nature to prevent a star from behaving in this absurd way."

There is a law, but Eddington himself obscured the simple answer with his "dogmatically correct" gravitational model of stars.

In this situation, of course, guesswork has free reign. Research becomes purely theoretical, engaged in adjusting sacrosanct theory to accommodate anomalous findings, not experimental, seeking to discover patterns of order in the phenomena. And modern computing power encourages playing with theoretical models. But the success of this approach relies on the correct choice of physical model. The most stringent requirement of the model is that it suggest tests and successfully predict the outcomes. Also it is preferable to have one or more different models that are subject to falsification by observations. The black hole model fulfils neither of these criteria. It is a solitary, non-predictive model that has difficulty even explaining the jets emitted by black holes. After all, black holes are supposed to "suck," not "blow." The black hole model has always needed patching up, so it has always been "a topic of much research."

Now we have a report of rapidly flickering light from a black hole.

The simple mechanical lighthouse model, of something many times heavier than the Sun and rotating in milliseconds, is applied (and it isn't clear what generates the narrow beam of radiation). However, to put 450 flashes per second into perspective, that's a 27,000 rpm lighthouse! "I think there should be a law of nature to prevent a star from behaving in this absurd way."

There is a kind of ridiculous inevitability about the progression of such an absurd idea as the black hole. As soon as you begin dealing with infinities you can "*prove black is white and white is black and go out and get yourself killed on a pedestrian crossing*," as Douglas Adams expressed it. And as if to parody a parody, the black hole has been variously described as black, white, or even pink. The truly mind boggling thing is that the numerous experts can't see the absurdity. And no investigative reporter has called attention to the fact that the emperors of science have no clothes.

Mackay was spot on in 1852 when he wrote:

"Men, it has been well said, think in herds; it will be seen that they go mad in herds."

It is a fundamental caution against academic hubris that is sorely missing in university curricula. It amplifies the hollow ring of the claim that science is logical and self-

correcting. History shows that many major changes in science have had to wait upon "eminent outsiders." Bernard Newgrosh describes these people as an *"interesting and important group of people who earn their living in one field whilst undertaking a hobby or other leisure study in a quite different discipline. Their amateur deliberations often result in crucial groundbreaking developments. Many of the laws of science can be credited to these people, also the foundation of new disciplines. This select band has had ideas which were truly new, momentous in the history of science."*

Newgrosh continues:

"It is a curious fact that almost none of these outsiders had any qualification or academic background in the discipline in which they shone – indeed many were entirely self-taught. Some are not all that well known, having just the single claim to fame but others are polymaths of astonishing intellectual calibre. I am going to call this group 'the eminent outsiders'."

The Eminent Outsider

- Occupation unrelated to discipline of achievement
- Work on hobby or other outside interest leads to discovery
- Initially purely amateur researches, etc.
- Entirely unqualified in discipline of hobby study
- Makes fundamental discoveries

Some examples of eminent outsiders are Hooke, Leibniz, Ben Franklin, Lavoisier, Priestley, Coulomb, Herschel, Young, Fresnel, Carnot, Lyell, Faraday, Ohm, Darwin, Pasteur, Westinghouse, Edison, Bell, and Einstein.

When a discipline is as far off the beam as astrophysics, the field is wide open for eminent outsiders. There are a number who will be recognized in future. The expertise they have in common is electrical engineering and/or experimental plasma science. That should be no surprise since we live in an electric universe.

They include:

- Charles-Edouard Guillaime (1883–1936), Nobel Laureate 1920.
- Kristian Birkeland (1867–1917), Nobel Prize nominee, 1917.
- Hannes Alfvén (1908–1995). 1970 Nobel Laureate for Physics.
- Irving Langmuir. 1932 Nobel Laureate for Chemistry.
- Anthony Peratt, Alfvén's student and author of *Physics of the Plasma Universe*.

Healy and Peratt have studied the detail of signals from those other super-rotators – pulsars – and have concluded:

"[T]he source of the radiant energy may not be contained within the pulsar, but may instead derive either from the pulsar's interaction with its environment or by energy supplied by an external circuit.... [O]ur results support the 'planetary magnetosphere' view, where the extent of the magnetosphere, not emission points on a rotating surface, determines the pulsar emission."

In other words, no whirling, super-condensed neutron star is required.

Plasmas transfer energy over great distances to smaller regions where it may be periodically or catastrophically released. Peratt explains the flickering of electromagnetic radiation:

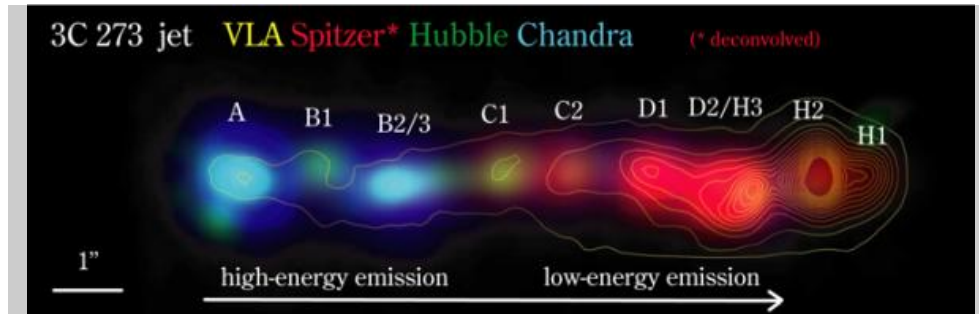
"The flickering of a light in Los Angeles does not mean that the supply source, a waterfall or hydroelectric dam in the Pacific Northwest, has abruptly changed dimensions or any other physical property. The flickering comes from electrical changes at the observed load or radiative source, such as the formation of instabilities or virtual anodes or cathodes in charged particle beams that are orders of magnitude smaller than the supply. Bizarre and interesting non-physical interpretations are obtained if the flickering light is interpreted by a distant observer to be both the source and supply."

Black holes and neutron stars can certainly be classified as "bizarre and non-physical" objects. It is commonsense electrical engineering to declare them non-existent. In that case the research funds currently being poured into investigation of black holes, pulsars and gamma-ray bursters is being wasted on astrophysicists and particle physicists. Rather than fritter away further decades waiting for them to "recover their senses slowly, and one by one" we should immediately fund experimental plasma cosmology under the auspices of the IEEE. That way we may at last escape a century of "delusion and madness."

POSTSCRIPT 1:

Evidence for Ultra-Energetic Particles in Jet from Black Hole

[Yale University, July 26]



Composite false-color image of the quasar jet 3C273, with emission from radio waves to X-rays extending over more than 100,000 light years. The black hole itself is to the left of the image. Colors indicate the wavelength region where energetic particles give off most of their energy: yellow contours show the radio emission, with denser contours for brighter emission (data from VLA); blue is for X-rays (Chandra); green for optical light (Hubble); and red is for infrared emission (Spitzer) The jet suddenly becomes very bright at A, where the high-energy X-ray emissions dominate; moving further away from the quasar, progressively lower-energy emissions dominate. Letters label individual jet features. Image credit: Y. Uchiyama, M. Urry, H.-J. Röser, R. Perley, S. Jester

There have been two competing theories of how emissions arise from the particles — the "Inverse-Compton" theory proposing that the emissions occur when jet particles scatter cosmic microwave background photons, and the "Synchrotron Radiation" theory postulating a separate population of extremely energetic electrons or protons that cause the high-energy emission.

According to the researchers, while the lifetime of the X-ray producing particles is only about 100 years, the data indicate that the visibly brightest part of the jet has a length of about 100,000 light years. Since there would be insufficient time for the particles to shoot out from the black hole at close to the speed of light and then release their energy as radiation as far out as they are seen, the particles have to be accelerated locally, where they produce their emission.

"The new observations show that the flow structure of this jet is more complicated than had been assumed previously," Jester explains. "That the present evidence favors the synchrotron model deepens the mystery of how jets produce the ultra-energetic particles that radiate at X-ray wavelengths."

"Our results call for a radical rethink of the physics of relativistic jets that black holes drive," said Uchiyama.

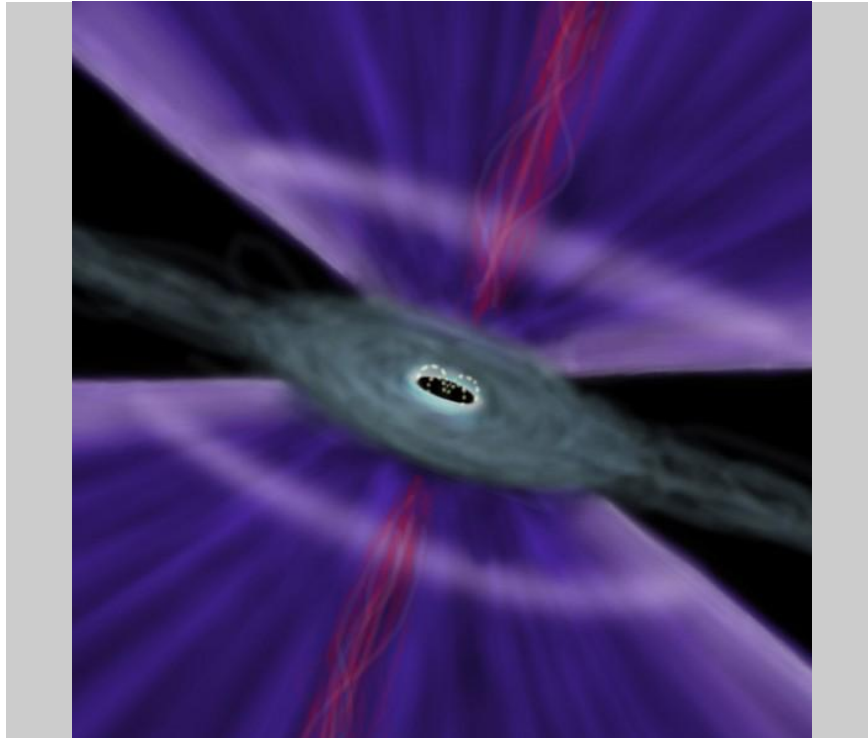
Comment: The hallmark of a cosmic plasma discharge is a jet that emits synchrotron radiation. There would also be some inverse Compton scattering due to the spiralling relativistic electrons within the Birkeland currents of the jet. The basic problem for the "black hole" model is the source of the energy to distant parts of the jet.

However, when the quasar "black hole" is not viewed as both the source of the jet and its supply of energy, we do not have to wait 100,000 years for the energy to reach the end of the jet. The quasar jet forms a part of a much larger electrical circuit and in the same way that the power lead to an electric radiator gets hot (radiates in the infrared), so the distant part of the quasar jet gets hot.

We don't need "a radical rethink of the physics of relativistic jets that black holes drive." What is needed is a course in electrical engineering and experimental plasma discharge. Neither appears in any astrophysics curriculum.

POSTSCRIPT 2: American astronomers claim that black holes may not exist

(Guardian, July 29)



They swallow everything that comes their way and exercise the world's finest minds, but the portrayal of black holes as awe-inspiring celestial menaces may be woefully inaccurate, a team of scientists claim. Indeed, they might not exist at all. Scientists have discovered a gaping hole in a disc of material surrounding the centre of the quasar, as wide as 4,000 times the distance from the Earth to the sun. Image credit CfA

Does this mean that the madness of black holes is at an end? Not a bit of it.

"According to the researchers, the traditional astronomers' view of a universe liberally sprinkled with invisible, all-consuming black holes should be replaced with an alternative that sees strange, magnetic balls of plasma floating in their place."

"The scientists, lead by Rudy Schild at the Harvard-Smithsonian Centre for Astrophysics, spotted what they claim to be the death knell for black hole theory while observing a quasar, lurking nine billion light years from Earth. They discovered a gaping hole in a disc of material surrounding the centre of the quasar, as wide as 4,000 times the distance from the Earth to the sun. The hole, they believe, could only be caused by a vast ejection of material propelled by a strong magnetic field.

Because black holes do not have magnetic fields, Dr Schild's team suggest the quasar must be powered by a dense ball of plasma called a MECO (magnetospheric eternally collapsing object). But according to the astronomers' theories the MECOs' existence precludes the possibility of black holes. "I believe this is the first evidence that the whole black hole paradigm is incorrect," said Darryl Leiter, a scientist on the team.

According to Gerry Gilmore at Cambridge University's Institute for Astronomy, the theory has yet to convince most scientists. He pointed to last year's groundbreaking experiments that gave the first direct observation of a black hole at the centre of our galaxy, the Milky Way. "I'd have to say it's a minority view. It's almost certainly wrong," said Prof Gilmore. "Before we had observations of a black hole, there was a legitimate debate over whether black holes existed or not, but now it's hard to think how it could be anything else."

Gilmore shows the delusion remains firmly in place and Schild demonstrates that gravitational science fiction is his forte with an "eternally collapsing object." The only glimmers of hope come from identifying the object as magnetized plasma and that black hole phenomena may be magnetospheric. However, a magnetic field requires an electric current and there is not one word about electricity.

Wal Thornhill

Grey Matter vs. Dark Matter

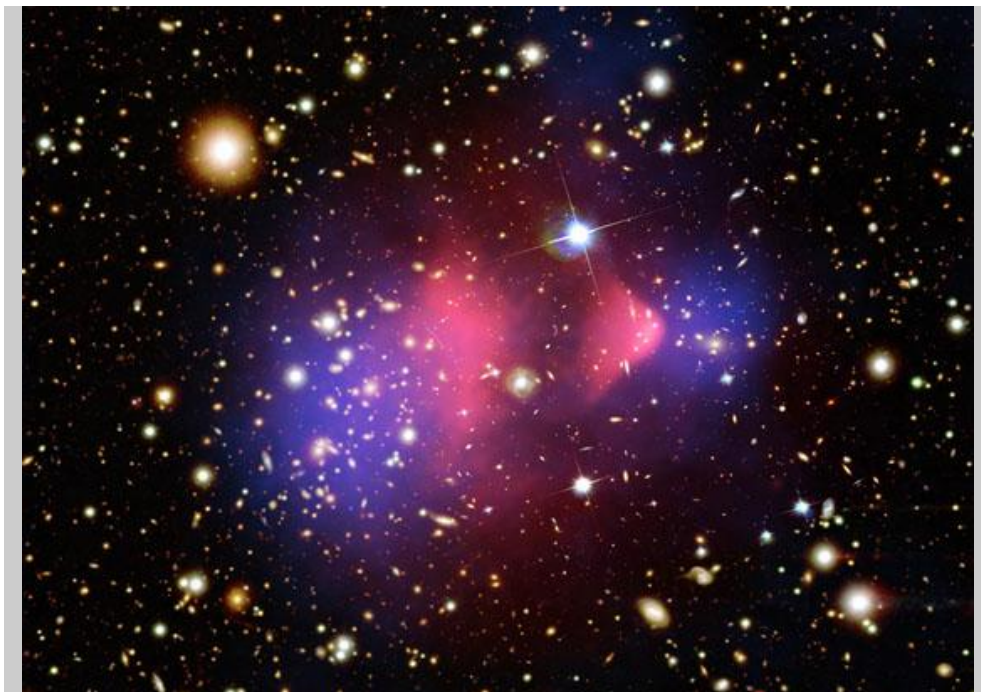
Posted on [August 28, 2006](#) by [Wal Thornhill](#)

"And pray that there's intelligent life somewhere up in space, 'cause there's bugger-all down here on Earth!"

—Eric Idle from [The Galaxy Song](#).

On August 21 the Chandra X-Ray Observatory website released the [news](#):

NASA Finds Direct Proof of Dark Matter



Credit: X-ray: NASA/CXC/CfA/M.Markevitch et al.; Optical: NASA/STScI; Magellan/U.Arizona/D.Clowe et al.; Lensing Map: NASA/STScI; ESO WFI; Magellan/U.Arizona/D.Clowe et al.

This composite image shows the galaxy cluster 1E 0657-56, also known as the "bullet cluster." This cluster was formed after the collision of two large clusters of galaxies, the most energetic event known in the universe since the Big Bang.

Hot gas detected by Chandra in X-rays is seen as two pink clumps in the image and contains most of the "normal," or baryonic, matter in the two clusters. The bullet-shaped clump on the right is the hot gas from one cluster, which passed through the hot gas from the other larger cluster during the collision. An optical image from Magellan and the Hubble Space Telescope shows the galaxies in orange and white. The blue areas in this image show where astronomers find

most of the mass in the clusters. The concentration of mass is determined using the effect of so-called gravitational lensing, where light from the distant objects is distorted by intervening matter. Most of the matter in the clusters (blue) is clearly separate from the normal matter (pink), giving direct evidence that nearly all of the matter in the clusters is dark.

Astronomers think that galaxy clusters form as clumps of dark matter and their associated galaxies are pulled together by gravity to form groups of dozens of galaxies, which in turn merge to form clusters of hundreds, even thousands of galaxies. The gas in galaxy clusters is heated as the cluster is formed. This heating can be a violent process as gas clouds enveloping groups of galaxies collide and merge to become a cluster over billions of years.

From the New York Times:

"This is really exciting," said University of Chicago physicist Sean Carroll, adding that the observations demonstrate the existence of dark matter "beyond a reasonable doubt."

Physorg.com confidently headlined:

"A Matter of Fact: NASA Finds Direct Proof of Dark Matter."

This echoes the remark by Doug Clowe of the University of Arizona at Tucson, and leader of the study:

"These results are direct proof that dark matter exists."

"Direct " means "having no intervening conditions or agencies" — implying that dark matter has been observed. But it hasn't. The pretty image above gives the impression that dark matter radiates blue light. It doesn't. The mass of dark matter that astronomers "find" is fabricated from assumptions and calculations. The telescope images have had an artefact superimposed—a blue "lensing map" that paints in what NASA scientists believe should be there. They've done this before: They [painted hot lava fountains](#) onto images of Io where the camera pixels were inexplicably overexposed by intense light. Digitally superimposing some imagined thing or mathematical virtual reality over an image is an artistic activity. It isn't science. Positing unobserved matter to account for physical phenomena is tantamount to a belief in fairies. If a theorist is unable to discover real objects, which cause the observed effects, it is unscientific—indeed, it is fraudulent science—to invent unreal objects and present them as a "factual" discovery of the cause of those effects.

"Criticism and dissent are the indispensable antidote to major delusions."

– Alan Barth, Professor of Political Science, University Of California, Berkeley.

When a crowd—a consensus—believes something, any doubt appears unreasonable. A crowd of scientists is not exempt from having "major delusions." This spurs my criticism and dissent. What follows is, I hope, the outline of a remedy for some of the most obstinate delusions of modern science.

The Real Science Behind the Bullet Galaxy Cluster

The description of the Bullet galaxy cluster as *"the collision of two large clusters of galaxies, the most energetic event known in the universe since the Big Bang,"* introduces two hypothetical events as if they were facts. But the Big Bang is contradicted by many direct observations, and the observations that are called "galaxy cluster collisions" are more consistently explained by contrary ideas. If there were no big bang and no galaxy cluster collision, there would be no need for dark matter, and the energy estimate would be wildly inflated. How would that fit the picture? As it turns out, it fits perfectly. And it doesn't require any added blue fuzz.



The Astronomer Halton Arp, known best for his Atlas of Peculiar Galaxies, published his most important work in "Seeing Red: Redshifts, Cosmology and Academic Science" and "Catalogue of Discordant Redshift Associations." His breakthrough was to recognize and prove that Edwin Hubble's "other" explanation for the redshift/faintness relationship was the correct one.

Hubble wrote:

*"If the redshifts are a Doppler shift ... the observations as they stand lead to the anomaly of a closed universe, curiously small and dense, and, it may be added, suspiciously young. **On the other hand, if redshifts are not Doppler effects, these anomalies disappear and the region observed appears as a small, homogeneous, but insignificant portion of a universe extended indefinitely both in space and time.**"*

—(Royal Astronomical Society Monthly Notices, 17, 506, 1937).

Arp has shown empirically, beyond a shadow of a doubt, that founding assumptions of the Big Bang and Expanding Universe theories are wrong. Redshift is not an exclusive indicator of velocity, expansion, or distance. **In other words, we cannot project backwards a redshift/expansion to a hypothetical "big bang." The universe is of unknown age and extent. In our current state of ignorance we cannot even frame a sensible question about the origin of the universe.** We should not meekly submit to the conceit of big bang cosmology, with its belief in a miraculous creation event documented in abstract mathematical scripture. Arp demonstrates that we need to humbly look at the universe without the distortion of the redshift = distance lens.

[Note: The redshift (z) is defined as the change in the distant object's wavelength of light divided by the rest (laboratory measured) wavelength of the light, as $z = (\text{observed wavelength} - \text{rest wavelength})/(\text{rest wavelength})$. A redshift of $z = 0.3$ means that wavelengths in the line spectrum of the observed object have been stretched by a factor of 1.3]

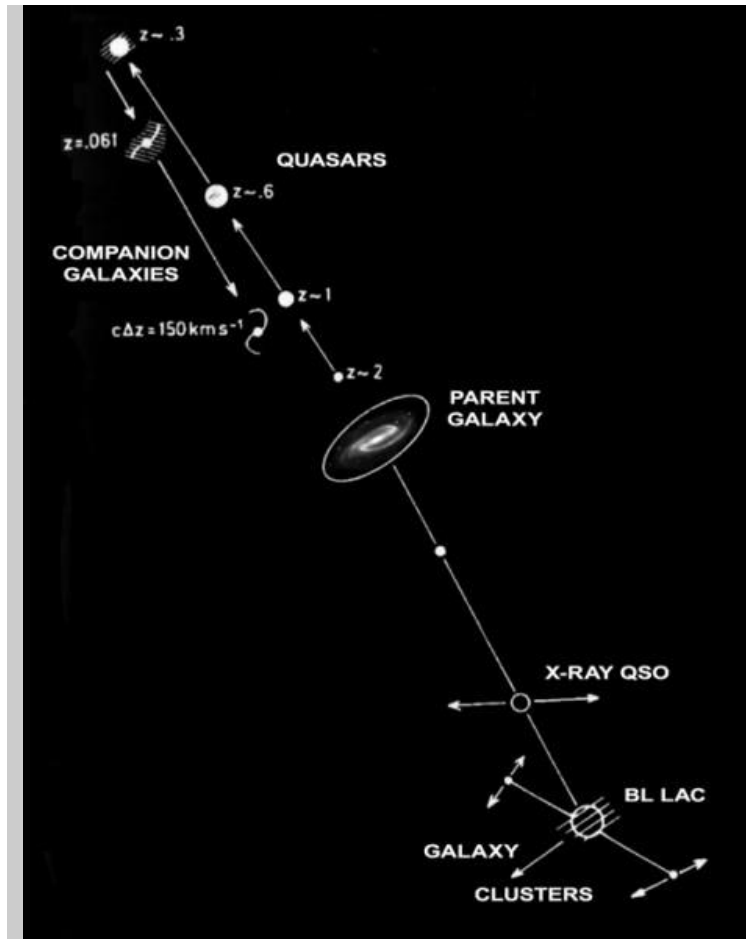
So, what is redshift really about? Simply, Arp's empirical observations show that the higher the redshift of an object, the younger it is. He has found that parent, active galaxies, spawn infant galaxies in the form of faint, highly redshifted quasars. The quasars are ejected from the parent galaxy's nucleus, most often along the spin axis but sometimes in the plane of the galaxy.

By a process that is not understood by present particle physics, the redshift of quasars decreases in discrete steps, or quanta, as they age, grow in brightness and move away from the parent galaxy. At the same time, the ejected quasar becomes more massive and slows down, eventually becoming a companion galaxy of the parent. Arp can trace several galactic generations from charts like the one he is seen holding. It is curious yet somewhat fitting that the visible universe exhibits such a "biological" pattern.

Arp outlines the empirical relationships between active galaxies, quasars, BL Lac objects and galaxy clusters:

1. *High-redshift objects (such as quasars) are aligned on either side of low-redshift eruptive objects (often active galaxies). The pairs have equal positive and negative dispersions from a redshift periodicity value. This implies that quasars are ejected with quantized intrinsic (not Doppler, i.e., velocity) redshifts from active galaxies.*

- [In 1967 Geoffrey and Margaret Burbidge noted the preferred values of redshifts of quasars. In 1971 K. G. Karlsson derived a formula relating those values: $(1+z_2)/(1+z_1) = 1.23$ (where z_2 is the next higher redshift from z_1). This gives observed quasar redshifts of $z = .061, .30, .60, .96, 1.41, 1.96$, etc. Arp comments wryly that this is one of the truly great discoveries in physics, for which Karlsson "was rewarded with a teaching post in secondary school and then went into medicine."]
2. *The youngest ejected objects appear to have the highest redshifts. As distance from the active galaxy increases, the objects decrease in redshift—stepwise, in consonance with Karlsson's periodicity. This implies that intrinsic redshift decreases with age in quantum jumps.*
 3. *The objects also tend to increase in brightness and to slow down with distance. This implies that they gain mass as they age.*
 4. *At about $z = .3$ and about 400 kiloparsec from the parent galaxy BL Lac objects appear. They are rare, highly variable, and very bright in optical and X-ray luminosity. Some show evidence of star formation, which quasars do not. This implies that they are a transition from the compact quasar phase to a galaxy phase.*
 5. *Clusters of galaxies, many of which are strong X-ray sources, tend to appear at comparable distances to the BL Lac's from the parent galaxy. This implies that the clusters are the result of the breaking up of a BL Lac.*
 6. *Clusters of galaxies in the range $z = .4$ to $.2$ contain blue, active galaxies. This implies that they continue to evolve to higher luminosity and lower redshift.*
 7. *Abell galaxy clusters from $z = .01$ to $.2$ lie along ejection lines from galaxies like Centaurus A. This implies that they are the evolved products of the ejections.*
 8. *The strings of galaxies which are aligned through the brightest nearby spirals have redshifts $z = .01$ to $.02$. This implies that they are the last stage of the ejection of quasars and their evolution into slightly higher-redshift companions of the original ejecting galaxies.*



A schematic diagram incorporating the empirical data for low redshift central galaxies and the higher redshift quasars and companions, which have been found since 1966 to be associated. It is suggested that the most evolved companion galaxies have relative intrinsic redshifts of only a few hundred km/sec and can have fallen back closer to the parent galaxy. —From *Seeing Red* by Halton Arp, 1998, p. 239.

How does the Bullet Cluster match up with Arp's schema? Very well it seems.

Arp writes:

"empirical observations ...tell us that the BL Lac's break up and they tell us how they do it! Just as in the ubiquitous ejections that accompany the formation of young stars in our own galaxy, the BL Lac's eject material in opposite directions. Apparently they eject a lot of it, and it eventually ages into somewhat higher-redshift companion galaxies and finally into clusters of similar redshift objects."
[Emphasis added.]

The Bullet Cluster has a redshift of $z = 0.3$, which is exactly one of the redshift quantization values. Significantly, $z = 0.3$ is also the redshift of BL Lac objects, which

spawn galaxy clusters like the Bullet Cluster. Arp published the evidence for these quantized redshifts and the BL Lac connection in 1997!

The Bullet Cluster emits X-rays, which fits naturally with Arp's observations of similar galaxy clusters. It is not necessary, or even likely, that a collision is required to explain the X-rays or the bullet shape of the emission. The shape is typical of the "bow shock" of many jets, as is the "trailing" pink clump, somewhat arc-shaped. The jet is evidence of "eject[ing] material in opposite directions," and the clumps of galaxies at each end are evidence of "it eventually age[ing] into ... clusters...."

Even the "hot gas" is not required: The x-rays are synchrotron (non-thermal) radiation, produced by fast electrons spiraling in the strong magnetic field of the jet.

Instead of colliding, the cluster is forming, exhibiting expected features of such clusters: x-ray jets, arcs, and filaments; a profusion of irregular and disturbed small galaxies; discrepant redshifts.

The Bullet Cluster is therefore much closer than astronomers calculate from the erroneous redshift/distance equation. That means the X-ray energy emitted is far less than calculated and it is not unusual. The cluster is not "the most energetic event known in the universe" but a minor ejection event in nearby galactic space.

To get some idea of the cluster's likely location, you must take a wider view than the narrow Hubble field. You must look for the cluster's possible relationship to the major "ejection family groupings" in the sky. Because of its faintness, the first place to look is the Local Group. If you draw the line of the Local Group from M31 through M33 and along the string of QSOs, clusters, hydrogen clouds and smaller (high-redshift) galaxies, including 3C120, and on to the Milky Way, the Bullet Cluster is within this "cone of ejection" from M31. It is likely a member of our Local Group.

It is significant that the first data from the new UK Infrared Deep Sky Surveys (UKIDSS) Deep eXtragalactic Survey (DXS), which is designed to map the faint $z = 1$ to 2 universe, has already found what I predict will become a critical anomaly for conventional cosmology. Five galaxy clusters have been observed, all of them with redshifts close to $z = 0.9$. There is only 1 chance in 6 of the WFCAM field finding a supercluster of the same redshift where the clusters are. **A redshift of $z = 0.9$ is one of the quantized redshift states. We can predict that the DXS will only find cluster redshifts grouped around $z = .91, 1.41$ and 1.96 .**

What about Gravitational Lensing?

Gravitational lensing became fashionable when astronomers discovered an excess number of quasars around bright galaxies. They argued that the quasars, which were assumed to appear faint because they were distant, became visible due to the bending of light by the gravity of the nearby bright galaxy. Every quasar in the vicinity of a galaxy could then be attributed to multiple lensed images of only one distant quasar, reducing

the excess of quasars to an acceptable number. (Of course, this subterfuge was never tested.)

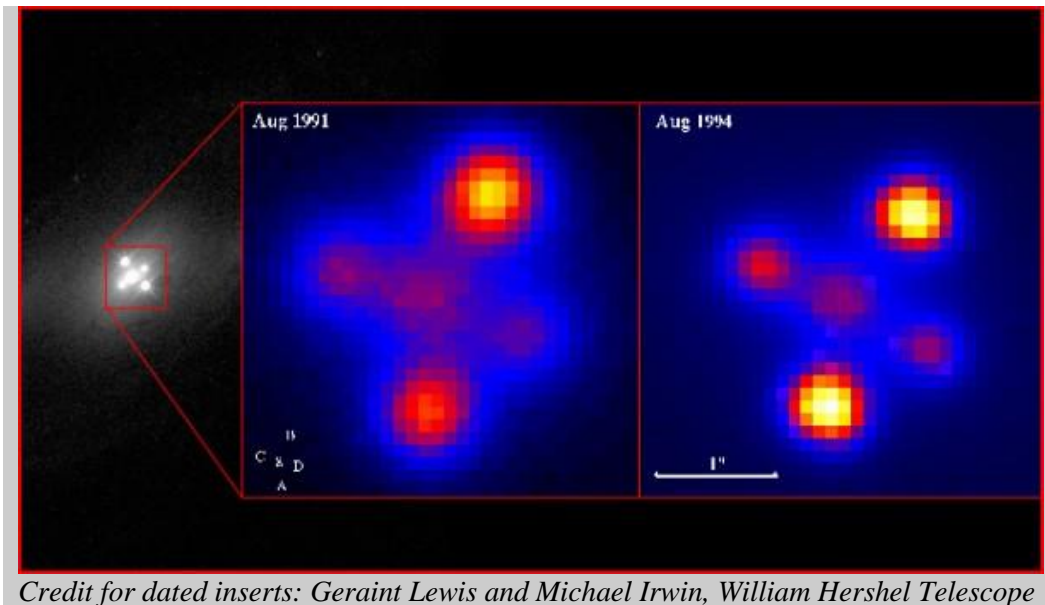
Arp wrote:

"When I heard that the gravitational microlensing calculations required a steep increase of quasar numbers with fainter apparent magnitudes, ...I protested that the observed numbers flattened off as they became fainter."

Arp's schema predicts that quasars will be distributed in the same way as bright nearby galaxies. He found that the match was "extraordinarily good" and "even the details fit well." His paper* detailing his analysis *"lists five independent reasons why gravitational lensing cannot account for the excess number of quasars around bright galaxies. But most decisively, it demonstrates that the observed number counts for quasars can only be accounted for by their physical association with bright nearby galaxies."*

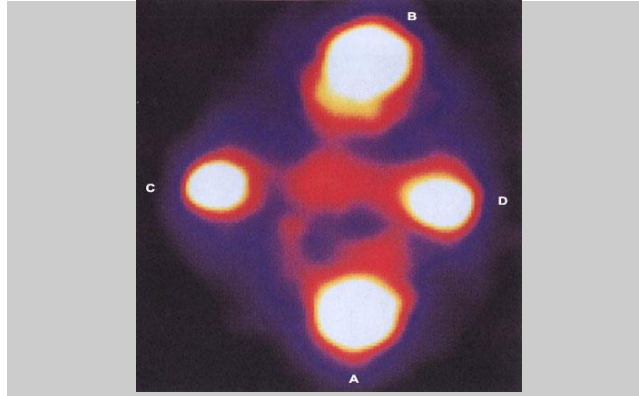
* *Astronomy and Astrophysics*, 229, 93, 1990.

The most celebrated case of "gravitational lensing" is that known (for obvious reasons) as the Einstein Cross.



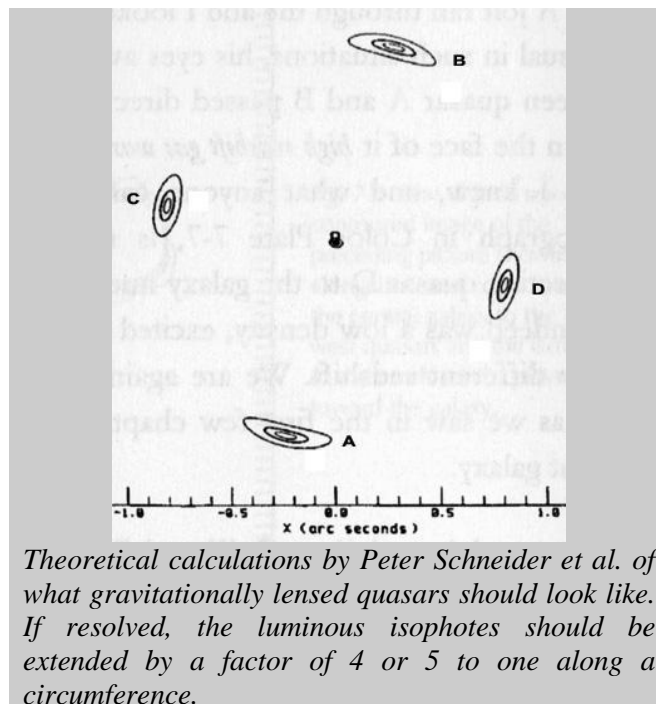
In the mid-1980's, astronomers discovered these four quasars, with redshifts about $z = 1.7$, buried deep in the heart of a galaxy with a low redshift of $z = .04$. (The central spot in this image is not the whole galaxy but only the brightest part of the galaxy's nucleus.) When first discovered, the high redshift quasar in the nucleus of a low redshift galaxy caused a panic. To save the redshift/distance conviction, gravitational lensing had to be invoked despite Fred Hoyle's calculation that the probability of such a lensing event was less than two chances in a million!

A change in brightness of the quasars was observed over a period of three years. Arp's explanation is that the galaxy has ejected four quasars, which are growing brighter with age as they move farther from the nucleus. The lensing explanation is that the bending of the light varies when individual stars pass in front of the quasar. If the lensing explanation were correct, the quasars should brighten briefly and then fade as the star moves out of alignment.



Hubble Space Telescope picture, in false color, of the Einstein Cross. At the wavelength of redshifted hydrogen Lyman alpha emission there is connecting material between the quasar D and the central galaxy core

With access to the primary data, Arp was able to show (above) that the high-redshift quasar was connected to the nucleus of the low redshift galaxy. The image shows trails of material from ejection and the tendency for orthogonal ejection from the parent galaxy.



Theoretical calculations by Peter Schneider et al. of what gravitationally lensed quasars should look like. If resolved, the luminous isophotes should be extended by a factor of 4 or 5 to one along a circumference.

Instead of being extended along the circumference, the well resolved quasars are extended toward the galactic nucleus. They are not gravitationally lensed images.

Arp reports other professional scandals associated with the Einstein Cross. One is that the central galaxy would need so much mass concentrated in its central region that it should outshine by 2 magnitudes the supposedly brightest objects in the universe—conventional quasars. As an authority on galaxy classification, Arp points out that the central galaxy in the Einstein Cross is in fact a small, dwarf galaxy! There is no way it could satisfy the gravitational lens requirement.

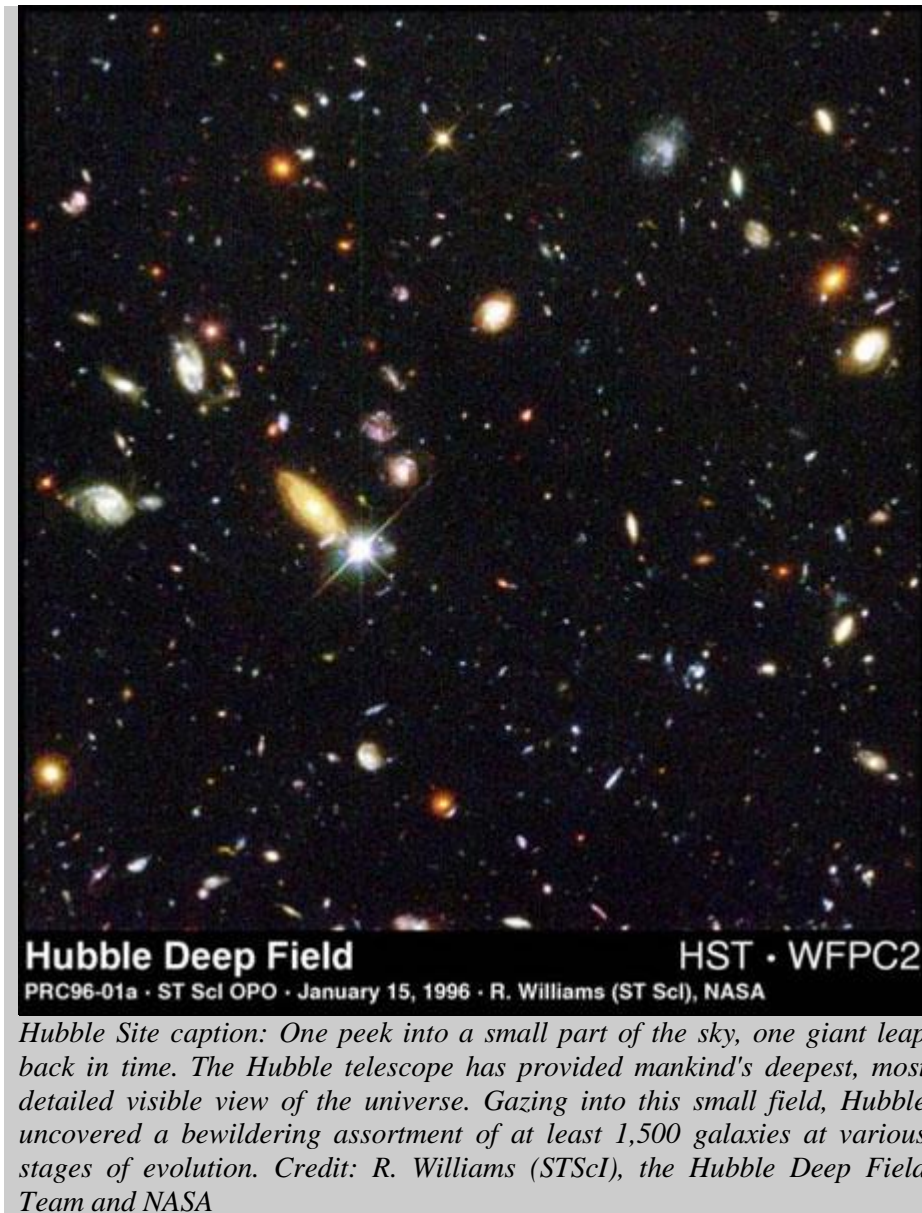
But perhaps the major scandal is the suppression, by peer review and editorial connivance, of papers that show flaws in accepted theories—and the consequent misuse of billions of dollars of public funds in ill-advised experiments and wasted telescope time. When the Hubble Space Telescope (HST) was being developed, Arp and a number of his colleagues were of the opinion that *"what was needed was a wide field optical survey of the dark sky from above the earth's atmosphere (a space Schmidt). That would have revealed the crucial relationships of different kinds of objects to each other. We would not now be in a position of looking at exceedingly faint objects in a tiny spot in the sky without the faintest notion what they really are."* The space Schmidt was estimated to cost between 10 and 20 million dollars. The HST cost between 3 to 5 billion dollars!

In the image purported to provide "direct proof" of dark matter, the blue fuzz superimposed on the telescopic images was drawn to reflect the distribution of matter required to provide sufficient gravity to distort the images of background objects to form arcs like those shown in the diagram above.

But arcs are a natural phenomenon in clusters of galaxies. It was the high redshifts of the arcs that mandated the notion that they must be gravitationally lensed distant background objects. However, Arp realized that very small, nearby Abell galaxy clusters, that also exhibit arcs, had such low mass that it was impossible for them to act as a gravitational lens. He also mentions that a casual inspection shows that some of the arcs look like an ejected shell. But the shock comes when we see that some of the arcs are radial and not tangential!

Arp concludes from his observations that "active galaxies eject high redshift quasars and also eject diffuse material, some of which is in the form of arcs." The radial jets and tangential arcs have nothing to do with gravity and dark matter.

Arp's View of the Universe



The Hubble site reports:

"Most of the galaxies are so faint (nearly 30th magnitude or about four-billion times fainter than can be seen by the human eye) they have never before been seen by even the largest telescopes. Some fraction of the galaxies in this menagerie probably date back to nearly the beginning of the universe."

From Arp's point of view, the notion that we are looking back in time to "nearly the beginning of the universe" is wrong on two counts. First, the highly redshifted objects in this view are close and faint. They originated at various times from various parent

galaxies. Second, therefore, we can say nothing about the beginning of the universe or when it happened.

As the leading authority on peculiar galaxies, Arp was ideally placed to recognize:

"...while 95% of the nearby galaxies have normal, regular morphologies, only 11% of the Deep Field galaxies could be considered normal in appearance.... My friend and classification expert, Sydney van den Bergh, added another important result, namely that there were almost no normal, grand design spirals in the deep field.... We would generally expect the most luminous objects to be the most massive and therefore the most relaxed, equilibrium forms. This is one thing the Hubble Deep Field objects are not."

Arp notes:

"The tendency for young, nearby, low luminosity objects to break up, eject material, show jets and disturbances could explain the prevalence of linear, knotty objects and multiple objects as shown in the Hubble Deep Field."

The evidence suggests:

"...all objects we can be sure of are within the rough confines of the Local Super Cluster."

Arp's perspective of the universe must be investigated before cosmology can claim to be a science.

Just like biological systems, the energy source to "grow" galaxies cannot be internal. It must be supplied from outside. Here, Arp's universe meets plasma cosmology. Plasma cosmology shows empirically and experimentally that the energy required to form galaxies and light the stars comes from intergalactic power transmission lines in the form of cosmic Birkeland current filaments. That is why the universe has a "stringy" appearance, with galaxies arranged like beads on a necklace. And the engine at the center of galaxies is a simple "plasma focus" or "plasma gun" effect. No incredible black holes are required.

As for quantized galactic redshifts, it shows that our understanding of one or both of those two incompatible pillars of big bang cosmology—quantum physics and relativity theory—is flawed. The Electric Universe has offered [a simple solution](#).

When empirical observation is combined with experimental plasma cosmology and the Electric Universe, we may begin to see our small corner of the universe clearly for the first time.

Is there Intelligent Life Down Here on Earth?

If there were a modest degree of intelligent life on Earth you might think that a theory that rests upon empirical observation, without resorting to invisible dark matter and other abstract inventions and beliefs, would be the focus of attention. Alas, Eric Idle's forlorn assessment seems to be accurate.

Evidently a PhD and a large number of published papers do not signify an individual's intelligence. The techniques we use to judge intelligence are skewed toward cleverness, conformity and a good memory. But there is one important facet that is never considered—emotional intelligence. Yet it requires a high degree of emotional intelligence to respond rationally to information that threatens our sense of personal power or of how things are. Judging from the rejection of Halton Arp's discoveries, it is a crucial lesson we are missing. Irritation or dismissal in response to a well-argued case is a signal that emotion has overruled reason.

For those who will not learn from it, history repeats itself. Halton Arp is to the 21st century what Galileo was to the 17th. Both were respected scientists, popular leaders in their field. Both made observations that contradicted accepted theory. Seventeenth century academics felt threatened by Galileo's observations and so, backed by ecclesiastical authority, they ordered him to stop looking. Twentieth century astronomers felt threatened by Arp's observations and so, backed by institutional authority, they ordered him to stop looking.

Both refused. Both published works geared to the non-specialist when specialists would no longer take note. Galileo's paper, "*A Dialogue on the Two Chief Systems of the World*," favored a heliocentric model of the solar system and undermined the accepted geocentric model. Arp's books, *Quasars, Redshifts and Controversies*, *Seeing Red*, and *Catalogue of Discordant Redshift Associations*, favor an ejection model of the universe and undermine the accepted big bang model.

The Church responded by placing Galileo under house arrest: his peers would not even look through his telescope and the Church judged his books heretical. The modern astronomical community responded similarly to Arp. Observatory officials cancelled his telescope time and astronomical journals refused to publish his research.

Historians of science are fond of using today's theories to expose the theoretical blind spots of earlier thinkers. However, in a review in *Science of Exceeding Our Grasp: Science, History, and the Problem of Unconceived Alternatives*, Tim Lewins writes:

"P. Kyle Stanford ...tries to show that past scientists have typically failed to consider (let alone evaluate) important alternatives to the theories they have ended up espousing. ...Stanford's aim is not to congratulate modern scientists on how much more perceptive they are than their predecessors. He argues that there is no reason to think that we are any better ...at avoiding cognitive oversight. According to Stanford, history suggests that modern scientists, too, are currently

overlooking alternative theoretical options of a wholly alien sort, which will only be apparent to scientists of the future. This persistent failure of the scientific imagination means that we should expect the truth to lie in the vast space of theories to which we are presently blind, rather than in the small areas that we are able to survey."

To get a glimpse of the science of the future, I have found it useful to seek out the courageous individuals who face academic rejection and disrespect for their heresies. Ostracism is a familiar human response to uncertainty. But then it is necessary to use your own judgment and to deal with your own uncertainties when evaluating the work of outcasts. It is demanding to behave intelligently— but the rewards in new and better understanding of our world and ourselves are worth the trouble.

Wal Thornhill

With appreciation to Mel Acheson for his editorial contributions.

Voyager Probes the Sun's Electrical Environment

Posted on [September 30, 2006](#) by [Wal Thornhill](#)

"...with his [Birkeland's] extraordinary intuition he had a feeling for the huge electrical importance of the universe. Future research may show that such messages from the sun are equally important to us as Galileo's understanding of messages from the stars when he took his telescope and studied space for the first time."

—*Sem Sæland, memorial address to Birkeland, 22 September 1919.*

"...the interaction of our sun with the surrounding interstellar matter from other stars is more dynamic and complex than we had imagined, and there is more yet to be learned as Voyager begins the final leg of its race to the edge of interstellar space."

—*Dr. Edward Stone, Voyager Project Scientist at CalTech, 27 September 2005.*

"The expectations of NASA scientists are not being met because their shock front model is incorrect. The boundary that Voyager has reached is more complex and structured than a mechanical impact. It conforms more closely to the effects seen in electric discharges in gases at low pressures, discovered by Irving Langmuir in the 1920's and 30's. Until the fabulous journey of the Voyager spacecrafts scientists have not been so confronted with the electrical nature of the Sun and its galactic environment."

—*Wal Thornhill, 29 September 2006.*

Astronomers consider stars as isolated bodies "burning" their own fuel as they orbit the galaxy. Stars produce exhaust "winds" for reasons that are not clear. These winds are thought to collide with the interstellar medium like an aircraft speeding through thin air. So we read about a "shock front" and "turbulence" at the interface with deep space. But is this simple analogy accurate?

Stars are the visible components of galaxies. Big bang cosmology has no explanation for galaxies and simply hopes someone will solve the problem, someday. Like old movie matinee serials, invoking a miracle at the start of each episode has allowed the fictional big bang story to be maintained. But if we cannot explain galaxies then our understanding of stars and their real galactic environment is doubtful.

Meanwhile the relatively new discipline of plasma cosmology has demonstrated quite simply and clearly by experiment and supercomputer simulation that galaxies are a natural electrical phenomenon in a universe that is more than 99% plasma. But

cosmology, touted as the "Queen of the sciences," has more in common with theology. One leading astronomer has compared it to the medieval church because of its intolerance of any theory or data that does not support the belief in the miraculous creation event of the big bang.

Electric galaxies imply an electrical interface with stars. But so far, plasma cosmology has not made that connection. It has been content to show that cosmic plasma "Z-pinch" discharge phenomena are present at the birth and death of stars. A recent study has found the classic "hourglass" shape of the Z-pinch in a star-forming region and, of course, it is well known in planetary nebulae—the so-called death throes of a star. It is also found in supernova remnants.



Planetary nebula M2-9 showing the classic hourglass, Z-pinch shape.
—Credit: M Balick (Uni of Washington) & NASA

But throughout its life, a star is viewed conventionally as a self-gravitating body that produces energy by consuming itself in a central thermonuclear fire. It is a model that is a product of the early 20th century and long past its "use by" date. In the optimism at the dawn of the nuclear age it was thought that nuclear energy would solve all our energy problems and also explain the steady source of energy from the Sun, which had to have shone for geological ages past and hopefully would do so into the future. But the thermonuclear model has many difficulties. It is a highly unlikely and essentially unstable model (based on the hydrogen bomb) and follows a gravitational theory of star formation that hasn't been shown to work. And as one perceptive scholar wrote:

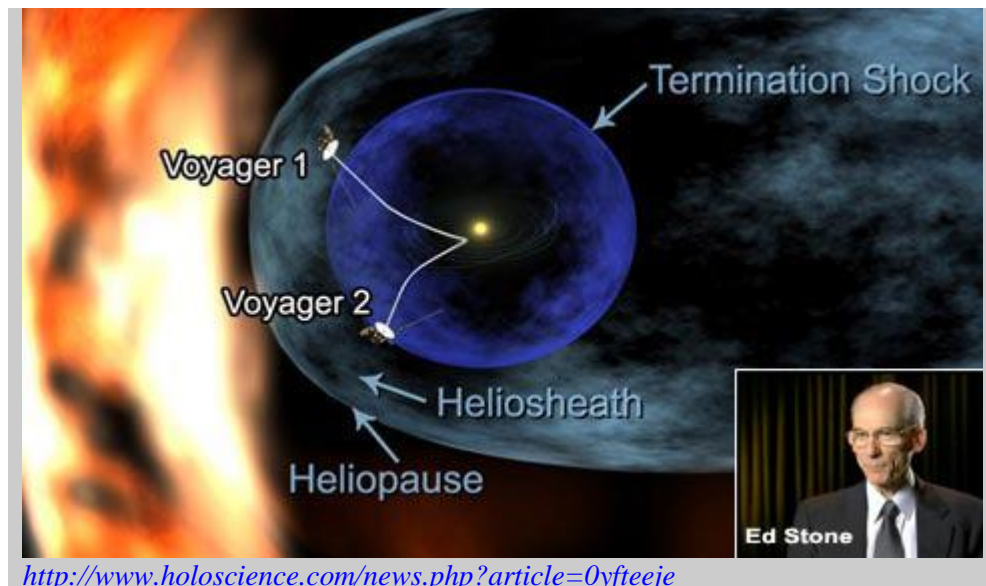
"The modern astrophysical concept that ascribes the sun's energy to thermonuclear reactions deep in the solar interior is contradicted by nearly every observable aspect of the sun."

The Electric Universe model simply argues that following their birth in a cosmic plasma Z-pinch discharge, stars continue to be lit electrically throughout their life at the focus of a mild, invisible Z-pinch. If this is so, interstellar spacecraft will not find what scientists expect at the boundary between the Sun's domain and the galaxy. I wrote on the subject in November last year in "[Voyager 1 at the Edge – of what?](#)"

NASA reported more surprises on September 21, 2006:

Surprises from the Edge of the Solar System

Almost every day, the great antennas of NASA's Deep Space Network turn to a blank patch of sky in the constellation Ophiuchus. Pointing at nothing, or so it seems, they invariably pick up a signal, faint but full of intelligence. The source is beyond Neptune, beyond Pluto, on the verge of the stars themselves. It's Voyager 1. The spacecraft left Earth in 1977 on a mission to visit Jupiter and Saturn. Almost 30 years later, with the gas giants long ago seen and done, Voyager 1 is still going and encountering some strange things.



<http://www.holoscience.com/news.php?article=0yfteeje>

"We've entered a totally new region of space," says Ed Stone, Voyager project scientist and the former director of JPL. "And the spacecraft is beaming back surprising new information." (See [Ed Stone video](#)).

Before we reveal the surprises, let us discuss exactly where Voyager 1 is: Our entire solar system—planets and all—sits inside a gargantuan bubble of gas about four times wider than the orbit of Neptune. The sun is responsible. It blows the bubble by means of the solar wind. Astronomers call the bubble itself "the heliosphere" and its outer membrane "the heliosheath."

Voyager 1 is about 10 billion miles from Earth, inside the heliosheath. "You can simulate the heliosheath in your kitchen sink," says Stone. "Turn on the faucet so that a thin stream of water pours into the sink. Look down into the basin. Where the stream hits bottom, that's the sun. From there, water flows outward in a thin, perfectly radial sheet. That's the solar wind. As the water (or solar wind) expands, it gets thinner and thinner, and it can't push as hard. Abruptly, a sluggish, turbulent ring forms. That ring is the heliosheath."

Comment: This description of the Sun's interface with interstellar space is very old-fashioned. It uses terms that are appropriate in discussing movement of air or water but it is entirely misleading and inappropriate when applied to plasma boundaries.

That the solar wind can be compared to the flow of a flat sheet of water raises questions about why that should be so from a spherical star inside a spherical "bubble." Invoking solar magnetism raises more questions than it answers. The mechanical analogy is misleading and must inevitably result in more surprises for scientists who base their expectations upon it.

The report continues...

And now for the surprises:

Magnetic Potholes: *Every now and then, Voyager 1 sails through a "magnetic pothole" where the magnetic field of the heliosheath almost vanishes, dropping from a typical value of 0.1 nanoTesla (nT) to 0.01 nT or less. There are also "magnetic speed bumps" where the field strength jumps to twice normal, from 0.1 nT to 0.2 nT. These speed bumps and potholes are an unexpected form of turbulence. What role do they play in scattering cosmic rays? "This is under investigation," says Stone.*

Sluggish solar wind: *The solar wind in the heliosheath is slower than anyone expected. "The solar wind is supposed to slow down out there, just as the water in your sink slowed down to make the 'sluggish ring,'" says Stone, "but not this slow." Before Voyager 1 arrived, computer models predicted a wind speed of 200,000 to 300,000 mph. Voyager 1 measured only about 34,000 mph. "This means our computer models need to be refined."*

Anomalous Cosmic Rays: *"This one takes a little explaining," he says. "While the heliosheath protects us from deep-space cosmic rays, at the same time it is busy producing some cosmic rays of its own. A shock wave at the inner boundary of the heliosheath imparts energy to subatomic particles which zip, cosmic-ray-like, into the inner solar system. "We call them 'anomalous cosmic rays.' They're not as dangerous as galactic cosmic rays because they are not so energetic."*

Anomalous cosmic rays are supposed to come from the Termination Shock—but Voyager 1 found otherwise. Researchers expected Voyager 1 to encounter the greatest number of anomalous cosmic rays at the inner boundary of the heliosheath "because that's where we thought anomalous cosmic rays were produced." Surprise: Voyager crossed the boundary in December 2004 and there was no spike in cosmic rays. Only now, 300+ million miles later, is the intensity beginning to grow. "This is really puzzling," says Stone. "Where are these anomalous cosmic rays coming from?"

Voyager 1 may find the source—and who knows what else?—as it continues its journey. The heliosheath is 3 to 4 billion miles in thickness, and Voyager 1 will be inside it for another 10 years or so. That's a lot of new territory to explore and plenty of time for more surprises.

No Surprises for an Electric Sun

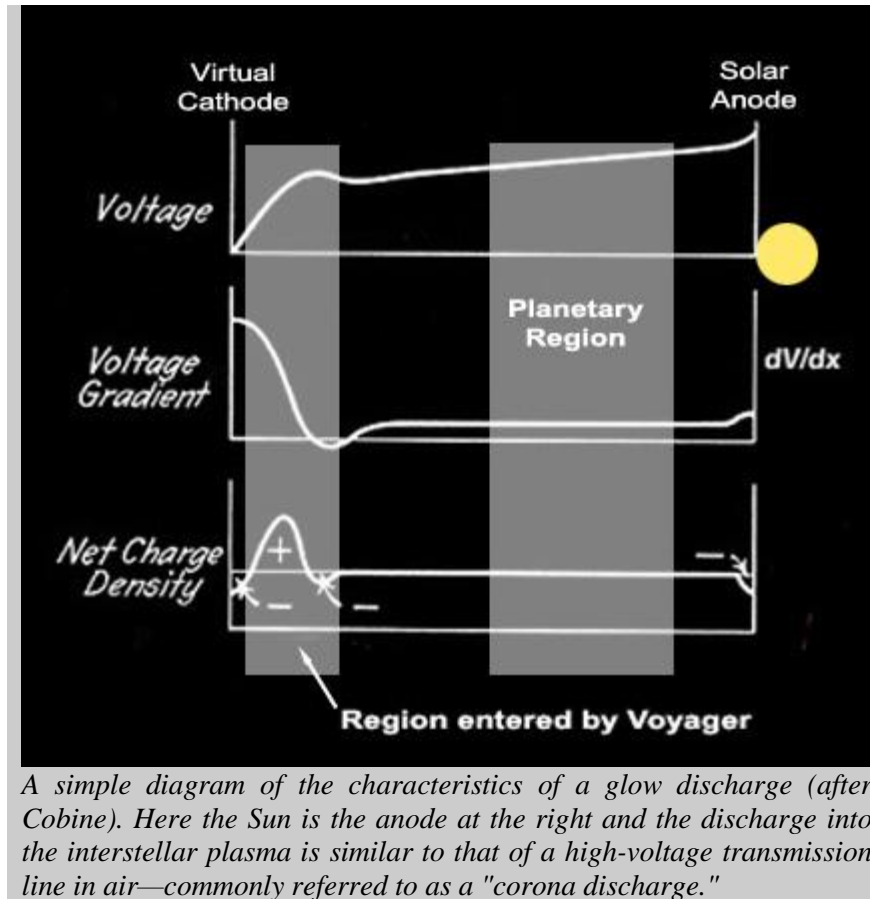
The Nobel Prize winner and pioneer of plasma physics, Irving Langmuir, wrote on the subject of *Electric Discharges in Gases at Low Pressures*:

"When a difference of potential is applied to two electrodes in a gas and a current flows through the gas between these electrodes, the distribution of potential in the space assumes a wide variety of forms. Some of these are in striking contrast to the distribution obtained with metal conductors... there are many types of discharge in which most of the potential drop takes place within a short distance from the cathode, the rest of the space having practically the potential of the anode. Moreover, it is common to have potential maxima and minima in the space between the electrodes; and it often happens that one of these maxima in space has a potential higher than that of the anode, or a minimum has a potential lower than that of the cathode. These seemingly anomalous phenomena have been shown, in recent years, to represent the normal working of the fundamental electrical properties of gases..."

The expectations of NASA scientists are not being met because their shock front model is incorrect. The boundary that Voyager has reached is more complex and structured than a mechanical impact. It conforms more closely to the effects seen in electric discharges in gases at low pressures, discovered by Irving Langmuir in the 1920's and 30's. Until the fabulous journey of the Voyager spacecrafts scientists have not been so confronted with the electrical nature of the Sun and its galactic environment. As Langmuir noted:

"Most of the potential drop takes place within a short distance from the cathode, the rest of the space having practically the potential of the anode."

In other words, throughout interplanetary space the steady radial electric field is so weak that its effects have been mistakenly attributed to other causes. For instance, the solar wind 's acceleration has been attributed to the heat of the corona and plasma waves emanating from the Sun. Cometary ablation and disintegration has been credited to solar heating. And the strange steady backward acceleration of the Voyager spacecrafts toward the Sun remains a [mystery](#).



It is a plasma sheath, or "double layer" of charge that separates the solar plasma from the interstellar plasma. The double layer forms part of the larger electric circuit of the solar Z-pinch. The double layer carries current and has an inner region of negative charge density and an outer region of positive charge density. Between the charge layers is a strong electric field. Allowing for the vast hourglass shape of the Sun's galactic circuitry, which will distort the pattern found by the Voyager spacecraft from the expected spherical shape, there are some general observations that can be made about what to expect. The complexity of plasma behavior makes it impossible to be highly specific.

The first significant feature encountered by Voyager as it moves from right to left in the diagram is the reversal of the electric field, which decelerates solar wind protons and accelerates electrons along the magnetic field lines. This effect gave NASA scientists the impression that Voyager had reached a hypothetical termination shock. It explains why the deceleration of the solar wind protons was greater than expected ("sluggish solar wind") and no ACR [anomalous cosmic ray] particles were found being accelerated there. Also beams of electrons were often found streaming out from the Sun along the magnetic field lines.

The electric field is strongest near the virtual cathode and it accelerates galactic electrons toward the Sun, leaving a region of positive space charge. The energetic electrons will ionize neutral interstellar particles that are drifting through the plasma sheath. It seems

likely that those formed to the right of the voltage peak will experience acceleration toward the Sun to become anomalous cosmic rays. The voltage maximum in the diagram may, as Langmuir noted, be higher than the Sun's potential by an amount sufficient to account for the maximum energy of anomalous cosmic rays.

However, the most interesting effect may be found in the "cathode drop" region to the left of the voltage peak, where the powerful electric field has been estimated to accelerate solar wind protons away from the Sun at cosmic ray energies of the order of 10 billion electron volts. It seems that all stars generate cosmic rays in this way with energies that reflect the driving voltage of the star. The effect on a charged Voyager spacecraft could be very interesting too.

Wal Thornhill

The Real Impact of Victoria Crater

Posted on [October 16, 2006](#) by [Wal Thornhill](#)

"I don't like the 'terrorist geology of impact', which is not the same thing as saying that no impacts have ever occurred."

—V. Axel Firsoff.

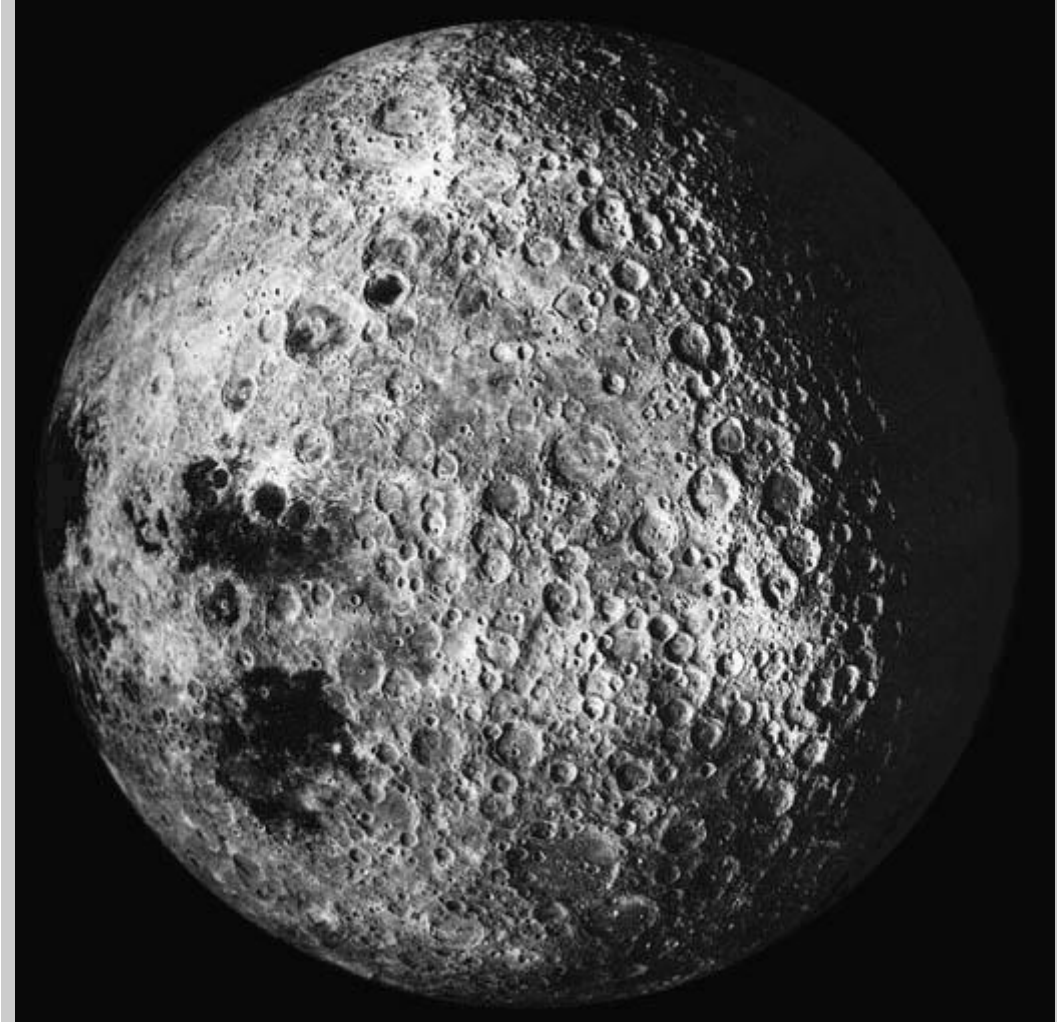


Photo from Apollo 16 on the flight back to Earth centered on the eastern-most part of the Moon visible from Earth. The right half shows the heavily cratered far side of the Moon. Credit: NASA

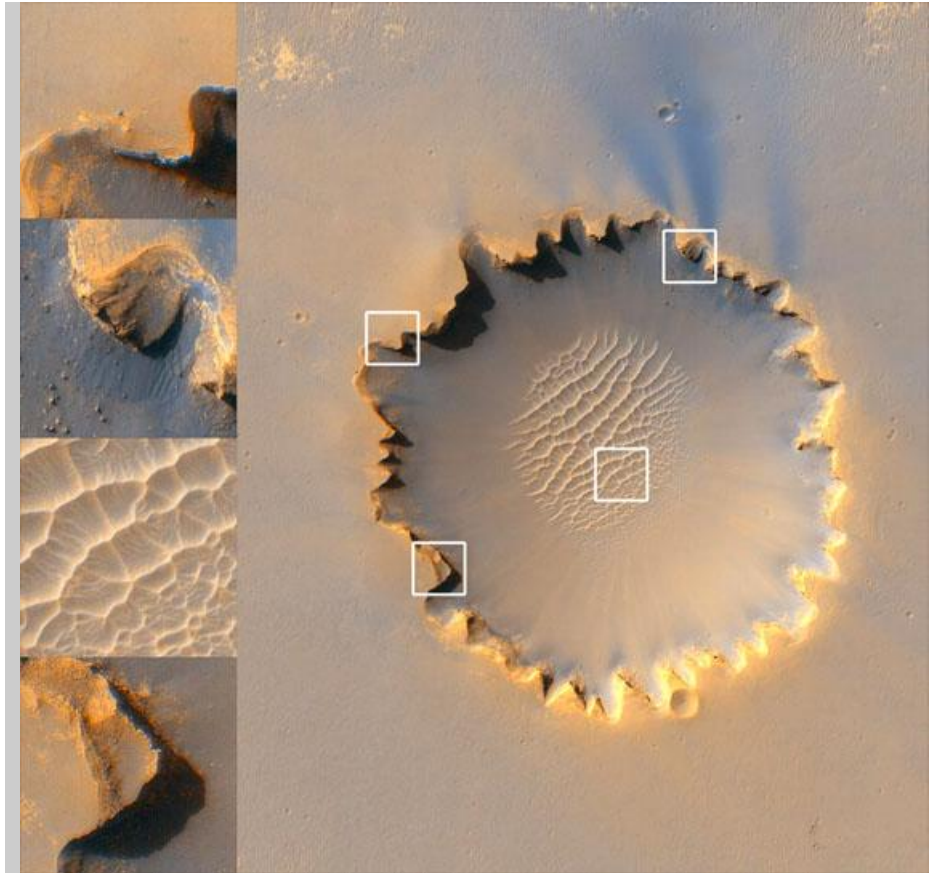
One of the key arguments used to support the impact origin of craters in the solar system is that they seem similar to terrestrial explosion craters. However, superficial appearances can be deceptive. There are many unresolved problems with the impact-cratering model, which led the Irish astronomer, Firsoff, to express his dislike of the theory. However, no one has considered a better theory, electrical cratering, because of the current dogma in astrophysics that yes, "there is electricity in space, but it doesn't do anything."

Joseph Priestley, in 1766, was the first to observe cathode cratering and to compare the craters to those on the Moon. He noted their circular, ringed patterns. Robert Dietz, in 1963, suggested that the explosion from a lightning bolt might create shocked minerals near craters in a manner similar to that thought to occur from meteorite impacts. However, he was unwilling to flout convention and contemplate lightning bolts in space. The Englishman, Brian Ford, proposed in 1965 to the British Interplanetary Society that plasma discharge effects early in the Moon's history formed its many craters. He suggested that the Moon may have been more closely coupled electrically to the Earth's magnetosphere in that early epoch. Like Priestley, he used a spark-machining apparatus and demonstrated parallels between the laboratory craters and lunar craters. He reproduced the crater circularity—some, but not all, with central peaks—and the tendency for small craters to impinge on the rims of larger craters, but not the reverse.

Plasma physicists have endorsed the wide scalability of electrical phenomena. It offers simple laboratory tests of the theory of electrical cratering of celestial bodies. Electrical cratering has an explosive aspect but unlike an explosion it has precursor surface effects such as an electric wind that causes surface cleaning, and cold-cathode disruption to produce extensive crater chains, rilles and rays. Also, an electric arc, once established, may last long enough to produce many peculiar effects that are diagnostic.

Meanwhile, no one has found the source of the impactors that are supposed to have sculpted the surfaces of solid bodies in the solar system billions of years ago. No one has witnessed such an impact (Comet Shoemaker Levy 9 didn't hit a solid surface). And no one has come up with convincing experimental tests of the impact theory.

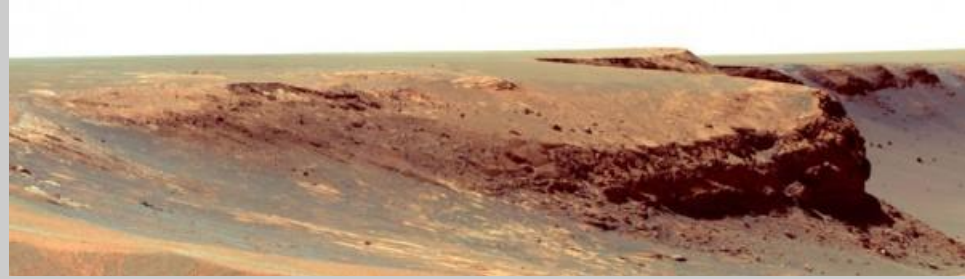
Impact explanations of crater features are weak. For example, the NASA news release on October 6, 'Victoria Crater' at Meridiani Planum, shows a remarkable closeup of a Martian crater that is also under close scrutiny by one of the indefatigable Mars Rovers:



The High Resolution Imaging Science Experiment (HiRISE) camera on the Mars Reconnaissance Orbiter (MRO) returned its first images of the Martian surface last week during a test, including this image of Victoria crater. Credit: NASA / JPL / HiRISE Team

This image from the High Resolution Imaging Science Experiment on NASA's Mars Reconnaissance Orbiter shows "Victoria crater," an impact crater at Meridiani Planum, near the equator of Mars. The crater is approximately 800 meters (half a mile) in diameter. It has a distinctive scalloped shape to its rim, caused by erosion and downhill movement of crater wall material. Layered sedimentary rocks are exposed along the inner wall of the crater, and boulders that have fallen from the crater wall are visible on the crater floor. The floor of the crater is occupied by a striking field of sand dunes.

Since January 2004, the Mars Exploration Rover Opportunity has been operating at Meridiani Planum. Five days before this image was taken, Opportunity arrived at the rim of Victoria crater, after a drive of more than 9 kilometers (over 5 miles). The rover can be seen in this image, at roughly the "ten o'clock" position along the rim of the crater.



This is an enhanced, false-color rendering of images that Opportunity took using its panoramic camera (PanCam). This view of Victoria crater is looking north from Duck Bay toward the striking promontory called Cape Verde. This cliff of layered rocks is about 50 meters (164 feet) away from the rover and is about 6 meters (19.6 feet) tall. The taller promontory beyond that is about 100 meters (328 feet) away, and the vista beyond that extends away for more than 400 meters (1,312 feet) into the distance. Credit: NASA / JPL / Cornell

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Credit: NASA / JPL / Cornell [Click to enlarge]

The pictures of Victoria crater expose the feebleness of the official "explanation." The crater "*has a distinctive scalloped shape to its rim, caused by erosion and downhill movement of crater wall material.*" The crater actually looks quite fresh, with very little debris and no sign of the large heaps of rubble to be expected at the bases of the large scallops. If the rubble has been covered by wind blown sand, we have two problems. First, there is practically no air on Mars to shift sand grains. And second, there is a radial pattern on the floor of the crater that is inexplicable by wind-blown dust or sand.

So what does that make of the floor of the crater "*occupied by a striking field of sand dunes?*" They look like no field of dunes on Earth. Dunes have a difference of slope across their ridges. And to form "network dunes" requires episodes of winds blowing steadily from different directions. They resemble instead shallow intersecting bowl-shaped depressions.

Victoria—The Electrical Crater

Geology was originally considered a "soft" science, being mainly descriptive. It was not until physicists began to provide geologists with tools like radioactive dating and astronomers developed a cosmogony (story of the formation of the solar system) that

geology was accepted as a "hard" science. However, if geologists have been "sold a pup" by their colleagues, then geology is no more than a fictional "once upon a time, long, long ago," story. And stories told at mother's knee tend to stay with us for life. Mars now has such a story, complete with geological eras known, from oldest to youngest, as the Noachian, Hesperian, and Amazonian Epochs.

According to the Lunar & Planetary Institute:

"These Epochs are defined by the number of meteorite impact craters on the ground surface; older surfaces show the scars of more impact craters. The actual timing of the Epochs is not known. The Noachian extends back in time to the beginnings of the planet, and ended sometime between 3.8 and 3.5 billion years ago (according to accepted models). Many large impact craters scar Noachian age surfaces. Next in time was the Hesperian period, a time of extensive lava plains. The Hesperian Epoch ended sometime between 3.55 and 1.8 billion years ago; the range here reflects different models of the rate of meteorite falls onto Mars. Finally, the Amazonian Epoch extends to the present day. Ground surfaces of Amazonian age have few meteorite impact craters, but otherwise are quite varied. The Amazonian Epoch has seen the formation of the huge volcano Olympus Mons, lava flows elsewhere on Mars, formation of the landslides in Valles Marineris (like these in Gangis Chasma), and formation of the broad plains and sand dunes near Mars' poles."

The crucial factor missing from radioactive dating and cosmogony is the electrical nature of the universe as described by the new science of plasma cosmology. Stars are an electrical phenomenon and their planets are involved in the stellar electrical circuit. The most common manifestation on Earth of this connection is lightning. But the [origin of lightning remains a mystery](#) due to the collective blind spot about cosmic electricity. If stars are an electrical phenomenon then the life story of the Sun is fictional. If planets have suffered powerful electrical discharges in the past then they are not closed energetic systems and radioactive dating is rendered practically worthless. Rather than concoct stories about the unimaginably distant past, we should reconstruct our recent past as effectively as we can to see what we might have missed.

Recent peer-reviewed papers in plasma science provide strong evidence that the Earth has suffered from sub-gigaampere auroral-type discharges in our recent prehistory. Such discharges, where they reach the surface, are capable of large scale scarring. It clearly demonstrates the failure of our current astrophysical fable to deal with a solar system that has an electrical aspect. The solar system most definitely is not simple Newtonian clockwork. Retro-calculations and stories based on this belief are fiction. Counting electrical craters, which can cover a planetary hemisphere in moments, has no dating value whatsoever.

I have written earlier on the electrical formation of the colossal gash across Mars' face, [Valles Marineris](#). That surface bears the hallmark of the most powerful electrical plasma discharge phenomenon in the universe—the characteristic form of the [spiral galaxy](#). The

problem facing science is that neither cosmologists nor geologists are trained in plasma discharge. So the pattern goes unnoticed on Mars.

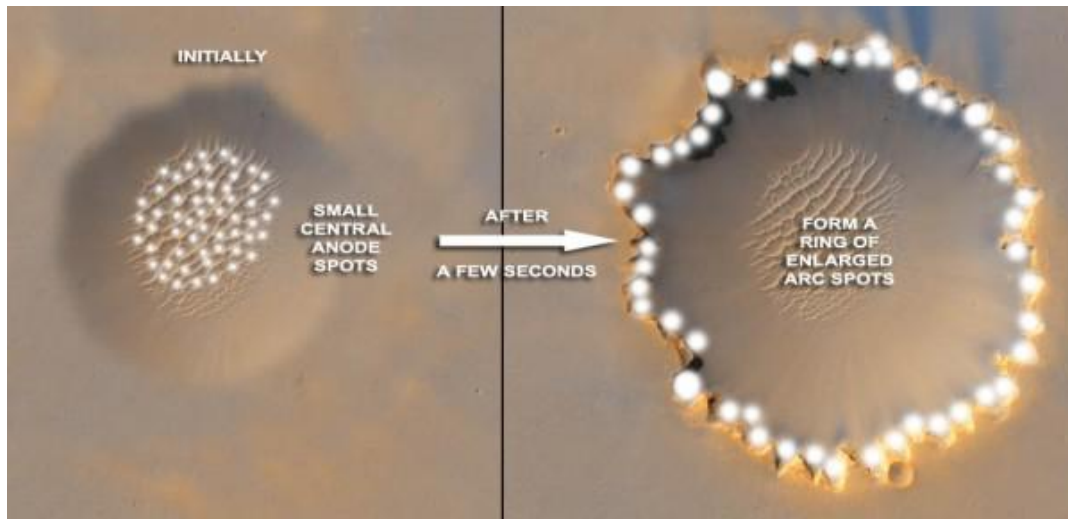
Victoria crater is tiny but it demonstrates the value of simple laboratory experiments using electrical discharges to solid surfaces. There are two types of lightning strokes; the most common is the negative cloud to ground, where the earth is the positive electrode, or anode. Less common is the more powerful positive cloud to ground stroke, where the earth is the negative electrode, or cathode. The scar is different in each case.

An arc struck to an anode tends to "stick" in one place, causing much melting and often raising a circular blister, called a "fulgamite." Fulgamite scars on lightning arrestors are bell-shaped with a circular crater, or craters, at the summit. They often rise steeply from a circular depression or "borrow pit," with many rings. This should sound familiar to any keen observer of Mars. Olympus Mons has all of these strange features, which do not fit the volcano model. The giant "volcanoes" on Mars are in fact massive fulgamites!



Olympus Mons, 25 kilometres high, is NOT the highest volcano in the Solar System. It is a giant raised electrical blister with characteristic superimposed circular craters at the summit. It is the kind of blister seen on metal lightning arrestor caps after a strike. Credit: USGS/NASA

Victoria crater appears to be a short-duration anode scar, or "spark" crater, where melting is insignificant. In laboratory experiments it is found that the anode spark scar on a "contaminated" surface develops many arc "spots" at the center of a roughly circular scar. In a very short time the central arc spots move out to form a ring. The spots enlarge and join into a ring. For a time the entire arc current passes through the annular ring. If it were to continue, melting would occur, obliterating the fine scalloped structure of the crater wall. In experiments there may be a hundred or more spots.



I would suggest that the "sand dunes" are the result of the central arc spots, forming overlapping circular depressions (see diagram above). Certainly, the orthogonal ridges have more in common with a corona discharge pattern than they do with sand dunes. They may therefore be solid, glassified sand, rather like that found in dry soil following a lightning strike. Such glassified sand is known as a "fulgurite." It is noteworthy that the Apollo astronauts found clumps of glass-crust soil near the centers of small (1 to 5 foot) craters on the lunar surface. It raised a stir because the glass was a surprise. In addition, orthogonal lineaments in the lunar soil were reported. They cannot have been there for long.

The blast effect of the cosmic "spark" together with the electrical stripping of ionized surface matter, produced the clean crater and surrounds. The sudden outward movement of the arc spots may have formed the radial pattern on the crater floor. The scalloped crater wall is simply the erosion signature of the irregular ring of enlarged anode spots.

The dark material on the crater floor may be from an exposed strata and/or the arc may have modified the lighter material. It may be rich in Martian hematite "blueberries." The somewhat curved dark streaks beyond the crater wall are to be expected from an electric discharge because of the rotating winds it generates.

I wish the Mars Rover, Opportunity, every success in exploring Victoria crater. It may at last be able to provide confirmation of the electrical model of planetary cratering. Of

course, that does not guarantee acceptance by planetary scientists. That requires giving up strong beliefs imbibed with mother's milk.

"A man receives only what he is ready to receive..."

"The phenomenon or fact that cannot in any wise be linked with the rest of what he has observed, he does not observe."

—Henry D. Thoreau

Wal Thornhill

Nobel Prize for Big Bang is a Fizzer

Posted on [October 29, 2006](#) by [Wal Thornhill](#)

"There are some ideas so wrong that only a very intelligent person could believe them."

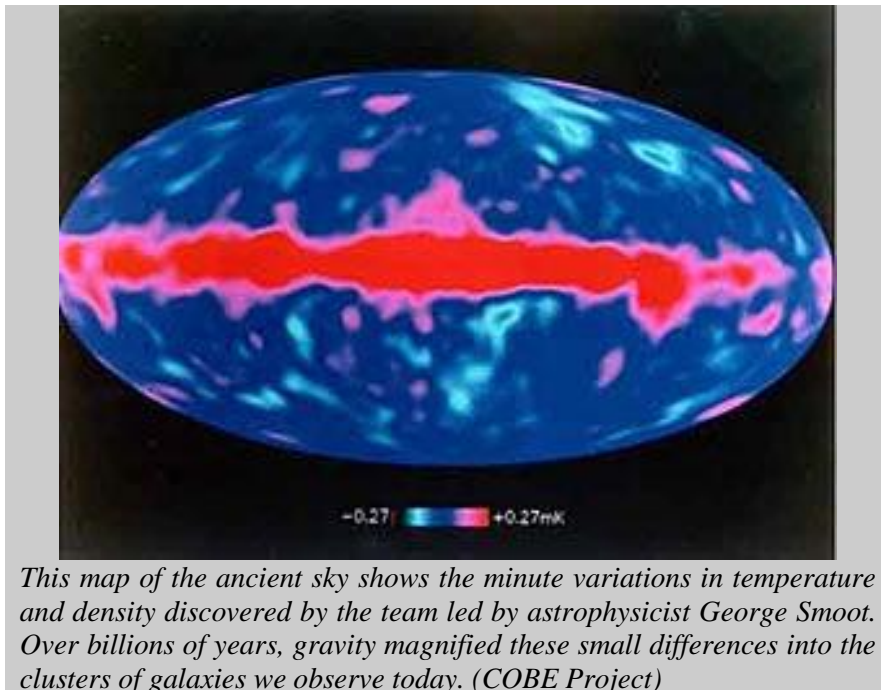
—George Orwell

Consensus discourages dissent... It is the enemy of science, just as it is the triumph of politics. A theory accepted by 99 percent of scientists may be wrong. Committees... that decide which projects shall be funded are inevitably run by scientists who are at peace with the dominant theory. Changing the consensus on cosmology will be an arduous task, like turning a supertanker with a broken rudder.

...the competition of theories has been the driving force behind scientific progress. Isolated individuals and private companies have been the most fruitful sources of this advance.

—paraphrasing Tom Bethell from his book, *The Politically Incorrect Guide to Science*

The Nobel Prize in Physics for 2006 was shared between John C. Mather and George F. Smoot "for their discovery of the blackbody form and anisotropy of the cosmic microwave background [CMB] radiation."

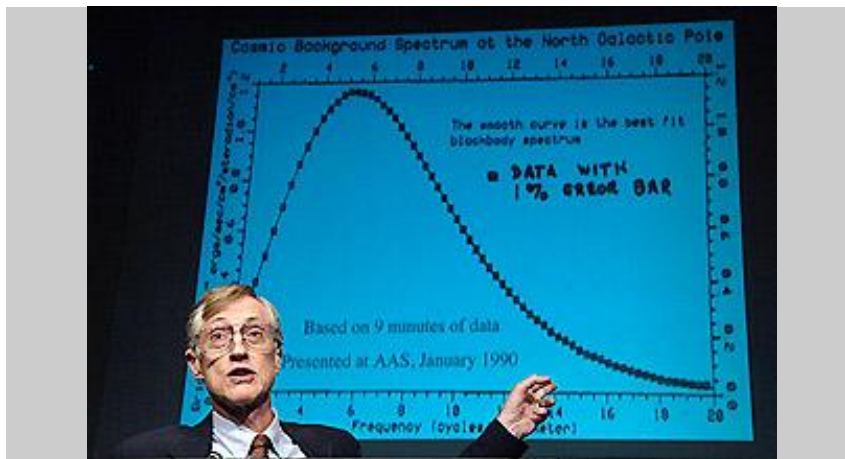


They announced in 1992 the discovery of residual heat from the big bang, as well as minute variations in temperature across the sky that indicated the beginnings of structure in the early universe that evolved into galaxies and clusters of galaxies. *"Those measurements really confirmed our picture of the Big Bang,"* Smoot said.

"By studying the fluctuations in the microwave background, we found a tool that allowed us to explore the early universe, to see how it evolved and what it's made of."



"Human beings have had the audacity to conceive a theory of creation and now, we are able to test that theory." -George F. Smoot



NASA Scientist Dr. John C. Mather shows some of the earliest data from the NASA Cosmic Background Explorer (COBE) Satellite during a press conference.

The results from COBE were *"the greatest discovery of the century, if not all times,"* the British physicist Stephen Hawking has said.

"These measurements... marked the inception of cosmology as a precise science," the Nobel jury said in its citation.

Dissenting voices

David Suzuki in a recent interview made the practical observation that ideas considered "red-hot" when he left university are now considered laughable. Science advances by incremental steps, he said. Our mistake is to place too much emphasis on those steps when they occur. By doing so we may be missing the bigger picture.

This highlights a problem faced by the Nobel Prize committee. If an award is granted too soon after one of science's incremental steps their decision may shortly prove to be an embarrassment. **I predict that the Nobel Prize in Physics for 2006 will have some present committee members red-faced because the "Big Bang" theory it rewards is already dead!** Technically, the Big Bang is not even a theory. It is a hypothesis that, despite the Nobel committee's imprimatur, remains devoid of real experimental and descriptive verification.

Strictly, theories are hypotheses that have been tested and found valid. The Big Bang is a highly adaptable hypothesis that has been repeatedly modified after failing tests. Some of those modifications are incredible, involving the invention of "dark" matter that responds to gravity but not to electromagnetic radiation. There is no known matter that does not involve electric charge and/or magnetism, so how is this possible? More recently, "dark energy" has been added to the Bang because it is perceived that it is accelerating. The Big Bang is, by scientific standards, an execrable hypothesis that defies the principles of physics and common sense. Future historians of science will judge this era insane.

Dennis Overbye described the situation in an essay in the NY Times:

You might wonder just exactly what kind of triumph "precision cosmology" represents when 96 percent of the universe is unknown dark stuff. Stars and people we know about. But the best guess for dark matter is that it is some kind of subatomic particle that will be discovered someday.

Dark energy was a complete surprise. How often do you toss a handful of gravel into the air and the rocks speed up as they leave your hand and disappear into the sky? The leading contender for an explanation is a fudge factor representing the repulsive force of empty space that Einstein danced in and out of his equations 75 or so years ago. But no one really knows.

The observation that saved the Big Bang theory from the trash in 1991 was the discovery honoured by this Nobel Prize. However, it remains a bold assumption that the COBE results can be interpreted as the afterglow of a Big Bang.

The truth is, as one might expect, much simpler. At the heart of the Big Bang hypothesis is the interpretation of the redshift of faint distant objects as proof that the universe is expanding. **Now called the "Hubble expansion," it is an interpretation that was not**

supported by Hubble. History has been rewritten. As my sadly missed colleague, Amy Acheson, wrote in 2003:

*The disproof of the Big Bang is already nearly 40 years old. Halton Arp's first major paper on discordant redshifts was submitted to the *The Astrophysical Journal* in 1966, at a time when he had just finished his *Atlas of Peculiar Galaxies* and was listed by the Association of Astronomical Professionals as 'most outstanding young astronomer' and among the top 20 astronomers in the world. The editor, Chandrasekhar, rejected that paper because of its subject, without even being submitted to peer review.*



Concerning M87, 2C273, and M49, one of several aligned configurations discussed in that first paper, Arp said, (Seeing Red, 1998) 'Perhaps even more convincing is the common-sense question: Is it significant that the brightest quasar in the sky falls in the dominant cluster in the sky — and forms a pair with the brightest radio galaxy in the cluster, almost exactly aligned across the brightest galaxy in the center of the cluster?' ... It is incomprehensible to me how astronomers could have continued believing that quasars were at their redshift distance after even this one single result. More than 30 years ago astronomy took a gamble, against odds of a million to one, that this observation was an accident. Arp was squeezed out of his Palomar telescope assignment because the allotment committee would not permit telescope time to any non-Big Bang project.

Of course, Amy was not the only one to have sounded a warning. Carl Sagan wrote in his book COSMOS in 1980:

"If Arp is right, the exotic mechanisms proposed to explain the energy source of the distant quasars—supernova chain reactions, super-massive black holes and the like—would be unnecessary. Quasars need not then be very distant."

And in New Scientist of May 22, 2004, an "[Open Letter to the Scientific Community](#)" was published. It has now been signed by hundreds of researchers around the globe. The letter notes:

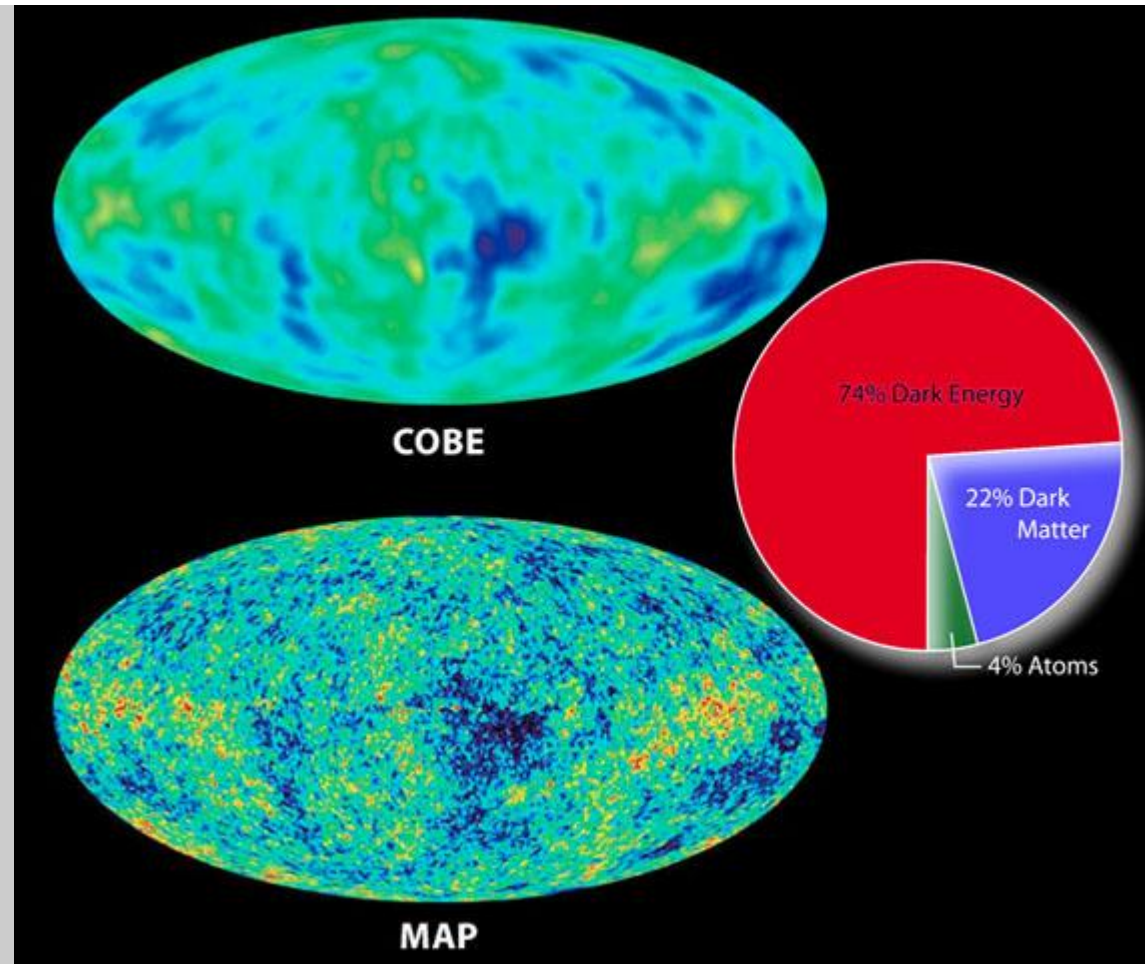
"the big bang theory can boast of no quantitative predictions that have subsequently been validated by observation. The successes claimed by the theory's supporters consist of its ability to retrospectively fit observations with a steadily increasing array of adjustable parameters, just as the old Earth-centred cosmology of Ptolemy needed layer upon layer of epicycles."

The open letter led to a conference, "**Crisis in Cosmology: Challenging Observations and the Quest for a New Picture of the Universe**," held in Portugal in June 2005. Its stated aim was to:

"consider the present state of understanding of the universe in the light of the increasing number of observations that challenge the conventional cosmological model. Participants will address observations such as the non-Gaussianity of the CMB, the excessive apparent ages of high-z galaxies, discrepancies in dark matter observations, the early formation of large-scale structure, the increasingly discordant results for light element abundances, the angular-size/redshift relation, and others."

If Arp and others are right and the Big Bang is dead, what does the Cosmic Microwave Background signify?

The simplest answer, from the highly successful field of plasma cosmology, is that it represents the natural microwave radiation from electric current filaments in interstellar plasma local to the Sun. Radio astronomers have mapped the interstellar hydrogen filaments by using longer wavelength receivers. The dense thicket formed by those filaments produces a perfect fog of microwave radiation—as if we were located inside a microwave oven. Instead of the Cosmic Microwave Background, it is the Interstellar Microwave Background. That makes sense of the fact that the CMB is too smooth to account for the lumpiness of galaxies and galactic clusters in the universe. We cannot "see" them through the local microwave fog.



Here we see the improvement in resolution between COBE and the WMAP project. The pie chart shows the constituents of the universe based on Big Bang cosmology. The most important result from WMAP is the filamentary structure and (red) hot spots in the microwave background. Images courtesy of NASA.

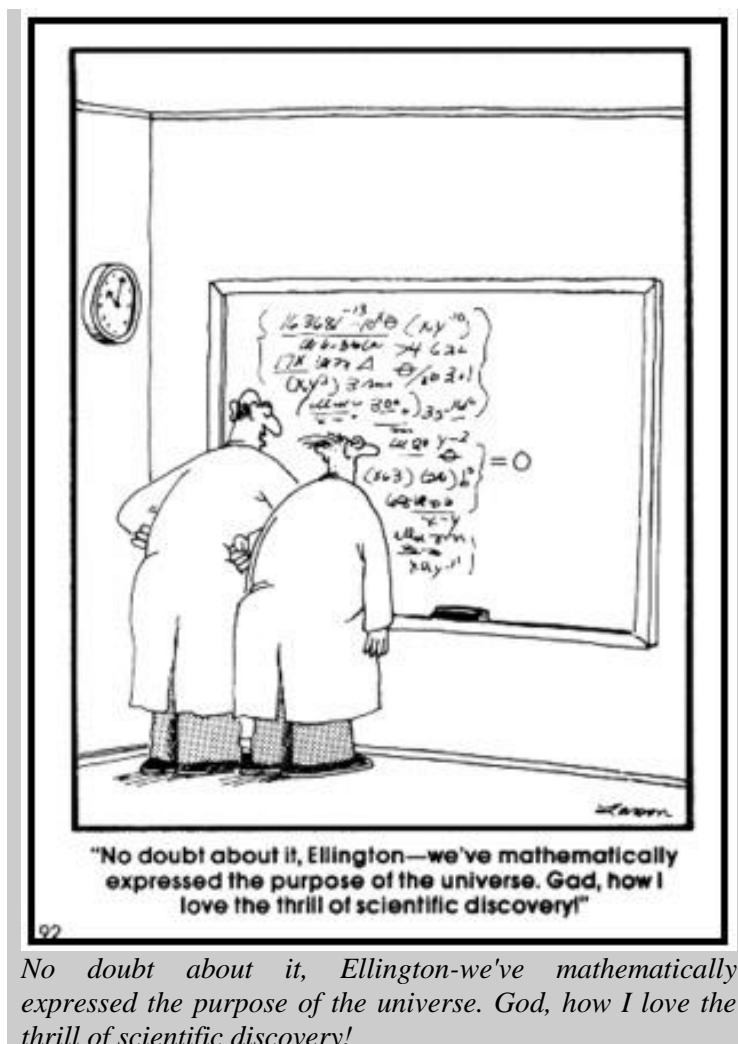
Ironically for the Nobel jury, the death notice for the Big Bang has been provided by the unprecedented accuracy of the Wilkinson Microwave Anisotropy Probe, or WMAP project, which was designed to map the CMB. Rather than "pinpoint when the first stars formed and provide new clues about events that transpired in the first trillionth of a second of the universe," the more detailed map matches the unique heated plasma signature of interactions between local interstellar hydrogen filaments. So it is, with a sigh of utter relief, we can dispose of all the whimsical nonsense accompanying the Big Bang hypothesis—the invisible dark matter, the dark energy, the expanding universe (whatever that meant) and creation of matter from nothing. (And cosmologists can don sackcloth and ashes and admit their profound ignorance—while pigs perform aerobatics overhead and the Nobel committee ask for their prize money back.)

As the Open Letter notes:

"Big Bang proponents have won the political and funding battle so that virtually all financial and experimental resources in cosmology are devoted to Big Bang studies. Funding comes from only a few sources, and supporters of the Big Bang dominate all the peer-review committees that control the funds. As a result, the dominance of the Big Bang within the field has become self-sustaining, irrespective of the scientific validity of the theory."

It points to a failure of the way science is done today and the way scientists are trained.

One of the casualties in modern physics has been the natural philosopher. If natural philosophers had retained their primary role in physics, instead of having it usurped by mathematicians like Einstein, Hawking, and many others who jumped on the bandwagon, we might have fewer "visions of God" in their "beautiful" mathematical equations and a better grounding in the extent of our ignorance.



No doubt about it, Ellington—we've mathematically expressed the purpose of the universe. God, how I love the thrill of scientific discovery!

If there were less reliance on monocultural monolithic research establishments and some modest funding for independent scholars, as suggested by the biologist Rupert Sheldrake, we might see once more the kind of freewheeling market of ideas we had at the end of the 19th century. Of course that market today needs the Internet to loosen the shackles of scientific censorship and control through anonymous peer review.

On the question of education, I regularly attend seminars given by leading researchers. The strongest impression is that of an enthusiastic "show and tell" at primary school — although the language is far more arcane. Perhaps this recognition stems from the fact that I was one of those kids who exalted in memorizing astronomical facts from encyclopaedias and books and presenting them to my under-whelmed classmates. Such display of cleverness established the intellectual pecking order in the class and often sets a lifelong behavior pattern for academics. The disturbing thing is that the basic stories I told more than 50 years ago have not changed, despite the avalanche of surprises from space probes. Those "once-upon-a-time" narratives have become a modern myth.

The seminar performances remind me that most academics have never left school. The satisfaction in embellishing a childhood fable is palpable. And the media encourages drama and exaggeration. These people deliver to the public what passes for science in press releases and contrived video clips of imaginary objects and events. But the same schoolyard imperatives apply. You are OK if you stick to the accepted storyline. You are out if you deviate too far. It can be a very cosy environment for those who conform, but it stifles or excludes the non-conformists who, history shows, are commonly the source of real breakthroughs. It seems to me that our teachers must emphasize the things we don't really know or that were controversial and decided by a vote, instead of a sanitized myth of scientific progress. That way we might challenge more thoughtful students to take up science.

And the myths we are told without a moment's reflection? Why, they start with the Big Bang, which somehow begets stars and galaxies. Galaxies somehow contrive to form spirals. Stars somehow manage to shine steadily despite the belief they are thermonuclear bombs. Stellar nebulae somehow beget planets from a disk of dust and gas. The Earth somehow finds itself with a lot of water and a large moon. Venus somehow is hellishly hot, has no moon and spins slowly backwards. "Somehow" is the operative process in modern cosmology. Perhaps we shouldn't be surprised that somehow we are giving Nobel prizes to those responsible for revitalizing this nonsense.

George Smoot recalls that when he first started his career, cosmology wasn't even considered a real science. *"It was a fringe field,"* he said. True, cosmology is no longer a fringe field but it is equally true that it remains *"not real science."* The reason for this is exposed in his comment:

"Human beings have had the audacity to conceive a theory of creation and now, we are able to test that theory."

Human beings have misconstrued religious stories of creation as referring to the universe, when that is clearly impossible. Scientists then had the audacity to think they had to conceive a competing hypothesis of creation of the universe, when that too is clearly impossible: We don't understand the real nature of matter or its interactions via gravity or light. We haven't even begun to accept the possibility that electricity plays a fundamental role in the universe. And as for the tests of the Big Bang hypothesis, they are viewed through the distorting lens of preconception. Afterwards theory is bent to fit. That may explain the 'Alice in Wonderland' appeal of cosmology:

"Why, sometimes I've believed as many as six impossible things before breakfast."

It's not that most of the matter and energy in the universe is dark, but that most cosmologists are totally in the dark about the real nature of the universe.

Wal Thornhill

The 'Spiral Galaxy' at Saturn's Pole

Posted on [November 20, 2006](#) by [Wal Thornhill](#)

Poincaré, at the conclusion of the preface to his book, '*Hypothèses Cosmogoniques*', states:

"One fact that strikes everyone is the spiral shape of some nebulae; it is encountered much too often for us to believe that it is due to chance. It is easy to understand how incomplete any theory of cosmogony which ignores this fact must be. None of the theories accounts for it satisfactorily, and the explanation I myself once gave, in a kind of toy theory, is no better than the others. Consequently, we come up against a big question mark."

Nothing has changed in 100 years. Spiral galaxies remain an enigma to astrophysicists who have had to resort to magical 'dark matter' in an attempt to save appearances. Consequently there is no recognition of a connection with [other spiral forms](#) seen much closer to home.

On this website I have made many successful yet unusual predictions based on the Electric Universe cosmology. For example, what would be seen when close-ups were taken of Io's 'volcanoes'; the initial flash and unexpected outburst from Deep Impact; what would be found beneath the clouds of Titan; and the link between spiral forms at the poles of Venus and the 'hot spot' at Saturn's south pole. If the test of a good theory is successful predictions, the Electric Universe is unparalleled. Even better if it can simply explain details in the new images of Saturn's south pole.

*NASA SEES INTO THE EYE OF A MONSTER STORM ON SATURN
>> Cassini stares deep into the swirling hurricane-like vortex at Saturn's south pole, where the vertical structure of the clouds is highlighted by shadows.
Credit: NASA/JPL/Space Science Institute*

From the NASA report:

" NASA's Cassini spacecraft has seen something never before seen on another planet — a hurricane-like storm at Saturn's south pole with a well-developed eye, ringed by towering clouds. The 'hurricane' spans a dark area inside a thick, brighter ring of clouds. It is approximately 8,000 kilometers (5,000 miles) across, or two-thirds the diameter of Earth.

"It looks like a hurricane, but it doesn't behave like a hurricane," said Dr. Andrew Ingersoll, a member of Cassini's imaging team at the California Institute of Technology, Pasadena. "Whatever it is, we're going to focus on the eye of this storm and find out why it's there."

A movie taken by Cassini's camera over a three-hour period reveals winds around Saturn's south pole blowing clockwise at 550 kilometers (350 miles) per hour. The camera also saw the shadow cast by a ring of towering clouds surrounding the pole, and two spiral arms of clouds extending from the central ring. These ring clouds, 30 to 75 kilometers (20 to 45 miles) above those in the center of the storm, are two to five times taller than the clouds of thunderstorms and hurricanes on Earth.

Eye-wall clouds are a distinguishing feature of hurricanes on Earth. They form where moist air flows inward across the ocean's surface, rising vertically and releasing a heavy rain around an interior circle of descending air that is the eye of the storm itself. Though it is uncertain whether such moist convection is driving Saturn's storm, the dark "eye" at the pole, the eye-wall clouds and the spiral arms together indicate a hurricane-like system.

Distinctive eye-wall clouds had not been seen on any planet other than Earth. Even Jupiter's Great Red Spot, much larger than Saturn's polar storm, has no eye or eye-wall and is relatively calm at the center. This giant Saturnian storm is apparently different from hurricanes on Earth because it is locked to the pole and does not drift around. Also, since Saturn is a gaseous planet, the storm forms without an ocean at its base.

In the Cassini imagery, the eye looks dark at infrared wavelengths where methane gas absorbs the light and only the highest clouds are visible. "The clear skies over the eye appear to extend down to a level about twice as deep as the usual cloud level observed on Saturn," said Dr. Kevin H. Baines of Cassini's visual and infrared mapping spectrometer team at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "This gives us the deepest view yet into Saturn over a wide range of wavelengths, and reveals a mysterious set of dark clouds at the bottom of the eye."

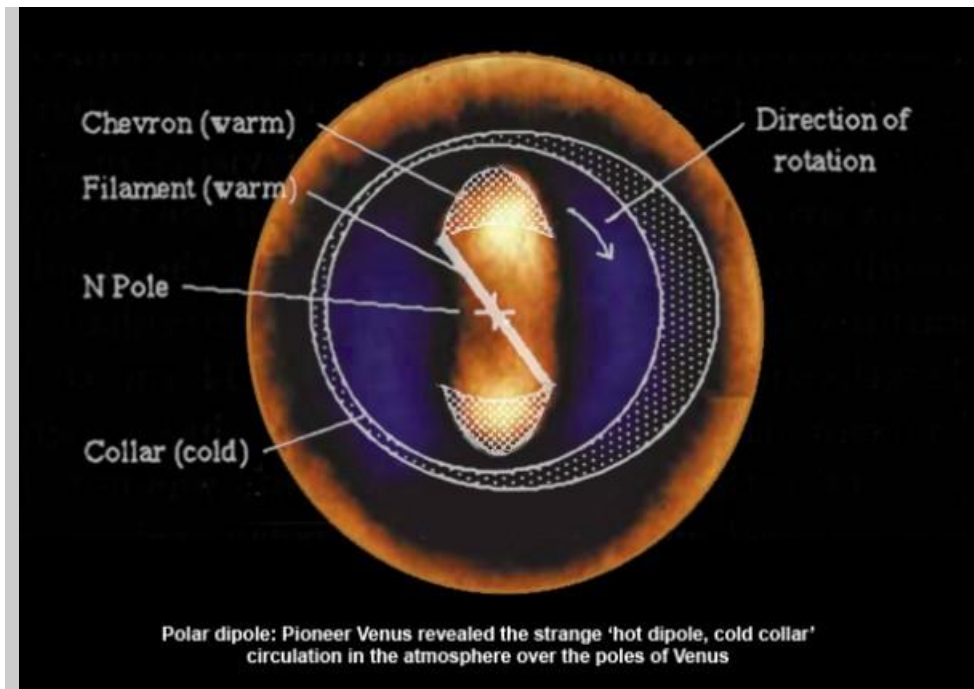
Infrared images taken by the Keck I telescope in Mauna Kea, Hawaii, had previously shown Saturn's south pole to be warm. Cassini's composite infrared spectrometer has confirmed this with higher-resolution temperature maps of the area. The spectrometer observed a temperature increase of about 2 Kelvin (4 degrees Fahrenheit) at the pole. The instrument measured high temperatures in the upper troposphere and stratosphere, regions higher in the atmosphere than the clouds seen by the Cassini imaging instruments.

"The winds decrease with height, and the atmosphere is sinking, compressing and heating over the South Pole," said Dr. Richard Achterberg, a member of Cassini's composite infrared spectrometer team at NASA's Goddard Spaceflight Center, Greenbelt, Md.

Observations taken over the next few years, as the south pole season changes from summer to fall, will help scientists understand the role seasons play in driving the dramatic meteorology at the south pole of Saturn."

I reported in [February 2005](#) that:

"...maybe things that can't be explained get forgotten! Saturn's 'warm polar vortex' is NOT 'the first to ever be discovered.' Professor F. W. Taylor reported the Venusian vortex in 1990. The Pioneer Venus Orbiter (PVO) discovered a warm 'giant vortex of surprisingly complex structure and behaviour located in the middle atmosphere at the north pole of the planet, with a similar feature presumed to exist at the south pole also.'"



The above diagram shows the main characteristics of the Venusian polar dipole. The diameter of the collar is about 5000 km and the temperature contrast between the hottest part of the chevron and the coldest part of the collar is about 45 K. Credit: F. W. Taylor. Composite image: W. Thornhill.

In April 2006 I wrote:

"...we watch with great interest the data coming back from the Venus Express spacecraft. Already, in the first images from Venus, we find confirmation of an earlier prediction. On February 5, 2005, in explaining the mysterious north polar vortex on Venus, I wrote: "...we should expect to see evidence of the twisted pair configuration at the poles of Venus, if the input current is sufficiently strong and this model is correct."

"The Venusian polar dipole shows the precise configuration and motion of Birkeland current pairs in plasma discharge experiments. That includes a surrounding spiral vortex."

Professor Taylor had written earlier about the Venusian north polar vortex:

"The absence of viable theories which can be tested, or in this case any theory at all, leaves us uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."

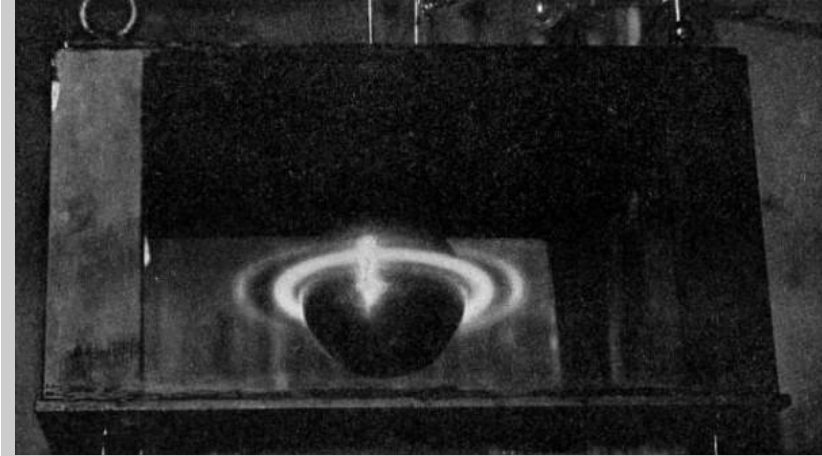
So there was no reason, other than an appeal to symmetry, for scientists to expect a similar vortex at the south pole of Venus. Based on the electrical model, I predicted that Venus' south pole would also have a vortex. **I make the same prediction for Saturn's opposite (north) pole. Cassini scientists are unsure because the north pole is in darkness and receives no solar heat.**

In a keynote address at the Marshall Space Flight Center in March 1986, Hannes Alfvén complained that the most used textbooks in astrophysics do not treat important concepts like double layers, critical velocity, pinch effects and circuits.

"Students using these [astrophysics] textbooks remain essentially ignorant of even the existence of these [concepts], in spite of the fact that some of them have been well known for half a century. The conclusion is that astrophysics is too important to be left in the hands of the astrophysicists. The billion-dollar telescope data must be treated by scientists who are familiar with laboratory and magnetospheric physics and circuit theory, and of course with modern plasma theory."

Twenty years later, this has not been done. The inertia of institutional specialization infects modern science and education. Astrophysicists with inappropriate and narrow training remain in control. Meanwhile the puzzles facing the space sciences multiply by the day and falsifiable predictions (the best test of a good theory) are rare—and even more rarely successful. This contrasts starkly with the Electric Universe model, which recognizes Alfvén's pioneering insights and has many successful predictions to its credit, including this one on Saturn.

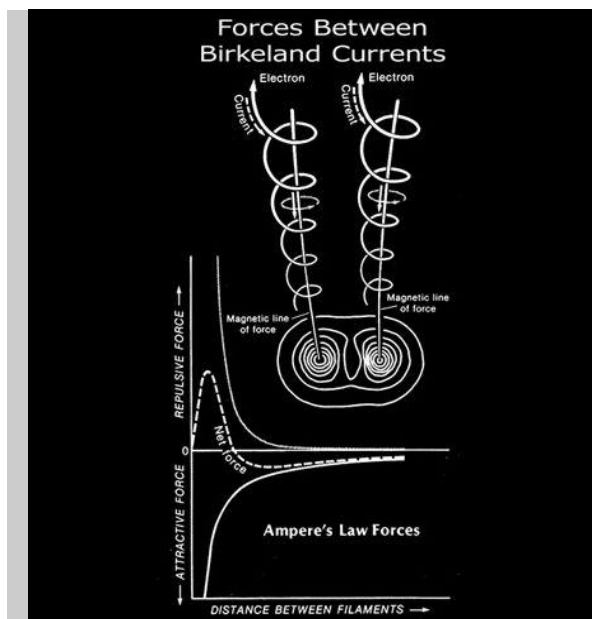
The imagery of Saturn's south polar hot spot is now sufficiently detailed to require more explanation than was given in my earlier news items. The electrical model of Saturn has the planet participating as a minor cathode in the solar circuit. Birkeland showed experimentally how Saturn's enigmatic rings could be the result of an electric discharge to a magnetized sphere, representing the planet, and acting as the cathode.



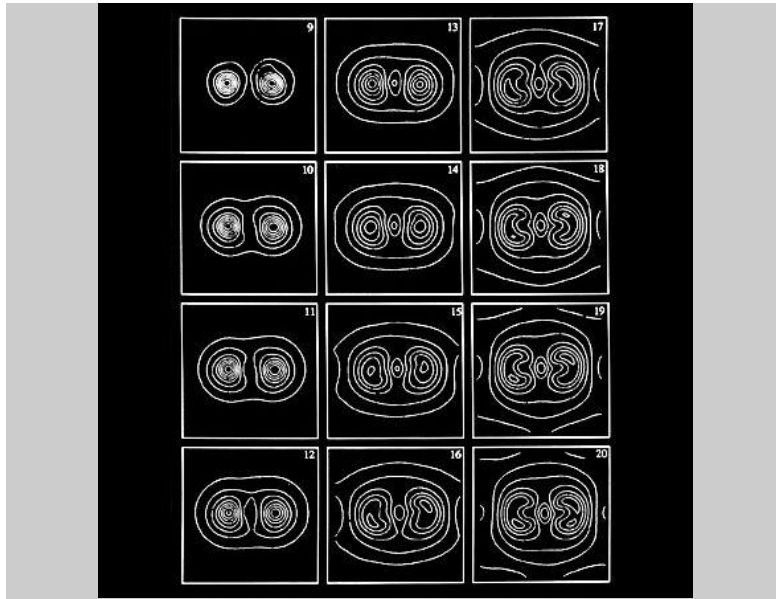
From Kristian Birkeland's series, 'The Norwegian Aurora Polaris Expedition 1902-1903,' Volume 1: On the Cause of Magnetic Storms and The Origin of Terrestrial Magnetism, published in 1908.

After 100 years Birkeland's simple electrically driven model is unmentioned in astrophysics textbooks! It is a disturbing illustration that astrophysics has no interest in experimental evidence that doesn't fit the dogma of an electrically inert universe. For this and other reasons, history will view the 20th century as a dark age of science. It is perhaps unfortunate that burgeoning technology has masked the stagnation in fundamental science.

It was Dr. Alex Dessler in 1967 who discovered the electric currents in space that Birkeland had predicted. He suggested that the transverse magnetic field components found in the Earth's magnetosphere and auroras indicated electric currents essentially parallel to the magnetic field lines. Dessler called them 'Birkeland currents,' a term which is now generally accepted and sometimes generalized to mean all currents flowing parallel to the ambient magnetic field.

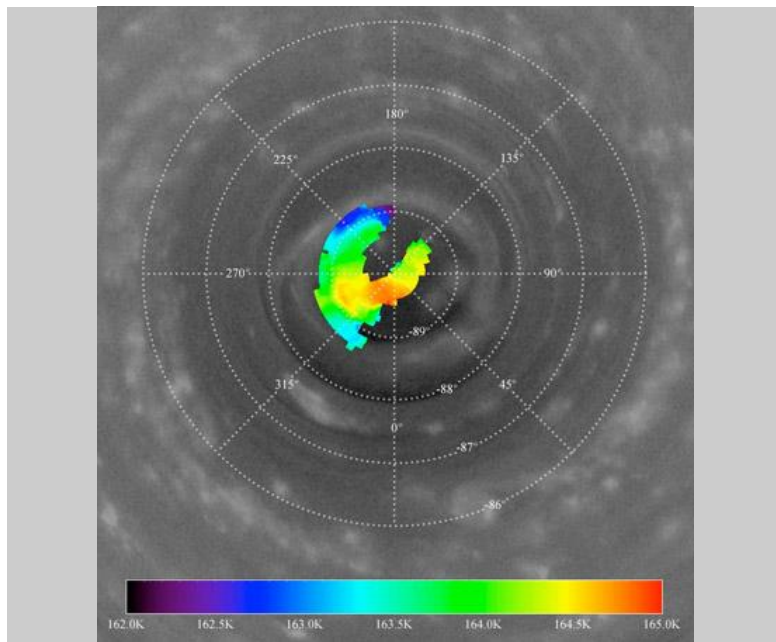


*This figure shows the forces between two adjacent Birkeland current filaments following auroral magnetic field lines. The parallel components of current are long-range attractive, while the counter-parallel azimuthal currents are short-range repulsive. These forces cause the currents to form sheets, filaments, or 'magnetic ropes' and they can be found far from the source region. A projection of the current-induced magnetic fields is shown above the graph. Credit: A. L. Peratt, *Physics of the Plasma Universe*, p. 112.*



This figure shows a time sequence of contours of magnetic energy in cross-section between two Birkeland filaments. The contours at the locations of the two filaments correspond to energy maxima while the central ellipse is an energy minimum. Credit: A. L. Peratt, Physics of the Plasma Universe, p. 114.

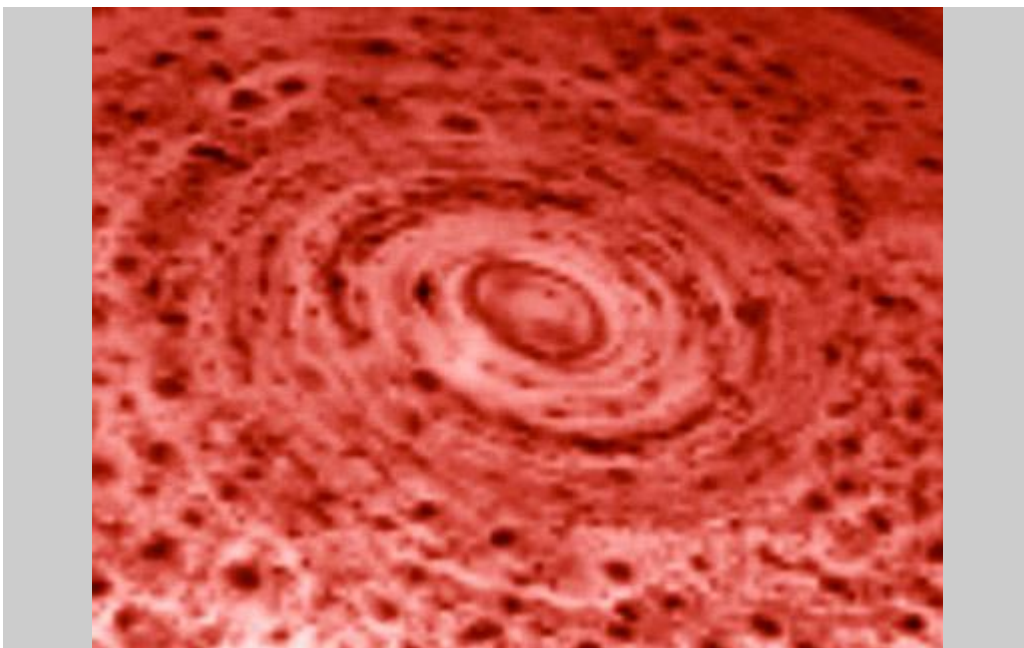
It is this behavior of twin Birkeland current filaments that explains the detailed features of Saturn's polar 'hurricane'.



From Kristian Birkeland's series, 'The Norwegian Aurora Polaris Expedition 1902-1903,' Volume 1: On the Cause of Magnetic Storms and The Origin of Terrestrial Magnetism, published in 1908.

The view shows temperature data from the Cassini spacecraft Composite Infrared Spectrometer (CIRS) overlaid onto an image from the Imaging Science Subsystem (ISS) wide-angle camera. The CIRS data refer to a depth in Saturn's upper stratosphere where the pressure is 0.5 millibars (324 kilometers above the 1-bar level). The CIRS data show a very small hot spot over the pole, similar in size to the "eye" of the storm seen in ISS images. Credit: NASA/JPL/GSFC/Space Science Institute

The image above, while being incomplete, supports the electrical model. At around 300° we see the yellow-reddish cusp feature of one Birkeland filament. At intervals, heated gas from that filament is 'squirted' in a thin jet into the central 'sump,' indicated by the reddish patch over the pole. The inward jets alternate between the two filaments so we may expect the pattern to be repeated where the infrared data is missing.

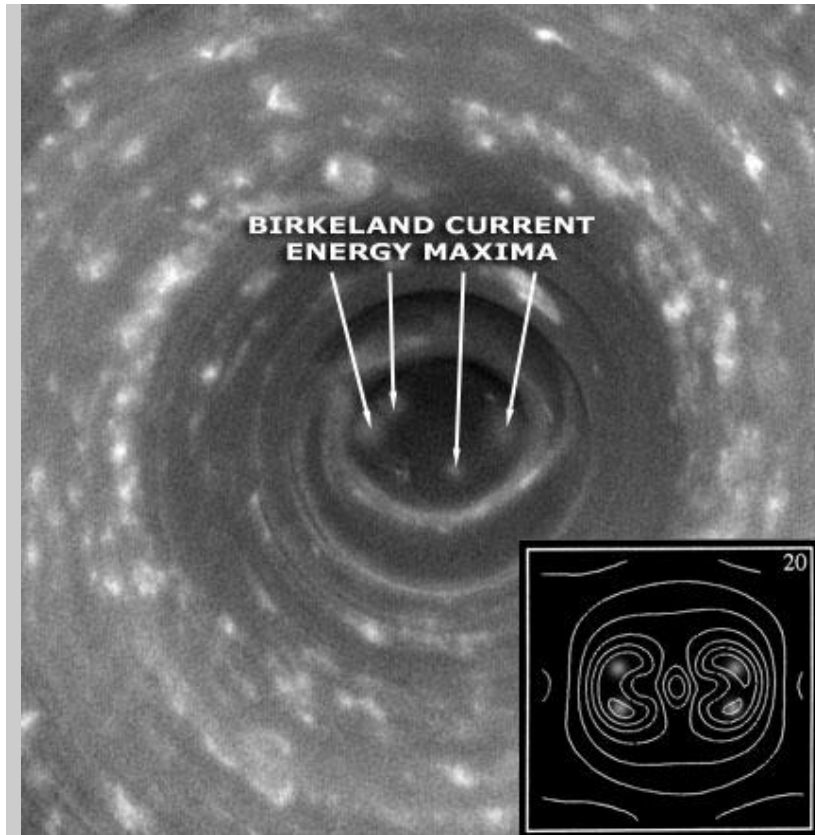


The individual storms surrounding the pole are seen as dark "leopard spots" in the thermal image. The large number of dark, circular "leopard spots" at the south pole seen at 5000 nm wavelength, and their correlation with the features seen in sunlight at 2800 nm wavelength, indicates that convective activity extending over dozens of kilometers in altitude is surprisingly rampant in the south polar region. Why such unusual dynamics exist there is perhaps linked to Saturn's southern summer, which is the season Saturn is in now. Observations taken over the next few years, as the south pole season changes from summer to fall, will help scientists understand the role seasons play in driving the dramatic meteorology at the south pole of Saturn.

The seasons play little role on Saturn, which is almost 10 times further from the Sun than the Earth and the solar heating only 1% of that here. The center of the 'storm' is fixed over the pole because it is an electrical discharge phenomenon linked to Birkeland currents that follow Saturn's neatly aligned magnetic field directly to the planet's pole of rotation. The spiral pattern is most clearly seen in this infrared image and the two cusps are evident inside the central ring of clouds. And the pattern of dark spots in the polar region is best explained by electric discharges.

On a galactic scale, twin interacting Birkeland current filaments produce the spectacular spiral galaxy formation. Here, on Saturn, we have a natural laboratory to study the dynamics of spiral galaxies.

Armed with these new insights, let's take another look at the 'eye' of Saturn's hurricane.



The lighter spots in the polar 'eye' seem to coincide with the energy maxima seen earlier in the computer simulation of the energy distribution between two Birkeland current filaments (inset). They are presumably formed by gases raised high into the stratosphere by the electric discharge, where they condense to form haze patches. Magnetohydrodynamic or thermal models of Saturn's atmospheric flows do not answer to such an unusual and specific pattern. The rotating Birkeland filaments and ionospheric currents form part of a circuit that drives the surprising high-speed upper atmosphere winds on Venus, Titan, Saturn and the other outer planets, not solar or internal heating.

It is clear why Professor Taylor and other specialists are "...uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."

The primary energy source in the universe has been overlooked.

Wal Thornhill

The Electric Sky – Interview with the Author

Posted on [December 24, 2006](#) by [Wal Thornhill](#)

"If you are only skeptical, then no new ideas make it through to you. You become a crotchety old person convinced that nonsense is ruling the world. (There is, of course, much data to support you.) But every now and then, a new idea turns out to be on the mark, valid and wonderful. If you are too much in the habit of being skeptical about everything, you are going to miss or resent it, and either way you will be standing in the way of understanding and progress."

—Carl Sagan

"The role of large-scale currents may be far more important in defining interstellar structure than has generally been recognized within the astronomical community."

— radio astronomer Gerrit L. Verschuur



Professor Don Scott and Wal Thornhill

"A revolution is beginning in astronomy and cosmology that will rival the one set off by Copernicus and Galileo."

—Don Scott

A new book I recommend highly for the new year is Don Scott's *The ELECTRIC SKY*. It is an important book because it encourages informed people to "demand reasonable answers to reasonable questions" from space scientists. It is easy to be intimidated by the flood of bizarre claims from astrophysicists and cosmologists and become "convinced that nonsense is ruling the world." *The ELECTRIC SKY* offers a refreshing, practical alternative. This work is not "fringe" science. It is based on the work of Nobel Prize winners whose work has been selectively and incorrectly applied by theoretical astrophysicists. When viewed from a practical electrical engineering standpoint, the fog of misconceptions and misinformation clears and a new vision of the universe appears.

The ELECTRIC SKY should appeal to the informed reader. It is based upon sound electrical engineering principles and confirmed by experiment. *The ELECTRIC SKY* argues that the universe is utterly different from what we have been taught to believe. With this new electrical circuit diagram the universe is transformed. As Bryan Appleyard writes:

"If all that we have been doing has merely been an effective series of extrapolations on a series of assumptions that we now know to be flawed, then perhaps the truth of the world is far more radically different from anything which we have yet allowed ourselves to dream."

The ELECTRIC SKY is easily accessible to engineers; to the informed public; to scientists who have maintained a healthy skepticism; and to students who have not been indoctrinated with a catechism of defective assumptions. There is a mountain of data to be reexamined and countless new discoveries to be made. The payoff will be an explosion of possibilities in every area of science.

The sooner the media becomes aware and allows the public to hear this new story, the sooner that public can decide to bring the scientific establishment to account. Instead of passive acceptance and waiting "until the present occupants of the astrophysics power structure have retired from the scene," the issue should be forced. After all, it is our money they are squandering. Meanwhile, Scott has done us a service with the publication of *The ELECTRIC SKY*. With scientific manpower and billions of dollars being wasted every year chasing theoretical fantasies, he is right:

"It's time to decide."

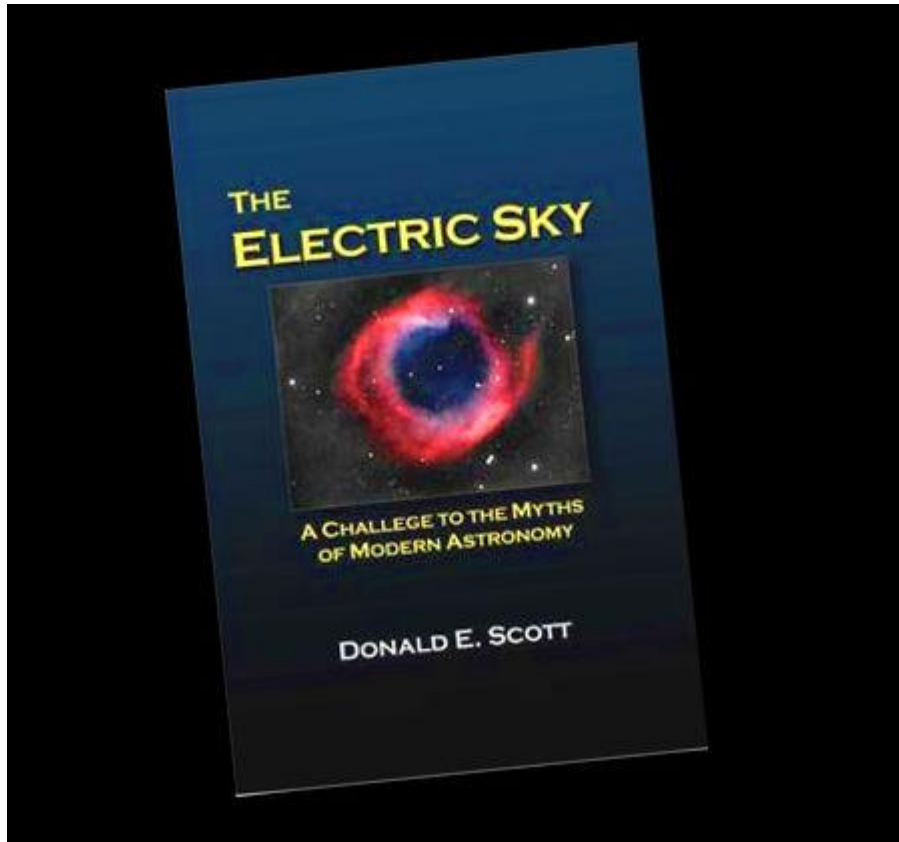
It's Time to Decide

The main thrust of this book is that the time is ripe for informed people from outside astrophysics to evaluate what the astrophysical theoreticians have been telling us.

If, as we will claim, the causes of most of the observed phenomena of modern astronomy are electrical in nature, do you need a degree in electrical engineering before you can understand them? Indeed not. The average informed person can understand and make rational judgments about these ideas. All it requires is the time and patience to read and to think logically and critically about the issues. Some basic facts and a few new concepts will suffice. So the main goal of this work is to convince you, the reader, that you really do have both the capability and responsibility to make informed, critical judgments about the pronouncements of established scientists. A careful reading of these pages will enable you to make an informed assessment of this new plasma-based alternative cosmology.

Interested plasma scientists and electrical engineers have been thrashing out the various hypotheses of Plasma Cosmology in their conferences and publications. So far, most astrophysicists have completely ignored them. Instead of engaging in further futile attempts to persuade the astrophysical community to seriously consider these new ideas, a growing band of plasma scientists, engineers, and a few brave cosmologists and astronomers are simply bypassing them. A paradigm based on electric plasma, which does not find new discoveries to be enigmatic and puzzling but instead to be predictable and consistent, is slowly but surely gaining ground. But it may well be that general acceptance of these new ideas will have to wait until the present occupants of the astrophysics power structure have retired from the scene.

An abridged interview with Don Scott



Click here for more information and to order [The ELECTRIC SKY](#).

Q: Why do you feel qualified to write this book about electricity in space?

A: I have been an amateur astronomer all my life and I have a bachelor's, master's and doctorate in electrical engineering – I taught that subject for 39 years at the University of Massachusetts. Those are my academic qualifications; but more importantly my book, The ELECTRIC SKY, is a report about the ongoing challenge being made by other qualified scientists and engineers to the old gravity-only ideas of classical astronomical theory. We now know that space is actually filled with matter in the form of "electric plasma" – and electrical scientists and engineers know how it works. Astronomers do not and they are refusing to learn.

Q: What is the main point of your book? What are you saying?

A: My main point is that astronomy, astrophysics and cosmology have become closed fortresses, not open unbiased sciences. Astronomers have to realize that over the last century a great deal of scientific progress has been made in experimental plasma physics that they need to know about. They reject this idea

totally. If we are to learn about the sky, astronomers have to lower the drawbridge of their castle and admit new knowledge.

Q: Why do you think astronomers are rejecting these "electrical ideas"?

A: Since the days of Kepler (who correctly described the paths planets take) and Newton (who described the force that keeps them on those paths) astronomers have refused to consider that any other important forces or mechanisms might also be at work out there. Astrophysicists do not study electricity in graduate school. They are unfamiliar with it – they reject it out of ignorance. But since the advent of radio telescopes, x-ray telescopes and infrared telescopes, they are seeing new things that are not explainable by their old "gravity-only" theories.

Q: Do many other engineers and scientists agree with you about there being electricity in space?

A: I'm definitely not alone. I am in very good company. Several of the leaders of what I call the Plasma Cosmology Revolution were Nobel Prize winners: Swedish electrical engineer Hannes Alfvén is often called the father of Plasma Cosmology – he was awarded the Nobel Prize in Physics in 1970. It always comes as a shock to me that so few Swedes know about Alfvén's work and what a giant among scientists he was.

Kristian Birkeland (whose picture is on the Norwegian 200K note) discovered that the aurorae are due to a flow of electric charges coming from the Sun. His ideas were viciously opposed by astrophysicists for decades until space probes were able to go beyond Earth's ionosphere – then they showed Birkeland was right. At the time of his death in 1917, he was being considered by the Nobel awards committee.

Irving Langmuir coined the word "Plasma" to describe the form of matter we see so much of in space. He discovered many of its properties, invented clever ways to measure it, and was awarded the Nobel Prize for his work.

A year or so ago a group of well-known astrophysicists and plasma scientists published an open letter complaining about the short-sightedness of mainstream astronomers & cosmologists. It is now available at www.cosmologystatement.org/ so the basic ideas of plasma cosmology as presented in The ELECTRIC SKY are supported by many informed scientists.

Q: Are there such things as Black-Holes?

A: The short answer is no. Because astronomers are unable, using only Newtonian gravity, to explain various things (such as monstrously powerful galactic "jets") that they are observing in the sky, they have invented an entire zoo of imaginary entities and forces. Black holes that emit jets of matter are among

these. Their basic problem is that gravity only attracts – electromagnetic fields both attract and repel. That property is the cause of many of the new ejection phenomena we are seeing.

Q: How do you know Black Holes don't exist? Can you prove they don't exist?

A: The main difference between science and pseudoscience is that true scientists never propose unfalsifiable hypotheses and then challenge you to falsify them. For example there's an old debating trick: "Prove to me there isn't a rhinoceros under this table. It's an invisible, unsmellable rhino, and you can't feel it – it has no mass. But it is THERE. Prove to me it isn't." This kind of debating trick should not be used in science.

When this happens, a red flag should go up in our minds. We must reject quickly and forcefully any demand that we falsify a non-falsifiable theory. Non-falsifiable theories are, by definition, not scientific.

Another example just like this one occurred when the originator of the concept of black holes, said, "To me, the formation of a naked singularity [a black hole] is equivalent to jumping across the Gulf of Mexico. I would be willing to bet a million dollars that it can't be done. But I can't prove that it can't be done."

What he is actually saying is – YOU can't prove that black holes don't exist, so I am free to use the concept as often as I like. It is a non-falsifiable hypothesis. It is intellectually dishonest. In logic this is called the fallacy of argumentum ad ignorantiam, meaning "argument from ignorance." The fallacy occurs when it is argued that something must be true, simply because it hasn't been proved false. Well-known properties of plasma are responsible for what astronomers say "black-holes" are doing.

Q: Can you tell us in just a couple of sentences the most important ideas in Plasma Cosmology.

A: Interplanetary space, interstellar space, and intergalactic space are all filled with ions and electrons (electric charges) – we call this Plasma. Our space probes have measured it. Radio telescopes tell us there are vast magnetic fields there too – and long filaments of moving charges (electric currents). These filaments make up a vast stringy spaghetti-like structure of interconnected paths upon which stars and galaxies form and which are surrounded by magnetic fields. The electromagnetic forces that exist in this environment vastly overpower gravitational forces.

Q: So you are saying that stars and planets are somehow formed by electric currents? What about the "accretion disks" that astronomers say condense down into stars and planets.

A: These long filaments are called "Birkeland currents" and they have a property of being able to squeeze clouds of matter together – this is called the "z-pinch" effect. It's not magic – it is a well-documented phenomenon that we see in the laboratory. On the other hand, "accretion disks" are one of those off-the-cuff inventions thrown out by astronomers to a gullible public. You can't make accretion disks accrete in lab experiments or in computer simulations. If our solar system is the result of an "accretion disk" then answer this question: Neptune's moon Triton travels "backward" in its orbit around Neptune. In other words, if we look down on the north poles of both Neptune and Triton, the planet rotates in the usual counter-clockwise direction, but its moon travels clockwise in its orbit. Clearly, if both these bodies were formed from the same rotating "accretion disk," their angular momentums should not be in opposite directions. At least five of the smallest moons of Jupiter also exhibit this same "strange" behavior. Venus rotates backwards on its axis. How did it get that motion from an accretion disk that made all the other planets rotate the other way? And how can a swirling cloud of dust and matter "accrete" (get smaller)? Such a shrinking process would increase its rotational velocity – just like a twirling ice skater who brings her arms in closer to her body in order to spin faster.

Q: Have plasma cosmologists such as you made any predictions that have been successful? Astronomers have made lots of successful predictions.

A: Oh really? Name one. They claim they have. But they haven't. Take for example the results of helioseismology – astronomers claim they have "probed the Sun" and found that their models "predict" the oscillations and resonances occurring in the Sun with fantastic accuracy. Not true. First, nobody can "probe" the Sun. We can't get at it – it's too hot. What astronomers did is sit here on Earth and observe fluctuations in the light coming from the Sun. They then made up a set of mathematical equations that produces the same sort of oscillating signal. It is easy to make up the mathematical model AFTER you see the data. That's not a prediction. If their equation has enough terms they can get 100% correspondence with the data. That's a posteriori DESCRIPTION not a PREDICTION.

Do you remember the "Deep Impact" experiment a year or so ago – NASA threw a block of copper into a comet. They said this head-on collision was going to produce a crater on the comet and the photographs they would take of the shape of this new crater were going to tell us what the comet was made of. A colleague of mine, Wal Thornhill, made a real prediction: Because of the properties of the plasma surrounding the Sun (sometimes called the "solar wind") Wal suggested that the onrushing comet would be at a different voltage from the block of copper. Therefore, just before the physical collision, there would be a spark discharge, a flash that would precede the main collision. This is exactly what happened. NASA said "What you see is something really surprising". They could not explain it. The reaction of mainstream astrophysics – even after Thornhill's prediction had been so singularly correct, so on the mark – was an abrupt, off-hand rejection: "It's complete cobbler," said Dr. David Hughes, comet expert and professor of

astrophysics at Britain's University of Sheffield. "Absolute balderdash. Electricity on the surface of a comet? Forget about it. It's not a contender." Those who refuse to learn are doomed to continuing ignorance.

In 1996 the European Space Agency's ROSAT satellite observed x-rays being emitted from Comet Hyakutake. Astronomers were again "surprised." A non-electrical "dusty snow-ball" would not do that. But x-rays are expected from a high-voltage double layer such as would enclose a comet's plasma sheath. So we are gaining more and more evidence that comets are good examples of an electrical phenomenon – mainstream astronomers not only do not believe it – they get downright insulting to anyone who mentions the idea.

How does your dentist produce x-rays? Does he throw snowballs around his office?

Q: Well, given your feelings about accepted astronomical theories, what do you think about the Big Bang?

*A: Let me return the compliment – It's complete cobblers, it's balderdash. One of the fundamental assumptions on which the Big Bang hypothesis is based is that if light coming from an object in deep space exhibits a property called "redshift", then this object must be extremely distant and also be going away from us very rapidly. They say they observe this very often and this is why the universe is expanding away from the point where the Bang happened. A very well-known astronomer (he was Edwin Hubble's assistant), Halton C. Arp, has taken dozens of images of objects that have very different redshift values that are **connected together**. If they are physically connected by bridges of matter, then they cannot be at vastly different distances from us. He even has an image of a high redshift quasar that is **in front of** a low redshift galaxy. If the high redshift object is closer to us than the low redshift galaxy, then that disproves the "redshift = distance" basis of the Big Bang.*

There are many other deficiencies in the Big Bang theory. The density of the universe predicted by the BB theory, when the density of light elements like lithium, helium and deuterium are considered, are self contradictory.

Big Bang proponents like to say the measured temperature of the Cosmic Background Radiation proves the BB Theory. What they don't tell you is that one of the most famous BB proponents, George Gamov, predicted that the temperature of the CMB would be 50 Kelvin. Many other estimates in the range 2.8 to 7 Kelvin had already been made by non-BB astrophysicists. When the temperature was finally determined (3Kelvin), Big Bangers immediately claimed that was what they "had said all along." It wasn't. That is a lie. Everyone else had gotten closer to the right answer – their guess was 16 times too large.

For the BB to be correct, 96% of the matter in the universe has to be invisible and not measurable. A cosmology that leaves 96% of the universe unexplained is something less than a riotous success.

My friend Eric Lerner says that "The essence of science is asking questions of nature, so Big Bang proponents are people who won't take No for an answer."

Q: Your name is linked with the Electric Sun idea. Is the Sun powered from the outside electrically?

A: We aren't sure. It may well be. This is the most speculative part of Plasma Cosmology. Much more data needs to be collected before we can make a definite decision on this. Clearly the present nuclear fusion model has a bunch of problems associated with it. The Electric Sun model has none of these difficulties and offers simpler explanations for many of the things we observe about the Sun. The following points are addressed in the book:

- *Neutrinos (too few?). The SNO announcement is logically flawed.*
- *No continuous fusion reaction has ever been achieved. It may be impossible – plasma instabilities.*
- *Why does the Sun have a corona at all?*
- *Why does the Sun rotate faster at its equator than at its poles?*
- *Why are the umbrae of sunspots the coolest points on the surface?*
- *Why is the bottom of the corona 2 million K hotter than the surface?*
- *Why does the strength of the solar wind vary? (It completely shut off for two days a few years ago.)*

Q: Why do astronomers refuse to study experimental plasma physics?

A: I don't know other than fear of the peer review system – fear of losing their funding – fear of being ostracized. BB proponents have won the fight for control of the scientific power structure. If you try to get a job in an astronomy department and repeat any of the ideas I present in The ELECTRIC SKY, you will not get the position. If you apply for a research grant, you will not get it. If you try to get a paper published. It will be rejected.

Astro-science has blinders on. NASA freely admits it will not fund any research antithetical to the BB. Blinders may be good for a horse pulling a wagon – they are not good for science – the new fact you are looking for may be off to the side of the road or in the middle of the field you are ignoring.

Q: We often hear about Missing Matter and Dark Energy. What are they?

A: They are examples of those "invented fictional entities" I mentioned.

- *Missing matter was invented because there isn't enough real matter in the outer reaches of galaxies to account for how they rotate if the only mechanism you are willing to consider is gravity.*
- *Dark Energy is a force that "has to exist" if the expansion of the universe is to be explainable by Einstein's General Relativity.*
- *WIMPs, MACHOs, neutron stars, and the "strings" in String Theory are similar fabrications.*

All of these are Fictional Ad hoc Inventions Repeatedly Invoked in Efforts to Defend Untenable Scientific Theories – FAIRIE DUST.

Q: Why should the average person care about this debate?

A: *Several reasons:*

- *Basic fairness – After Halton Arp challenged the BB theory he was prohibited from using any of the big telescopes in the US.*
- *To avoid being cheated – NASA's yearly budget is about 15 Billion dollars, paid for by American taxpayers.*
- *Just to get the true story, and not a bunch of fairie tales. Nobody likes to be "sold a bill-of-goods".*
- *The public is now being told that only the "experts" can understand the complexities of cosmology (such as warped 11-dimensional space, inflatons, Heteronic-M theory, and why 96% of the universe is invisible, etc.). Unless you can understand the tremendously abstract mathematics in which their tales are shrouded, you should consider yourself somewhat incapable if not truly stupid and leave these questions to your intellectual betters. It is the story of the Emperor's New Clothes.*

Wal Thornhill

2007

Global Warming in a Climate of Ignorance

Posted on [February 15, 2007](#) by [Wal Thornhill](#)

"As for the promised control of nature, it is in rout before nature unleashed."

-Jacques Barzun, Science: the glorious entertainment

"Next we come to a question that everyone, scientist and non-scientist alike, must have asked at some time. What is man's place in the Universe?"

-Fred Hoyle, The Nature of the Universe



Global warming has been deemed a fact. However, the *inconvenient truth* is that humans are not causing it. Al Gore has been given poor advice. Like Darwin's theory of evolution and Big Bang cosmology, global warming by greenhouse gas emissions has undergone that curious social process in which a scientific theory is promoted to a secular myth. When in fact, science is ignorant about the source of the heat — the Sun.

The *really inconvenient truth* is that we cannot control Nature. But we can begin to learn our true place in the Universe and figure out how to cope rationally with inevitable change. Clearly, reducing air pollution is an admirable goal in itself. But we must not be deluded into thinking it will affect climate significantly. The connection between warming and atmospheric pollution is more asserted than demonstrated, while the connection with variations in the Sun has been demonstrated.

The Sun is undergoing a power surge

Since the late 1970s, three Sun-watching satellites recorded surprising changes in heat, ultraviolet radiation, and solar wind. Dr. Sami Solanski, director of the renowned Max Planck Institute for Solar System Research, said:

"The Sun has been at its strongest over the past 60 years and may now be affecting global temperatures." "The Sun is in a changed state. It is brighter than it was..."

Dr. Solanski admitted to not knowing what is causing the Sun to burn brighter. A leading authority, Eugene N. Parker, adds:

"...we really do not properly understand the physics of the varying luminosity of the Sun."

This highlights the fundamental problem with the global warming verdict from climate experts. It is based on profound ignorance about how the Sun really "ticks" and what forms of energy are input to a planet's climate. For this they can blame astrophysicists.

Although the historical climate records tie climate to variations in the Sun's output, the solar variation is considered too small to have much effect on global warming. As John Gribbin wrote in *New Scientist*:

"Statistical evidence links changes in our weather to changing solar activity. But no one has ever come up with a convincing explanation of how the link works." "The puzzle is that the overall brightness of the Sun varies by less than 0.1 per cent during the 11-year cycle, too little to explain the observed changes in the weather."

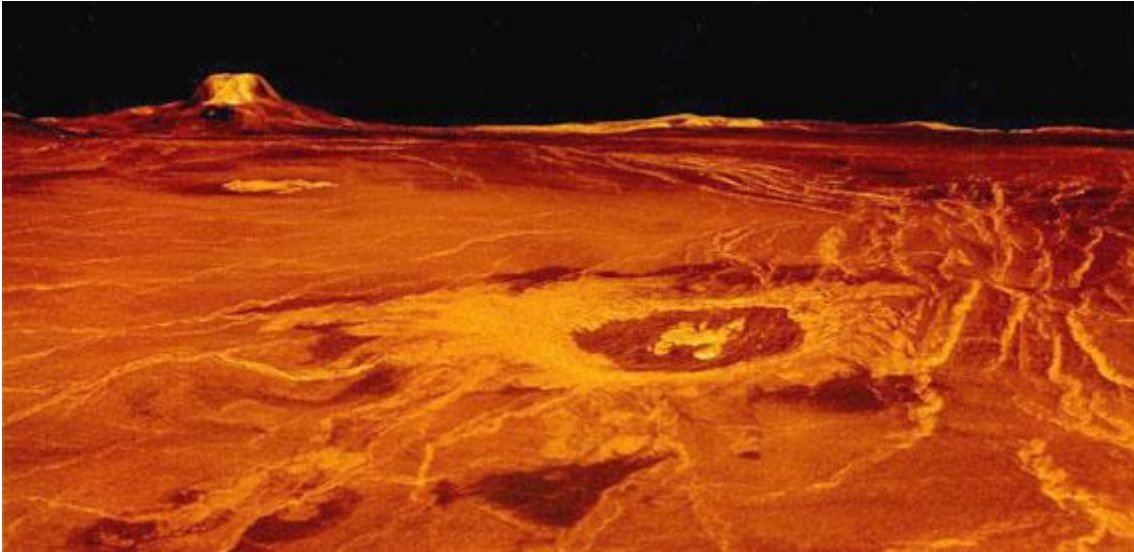
Slowly, the consensus has shifted politically in favour of this view.

A recent report concedes that there could be more influential effects on the climate, such as cosmic rays causing cloudiness, or ultraviolet radiation affecting the ozone layer. These factors change more markedly during the solar cycle. But are these merely more side effects of solar variability and not the real cause?

As for warming caused by mankind's production of so-called "greenhouse gases," Professor Nils-Axel Mörner wrote in a submission to the UK parliament on global warming:

"The driving idea is that there is a linear relationship between CO2 increase in the atmosphere and global temperature. The fact, however, is that temperature has constantly gone up and down. From 1850 to 1970, we see an almost linear relationship with Solar variability; not CO2. For the last 30 years, our data sets

are so contaminated by personal interpretations and personal choices that it is almost impossible to sort up the mess in reliable and unreliable data."



Underlying the bogeyman of the global greenhouse is the belief that something went wrong on our sister planet, Venus, and a "runaway greenhouse effect" occurred, turning it into a furnace hot enough to melt some metals. It is another of the secular myths of our age. In Venus isn't our twin! I wrote:

Comparisons with the Earth will lead nowhere. Nothing "went wrong" on Venus or "went right" on Earth. The two planets are not the same age and are only distantly related. There is no message for us from the study of Venus for an imagined evolution of Earth's climate into a hothouse.

"It is my firm belief that the last seven decades of the twentieth century will be characterized in history as the dark ages of theoretical physics."

-Carver Mead, Collective Electrodynamics

What do we need to know before an informed judgement can be made in the global warming debate? What are the science myths holding us back?

It is crucial that we know what is really going on in space-and in particular how the Sun really works. By historical accident the theory of what makes the Sun shine was developed at the time nuclear energy was discovered and when plasma physics was in its infancy. The Sun, instead of being an aboriginal campfire in the sky with limited fuel, became a "thermonuclear campfire" with practically limitless fuel. Not such a big advance over Stone Age thinking!

It seems very satisfying-and safe. We don't need to put coins in the meter to keep it burning. However, the reactions which are thought to generate heat in the Sun's core are hypersensitive to temperature variations, and mechanisms to control the reactions are difficult to devise. In view of this, the steadiness of the Sun's output is a puzzle. Furthermore, if thermonuclear reactions generated all the Sun's energy, a certain number of subatomic particles called electron neutrinos would be produced. And critically — the number of electron neutrinos coming from the Sun is woefully inadequate.

Astronomers appealed to particle physicists to help patch things up. Particle physicists responded with a clever subterfuge, saying that all is well if you add up the different neutrino "flavors" and propose that some were electron neutrinos that swapped flavours en-route to the detectors on Earth. Astrophysicists grasped this lifesaver like drowning men and women. It became "proof" of their "thermonuclear campfire" model overnight. Unfortunately, it cannot be proven without a neutrino detector close to the Sun. Occam's razor recommends that we take the neutrino data at face value and re-examine our assumptions about the Sun.

Meanwhile astronomers discovered that the Sun is an amazingly complex magnetic body — while campfires are not noted for their magnetism. So heroic attempts have been made to conjure up a "dynamo" inside the Sun to match its weird magnetic behaviour. Not surprisingly, all attempts have failed. It is simply assumed there must be a hidden dynamo because the magnetic fields are there and no one believes they could come from outside the Sun. The mysteriously generated magnetic fields are called upon to explain most of the puzzling observations about the Sun. It fits the astrophysicists' maxim, "when we don't understand something, we blame it on magnetism." They then show their ignorance of magnetism by describing electric discharge phenomena in terms of the 'snapping' and 'reconnection' of imaginary field lines. The father of plasma physics, Hannes Alfvén, wrote concerning the mistreatment of magnetism by astrophysicists:

"Magnetospheric physics and solar wind physics today are no doubt in a chaotic state, and a major reason for this is that part of the published papers are science and part pseudoscience, perhaps even with a majority in the latter group."

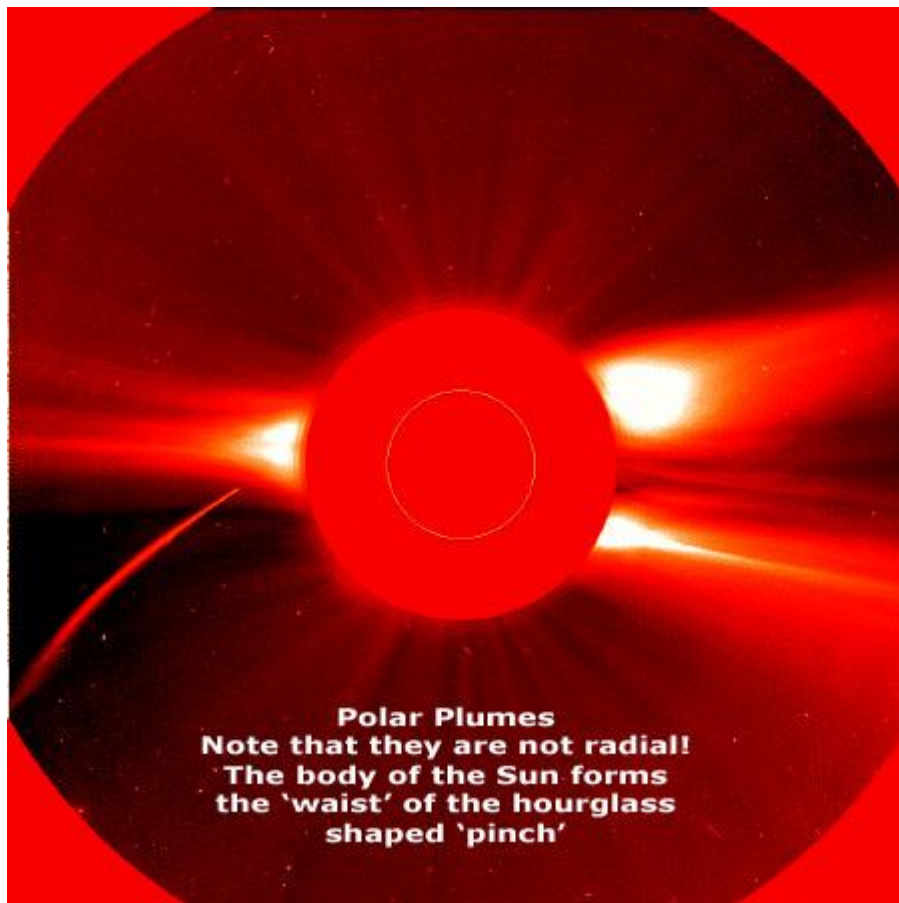
The view of the Sun as an isolated, self-sufficient, self-immolating, magnetic body is the chief peculiarity and drawback of the campfire Sun.

But the refutation of this theory blazes down on us in plain view. Nothing seen on or above the Sun conforms to the "campfire" model!

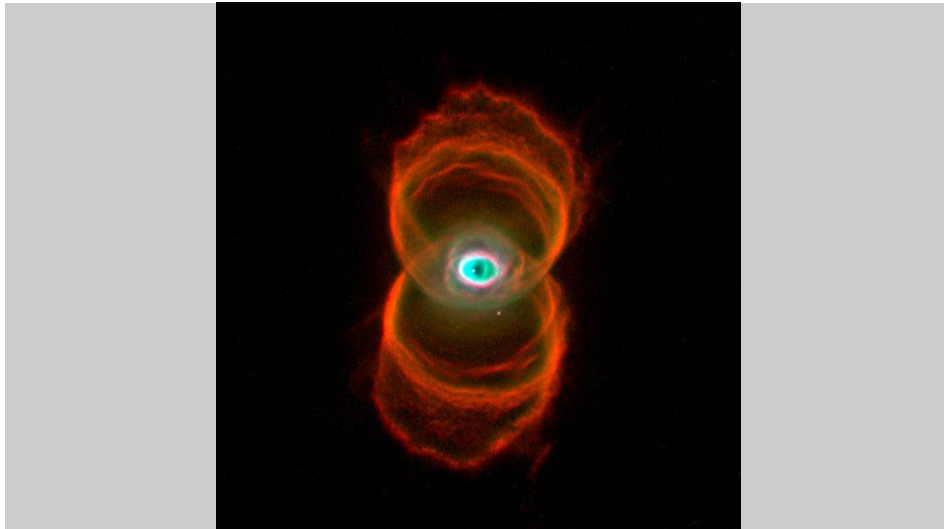
—the odd solar magnetic field, the remarkable photospheric granulation, dark sunspots, the filamentary sunspot penumbrae, the sunspot cycle, the variation of rotation rate across the surface and with depth, the blisteringly hot corona above a cool photosphere (like boiling the kettle on a cold campfire), the solar flares and coronal mass ejections, the acceleration of the solar wind.

Simply put, we do not understand the Sun. And if we do not understand the Sun we have no basis for understanding its influence on the Earth's climate.

But there is a way to understand the Sun, if only we can step outside the traditional astrophysical assumption that gravity alone operates in space. The generation and transmission of power for electric lights involves magnetism. And unlike any campfire, the Sun manifests an abundance of magnetic phenomena. Those phenomena suggest that the Sun is an electrical body. The magnetic field of the solar wind shows that electric currents flow within the solar system. The million-degree temperature of the solar corona points to an external power source for the Sun. The polar plume and [equatorial plasma torus](#) show that the Sun, like all stars, is the focus of galactic currents "pinching" naturally into an hourglass form with an equatorial current sheet.

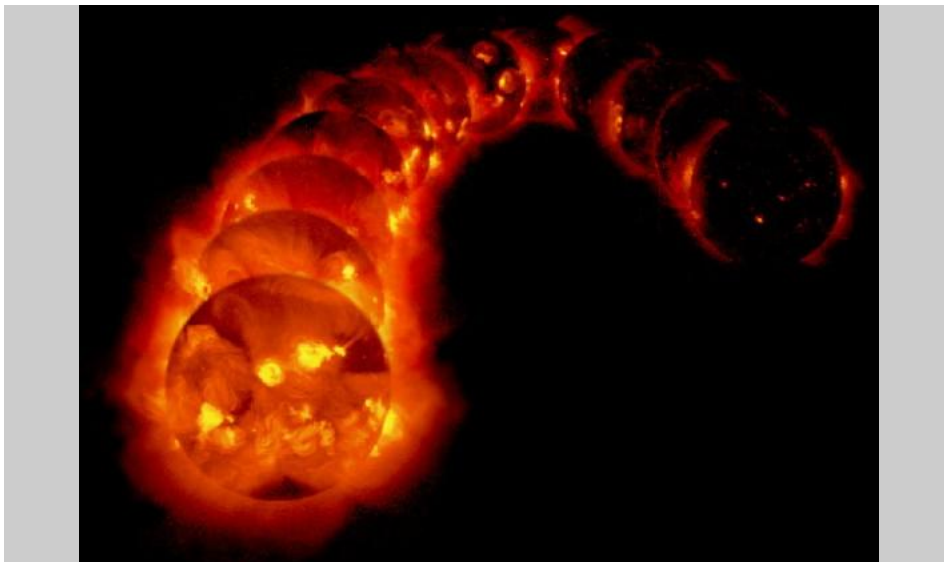


The hourglass shape is made visible in many beautiful planetary nebulae.



A long-standing puzzle is how planetary nebulae acquire their complex shapes and symmetries, since stars and the gas/dust clouds surrounding them are mostly round. The Hourglass Nebula, is a young planetary nebula located about 8,000 light-years away. As revealed by Hubble, it does not fulfil some crucial theoretical expectations. But just as a neon tube is evenly lit from end to end, the nebula remains evenly lit at great distances from the central star. Credit: R. Sahai & J. Trauger (JPL), the WFPC2 Science Team & NASA.

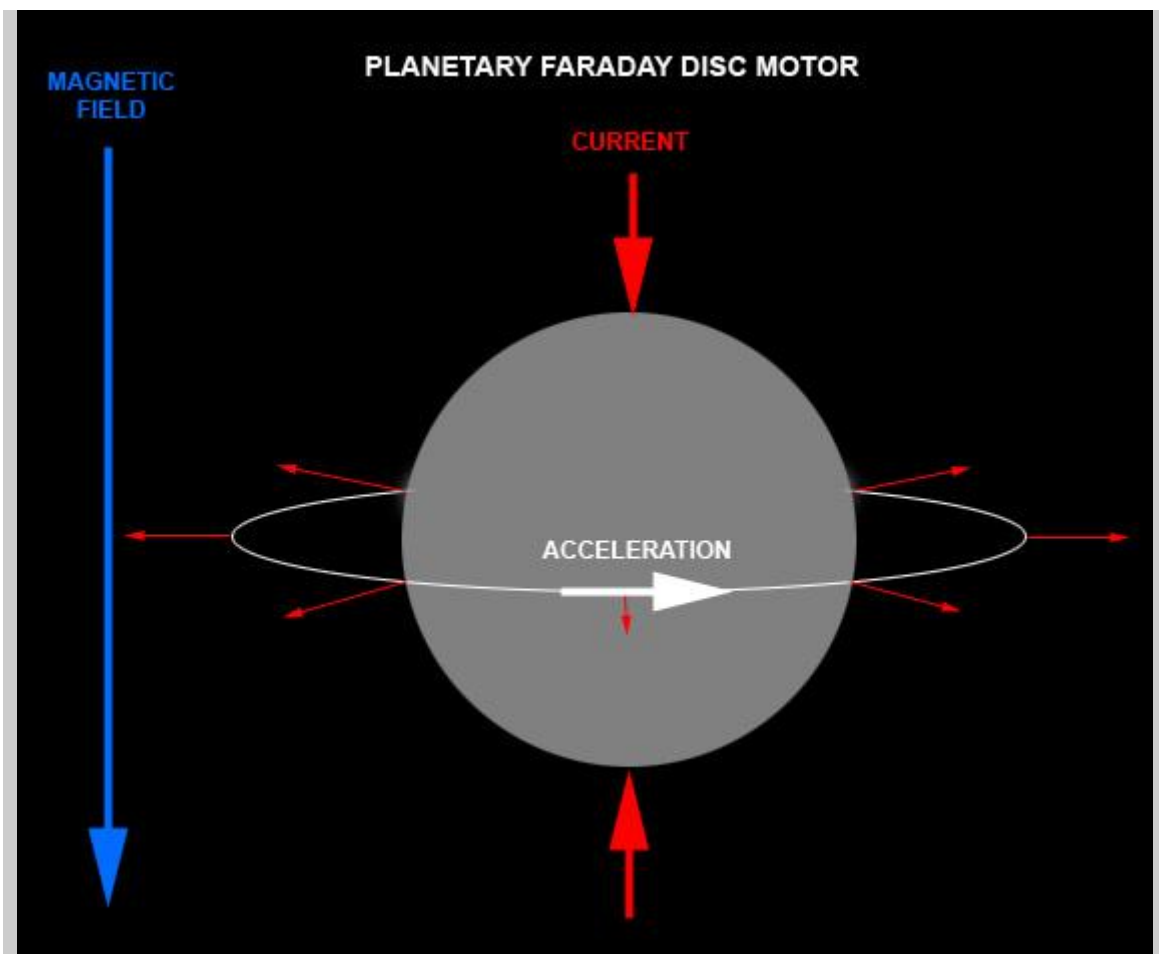
Stars are elements in galactic circuits. They trace the power lines like electric streetlights along the arms of the Milky Way. The solar magnetic and sunspot cycle is due to the quasi-periodic DC power input to the Sun. This variability of power input to the Sun can be clearly seen in X-rays and UV light. See "[The Sun – Our Variable Star.](#)"



Above is a montage of X-ray images of the Sun captured 4 months apart between 1991 and 1995 by the Yohkoh spacecraft. The cyclical switching of the solar magnetic field is induced by the varying galactic DC input current.

It has been shown that the Sun's constancy of light and heat output is due to a natural [transistor action](#) of the plasma sheaths forming the photosphere and chromosphere of the Sun. A very small voltage between the body of the Sun and the underside of the photosphere controls the enormous current that lights the Sun. Nature, as we have come to expect, has found a beautifully simple method of steadying the light output of main sequence stars.

A star is the focus of a galactic "glow discharge." The electrical energy that courses through the solar system and powers the Sun is a subtle form of energy that all of the planets intercept to some degree. Planets orbit within this discharge and intercept some of the electrical energy. Planets are minor "electrodes" within a stellar discharge envelope. The electrical energy is delivered to stars and planets in the manner of a simple Faraday motor.



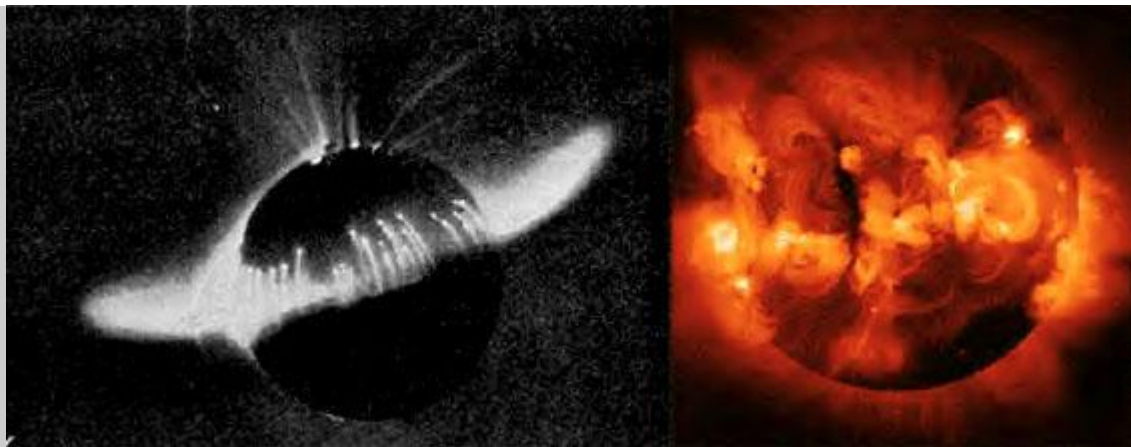
Schematic of the Faraday motor effect upon a planet (or star).

The electromotive power is deposited mostly in the upper atmosphere at mid to low latitudes and gives rise to fast upper atmosphere winds and even "super rotation." That is, the wind races around the planet faster than the planet turns. It is a phenomenon observed on Venus and Titan and remains unexplained by atmospheric physics, which relies on solar heating. It is the cause of the extraordinary winds on the gas giant planets in the

outer solar system, where solar heating is weak. It has implications for the jet streams and weather patterns on Earth as well. Notably, the polar current streams take the form of twin Birkeland current filaments, which give rise to the enigmatic "[double vortexes](#)" seen at the poles of Venus. It is apparent that electrical energy from space doesn't merely light up auroras. It has a profound influence on upper atmosphere winds and [storms](#). An expert on the dynamics of planetary atmospheres, F. W. Taylor, has admitted:

"The absence of viable theories which can be tested, or in this case [Venusian polar vortex] any theory at all, leaves us uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."

Meanwhile, electrical energy appears nowhere in any climate model.

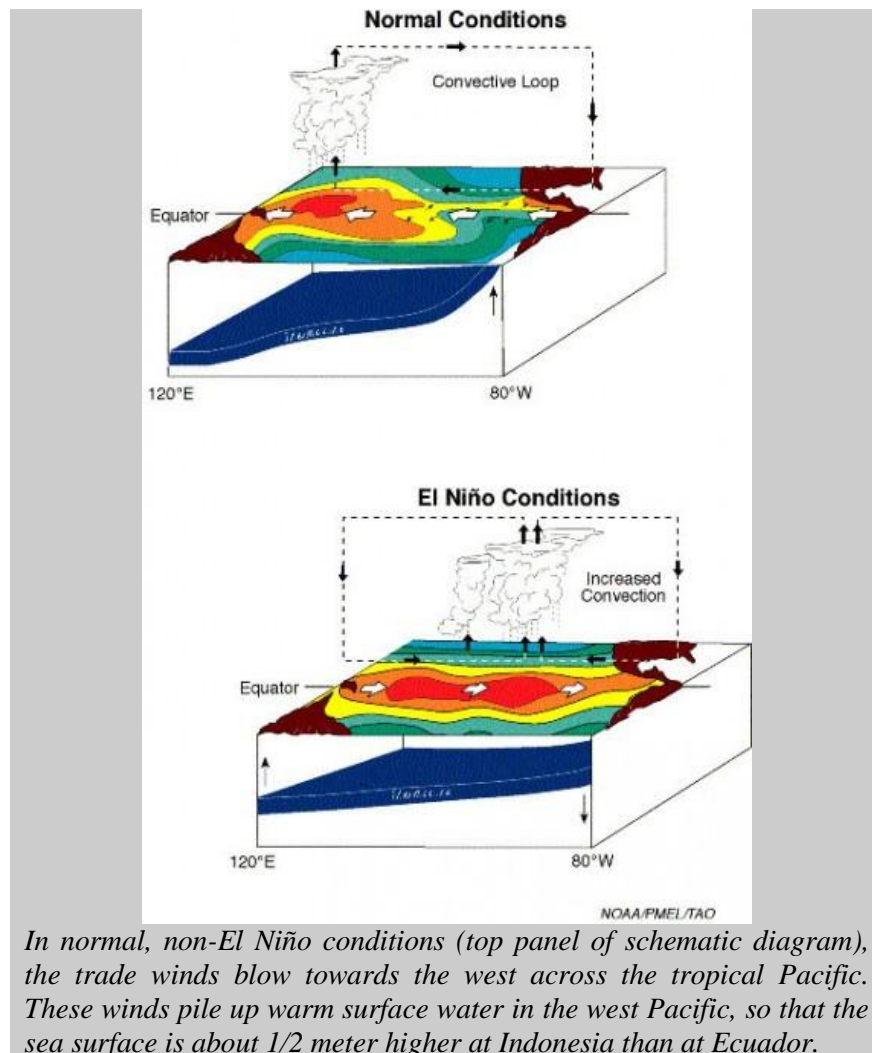


Around 1900, the famous Norwegian scientist, Kristian Birkeland, performed experiments (left) using an electromagnetic terrella (magnetized metal sphere) as one of the electrodes in a gas-discharge apparatus. He created an artificial Aurora around the poles of the terrella, replicating the effects of the solar wind on the magnetic Earth. He also simulated other cosmic phenomena, such as the Sun's corona, sunspots, and the rings of Saturn, using other small metal spheres. Note that the experiments use external electrical power! The era gives a measure of how far we must backtrack from the current dead end to bring astrophysics in tune with reality.

The electrical model of the Sun and its environment answers the question of how the solar cycle can have more effect on the weather than expected from solar heating alone. Because the planets are minor electrodes in the Sun's circuit, they are subject to the full variation of the galactic electrical input. It explains the simultaneous warming of other planets and changes in their atmospheres. Even distant Pluto (at the time still a planet) baffled astronomers by continuing to warm up eighteen years after its orbit began to take it further from the Sun. Electrical energy may constitute a major energy source for the outer planets. And, of course, [on Mars](#) there are no SUVs or farting cows to explain its warming.

What about the global El Niño-Southern Oscillation?

The El Niño-Southern Oscillation (ENSO) is a set of interacting parts of a single global system of coupled ocean-atmosphere climate fluctuations that are believed to come about as a consequence of oceanic and atmospheric circulation. ENSO is the most prominent known source of inter-annual variability in weather and climate around the world (~3 to 8 years), though not all areas are affected. ENSO has signatures in the Pacific, Atlantic and Indian Oceans. Scientists are unable to explain this global weather and climate feature.



During [El Niño](#) (bottom panel of the schematic diagram), the trade winds relax in the central and western Pacific leading to a depression of the thermocline in the eastern Pacific, and an elevation of the thermocline in the west. The weakening of easterly tradewinds during El Niño is evident in this figure as well. Rainfall follows the warm water eastward, with associated flooding in Peru and drought in Indonesia and Australia. The eastward displacement of the atmospheric heat source overlaying the warmest water results in large changes in the global atmospheric circulation, which in turn force changes in weather in regions far removed from the tropical Pacific.

What has the electrical model of the Sun-Earth connection have to offer for our understanding of ENSO?

Climatologists base their predictions on Coupled General Circulation Models. These are computer models that try to mimic the interplay of the atmosphere and the ocean with energy coming from the Sun. The contradictory results prompted the Chairman of the World Climate Conference in 2003, Prof. Yuri Izrael, to ask:

"What is going on, on this planet — warming or cooling?"

Now some geologists are beginning to take a broader look at climate drivers, from the perspective of Aristotle's four elements: earth, water, air, and fire. In other words, it seems that what goes on inside the Earth also affects climate.

The possibility that something internal to the Earth affects climate was raised by Daniel Walker first in 1988 and then again in 1995 and 1999. He pointed out that increased tectonic activity (seismicity, magma upwelling and hydrothermal venting) along portions of the East Pacific Rise (EPR), precede (by up to six months) each El Niño event studied since 1964. The association was so significant that Walker called the increased seismicity along the EPR "Predictors of El Niño."

Geophysicist Bruce Leybourne has found a link between global climate oscillations and small changes in the Earth's gravity, which alters storm tracks and affects sea levels.

"The evidence so far available indicates that tectonic events precede ocean/atmospheric changes. The evidence comes from gravity measurement studies... These studies indicate strong correlations or 'teleconnections' between barometric pressure change and the force of gravity... This establishes an unmistakable link between gravity fluctuations and ocean-atmosphere dynamics."

It would be preferable to find a cause that doesn't rely on tectonics—the science of hypothetical activity within the Earth. I have already made the [connection between earthquakes and solar activity](#).

The missing link between the sunspots and earthquakes is the fact that the electric discharges to the Sun that cause sunspots can also affect the Earth's ionosphere. The ionosphere forms one "plate" of a capacitor, while the Earth forms the other. Changes of voltage on one plate will induce movement of charge on the other. But unlike a capacitor, the Earth also has charge distributed in rock beneath the surface. And if the subsurface rock has become semi-conducting because of stress, there is an opportunity for sudden electrical breakdown to occur through that rock.

We should expect similar processes to occur underground as are found in atmospheric lightning. ...in a large earthquake, the entire circuit may be involved, from below the Earth, through the atmosphere to the ionosphere.

This would explain the massive disturbance of the ionosphere over a large area accompanying a major earthquake. Subterranean lightning causes earthquakes! Seismic waves are the rumble of underground thunder."

The 'weather' beneath the ground is linked to the weather above. So what is the connection with the fluctuations in gravity?

This brings us to one of the most intransigent myths of the 20th century: that Einstein gave us a real understanding of gravity. [He did not](#). He was the most significant physicist to cross the line between physics and metaphysics. His imaginary description of gravity in terms of matter curving space, in some non-physical extra dimension, explains nothing. How can you curve nothing?

Newton had shown that gravity is related directly to mass. But what causes matter to exhibit mass remains a fundamental mystery. Also, Newton's gravity operates instantaneously (time does not appear in his gravitational equation). Yet Einstein would have us believe that the Earth has no information about where the Sun is until 8 minutes after. He bequeathed us a disconnected, incoherent universe that simply cannot work or give rise to life. That is why cosmology reads like science fiction. This ignorance of the real nature of gravity may have significance in relation to climate.

Einstein published his theory of gravitation, or general theory of relativity, in 1916. And so a new paradigm, or set of beliefs, was established. It was not until 1930 that Fritz London explained the weak, attractive dipolar electric bonding force (known as Van der Waals' dispersion force or the 'London force') that causes gas molecules to condense and form liquids and solids. Like gravity, the London force is always attractive and operates between electrically neutral molecules. And that precise property has been the most puzzling distinction between gravity and the powerful electromagnetic forces, which may repel as well as attract.

So it seems the clue about the true nature of gravity has been available to chemists — who are not interested in gravity — and unavailable to physicists — who are not interested in physical chemistry (and view the world through Einstein's distorting spectacles). Look at any average general physics textbook and you will find no reference to Van der Waals or London forces. What a different story might have been told if London's insight had come a few decades earlier? Physics could, by now, have advanced by a century instead of being bogged in a mire of metaphysics.

The London force originates in fluctuating electric dipoles caused by slight distortion of otherwise electrically neutral atoms and molecules. The tiny electric dipoles arise because the orbiting electrons, at any given instant, cannot shield the positive charge of the nucleus equally in all directions. The result, amongst a group of similar atoms or

molecules is that the electric dipoles tend to resonate and line up so that they attract each other. An excellent illustrated lesson on the London force, or Van der Waals' dispersion force can be found [here](#).

Obviously, gravity is distinct from the London force. It is much, much weaker. That should be a clue. What if we are looking at gravity being due to a similar electrostatic distortion effect in the far smaller constituents of each atom, in the electrons, protons and neutrons? Of course, this is heresy because the electron is supposed to be a fundamental particle, with no smaller constituent particles. However, there are experiments that challenge this belief.

If gravity is an electric dipolar force, we can understand why the so-called "universal constant of gravitation" is so infernally inconstant. There is no reason to assume it is universal. Changes in charge distribution within the Earth contribute most of the variability in gravity. And sudden changes in charge distribution within the Earth cause earthquakes and thermal, volcanic events. They will occur most often in regions having peculiar electrical properties. The common thread can now be seen. The Sun's radiant output remains fairly steady while the electrical power in its galactic circuit has a superimposed cyclic "hum." The Earth receives the hum plus the static from solar flares, which simply adds "noise" to our average climate and earthquake activity.



A final word about our place in the Universe. We live with the fable of Newton's clockwork solar system and the constancy of the Sun over past aeons. Scientists chart past climate and blithely assign periodicities to various warming and cooling episodes extending back millions of years into the past. All of the numbers and charts bestow the appearance of being in control of the facts. But it is mere wishful thinking. Here, science unconsciously takes on the mantle of religion—providing assurance in an uncertain universe.



Credit: www.heartland.org

Where does this powerful urge for certainty come from? Underlying the global warming debate is an unacknowledged fear—a subconscious, irrational fear of THE END OF THE WORLD. A few decades ago climate experts were warning us that we were facing another ice age. Now we are told that we face a catastrophe of global warming. All the while, there is a Greek chorus of scientists whipping up our innate fear of an apocalyptic cometary impact. All of these anxieties are irrational. We have no modern experience of them.

But there does seem to be an archetypal memory of doomsday. Fossil strata record several of them. Ancient myths and legends describe one or more at the dawn of civilization. The Earth sciences will remain hamstrung for as long as it takes to understand that we live in an electric universe and the solar system we see today is not as old as the human race. Meanwhile, human behavior will continue to be irrational until we understand our true history and place in an electric and sometimes catastrophic universe.

Wal Thornhill

The Astrophysical Crisis at Red Square

Posted on [April 17, 2007](#) by [Wal Thornhill](#)

"The history of science shows that the progress of science has constantly been hampered by the tyrannical influence of certain conceptions that finally come to be considered as dogma. For this reason, it is proper to submit periodically to a very searching examination, principles that we have come to assume without discussion."

—*Louis de Broglie, Revolution in Physics, 1953.*



In 1970, Hannes Alfvén, the 'father of plasma physics,' warned that cosmology was headed into crisis. He was referring to the treatment of plasma—which makes up about 99.9% of the visible universe—as a magnetizable gas. Alfvén was responsible for the theory, known as 'magnetohydrodynamics' or MHD. But he publicly repudiated its use for space plasma in his 1970 Nobel Prize acceptance speech:

"The cosmical plasma physics of today is far less advanced than the thermonuclear research physics. It is to some extent the playground of theoreticians who have never seen a plasma in a laboratory. Many of them still believe in formulae which we know from laboratory experiments to be wrong. The astrophysical correspondence to the thermonuclear crisis has not yet come."

—H. Alfvén, *Plasma physics, space research and the origin of the solar system*, Nobel Lecture, December 11, 1970

But astrophysicists didn't want to know. MHD made their theoretical work easy compared with the intricate behavior of plasma discovered in attempts to harness fusion power—the so-called 'power source of the Sun.' Their ignorance of the real behavior of plasma was certain to lead to divergence between theory and reality, just as it did for fusion power.

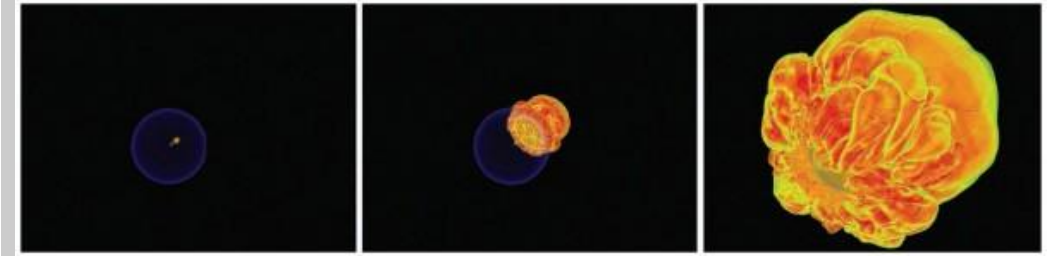
In fact each specialist group fuelled the mistakes of the other. It is a common situation in institutionalized science today. The astrophysicists misled the nuclear physicists into thinking the Sun is powered internally, which led nuclear physicists to try unsuccessfully to mimic the Sun's hypothetical thermonuclear 'engine.' The nuclear physicists have nevertheless misled the astrophysicists into thinking that a stable thermonuclear reaction is possible inside the Sun even though it results in a weird body that transfers internal heat unlike any other—by radiation instead of conduction and convection. And the Sun is a cosmic body that is assumed to have much the same composition at its center as at the top of its atmosphere! Clearly, it has been a theoretical 'deadly embrace.'

Alfvén was considered a brilliant maverick. He railed against the consensus of big bang cosmology and insisted that we live in an electric universe. He argued that it was not enough to treat magnetism in space without considering the electric circuits in space necessary to generate and sustain magnetic fields. Yet no book on astronomy mentions electricity or circuits. Future historians of science will find this beyond rational understanding, like the belief in a flat Earth. Astronomy labors in the space age under the yoke of gaslight era science. Our model of stars is little better than the ancient one of a 'campfire' in the sky. Only the fuel is different.

Thirty-seven years after Alfvén's speech, the astrophysical crisis is becoming more obvious. Adaptive optics and space telescopes give us much clearer views of stars, nebulae and galaxies, which theorists are floundering to explain. Some express mild concern that their models aren't working. No one recognizes that there is a deep crisis. Denial, minimization and obfuscation can be expected before a paradigm shift begins. Two reports in the April 13 issue of Science highlight the situation.

The first report, "Surveys of Exploding Stars Show One Size Does Not Fit All," says:

"Type Ia supernovae are regular enough that astronomers can use them to measure the universe. But some of the 'standard candles' are breaking the theoretical mold. When astronomers wish upon a star, they wish they knew more about how stars explode. In particular, experts on the stellar explosions known as supernovae wonder whether textbook accounts tell the true story."



A fanciful computer generated cartoon (above) of a supernova type Ia explosion is presented. The description raises more questions than answers: "a bubble of fusion beginning inside the star can burst out through its surface and then, confined by the star's gravity, wrap around the star in all directions, until encountering itself on the other side. When the fusing material collides with itself, a jet of material fires back down into the star, detonating the full fusion explosion."

Heath Robinson would be proud of this! The pictures bear no relationship to observations of supernova remnants.

Various other comments in the same report are revealing:

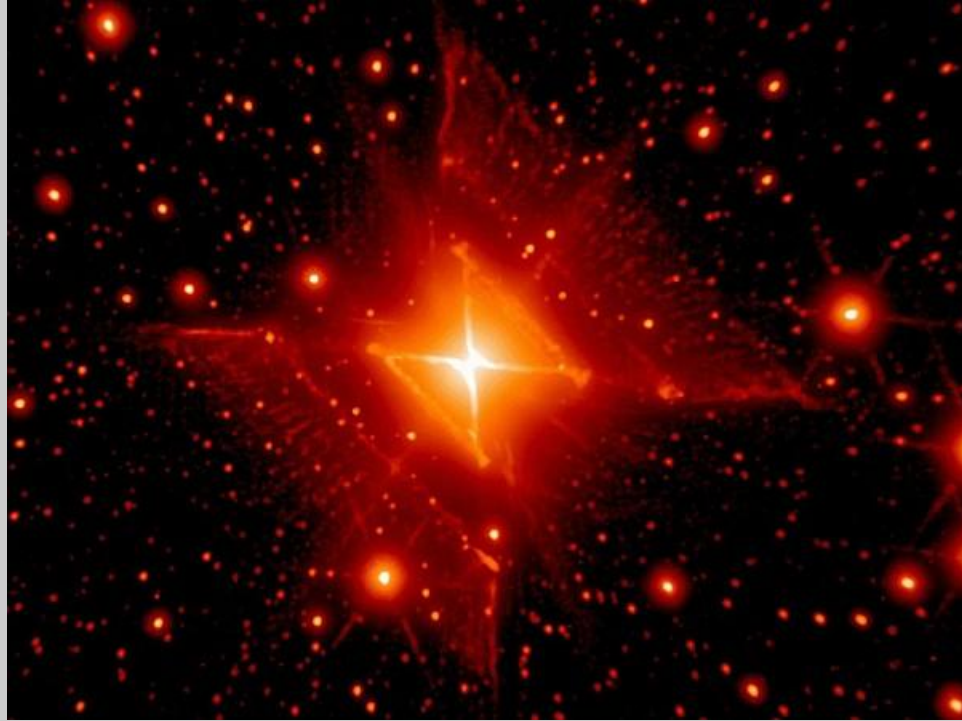
"We put the theory in the textbooks because it sounds right. But we don't really know it's right, and I think people are beginning to worry," says Robert Kirshner, a supernova researcher at the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts. "We keep saying the same thing, but the evidence for it doesn't get better, and that's a bad sign." Kirshner was among more than 100 experts on stars and their explosions who gathered to discuss their worries last month at the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara. General agreement emerged that the textbook story "is a little bit of 'the emperor has no clothes,' " as Lars Bildsten, an astrophysicist at the Kavli Institute, put it.

"There's a lot of holes in the story." "I wouldn't say it's a crisis," [Kirshner] said. "But if you ask, 'Are the pieces falling into place?' I'd say the answer is no." Understanding type Ia supernovae has become an urgent issue in cosmology, as they provide the most compelling evidence that the universe is expanding at an accelerating rate.

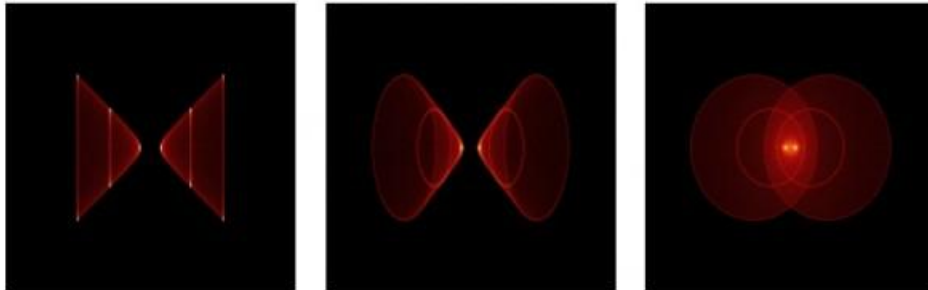
How can any deductions based on evidence from type Ia supernovae be "compelling" when supernovae are not understood? The paper above demonstrates the classic signs of minimization of the problem and obfuscation with complex and improbable computer models.

The textbook accounts of stellar explosions are fiction

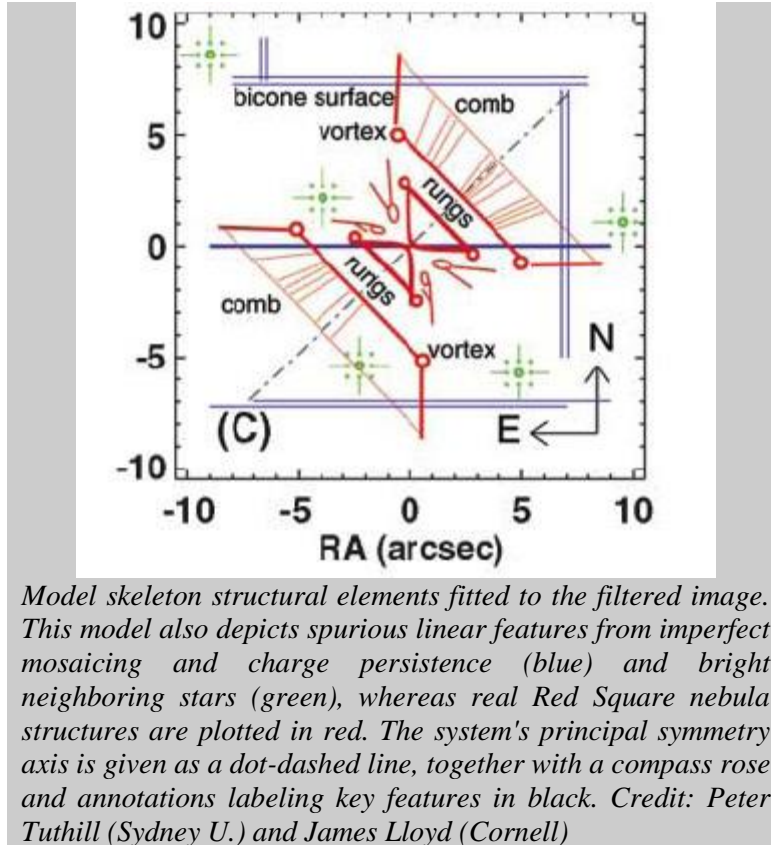
The second report is titled obscurely "A Symmetric Bipolar Nebula Around MWC 922." The nebula is known by the term 'The Red Square' (see below). Click [here](#) for a more readable account.



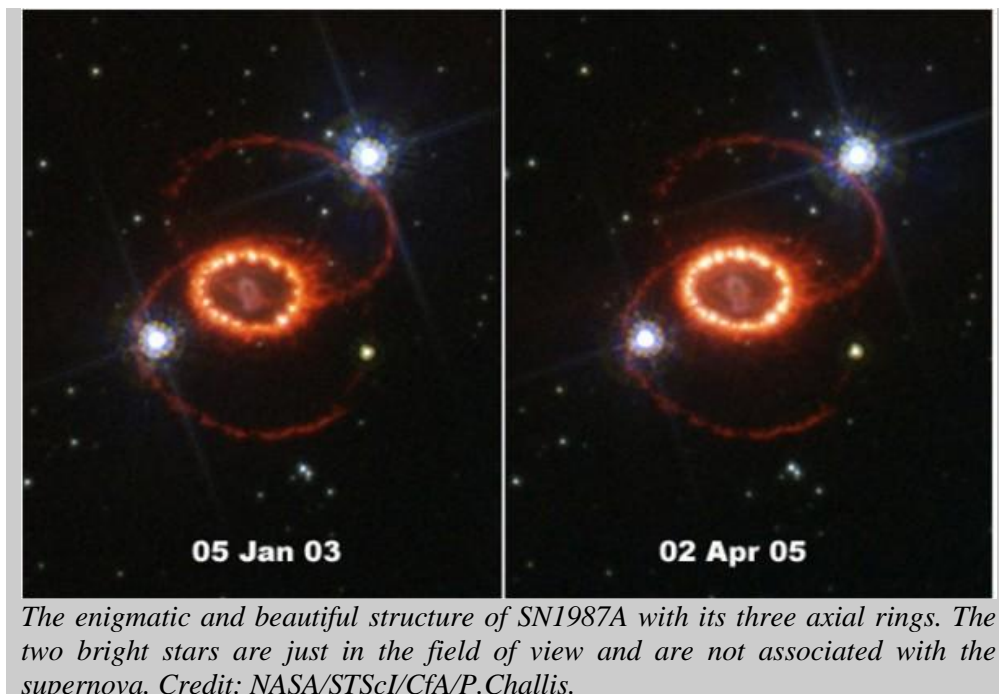
MWC 922: The Red Square Nebula. The image above combines data from the Mt Palomar Hale telescope and the Keck-2 telescope. It was taken in near-infrared light (1.6 microns) and shows a region 30.8 arcseconds on a side around MWC 922. As the outer periphery of the nebula is very faint compared to the core, the image has been processed and sharpened to display the detail and structure. Credit: Peter Tuthill (Sydney U.) and James Lloyd (Cornell)



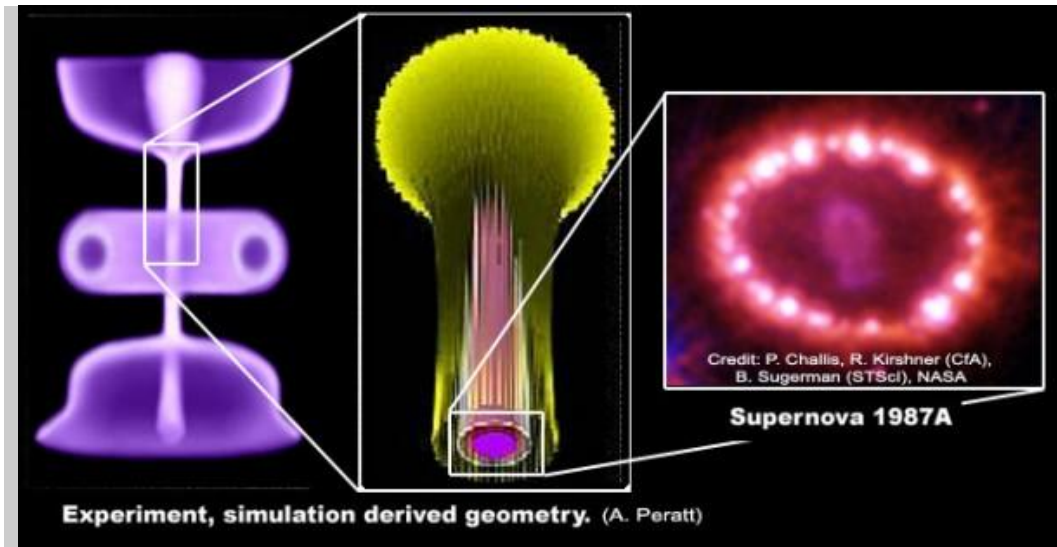
If we imagine moving away from the precise (and fortuitous) edge-on viewing angle onto this object that we find from Earth, we might get a view like that depicted above. The left-hand panel shows the skeleton of the twin opposed cones as we see them from earth, but if we rotate away from our view at 90 degrees to the axis (middle panel) we can visualize that the bright bars seen edge-on become elliptical rings encircling the polar axis of the system (right panel). Credit: Peter Tuthill (Sydney U.)



The Red Square image is very important because it is only 5,000 light years away. It is compared in the report with the structures seen around supernova 1987A, which is 169,000 light years away in the Large Magellanic Cloud.



In August 2005, I wrote a news report titled [Supernova 1987A Decoded](#). I argued that all of the detailed features of that spectacular supernova remnant could be explained in terms of a cosmic 'Z-pinch' plasma discharge, focused on a star.



Experimental and simulation derived geometries for extreme plasma currents in a plasma column. The Birkeland current filaments will only be visible where the plasma density is high. The diagram above shows the essential features of a plasma Z-pinch (left), the detailed filamentary current structure (center), and the 'witness plate' result of the Birkeland current filaments interacting with the equatorial expulsion disk of supernova 1987A. The number of filaments forming a cylinder follows a regular pattern. Plasma physicist Anthony Peratt writes: "Because the electrical current-carrying filaments are parallel, they attract via the Biot-Savart force law, in pairs but sometimes three. This reduces the 56 filaments over time to 28 filaments; hence the 56 and 28 fold symmetry patterns. In actuality, during the pairing, any number of filaments less than 56 may be recorded as pairing is not synchronized to occur uniformly. However, there are 'temporarily stable' (longer state durations) at 42, 35, 28, 14, 7, and 4 filaments. Each pair formation is a vortex that becomes increasingly complex."

I wrote in the August 2005 report:

"If the equatorial ring shows the Birkeland currents in the outer sheath of an axial plasma current column, then the supernova outburst is the result of a cosmic z-pinch in the central column, focused on the central star. It is important to note that the z-pinch naturally takes the ubiquitous hourglass shape of planetary nebulae. No special conditions and mysteriously conjured magnetic fields are required."

The Red Square shows the stellar Z-pinch in close-up and we can see the Birkeland filaments for the first time, called 'combs' in the Science paper. They match the electrical model. Supernova 1987A was successfully decoded. The hallmark of a successful theory is its ability to predict or explain new discoveries with no additional assumptions.

For comparison, the report in Physorg.com concludes:

"Structures such as this are rarely seen in nebulae, and the high degree of regularity in this case may point to the intriguing possibility that these bands are shadows cast by periodic ripples or waves on the surface of an inner disk close to the star at the heart of the system," said Lloyd. But the most compelling and important implication for astronomy comes from the three-dimensional structure implied by the Red Square images.

If you can really get a mental grasp of the three-dimensional geometry implied by the Red Square images," said Tuthill, "then it is fascinating to take a second look at one of the most famous astronomical images of them all: SN1987A. We are not saying that the star MWC 922 at the heart of the Red Square is about to explode as a supernova," said Lloyd, "but we're not ruling it out either, and if it did it would certainly put on quite a show as it kindles the outer reaches of its nebula."

Whatever the fate of the central star, the remarkable series of bars seen in the Red Square make it the best astrophysical laboratory yet discovered for studying the physics of generating the mysterious sharp polar-ring systems like that around SN1987A.

According to Tuthill, "This is just the beginning—a system as complex and fascinating as this is bound to keep us guessing for years to come."

Meanwhile, plasma cosmologists don't have to guess. They know what the three-dimensional geometry implies. The bipolar hourglass shape is a stellar circuit made visible. The 'combs' are Birkeland current filaments in a Z-pinch configuration, so it can be confidently predicted that their number will match the sequence found experimentally.

The most important plasma circuit element—the 'Double Layer.'

Alfvén writes:

"Since the time of Langmuir, we know that a double layer is a plasma formation by which a plasma—in the physical meaning of this word—protects itself from the environment. It is analogous to a cell wall by which a plasma—in the biological meaning of this word—protects itself from the environment."

This concept of a star "protecting itself" from the environment throws an entirely different light upon the real nature of stars. They are powered from without, electrically, not from within! This is impossible in the language of MHD, the lingua franca of astrophysicists. Neither double layers nor circuits can be derived from MHD models. Yet Alfvén was moved to suggest:

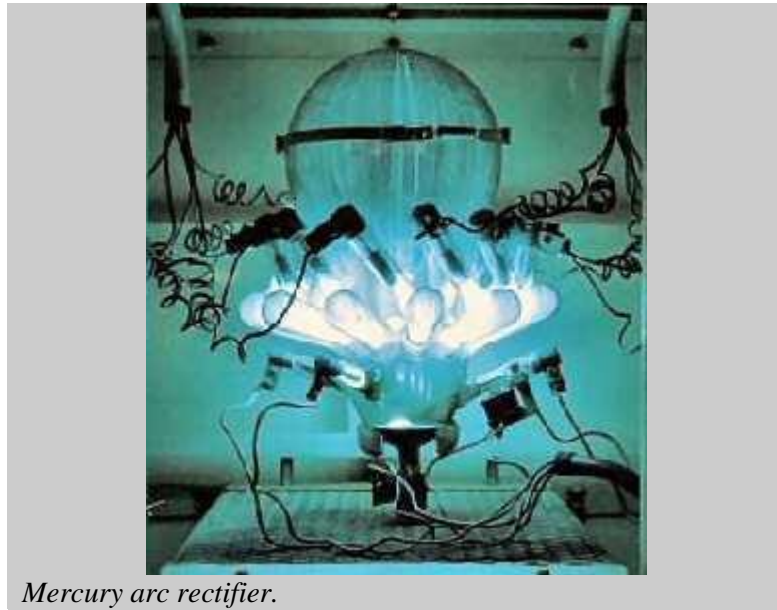
"...double layers in space should be classified as a new type of celestial object."

He proposed:

"...X-ray and gamma-ray bursts may be due to exploding double layers."

Exploding double layers are very important in stellar outbursts. It is the only stellar explosion mechanism that naturally produces bipolar remnants and equatorial ejection disks (as distinct from hypothetical 'accretion' disks) and lends itself to empirical testing in the lab. Alfvén gives a practical example:

"In Sweden the waterpower is located in the north, and the industry in the south. The transfer of power between these regions over a distance of about 1000 km was first done with a.c. When it was realized that d.c. transmission would be cheaper, mercury rectifiers were developed. It turned out that such a system normally worked well, but it happened now and then that the rectifiers produced enormous over-voltages so that fat electrical sparks filled the rectifying station and did considerable harm. In order to get rid of this, a collaboration started between the rectifier constructors and some plasma physicists at the Royal Institute of Technology in Stockholm.



Mercury arc rectifier.

An arc rectifier must have a very low pressure of mercury vapor in order to stand the high back voltages during half of the a.c. cycle. On the other hand, it must be able to carry large currents during the other half-cycle. It turned out that these two requirements were conflicting, because at a very low pressure the plasma could not carry enough current. If the current density is too high, an exploding double layer may be formed. This means that in the plasma a region of high vacuum is produced: the plasma refuses to carry any current at all. The sudden interruption of the 1000 km inductance produces enormous over-voltages, which may be destructive."

In 1964 Jacobsen and Carlqvist suggested that exploding double layers produced violent solar flares. In an extreme situation the power from a galactic circuit is catastrophically released in an exploding double layer near the surface of a star to produce a supernova.



A 500 kilovolt circuit breaker reveals the concentration of destructive energy possible at a double layer.

A number of double layers develop in series between a star and its galactic environment. Strong electric fields exist across them summing to the voltage difference between the star and the galactic plasma environment. Cosmic rays allow us to estimate the voltages of stars at tens of billions of volts. Ions and electrons are accelerated across the thin double layers and collide. The 'linear rungs or bars' of the Red Square fit Alfvén's circuit diagram as polar 'double layers,' symmetrically situated along the Z-pinch filaments, some distance from the star's two poles. Their thinness and electrical excitation results in the enhanced glow and sharp definition of the 'rungs or bars.'

Alfvén pioneered the stellar circuit concept and it seems his 'wiring diagram' is essentially correct but incomplete because it does not show the star's connection to the larger galactic circuit. Alfvén remarked:

"The current closes at large distances, but we do not know where."

Plasma cosmologists have supplied the answer by mapping the currents flowing along the arms of spiral galaxies. It is but a small step from there to see that all stars are the focus of Z-pinches within a galactic discharge. Normally the current flows in 'dark mode' so we don't usually see the spectacular bipolar 'wiring harnesses' of hyperactive stars, like that at the heart of Red Square. All we witness, closest to home, are the effects on the Sun's 'surface,' in its superheated corona, and the solar 'wind.'

De Broglie says:

"The progress of science has constantly been hampered by the tyrannical influence of certain conceptions that finally come to be considered as dogma."

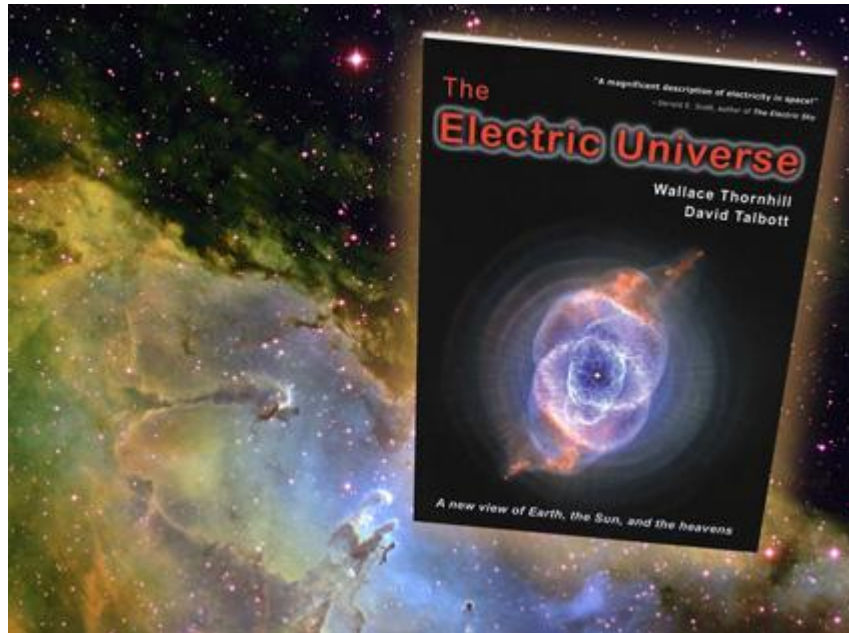
The problem in astrophysics runs deep because dogma has ensured the practitioners are not trained appropriately for their task. They look upon structures like Red Square and supernova 1987A and cannot recognize them as plasma discharges. But what scientist would volunteer that they have been wasting their careers and our money and don't know what they are talking about?

Astrophysicists will not be motivated to change anything while supine journalists allow them to ignore plasma cosmology. But as the evidence for an electric universe stacks up ever faster, the truth can only be delayed; it cannot be avoided. The astrophysical crisis is here now at Red Square.

Wal Thornhill

Io and the Electric Universe

Posted on [May 30, 2007](#) by [Wal Thornhill](#)



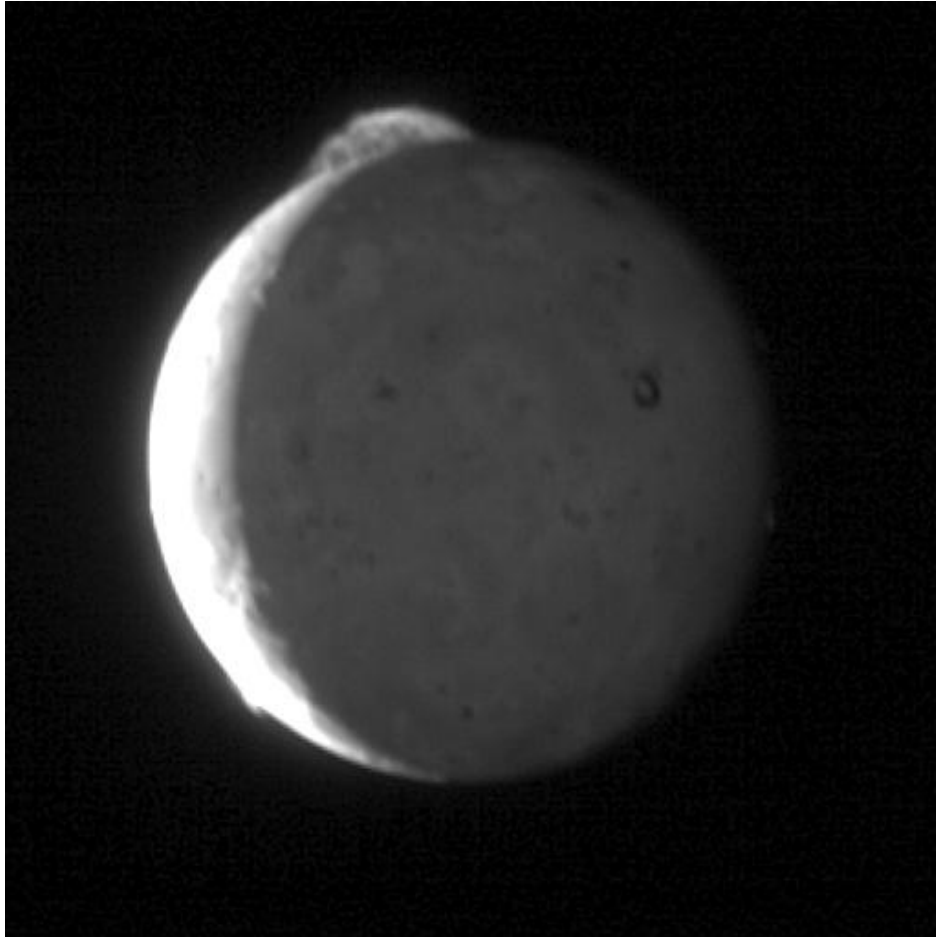
The book is now available from [Mikamar Publishing](#).

"Compelling, highly readable, and superbly illustrated, this book provides a comprehensive introduction to what will surely be the beginnings of a scientific revolution in the years ahead. The Electric Universe understanding eliminates the need for the highly imaginative, sensational yet logic-breaking constructs of black holes, dark matter and energy, and replaces them with laboratory demonstrated plasma phenomena."

As if to herald the arrival of the book, a series of images of the electric 'plasma gun' jet on Io, known to NASA scientists only as the 'volcano' Tvashtar, have been released as a brief [movie](#) (see below).

The [second news item on this website](#), in October 1999, credited Professor Tommy Gold with predicting in 1979 that the so-called volcanoes on Io are actually the sites of [powerful electric discharges](#). Gold's view was substantiated in a paper in 1987 by Peratt and Dessler: "Filamentation of Volcanic Plumes on the Jovian Satellite Io" where they showed the filamentation and cross-sectional shape of the plume "is consistent with theories developed from laboratory observation." Meanwhile "The knots and filaments that allow us to track the plume's motion are still mysterious" according to NASA scientists. Yet they have had 20 years to acknowledge the contribution from experimental plasma physics! Io's plumes highlight the dysfunctional nature of specialization in science. We are long overdue for a revolution in science that breaks down the artificial barriers between disciplines. Those barriers have more to do with maintaining exclusive

'guilds' than they do with advancing our understanding. A 'Big Picture' of our true place in the universe will only be achieved by a synthesis of information from all present disciplines and a forensic style re-examination of information from our past on this planet.



From the NASA caption:

This five-frame sequence of New Horizons images captures the giant plume from Io's Tvashtar volcano. Snapped by the probe's Long Range Reconnaissance Imager (LORRI) as the spacecraft flew past Jupiter earlier this year, this first-ever "movie" of an Io plume clearly shows motion in the cloud of volcanic debris, which extends 330 kilometers (200 miles) above the moon's surface. Only the upper part of the plume is visible from this vantage point – the plume's source is 130 kilometers (80 miles) below the edge of Io's disk, on the far side of the moon.

The appearance and motion of the plume is remarkably similar to an ornamental fountain on Earth, replicated on a gigantic scale. The knots and filaments that allow us to track the plume's motion are still mysterious, but this movie is likely to help scientists understand their origin, as well as provide unique information on the plume dynamics.

Io's hyperactive nature is emphasized by the fact that two other volcanic plumes are also visible off the edge of Io's disk: Masubi at the 7 o'clock position, and a very faint plume, possibly from the volcano Zal, at the 10 o'clock position. Jupiter illuminates the night side of Io, and the most prominent feature visible on the disk is the dark horseshoe shape of the volcano Loki, likely an enormous lava lake. Boosaule Mons, which at 18 kilometers (11 miles) is the highest mountain on Io and one of the highest mountains in the solar system, pokes above the edge of the disk on the right side.

The five images were obtained over an 8-minute span, with two minutes between frames, from 23:50 to 23:58 Universal Time on March 1, 2007. Io was 3.8 million kilometers (2.4 million miles) from New Horizons; the image is centered at Io coordinates 0 degrees north, 342 degrees west.

The pictures were part of a sequence designed to look at Jupiter's rings, but planners included Io in the sequence because the moon was passing behind Jupiter's rings at the time.

Release date: May 14, 2007. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute

A word of explanation for those who have been frustrated by a lack of news items recently. Firstly I offer the newly published book in recompense. Then there are four conferences being held this year, beginning in June, which have invited me to present aspects of the Electric Universe. In addition, important papers have required editing for publication in August. Meanwhile, the supportive evidence for the Electric Universe pours in relentlessly.

Wal Thornhill

2008

2008 – Year of the Electric Universe

Posted on [January 10, 2008](#) by [Wal Thornhill](#)

The pause in news from this website is ended. I declare 2008 the International Year of the Electric Universe. More on that later...

**"A first rate theory predicts
A second rate theory forbids
And a third rate theory explains after the fact."
—*The Russian crystallographer, Alexander I. Kitaigorodskii.***

Karl Popper listed two other criteria of a good, new theory besides falsifiability. Firstly, it should, *"proceed from some simple, new, and powerful unifying idea."* It should, in principle, be able to unify a body of knowledge that would otherwise be a set of disparate facts. Secondly, Popper held that it should pass some tests. A good new theory should make at least one successful prediction not apparent from existing theory.

Things have been happening. My companion website, [THUNDERBOLTS.INFO](#), has a new managing editor of the Thunderbolts Picture of the Day (TPOD), Steve Smith, who has expanded the daily news coverage with much new material. The Thunderbolts website has grown to include a [forum](#) and weekly update. More features are planned. The impetus for expansion followed a June meeting in Las Vegas of talented people inspired by the first rate interdisciplinary science of an Electric Universe.

Also in June I attended the International Conference on Plasma Science (ICOPS 2007) in Albuquerque, NM, and presented papers on the electrical nature of comets and electric surface scarring. Biological applications of plasma science were of particular interest at that conference.

At the end of August I spoke at the UK Society for Interdisciplinary Studies Cambridge Conference on the electrical nature of gravity and its implications for planetary orbital stability. It was gratifying to see new people from around the world motivated to come to the conference.

To cap it all, two peer-reviewed papers were published in August in the IEEE Transactions on Plasma Science. The first, co-authored with my colleague Dr. C. J. Ransom, detailed the experimental results of crater and spherule (Martian "blueberries") formation by plasma arcs. The second is a paper on the electrical nature of stars and supernovae. My new book, [THE ELECTRIC UNIVERSE](#), co-authored with David Talbott, covers the topic in some detail.

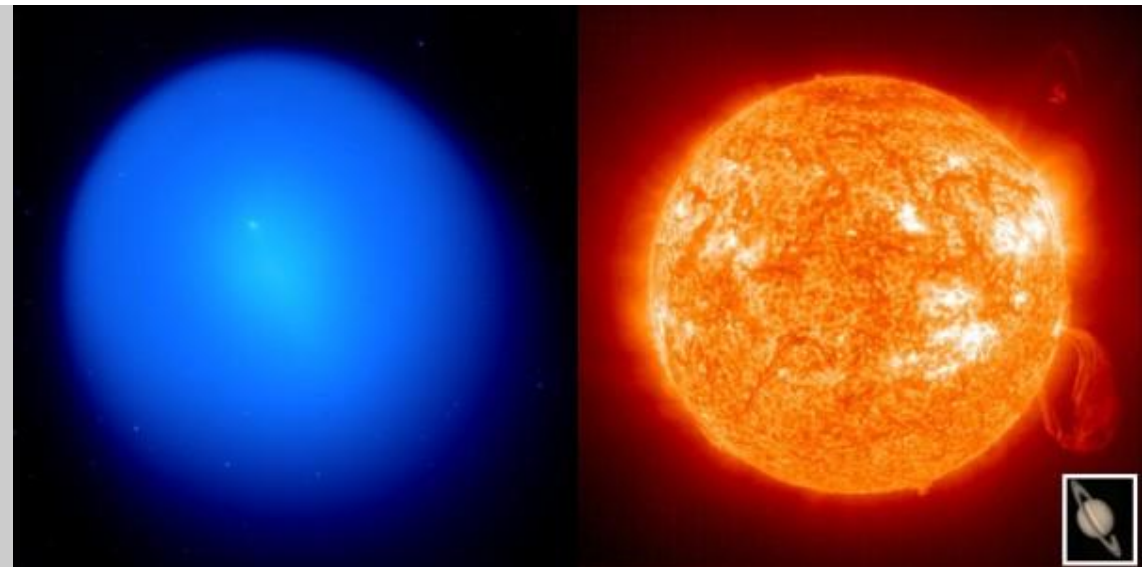
Several guest appearances on radio programs in the U.S. helped to publicize the work. And Thunderbolts of the Gods is to be published in Japanese, preceded by publicity in the popular press. It is an historic opportunity for Japanese scientists to do an "end run" around sclerotic western science.

The Electric Universe paradigm continues its successful run of discovery and prediction.

In recent months...

1. The electric comet.

On October 24th, periodic Comet Holmes (17P) brightened by nearly a million times overnight. For no apparent reason, it erupted from a very dim magnitude 17 to about magnitude 2.5 and its coma expanded to 2 million km diameter. Formerly, the Sun was the largest object in the Solar System. Briefly, Comet 17P/Holmes held that distinction.



(Left) Image of comet Holmes from the 3.6-meter Canada-France-Hawaii telescope on Mauna Kea showing the 1.4 million km diameter coma approximately 5 months after perihelion (the point in an orbit that is closest to the Sun). The white "star" near the center of the coma is in fact the dust-shrouded nucleus. (Right) the Sun and planet Saturn shown at the same scale for comparison. (Sun and Saturn images courtesy of ESA/NASA's SOHO and Voyager projects). Credit: D. Jewitt and R. Stevenson, Institute for Astronomy, University of Hawaii.

Comets will remain an enigma to astronomers as long as they insist that the star-size comas can be controlled in the solar 'wind' by the gravity of a tiny nucleus and that the energetic performances can be explained by solar heating. Comets are highly charged bodies moving radially in the electrical domain of the Sun. The comas and ion tails are an

electrical phenomenon. And the dust is finely divided because it has been electrically 'sputtered' from the nucleus.

2. Astronomers finally admit that Venus has lightning.

"In addition to all the pressure and heat, we can confirm there is lightning on Venus — maybe even more activity than there is here on Earth," said Christopher Russell, a NASA-sponsored scientist on Venus Express from the University of California. Earlier claims for lightning on Venus were greeted with scepticism and denial.

I wrote in ['The Shiny Mountains of Venus,'](#) December 2003:

"The principal difficulty in understanding the origin of lightning is due to the assumption that the Earth and Venus are closed electrical systems with no input from the solar plasma environment via the magnetosphere. The Venusian ionosphere is directly coupled to the solar wind. Intense airglow emission in long wavelength UV was observed to occupy a large volume of the ionosphere on both the day and night sides of the planet. The intensity seems to be linked to solar activity. I would therefore expect lightning activity on Venus to be generated, not from cloud motions, but from electrical input originating in the Sun."

My explanation for the radar-shiny mountains of Venus as a 'St. Elmo's fire' type of surface plasma discharge phenomenon stands as a further prediction.

3. Electric current from the Sun powers auroras.

On March 23, 2007 an auroral substorm erupted over Alaska and Canada, producing vivid auroras for more than two hours. Substorms are sudden bursts of energy in Earth's atmosphere that turn the undulating curtains of the Northern Lights into hyperactive light shows lasting from minutes to hours. Estimates of the total energy of the two-hour event were put at five hundred thousand billion (5×10^{14}) Joules. That's approximately equivalent to the energy of a magnitude 5.5 earthquake.

Where does all that energy come from? [THEMIS](#) may have found an answer:

"The satellites have found evidence for magnetic ropes connecting Earth's upper atmosphere directly to the Sun," says Dave Sibeck, project scientist for the mission at the Goddard Space Flight Center. *"We believe that solar wind particles flow in along these ropes, providing energy for geomagnetic storms and auroras."*

This report was written within days of the 140th anniversary of the birth of the Norwegian-born physicist Kristian Birkeland. Birkeland correctly hypothesized and demonstrated experimentally in the early 20th century that electric current from the Sun powers the earth's auroras. The 'magnetic ropes' connecting the Sun and the Earth are more correctly named after him- 'Birkeland currents.' The solar wind is not a mechanical 'wind' of particles, it is an electric current from the Sun that takes the form of twisted filament pairs and plasma sheets.

"We have much more to learn about all these things," says Angelopoulos.

"I can't wait to see what comes next."

Reading Birkeland's century-old works would be a good start for NASA scientists. Terry Pratchett's wry remark applies to science: *"Most of what you get taught is lies. It has to be. Sometimes if you get the truth all at once, you can't understand it."*

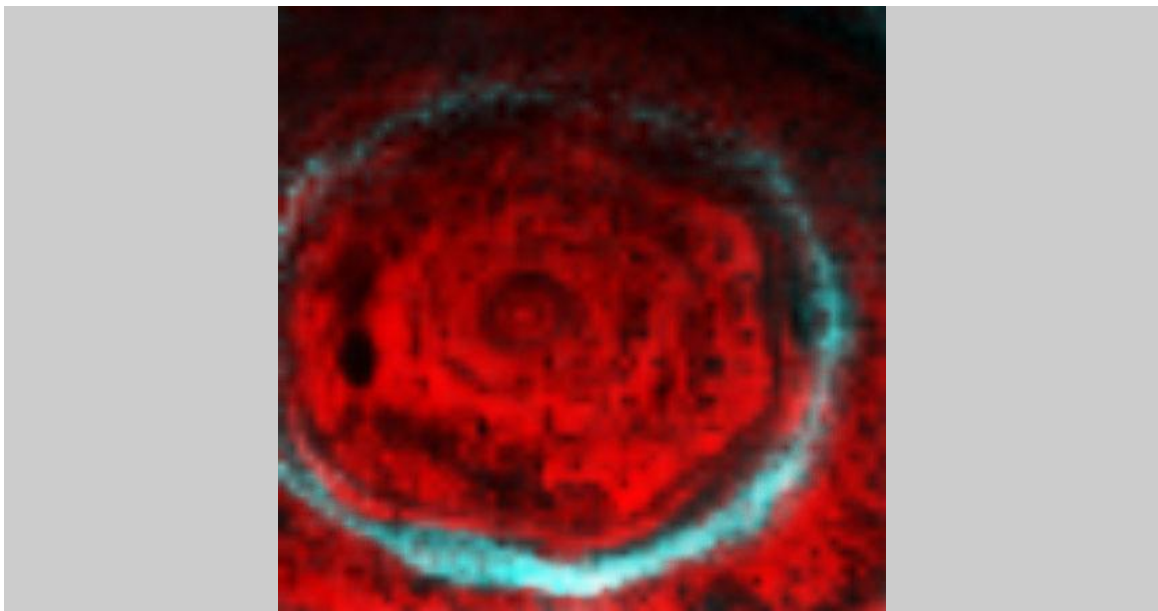
"It seems to be a natural consequence of our points of view to assume that the whole of space is filled with electrons and flying electric ions of all kinds."

— Kristian Birkeland

4. Saturn's north polar hot spot and the Electric Universe "experimentum crucis."

In Science, Feb 4, 2005, the W. M. Keck Observatory reported the discovery of a south polar hot spot on Saturn. See [The Spiral Galaxy at Saturn's Pole](#). Saturn's south pole is presently lit by the Sun but it was not expected to be the hottest place on the planet! Saturn's north pole has been in darkness since 1995, which prompted Dr. Orton to remark:

"One of the obvious questions is whether Saturn's north pole is anomalously cold and whether a cold polar vortex has been established there."



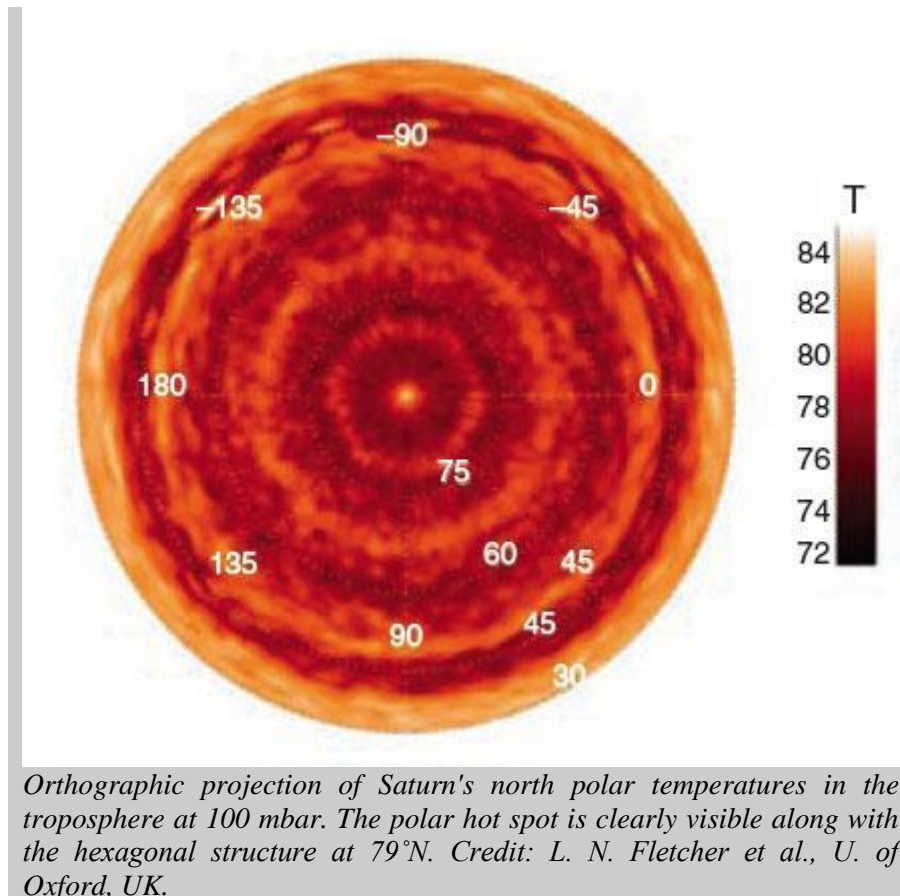
Saturn's North Pole Hexagon and Aurora. This night-time view of Saturn's north pole by the visual and infrared mapping spectrometer on NASA's Cassini orbiter reveals a dynamic, active planet at least 75 kilometers (47 miles) below the normal cloud tops seen in visible light. Clearly revealed is the bizarre six-sided hexagon feature present at the north pole. Credit: NASA/JPL/University of Arizona.

The following day I posted the news "[Saturn's Strange Hot Spot Explained.](#)" In it I made the following statement:

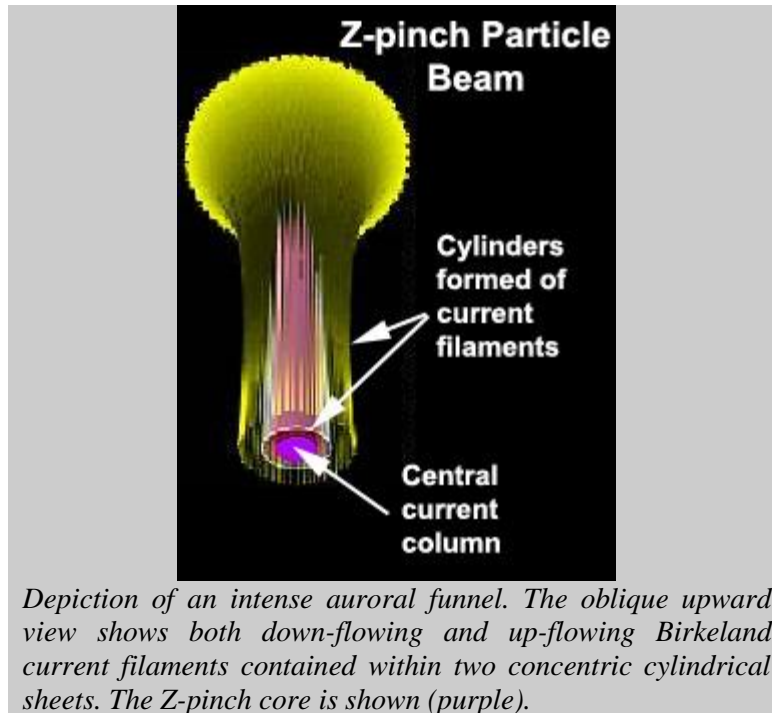
"The Electric Universe predicts, experimentum crucis, that BOTH poles should be hot, not one hot and the other cold."

That *extraordinary* prediction was confirmed in a report in Science on Jan 4. Such unusual predictions have become a hallmark of the Electric Universe paradigm and establish it as a first class theory. The bizarre long-lived hexagonal feature is a mystery to astronomers. Ground-based observations published in Science, April 16, 1993, prompted the remark:

"The large lifetime of cloud features poleward of $\sim 74^\circ\text{N}$ seems amazing in view of the strong seasonal insolation cycle at these latitudes."



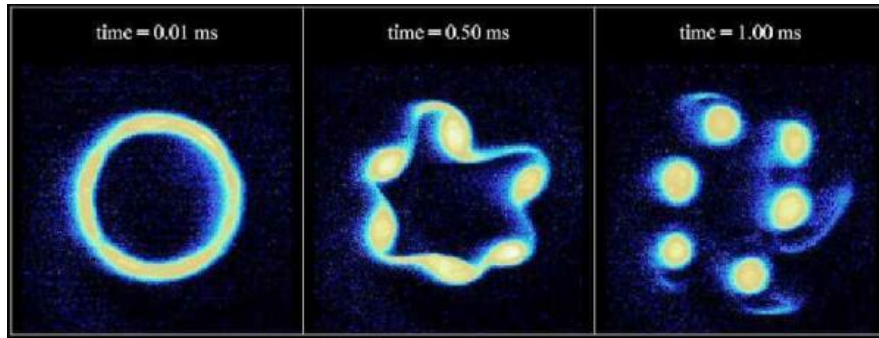
The polar hot spot and long-lived hexagonal feature results from a continuous electric current flowing from the Sun into the pole of Saturn. The hot spot will remain for as long as the Sun shines electrically. The blue (false color) auroral ring shows that the current flows into Saturn via a cylindrical electron beam propagating along Saturn's magnetic field and magnetically pinching (known as a Z-pinch) down to the polar region.



"The auroral plasma column is susceptible to two plasma instabilities; hollowing of the relativistic electron beam to form the sheets and the diocotron instability that cause the sheets to filament into individual current strands causing the "swirls" or "curtains." These instabilities also produce the radiation observed over a wide range of the electromagnetic spectrum."

— A. Peratt. *Characteristics For The Occurrence Of A High-Current, Z-Pinch Aurora*, ([PDF 6.6 Mb](#)) *IEEE Transactions On Plasma Science*, Vol. 31, No. 6, December 2003.

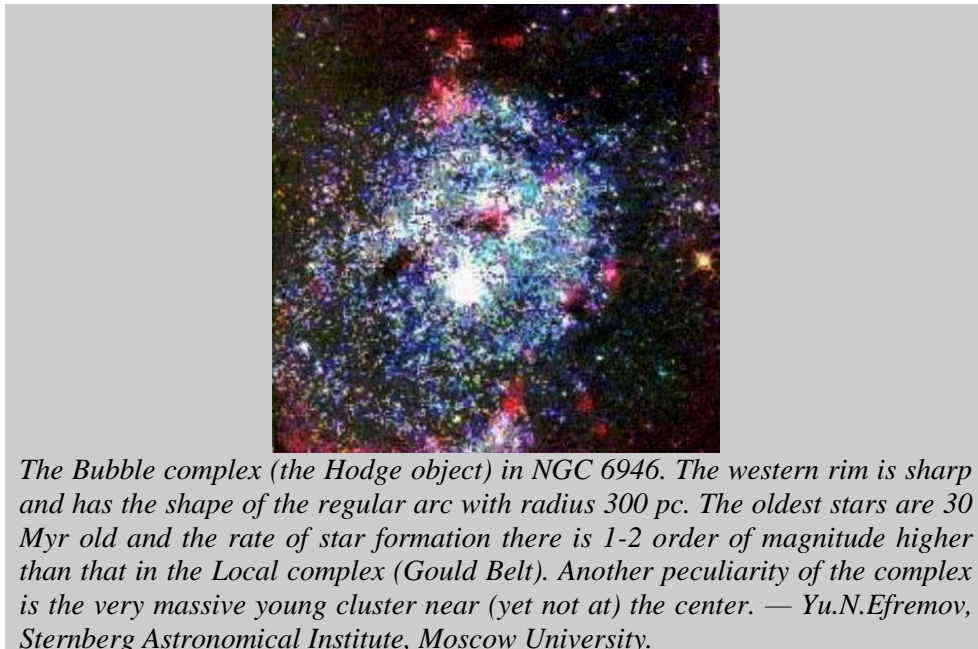
Birkeland current filamentation can be seen best in the top quadrants of Saturn's blue auroral ring. The cylindrical auroral beam is subject to vortex formation, known as 'diocotron instabilities.' Historically, vortex structure and vortex interactions in charged particle beams have been known since the turn of the 19th century when Kristian Birkeland first photographed the passage of particle beams through low vacuum in his terrella cathode experiments. Neighbouring vortices are subject to long-range attractive and short-range repulsive forces, which result in a departure of the discharge pattern from a circle to a polygon.



The diocotron instabilities in the inner current cylinder are forcing the cloud pattern to form the distinctive hexagonal shape. The polar hot spot is heated by the Birkeland current discharge in the core of the Z-pinch.

It is important to note that Jupiter has been found to have a hexagonal cloud collar at its north pole. And Neptune, the most distant planet from the Sun, has a hot pole. These discoveries show that these planets are connected electrically to the Sun's circuit and real power source—the galaxy. Jupiter's Great Red Spot occasionally shows clear hexagonal morphology too, which indicates that it is an electrical tornado connected to some surface electrical anomaly beneath the clouds.

Given the almost unlimited scalability of plasma phenomena, it is not surprising that there are galaxies exhibiting hexagonal structure within a circular arc (NGC 7421, NGC4676A) and diocotron instabilities in their spiral arms (NGC 3646). (The arcs are formed electrically not by collision). In addition there are circular and hexagonal structures within the spiral arms (the Hodge object in NGC 6946). Even more compelling for the Electric Universe model is that the center of the Hodge object is a region of vigorous star formation.



The Bubble complex (the Hodge object) in NGC 6946. The western rim is sharp and has the shape of the regular arc with radius 300 pc. The oldest stars are 30 Myr old and the rate of star formation there is 1-2 order of magnitude higher than that in the Local complex (Gould Belt). Another peculiarity of the complex is the very massive young cluster near (yet not at) the center. — Yu.N.Efremov, Sternberg Astronomical Institute, Moscow University.

In fact, the shape and position of the star cluster mimics the complex polar vortex on Venus! It is the characteristic form of two interacting Birkeland current filaments. The bright stars shows the formation of trailing arms and spiral structure.

This demonstrates that in an Electric Universe stars are not formed by gravitational accretion but by the infinitely more powerful electromagnetic scavenging of gas and dust by a galactic Z-pinch discharge. And once formed, the discharge continues to light the stars.

The beautiful, ubiquitous spiral structure seen throughout deep space is revealed as the visible manifestation of the intersection of two cosmic power lines!

2008-The International Year of the Electric Universe

We have an opportunity in 2008 to begin a renaissance in astronomy and cosmology. Unfortunately it will be too late to have any influence on the International Year of Astronomy (IYA) 2009, which was recently proclaimed by the United Nations' General Assembly. The International Astronomical Union IYA 2009 celebrates the 400th anniversary of Galileo's introduction of the telescope to astronomy. A statement issued by the IAU, the world's largest association of professional astronomers, notes that in 1609 Galileo *"initiated 400 years of astronomical discoveries and triggered a scientific revolution which profoundly affected our worldview."*

The vast resources to be poured into that enterprise would be far better employed under a new scientific revolution grounded in reality and commonsense. We already have enough telescopic observations to make phenomenal advances. But with astronomy a pseudoscience we have no reason to celebrate. Our cosmology has become so fantastic as to bear no relationship to everyday experience, experimental verification or any practical use. News headlines read like science fantasy because that's what cosmology has become. If alive today, Galileo would not be amused. The modern doctrine of the absurd big bang creation event and expanding universe shows that while the technology has advanced, astronomy/cosmology has become merely a substitute religion.

It is impossible that the Big Bang is wrong. We may have to make it more complicated to cover the observations, but it is hard to think of anything that could refute the theory itself.

— Joseph Silk, Savilian Chair of Astronomy, University of Oxford.

Cosmology has always been – and will by definition always remain – a borderland between science and philosophy – some would say religion.

— Cosmic Plasma, Hannes Alfvén, 1981.

In the limit Alfvén may be right. But cosmologists have lost touch with science and philosophy and wandered into a borderland of pseudoscience.* Humanity was never more in need of a new science of Life in the Universe. Our hope-less, detached cosmology permeates our lives. We thrash about in ignorance, nonsense and illogicality, seeking real meaning to our existence. All we are offered is a quasi-religious creation from nothing in a mysterious, unscientific event—the "big bang"—followed by random and unexplained miracles to arrive at the present. And our future? We are to fizzle out in eventual darkness or incineration. How uninspired. How unintelligent!

A real cosmology must reunite the sciences, humanities and the arts. It cannot be limited to astronomy. It must give real meaning to Life. It is becoming clear to more and more scholars and the questioning public from around the world that the Electric Universe offers such a broad vista of future science. It is time to get started in 2008. We have no time to lose.

"The Electric Universe opens up science again to the individual.

Science will blossom in the new millennium as a cultural activity more integrated with history, the arts and the human condition."

— from the preface to the Electric Universe.

* Pseudoscience [Wikipedia]:

"Pseudosciences may be characterised by the use of vague, exaggerated or untestable claims, over-reliance on confirmation rather than refutation, lack of openness to testing by other experts, and a lack of progress in theory development."

Pseudoscience is widespread and afflicts all science. The malaise stems from theoretical physics. As science-philosopher Viv Pope said at a 2002 meeting:

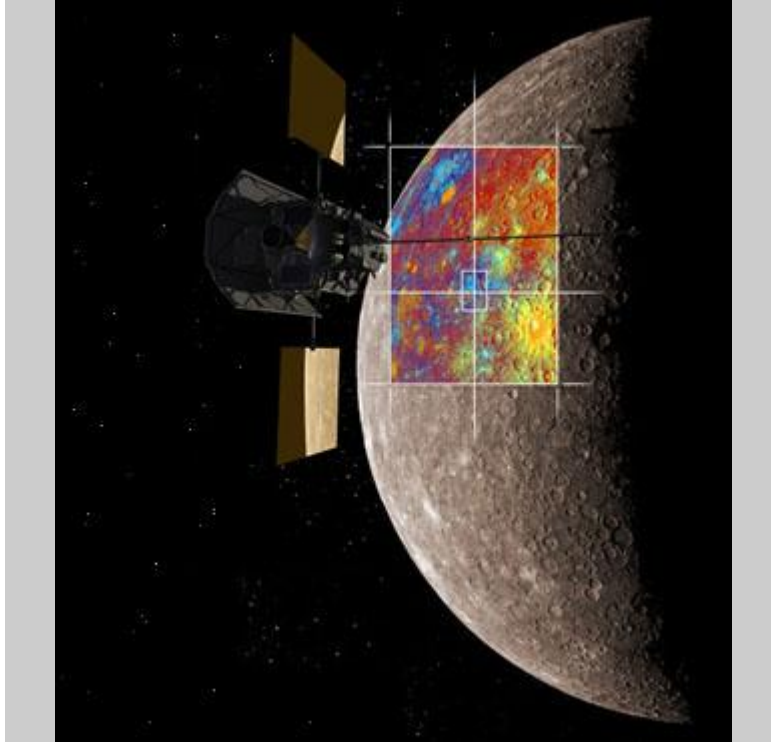
"The majority of people nowadays neither know nor care what Theoretical Physics is or what it does. In the subject itself, confusion reigns supreme. Many professionals believe that it has gone beyond any prospect of repair with more and more theoretical patching and that nothing less than a whole new philosophical approach – a new paradigm, in effect – is now long overdue."

Wal Thornhill

Astronomical Myths of Mercury & the Sun

Posted on [January 14, 2008](#) by [Wal Thornhill](#)

The Messenger spacecraft has its inaugural fly-by of the planet Mercury today. Once again we hear the mantra that it will answer the solar system's big questions. Once again it will fail to do so because our modern myths of astronomy and solar system history prevent insight and understanding.



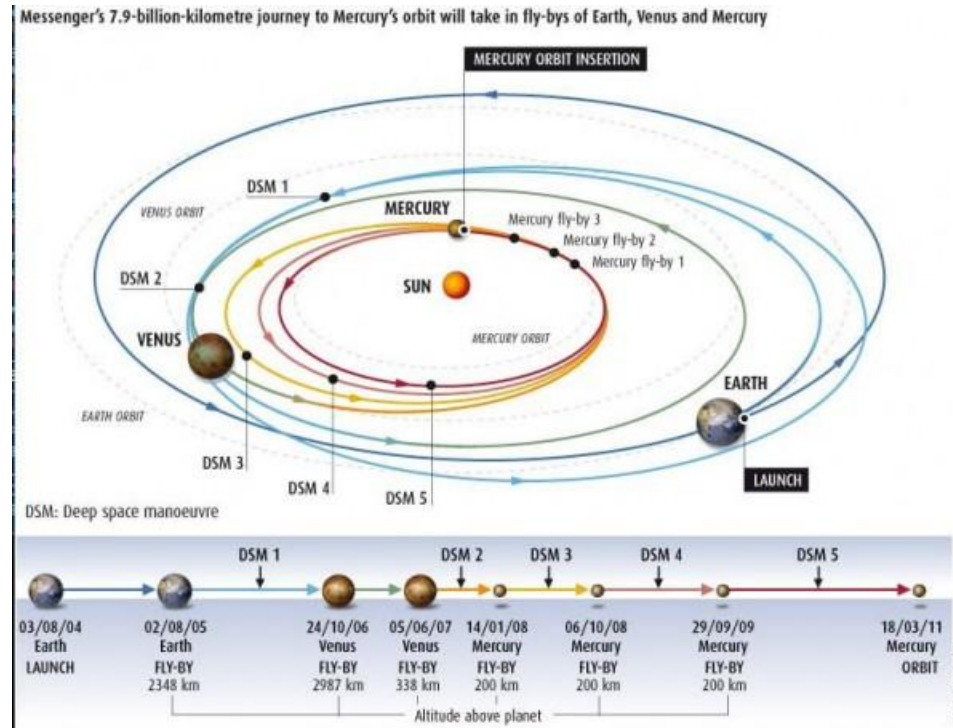
At 2:04 p.m. EST MESSENGER skimmed 200 kilometers (124 miles) above the surface of Mercury in the first of three flybys of the planet. Initial indications from the radio signals indicate the spacecraft is still operating nominally.

In a New Scientist cover story, "[Unlocking Mercury's secrets](#)," 5 January 2008, the author Stuart Clark writes:

"If you want answers to the solar system's big questions, get as close to the sun as you can."

That may be true but it is unnecessary. We already have enough information to figure things out. Yet we may expect the usual "it's back to the drawing board," comments after the fly-by and after Messenger goes into orbit about the planet in March 2011. The problem for scientists lies in the indelible myths inscribed on their drawing board a century and more ago. The following New Scientist story is a clear illustration.

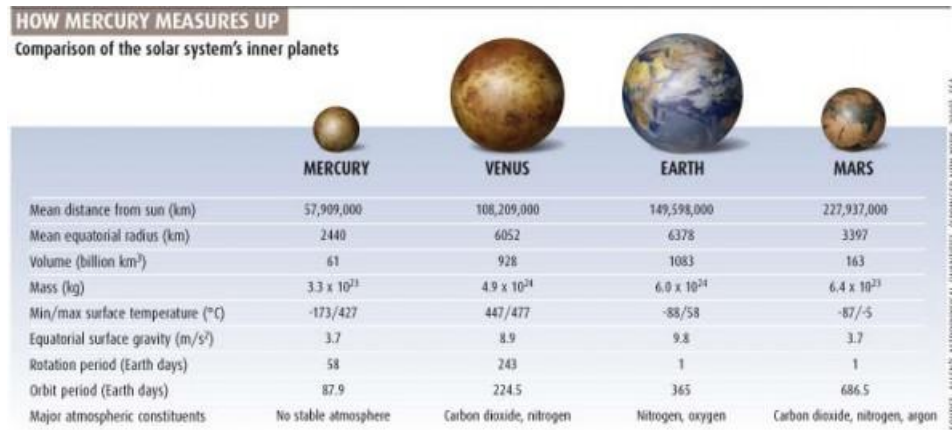
"For more than 30 years we have virtually ignored Mercury. Yet that's all about to change thanks to NASA's [Messenger](#) spacecraft. Launched on 3 August 2004, the probe is about to begin a series of three fly-bys which will manoeuvre it into position to enter orbit around Mercury on 18 March 2011.



The inaugural fly-by on 14 January will provide the first opportunity to explore Mercury since 1975, when NASA's Mariner 10 spacecraft completed its third and final fly-by. Planetologists are getting excited. McNutt, the mission's project scientist, and his colleagues have a big list of Mercurial mysteries to solve, and believe that Messenger could crack some of them on its first pass.

Of all the planets in our solar system, Mercury is an enigma. The chimeric planet has a face like the moon, yet conceals a metal heart larger than that of Mars; while all of the major planets go around the sun in more or less the same plane, Mercury opts for a jaunty angle; while Earth's orbit is essentially round, Mercury prefers an ellipse; and let's not forget the magnetic field that it shouldn't have. Clearly, the closest planet to the sun is trying to tell us something.

HOW MERCURY MEASURES UP
Comparison of the solar system's inner planets



	MERCURY	VENUS	EARTH	MARS
Mean distance from sun (km)	57,909,000	108,209,000	149,598,000	227,937,000
Mean equatorial radius (km)	2440	6052	6378	3397
Volume (billion km ³)	61	928	1083	163
Mass (kg)	3.3×10^{23}	4.9×10^{24}	6.0×10^{24}	6.4×10^{23}
Min/max surface temperature (°C)	-173/427	447/477	-88/58	-87/-5
Equatorial surface gravity (m/s ²)	3.7	8.9	9.8	3.7
Rotation period (Earth days)	58	243	1	1
Orbit period (Earth days)	87.9	224.5	365	686.5
Major atmospheric constituents	No stable atmosphere	Carbon dioxide, nitrogen	Nitrogen, oxygen	Carbon dioxide, nitrogen, argon

SOURCE: ALLEN'S ASTRONOMICAL QUANTITIES, COPYRIGHTED NEW YORK, 2000, USA

It even had a famous fan: Albert Einstein. Mercury's odd motion around the sun was impossible to explain with Newton's theory of gravitation alone. The puzzle remained until Einstein used it as the first convincing evidence for his general theory of relativity."

Myth No. 1. Mercury's motion is convincing evidence for Einstein's general theory of relativity.

Einstein's geometric theory of general relativity makes no real sense whatsoever. It leaves more unanswerable questions than it appears to solve. How, precisely, does matter have an effect on empty space? Nobel Prize nominee, the late Professor C. L. Kervran, stated the problem:

"..the word "matter" has no exact meaning; we just do not know what matter is; we do not know what a proton or electron is made of; the word only serves to cloak our ignorance. Matter has not been proved to come from energy."

In addition, the concept of curved or 'warped' empty space has no physical reality. It is a purely mathematical concept where the word 'dimension' has a broader meaning than mensuration. It seems that the esoteric theoretical geometry of general relativity may have defeated Einstein too. A fellow Australian has issued a quite simple and specific, yet unanswered, mathematical [challenge](#) to hundreds of experts. His conclusion?

"The relativists have all fatally erred in their analysis of black holes and relativistic cosmology. General Relativity does not predict black holes or expansion of the Universe with or without a big bang."*

The stark nakedness of our 'emperors of science' underlines the power of myth to blind us to reality. Mercury's perihelion advance is telling us something different. But no one can see that—yet.

* One mistake is a school kid howler. The mathematical infinity generated by treating an extended object as a point mass and letting the radius of gravitational attraction tend to

zero is invalid. The center of mass is a geometric convenience that has its uses for such things as calculating moments of inertia and deriving planetary orbits, but to reify it into a gravitating "thing" is an exercise in human imagination, not reality. The expression for gravitational field strength at a point inside an extended object isn't the same as for a point outside it. But invoking a point mass makes every part of the object "outside." Within a gravitating mass, the force diminishes as you move inward from the surface and more of the downward pull is offset by mass that now lies above, until at the center of a sphere it becomes zero. The surrounding region is therefore not under intense compression, which precludes any formation of a black hole. The debate over general relativity is ephemeral and of no real consequence. Massive public funding of research in relativistic cosmology should stop and those responsible for the unconscionable waste of time and resources held to account. It should be obvious that gravity is a property of matter and not of empty space.

Myth No. 2. We can use Newton's law of gravity to determine the mass of a celestial body and from that its density.

All subatomic particles are composites of electric charge. Gravity is a weak manifestation of a dipolar electric force between distorted subatomic particles. The distortion is a sum due to the presence of matter in the rest of the universe. I will present more on this topic in a forthcoming news item, following the publication of my paper for the UK Society for Interdisciplinary Studies [2007 Cambridge conference](#). Empirically, we observe subatomic particles accelerated in an electric field apparently gaining in mass. That apparent mass increase is not due to the particles' motion but the absorption of energy in the form of particle distortion instead of acceleration. So the mass of a body is an electrical variable! Mass is not directly related to the quantity of matter. And Newton's 'universal constant of gravitation,' G , which has the dimensions of length cubed, divided by mass and by time squared, is neither 'universal' nor 'constant' since it includes mass. It means that we cannot determine the density of a planet from its gravitational field and make assumptions about its internal composition. **Mercury does not conceal a metal heart larger than that of Mars. It will be found eventually to have a composition and structure like that of similar looking bodies in the solar system. Analysis of Mercury's surface mineralogy will validate that superficially at least.**

"Now astronomers think it holds another secret: how the solar system itself was formed. Ralph McNutt, a planetary scientist at Johns Hopkins University in Baltimore, Maryland, is in no doubt about the planet's importance. "Mercury is the key to the solar system," he says. If you can explain how such an oddball planet came together, it would go a long way to explaining how all the others formed."

Myth No. 3. The solar system was formed in a single gravitational collapse event of a widely dispersed cloud of gas and dust, 3.7 billion years ago. The solar system has no recent history.

The obligatory mantra about uncovering the secret of how the solar system was formed is repeated. Each time silence follows, or else a smile and a wave as scientists head back to the drawing board. There is no acceptable gravitational theory of the formation of the solar system from an initial rotating cloud of gas and dust. In a recent expert forum I attended it was admitted that it is difficult for an object to accrete to 1 km in size and to make planets. In contradiction to the accretion theory it is then necessary for a planet to lose a lot of mass. In fact it requires a separate theory for each planet! And critical to our understanding of gravity — it is not understood why planets have such circular orbits. (The simple answer to that question will be addressed in the forthcoming paper).

Star formation

Observations of rings of dust about nearby stars seems to have confirmed in astronomers' minds the notion of an 'accretion' disk. But this is an unwarranted assumption when we also see stars ejecting colossal jets of matter in defiance of gravity. Stars are formed in an electrical Z-pinch at the intersection of cosmic 'power lines' or Birkeland current filaments. The electromagnetic scavenging effect of these entwined Birkeland filaments falls off slowly with distance from their linear axis. Gravity falls off much more rapidly — with the square of the radial distance from a central mass. Electric stars are formed in a linear group and provided with an initial spin by the rotary electromagnetic forces inherent in the plasma Z-pinch. In the laboratory, as the Z-pinch decays, the plasmoids (stars) "scatter like buckshot." However stellar axial alignments may remain as a signature of their common birth. Stars remain attached to their electrical umbilical cords and draw their power from them. The magnetic fields detected by radio telescopes trace the cosmic circuitry.

Planet formation

In a suddenly changing electrical environment a star may 'split' into pieces to accommodate electrical stress. It presents a larger surface area to the discharge current. Of 100 nearby stars 40 are binaries, 15 triplets and 5 quadruplets. The partitioning usually includes smaller objects — 'hot' gas giants — so-called because they have been found to orbit a star extremely closely.

Not all stars shine brightly like the Sun. There is a discontinuity in plasma discharge phenomena that causes the bright 'anode tufting' seen as granulation on our own Sun. At lower power densities there is no need for 'tufting' and the red chromospheric 'anode glow' becomes dominant. That is the realm of red stars, both so-called dwarfs and giants. Both appear giant relative to the physical size of the star because their red chromospheric anode glow expands into space seeking electrons to satisfy their discharge. Brown dwarfs are like our own gas giants but leading an electrical existence independent of a bright

star. They are more abundant than bright stars in the galaxy. **All bodies in the universe are supplied with electrical power.**

Capture of another star by the Sun is likely because orbits are changed strongly by charge exchange. Change the charge on a celestial body and its mass is changed. By simple conservation of energy, its orbit is changed in the same proportion. Entering the Sun's circuit, the electric light goes out on a captured dwarf star and it becomes a gas giant planet in a distant orbit. It seems that electrogravitic restoring forces due to repeated passages of a strongly discharging planet (comet) through the Sun's equatorial current sheet during capture causes the captive star to settle toward that plane.

Given this scenario we are much better placed to understand our 'fruit salad' of a solar system. The distant gas giant planets are captured brown dwarf stars, each bringing its entourage of minor planets (moons), some actually being [born](#) (expelled electrically from the core) in the process of charge exchange and capture. Saturn retains its 'expulsion disk' and is the most recent addition to the solar system. Saturn is remembered by the earliest civilizations as THE SUN! (See "[Cassini's Homecoming](#)." Our book, [Thunderbolts of the Gods](#), details the global petroglyph evidence for powerful electrical effects witnessed in Saturn's transition from star to gas giant. The strange, complex figures are accurate renditions of plasma instabilities seen only recently in the highest energy electrical experiments on Earth.

This throws into sharp relief how recently the solar system last changed. It is exactly as it appears — a blended family. The Sun is our foster parent. Looking for gradations in properties of the planets according to a retrocalculated theoretical order is futile. We must learn to appreciate the familial differences and in the process learn more about our neighborhood in the Milky Way. **We don't need to travel to study the nearest stars. Some have come to us!**

Myth No. 4. Radioactive dating can give reliable estimates of the ages of rocks. The solar system is 3.7 billion years old.

Radioactive dating relies on a planet being essentially a closed system since shortly after its formation. However, powerful plasma discharges are a copious source of neutrons, which can introduce radioactive species to planetary surfaces. Matter is also irradiated and transferred between planets by cosmic discharges. Radioactive 'clocks' cannot be relied upon under such circumstances. This also explains isotope anomalies in some meteorites, for example, in the Allende meteorite (and others of its type) where short-lived radioactive decay products like Mg^{26} are found to excess. It suggests conventionally that there was more than the expected amount of Al^{26} in the early nebula when the meteor was formed. This, in turn, has led to speculation that there was a nearby supernova at or near the same time. No such implausible explanation is required in an Electric Universe. The meteor is a remnant of debris removed from a planetary surface by a plasma arc, which has the power to generate radioactive species in situ in the meteorite.

"Was Mercury once twice the size?"

Mercury is peculiarly dense, suggesting it hides a huge iron core, which would account for more than 40 per cent of the planet's volume. This is a gigantic proportion compared to Earth's core, which fills just 17 per cent of its interior, and its origin is one of the planet's biggest mysteries.

One possibility is that the large core may simply reflect the fact that Mercury formed from the hot gas cloud surrounding the sun, where only metals with high melting points could have solidified. Rockier materials would not have condensed so close to the sun, leaving a metal-rich embryonic planet. Or perhaps proto-Mercury formed before the sun's fierce heat began and had rocky outer layers which then evaporated as the young sun heated up."

Myth No. 5. The Sun evolves over time as a result of consuming itself in a central thermonuclear furnace.

A star is not just a fancy version of the old 'campfire in the sky.' It is not self-immolating. A star's size and appearance are a plasma discharge phenomenon, the discharge being powered externally via galactic circuits. That is the simple explanation why the Sun's corona is millions of degrees hotter than its surface. As commonsense would dictate, stars are chemical element factories, producing in their intense photospheric plasma discharge all of the heavy elements observed in their spectra. Stars may therefore change appearance and apparent age at any time in response to their environment and in some instances have been observed to do so rapidly. The usual evolutionary story of stars' youth and senescence is fictional.

Myth No. 6. Mercury was formed where we find it today.

Mercury had nothing to do with the Sun in its early history. Mercury was never twice the size. [All planets and moons are born](#) fully formed from their parent body — usually a flaring dwarf star (or gas giant planet). The birth process involves intense plasma discharging between the parent and its departing newborn satellite, which modifies the infant's atmosphere and 'spark etches' the surface electrically, forming circular craters and distinctive Lichtenberg figures of canyons, or rilles. Subsequent near encounters with other bodies result in further electrical scarring, matter transfer and atmospheric modification. Cometary surface arcing also occurs while orbits are adjusted for a new stability within a stellar system. Mercury will be found to bear globally the hallmark scars of such events. Presently only 40% of its surface has been mapped.

"New ideas have emerged as computing power has increased. Planet-formation models suggest that enormous asteroid-like objects were hurtling around the early solar system, colliding and coalescing. Perhaps one of these, from as far away as Mars or beyond, smashed into Mercury so violently that it blasted most of Mercury's outer layers into space, leaving the planet just half its original size.

The clues to Mercury's formation should lie in its surface composition, but even there the planet shrouds itself in mystery."

Myth No. 7. Planets collide mechanically.

Modern astrophysics has degenerated into computer games based upon mechanical and gravitational concepts that are a century out of date. That is when Kristian Birkeland, in his brilliant but little known Terrella (little Earth) experiments, electrically modeled auroras and many other phenomena seen on the Sun and in space. However, the space age discovery of magnetic fields and charged particles (plasma) permeating space has not changed thinking one iota. Electricity is rarely mentioned except to say that "it does nothing" in space. Yet recently the magnetic field tracing the circuit between the Sun and our auroras was discovered. All bodies in the solar system are electrically charged. Asteroid-like objects do not simply "collide and coalesce." The smashing scenario suggested is entirely imaginary.

Collisions are generally avoided. Before mechanical contact can be made, electrical exchanges will occur. This is particularly so for large bodies. It is the missing element in explaining why planetary orbits are so circular. It is the missing element in all fanciful renditions of an asteroid or comet collision with the Earth. The Tunguska explosion in Siberia is an example where the incoming bolide was destroyed in the upper atmosphere by discharges from the ground. Of course, such cosmic discharges can be very destructive, leaving characteristic electrical scars on each body and/or entirely destroying the smaller interloper. Meteor crater in Arizona is a neat circular electrical crater with no buried meteorite. It is accompanied by nearby sinuous channels or rilles carved by surface lightning. Electrical discharges last longer than an impact, resulting in less collateral damage and sharp features. That's why the overlapping craters on Mercury and the Moon show little disturbance of each other. Lightning seeks the highest point, which explains another feature that cannot be explained by impact cratering. Small secondary-discharge craters are perched preferentially on the rims of larger craters. Material spark-machined from the craters is lofted upwards against gravity into space by powerful electrical forces. This gives the craters an astonishingly fresh appearance — as the Apollo astronauts remarked when orbiting the Moon. Mercury's craters show the same freshness and lack of fallback debris.

"If Mercury formed close to the sun, there shouldn't be much iron oxide on its surface, since this otherwise common molecule forms more easily at low temperatures. If, however, Mercury formed when building blocks from across the inner solar system coalesced, then its crust should have about the same iron oxide content as Earth's, regardless of whether a giant impact once blasted Mercury's surface layers into space.

The trouble is that Mercury sits between these two extremes. Direct observations from Earth indicate that it is 3 per cent iron oxide by mass, compared to Earth's 8 per cent. Messenger should be able to clarify this situation. The probe will also measure other key elements and identify the minerals they combine to create across the surface of the planet. For example, if Mercury's outer layer evaporated long ago, planetary scientists would expect very low quantities of silicon dioxide and large amounts of magnesium oxide, which has a higher melting point. Other

formation scenarios predict different combinations and quantities. But what if Messenger sees something that no one has predicted? "People can always come up with explanations," Jeffrey Taylor of the Hawaii Institute of Geophysics and Planetology in Honolulu."

Comment: Mercury's familial connections in the solar system are unknown at present. Similarities with other large moons in the solar system should be sought. Taylor's frank admission demonstrates how the astrophysical myths are perpetuated.

"Why does Mercury have a magnetic field?"

Mercury's large, dense core generates more than just confusion. It also gives rise to a magnetic field, as Mariner 10 discovered. The field itself is small – just one-thousandth of the strength of Earth's – but its mere presence was perhaps the biggest surprise of the discoveries made in the 1970s. Put simply, it should not be there.

A magnetic field is usually generated in the core of the planet from a circulating region of electrically conducting, molten material. As large as Mercury's iron core is in relation to the planet, it is still only half the diameter of Earth's core. This, combined with the thinner layer of insulating rocks around it, means that Mercury's core should have long since radiated away its heat and solidified, putting an end to any magnetic field."

Myth No. 8. Planetary magnetic fields are generated by a hidden 'dynamo' in the core.

A rotating charged body will produce a dipolar magnetic field. Scientists discard this simple explanation because it is calculated for the Earth that the moving charge would have to constitute a current of a billion Amps, which implies a tremendously strong electric field at the Earth's surface. But this simple electrostatic argument fails in a plasma environment. The electric field at the Earth's surface reflects merely the difference in voltage between the Earth and its plasma sheath at the magnetospheric boundary with the solar wind. Like a bird sitting on a high-voltage transmission line, we are unaware of the electrification beneath our feet.

In Mercury's case, its strong gravitational field for its size indicates a high level of internal electrical polarization. That means a high surface charge. So Mercury's slowly rotating charge will produce a small magnetic field. Other effects will modify that field. For example, currents flow in the plasma above the surface and are induced in the surface of the planet. And there is remanent magnetism associated with old cosmic thunderbolt surface scars. The eccentric orbit of Mercury within the Sun's electric field should ensure electric current is flowing to the planet throughout its year. The current flow is usually in the sense of a Faraday motor, via the poles and an equatorial plasma sheet.

"There is a slim chance that it is a "fossil field", created by magnetic material deposited in Mercury's crustal rocks as the planet solidified. Fossil fields have been detected on both the moon and Mars, but they are relatively small-scale phenomena, dubbed crustal anomalies, which seem unlikely to account for a planet-wide field.

Recent measurements from radio telescopes suggest that there is a molten mantle churning inside Mercury, because of the way the planet wobbles. Such wobbles depend upon the distribution of mass inside a planet – whether it is moving as a single, solid entity or instead sloshing around because part of it is liquid. Jean-Luc Margot of Cornell University in Ithaca, New York, and his colleagues have recently shown that Mercury's wobble is twice that expected from a completely solid object (Science, vol 316, p 710)."

Comment: Mercury may have a liquid core. We don't know the planet's history. However, there is a possible electrical cause of the observed wobble (longitudinal librations, or variations in the spin rate of a planet). The Sun occasionally dumps charge onto the Earth following a solar outburst. The length of the day changes suddenly then slowly recovers to its original duration. The effect is a mystery. But as argued earlier, the mass of a planet changes when charge is gained or lost. Simple conservation of angular momentum argues that the planet will exhibit the kind of rotational disturbance observed on Earth. The high eccentricity of Mercury's orbit in the weak radial electric field of the Sun ensures that this effect will be present in a periodic fashion and must be taken into account before pronouncing that Mercury has a liquid core.

"So what's keeping the interior molten? A popular theory is that the iron is mixed with sulphur, which would lower the freezing point of the core, allowing it to remain fluid.

There will be no way to probe the composition of the core during Messenger's first fly-by, but the path the spacecraft takes as it slingshots around the planet will reveal much about Mercury's internal structure. "With a closest approach of 200 kilometres, we will be able to measure the mass distribution of the planet and tell the extent of the molten core," says McNutt.

At the same time, Messenger's magnetometer will be studying the shape of Mercury's magnetic field to see whether it resembles that of a classic bar magnet. This would prove the field is generated in the core, as is Earth's field.

Yet even if they see this, the job is far from over, says Sean Solomon at the Carnegie Institution for Science in Washington DC, and the principal investigator for Messenger. He points out that simply scaling down the size and speed of Earth's liquid core to Mercury proportions would produce a field far stronger than Mercury's. "Something different must be going on inside Mercury," he says.

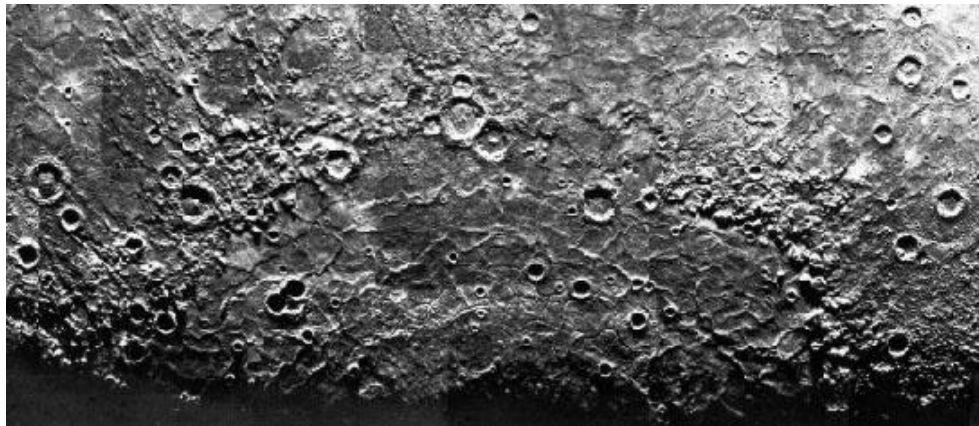
What that might be is still anyone's guess, but Messenger's fly-bys will help find out. "We should get a good measurement of the internal field, and possibly some crustal anomalies also," says Solomon."

Comment: If Mercury's magnetic field is the shape of a bar magnet it does not "prove the field is generated in the core." Certainly, there is no proof that the Earth's field is generated in a molten core. The rotating charged sphere model has been rejected on erroneous electrostatic grounds. And no account is taken of the electrical power from the Sun driving currents and generating magnetic fields around the Earth.

"What does the far side of Mercury look like?"

Mariner 10's carefully planned trajectory around the sun took it repeatedly past the planet, rather than into orbit around it. For every loop the probe made around the sun, the planet completed two orbits. This and Mercury's slow rotation rate meant that Mariner 10 always saw the same hemisphere bathed in sunlight, while the other remained hidden in darkness.

As a result, Mariner 10 only managed to image 44 per cent of the planet's surface. Being the first craft to orbit the closest planet to the sun, Messenger should finally reveal the rest. One of the structures awaiting us is the whole of Mercury's Caloris Basin, one of the biggest impact structures in the entire solar system. Mariner 10 photographed only half of it.



Caloris is estimated to stretch for 1350 kilometres and is seemingly ringed by mountains. The basin contains a flat, dark lava plain similar to the lunar maria. The crater may also allow us a glimpse "inside" Mercury because the impact will have excavated vast quantities of material from deep within the planet. "Caloris is a drill hole – a messy one – but a drill hole nonetheless," says Taylor. He suggests that the smash may have thrown lower-crust and even upper-mantle material onto the surface, where Messenger will soon be able to see it.

Messenger will capture images of half of the remaining hemisphere starting this month and fill in the gaps on its second pass, on 6 October. The planet preserves a virtually unblemished record of impacts across its near airless surface. Once the map of Mercury is complete, astronomers will be able to deduce the frequency and ferocity of collisions close to the sun during Mercury's lifetime – crucial for the understanding the how the solar system formed."

Comment: The surface of Mercury should exhibit global electrical scarring features. The APOD website offers the misinformation:

"...the Caloris Basin, ...resulted from a collision with an asteroid."

As argued earlier, massive collisions are avoided electrically. The huge ringed basin is an electrical scar. One of the characteristic features seen in cathodic electrical cratering, and inexplicable by impact, is terracing of crater walls. Another is the concentric ringed structure accompanying the blisters found on lightning arrestors following a lightning strike. Electric discharges always hit a surface vertically to form neat circular craters, often with flat melted floors. Impacts do not. Impacts cause little melting but extensive collateral damage. Cosmic discharges take the form of rotating pairs of Birkeland filaments, which drill into a surface to form rotary and corkscrew patterns. Corkscrew walled craters are found on the Moon. In many craters the rotating Birkeland filaments may leave a central peak untouched. Changing discharge current may generate corkscrew patterns and pulsations in the current or cylindrical particle beams create concentric configurations.

"Does Mercury have polar ice caps?"

As bizarre as it seems for a planet whose sunny side is hot enough to melt lead (see How Mercury measures up), Mercury may have icy deposits. "Radar echoes from Mercury's polar regions are very strong and look like the echoes we get from Mars's polar caps, and from the icy satellites of Jupiter," says John Harmon of the Arecibo Observatory in Puerto Rico.

The specific radar bright spots that the astronomers can see all seem to coincide with known polar craters. This evidence suggests that these craters are "cold traps" – permanently shaded regions of Mercury's surface where molecules freeze out of the planet's ultra-tenuous atmosphere.

Messenger will be unable to peer into the polar craters during its fly-bys, as its closest approach is above Mercury's equatorial region. However, mission controllers will turn the probe's cameras towards the poles on its first pass to look for telltale signs of icy material boiling off.

"Even though the crater floor is in shade, the walls can still heat up," Harmon explains. These walls radiate their heat, warming the ice on the floor sufficiently for some of it to boil back into Mercury's pseudo-atmosphere.

What the ice is made of is another question. While it could be water ice, it could also be anything that reflects rather than absorbs the radar signals, such as sulphur. If the polar deposits turn out to be water ice, they must be the remains of comets that have collided with Mercury. If they are sulphur, they will have originated in the planet's interior and seeped out as a result of volcanic activity.

Once Messenger settles into orbit in 2011, it will investigate the polar deposits in greater detail."

Comment: Water ice is a highly unlikely answer to the puzzle. Once again, there is an electrical possibility. Mercury is likely to have a weak dipolar magnetic field. Mercury, like all planets is connected to the solar circuit. That connection follows the magnetic field down to the poles. Any remanent magnetism of the electrical craters at the pole will tend to focus the plasma discharges upon those craters. In the near vacuum at Mercury's surface, electrons will strike the surface and form more dense plasma. If sufficiently dense, the plasma layer acts like a metallic surface coating and returns a strong radar echo. I have addressed this issue in the "[The Shiny Mountains Of Venus](#)." If this view is correct the strong radar returns may change abruptly or flicker as the auroral-type discharge moves about.

"Why is Mercury's orbit so tilted?"

Of all the major planets, Mercury has the weirdest orbit. It is elliptical, swinging 46 million kilometres from the sun right out to 70 million kilometres and back again. The 88-day orbit is tilted too, inclined at about 7 degrees to the orbital plane of Earth. At first glance, Mercury's odd orbit seems to be compelling evidence that it was walloped by another large body – perhaps the same impact that may have stripped its outer layers. As ever, though, things are not clear-cut.

"You don't need a giant impact to do this," says Solomon. "Gravitational interactions can pump up oddities in planetary orbit." Such interactions occur when planetary objects continually pass close to one another, which could have happened to Mercury during the formation of the solar system. Repeated gravitational nudges can force bodies into increasingly elongated orbits. "All you need is for an orbit to be stable, rather than circular," says Solomon, citing the various "exoplanets" now being found around other stars, many of which also have elliptical orbits.

There is probably no single observation that Messenger can make to determine the origin of Mercury's orbit. Instead, when results from the probe's many investigations are collated to provide the big picture of the planet's formation history, we will know whether a large impact was likely sometime in its past. If it was not, the focus will turn to modelling Mercury's orbit using the softly, softly approach of gravitational interactions."

Comment: Mercury's orbit can tell us nothing about Mercury's origin or that of the solar system. There is no single "origin" of the solar system. It is a complex genealogy with new actors appearing and many chapters of chaos, which makes a retrospective evolutionary story impossible. However, due to gyroscopic action, axial and orbital tilts may indicate possible related solar family members. For example Saturn, Mars and Earth have similar axial tilts. It is very interesting to note that Mercury and the Moon have

practically the same negligible tilt of their equators to the ecliptic. In addition, Mercury has a large orbital tilt, referred to the ecliptic, of 7 degrees and the Moon 5 degrees. Mercury and the Moon may be related. Their appearance certainly suggests so. The Sun captured Mercury while the Earth captured the Moon. Capture of a satellite is a quick and easy process electrically. Gravitationally it is very unlikely. Mercury's marked orbital tilt and eccentric orbit suggest a recent arrival there.

"Is there physics beyond Einstein?"

Orbiting so close to the sun, Mercury feels its gravitational pull most keenly, making it the perfect place to test general relativity. As Einstein showed, the effects of general relativity constantly alter the planet's path. On its elliptical orbit, Mercury dips in and out of the dent in space caused by the sun's mass, and this turns the planet's orbit. Any slight inconsistencies in this motion might reveal new physics in action.

However, Messenger was not designed to test fundamental physics. "We'll feel the effects of relativity – and have to correct for them – but we won't be able to test relativity to more stringent limits than before," says McNutt.

Fortunately, Messenger is not the only Mercury mission we have to look forward to. The European and Japanese space agencies plan to launch a joint mission to Mercury in 2013, and this one does plan to probe fundamental physics. Called BepiColombo, it is larger than Messenger and will consist of two orbiting spacecraft. One will scrutinise the surface of Mercury while the other will investigate the details of its magnetic field. Researchers are already referring to Messenger as the appetiser to BepiColombo's main course.

For general relativity, BepiColombo will carry radio equipment that allows mission controllers to track the position of the spacecraft to an accuracy of 10 centimetres. This accuracy will enable them to deduce the motion of the planet to within 10 metres. At present, the planetary position is only known to an accuracy of several kilometres.

Gravitational physicists and cosmologists are becoming increasingly convinced that general relativity must break down beyond a certain level of accuracy, as a result of the new energy fields they postulate to account for the accelerating expansion of space. Each new field that theorists introduce produces a subtle deviation from the behaviour that relativity predicts for gravity. If BepiColombo detects such violations of general relativity, they will discover a strong clue as to the nature of these mysterious energy fields.

Once in orbit around Mercury, the craft will test general relativity in two ways. First, it might simply detect a subtle deviation in the position of the planet that relativity cannot account for. Second, and more decisively, mission scientists will time the delay in radio signals the spacecraft sends back to Earth as Mercury

begins to go behind the sun. This delay will be caused by the signal dropping into the sun's gravitational well before "climbing" out the other side.

This phenomenon is predicted by relativity to be the equivalent of the radio signals travelling an extra 70 kilometres through space. With a tracking accuracy of 10 centimetres, BepiColombo will measure this distance more accurately than before and spot any anomalies.

Luciano Iess at the University of Rome La Sapienza, Italy, conducted a similar experiment with the Cassini spacecraft at Saturn in 2003. It just reached the accuracy at which violations of relativity are expected to show up, but none was seen. Iess is now principal investigator of BepiColombo's radio science experiment. "We will improve on the accuracy of the Cassini experiment by a factor of 10," he says, making it the sharpest test of general relativity yet."

Comment: Since gravity is a property of matter, which in turn is an electrical phenomenon, Einstein's hyper-dimensional geometry is not going to reveal the true nature of gravity whether general relativity gives the right answers or not. The two tests mentioned ignore the possibility that both phenomena may be explained or influenced by factors considered in another more simple and all-encompassing theory. Subtle deviations in the position of Mercury will occur as a result of charge transfer with the Sun due to the planet's eccentric orbit. Charge transfer alters the internal electrical stress of Mercury. That subtly alters the planet's mass, which by the law of conservation of orbital energy shifts its orbit. The second test amounts to simple diffraction of the radio signal through an atmosphere. The "atmosphere" is the æther, so cavalierly discarded by Einstein. He never explained how an electromagnetic signal could be transmitted through empty space. Maxwell's theory of electromagnetism requires an æther — "something to carry the wave."

That "something" is a universal plenum of ghostly neutrinos. Though they have vanishingly small mass, they respond to the gravitational field of a star or planet to form a tenuous but extensive "atmosphere." It is that atmosphere which refracts light or radio signals.

There is definitely real physics beyond Einstein's speculations. The unquestioning acceptance of his idiosyncratic theories of relativity has diverted untold resources down blind alleys for almost a century. It is time to divert attention to the Electric Universe in this 21st century!

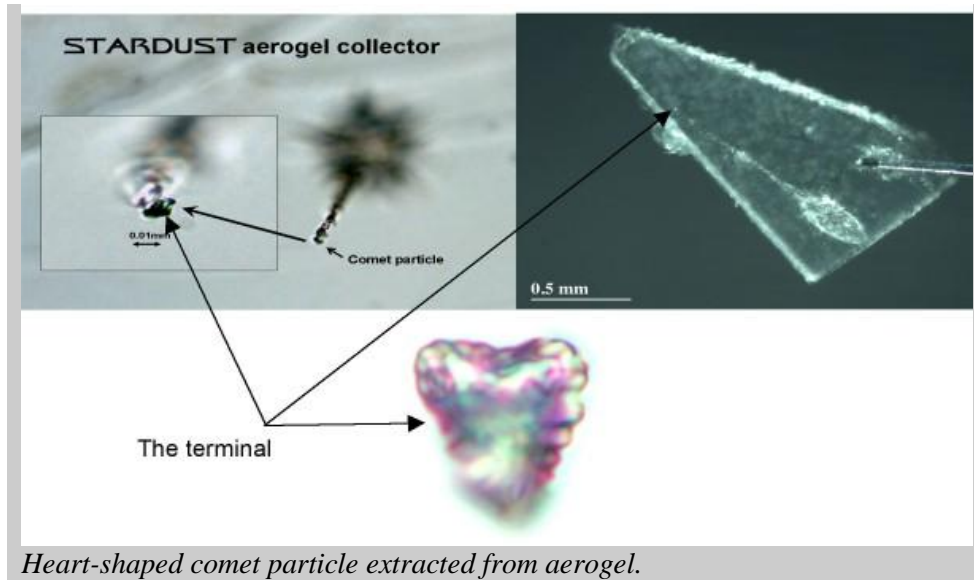
Wal Thornhill

Comet – Asteroid Link Confirmed

Posted on [January 25, 2008](#) by [Wal Thornhill](#)

"The remarkable properties of comets are not even remotely explicable by any of the numerous ad hoc assumptions of 'modern' comet theory."

— R A Lyttleton, FRS, Journey to the Centre of Uncertainty, Speculations in Science & Technology.



Heart-shaped comet particle extracted from aerogel.

Further support for the predictive power of the Electric Universe model comes from NASA's Stardust mission to comet Wild 2 and the discovery that the comet is made of "rocky material, like an asteroid." This has been a cornerstone of the reconstruction of the recent history of the solar system by using all of the forensic evidence available to us. This method is quite distinct from the theoretical approach adopted by conventional astronomers and astrophysicists who try to imagine how things were in the beginning and then work forward in time concocting ad hoc events as required in an attempt to match what we see today. The Electric Universe investigation shows that [the solar system has changed](#) drastically within the short span of intelligent humankind on this Earth. Such sharp discontinuities render the theoretical approach worthless.

Plasma cosmology shows that stars are born in a galactic electrical discharge event involving the powerful electromagnetic "Z-pinch" effect. Gravity can be ignored. Companion stars and gas giant planets are born later as the Z-pinch subsides and the new stars adjust to their changing electrical environment by expelling matter from their cores. That explains the apparent anomaly of "hot Jupiters" found closely orbiting nearby stars. Sometime later again, in achieving orbital stability through electrical encounters with other planetary bodies, gas giants may expel matter from within to form companion

moons and rings. Some of that matter escapes the parent to form planetary, asteroidal, cometary and meteoroidal bodies.

In the Electric Universe model it is futile to look for remnants of the primordial gas and dust from which the solar system is supposed to have collapsed. Comets are not primordial composites. The matter in comets (and asteroids and meteoroids) has been through several processes, first in a star, then within a gas giant and possibly a rocky planet before being discharged into space. The same discharge that gives birth to these small bodies may burn them black and leave distinctive birthmarks in the form of large arc craters. That is how asteroids, like Mathilde, can be covered in gigantic craters without suffering any disruption.

With this model in mind, it is instructive to compare excerpts from two popular scientific reports followed with earlier predictions of the Electric Universe.

From the NewScientist.com [news service](#), 24 January 2008:

Comet samples are surprisingly asteroid-like

By David Shiga

Samples of Comet Wild 2 suggest it is made of rocky material, like an asteroid, rather than the fluffy dust expected of a comet. The object may be a refugee that formed in the asteroid belt before getting kicked to the chilly fringes of the solar system, or it might have formed in that frigid realm from material thrown out of the inner solar system, scientists say.

NASA's Stardust mission swung by comet Wild 2 in 2004 to capture particles shed by the 5-kilometre object and returned them to Earth in 2006. Since then, scientists have been carefully analysing the microscopic fragments it collected.

Early on, scientists found surprising evidence that Wild 2 contained some material from the inner solar system that had been heated to more than 1000° C due to its proximity to the Sun.

*Now, scientists have been surprised again as further study suggests Wild 2 is made mostly of material from the inner solar system, and that **the object has a composition more like that of an asteroid than what was expected of a comet.** The conclusion comes from a study led by Hope Ishii of the Lawrence Livermore National Laboratory (LLNL) in Livermore, California, US." ...*

"Stardust chief scientist Don Brownlee of the University of Washington in Seattle, US, who was not involved in the study, says he agrees with its main conclusion. "Probably most of the mass of the comet is actually inner solar system material that was carried out from the inner solar system to the outside," he told New Scientist.

'Asteroid-like comet'

*The picture that emerges is that **Wild 2 appears to be "kind of an asteroid-like comet"**, Ishii told **New Scientist**. Wild 2 may have formed in the outer solar system from material that had drifted there from the inner solar system, she says. Alternatively, the object itself could have formed closer to the Sun and then migrated outwards later, she says.*

Wild 2 should still be considered a comet, she adds, because it is throwing off gas and dust as ice on its surface evaporates in sunlight. But she says the new findings bolster the view that there is no sharp dividing line between comets and asteroids. "This is a good indication that there is a continuum between asteroids and comets," she says.

Some objects in the outer asteroid belt have been dubbed 'outer belt comets', because they contain a lot of ice that sometimes produces tails when it evaporates in the Sun's heat. And some objects in the outer solar system beyond Neptune appear to be rocky in composition, like asteroids, says co-author John Bradley, also of Lawrence Livermore.

And in Science magazine of 25 January 2008, comes the following [report](#) from Richard A. Kerr:

Where Has All the Stardust Gone?

Surprise has followed surprise for cosmochemists analyzing the dust sample that the Stardust spacecraft returned from comet Wild 2 in January 2006. First, they found tiny flecks of once molten minerals—material very different from the raw, primordial dust they expected to see. Such unaltered, so-called presolar material was the prime ingredient of the rocky planets and was thought to abound in icy comets. But researchers report that they have failed to find a single speck of it.

*"For those of us who study presolar materials, it's turned out to be a bit of a bust," says cosmochemist Larry R. Nittler of the Carnegie Institution of Washington's Department of Terrestrial Magnetism in Washington, D.C. "**Wild 2 seems more related to asteroids than comets**," because all asteroids were altered from the solar system's primitive starting materials. Still, "the mission's been a huge success," says John Bradley of Lawrence Livermore National Laboratory (LLNL) in California, a co-author of the Science paper. "It's changing the way we think about comets."*

*All in all, "**it's looking as if Wild 2 is more like an asteroid than a primitive comet**," says Ishii. Brownlee agrees. Rather than preserving the original ingredients of planets, comets—or at least Wild 2—seem to be loaded with materials first altered by the great heat near the young sun, he says. Then those altered materials must have been carried outward to the outer reaches of the*

nebula, where comets incorporated them. "I would say a large fraction of the [outermost] nebular materials were probably transported there" from much nearer the sun, Brownlee says, "which is pretty amazing." Now, no one is at all sure where the solar system's lingering primitive materials might reside.

Comment: It is clear from statements like those above that the thinking about comets is not going to change sensibly while the basic assumptions of astronomers about the formation of the solar system remain unquestioned. As usual, a number of post hoc, and ad hoc ideas have had to be added to a theory that doesn't work — the gravitational accretion theory of formation of the solar system.

The Comet — Asteroid Link in the Electric Universe

I first wrote on this subject in a paper for the UK Society for Interdisciplinary Studies Chronology and Catastrophism Review 1988, Vol. X, titled, "Formation of Chondritic Meteorites and the Solar System":

According to [the Electric Universe] scenario, comets, asteroids and meteorites have a common origin. It is not assumed that these bodies have anything to do with a highly problematical primordial solar nebula. Therefore, for example, the 'Oort Shell' hypothesis of comets surrounding the Solar System is considered an unnecessary fiction. Indeed, Professor Ray Lyttleton described the Oort Shell theory as 'a piece of trash.'

Professor S. Vsekhsviatskii, Director of the Kiev Observatory and Head of the Faculty of Astronomy, University of Kiev, has concluded from his studies of comets that:

- i. Celestial mechanics, the distribution and statistics of cometary orbits, and consideration of the kinematics of the cometary system leave no doubt whatsoever that all comets, and therefore the products of their decay, were formed inside the Solar System, and were formed a little later, on the average, than were the planets.*
- ii. The existence of the families of short-period comets of Jupiter, Saturn, Uranus, and Neptune, and the peculiarities of their motion and nature — their chemistry, the presence of ice in their nuclei, their close association with Jupiter prior to discovery, etc. — demonstrates the recent origin of comets.*

*This is in accord with the theory of the eruptive development of planets, as developed by Lagrange, Proctor, Crommelin and Vsekhsviatskii. Recent, comprehensive investigations by Everhart (1969) confirmed once more that peculiarities of the observed distribution of short-period comet orbits cannot be explained on the basis of the 'gravitational capture' hypothesis. Indeed, Fred Whipple in his recent book, *The Mystery of Comets*, writes:*

'A plot of the orbits of the short-period comets projected on the plane of Jupiter's orbit shows a remarkable clustering. The ring of their aphelion curves outlines Jupiter's orbit beautifully. The conclusion has been clear for more than a century! Jupiter's huge attractive mass has somehow collected two-thirds of all the short-period comets into a family.' [emphasis added]

On March 7, 1979, Voyager 1 unexpectedly discovered a faint ring of dark rocky debris circling the planet Jupiter. In the words of Dr Bradford A. Smith, head of the Voyager photography team; 'Now Jupiter is found to have a ring and we must invent a theory to explain it.'

Two months after the discovery of the ring around Jupiter, the Soviet Union claimed joint credit for the discovery, contending that Vsekhsviatskii had predicted the ring's existence as early as 1960 in a journal called Izvestia of the Armenian Academy of Sciences. The passage from the relevant paper is as follows:

'The existence of active ejection processes in the Jupiter system, demonstrated by comet astronomy, gives grounds for assuming that Jupiter is encircled by comet and meteorite material in the form of a ring similar to the ring of Saturn.'

Despite the fact of his priority, Vsekhsviatskii's name has remained conspicuously absent from the scientific literature pertaining to comets and planetary rings. Given that mathematicians seem to be the final arbiter on astronomical theory in this age, it is not surprising that Vsekhsviatskii's work has been ignored because they immediately calculated that the energy required to explosively erupt matter from Jupiter would be sufficient to totally atomise the ejected material. A more scientific approach would have been to examine his promising findings and consider other mechanisms.

In the event, it has been left to two astronomers [C. E. R. Bruce and Eric Crew] with a particular interest in electric discharge phenomena to propose a promising ejection mechanism which may explain the features of comets and meteorites.

... T. van Flandern has proposed the formation of comets, meteorites, asteroids and tektites from the explosion of a larger former planet in the Solar System by some unknown mechanism. He shows how many anomalies in the characteristics of our solar system may be simply explained by such an event. The stratification of chondritic types within the asteroid belt certainly indicates at least four separate events in that region of the Solar System. The differences in composition of meteorites from those regions may be diagnostic of the parent bodies.

It should be remembered that all of the giant planets have ephemeral ring systems, which by this theory are indicative of past expulsion of matter. Saturn's rings would appear to be the most recent.

"... Conclusion and Implications

The electric discharge hypothesis appears to offer, for the first time, the possibility of an explanation for all of the peculiar features of chondrites. By extension it offers a more plausible mechanism for the creation of asteroids, comets, moons, planets, planetary rings, and companion stars than does the nebular hypothesis. It follows that the history of the Solar System has been one of continual evolution rather than creation, roughly as we see it now, from a nebula 5 billion years ago followed by relative peace since that event."

And from [Comet Borrelly rocks core scientific beliefs](#), 18 October 2001.

"..there is no difference between the appearance of a comet nucleus and an asteroid. One schizoid object, Chiron, has been called both an asteroid and a comet at different times. Yet asteroids are thought to be much more evolved bodies than comets. The Electric Universe proposes that their origin is identical and that a cometary display is due entirely to highly eccentric motion of a charged body in the radial electric field of the Sun."

Also from [Comet Wild 2](#), 06 January 2004:

And how does the electric universe model fit this picture?

'The electric universe model of comets has a simple, coherent explanation for all of the features and behavior of comets.

'Comets are not leftovers from the formation of the solar system. Present theories of the formation of planetary systems cannot explain our solar system anyway.

'Just as there is no invisible dark matter required in the galaxy to save the electric universe theory, there is no invisible Oort cloud of comets required to provide a theoretical comet source. In the electric universe – what you see is all you need.

'Comets are the result of electrical discharge machining of planetary bodies that occurs in the catastrophic evolution of planetary orbits. It is far too simplistic to assume that the planets were formed along with the Sun and remained in their present orbits ever since.

'In addition to removing dust, the gargantuan electric forces of an interplanetary thunderbolt are able to loft entire mountains into space from the surface of a planet. Comets and asteroids can be formed this way.

'And the same discharge that gives birth to comets and asteroids may burn them black and leave distinctive birthmarks in the form of large arc craters. That is how asteroids, like Mathilde, can be covered in gigantic craters without suffering any disruption.

'Density calculations based on gravitational perturbation theory are worthless. Gravity is a weak dipole electric force between subatomic particles. So the charge distribution in a body affects gravity strongly. Comets are highly charged bodies and will exhibit anomalous gravity. Newton's gravitational 'constant,' G, is a dependent variable. It is dependent on the electrical state of a body.

On 14 March 2006, I wrote in [Stardust Comet Fragments Solar System Theory](#):

"NASA researchers announced on March 13 another in the long procession of surprises about comets. The grains from comet Wild 2, trapped in aerogel and returned to Earth, were much larger than expected and made from the same high-temperature minerals as found in the most abundant meteorites. This discovery was so unexpected that an early sample was thought to be contamination from the spacecraft.

Once again, rather than revisiting the assumptions about the origin of comets, NASA scientists introduced another ad hoc addition to comet theory. Now the Sun must somehow eject material from inside Mercury's orbit into the far reaches beyond Pluto's orbit where it somehow accretes to form comets. The word 'somehow' is overworked to death in comet theory.

..If successful predictions are a hallmark of a good theory, standard comet theory rates nowhere."

"Now we have the evidence, delivered to Earth directly from a comet. They are made from the same minerals we find in meteorites and asteroids. They are composed of rocky, planetary material. They are not primordial."

Wal Thornhill

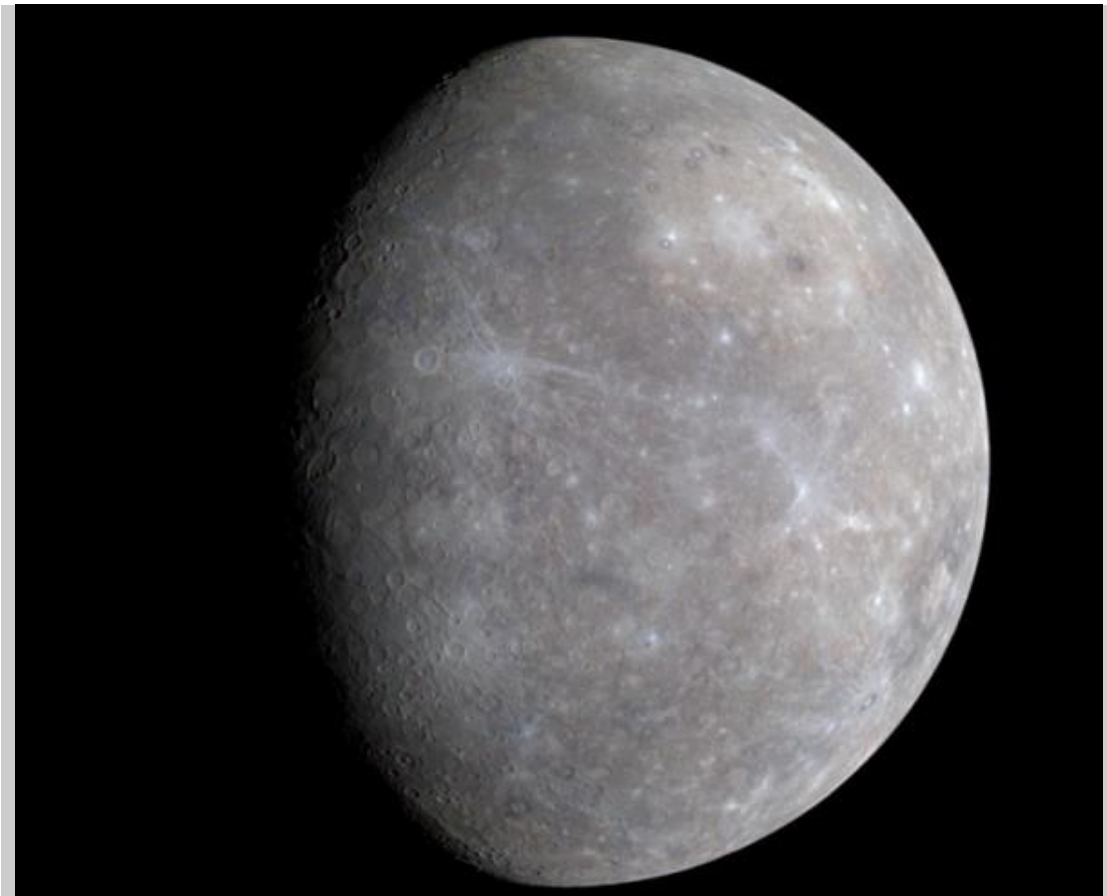
More on Mercury's Mysteries

Posted on [March 5, 2008](#) by [Wal Thornhill](#)

"[Those] who have an excessive faith in their theories or in their ideas are not only poorly disposed to make discoveries, but they also make very poor observations."

—*Claude Bernard (1813-78) French physiologist, 1865.*

MESSENGER flew 200 kilometres above Mercury's surface on 14 January at a speed of 6 kilometres per second relative to the planet. It is the first spacecraft to visit Mercury since NASA's Mariner 10 flew by the planet three times in 1974 and 1975. Mariner 10 was only able to photograph 45% of Mercury's surface. MESSENGER took more than 1213 images during its flyby, covering about half of the previously unseen portion of the planet. On January 30th the first impressions of the science team were presented. As usual, more mysteries were generated than were solved. This will continue while astronomers and geologists "have an excessive faith" in their imaginary story about the birth and evolution of the planets.



Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington.

From the official [MESSENGER](#) website:

"Mercury, Venus, Earth, and Mars are terrestrial (rocky) planets. Among these, Mercury is an extreme: the smallest, the densest, the one with the oldest surface, the one with the largest daily variations in surface temperature, and the least explored. Understanding this 'end member' among the terrestrial planets is crucial to developing a better understanding of how the planets in our solar system formed and evolved. To develop this understanding, the MESSENGER mission, spacecraft, and science instruments are focused on answering six key outstanding questions that will allow us to understand Mercury as a planet."

Question 1: Why is Mercury so dense?

The high density of Mercury is inferred from its surface gravity, which is virtually the same as that on the larger planet, Mars. Mercury's density implies that a metal-rich core occupies at least 60% of the planet's mass, a figure twice as great as for Earth. The problem for theorists is that Mercury is so dense that it must contain twice as much iron relative to rock as the other inner planets.

Answer: The answer to this question was outlined in [Astronomical Myths of Mercury & the Sun](#). The problem is that physicists have no understanding of gravity beyond the mathematics. Gravity is directly related to the mass of a body yet the relationship of mass to matter remains a mystery to philosophers of science. Physicists merely assume that gravity is directly related to the quantity of matter in a body. If that isn't so, the quantity of matter in a body cannot be calculated from measurements of a body's gravitational strength, and therefore its density cannot be determined. The make-up of Mercury is unknown.

The similarity in appearance of Mercury to the Moon and the tilts of their equators and orbital planes to the ecliptic, suggests they are related. It is likely therefore that they have a similar surface mineral composition. There is already evidence that the reflectance spectrum of the surface of Mercury bears a close resemblance to a laboratory spectrum of an Apollo 16 lunar highlands soil sample. And microwave spectra from the surface of Mercury resemble those from the lunar highlands. I expect therefore that measurement of the moment of inertia of Mercury will show a more homogeneous planet than one with a massive iron core. If so, that will intensify the mystery of Mercury's magnetism (see below).

Question 2: What is the geologic history of Mercury?

From the official [MESSENGER](#) website:

"There are three major theories to explain why Mercury is so much denser and more metal-rich than Earth, Venus, and Mars. Each theory predicts a different composition for the rocks on Mercury's surface. According to one idea, before Mercury formed, drag by solar nebular gas near the Sun mechanically sorted silicate and metal grains, with the lighter silicate particles preferentially slowed and lost to the Sun; Mercury later formed from material in this region and is consequently enriched in metal. This process doesn't predict any change in the composition of the silicate minerals making up the rocky portion of the planet, just the relative amounts of metal and rock. In another theory, tremendous heat in the early nebula vaporized part of the outer rock layer of proto-Mercury and left the planet strongly depleted in volatile elements. This idea predicts a rock composition poor in easily evaporated elements like sodium and potassium. The third idea is that a giant impact, after proto-Mercury had formed and differentiated, stripped off the primordial crust and upper mantle. This idea predicts that the present-day surface is made of rocks highly depleted in those elements that would have been concentrated in the crust, such as aluminium and calcium."

Answer: The three theories above demonstrate blind 'faith' in the idea that the planets were formed from a nebula as one 'family,' roughly where we see them today. There is no scientific reason to adhere to such a belief while there is an avalanche of data from space to contradict it. We do not know that Mercury has a high density. There is no need for far-fetched scenarios involving the early Sun or a colossal impact. Planet and star formation by gravitational accretion has never been observed and it cannot be shown to work in theory.

"There is a general belief that stars are forming by gravitational collapse; in spite of vigorous efforts no one has yet found any observational indication of confirmation. Thus the 'generally accepted' theory of stellar formation may be one of a hundred unsupported dogmas which constitute a large part of present-day astrophysics."

—Hannes Alfvén, G. Arrhenius, *Evolution of the Solar System*, NASA 1976.

The alternative Electric Universe cosmogony (theory of creation of the Solar System) is unknown to astrophysicists. It is radically different from the nebular theory of planet formation. It unites an interdisciplinary forensic investigation of the entire human record of the appearance of the sky, stretching back to Neolithic petroglyphs, with experimentally confirmed modern plasma cosmology. Because of its broad interdisciplinary base, the Electric Universe has great explanatory and predictive power—key measures of a good theory.

There are two possible electrical origins of planets in the solar system. First, the Sun may become electrically unstable and eject sufficient matter to form a gas giant companion. Currently, astrophysicists are unable to account for powerful jets of matter seen issuing from stars and galaxies. The electrical model interprets them as electric discharge phenomena. So stars undergoing a nova outburst may give birth to gas giant planets, which explains the discovery of giant planets in very close orbits about nearby stars. It is similarly proposed that rocky planets are 'born' fully formed by material jetted from within a brown dwarf star or gas giant planet undergoing an electrical 'flaring' or 'nova' outburst. As British physicist Peter Warlow wrote in 1982:

"...the obvious place for a small heavy planet to form is at the core of a large gaseous planet. This is the ideal place to collect together the heavier elements and if, for the same but unknown reason that quasars eject material from their cores, the core of that large planet is also ejected, then we will have a source of Earth-like and Venus-like planets. If the lesser nova eruptions of stars are, in fact, manifestations of the same process, then we have a source of the larger Jupiter-like planets."

— *The Reversing Earth*, 1982.

The second possible origin for giant planets like those in our solar system, which orbit at great distances from the Sun, is electrical capture. That would explain the great differences between Jupiter, Saturn, Uranus and Neptune. But how do we know there are any free-floating gas giants in the galaxy? By tracing galactic magnetic fields, plasma cosmologists have shown that electric current flows along the spiral arms of a galaxy. Like cosmic streetlights, all stars in interstellar space are connected to the galactic power lines (Birkeland current filaments). So instead of being dark and dead, independent giant planets shine as dim stars — red or brown dwarfs. And these dwarf stars are the most numerous in the galaxy.

The cross-section for electrical capture of a dwarf star by the Sun is huge, involving the plasma sheaths of both bodies. For example, the Sun's plasma sheath is roughly 200 AU in diameter or .07% of the distance to the star system of Alpha Centauri. When stellar plasma sheaths touch the two stars 'see' each other electrically for the first time and an 'anomalous' acceleration toward the Sun (also experienced by charged spacecraft) takes the interloper in its grip. The electric light of the dwarf star is snuffed out and it becomes a gigantic comet, flaring and fragmenting to form new satellites, comets and ejecta rings before settling as a new gas giant into a solar orbit that provides electrical equilibrium.

In this scenario the best we can do with an obscure history of random solar system gatecrashers is to look at the planets today and try and figure out the relationships between 'parent,' 'child' and 'foster-parent.' Given Mercury's odd eccentric orbit and the tendency for charge exchange to facilitate capture and circularization of planetary orbits, it seems that Mercury only lately arrived at its present location. The Sun is merely Mercury's foster-parent. Similarly, the Earth is the Moon's foster-parent. For to identify the parent of Mercury and the Moon we must look for family traits amongst the moons of

the gas giant planets in the outer solar system. Jupiter is a prime suspect with its orbital and axial tilt being of the right order to have launched Mercury and the Moon. Both bodies would look at home among Jupiter's Galilean satellites.



Q: Which one is the Moon? A: Second from the top. Mercury is about the same size as Callisto (bottom).

Conventionally, the geological history of Mercury is based on the study of surface features in terms of the nebular hypothesis. The heavily cratered surface of Mercury is attributed to a violent period in the development of the early solar system known as the "Late Heavy Bombardment." This is an imaginary episode of solar system evolution. The origin of this late bombardment is unknown. It is merely required to explain craters on the Moon, Mars and Mercury. It doesn't explain why the cratering of the Earth is so different from that on the Moon. Historically, only two mechanisms—volcanism and impact—were considered for crater formation. A century ago it was the subject of hot debate. The geologist, William Morris Davis, wrote in 1922 that "astronomers tended to explain the craters of the Moon by volcanic action, a geologic process, while geologists tended to explain them by meteoritic action, an astronomic process – each scientist evidently feeling free to take liberties with a field other than his own." However, the 'fact' of impact cratering has not been observed or established by experiment. This 'pseudo fact' was established by consensus only after long argument between geologists and astronomers. But consensus isn't science. The real fact is that the features of most planetary craters cannot be explained by either impact or volcanism.



Two signs on the road to Meteor Crater, Arizona. They demonstrate the power of a belief, once it becomes established as a 'fact.'

The Czech astronomer Zdenek Kopal was a lone voice when he scrupulously pointed out that the word 'crater' should be used without presupposing the mechanism of its origin. Otherwise, he warned, it could *"easily render the word as much a misnomer as the Martian 'canals' or the lunar 'seas.'"* His warning went unheeded.

Crater circularity argues against impacts at significant angles from the vertical. So geologists assumed that the kinetic energy of the impactor is simply converted into a powerful surface explosion, like a nuclear bomb. This is now the accepted story. Gene Shoemaker in the late 20th century spent decades examining circular formations on Earth, in an effort to determine whether volcanoes or impacts formed them. His research ruled out volcanism as the cause of certain craters found on Earth. From his point of view, this left only the possibility of impact. Since then, about 160 circular formations on Earth have been identified as impact craters, although fragments of meteorites are found only around the smallest of these craters.

When the lunar samples were returned to Earth by the Apollo astronauts and up to 90% by weight was found to be shocked and welded minerals, known as breccias, all doubt

about the impact origin was erased. The geologist, Robert Dietz, made the argument clear:

"Barring the unlikely possibility of a natural nuclear explosion, a meteorite impact is thus the only mechanism for producing intense shock on a large scale (a lightning bolt might do so on a small scale)."

Despite not knowing where the impactors came from, Kopal's fears were realized; the word "crater" became synonymous with "impact." Dietz deserves credit for recognizing (albeit parenthetically) that a lightning bolt could be responsible for shock and heat effects too. The mistake that he and all other geologists have made is to listen to astronomers and limit their imagination to huge impacts in the past, while dismissing huge thunderbolts.

Meanwhile, in 1965, British amateur astronomer Brian Ford showed that neither of the two main theories could account for all of the features of lunar craters and he introduced a third possibility. He noted the similarity between cratering patterns on the Moon and the microscopic patterns created by the industrial process of electrical discharge machining (EDM). Using EDM, a surface is eroded to a precise depth by myriad tiny electric discharges that form microscopic craters. Ford noticed three outstanding features of these electrical craters:

- The larger EDM craters have central peaks in about the same proportions as found on the Moon.
- The circular dish-shaped electrical craters matched the shape of the smaller lunar craters precisely.
- The larger craters often have smaller craters perched on their rims. There are no examples of a large crater intersecting a smaller crater in the same manner.

Ford also noted in his paper that the pattern of rays around the conspicuous lunar "rayed" craters is tangential to the rim of the craters. This is an impossible coincidence for impact cratering. If the craters were formed by impact, the rays would be directed radially from the center of the crater. However, this strange detail is explained electrically because the rays trace the path of electron streamers rushing from halfway around the Moon to satisfy the discharge, which is impinging inside the crater rim and not at the crater center.

Crater distribution is a puzzle too. For example, in images of any substantially cratered surface we see small craters centered precisely on the rim of a larger crater. At a 1965 NASA symposium on the nature of the lunar surface, Eugene Shoemaker remarked:

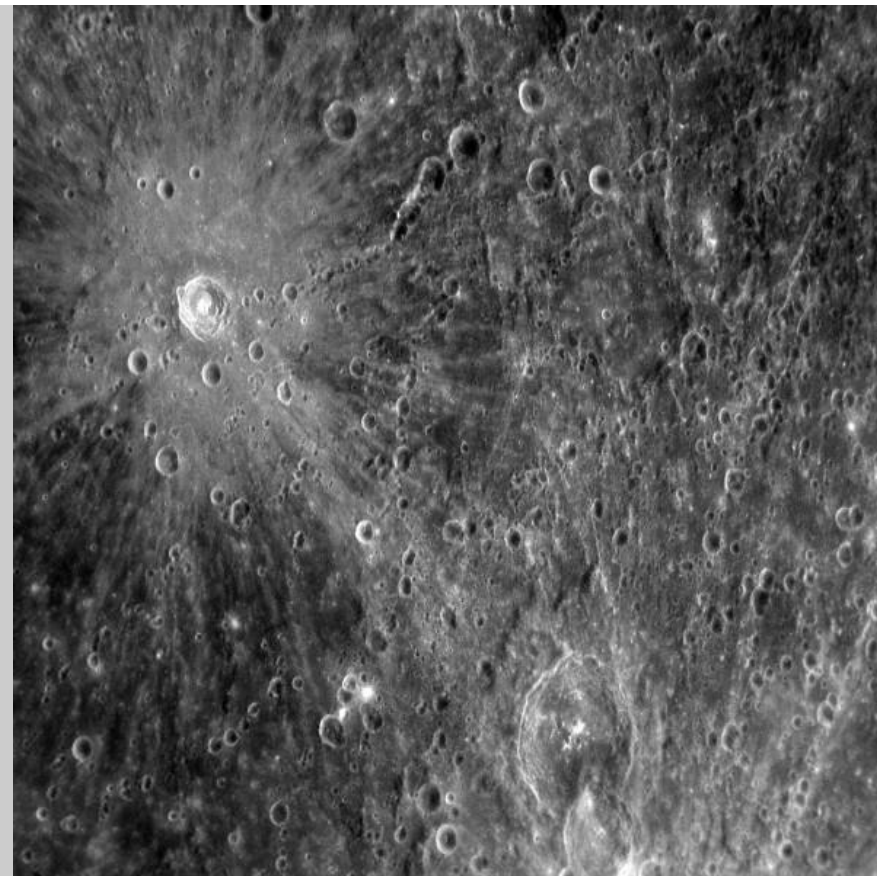
"there are a good many more pairs of craters, where two craters occur close together, than we have any right to expect just from random distribution."

Thomas Gold added that the two craters *"are characteristically of a similar age and appearance."* That led to an ad hoc proposal that meteoroids go around in pairs. However, it is fanciful to suggest that their separation would generally allow the smaller

object to arrive after the larger had formed a crater, and in such a way as to neatly target the new crater rim. We do not find a large crater that has cut into one of smaller diameter.

Difficult though it may seem, we must find a mechanism that naturally tends to form more than one crater at a time, with the smaller crater being formed after the larger crater. Also, the second crater must be formed gently so as to not disturb the first unduly. The evidence suggests that these craters are somehow 'machined' into the surface. There is a natural phenomenon that fits these unusual requirements – the lightning bolt. Each bolt of lightning is usually made up of more than one stroke, with the first being the most powerful. Therefore, the first stroke forms the largest crater. Any subsequent stroke will be directed at the nearest high point, usually the new rim of the first crater. These secondary craters will generally be smaller than the first. Mercury sports countless examples.

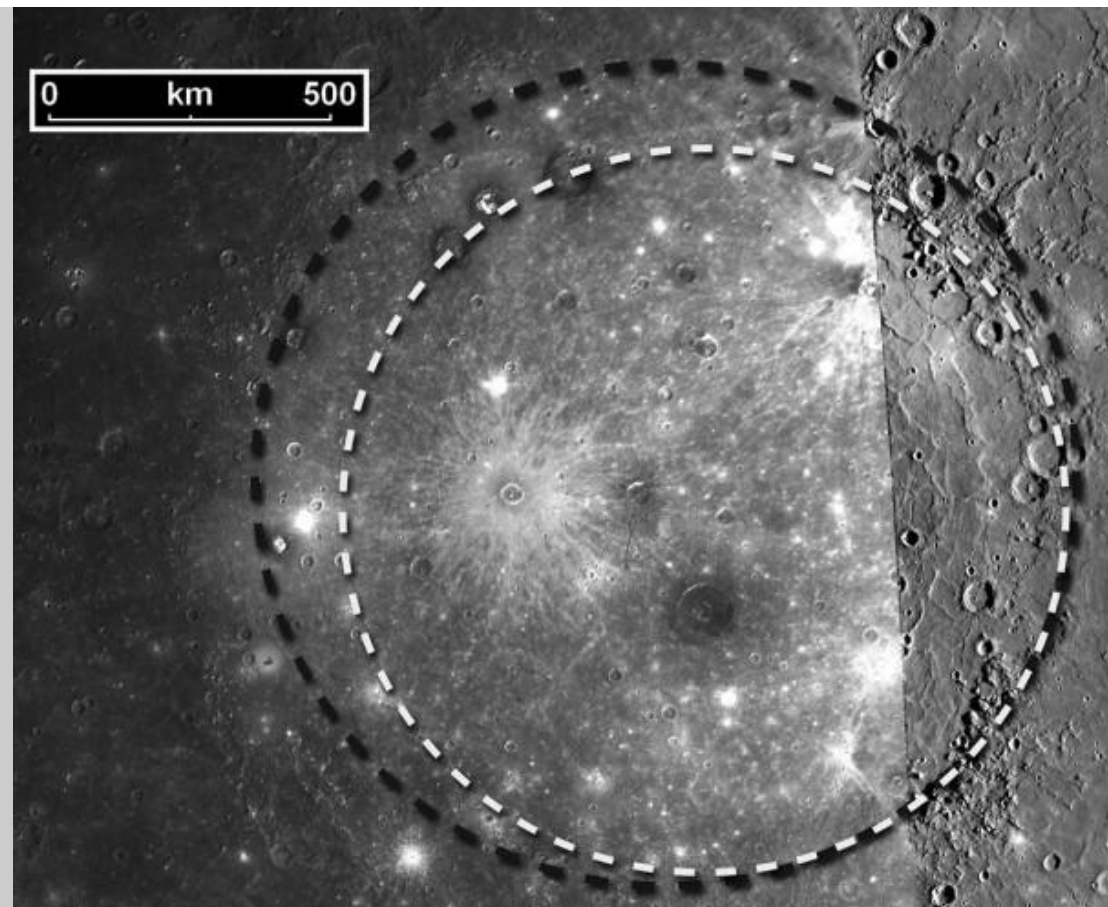
The progression of a series of electrical craters forms a crater chain. It underlines the discriminatory blindness of belief that the many neatly 'machined' crater chains seen throughout the solar system are attributed to chaotic impact fallout. It is impossible for low-angle impact ejecta to form neatly graded circular craters with little disturbance of one crater by its neighbor.



A good example of crater chains on Mercury. They cannot be explained by impacts. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington.

A storm of celestial thunderbolts removes the foundation for dating a planetary surface by counting craters or measuring rock ages by using long-lived radio-isotopes. An entire hemisphere may be saturation cratered with neat, circular scars in a matter of hours. The Apollo astronauts remarked upon the fresh appearance of the lunar craters, which are supposed to be billions of years old. A short-term electrical encounter can explain the observed hemispheric dichotomies and the restricted range of crater sizes on some planets and moons.

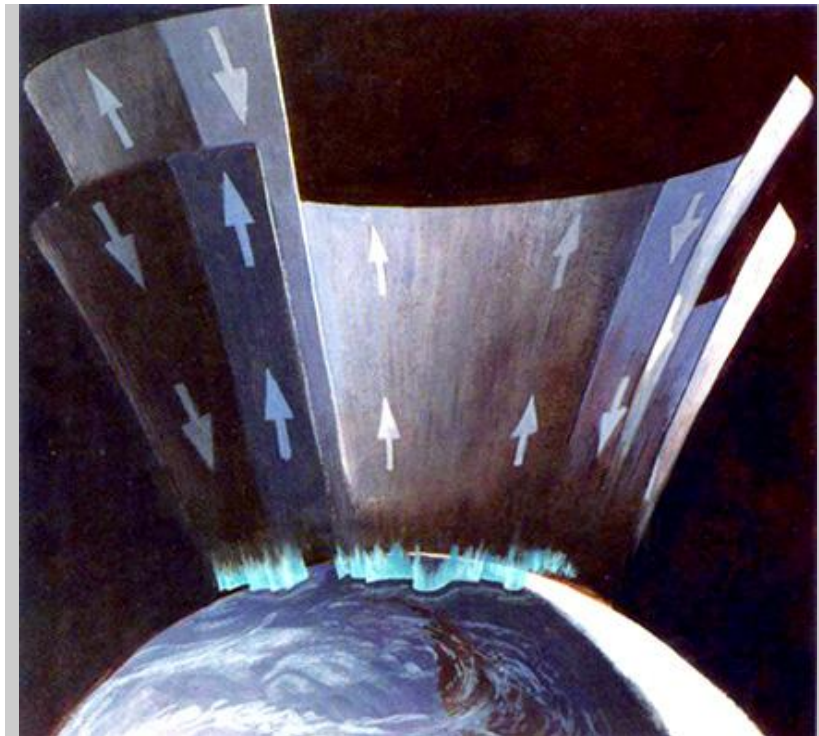
MESSENGER finally got a look at the entire great Caloris basin on Mercury and found it to be 1,550 kilometres in diameter. Caloris is always referred to as "a giant impact structure." But it was not formed by impact because electrical exchanges between massive celestial bodies act to prevent collision. If the sizes of the two bodies involved are markedly different, the smaller body may undergo catastrophic electrical disruption, rather like an exploding capacitor. (The effect is witnessed but unrecognized by astronomers in the form of cometary outbursts). The result may be a shower of finely divided meteoric material upon the larger body. A recent trivial example on Earth was the enigmatic Tunguska explosion. But if the Caloris basin is not due to impact, what is it?



The black circle shows the size of the Caloris basin. It is larger than the estimate from the earlier Mariner image (white circle and right strip of image). The difference in lighting renders MESSENGER'S more detailed image rather featureless. Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington.

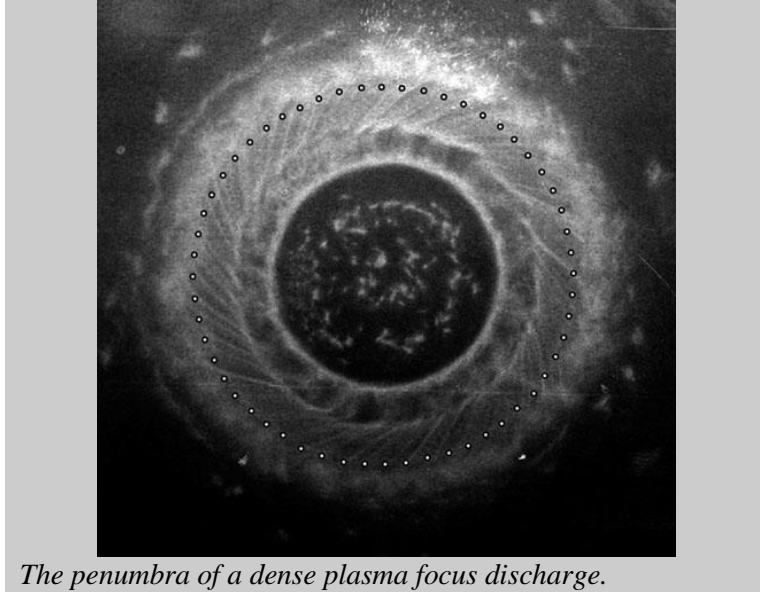
With increasing size, craters grade into basins—circular structures with an arbitrary lower limit of about 200 km in diameter. The basins show a variety of morphologies depending on their size and degree of flooding by plains materials. The smaller basins tend to have two well-preserved rings, with the diameter of the outer ring close to twice that of the inner ring. Both rings are of relatively low relief. Outside the outer ring, radial structures dominate, consisting of hills, valleys, gouges, and strings of craters.

A feature of intense plasma discharges in vacuo is that they may take the form of a hollow relativistic electron beam. On Earth, the circular auroral curtains in the ionosphere are a result. But Mercury has no atmosphere so a similar discharge would reach the surface.

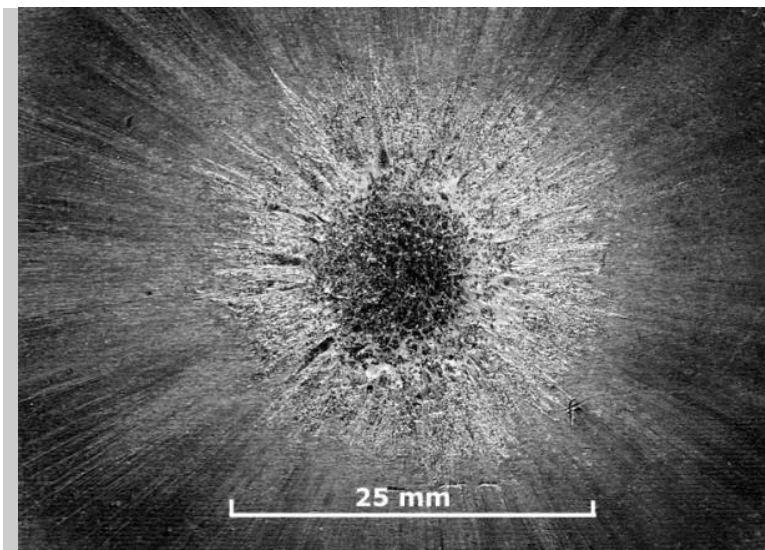


Artist's depiction of Birkeland currents flowing in and out of the Earth's atmosphere at high latitude. (Courtesy of S. G. Smith, Applied Physics Laboratory, The Johns Hopkins University).

These auroral currents, once the subject of intense debate, are routinely measured by today's satellites and have total magnitudes of millions of amperes (mega-amperes). In the case of the interplanetary thunderbolt, we are talking about billions of amperes (giga-amperes). Such a powerful current will magnetically 'pinch' down to produce circular ringed craters and features like Caloris. Current flows radially between the current cylinders through the surface layers causing melting and etching of the crater floor or basin. So, paradoxically, a more sustained but widespread (and therefore lesser current density) discharge was probably responsible for the huge Caloris basin. The pattern of 'fractures' on the floor of Caloris basin is similar to the radial and concentric discharge patterns seen in the dense plasma focus device where the discharge current is forced to flow radially between two concentric conductors.

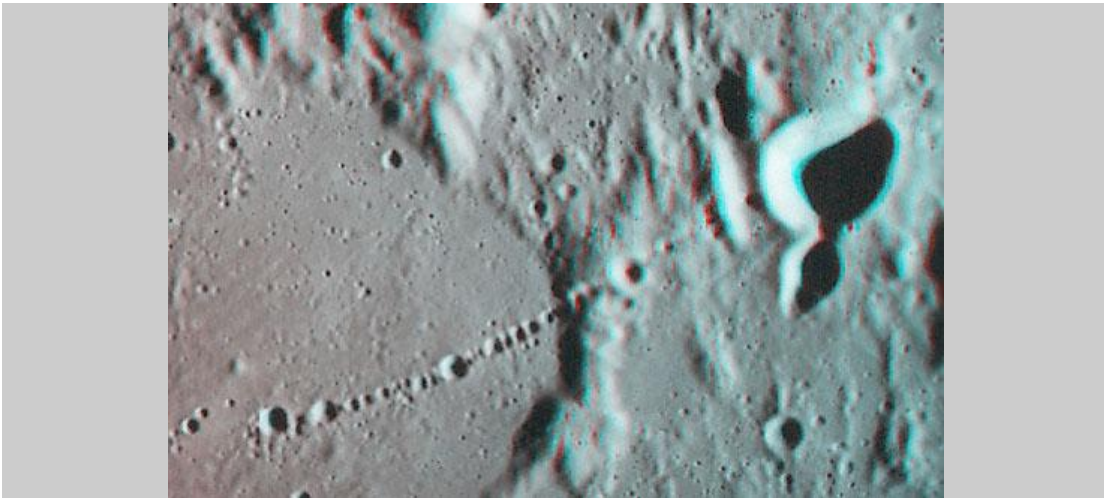


It should be noted, as Tommy Gold did, that an impact causes little melting. In the brief interval of the impact the poorly conducting lunar rock cannot transfer appreciable heat. Instead, the rock simply flows until the blast over-pressure drops at which time the rock 'freezes,' bearing the imprint of the blast. So images of ripples frozen in the act of spreading from an object dropped into a liquid milk/cream mixture, used ad nauseum to explain the formation of ringed impact structures, is an inappropriate model. Clearly, it does not explain why two rings should be favored in the intermediate sized 'craters.' And central peaks are not due to 'rebound' from an impact. As Brian Ford noticed, they are a normal result of electric discharge machining.

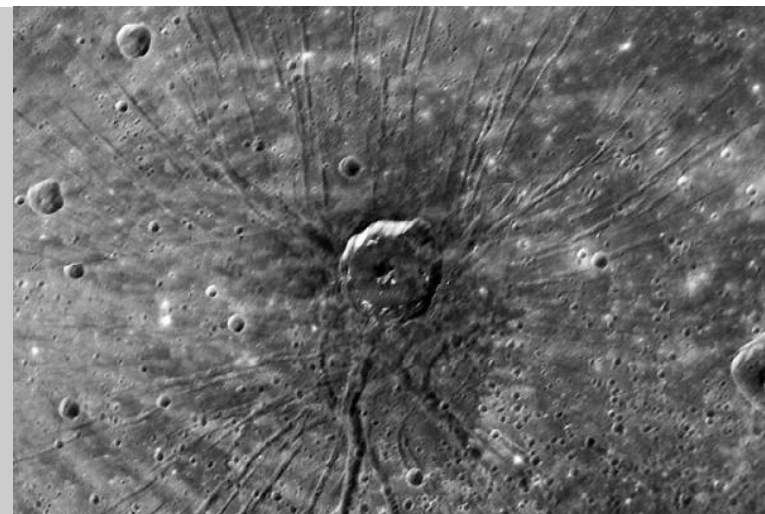


A 7 kilovolt 5 kilojoule impulsive blast on an aluminium block shows the metal frozen in a radial blast pattern that would be expected from a vertical impact of the same energy. This is the kind of pattern we should expect to see if the impact cratering theory were correct.

There are differences in arc scarring effects depending upon the polarity of the discharge. An arc to an anode (positive) surface tends to stick to one spot and cause melting and uplift with relatively subdued features. An arc to a cathode (negative) surface tends to jump about, forming many circular craters with sharp features, rim craters and chains of craters. Electrons scavenged from the surface surrounding the main crater may form 'rays,' and sinuous rilles or channels. The rilles often have on-channel cratering or form a crater chain that points toward the main crater. This prominent effect has given rise to the indefensible notion of secondary impact cratering due to ejecta from a large crater.



This 3D Apollo 16 image shows the well-known crater chain on the Moon called Catena Davy. The official explanation says it "...may be a chain of volcanic craters or a chain of secondary craters formed by the large Orientale impact basin located 2000 kilometers to the west. Alternatively, it may have been formed by the impact of a comet similar to Comet Shoemaker-Levy 9, which split into numerous fragments in 1992 and struck Jupiter in 1994." Note, however, the neat circularity of all of the craters, even on the mountainsides! And Shoemaker-Levy 9 did not leave a neat line of closely spaced impact marks on Jupiter. The confusion of ideas is obvious.



The 40 km crater dubbed 'The Spider.'

The Planetary Society [reports](#):

Louise Prockter, instrument scientist for the MESSENGER camera system, explained the science team's struggle to interpret this feature. "What isn't clear is the relationship of the crater to the radial trough complex. Did the crater help to form some or all of the troughs? Did it impact serendipitously right at the bull's-eye? At this point we really don't know. This feature is very close to the center of the Caloris basin. We have seen a number of impact basins in the solar system. We have never, ever seen a feature like this at the center of any of them. And we haven't seen any features like this elsewhere on Mercury or on the Moon. Being scientists we have many theories as to how it formed, but at this point it's anybody's guess; it's a very unexpected find."

Answer: The Spider is unquestionably an electrical crater. Being near the center of the Caloris basin, it may have been burnt into the surface by the equivalent of a lightning 'leader stroke,' which sets up a conductive plasma path for a powerful return stroke. That would account for the crater being slightly off-center in the Caloris basin. The radial channels or 'rilles' are diagnostic of material being blasted aside by surface lightning as electrons are stripped from atoms and follow the electric field toward a high central point where they launch into space, forming a crater. It is obvious that the largest rille, entering the picture bottom center, was responsible for initiating the 40 km electrical crater, with its steep walls, flat floor and central peak. None of these features are explained by an impact. The crater walls also hint at the polygonal 'diocotron instability' pattern of a powerful particle beam.

Planetary scientists have missed a new, low cost field of research into the most powerful sculpting force of planetary surfaces—the electric arc. Meanwhile, plasma physicists and electrical engineers under the auspices of the largest professional body in the world, the Institute of Electrical and Electronic Engineers (IEEE), published a paper last year on the production of Martian 'blueberries' by an electric arc striking an analog of Martian soil. Specialization and institutionalisation of science takes its toll of progress. Astrophysicists and planetary scientists don't heed the IEEE plasma science publications. They operate in an imaginary 'parallel' universe detached from the obvious electrical nature of our real universe.

Question 3: What is the nature of Mercury's magnetic field?

Answer: This was explained in the 14th January news item referred to earlier. In Mercury's case, its strong gravitational field for its size indicates a high level of internal electrical polarization. That means a high surface charge. So Mercury's slowly rotating charge will produce a weak dipolar magnetic field.

Question 4: What is the structure of Mercury's core?

Answer: This is an interesting test of the Electric Universe model which has no need of an immense core of liquid iron. Measuring Mercury's moment of inertia provides one test. Currently it has not been measured, but conventional interior models constrain it to the range from 0.325 to 0.380, where the smallest value corresponds to the most centrally condensed configuration. When MESSENGER goes into orbit about the planet and measures the gravitational field globally we will learn if it is a more homogeneous sphere or not and whether it has a liquid or solid core. I expect Mercury's moment of inertia to be closer to 0.4, in other words closer to a homogeneous sphere and rather like the Moon. Also, by analogy with the Moon, it is probable that Mercury's core is solid.

Question 5: What are the unusual materials at Mercury's poles?

Answer: Radar imaging of Mercury from the Earth in the early 1990s found anomalous radar-bright returns from the Martian poles. They have raised the possibility that water-ice survives in some of the polar craters where the Sun never shines. Discovery magazine also reports:

"The first rock from the sun has a glowing dragon tail of sodium atoms that is more than seven times longer than ever suspected."

These findings fit a planet that is strongly transacting electrically with the solar plasma. The electric current will follow Mercury's magnetic field. We may expect therefore that plasma discharge effects will occur most strongly along sharp crater walls near the poles. Such vertical plasma discharge curtains, similar to those observed at Io by the Galileo orbiter, will return a strong radar echo if sufficiently dense. (Plasma can reflect a radar signal like a mirror). It seems less likely that matter suspended in water ice on the floor of a crater would return an appreciable signal at such low grazing angles. The estimated extent of the radar reflective region of 350km is of the right order for an auroral-type discharge.

Electrical spark machining of Mercury's surface provides the source and energies of sodium, potassium and other ions that have been detected in Mercury's tenuous atmosphere (exosphere) and cometary plasma sheath. A concentration of potassium ions above the Caloris basin suggests a magnetic anomaly and/or ion implantation remaining from the cosmic thunderbolt that struck there.

Question 6: What volatiles are important at Mercury?

From the official MESSENGER website:

"Six elements are known to exist in Mercury's exosphere: (1) hydrogen, (2) helium, (3) oxygen, (4) sodium, (5) potassium, and (6) calcium. The observed exosphere is not stable on timescales comparable to the age of Mercury, and so there must be sources for each of these elements. Hydrogen and helium are present in high abundances in the solar wind, the stream of hot, ionized gas emitted by the Sun. The other elements are likely from material impacting Mercury, such as micrometeoroids or comets, or directly from Mercury's surface rocks. Several different processes may have put these elements into the exosphere, and each process yields a different mix of the elements: vaporization of rocks by impacts, evaporation of elements from the rocks due to sunlight, sputtering by solar wind ions, or diffusion from the planet's interior. Variability of the composition of Mercury's exosphere has been observed, suggesting the interaction of several of these processes."

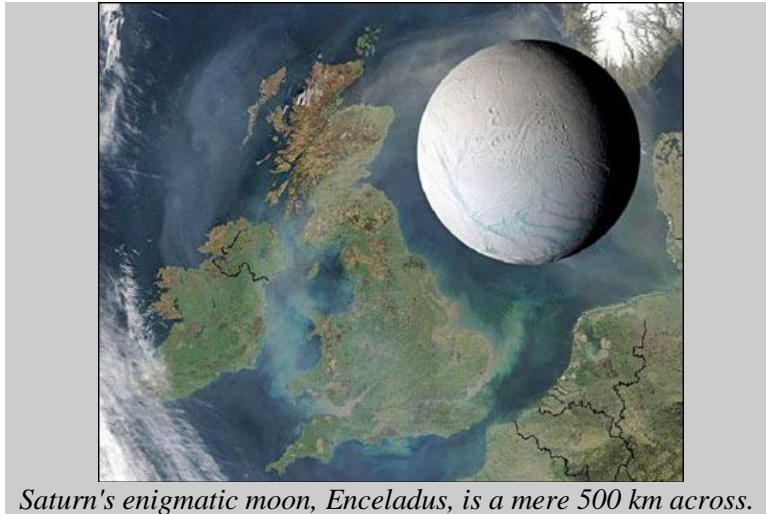
Answer: The most important process missing from the list is that of electric discharge machining (EDM) of Mercury's surface. The problem of the astrophysics mind set can be seen in the language used, "the stream of hot, ionized gas emitted by the Sun" is better understood by plasma physicists as an equatorial solar current sheet rather than a hot wind. Also the exosphere has not existed for the "age of Mercury" since Mercury has not been in its present orbit for as long as astronomers believe. So we can expect more surprises when MESSENGER goes into orbit about the planet — as usual.

Messenger will fly by Mercury twice more, on 6 October 2008 and 29 September 2009. Mercury's gravity slows Messenger down during each flyby, making it easier for the planet to eventually capture the spacecraft into orbit on 18 March 2011. The spacecraft is designed to last at least one year in orbit around Mercury.

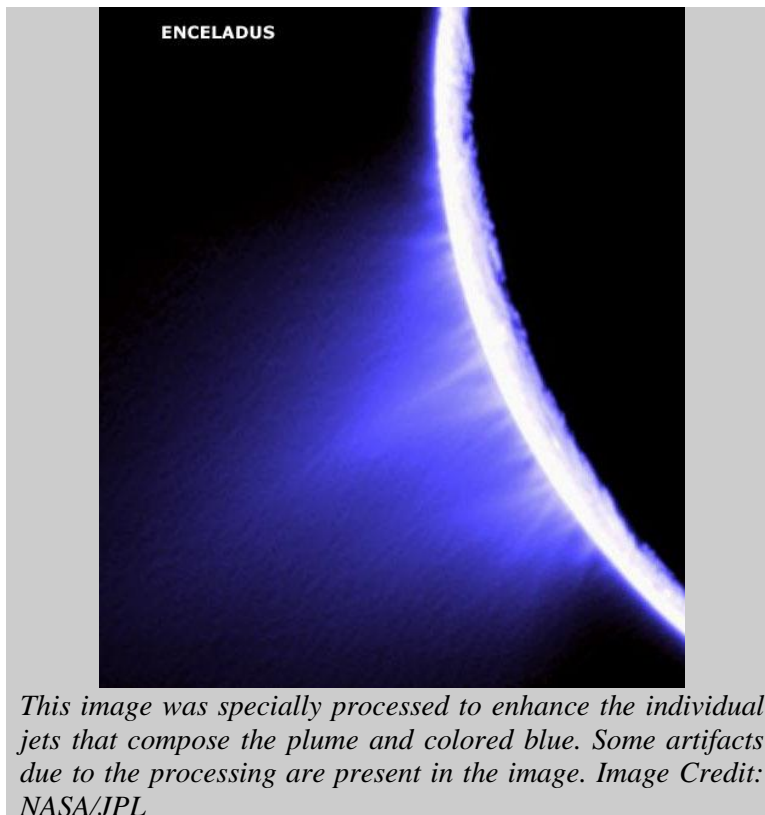
Wal Thornhill

Enceladus' Cometary Plumes

Posted on [March 12, 2008](#) by [Wal Thornhill](#)

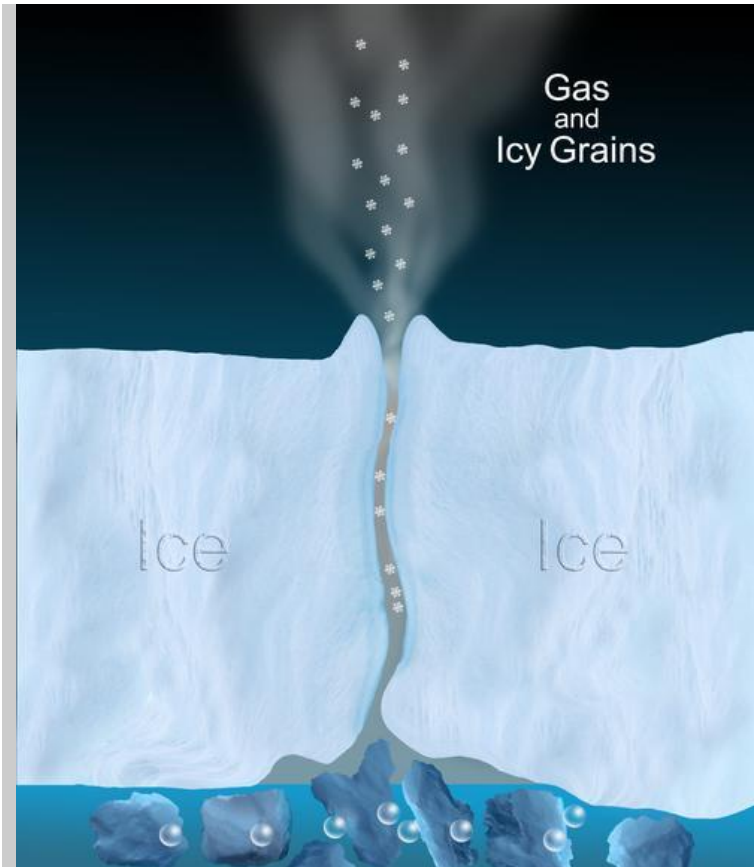


Today the Cassini spacecraft is due to swoop over the south pole of Enceladus, one of the inner moons of Saturn, at a height of 50 km (30 miles), sampling its celebrated south polar plumes. The analyzers will "sniff and taste" the plume. Information on the density, size, composition and speed of the gas and the particles will be collected.



"There are two types of particles coming from Enceladus, one pure water-ice, the other water-ice mixed with other stuff," said Sascha Kempf, deputy principal investigator for Cassini's Cosmic Dust Analyzer at the Max Planck Institute for Nuclear Physics in Heidelberg, Germany.

"We think the clean water-ice particles are being bounced off the surface and the dirty water-ice particles are coming from inside the moon. This flyby will show us whether this concept is right or wrong."



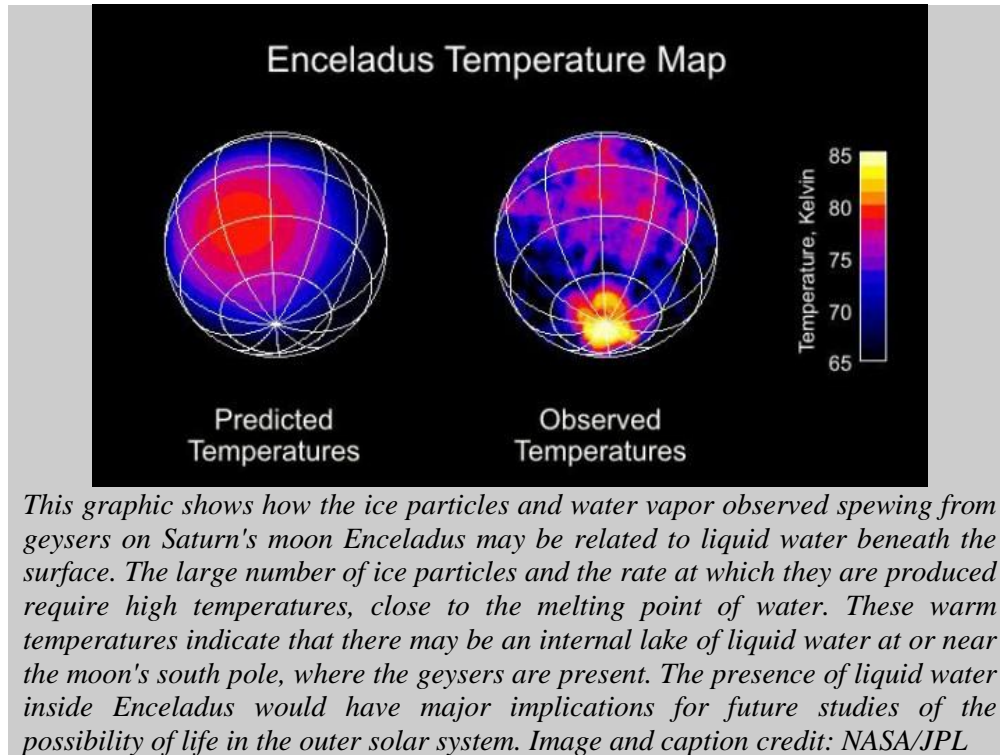
This graphic shows how the ice particles and water vapor observed spewing from geysers on Saturn's moon Enceladus may be related to liquid water beneath the surface. The large number of ice particles and the rate at which they are produced require high temperatures, close to the melting point of water. These warm temperatures indicate that there may be an internal lake of liquid water at or near the moon's south pole, where the geysers are present. The presence of liquid water inside Enceladus would have major implications for future studies of the possibility of life in the outer solar system.

Image and caption credit: NASA/JPL

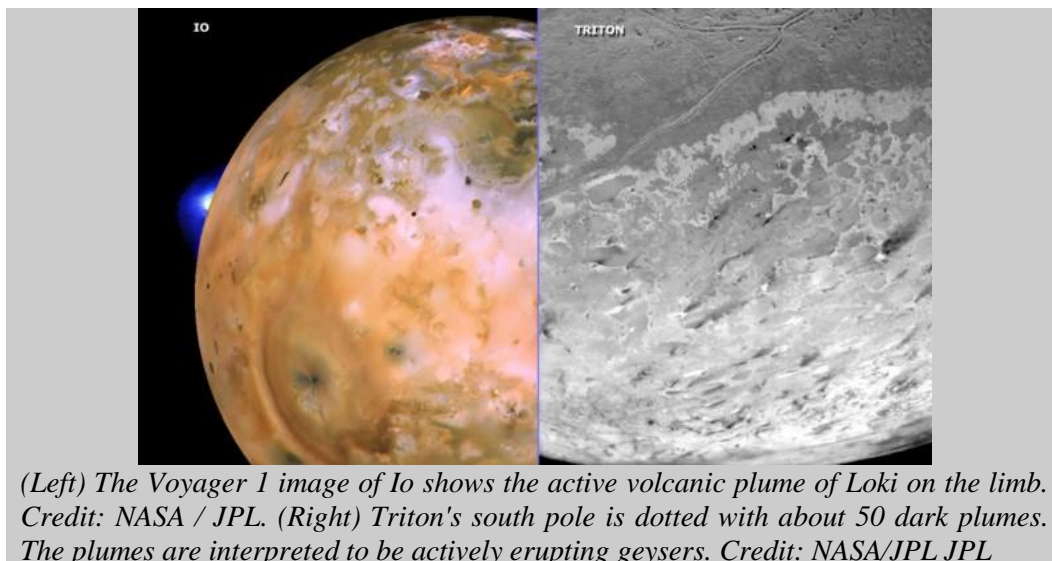
According to the usual geological arguments, Enceladus' plumes require some form of internal heating. Of course, NASA is quick to exploit any suggestion of subsurface liquid water on another body in the solar system as a reason for further missions to look for signs of life. But a source for that heat is not apparent. Susan Kieffer, a geology professor and planetary scientist at the University of Illinois at Urbana-Champaign, observed:

"This tiny satellite should be cold and inactive, like our own moon. But it isn't."

Modeling the maximum heat available from tidal distortion and radiogenic heating from a rocky core fails by an order of magnitude to explain the energy of the plumes. It also fails to explain the concentration of heat at Enceladus' south pole. So, what if Kieffer's intuition was correct and Enceladus is "cold and inactive?" Could the measured heat and the energy to drive the plumes come from space?



Kieffer has studied geysers and volcanoes on Earth; on Io, a satellite of Jupiter; and on Triton, a satellite of Neptune. Lumping such disparate phenomena together on the basis of superficial similarities and unquestioned assumptions leads to cognitive dissonance. As argued earlier on this website, there are no volcanoes on Io. Io is subject to extensive and continuous surface 'machining' by electric arcs. Jupiter and Io do not form a closed electromagnetic system. Io participates in the electrical circuit between Jupiter and the Sun. Similarly it will be found that Triton, the most distant moon in the solar system, shares in Neptune's circuit. Assuming by analogy that the jets on Io and Triton are volcanoes or geysers will lead to confusion.



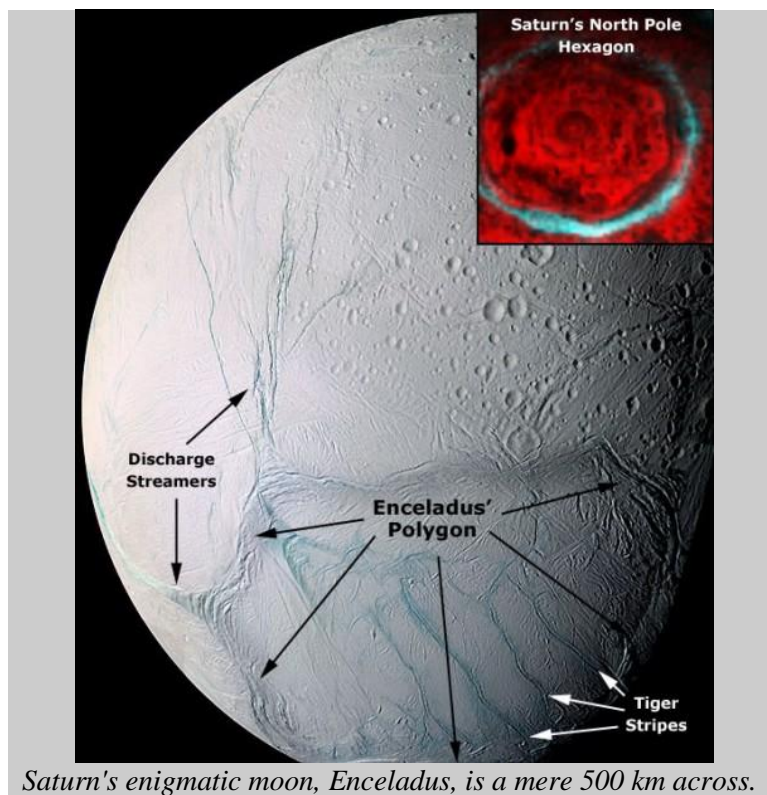
Similarly, it seems that Enceladus is connected to Saturn's circuitry. There is no need to postulate special and unlikely conditions inside Enceladus to explain its plumes. Like Io, Triton, and Europa in the past, Enceladus is undergoing electric discharge activity on its surface too. The tiny moon is geologically "cold and inactive" because internal geological forces are not driving the plumes. The energy of the plumes is being supplied externally by electricity. This possibility has never entered planetologists' consciousness due to the astronomical dogma that electricity plays no role in space. Cognitive dissonance is inevitable.

Electric Enceladus

Both Saturn and Enceladus have surprisingly 'hot' south poles. Planetary scientists can see no connection. The vast disparity in size and lack of appreciable atmosphere on Enceladus renders comparisons seemingly pointless. However, more surprising was the discovery that Saturn has a hot spot at its north pole, which has been in darkness for 13 years. But a greater mystery within that enigma is a hexagonal feature inside Saturn's auroral discharge. I [explained in January](#):

"The polar hot spot and long-lived hexagonal feature result from a continuous electric current flowing from the Sun into the pole of Saturn. The hot spot will remain for as long as the Sun shines electrically."

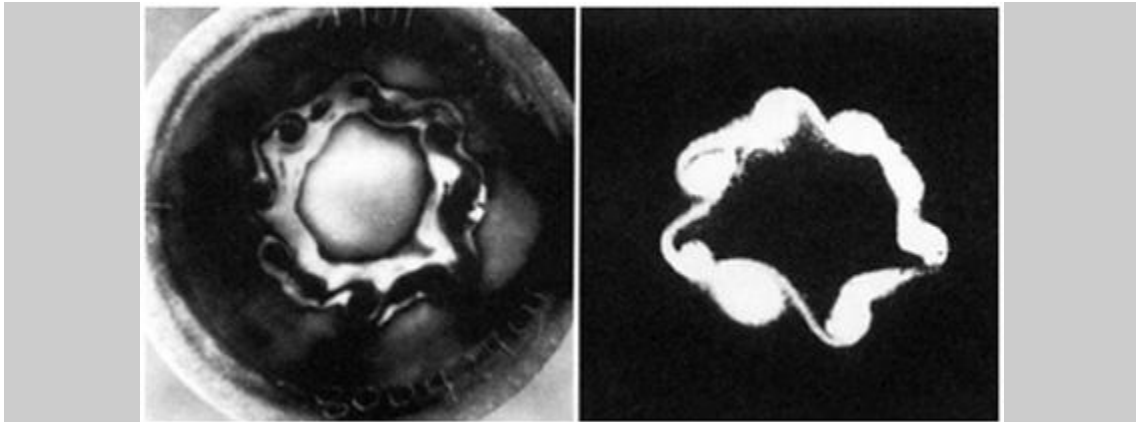
Now, what do we find encircling the 'hot' south pole of Enceladus but another polygonal feature.



Saturn's enigmatic moon, Enceladus, is a mere 500 km across.

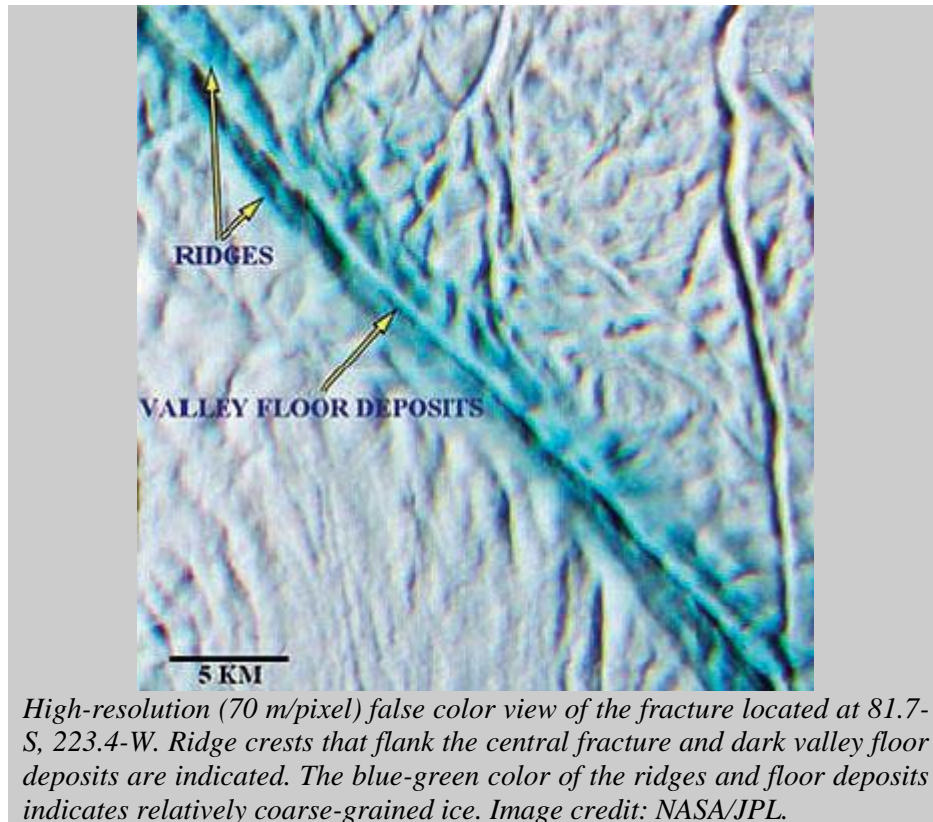
The southern region of Enceladus is shown here, emphasizing a polygonal feature encompassing the south polar hot spot and known as the South Polar Terrain (SPT). Inset is the Cassini Orbiter night-time infrared view of Saturn's weird hexagonal north pole structure. Credit for images: NASA/JPL.

I further explained, "The blue (false color) auroral ring shows that the current flows into Saturn via a cylindrical electron beam propagating along Saturn's magnetic field and magnetically pinching (known as a Z-pinch) down to the polar region."



(Left) Vortices of a 90 kiloamp electron beam etched onto a carbon 'witness plate' (courtesy of H. Davis), (right) Vortices of a 56 microamp electron beam photographed on a fluorescent screen (courtesy of H. F. Webster). "One of the outstanding problems in the propagation of electron beams along an axial magnetic field is the breakup of the beam into discrete vortex-like current bundles when a threshold determined by either the beam current or distance of propagation is surpassed. The vortices of the diocotron instability are found to occur over 12 orders of magnitude in beam current. This mechanism was first introduced to explain auroral curtains by Hannes Alfvén." —From Physics of the Plasma Universe by Anthony Peratt.

Clearly, the polygonal south polar terrain (SPT) on Enceladus is the result of a recent intense auroral-type discharge. The bluish 'discharge streamers' can then be understood as channels carved by surface lightning streaking away from the current vortexes toward the north pole. There, electrons leaving Enceladus to complete the circuit would produce extensive cathode cratering. And the north pole of Enceladus is heavily cratered. The near surface currents would heat the ice and soften or erase earlier craters.



Science magazine reports:

"The interior of the SPT is characterized by a complex network of cross-cutting fractures. Most conspicuous is a family of roughly parallel lineaments that we informally term 'tiger stripes.' The tiger stripes are linear depressions, typically about 500 m deep, 2 km wide, and 130 km in length, flanked on both sides by prominent 100-meter-high ridges. Darker material extends a few kilometers to either side." There are also "Narrow deposits of spectrally distinct icy material that often thread along the valley floors." "Tiger stripes have sharp relief and cross-cut all other fractures in their path."

Similar discharge channels can be seen on Jupiter's moon Europa, complete with coloration of the material excavated and thrown to both sides of the channel. A close-up of the tiger stripe terrain (4m/pixel) shows large ice boulders strewn about. Also in the closest image, narrow darker deposits "thread along the valley floors." These threads trace the path of the subsurface lightning with material altered by the energy of the discharge. Some of the altered material is usually responsible for the coloration of the levees to either side. On both Io and Europa the reddish coloration is due to the 'fritting' of two oxygen atoms from water ice to form a sulfur atom. On Enceladus, the energy of the discharge seems to be insufficient to allow this particular nuclear transmutation; otherwise sulfur would be present in the plumes.

The parallelism of the tiger stripes suggests they were formed at the same time and were subject to electromagnetic forces that forced the observed pattern. Similar parallelism is observed in some sinuous rilles on the Moon. Also the curvature where the tiger stripes meet the polygonal pattern suggests they were formed at the same time as the auroral discharge. The continued mild discharge activity centered on the tiger stripes and producing the polar plumes suggests an enhanced conductivity of the altered ice in those channels.

Geological dogma leads planetary scientists into confusion over dating as well as over mechanisms:

"The derived absolute ages for terrains on Enceladus from crater counts strongly indicate geologic activity over a time span of more than 4 billion years up to the present. Ages within the SPT are possibly as young as 500,000 years or younger. The discrete ages of different terrains suggests that rather than being continuously active through geologic time, Enceladus experienced localized episodes of activity perhaps separated by much longer time periods of inactivity."

As argued at length in [More on Mercury's Mysteries](#), crater statistics tell us nothing about the age of a planetary surface. Almost all craters are electrical scars, generated suddenly and intermittently. So all that can be deduced is that the SPT is younger than the nearby surface. We cannot assume that all bodies in the solar system were formed more than 4 billion years ago. "Geologic time" is a worthless fiction that is clung to because it allows theoretical extrapolations over vast time spans and consequently a facade of scientific rigor. The only supportable official statement is:

"Enceladus experienced localized episodes of activity perhaps separated by much longer time periods of inactivity."

Returning to the "sniffing and tasting" of the polar plumes, officially *"there are two basic possibilities for the source of the jets: either sublimating ice, above or below ground, or underground reservoirs of boiling liquid erupting through vents in the tiger stripes."* The boiling liquid model is preferred because it is easier to explain a wider size range of particles from a liquid than a sublimating solid. But the boiling model has severe problems in explaining a heated reservoir beneath the surface and the formation of vents of the precise character required to produce the observed jets.

On 14 July 2005 Cassini was lowered to a close-approach distance of 168 km. The encounter produced unequivocal evidence of a plume of water vapor and small icy particles emanating from the south polar region of Enceladus. Surprisingly, the Ion and Neutral Mass Spectrometer (INMS) found that if the mass-28 species is CO rather than N₂, then the outgassing observed from the plume would have a composition that is remarkably close to that of comets. Also the very narrow size distribution of particles fed to the E-ring by Enceladus is remarkably close to that of comets. This finding favors the electric discharge sputtering mechanism. It is precisely that mechanism that operates on comet nuclei to produce jets and that produced expressions of surprise when the fineness

and limited size distribution of comet dust was first measured. Dr. Torrence Johnson, imaging team member from NASA's Jet Propulsion Laboratory (JPL) in Pasadena, had the answer intuitively when he said in December 2005:

"In some ways, Enceladus resembles a huge comet."

But then cognitive dissonance took over:

"Only, in the case of Enceladus, the energy source for the geyser-like activity is believed to be due to internal heating by perhaps radioactivity and tides rather than the sunlight which causes cometary jets."

On the contrary, using Ockham's razor, one simple model should explain them all.

The "other stuff" found in some of the ice particles may be composed of atoms formed by nuclear modification of hydrogen, oxygen, carbon and nitrogen, detected by INMS. Even CO may be a product of a nitrogen molecule, N₂, under these conditions. If the "other stuff" can be analyzed, it may provide the identity of the blue coloration of the tiger stripes.

Electric discharge machining of planetary surfaces is the most powerful sculpting force in Nature. Until planetary scientists recognize this fact they will continue to be surprised and puzzled by images and data returned from other bodies in the solar system.

Wal Thornhill

Enceladus, Comets and Electric Moons

Posted on [April 1, 2008](#) by [Wal Thornhill](#)

*"William Whewell, in his 1840 synthesis *The Philosophy of the Inductive Sciences*, was the first to speak of consilience, literally a 'jumping together' of knowledge by the linking together of facts and fact-based theory across disciplines to create a common groundwork of explanation."*

"When we have unified enough certain knowledge, we will understand who we are and why we are here."

– Edward O. Wilson, *Consilience*.



A montage of Enceladus and a comet to emphasize the unexpected similarity of the composition of their jets. The Enceladus image is courtesy of NASA/JPL.

Recent reports about Saturn's mysterious moon, Enceladus, have supported the advance claims of the Electric Universe view of the shared origin of planets and comets while requiring post hoc, implausible adjustments to the conventional theory of origin of planets and moons from a nebular disk — a problematic 200-year-old theory lacking any successful predictions. Gravitational collapse of a rotating proto-solar nebula has problems; accretion of large bodies from smaller bodies has not been shown to work; and up to 99 percent of the matter in the imagined original solar nebula, having formed the planets, has then to be removed!

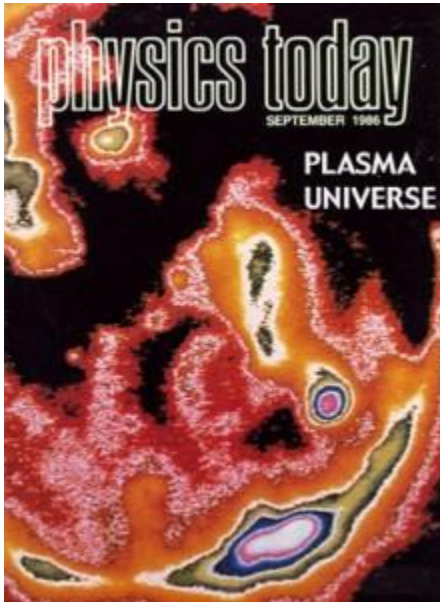
*"The disk from which the Sun and planets formed has now vanished, reminding one of the Cheshire Cat in *Alice in Wonderland* that disappeared, leaving only its smile behind."**

Nearly all of the key processes of astronomical theory occurred in the remote past or are otherwise unobservable — the birth processes of stars and planets; the hypothetical

nuclear furnaces in stars; and the 'dynamos' within celestial bodies that are supposed to generate magnetic fields. Most of the basic theoretical models are far-fetched. For instance, the production and dispersal of all heavy elements only in rare supernovae explosions, the formation of collapsing nebulae from dissipating matter, and the re-dispersal of most of it after forming the solar system. It is a story requiring miracles in every chapter — a hallmark of science fiction. However, the story is now so entrenched that it takes precedence over counter evidence. When writing fantasy, the constraints on imagination are no more than they were for Lewis Carroll when he wrote *Alice in Wonderland*. Reading the popular journals, astronomy has become a Mad Hatter's tea party, leaving us baffled with a strange use of language like 'fabric of space-time,' 'dark matter' and 'dark energy' to conceal obvious deficiencies in basic understanding and theory.

"Alice felt dreadfully puzzled. The Hatter's remark seemed to have no sort of meaning in it, and yet it was certainly English. 'I don't quite understand you,' she said, as politely as she could."

—*Lewis Carroll.*



The benefit of plasma cosmology and the Electric Universe is that all of the important processes occur in space and on the surfaces of stars and planets. They are in plain view of telescopes and spacecraft instruments covering the electromagnetic spectrum from radio waves to X-rays and gamma-rays. The concepts are grounded in sound electrical engineering principles. And plasma phenomena are scaleable from the laboratory to galactic dimensions, which make them amenable to experimental testing. Imagination is constrained, as it should be, by observation and experiment. It is the way that science is supposed to be conducted, not by mathematicians modeling the grin of the Cheshire Cat.

Prof. Taylor stated the obvious when he wrote:

*"There are only two ways to make things. The first is to start with something big and break it into pieces. The second is to build a larger structure from little bits."**

Familiarity with one story leads him to consider only the solar nebula as the 'something big.' However, plasma experiments show that big objects (stars) are formed very efficiently in a cosmic lightning bolt in a dusty nebula — rather like bead lightning where the discharge pinches off to form a string of bright plasma spheres. Once formed, the stars "scatter like buckshot" and each star may fission to achieve electrical stability. This

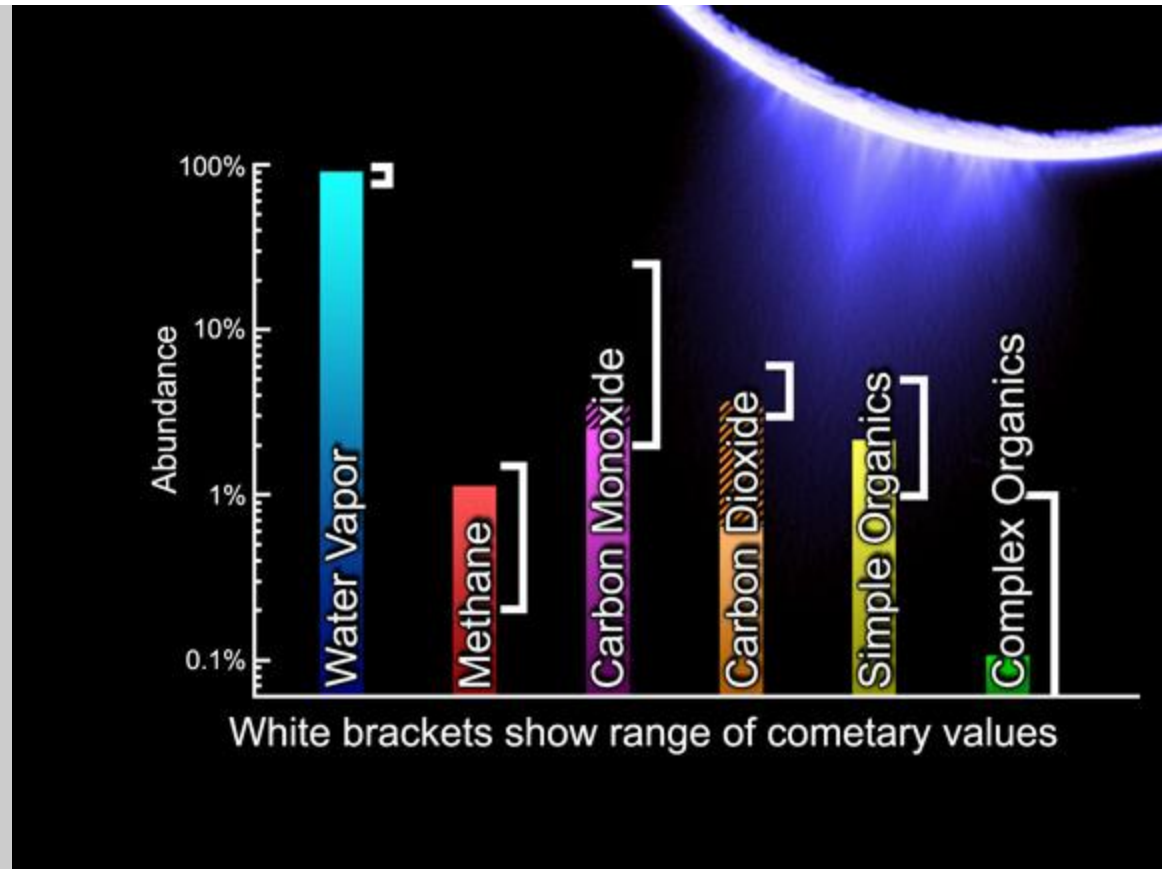
explains why about three quarters of stars have partners. That figure would be higher if we were to include gas giant partners.

The Electric Universe 'starts with something big and breaks it into pieces.' The fission process is repeated in further electrical disturbances by flaring red dwarfs and gas giant planets ejecting rocky and icy planets, moons, comets, asteroids and meteorites. Planetary systems may also be acquired over time by electrical capture of independent interstellar bodies such as dim brown dwarf stars. That seems the best explanation for our 'fruit salad' of a solar system. Capture of a brown dwarf requires that the dim star accommodate to a new electrical environment within the plasma sheath of the Sun. The brown dwarf flares and ejects matter, which becomes planets, moons and smaller debris. The 'dead' dwarf star becomes a gas giant planet.

This is not the 4.5 billion year evolutionary story of the clockwork solar system taught to us in Astronomy I. There is no primordial nebular 'stuff' of which all objects in the solar system were formed at the one time. The 'stuff' of which stars are made has been differentiated and altered by plasma discharge processes. All stars produce heavy elements in their photospheric discharges, which alters their internal composition with time. And the 'stuff' expelled electrically from inside stars and gas giants is further modified elementally, chemically and isotopically.

Meteorites bear witness to this process in their isotopic anomalies and the myriad tiny glass spheres found in most of them — attributed by more than one brave astronomer to 'lightning' in the solar nebula. The production of heavy radioactive elements in situ by 'cosmic thunderbolts' renders standard geological dating techniques useless for establishing ages. Other distinctions of the Electric Universe model are so stark as to provide simple observational tests to eliminate one or the other model. Saturn's moon, Enceladus, provides another opportunity.

* S. Ross Taylor, *Destiny or Chance: our solar system and its place in the universe*, pp. 41 and 51.



Enceladus's plume was found to have a comet-like chemistry by Cassini's Ion and Neutral Mass Spectrometer during its fly-through of the plume on 12 March 2008. Water vapor, methane, carbon monoxide, carbon dioxide, simple organics and complex organics were identified in the plume. The graph shows the chemical constituents in percentage of abundance found in comets compared to those found in Enceladus's plume. Credits: NASA/JPL/SwRI

On March 26 the official ESA website posted the following [report](#):

The Cassini spacecraft tasted and sampled a surprising organic brew erupting in geyser-like fashion from Saturn's moon Enceladus during a close flyby on 12 March. Scientists are amazed that this tiny moon is so active, 'hot' and brimming with water vapour and organic chemicals.

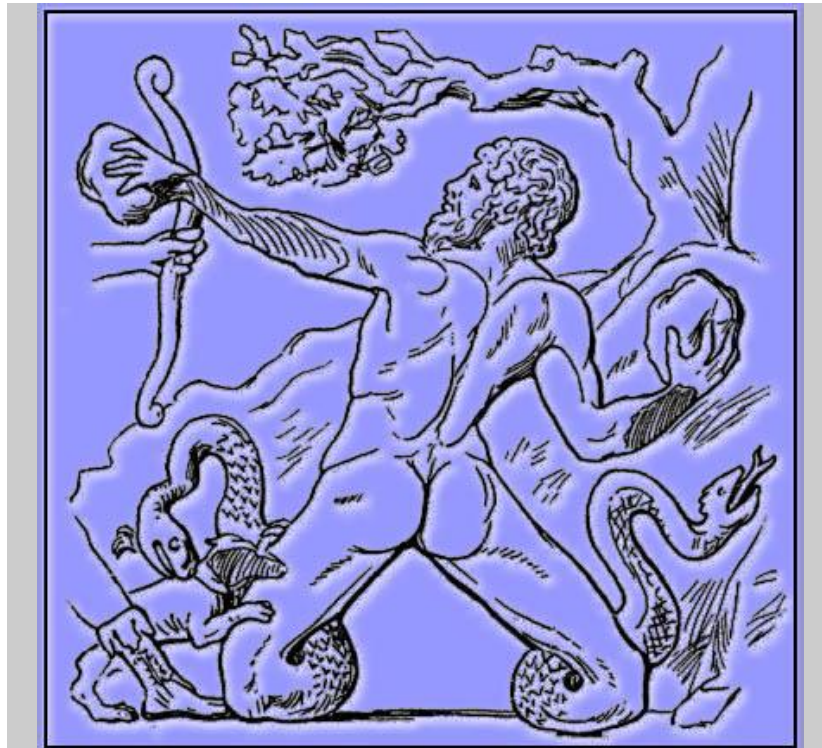
New heat maps of the surface show higher temperatures than previously known in the south polar region, with hot tracks running the length of giant fissures. Additionally, scientists say the organics 'taste and smell' like some of those found in a comet. The jets themselves harmlessly peppered Cassini, exerting measurable torque on the spacecraft, and providing an indirect measure of the plume density.

"A completely unexpected surprise is that the chemistry of Enceladus, what's coming out from inside, resembles that of a comet," said Hunter Waite, principal investigator for the Cassini Ion and Neutral Mass Spectrometer at the Southwest Research Institute in San Antonio. "To have primordial material coming out from inside a Saturn moon raises many questions on the formation of the Saturn system."

"Enceladus is by no means a comet. Comets have tails and orbit the sun, and Enceladus's activity is powered by internal heat while comet activity is powered by sunlight," said Waite.

Comment: Except for the obvious, *"comets have tails and orbit the sun,"* none of Waite's other assertions are correct. Only a source of internal heat has been considered on Enceladus. The crucial discovery is the "completely unexpected surprise" of the similarity of the chemistry of the jets of comets and Enceladus. It should not have been a surprise. The jets of both are an electric discharge phenomenon, heating the surface. The matter in the jets is coming from the surface and not the interior. And the chemistry of the jets is comparable because comets are born from the same parent bodies and under the same electrical conditions as rocky and icy planets and moons. The concept of 'primordial material' has no basis outside the nebular theory. The only difference between Enceladus and a comet is their orbits. If Enceladus were to follow a cometary orbit it would suffer electrical interactions with the solar plasma and appear a giant comet.

It is singularly appropriate that Enceladus was named after one of the Giants of Greek legend who fought with the celestial gods. The Giants are depicted variously with long hair and beard, powerful wings, or snakes for legs. All of these features are ancient symbols of comets.

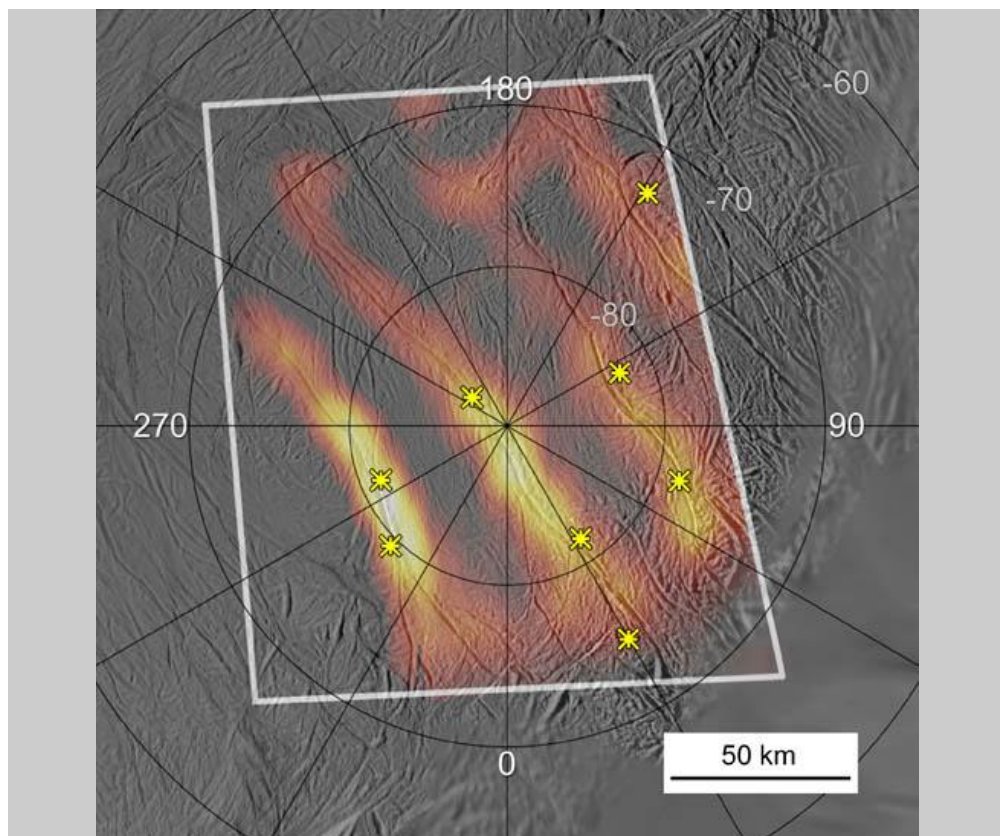


*Revolt of the Giants. The serpents, barrage of rocks (meteorites) and the cosmic tree are all symbols associated with extraordinary cometary electrical activity in the solar system, together with polar mega-auroral displays recorded globally in strange petroglyphs by prehistoric humans. Illustration from Harry Thurston Peck, *Harpers Dictionary of Classical Antiquities* (1898).*

We ignore the celestial origins of myth and legend to our great cost. They provide an astronomy stretching back over many thousands of years. Although appearing obscure on the surface, a forensic approach to the earliest global myths uncovers unambiguous correspondence between ancient depictions of the appearance of the sky gods and the recent discoveries of complex high-energy plasma discharge behavior. The "thunderbolts of the gods" takes on crucial significance in the history of the solar system.

According to the Electric Universe model, in its birth from its parent, Saturn, Enceladus would have had a post-natal cometary tail that formed a ring about its parent. This kind of scenario is the explanation for the origin of Saturn's ephemeral rings. This is not to say that legends have anything specific to tell us about Saturn's small moon. It is merely to highlight the fact that there is no intrinsic difference between Enceladus and a comet. The claims of the Electric Universe come with extraordinary evidence and successful predictions. The extraordinary claims of the nebular theory come with little evidence and unsuccessful predictions. Astronomical data requires a much broader analysis than its practitioners are trained to do. Specialization is the enemy of consilience. As E. O. Wilson wrote:

"When we have unified enough certain knowledge, we will understand who we are and why we are here."



Jet spots in tiger stripes

Heat radiating from the entire length of 150 km-long fractures is seen in this best-yet heat map of the active south polar region of Saturn's ice moon Enceladus. The warmest parts of the fractures tend to lie on locations of the plume jets identified in earlier images, shown in the annotated version with yellow stars. The measurements were obtained by the Cassini spacecraft's Composite Infrared Spectrometer from the spacecraft's close flyby of the moon on 12 March 2008.

Remarkably high temperatures, at least 180 Kelvin were registered along the brightest fracture, named Damascus Sulcus, in the lower left portion of the image. For comparison, surface temperatures elsewhere in the south polar region of Enceladus are below 72 Kelvin. Heat is escaping from Enceladus' interior along these warm fractures, dubbed "tiger stripes," which are also the source of the geysers that erupt from the polar region. The infrared data, shown in false colour, are superimposed on a greyscale image mosaic of the south pole obtained by Cassini's cameras on 14 July 2005, during the previous close Enceladus flyby. Numbers on the map indicate latitude and longitude.

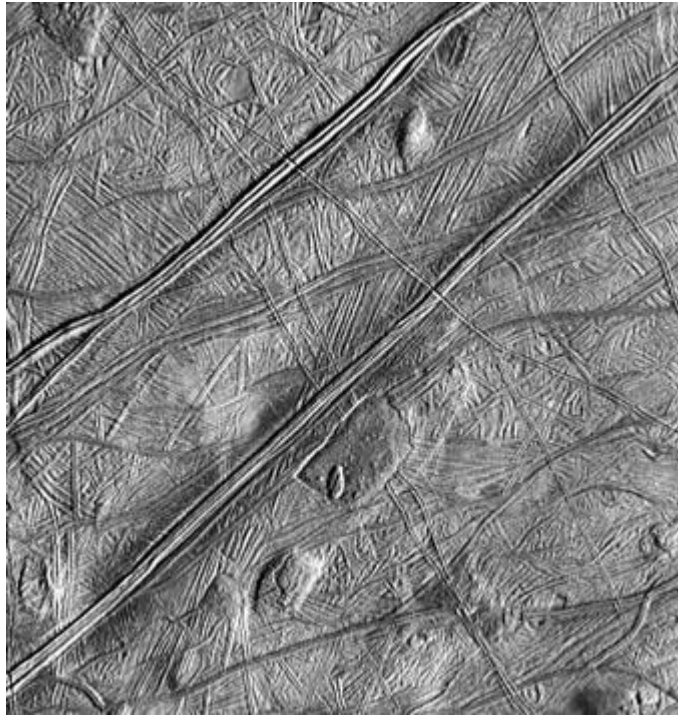
This new view shows that at least three of the south polar fractures are active along almost their full lengths – the fourth one, on the right, was only partially covered by this scan. The level of activity varies greatly along the fractures. The warmest parts of the fractures tend to lie on locations of the plume jets identified in earlier images. The main 'tiger stripe' fractures are not the only sources of heat, however; additional warm spots are seen in the upper right part of the scan. The warm regions are probably concentrated within less than a few hundred meters (a few hundred yards) of the fractures, and their apparent width in this image results from the relatively low resolution of the infrared data.

This map was made by scanning the south pole during the period from 16 to 37 minutes after closest approach to Enceladus, at a distance between 14,000 and 32,000 km as Cassini rapidly receded from its close, 50-km flyby. Credits: NASA/JPL/GSFC/SwRI/SSI

Comment: It is reasonable to assume that the 'tiger stripes' are fractures, based on standard geology. However, the stripes do look like claw marks scratched across the moon's surface. And that is a more useful analogy if we look for parallels on other moons that orbit in a similar electromagnetic environment — such as Jupiter's innermost Galilean satellites.

Jupiter's Electric Moons

The first images of Europa from Voyagers 1 and 2 revealed a smooth whitish sphere, crisscrossed with lines like a well-used skating rink. Science writers described it as "a surface that looked as if it had been clawed by a tiger with talons several kilometers wide," and as "enigmatic" and "difficult to interpret in terms of mechanism." Closer views resolved each line into a groove flanked by ridges or levees.



Soon after NASA published the first close-up images of Europa's surface, Arthur C. Clarke described the image above as the "most extraordinary ever received from space." In May 1997, Fred Hoyle and Chandra Wickramasinghe wrote a letter about the channels to the scientific journal, *Nature*:

"[The channels] have an almost uncanny persistence. They cross over each other, maintaining their identities over distances ...very large compared to their individual widths."

After favoring the analogy of a system of ropes, the authors asked the obvious question,

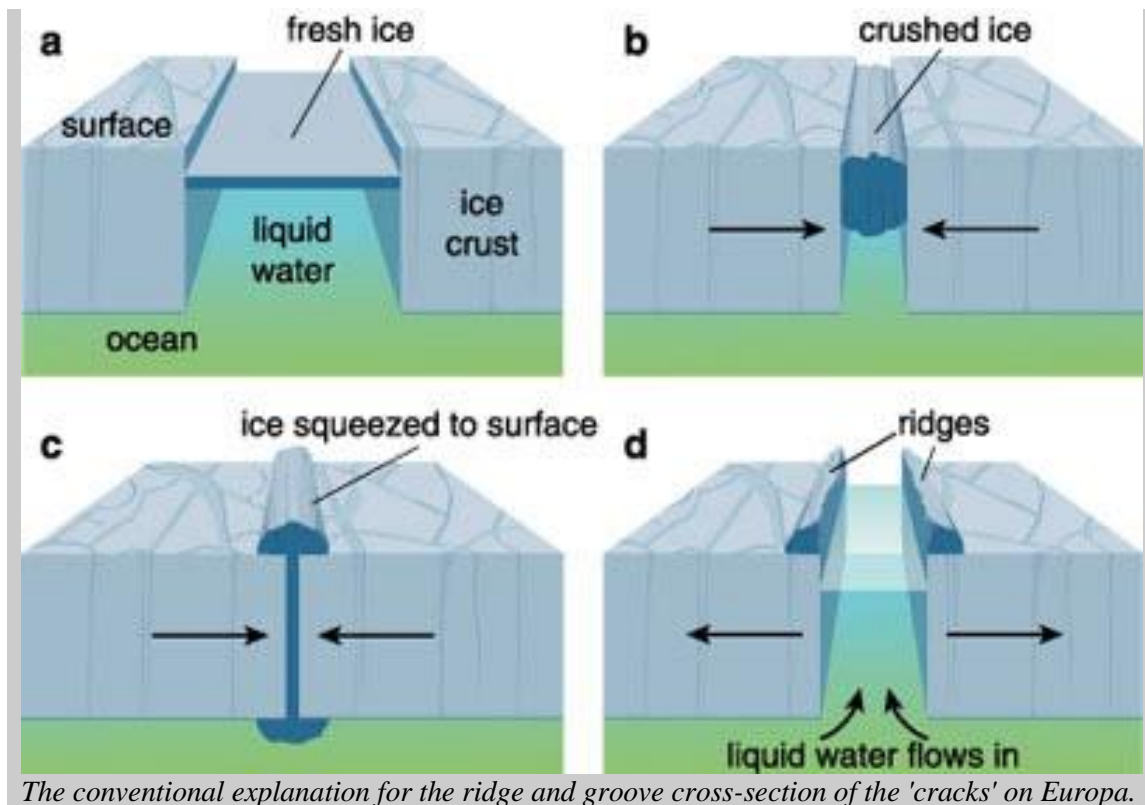
"How did the ropes come to be laid in the complex pattern in which we now see them?"

Needless to say, *Nature* would not publish the contentious letter. The larger channels travel thousands of kilometres along great circles without being diverted by the terrain. Whatever mechanism formed them must explain this tendency. Repeated tidal cracking

and compression of ice is too chaotic a process to explain it. As we shall see, the Hoyle/Wickramasinghe analogy of ropes stretched between two points is remarkably apt.

Another early description used the term "sinuous rille-like features" to describe the channels, but the analogy was not pursued because rilles are usually attributed to collapsed lava tubes. However, the analogy, like that of ropes, is accurate. The longest channels run along great circles and connect two regions, roughly sub-Jovian and anti-Jovian, that are described as "chaotic." (Like many other solid bodies in the solar system, Europa shows odd hemispheric differences). Those channels are up to 70 km wide and run over 3,000 km, or 30 percent of the distance around Europa. Yet they maintain parallel sides with a constant width and cross-section over almost the entire length. Tidal forces on tiny Europa cannot maintain the same intensity over such a distance to give this uniformity to a fissure.

Cracking ice will tend to follow weaknesses caused by earlier cracks in the ice. The repeated opening and closing of cracks proposed to account for their ridges-and-groove morphology relies on this tendency. But many channels on Europa disregard existing terrain, plowing through earlier channels without deviation and ignoring the presumably weaker shear planes. Where the channels intersect at oblique angles, the opposite sides of earlier channels often do not show the offset which the geometry of cracking and expansion necessarily creates. The intersections are of superimposed channels. Superimposition implies an external origin and fits the early description of a surface that had been "clawed by a tiger."



The repeated crushing of ice that is squeezed to the surface is unlikely to produce everywhere the appearance or cross-section of a neatly plowed furrow. It does not appear that any ridges contain more material than would be necessary to fill the groove, which is consistent with their being furrows. And there are no ridges observed without the central groove: In other words, all the purported cracks are open. One would expect about half, certainly some, of the cracks to be in the "crushed" position. This fact alone discredits the claim that the ridges are formed by material from beneath the surface repeatedly squeezed through a crack in the ice. But in addition, having all of the cracks open requires that surface ice elsewhere must have crumpled or slid beneath the surface for a distance of hundreds of kilometres. There is no sign of crumpling or subduction.

The channels are the icy European equivalent of lightning rilles on rocky bodies. But instead of being the target of thunderbolts, Europa was a hapless passer-by in a larger electrical exchange. Europa was caught in the crossfire. The small moon was forced to conduct current from one hemisphere to the other across its icy surface. The dominant pattern of rilles suggests a discharge originating from Jupiter. It was an externally imposed electric field between two hemispheres of Europa that gave rise to the discharges that formed the "freeways," some covering thousands of kilometres in a purposeful manner and ignoring all obstacles.

A discharge tends to form a number of equally spaced current filaments. The force between any two filaments is attractive beyond a certain distance and repulsive inside that distance. That causes each filament to retain its identity and to space itself equidistantly from its neighboring filaments. These powerful parallel lightning bolts streak across the surface, plowing grooves with raised levees of material thrown to either side — or parallel rilles. Once again, it is the parallel furrows that evokes the image of having been "clawed by a tiger."

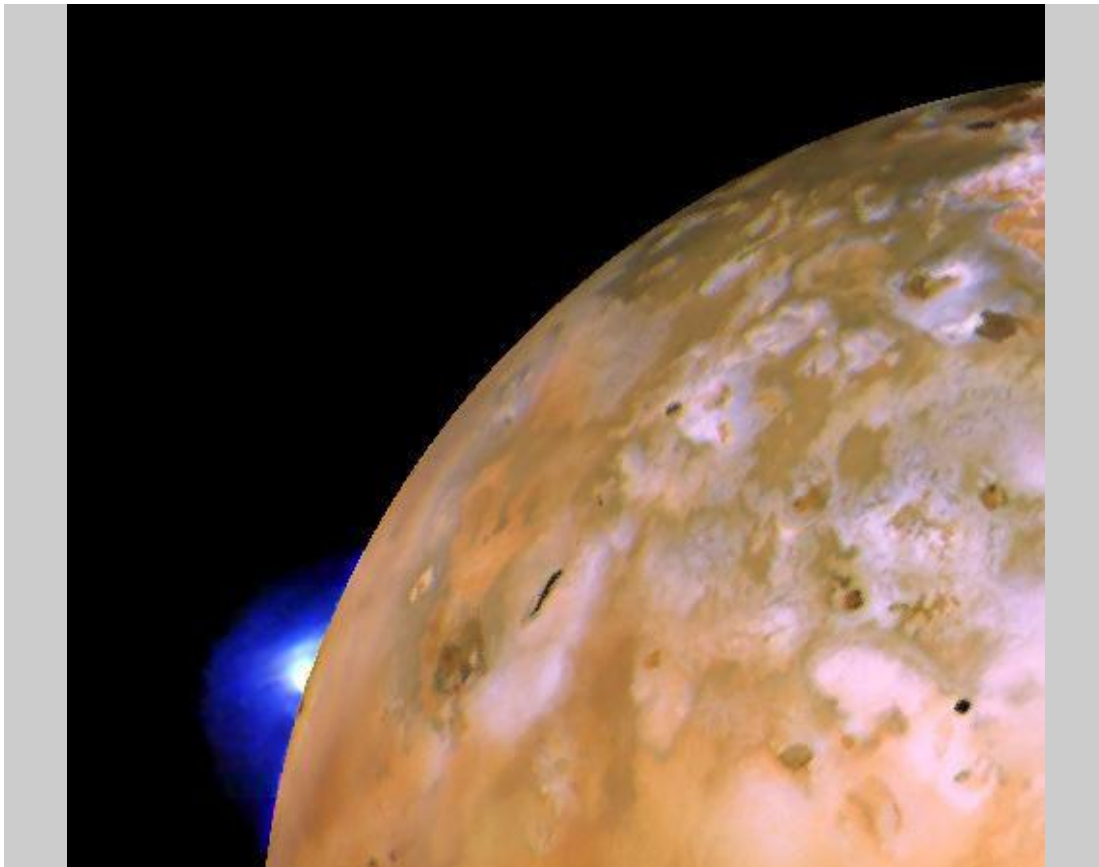
Confirmation of the electrical model comes from the even more extraordinary looping, or cycloid, rilles on Europa, known collectively as "flexi." The longest extends more than 1600 km and is made up of several loops, each roughly 100 kilometres long.



Credit: NASA/JPL

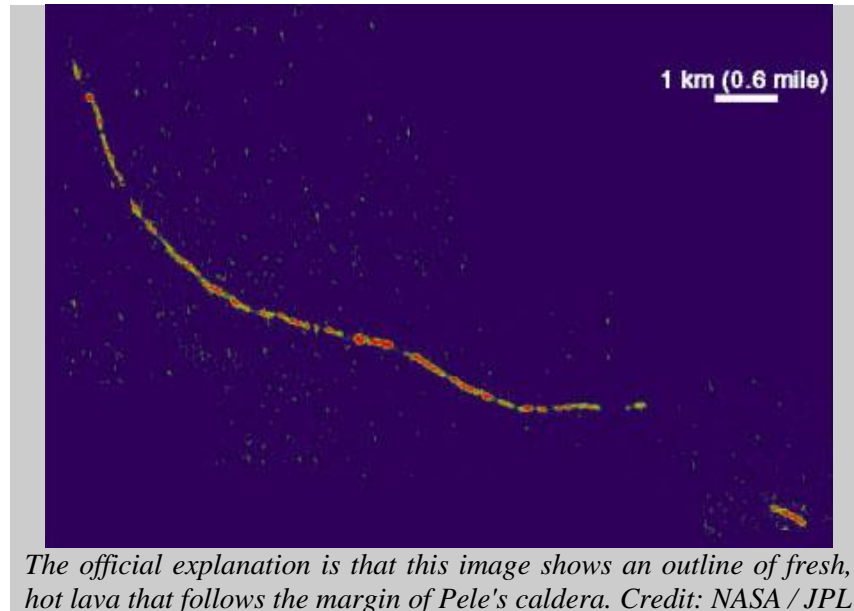
Flexi, like all other rille-like features on Europa, cannot be cracks in the ice. An electrical explanation for the flexi is straightforward. Ice is more homogeneous than rock. This would tend to produce relatively uniform rilles as the discharge channel follows the strong electric field along great circles from the sub-Jovian hemisphere to the opposite hemisphere. It is known that an ambient horizontal magnetic field causes a travelling arc to trace a cycloidal pattern, which is simply a combination of linear and rotary motion. The ambient field would be due to the Jovian discharge that engulfed Europa. The longest cycloidal rilles have loops with a slowly changing radius of curvature. That can be explained electrically because each loop varies in response to the strength of the ambient magnetic field.

Europa retains a snapshot of past electrical violence by Jupiter. But Jupiter's innermost Galilean moon, Io, remains electrically active. Like Enceladus, it sports cathode jets, misinterpreted by planetary scientists as volcanoes. Being in the more dynamic electromagnetic environment of Jupiter, the Io jets are more powerful than those on Enceladus and the surface machining more extensive and dynamic.



This Voyager 1 image of Io shows the active plume of Loki on the limb. Credit: NASA / JPL

With a plume like the one above, we should expect to see a single powerful vent. However, when one of the plume sources was viewed close up and at night what did we see? The same kind of thing we see on Enceladus — a number of hot spots arranged in a line.



"The volcano Pele glows in the night in this close-up image of Jupiter's moon Io, obtained by NASA's Galileo spacecraft in the closest-ever Io flyby on October 10, 1999. Only surfaces hotter than 600 degrees Celsius (1,100 degrees Fahrenheit) are visible in this image. The hot material forms a thin, curving line more than 10 kilometers (6 miles) long and up to 50 meters (150 feet) wide. Galileo scientists believe that the changes in brightness along the curving line are due to variations in the amount of hot lava exposed at the surface."

Credit: NASA/JPL

The official explanation is far-fetched. However, it is characteristic of cathode jets to erode the sharp edges of a crater. It is also characteristic of a corona discharge to form jets spaced roughly equally, which explains the line of hot spots. It may be possible to confirm equal spacing of some of the jets on Enceladus. Higher resolution images of that moon should show a similar pattern of hot spots along the "tiger stripes" where the enhanced heat output is detected. Meanwhile, [Io is a living laboratory](#) of the electric discharge machining of planetary surfaces.

The cometary nature of Enceladus doesn't merely "raise many questions on the formation of the Saturn system." It raises serious questions about the modern mythology of the formation of the entire solar system. If we are to take the concept of consilience seriously, and I think it is an imperative if we are to have a cosmology that answers all questions, then we must understand the ancient references to electrical activity in the heavens that is beyond modern experience. We must grasp the meaning of the thunderbolts of the gods.

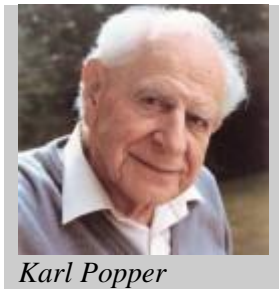
Wal Thornhill

Whatever Happened to Real Science?

Posted on [May 13, 2008](#) by [Wal Thornhill](#)

Just as much of modern science has become self-serving in striving for status and funding, the theory of how science should be done is similarly afflicted. An assessment of a theory based on 'degrees of belief' might be useful if scientists didn't routinely ignore, minimize or dismiss falsifying evidence and twiddle the countless knobs on their models to fit new data. The most glaring modern example of such behavior is the rejection of stark evidence of intrinsic redshift of quasars. Big bang cosmology is already lifeless by this assessment but 'belief' keeps the corpse warm. While we allow the few scientists who judge the data according to their beliefs to control publication, funding and press releases, real science is dead.

On May 7 New Scientist published "**Do we need to change the definition of science?**" by Robert Matthews.



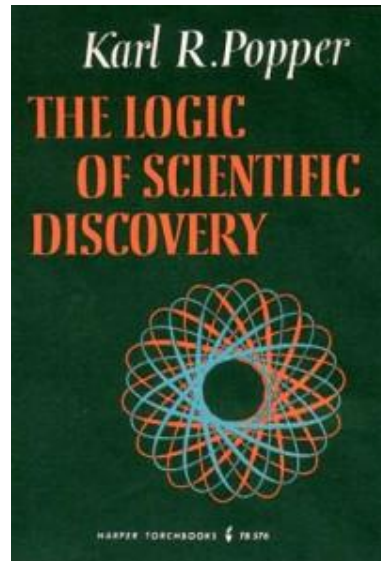
Karl Popper

"Identified as the defining characteristic of real science by the philosopher Karl Popper more than 70 years ago, falsifiability has long been regarded by many scientists as a trusty weapon for seeing off the menace of pseudoscience.

The late Viennese thinker has been lauded as the greatest philosopher of science by the likes of

*Nobel prizewinning physicist Steven Weinberg, while Popper's celebrated book *The Logic of Scientific Discovery* was described by cosmologist Frank Tipler as 'the most important book of its century'.*

Times change, though. Popper's definition of science is being sorely tested by the emergence of supposedly scientific ideas which seem to fail it. From attempts to understand the fundamental nature of spacetime to theories purporting to describe events before the big bang, the frontiers of science are sprouting a host of ideas that are seemingly impossible to falsify."



It is not clear how people could conclude that Popper "identified [falsification] as the defining characteristic of real science" if they actually read *The Logic of Scientific Discovery*. The book is about the logic associated with the discovery of new ideas; the

title is not The Objective Characteristics of a Reified Abstraction. He clearly presents looking for false entailments as a convention. (That's actually a quote from Popper on p. 37— "convention.": Falsifiability "will accordingly have to be regarded as a *proposal for an agreement or convention.*" [Emphasis in original]. That is, an agreement not to "adjust" a theory but to consider any variation as an entirely new theory that must compete with all available alternatives and to admit that the old version was falsified.)

The book is not so much about science as about an attitude—an eagerness to discover and to test new ideas rather than to defend an established dogma against life's inevitable changes. On the next page, Popper writes:

"Thus I freely admit that in arriving at my proposals I have been guided, in the last analysis, by value judgments and predilections. But I hope that my proposals may be acceptable to those who value not only logical rigour but also freedom from dogmatism; who seek practical applicability, but are even more attracted by the adventure of science, and by discoveries which again and again confront us with new and unexpected questions, challenging us to try out new and hitherto undreamed-of answers."

The New Scientist article continues:

Much of [Popper's] appeal rests on the clear-cut logic that seems to underpin the concept of falsifiability. Popper illustrated this through the now-celebrated parable of the black swan.

Suppose a theory proposes that all swans are white. The obvious way to prove the theory is to check that every swan really is white – but there's a problem. No matter how many white swans you find, you can never be sure there isn't a black swan lurking somewhere. So you can never prove the theory is true. In contrast, finding one solitary black swan guarantees that the theory is false. This is the unique power of falsification: the ability to disprove a universal statement with just a single example – an ability, Popper pointed out, that flows directly from the theorems of deductive logic.

Comment: Popper's emphasis is on testing, and he repeats that it's something scientists decide to do. It doesn't exist independently in the (passive-voiced) objective world; someone does it (or, more commonly these days, doesn't do it). Popper's idea isn't "sorely tested" by modern theories; modern scientists simply decided not to discover new ideas: There are plenty of black swans swimming in the pond of science; scientists just decided to define them as a different species rather than to look for a new theory that accounts for black swans.

Philosopher Colin Howson of the London School of Economics in the UK "believes it is time to ditch Popper's notion of capturing the scientific process using deductive logic. Instead, the focus should be on reflecting what scientists

actually do: gathering the weight of evidence for rival theories and assessing their relative plausibility.

Howson is a leading advocate for an alternative view of science based not on simplistic true/false logic, but on the far more subtle concept of degrees of belief. At its heart is a fundamental connection between the subjective concept of belief and the cold, hard mathematics of probability..."

Comment: Here is the point of departure from real science, where the perceived probability of a belief being true determines the course of science.

This should sound familiar; after all, it is what scientists do for a living. And it is a view of scientific reasoning with a solid theoretical basis. At its core is a mathematical theorem, which states that any rational belief system obeys the laws of probability – in particular, the laws devised by Thomas Bayes, the 18th-century English mathematician who pioneered the idea of turning probability theory on its head. Unlike Popper's concept of science, the Bayesian view doesn't collapse the instant it comes into contact with real life. It relies on the notion of accumulating positive evidence for a theory.

Comment: It is this kind of thinking that has allowed the big bang theory to persist when it should have collapsed the instant it came into contact with real life—the observations that highly redshifted objects (quasars) are connected to low redshift galaxies. In simple terms, redshift is not a measure of an expanding universe. We cannot 'rewind' time to a metaphysical 'creation' event—the big bang. What has happened is not science. It has been a process of selectively fitting the evidence to a belief in the big bang. Such a belief is not rational and shouldn't even qualify for the Bayesian test.

Astrophysicist Robert Trotta of Oxford University [rationalizes the Bayesian method](#):

"At first glance, it might appear surprising that a trivial mathematical result obtained by an obscure minister over 200 hundred years ago ought still to excite so much interest across so many disciplines, from econometrics to biostatistics, from financial risk analysis to cosmology. Published posthumously thanks to Richard Price in 1763, "An essay towards solving a problem in the doctrine of chances" by the rev. Thomas Bayes (1701(?)–1761) had nothing in it that could herald the growing importance and enormous domain of application that the subject of Bayesian probability theory would acquire more than two centuries afterwards. However, upon reflection there is a very good reason why Bayesian methods are undoubtedly on the rise in this particular historical epoch: the exponential increase in computational power of the last few decades made massive numerical inference feasible for the first time, thus opening the door to the exploitation of the power and flexibility of a rich set of Bayesian tools. Thanks to fast and cheap computing machines, previously unsolvable inference problems became tractable, and algorithms for numerical simulation flourished almost overnight..."

Cosmology is perhaps among the latest disciplines to have embraced Bayesian methods, a development mainly driven by the data explosion of the last decade. However, motivated by difficult and computationally intensive inference problems, cosmologists are increasingly coming up with new solutions that add to the richness of a growing Bayesian literature."

Comment: Trotta's argument boils down to extolling the virtues of being able to play computer games with the data more effectively in recent times. The aim is to produce computer models that mimic as closely as possible 'real life.' However, cosmological models fail unless they introduce imaginary black holes, dark matter and dark energy as 'fudge factors' to match appearances. Once again, this is not science, it is computer game playing. Judging by science news reports, cosmologists are increasingly coming up with new science fiction that will certainly add to the richness of the laughter at their 'literature' in future. This [misuse of Bayesian methodologies](#) is symptomatic of a disconnect from reality in the sciences.

The New Scientist article continues:

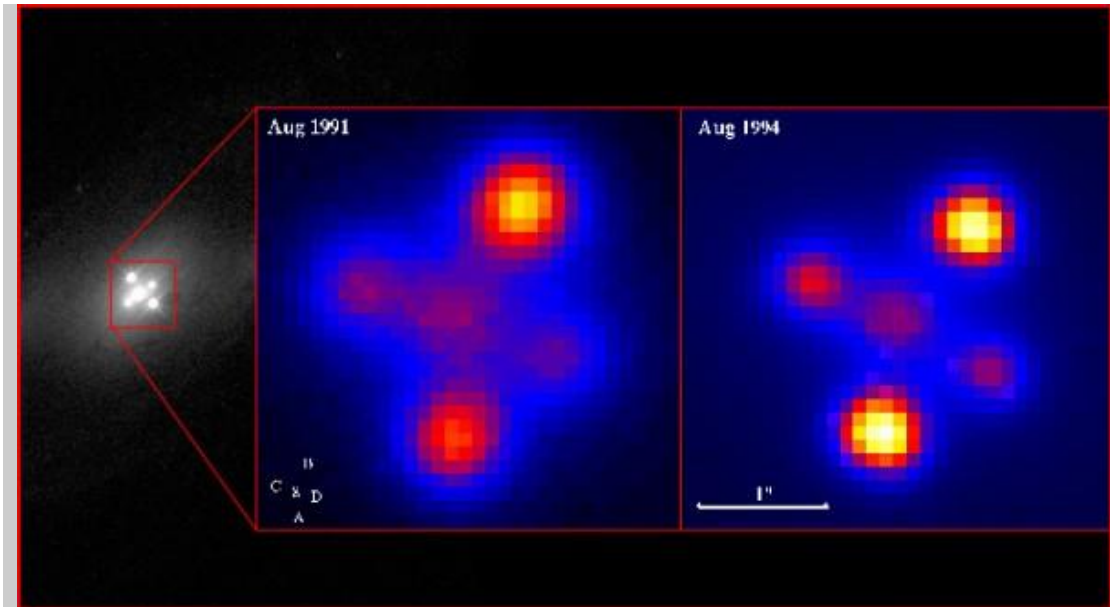
Scientists begin with a range of rival explanations about some phenomenon, the observations come in, and then the mathematics of Bayesian inference is used to calculate the weight of evidence gained or lost by each rival theory. Put simply, it does this by comparing the probability of getting the observed results on the basis of each of the rival theories. The theory giving the highest probability is then deemed to have gained most weight of evidence from the data.

Comment: Bayes's idea of calculating "the probability of getting observed results on the basis of each of the rival theories" may be of some use in comparing small variations on initial beliefs, but it misconceives the situation when different initial beliefs are involved. "Observed results" are interactive with the theories that direct observers about what to observe, how to observe it, what value to put on it, and which way to interpret it. As a good illustration Matthews quotes cosmologist Lawrence Krauss at Case Western Reserve University in Cleveland, Ohio:

"You just can't tell if a theory really is unfalsifiable." [Krauss] cites the case of an esoteric consequence of general relativity known as the Einstein ring effect. In a paper published in 1936, Einstein showed that the light from a distant star can be distorted by the gravitational field of an intervening star, producing a bright ring of light around it. It was a spectacular prediction but also, Einstein said, one that astronomers stood 'no hope of observing', as the ring would be too small to observe.

For all his genius, Einstein had reckoned without the ingenuity of astronomers, which in 1998 led to the discovery of the first example of a perfect Einstein ring – created not by a star, but by a vast galaxy billions of light years away.

Comment: Clearly the author had no idea that other "results" were possible: [multiple active galactic nuclei ejections](#), plasma torus, etc. The interactivity between theories and observations is present in something as simple as observing an electron: are you looking at a particle with momentum or at a charge comprising an electrical current? Or at something no one has yet imagined?



The Einstein Cross.

In the mid-1980's, astronomers discovered these four quasars, with redshifts about $z = 1.7$, buried deep in the heart of a galaxy with a low redshift of $z = .04$. (The central spot in this image is not the whole galaxy but only the brightest part of the galaxy's nucleus.) When first discovered, the high redshift quasar in the nucleus of a low redshift galaxy caused a panic. To save the redshift/distance conviction, gravitational lensing had to be invoked despite Fred Hoyle's calculation that the probability of such a lensing event was less than two chances in a million! And there is little sign of the expected reddening of the quasars' light if it had passed so deeply through the dusty spiral. A change in brightness of the quasars was observed over a period of three years. Arp's explanation is that the galaxy has ejected four quasars, which are growing brighter with age as they move farther from the nucleus. The lensing explanation is that the bending of the light varies when individual stars pass in front of the quasar. If the lensing explanation were correct, the quasars should brighten briefly and then fade as the star moves out of alignment.

A cardinal rule before applying the Bayes methodology is to ask whether the situation calls for a probability test. For example, an astronomer obtains an image of a highly redshifted quasar that appears to be in front of a low-redshift galaxy. Other astronomers are unconvinced and demand that he should evaluate the a posteriori probability that the quasar is indeed closer to us than the galaxy. In this case, examining data is not a matter of 'probabilities' (neither a priori nor a posteriori). It is simply a question of do you believe the evidence or not. If not, then you must be prepared to say why not. Are you

accusing the presenter of the evidence of forgery? Are you saying the quasar is an 'artifact' and not really there? To raise probabilistic arguments in cases where the evidence is so confronting is an evasion. It is dishonest.

Probabilities aren't prices by which you can compare the apples and oranges of different initial beliefs. Probabilities incorporate the very initial beliefs that scientists should be discovering and questioning. The theory that is based on familiar assumptions will always calculate out as more probable than the ones with unfamiliar assumptions. Bayesian probabilities are little more than digitized familiarities. "Secure knowledge" is the enemy of scientific discovery.

The author gets nowhere. *"In the end,"* he still misses Popper's point and stays stuck in the conformist peer (reviewed) pressure that has all but stopped progress:

"empirical observations...decide if a theory gets taken seriously."

As if people had nothing to do with it. No, scientists decide—to take seriously, to take for granted, or to discover new combinations of data, ideas, and initial beliefs.

It seems that modern scientists will not learn from history. They seem more opposed to unfamiliar theoretical options than in the past, which will only be apparent to scientists of the future. The Bayesian probabilistic evaluation of theories by those who choose which theories to test and the importance of the data merely serves to perpetuate this dysfunctional aspect of science. When the suspect is the judge and jury the verdict is not real science.

Wal Thornhill

With appreciation to Mel Acheson for his contribution.

Electric Galaxies

Posted on [May 20, 2008](#) by [Wal Thornhill](#)

"The conformist propensity of social institutions is not the only reason that erroneous theories persevere. However, once embedded within a culture, ideas exhibit an uncanny inertia, as if obeying Newton's law to keep on going forever until acted upon by an external force."

—Henry Zemel.

"One fact that strikes everyone is the spiral shape of some nebulae; it is encountered much too often for us to believe that it is due to chance. It is easy to understand how incomplete any theory of cosmogony which ignores this fact must be. None of the theories accounts for it satisfactorily, and the explanation I myself once gave, in a kind of toy theory, is no better than the others. Consequently, we come up against a big question mark."

— Henri Poincaré, at the conclusion of the preface to his book, *Hypothèses Cosmogoniques*.

"Space is filled with a network of currents which transfer energy and momentum over large or very large distances. The currents often pinch to filamentary or surface currents. The latter are likely to give space, as also interstellar and intergalactic space, a cellular structure."

—Hannes Alfvén.

In an Electric Universe x-ray and radio astronomies are very important; x-ray because it reveals discharge activity that produces x-rays; and radio because it traces the cosmic power transmission lines in deep space through the polarization of radio waves from electrons spiralling in a magnetic field — known as 'synchrotron radiation.'



The Very Large Array (VLA) of radio antennae in its most compact configuration ("D-array"). The VLA is 50 miles west of Socorro, New Mexico on U.S. Highway 60.

Image courtesy of NRAO/AUI and Kristal Armendariz, Photographer.

A [recent report](#) from the National Radio Astronomy Observatory (NRAO) highlights the usefulness of radio astronomy in discovering some of the electrical secrets of galaxies. However, it also demonstrates the "uncanny inertia" of "erroneous theories."

New VLA Images Unlocking Galactic Mysteries

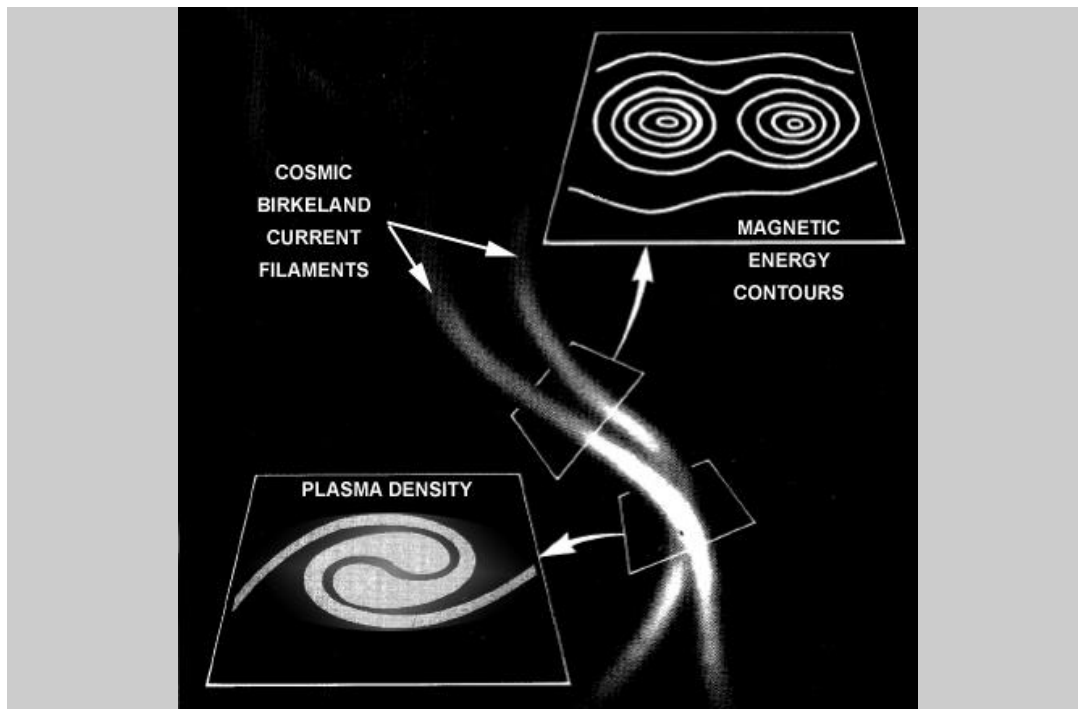
Astronomers have produced a scientific gold mine of detailed, high-quality images of nearby galaxies that is yielding important new insights into many aspects of galaxies, including their complex structures, how they form stars, the motions of gas in the galaxies, the relationship of "normal" matter to unseen "dark matter," and many others. An international team of scientists used more than 500 hours of observations with the National Science Foundation's Very Large Array (VLA) radio telescope to produce detailed sets of images of 34 galaxies at distances from 6 to 50 million light-years from Earth. Their project, called The HI Nearby Galaxy Survey, or THINGS, required two years to produce nearly one TeraByte of data. HI ("H-one") is an astronomical term for atomic hydrogen gas.*

"Studying the radio waves emitted by atomic hydrogen gas in galaxies is an extremely powerful way to learn what's going on in nearby galaxies."

Comment: The reference to "dark matter" in the outline of the THINGS project should be of concern to all taxpayers. The invention of undetectable "dark" matter in a gravitational model of galaxies should be ringing alarm bells and flashing warning lights for anyone with commonsense. It is saying that there may be something we don't know about gravity or that simple Newtonian mechanics does not apply to galaxies. Perhaps both are true. Clearly, we need a better explanation than "an invisible tooth fairy did it." To be confident we understand galaxies we need a working model that can be demonstrated in the laboratory. Is there such a model?

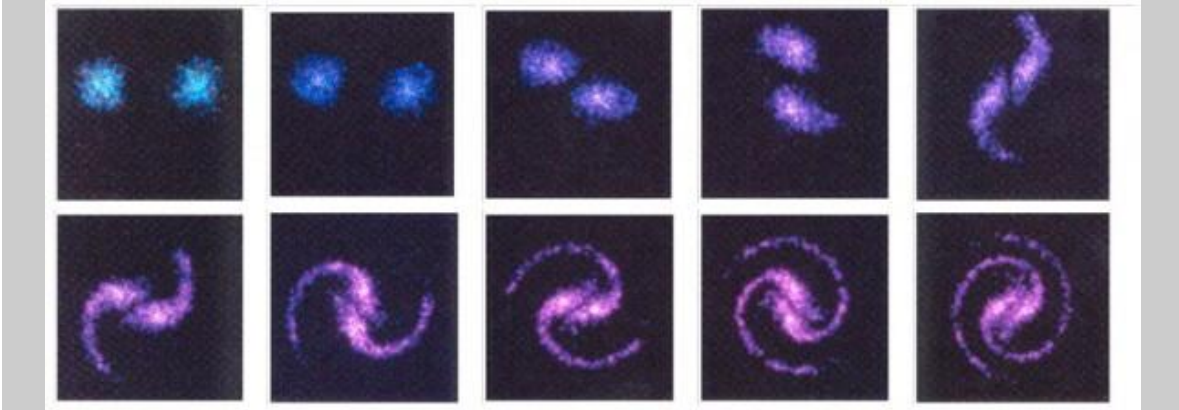
The Electric Galaxy

The scandalous truth is that there is a model of spiral galaxy formation that has long been demonstrated by laboratory experiment and "particle in cell" (PIC) simulations on a supercomputer. But instead of using stars, gas and dust as the particles, subject to Newton's laws, the particles are charged and respond to the laws of electromagnetism. This seems like an obvious approach when we know that more than 99.9 percent of the visible universe is in the form of [plasma](#). Plasma is a gas influenced by the presence of charged atoms and electrons. Plasma responds to electromagnetic forces that exceed the strength of gravity to the extent that gravity can usually be safely ignored. This simple fact alone suggests why gravitational models of galaxies must fail.



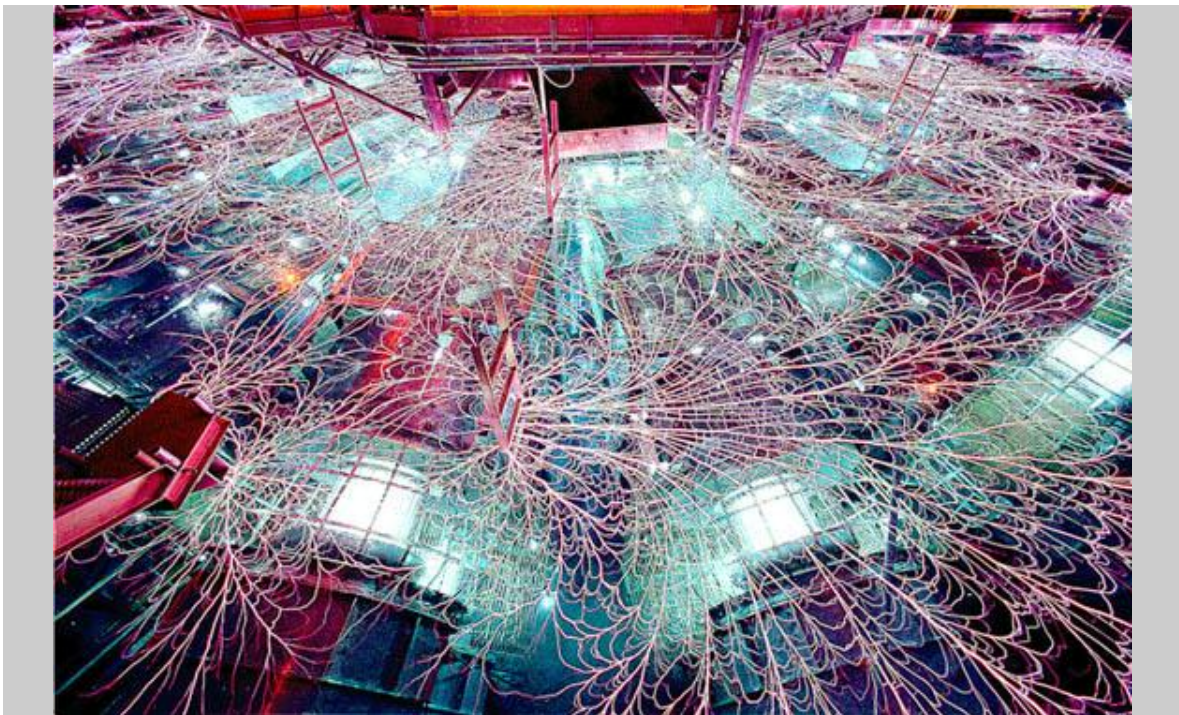
The plasma universe may be eternal and infinite, directly contradicting the Big bang model. In this picture, swirling streams of electrons and ions form filaments that span vast regions of space. Where pairs of these filaments interact the particles gain energy and at narrow "pinch" regions produce the entire range of galaxy types as well as the full spectrum of cosmic electromagnetic radiation. Thus galaxies must lie along filaments, as they are observed to do on a large scale. The bulk of the filaments are optically invisible from a distance, much like the related Birkeland currents that reach from the Sun and cause auroras on Earth. —Credit: A. Peratt, Plasma Cosmology, 1992.

The simplest geometry for galaxy formation is two adjacent Birkeland currents of width 35 kiloparsecs separated by 80 kiloparsecs. The interaction region, and hence the thickness of a galaxy is 10 kpc. By scaling the current flows in astronomical objects by size, it is determined that the average flow in a galactic Birkeland current is approximately 10^{19} amperes; the Alfvén galactic current. The synchrotron radiated power is of the order of 10^{37} watts, that is, the power recorded from double radio galaxies.

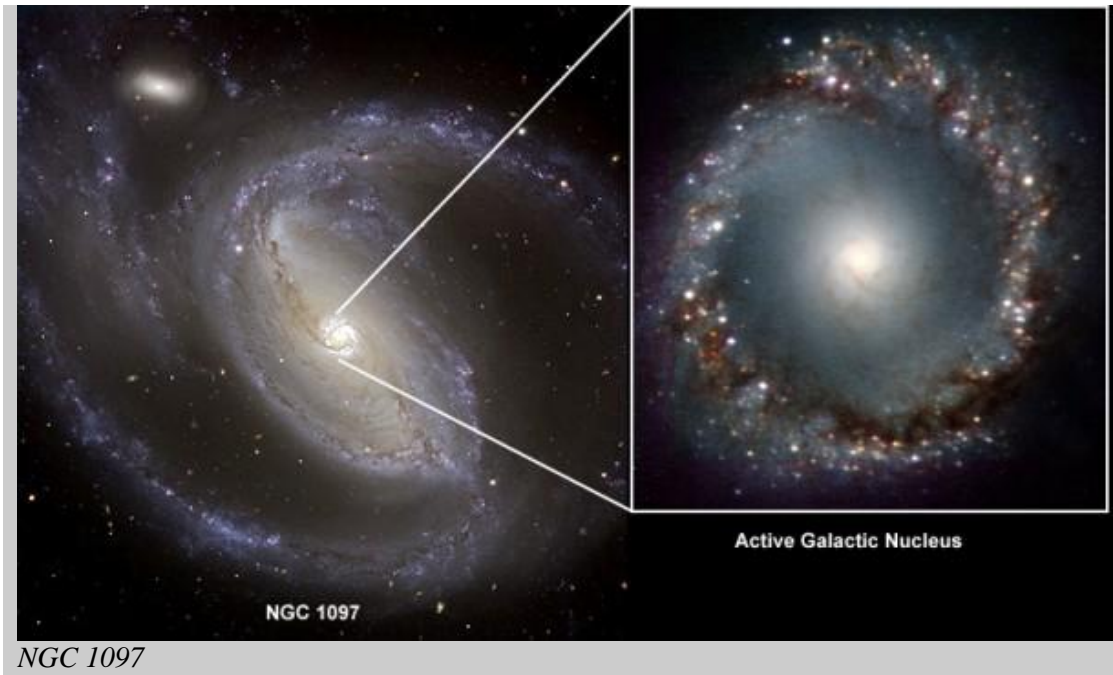


*These images from a supercomputer simulation trace the development of spiral structure in two interacting plasma blobs over a span of nearly 1 billion years. At the start of the interaction at upper left the filaments are 260,000 light-years apart; all 10 panels are reproduced at the same scale. Simulations such as this can reproduce the full range of observed spiral galaxy types using electromagnetic processes rather than gravitational ones. — Credit: A. Peratt, *Plasma Cosmology*, 1992.*

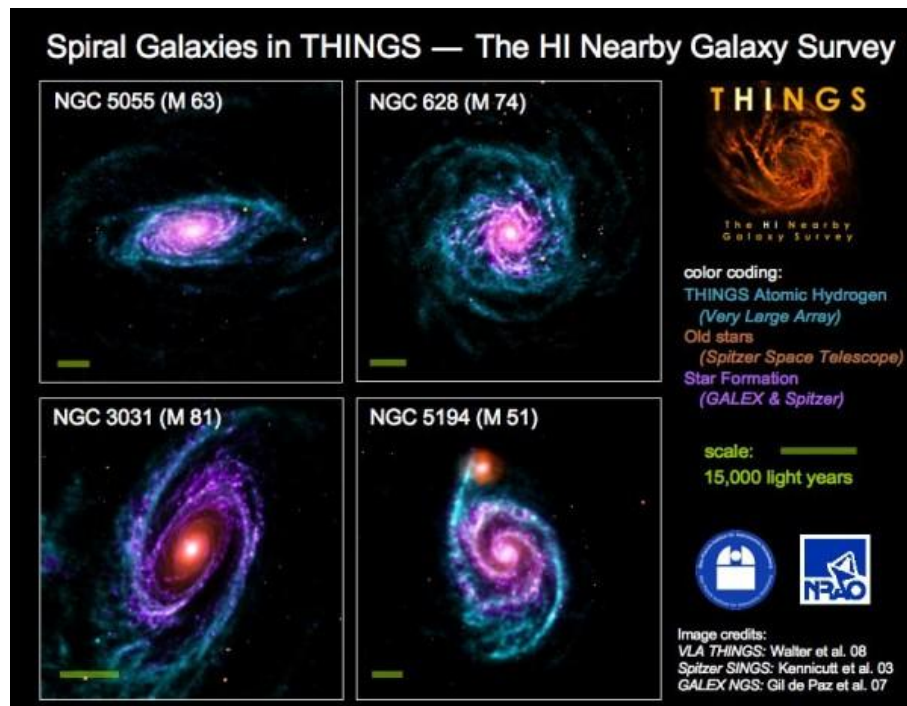
And so that there can be no objection, the computer simulations have been backed up by experiments in the highest energy density laboratory electrical discharges—the Z-pinch machine. The experiments verify each stage in development of the PIC simulations. This important work demonstrates that the beautiful spiral structure of galaxies is a natural form of plasma instability in a universe energized by electrical power.



Electrical discharges (Lichtenberg figures) illuminate the surface of the Z machine during a recent shot. The most recent advance gave an output power of about 290 trillion watts for billionths of a second, about 80 times the entire world's output of electricity focused onto a target the size of a cotton reel.



NOTE: Clearly, the production of a spiral galaxy requires the input of prodigious electrical power! But nowhere in astrophysical theory will you find any mention of electrical energy. In stark contrast, cosmologists are content to invent "dark matter" and "dark energy" on the basis of their universe built with the weakest force in the universe – gravity. Meanwhile magnetic fields are found throughout space, plainly signaling the electric currents required to sustain them.

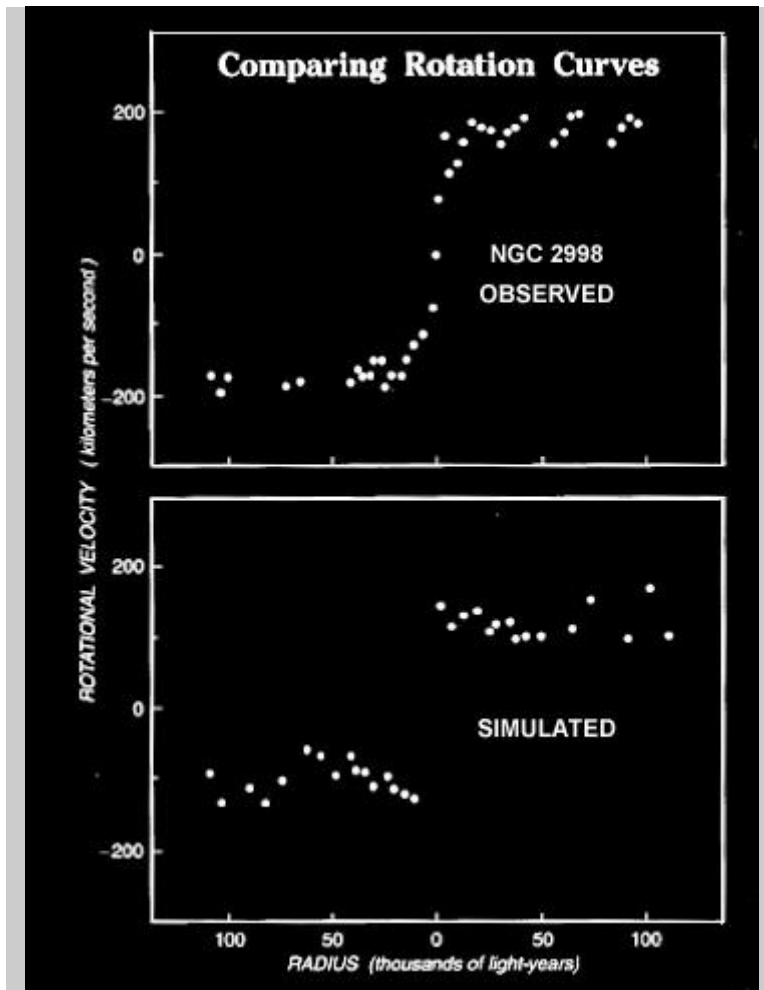


Most of the galaxies studied in the THINGS survey also have been observed at other wavelengths, including Spitzer space telescope infrared images and GALEX ultraviolet images. This combination provides an unprecedented resource for unraveling the mystery of how a galaxy's gaseous material influences its overall evolution.

Analysis of THINGS data already has yielded numerous scientific payoffs. For example, one study has shed new light on astronomers' understanding of the gas-density threshold required to start the process of star formation. "Using the data from THINGS in combination with observations from NASA's space telescopes has allowed us to investigate how the processes leading to star formation differ in big spiral galaxies like our own and much smaller, dwarf galaxies," said Adam Leroy and Frank Bigiel of the Max-Planck Institute for Astronomy at the Austin AAS meeting.

Because atomic hydrogen emits radio waves at a specific frequency, astronomers can measure motions of the gas by noting the Doppler shift in frequency caused by those motions. "Because the THINGS images are highly detailed, we have been able to measure both the rotational motion of the galaxies and non-circular random motions within the galaxies," noted Erwin de Blok of the University of Cape Town, South Africa.

Comment: The observations of 'motions of gas' in galaxies will be valuable to plasma cosmologists but will only serve to further confuse gravity models because it is not 'gas' that is in motion but plasma. And as for star formation, the same electrical plasma processes that form galaxies are involved at the stellar scale. A later article will show that astronomers' understanding of stars is little advanced on the aboriginal 'campfire in the sky.' There will be no new light on astronomers' understanding of stars until electric light dispels the darkness.



Comparison of rotational velocity with radius in a spiral galaxy versus a supercomputer simulation of the rotation of an equivalent mass object formed at the intersection of two interacting plasma filaments. No dark matter need be invented to reproduce the peculiar rotation curves of spiral galaxies because the electromagnetic forces acting on plasma are so much stronger than gravity. —Credit: A. Peratt.

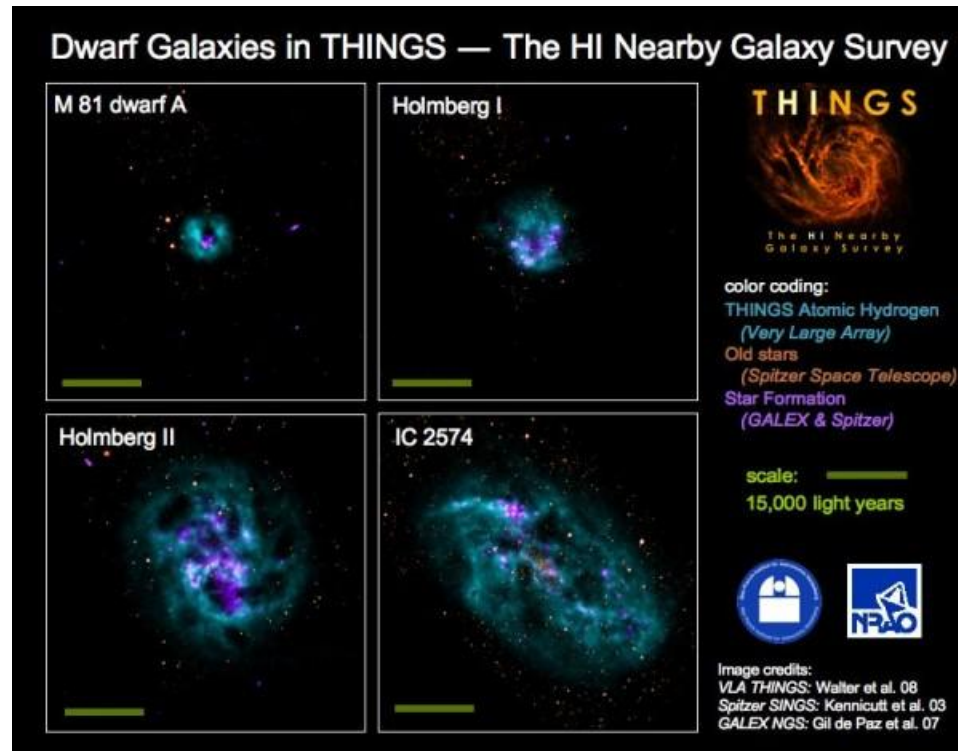
There is an important lesson here. The notion that gravity governs celestial mechanics has been "embedded within our culture" for hundreds of years and is as difficult to dislodge as was Ptolemy's epicycles. Science is essentially a cultural activity and is not as

objective as we like to fool ourselves. It seems that the cultural imperative remains strong enough to deny prima facie evidence and defy logic and commonsense. As Max Planck lamented"

"An important scientific innovation rarely makes its way by gradually winning over and converting its opponents. What does happen is that its opponents gradually die out, and that the growing generation is familiarized with the ideas from the beginning."

But our growing generation is not being familiarized with important scientific innovation, that history shows often comes from outsiders to a discipline who have not been imbued with the culture of that discipline. Innovation from outside a discipline is actively suppressed by academia and generally ignored by a [lazy media](#). Meanwhile there is a blizzard of high-tech computer simulations** presented to a growing generation as real science. Science has entered the age of virtual reality. And our understanding of the universe has become as contrived as a computer game.

** The PIC supercomputer simulations referred to earlier are simply based on the known behavior of charged particles obeying Maxwell's laws of electromagnetism. So it is no surprise that the simulations mimic the lab results. However, most cosmological simulations are derived from a priori mathematical theory where there are no experiments or direct observations to serve as a brake on speculation. The result is continual astonishment at new data.



The new survey also showed a fundamental difference between the nearby galaxies — part of the "current" Universe, and far more distant galaxies, seen as they were when the Universe was much younger. "It appears that the gas in the galaxies in the early Universe is much more 'stirred up,' possibly because galaxies were colliding more frequently then and there was more intense star formation causing material outflows and stellar winds," explained Martin Zwaan of the European Southern Observatory. The information about gas in the more distant galaxies came through non-imaging analysis.

These discoveries, the scientists predict, are only the tip of the iceberg. "This survey produced a huge amount of data, and we've only analyzed a small part of it so far. Further work is sure to tell us much more about galaxies and how they evolve. We expect to be surprised," said Fabian Walter, of the Max-Planck Institute for Astronomy in Heidelberg, Germany.

Comment: The *expectation* of surprise has become a hallmark of astronomy. It is symptomatic of the non-predictive nature of astrophysical theory based on the big bang and gravitational cosmology. Successful prediction is the principal test of a good theory, not surprises.

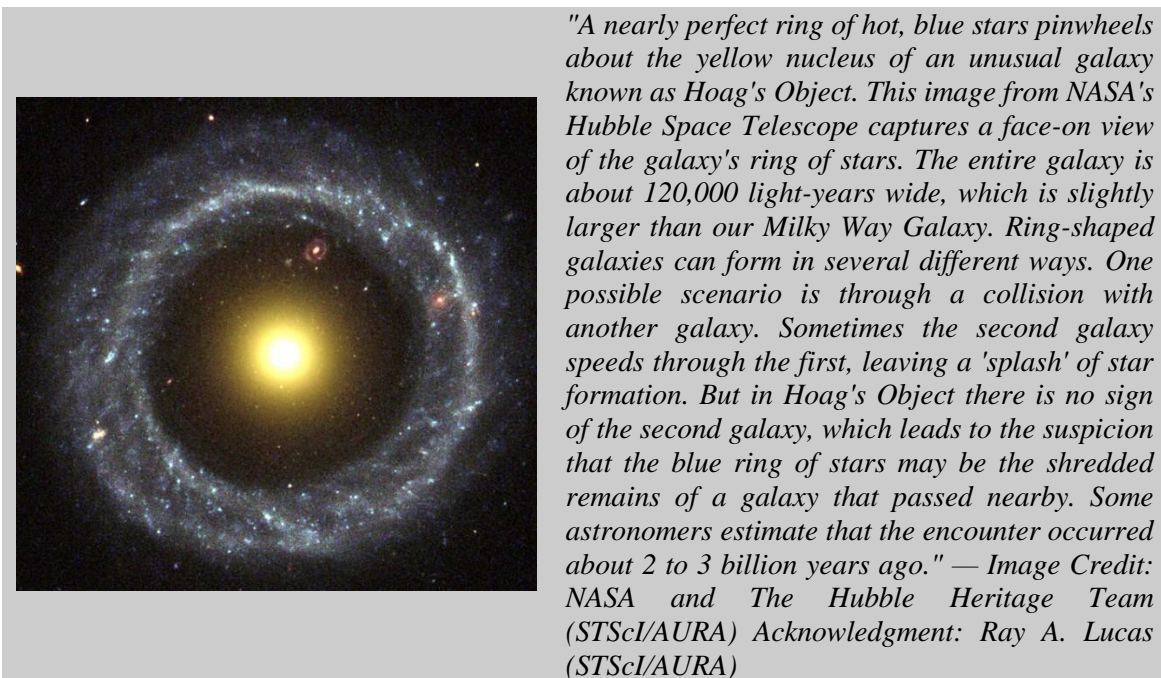
In the Electric Universe, the lynchpin of big bang theory — the equation of redshift of stellar spectra with velocity of recession — is shown empirically to be false. The inability of astrophysicists to accept the manifest evidence of [intrinsic redshift](#) (a high-redshift quasar in front of a low redshift galaxy should be blatant enough) may be due to a

reluctance to admit that modern physics has no explanation for the phenomenon of mass in matter and therefore cannot explain how subatomic particles like the proton and electron might exhibit the lower mass required to produce lower energy spectra (redshift). Observations of connections between high- and low-redshift objects requires that the redshift is intrinsic to the matter in distant quasars and galaxies and cannot be due to some modification of the light on its journey to Earth. It calls into question our understanding of quantum theory because it has been discovered that the redshift of quasars and companion galaxies is quantized!

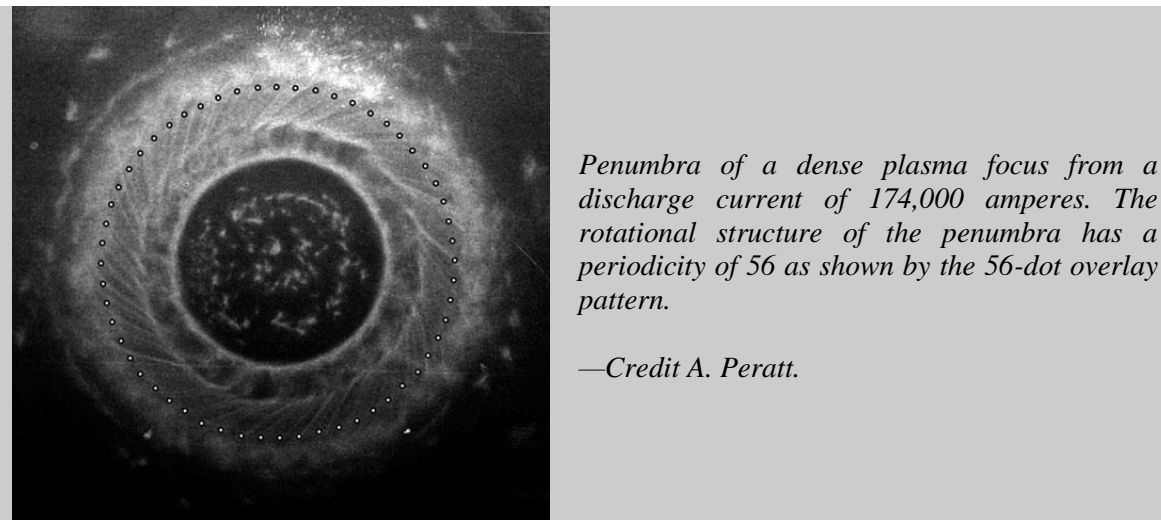
Quantum theory has no real explanation, it is merely a set of rules that match some limited real world observations. On that basis it is a very shaky pillar to support cosmology. Quantum theory is thought to apply exclusively to the submicroscopic realm of atoms and subatomic particles. But that is not so. Redshift has been observed to be quantized across entire galaxies — no galaxy has been found in transition from one redshift to another.

Intrinsic redshift of quasars and galaxies means an end to the big bang. Instead of being seen "when the universe was much younger," highly redshifted objects are merely young, nearby and faint. Observations show that [quasars are "born"](#) from the nucleus of active galaxies. They initially move very fast away from their parent, usually roughly along the spin axis. As they grow older they grow brighter and seem to slow down as they gain in mass and evolve into companion galaxies. This gain in massiveness points to a process whereby normal matter can pass through a number of small quantized increases in mass, which gives rise to the observed quantized decreases in redshift. This discovery points the way, at last, to an understanding of the phenomenon of mass.

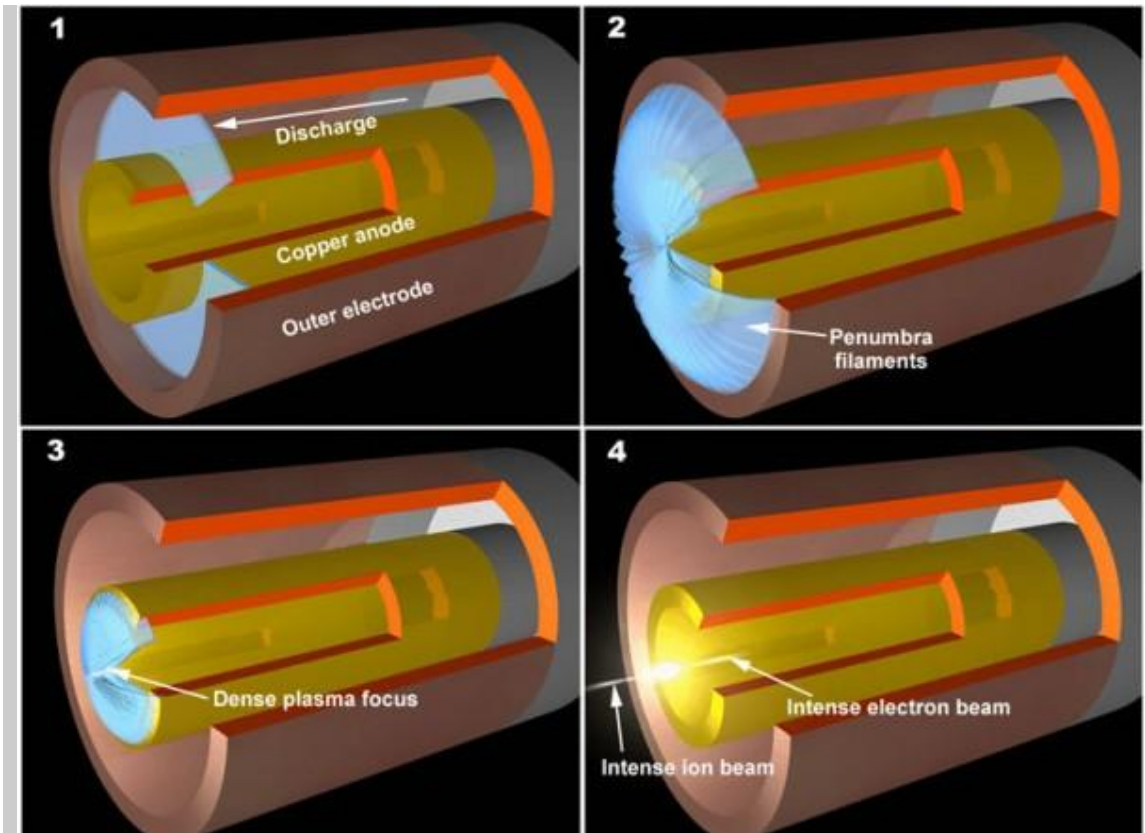
The "stirred up" gas in highly redshifted objects can be simply understood as being due to unruly youthfulness and electrical hyperactivity. It has nothing to do with an imaginary early epoch of galactic collisions. In fact, "galactic collisions" are a recently popular catch-all to try to explain the formation of spiral galaxies and many of their anomalous features. Collisions are as unlikely and unnecessary as they are forbidden in an Electric Universe. The following exceptional example clearly favors the Electric Universe explanation. One simple electrical model fits all galaxies naturally.



Comment: In stark contrast to standard ad hoc attempts to explain Hoag's object in terms of a collision, the Electric Universe can point to a simple explanation, which fits neatly the plasma cosmology model of formation of galaxies in a magnetic pinch at the intersection of cosmic Birkeland current filaments. Hoag's object shows the detailed features of the 'penumbra' of a plasma focus discharge.



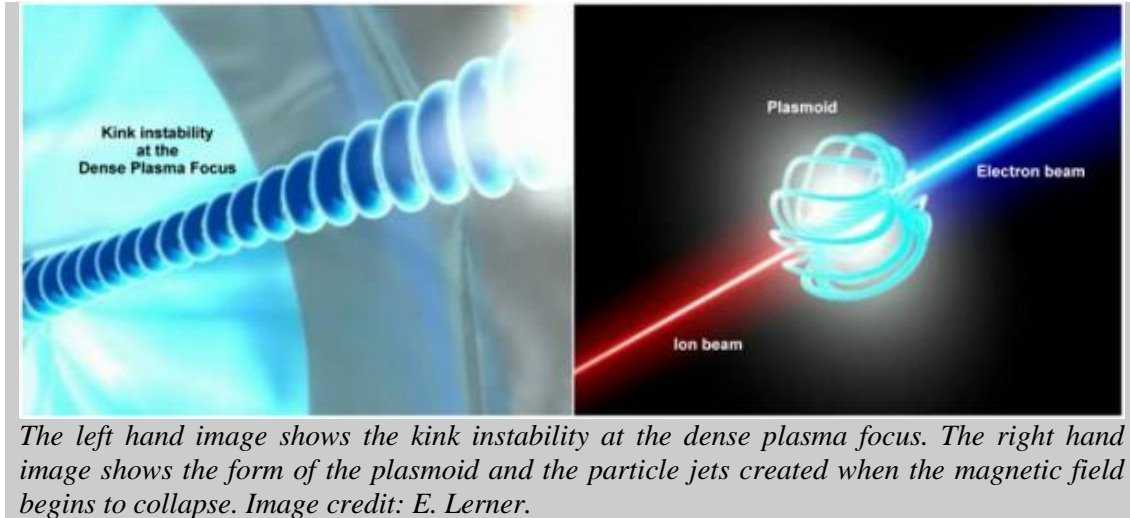
See also the earlier image of the active galactic nucleus of NGC 1097 as another fine example of a dense plasma focus penumbra. The astronomer [Halton Arp](#) has shown that NGC 1097 is one of the most compelling examples of quasar ejection from an active nucleus. He describes it as "a busy quasar factory."



The plasma focus is the simplest of devices. Two coaxial cylindrical electrodes have a very high voltage and current applied between them at one end. A radial discharge is initiated (shown in blue), which moves axially along the electrodes (1), under the influence of its self-generated magnetic field, until it reaches the end of the electrodes. There it balloons out in a filamentary penumbra (2). Image credit: E. Lerner.

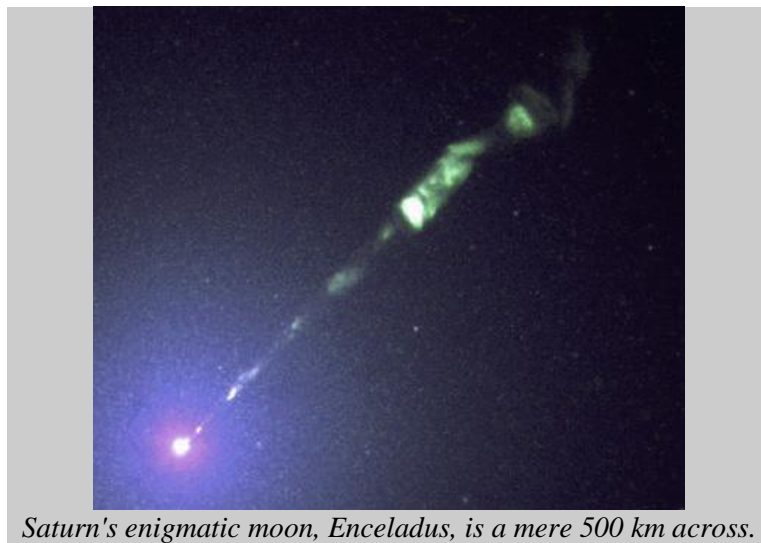
The Birkeland current filaments are caused by the magnetic pinch effect and they space themselves evenly apart in a characteristic number of 56 filaments. With time, the 56 filaments coalesce in two's and sometimes threes. The result is a sequence of 56 (by far the most common), 49, 47, 41, 39, 33, 30, followed by a large number of 28 filaments. The convergence continues through 20, 16, 8, 7, 6, and 4, the latter being the minimum number of Birkeland filaments recorded.

The energy of the discharge becomes focused at the center of the inner electrode (3) where a 'kink' plasma instability causes the filaments to form a 'coiled coil' like a coiled telephone cord. The kink instability twists upon itself to form a tiny donut shaped 'plasmoid' of extremely high energy density. Eventually, the plasmoid breaks down and electrons and ions are accelerated from the plasmoid in opposite directions along the axis in intense, narrow beams (4).



The natural formation of highly focused jets from some stars and active galactic nuclei is now clear. And the rapid motion of stars close to our own galactic center may be explained by the assemblage of matter there in the form of a dusty plasmoid constrained by powerful magnetic fields.

Below is an image of the galactic jet of M87 with (by way of contrast) the best explanation that gravitational theorists can muster.



The jet blasting out of the nucleus of M87, a giant elliptical galaxy 50 million light years away in the constellation Virgo (false color). At the extreme left of the image, the bright galactic nucleus harboring a supermassive black hole shines. The jet is thought to be produced by strong electromagnetic forces created by matter swirling toward the supermassive black hole. These forces pull gas and magnetic fields away from the black hole along its axis of rotation in a narrow jet. Inside the jet, shock waves produce high-energy electrons that spiral around the magnetic field and radiate by the "synchrotron" process, creating the observed radio, optical and X-ray knots.

Comment: The gravitational 'explanation' of the galactic jet can be summarized in one word — "garbage." The confident assertion that the galactic nucleus is hiding a supermassive black hole is nonsense. Black holes are a 'school-kid howler' perpetrated by top scientists. It involves taking Newton's gravitational equation to an absurd limit by dividing by zero to achieve an almost infinitely powerful gravitational source. This is done by impossibly squeezing the matter of millions of stars into effectively a point source. And then mysteriously available magnetic fields are pressed into performing miracles to create something that approximates a relativistic jet of matter from an object that is supposed to gobble up anything that comes near.

It is very disturbing that the public accepts this blatant baloney without question. If scientists were forced to defend their statements in a court of law under the rules of evidence, most of the misbegotten ideas that make up modern science would never have survived. Physics would have remained in the classical hands of the experimentalists and the engineers who have to make things work. Countless billions of dollars could have been saved in misdirected and pointless experiments.

The experimental evidence for the electrical nature of galaxies has been available for many decades now. But who has heard anything about it? The lack of debate demonstrates the power of institutionalized science to maintain the "uncanny inertia" of the "erroneous theories" they have introduced into our culture. We have given scientists that power by trusting them more than our commonsense.

Having discovered electric power we find it indispensable. We also find that Nature does things with exquisite economy. So the commonsense question is simply, "would Nature choose the weakest force in the universe — gravity — to form and light the countless magnificent galaxies?" I don't think so!

** The THINGS project is a large international collaboration led by Fabian Walter of the Max-Planck Institute for Astronomy in Heidelberg, Germany, and includes research teams led by Brinks, de Blok, Michele Thornley of the Bucknell University in the U.S. and Rob Kennicutt of the Cambridge University in the UK.*

The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.

Wal Thornhill

Twinkle, Twinkle Electric Star

Posted on [July 1, 2008](#) by [Wal Thornhill](#)

*Twinkle, twinkle electric star
Astronomers don't know what you are!*

"Sit down before facts like a child, and be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses Nature leads, or you shall learn nothing."

— T.H. Huxley



An undergraduate textbook on the structure and evolution of stars makes a star seem a simple thing:

"A star can be defined as a body that satisfies two conditions: (a) it is bound by self-gravity; (b) it radiates energy supplied by an internal source."

Buried in this definition are some critical assumptions that Sir Arthur Eddington bequeathed to us long before the space age in his 1926 opus, *The Internal Constitution of the Stars*. But how many students now read his original work with a critical eye?



Eddington wrote:

"The problem of the source of a star's energy will be considered; by a process of exhaustion we are driven to conclude that the only possible source of a star's energy is subatomic; yet it must be confessed that the hypothesis shows little disposition to accommodate itself to the detailed requirements of observation, and a critic might count up a large number of 'fatal' objections."

A single fatal objection would suffice to falsify the hypothesis, but the apparent isolation of stars in the vacuum of space encouraged the belief that stars must consume themselves to fuel their fire. The fatal objections would be sorted out later. Two such objections are behind NASA's plan to launch a [mission to the Sun](#) in 2015. That will be 89 years of denial that there is a serious problem with our understanding of the nearest star — the Sun!

Eddington argued the need for a central fire as follows:

"No source of energy is of any avail unless it liberates energy in the deep interior of the star. It is not enough to provide for the external radiation of the star. We must provide for the maintenance of the high internal temperature, without which the star would collapse."

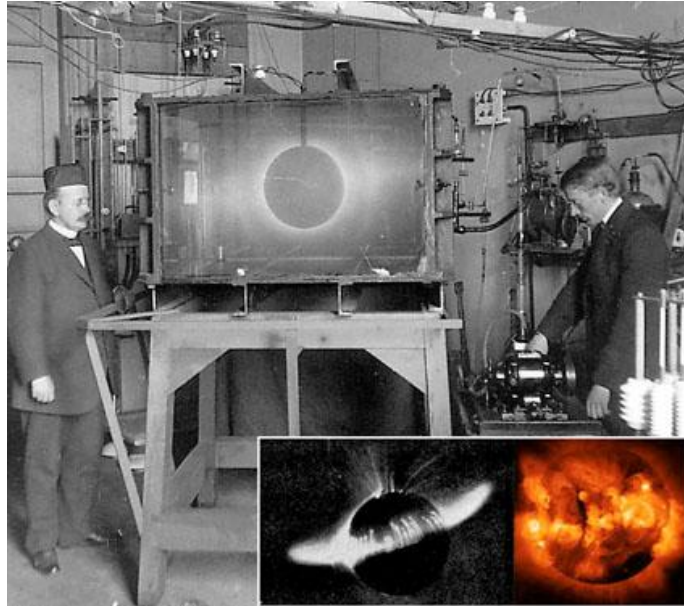
But this assumes that a star is basically a ball of hot gas, obeying the standard laboratory gas laws. Eddington's 'logic of exhaustion' had to set aside facts that didn't fit the "only possible" theory.

Appearances can be deceptive when viewed through the lens of a single idea. A kind of tunnel vision develops that accommodates 'fatal objections' with the excuse that "someday we will find the answers." To compensate for the weakness of the excuse, those who adopt the consensus view acquire a kind of evangelical zeal. As exhibit, the undergraduate textbook referred to above opens with:

"The theory of stellar structure and evolution is elegant and impressively powerful."

Yet we have recently discovered a star that "shouldn't exist" because it is too big to be inflated by a central fire.

The tunnel vision does more than magnify the elegance of the single idea. It also excludes considering other ideas. Alternative ideas are stymied by unquestioning faith in the "only possible" theory. For this reason, as history shows, most fundamental breakthroughs come from outsiders — those who "sit down before facts like a child."



One such outsider had already published an electrical theory of the Sun in 1913, long before Eddington's work on the subject. Kristian Birkeland (above left) was a renowned Norwegian scientist and Nobel Prize nominee who set up observatories in the Arctic Circle to study the Aurora Borealis. His story can be read in Lucy Jago's biography, *The Northern Lights*. His theory that the aurora is due to 'charged particle beams' from the Sun has only recently been confirmed. Birkeland's approach was largely experimental. He managed to reproduce sunspot behavior (inset) in his famous Terrella experiments where he applied external electrical power to a magnetized globe suspended in a near vacuum.



Another outsider was Charles E. R. Bruce. He was a fellow of the Royal Astronomical Society (1942), the Institute of Physics (1964), the Institution of Electrical Engineers (1965), and was a member of the Electrical Research Association (ERA) from 1924 until his retirement in 1967. His interest in astronomy and study of lightning led him to write in 1968:

"The main observational evidence indicating the existence of cosmic electrical discharges is the same as that which would lead an external observer to conclude that lightning flashes occur in our own atmosphere — namely, the sudden change they effect in the spectra of the Sun, stars and galaxies. In the Sun's spectrum, lines suddenly appear indicating the existence of gas temperatures of hundreds of thousands or even millions of degrees."

Electric Fields in Space, Penguin Science Survey 1968, p. 173.



An important outsider was the late Ralph E. Juergens, an engineer and a pioneer of the electrical model of stars who was inspired by Bruce. Because of the tunnel vision of the consensus view, he was forced to publish his ideas in obscure journals in the early 1970s. His model is a shining example of commonsense and simplicity when compared with the infernally complex and improbable thermonuclear paradigm. Yet such is the inertia of institutionalized science and its hostility toward interlopers that Juergens' insight was in danger of being lost following his untimely death in 1979.

"As I pursued the phenomenology of electric discharges, it gradually dawned on me that, structurally, the atmosphere of the sun bears a striking resemblance to the low-pressure type of electric discharge known as the glow discharge..."

— *Ralph E. Juergens.*

The insiders' unquestioned assumptions blindfolded them to other possibilities. Sydney Chapman commented in *The Solar Wind*:

"It seems appropriate to call attention to the ideas, put forward over many years by Bruce, concerning the importance of electrical discharges in the cosmos, and in particular in the Sun's atmosphere. Bruce agrees that the Sun offers his ideas perhaps their greatest challenge, because of the very high electrical conductivity of the solar material at all levels. Any electrical discharge in the Sun's atmosphere demands an exceptionally rapid and strong means of generating differences in electric potential."

Here we see a recognized leader in the field assuming that the Sun itself, as an isolated body in space, could somehow generate its own electricity.

Eddington had addressed this problem of generating electricity when trying to explain bright lines in the spectra of some stars. The difficulty is that the heat of the star cannot supply the energy of the atoms producing the bright lines. Something extra is adding energy. He came close to the answer when he wrote:

"If there is no other way out we may have to suppose that bright line spectra in the stars are produced by electric discharges similar to those producing bright line spectra in a vacuum tube."

He explains:

"A disturbed (cyclonic) state of the atmosphere might establish local and temporary electric fields—thunderstorms—under which the electrons would acquire high speeds."

Collisions between the high-speed electrons and atoms in the stellar atmosphere would give rise to the bright spectral lines.

However, in a footnote Eddington reveals the fundamental limitation of his theory of stars:

"The difficulty is to account for the escape of positively charged particles; unless charges of both signs are leaving the escape is immediately stopped by an electrostatic field."

This statement will reverberate down the years as one of the gravest mistakes in science. It is an **ELECTROSTATIC** model of an isolated, self-contained star. But stellar magnetism is an **ELECTRODYNAMIC** phenomenon, requiring electric currents flowing in circuits beyond the star.

Lightning and electrical discharges are a form of plasma and research into plasma was going on while astrophysicists were developing their one idea about stars. But their tunnel vision kept them from becoming aware of it. When they did notice, they only took in a flawed, incomplete form known as 'magnetohydrodynamics,' which, as the name implies, treats plasma as a magnetized fluid. Their training does not give astrophysicists the authority to judge an electric discharge theory of stars.

Nowhere will you find any reference to electric discharge in cosmology. The subject is not taught in astrophysics. Research into plasma discharge phenomena is the domain of the largest professional organization in the world, the Institute for Electrical and Electronic Engineers (IEEE). My paper on electric stars was published in the IEEE Transactions on Plasma Science, Special Issue on Space and Cosmic Plasma in August 2007. The IEEE recognizes and supports plasma cosmology. Electric stars fit seamlessly with plasma cosmology and [electric galaxies](#).

Electric Stars

PLASMA COSMOLOGY

Almost all the matter in space is in the form of plasma. Clouds of gas and dust contain free charged particles — ions, electrons and charged dust (molecules). These charged particles respond strongly to electric and magnetic fields. In cosmic molecular clouds, where stars are formed, just one charged particle in ten thousand neutral particles is sufficient for electric and magnetic forces to overcome gravity.

Plasma in space is an excellent conductor but it is not a superconductor, as astronomers assume when they talk of 'frozen in' magnetic fields. Plasma clouds that move relative to each other generate electric currents in each other. Electric currents in plasma take the form of twisted filament pairs, which follow the ambient magnetic field direction. The

filamentary current is electrically insulated from the surroundings in a way similar to a current in an electric cable located in the ocean and carrying current through a low resistance metal wire. The magnetic fields generated by these currents have been detected between and within galaxies. These currents are not visible because the current density is too low to excite the plasma to emit light: The current is in what plasma physicists call "dark current mode."

For currents to continue to flow, they must eventually form into circuits. These invisible circuits are of crucial importance in understanding the cosmos. If external electrical currents power stars and galaxies, the power source is probably not located in the stars. The situation is similar to viewing from space the twinkling lights of great cities on Earth, which give no indication of where the power is being generated.

Charged bodies embedded in plasma create about themselves a protective cocoon of plasma, rather like a living cell wall. This cell wall is known as a Langmuir plasma sheath, or 'double layer,' which contains most of the voltage difference between the charged body and the surrounding plasma. Only an electric current sustains the charge separation across the double layer. If the surrounding plasma is moving relative to the charged body, the plasma sheath is drawn out into a teardrop or cometary shape. And if the charged body is rotating it will generate a magnetic field that is trapped inside the plasma sheath. This has led to the misnomer — "magnetosphere" — when referring to a plasma sheath.

The father of plasma cosmology, Hannes Alfvén, expressed the opinion that double layers should be classed as "a new type of celestial object." They are responsible for the radio noise from 'radio' galaxies. In interstellar space they produce the cosmic microwave radiation, mistakenly interpreted as the afterglow from the mythical big bang. Alfvén tentatively suggested that X-ray and gamma ray bursts may be due to exploding double layers.

An important feature of plasma sheaths, or double layers, is that the electric field on either side of the thin double layer is very weak and the plasma there is 'quasi neutral.' That's why we do not see evidence of a strong electric field from the charged Sun, and why the 'solar wind' appears to be electrically neutral. For this reason, the bulk movement and magnetic field of the 'solar wind' best signify the Sun's electrical activity.

"So far as the solar wind is concerned, it is essentially a dynamical phenomenon, which does not resemble, in any way, what one would expect when treating stellar structure."

— J. C. Pecker — *Solar Interior and Atmosphere.*

The so-called 'winds' and 'jets' of stars are a form of 'dark current,' equivalent to the breeze from an air ionizer. The enigma of prodigious stellar winds accelerating away from the 'cool' photospheres of red giant stars is simply solved [see later].

STAR FORMATION

Note: American Scientist explains:

*"The making of a star is directed by a maelstrom of competing forces—including gravitational collapse, magnetic fields, nuclear processes, thermal pressures and fierce stellar winds—all of which wish to have their way with the unformed star. Because the interaction of these forces is not fully understood, **there is much that remains mysterious about the birth of a star.**"*

Precisely! The mysteries persist after more than a century because the standard model of stars is utterly wrong.

An electric star is formed by the equivalent of a lightning bolt in a molecular (plasma) cloud. Just like earthly lightning, cosmic lightning scavenges, squeezes and heats matter along the discharge channel. Where the squeeze is most intense, the current may 'pinch off' to give the effect of 'bead lightning.' In high-energy plasma lab discharges researchers have found that hot plasma 'beads' (known as plasmoids) form along the discharge axis before "scattering like buckshot" when the discharge quenches.

Another important phenomenon known as 'Marklund convection' occurs along the discharge axis. It separates the chemical elements radially. Marklund convection causes helium to form a diffuse outer layer, followed by a hydrogen layer, then oxygen and nitrogen in the middle layers, and iron, silicon and magnesium in the inner layers. So electric stars should have a core of heavy elements and an upper atmosphere mostly of hydrogen. This renders the difference between stars and planets to be more apparent than real.

In addition to scavenging elements, stars produce electrically in the high-energy electrical discharges of their photospheres all of the elements required to form rocky planets. Nucleosynthesis of heavy elements does not require a supernova explosion. Planets are then born by electrical expulsion of matter from the body of the star in the form of giant mass ejection events, like we see in miniature in solar outbursts. Large stellar flares and nova outbursts probably signal the birth of planets. Disks of matter encircling stars are not due to gravitational accretion but to electrical expulsion.

STAR LIGHT

The bright photosphere of a star is an electric discharge high in its upper atmosphere that can be compared directly with low-pressure glow discharges in the lab. The spectrum of the photosphere reflects the star's upper atmosphere composition, which is largely hydrogen. The heavy elements seen in the spectrum are produced right before our eyes in the photospheric discharge.

Measurements of stellar radii are misleading since the photosphere is a bright plasma 'skin' at great height in the atmosphere above the solid surface of the star. That height, in

the case of the Sun, may be estimated simplistically as follows: the Sun has a mass equivalent to 333,000 Earths; if most of the mass of the Sun is in heavy elements similar to the Earth, the Sun would have a solid diameter somewhat less than 900,000 kilometers, compared to its optical diameter of 1.4 million kilometers. That suggests the photosphere is some 250,000 kilometers above the surface of the Sun.

Note: An immediate objection may be raised by helioseismologists, who claim to be able to determine what is going on inside the Sun by the way the Sun 'rings like a bell.' However, helioseismology assumes the standard thermonuclear model of stars and interprets the oscillations of the photosphere as a purely mechanical phenomenon. In fact, the question of what causes the Sun's 'ringing' remains unanswered.

"The flute does not produce music unless one blows in it. Therefore one is led to the question: who is blowing the pipe?"

J. C. Pecker —Solar Interior and Atmosphere.

On the other hand, a fundamental characteristic of plasma double layers is that they are driven electromagnetically to oscillate. Photospheric oscillations are properly the study of double layers and stellar circuits, not mechanical sound waves. This study has wider applications than to photospheric 'ringing.' For example, the regular pulsations of 'neutron stars,' conventionally attributed to a "runaway lighthouse effect," are better explained by oscillations in the magnetospheric circuit of a normal, lazily rotating and externally powered electric star.

A star is a pinpoint object at the center of a vast plasma sheath. The plasma sheath forms the boundary of the electrical influence of the star, where it meets the electrical environment of the galaxy. The Sun's plasma sheath, or 'heliosphere' is about 100 times more distant than the Earth is from the Sun. To give an idea of the immensity of the heliosphere, all of the stars in the Milky Way could fit inside a sphere encompassed by the orbit of Pluto. The Sun's heliosphere could accommodate the stars from 8 Milky Ways!

Note: [Voyager 1](#) has begun sampling the heliosphere and the results do not meet the expectations of a mechanical shock interaction. But they do meet the [plasma sheath interpretation](#).

Clearly, in the immense volume of the heliosphere an unmeasurably small drift of electrons toward the Sun and ions away from the Sun (the solar wind) can satisfy the electrical power required to light the Sun. It is only when we get very close to the Sun that the current density becomes appreciable and plasma discharge effects become visible. The enigma of the Sun's millions-of-degrees corona above a relatively 'stone cold' photosphere is immediately solved when the Sun's power comes from the galaxy and not the center of the Sun!

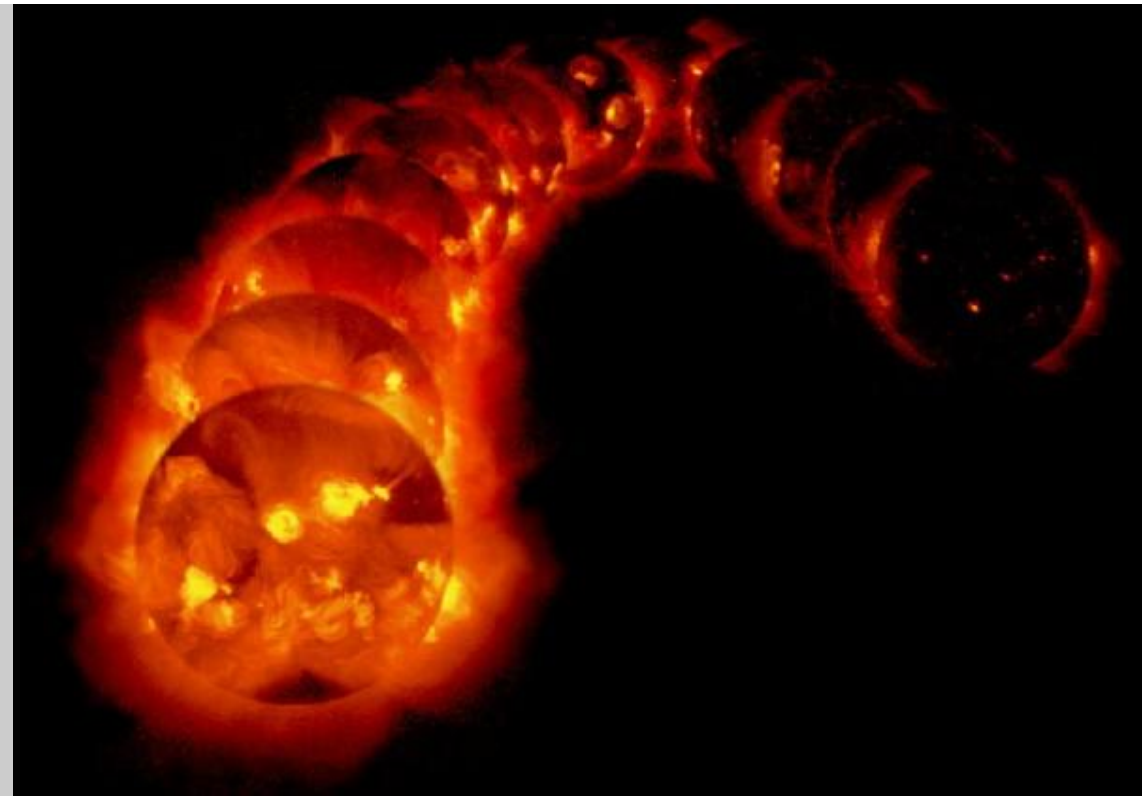
It is clear from the behavior of its relatively cool photosphere that the Sun is an anode, or positively charged electrode, in a galactic discharge. The red chromosphere is the counterpart to the glow above the anode surface in a discharge tube. When the current density is too high for the anode surface to accommodate, a bright secondary plasma forms within the primary plasma. It is termed "anode tufting." On the Sun, the tufts are packed together tightly so that their tops give the appearance of "granulation."

CONSTANT STARSHINE

"The Sun is a variable X-ray star; it is fortunate for us that the variability is not reflected in the energy flux in the visible."

— R L F Boyd, *Space Physics: the study of plasmas in space.*

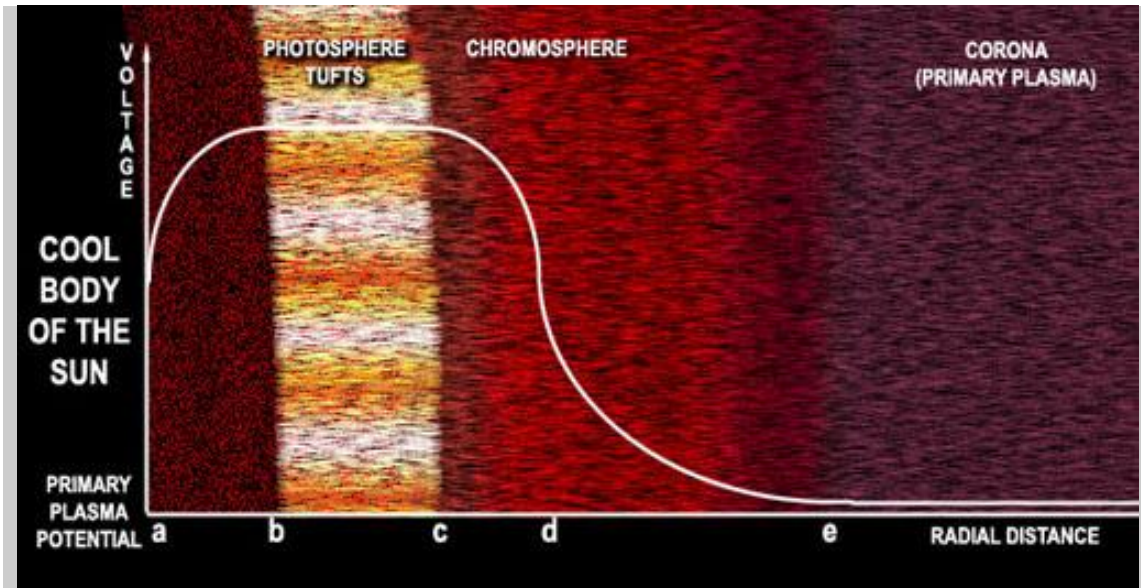
We rely on the Sun to shine steadily. The variation in light and heat is measured to be a fraction of one percent from year to year. Yet the Sun is a variable star when viewed in X-rays. And X-rays are emitted where electrical activity is most intense.



Seen above in X-rays by the Yokhoh satellite, from solar minimum to maximum, the Sun is a variable star. X-rays are the signature of electric arcs.

When considered without tunnel vision, it is obvious that stars with a thermonuclear core are not likely to be stable. So sensitive to core temperature are some of the nuclear reactions that the night sky should look like the fourth of July.

Juergens went to great pains to explain the complex and exquisitely tuned control mechanism of the solar discharge. His insights are of paramount importance for an understanding of the Sun and for clarity on one of the most frequently asked questions: can we rely upon the Sun as a constant source of life-giving energy? As noticed by Scott, the tufted plasma sheath above the stellar anode seems to be the cosmic equivalent of a 'PNP transistor,' a simple electronic device using small changes in voltage to control large changes in electrical power output. The tufted sheath thus regulates the solar discharge and provides stability of radiated heat and light output, while the power to the Sun varies throughout the sunspot cycle.



*The Sun's plasma sheath. The white curve shows how the voltage changes within the solar plasma as we move outward from the body of the Sun. Positively charged protons will tend to "roll down the hills." So the photospheric tuft plasma acts as a barrier to limit the Sun's power output. The plateau between (b) and (c) and beyond (e) defines a normal quasi-neutral plasma. The chromosphere has a strong electric field which flattens out but remains non-zero throughout the solar system. As protons accelerate down the chromospheric slope, heading to the right, they encounter turbulence at (e), which heats the solar corona to millions of degrees. The small, but relatively constant, accelerating voltage gradient beyond the corona is responsible for accelerating the solar wind away from the Sun. Credit: W. Thornhill (after W. Allis & R. Juergens), *The Electric Universe*.*

This ability of the Sun's plasma sheath to modulate the solar current was demonstrated dramatically in May 1999, when the solar wind stopped for two days. The bizarre event makes no sense if the solar wind is being 'boiled off' by the hot solar corona. But in electrical terms, its regulating plasma sheath performed normally and there was no noticeable change in the Sun's radiant output.

SUNSPOTS

Note: Sunspots are a phenomenon that is not expected in the standard thermonuclear model of stars:

"The very existence of sunspots is intriguing. They should be heated quickly from the sides and disappear. They should never have formed — but they do form. Their behavior is so strange that there is still argument between scientists as to why they are there at all."

— Ronald Giovanelli, *Secrets of the Sun*.

[Sunspots](#) are a clearing of the tufts where a dark discharge from an equatorial plasma toroid encircling the Sun punches through them. Birkeland had the general idea figured out in 1913! The dark center, or umbra, of the sunspot shows the cooler temperature of the Sun beneath the bright plasma. The sunspot penumbra, in which we are looking at the sides of the "hole" punched through the tuft layer, shows the structure of the tufts. They are bright tornadic cylinders of plasma, thousands of kilometers long. Tornadoes are constrained by strong electromagnetic forces to be a slow form of lightning discharge. This explains why solar granulations last for about 10 minutes before slowly fading to be replaced by others. They have nothing to do with convection, although they do dredge material from below.

SOLAR MAGNETISM

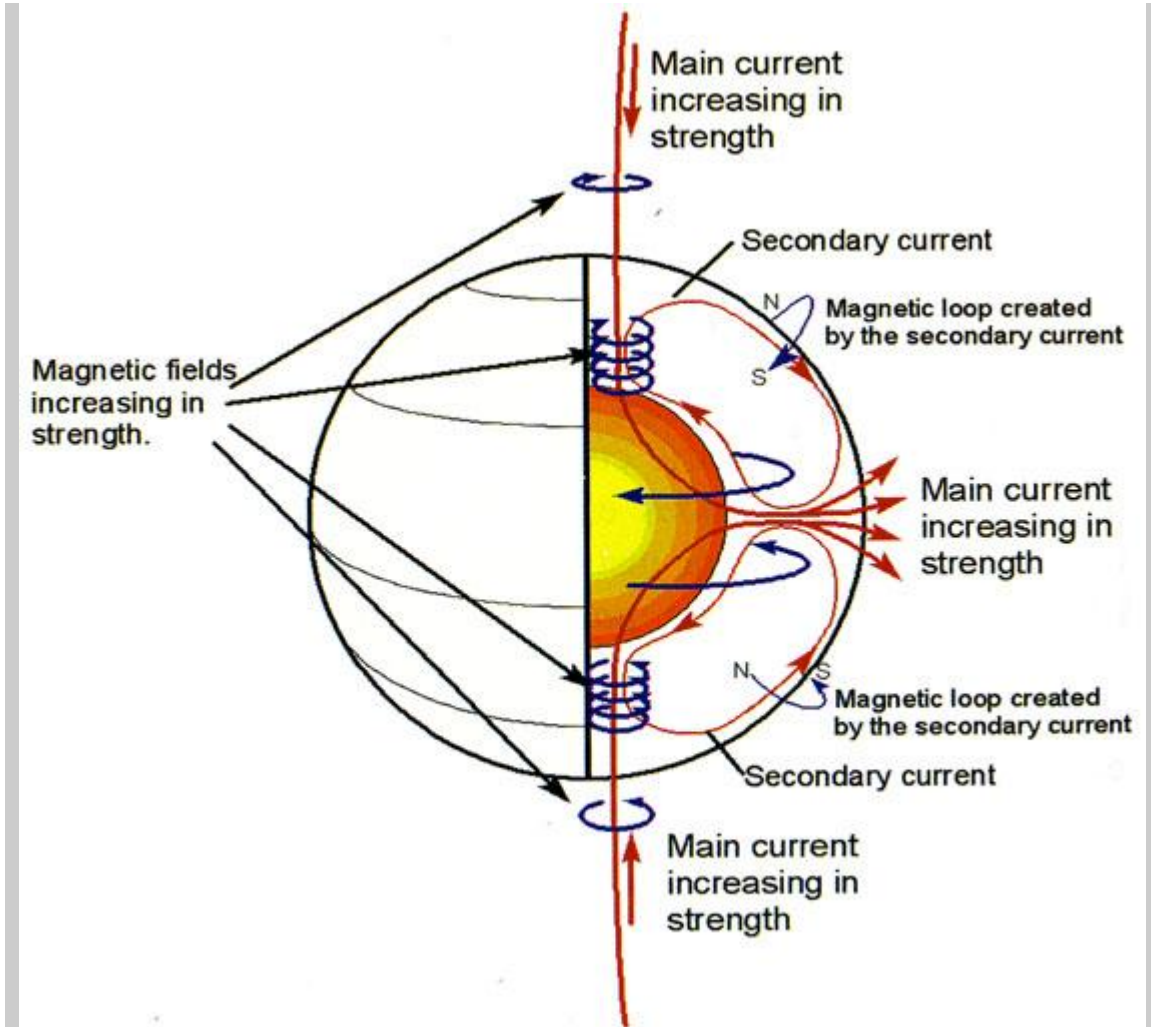
One of the greatest mysteries of the Sun is the sunspot cycle. It is intimately associated with that other great puzzle — the Sun's magnetic field. This puzzle is that it is extremely difficult to conjure a magnetic field from inside a hot ball of conducting plasma, particularly when the solar magnetic field shows amazing complexity and often rapid variability.

The Sun has a generally dipole magnetic field that switches polarity with the sunspot cycle. Unlike a dipole magnet, in which the field is twice as strong at the poles as at the equator, the Sun has very evenly distributed field strength. This oddity can be explained only if the Sun is the recipient of electric currents flowing radially into it. These magnetic field-aligned currents adjust the contours of the magnetic field by their natural tendency to space themselves evenly over an anode surface. An internal dynamo will not produce this magnetic field pattern.

The Sun's interplanetary magnetic field increases in strength with sunspot number. Electrically, the relationship is essential, since the interplanetary magnetic field is generated by the current flow to and from the Sun. As the power increases, sunspot numbers rise (reflecting current input) and the magnetic field strengthens.

The standard thermonuclear star theory has no coherent explanation for the approximately eleven-year sunspot cycle. In the electrical model the sunspot cycle is

induced by fluctuations in the DC power supply from the local arm of our galaxy, the Milky Way, as the varying current density and magnetic fields of huge Birkeland current filaments slowly rotate past our solar system. The solar magnetic field reversals may be a result of simple 'transformer' action.



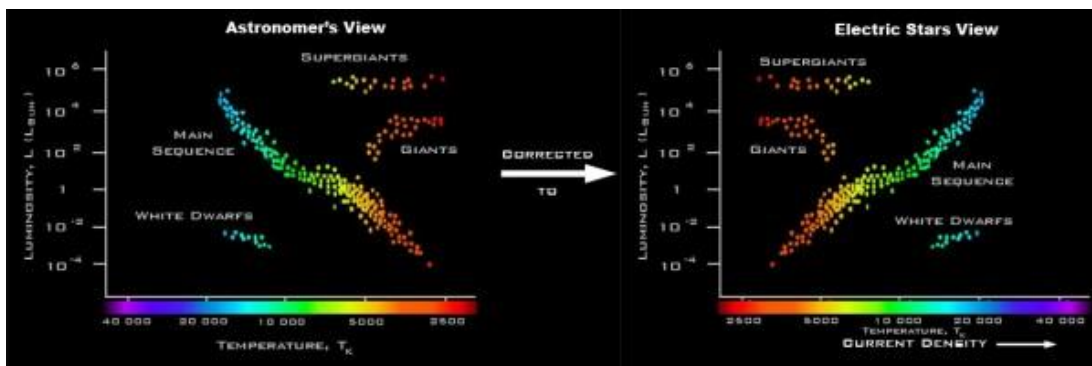
*"Primary and secondary electric currents in the Sun." Using Alfvén's circuit diagram of the Sun, Professor Scott offers the following explanation for solar magnetic field reversals: "If the main magnetic field that induces the surface currents is growing in strength, the surface current will point in one direction. If the main magnetic field weakens, the secondary surface currents will reverse direction." This 'transformer' action does not require the solar driving current to reverse direction. Credit: Diagram and explanation are from D. E. Scott's *The Electric Sky*.*

DIFFERENT LIGHTS

Electric lights come in a wide variety. There are the original incandescent filament lamps where the light comes from a filament heated internally by electric current. And today we have fluorescent lights, high-intensity gas discharge lamps, arc lights, neon lights and solid-state light emitting diodes (LEDs).

Stars fall into the categories of neon lights, gas discharge lamps and arc lights. They are not incandescent (heated from within). The main differences between these types of lights are the power density of the discharge and the location in the gas discharge path where most of the light comes from. For example, in a neon tube the light comes from the extensive plasma column between the electrodes at each end of the tube. In an arc light, the light is concentrated at the electrode. As the power of an arc light is increased its color changes from yellow-white to white to blue-white. The sharp discontinuities in the nature of the light from an electric discharge as it switches from a red glow to a bright arc explain many of the mysteries of starlight.

Astronomers use the Hertzsprung-Russell (H-R) diagram to categorize stars. It is a plot of the absolute brightness of stars against their spectral class (temperature).



The data graphed by the H-R diagram are observed quantities, while assumptions drawn about the diagram's meaning are not. Clearly, not being electrical engineers, astronomers have got things precisely backwards (left). As you increase the current density to an electric arc, the light becomes brighter, hotter, and therefore bluer. In other words, the current density is responsible for both the luminosity (y-axis) and the color temperature (x axis) of the H-R diagram. That explains the near 45° slope of the so-called 'main sequence' stars in the corrected H-R diagram (right).

At the lower left-hand end of the main sequence we find the red dwarfs – small stars under low electrical stress, in which anode tufting is sparse and the light from the tufts is emitted at low energies, toward the red end of the spectrum. A good deal of the red light comes from the chromospheric anode glow.

As we move diagonally upward and to the right on the H-R diagram the stars become more massive and the current density increases. Anode tufting becomes more intense and the tufts' mutual repulsion forces the photosphere to grow to accommodate them. At the top right of the main sequence the light from the tufts is the electric blue of a true arc and the stars appear as 'blue giants' — intensely hot objects considerably larger than our Sun. These blue giants tend to be concentrated on the central axes of our galaxy's spiral arm arms, where the galactic currents are strongest.

But what about the stragglers — the red giants and the white dwarfs? Here the natural simplicity of the electric star model shines. Stellar color and luminosity are discontinuous

functions for good reason: plasma discharge phenomena at an anode exhibit sharp discontinuities. Thermonuclear star models projecting theoretical stellar evolution onto the H-R diagram require great imagination to explain these discontinuities. Usually it requires that a star explodes, or else the transition off the main sequence is said to be so rapid that we don't see a continuous plot. The terms 'giant' and 'dwarf,' when applied to these stars, are highly misleading since a star's size is a plasma phenomenon too. And the notions that a red giant is an old, dying star, and that a white dwarf is a remnant of an exploded star, have no validity.

WHITE DWARFS

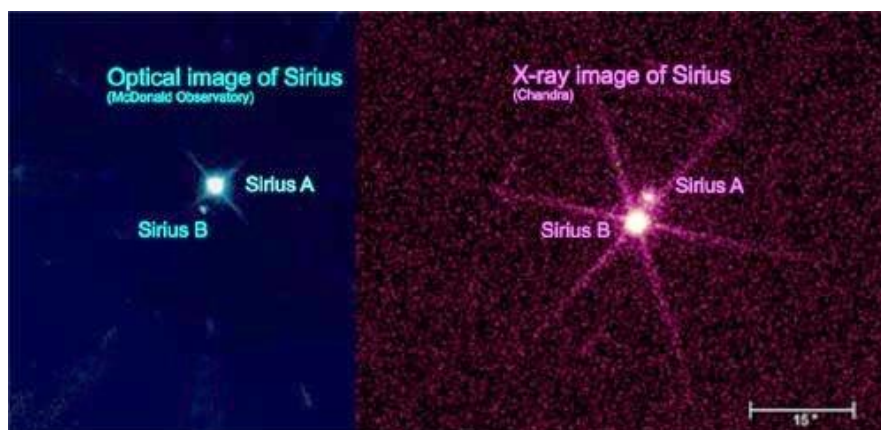
Eddington himself expressed his puzzlement about white dwarfs:

"Strange objects, which persist in showing a type of spectrum entirely out of keeping with their luminosity, may ultimately teach us more than a host which radiates according to rule."

He was right.

A white dwarf is a star that is under low electrical stress so that bright 'anode tufting' is not required. The star appears extremely hot, white and under-luminous because it is equivalent to having the faint white corona discharge of the Sun reach down to the star's atmosphere. As usual, a thin plasma sheath will be formed between the plasma of the star and the plasma of space. The electric field across the plasma sheath is capable of accelerating electrons to generate X-rays when they hit atoms in the atmosphere. And the power dissipated is capable of raising the temperature of a thin plasma layer to tens of thousands of degrees.

White dwarfs are often found in multiple star systems, which puzzles astronomers because "it is not easy to understand how two stars of the same age could be so different." The answer is simple. The appearance of stars has nothing to do with their age. In multiple star systems the brighter primary star usurps most of the electrical power, dissipating the energy in optical wavelengths. The white dwarf converts its share of power most efficiently into X-rays.



An example is the nearby double star system of Sirius, which is the brightest star in the sky and one of the closest. Sirius also has a partner, called Sirius B, a 'white dwarf.' To our eyes, it is 10,000 times fainter than the primary star, Sirius A. However, when astronomers pointed the Chandra X-ray telescope at Sirius, they got a shock. In the X-ray image (right), Sirius A is the lesser of the two lights. Sirius B, the white dwarf, is the greater. It is the reverse of what we see with human eyes.

RED GIANTS

Red stars are those stars that cannot satisfy their hunger for electrons from the surrounding plasma. So the star expands the surface area over which it collects electrons by growing a large plasma sheath that becomes the effective anode in space. The growth process is self-limiting because, as the sheath expands, its electric field will grow stronger. Electrons caught up in the field are accelerated to ever-greater energies. Before long, they become energetic enough to excite neutral particles they chance to collide with, and the huge sheath takes on a uniform 'red anode glow.' It becomes a red giant star.

The electric field driving this process will also give rise to a massive flow of positive ions away from the star, or in more familiar words—a prodigious stellar 'wind.' Indeed, such mass loss is a characteristic feature of red giants. Standard stellar theory is at a loss to explain this since the star is said to be too 'cold' to 'boil off' a stellar wind. So when seen in electric terms, instead of being near the end point of its life, a red giant may be a 'child' losing sufficient mass and charge to begin the next phase of its existence— on the main sequence.

COMING TO TERMS WITH ELECTRIC STARS

Electric stars change forever the picture of our place in the universe. At first the idea of electric stars is unsettling. The comforting fable about the history of the Sun and its reliability for billions of years into the future is gone. Reliability now depends upon the steadiness of power from the Milky Way itself. Nearby stars look steady enough. But there is no guarantee that surges and brown-outs will not interrupt the electric Sun's steady shining for millions, let alone billions, of years into the future.



The Allen Telescope Array. This is the first phase of a planned 350 radio dishes that will advance the capabilities of radio astronomy research. This array is named after Paul G. Allen, Microsoft co-founder and philanthropist whose foundation donated seed money that started the project in 2001. It is a joint effort by the SETI (search for extra-terrestrial intelligence) Institute and the Radio Astronomy Laboratory (RAL) at the University of California, Berkeley to construct a radio interferometer that is dedicated to astronomical observations and a simultaneous search for extra-terrestrial intelligence.

Ken Croswell noted in *New Scientist*, January 27, 2001:

"It was always thought that any planet orbiting a red dwarf would be an extremely unlikely place to find life. But it now looks as though these dim red suns could harbour most of the Galaxy's life-bearing worlds."

Such phase-locked worlds would, however, have one hemisphere roasted and the other frozen.

Electric stars offer radically new ideas about life on other worlds and the search for extra-terrestrial intelligence. A galactic source of electrical energy provides more possibilities for sustaining life in the universe than the lottery of finding an Earth-like planet orbiting in a narrow 'habitable zone' about a bright star like the Sun. The probability of the latter occurrence is very low. But with electric stars, we can turn to the most numerous stars in the galaxy as likely incubators of life — the brown 'dwarfs' — which are actually red in color. They could be described as 'cosmic plasma eggs.' This picture is much more encouraging than conventional thinking on such dwarf stars.

Imagine giant Jupiter and its moons floating independently in deep space. Outside the Sun's dominating electrical influence, Jupiter would become a dim electric star enclosed in the huge radiant red plasma shell of its 'anode glow' — a brown dwarf. Inside the glowing sheath is the most hospitable environment in the universe for life because the radiant energy received by each satellite is evenly distributed over its entire surface. There are no seasons, no tropics and no ice caps.



The radiant energy from the plasma cell of a brown dwarf star is strongest at the blue and red ends of the spectrum. Photosynthesis relies on red light. L-type brown dwarfs have water as a dominant molecule in their spectra, along with many other biologically important molecules and elements. Satellites would accumulate atmospheres from the brown dwarf and water would mist down. Regardless of its spin and axial tilt, a satellite orbiting inside the sheath of a brown dwarf could experience an ideal environment for life.

It is instructive to note the icy nature of the moons of our gas giant planets. Those planets may be electrically captured brown dwarf stars. That would explain their odd axial tilts, excess heat, and remnants of expulsion disks or rings.

However, the brown dwarf 'Garden of Eden' comes with a caveat. Stars off the main sequence do not have the self-regulating photospheric discharge to smooth out variations in electrical power input. Consequently, brown dwarfs are subject to sudden outbursts, or 'flaring,' when they encounter a surge in the circuit that powers them. These flares could cause sparking to and between the satellites orbiting inside the sheath and lead to sudden extinction events, vast fallout deposits and fossilization. There is much food for new thoughts!

WHY NO CALL FROM ET?

The problem for SETI is that no radio signals can penetrate the glowing plasma shell of such a brown dwarf star. Even the dim twinkling of other stars would be obscured. Intelligent life forms living on the satellites of a brown dwarf star would be unaware of the spectacle of the universe that we are privileged to witness. Seeing only a purple glow in their sky, they would have no cause to attempt to communicate. This may explain why SETI hears only eerie static on the galactic phone.

CONCLUSION

Eddington remarks, in the conclusion to *The Internal Constitution of the Stars*:

"The history of scientific progress teaches us to keep an open mind. I do not think we need feel greatly concerned as to whether these rude attempts to explore the interior of a star have brought us to anything like the final truth." Fine words, but his prejudice cannot be contained, "The partial results already obtained encourage us to think that we are not far from the right track... it is reasonable to hope that in a not too distant future we shall be competent to understand so simple a thing as a star."

We are swiftly approaching the centenary of Eddington's publication without that understanding.

The standard model of stars has become a nightmare of complexity and special pleading (miracles). The situation may be due to bad timing. Before Eddington, the principal difficulty was to find a long-lived, steady source of energy for the Sun. In 1862, William Thomson (later known as Lord Kelvin) wrote *On the Age of the Sun's Heat*:

"It seems therefore, on the whole most probable that the Sun has not illuminated the Earth for 100, 000,000 years, and almost certain that he has not done so for 500, 000,000 years. As for the future, we may say, with equal certainty, that inhabitants of the Earth cannot continue to enjoy the light and heat essential to their life, for many millions of years longer, unless sources now unknown to us are prepared in the great storehouse of creation."

The unlocking of the energy of the atom in Eddington's time seemed to provide the "great storehouse of creation." Meanwhile the study of electric discharges in low-pressure gases was in its infancy. Eddington recognized the difficulties in explaining how lethal nuclear energy could be released in relatively stone cold stars and converted to benign sunshine. The difficulties were overcome gradually by inventing a truly "Heath Robinson" model. Since hydrogen was necessary as fuel, this lightest of elements had to be in the core of the star as well as its atmosphere. The deadly high-energy radiation from the thermonuclear core had to be tamed by proposing an extensive radiation zone between the core and the surface of the star, where scattering of the radiation over a million years could tame it. No known physical body exists that transfers internal heat by radiation.

Finally the heat reaches the surface by convection. But the solar granulation doesn't behave like convection of hot hydrogen. Despite these seemingly fatal objections, the desperate need to explain how the Sun works over-rode commonsense. Meanwhile, the many strange solar phenomena in plain view that had no place in the thermonuclear model were pushed to one side. There they remain.

While enormous time and resources have been poured into the effort to understand stars based on a single outdated idea, those familiar with plasma discharge phenomena have been paying close attention to the observed phenomena on the Sun and finding simple electrical explanations. After 100 years of neglect, an electrical model of stars is just beginning to emerge. It is an engineer's view that offers a coherent understanding of our real place in the universe (cosmology) and practical insights for the future exploration of space. If the Sun shines as an electric light 'plugged in' to the Electric Universe, the objective tests become obvious. Perhaps, with a real understanding of stars we may reach childhood's end in the cosmos.

For much more detail see [The Electric Universe](#) book and Don Scott's [webpage](#) on the evolution of electric stars.

Wal Thornhill

Electric Gravity in an Electric Universe

Posted on [August 22, 2008](#) by [Wal Thornhill](#)

"..if a special geometry has to be invented in order to account for a falling apple, even Newton might be appalled at the complications which would ensue when really difficult problems are tackled."

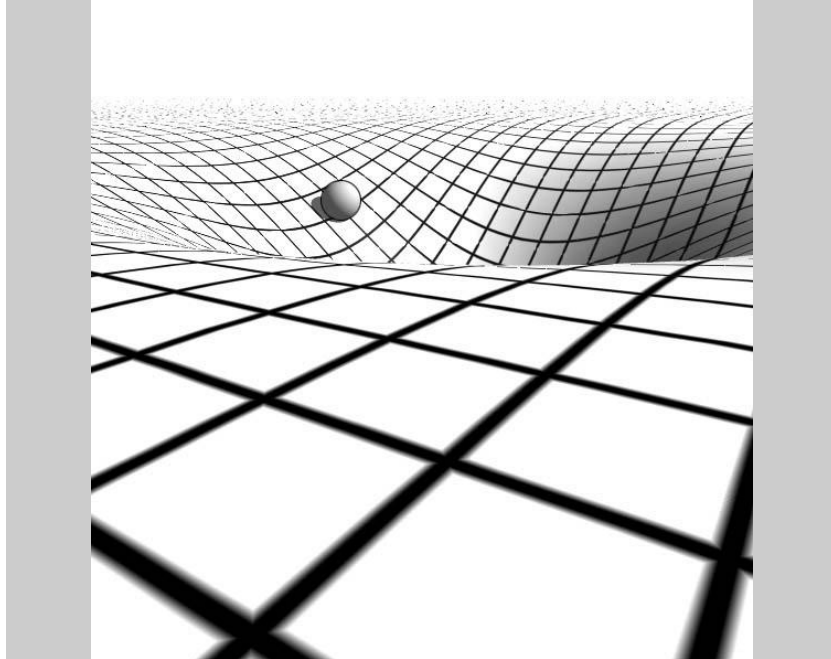
— Sir Oliver Lodge, FRS, 1921. ^[1]



Credit: London Science Museum.

[This news item is shortened and modified from a [presentation](#) given in Cambridge, England, in September 2007. Endnotes are therefore included.]

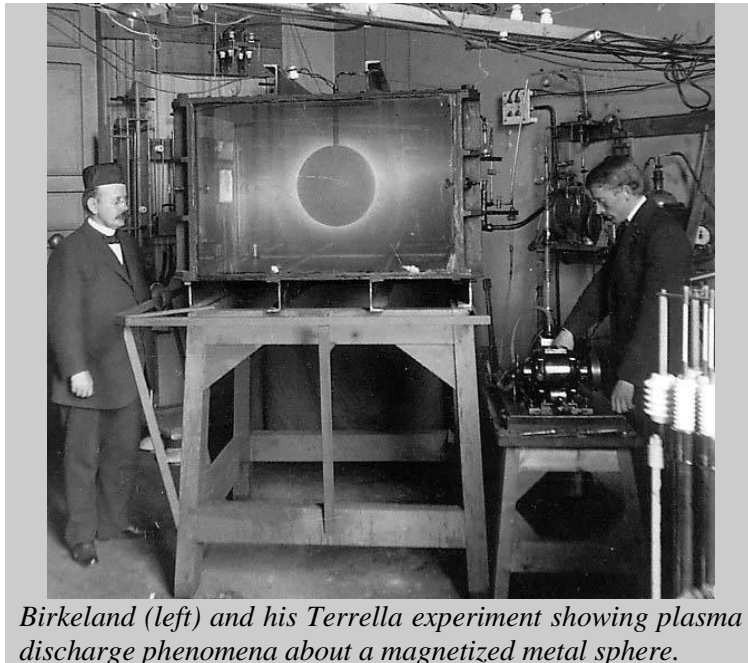
Gravity is the most familiar force. We are subject to it every day of our lives. Newton gave us his 'law of gravity,' which describes its effect but doesn't explain it. "I frame no hypotheses," he wrote. Einstein wasn't so prudent when he introduced his "postulates." Unfortunately, his unreal geometry doesn't explain gravity either. The usual demonstration using heavy steel balls on a rubber sheet to represent 'gravity wells' relies on gravity as its own explanation!



Rubber sheet analogy for "curved space-time." Artwork by Starosta.

The fact that we do not understand gravity in this space age should cause alarm. Our cosmology — our view of our situation in the universe — is based on a mystery! The 'big bang' is a monumentally expensive work of fiction.

Some History



Birkeland (left) and his Terrella experiment showing plasma discharge phenomena about a magnetized metal sphere.

We missed a chance to include electricity in astronomy in the early 1900s. Birkeland was performing his electrical 'little Earth,' or Terrella, experiments in Norway, and Gauss and Weber were discovering the electrical interactions of matter. Today, physicists labour under misconceptions about the nature of matter and space; the relationship between matter, mass and gravity; the electrical nature of [stars](#)^[2] and [galaxies](#); and the size, history and age of the universe. So when astrophysicists turn to particle physicists to solve their intractable problems and particle physicists use it as an excuse for squandering billions of dollars on futile experiments, neither party recognizes that the other discipline is in a parlous state.

"After all, to get the whole universe totally wrong in the face of clear evidence for over 75 years merits monumental embarrassment and should induce a modicum of humility." [3]

"The Standard Model of particle physics would appear to fail in nearly every possible way, and all of its failures seem to stem from the early 1930s. By all indications science seems to have taken a wrong turn about this time. After three hundred years of progressively simplifying the description of the universe, with fewer entities and simpler laws, it suddenly turned the other way, with complexity and entities multiplying like rabbits." [4]

"We are about to enter the 21st century but our understanding of the origin of inertia, mass, and gravitation still remains what has been for centuries – an outstanding puzzle." [5]

How has this situation arisen? In the 20th century technology perfected wireless communication and computers and got man into space, while fundamental science fell deeper into a 'black hole' of complication, illogicality and metaphysics. I consider the principal cause has been the usurping, since Einstein, of natural philosophy and physics by theoretical mathematicians. Meanwhile Einstein, perhaps to his credit, remained sceptical of his own work. [6,7]

I have always found it instructive to read what past luminaries of science thought of a radically new idea. The free exchange of opposing opinions is later stifled by the bandwagon effect. Science, like all human endeavours, is subject to fads and fallacies.



Caricature of Sir Oliver Lodge (June 12, 1851 - August 22, 1940).

When controversy was still tolerated over Einstein's theories, Sir Oliver Lodge, a noted Fellow of the Royal Society, wrote in *Nature* on Feb 17, 1921:

"..what is really wanted for a truly Natural Philosophy is a supplement to Newtonian mechanics, expressed in terms of the medium which he suspected and sought after but could not attain, and introducing the additional facts, chiefly electrical—especially the fact of variable inertia—discovered since his time ...

If we could understand the structure of the particle, in terms of the medium of which it is composed, and if we knew the structure of the rest of the medium also, so as to account for the potential stress at every point—that would be a splendid step, beyond anything accomplished yet." ^[8]
[Emphasis added]

This is precisely the Electric Universe view. Natural Philosophy has withered in its confrontation with the modern fashion of mathematical metaphysics and computer games. Most of the 'discoveries' now are merely computer generated 'virtual reality' — black holes, dark matter, dark energy, etc. The computer models are constructed upon a shadowy kernel of ignorance. We do not understand gravity!

Einstein in his special theory of relativity postulated there was no medium, called the 'aether.' But Maxwell's theory of electromagnetism requires it. And Sir Oliver Lodge saw the aether as crucial to our understanding. So Einstein, at a stroke, removed any possibility that he, or his followers, would find a link between electromagnetism and gravity. It served the egos of his followers to consecrate Einstein's ideas and treat dissent as blasphemy.

"Sometimes a concept is baffling not because it is profound but because it's wrong." [9,10]

Decades later, Paul R. Heyl wrote in *Scientific Monthly*, May 1954:

"The more we study gravitation, the more there grows upon us the feeling that there is something peculiarly fundamental about this phenomenon to a degree that is unequalled among other natural phenomena. Its independence of the factors that affect other phenomena and its dependence only upon mass and distance suggest that its roots avoid things superficial and go down deep into the unseen, to the very essence of matter and space."

—**Gravitation: Still A Mystery.**

This sentiment has been echoed down to the present but few are listening. The problem has been worsened by the particle physicists who indulge in their own virtual reality — inventing "virtual particles" to transmit forces. If they "*could understand the structure of the particle, in terms of the medium of which it is composed*" and put flesh on the metaphysical bones of quantum theory we should be much further advanced. Sir Oliver Lodge deserves to be heard once more:

"..it may be that when the structure of an electron is understood, we shall see that an 'even-powered' stress in the surrounding aether is necessarily involved. What I do feel instinctively is that this is the direction for discovery, and what is needed is something internal and intrinsic, and that all attempts to explain gravitation as due to the action of some external agency, whether flying particles or impinging waves, are doomed to failure; for all these speculations regard the atom as a foreign substance — a sort of 'grit' in the aether — driven hither and thither by forces alien to itself. When, some day, we understand the real relation between matter and aether, I venture to predict that we shall perceive something more satisfying than that." [11]

Electric Gravity

In 1850, Faraday performed experiments trying to link gravity with electromagnetism that were unsuccessful. However, his conviction remained:

"The long and constant persuasion that all the forces of nature are mutually dependent, having one common origin, or rather being different manifestations of one fundamental power, has often made me think on the possibility of establishing, by experiment, a connection between gravity and electricity ...no terms could exaggerate the value of the relation they would establish." [12]

Faraday's estimate of the importance of such a connection still stands. Today, there are a number of scholars pursuing this obvious line of inquiry. After all, the electrical and gravitational forces share fundamental characteristics—they both diminish with the inverse square of the distance; they are both proportional to the product of the interacting masses or charges; and both forces act along the line between them.

Matter and mass

Gravity acts in proportion to the mass of an object. What do we mean when we refer to the 'mass' of an object?

"One of the most astonishing features of the history of physics is the confusion which surrounds the definition of the key term in dynamics, mass." [13]

Early in the 20th century numerous textbooks equated the mass of an object to its weight. That equation led to confusion because it doesn't explain why the mass of an object we measure on a weighing machine (gravitational mass) is identical to the mass of that object when we push it (inertial mass).

When it was found that atoms are composed of charged particles, there were attempts to explain mass in terms of electromagnetism. Henri Poincaré wrote in 1914:

"What we call mass would seem to be nothing but an appearance, and all inertia to be of electromagnetic origin."

It makes good sense that the equivalence of gravitational and inertial mass should be explained by the electrical structure of matter. However, it is not the philosophical concept of mass but its mathematical treatment that occupies physicists. Einstein's famous equation, $E = mc^2$, demonstrated that mass and electromagnetic energy are directly related. But mystification resulted when the earlier concept that related mass to 'quantity of matter' was unconsciously substituted. Textbooks and encyclopaedias today slip unnoticeably into the error of using the words 'mass' and 'matter' interchangeably. A NASA educational website tells us that *"mass is a measure of how much matter a planet is made of."* It shows that the confusion of mass with quantity of matter infects astrophysics.

The consequences are profound for cosmology. **The mass of a celestial body cannot tell us about its composition.** We cannot say what the Sun is made from! Another example is comet nuclei, which are electrically charged bodies. They register masses that should have them constructed like an empty sponge yet they look like solid rock. It is their appearance, together with the recently recovered high-temperature minerals (rock particles) from a comet, that give the accurate picture. Comets and asteroids are fragments of planets. They are not primordial—quite the reverse, in fact.

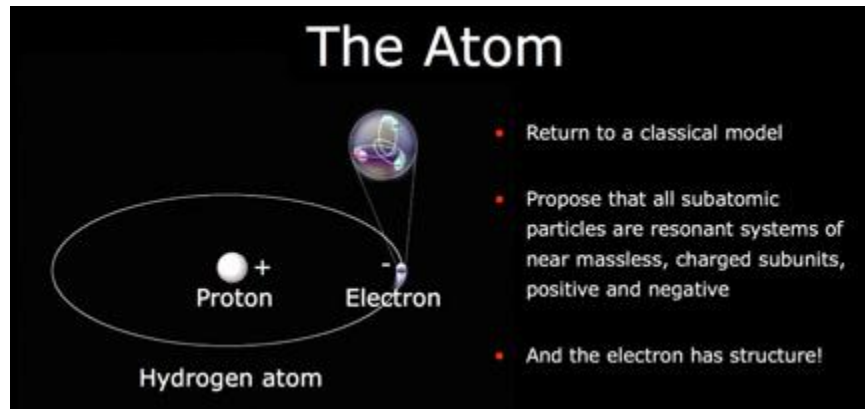
This inexcusable philosophical muddle over matter and mass has given rise to violation of the fundamental [physics principle](#) of no creation or annihilation of matter. It has allowed a miraculous cosmological creation story to gain currency, known as the 'big bang.'^[14] Notions of 'vacuum energy' and of particles 'winking in and out of existence' in the vacuum of space are similarly miraculous. The simple fact is that we have no concept of why matter manifests with mass.

But when we apply force to a body, how is that force transferred to overcome inertia? The answer is 'electrically' by the repulsion between the outer electrons in the atoms closest to the points of contact. The equivalence of inertial and gravitational mass strongly suggests that the force of gravity is a manifestation of the electric force.

The origin of mass in the electrical nature of matter.

Ralph Sansbury in New York.

Without accepting his model in its entirety, I consider Ralph Sansbury's straightforward electrical theory of magnetism and gravity[15] to have conceptual merit. Simply stated, all subatomic particles, *including the electron*, are resonant systems of orbiting smaller electric charges of opposite polarity that sum to the charge on that particle. These smaller electric charges he calls 'subtrons.' This is the kind of simplification of particle physics required by Ockham's razor and philosophically agreeable, though it leaves unanswered the real nature and origin of the subtrons. In this model, the electron cannot be treated like a fundamental, point-like particle. It must have structure to have angular momentum and a preferred magnetic orientation, known vaguely as 'spin.' There must be orbital motion of subtrons within the electron to generate a magnetic dipole. The transfer of energy between the subtrons in their orbits within the classical electron radius must be *resonant* and *near instantaneous* for the electron to be a stable particle. The same argument applies to the proton, the neutron, and, as we shall see —the neutrino.



This model satisfies Einstein's view that there must be some lower level of structure in matter to cause resonant quantum effects. It is ironic that such a model requires the electric force between the charges to operate incomparably faster than the speed of light in order that the electron remain a coherent particle. It means that Einstein's special theory of relativity, that prohibits signalling faster than light, must be repealed. A [recent experiment](#) verifies this.

Electromagnetic waves are far too slow to be the only means of signalling in an immense universe. Gravity requires the near-instantaneous character of the electric force to form stable systems like our solar system and spiral galaxies. Gravitationally, the Earth 'sees' the Sun where it is this instant, not where it was more than 8 minutes ago. Newton's famous law of gravity does not refer to time.

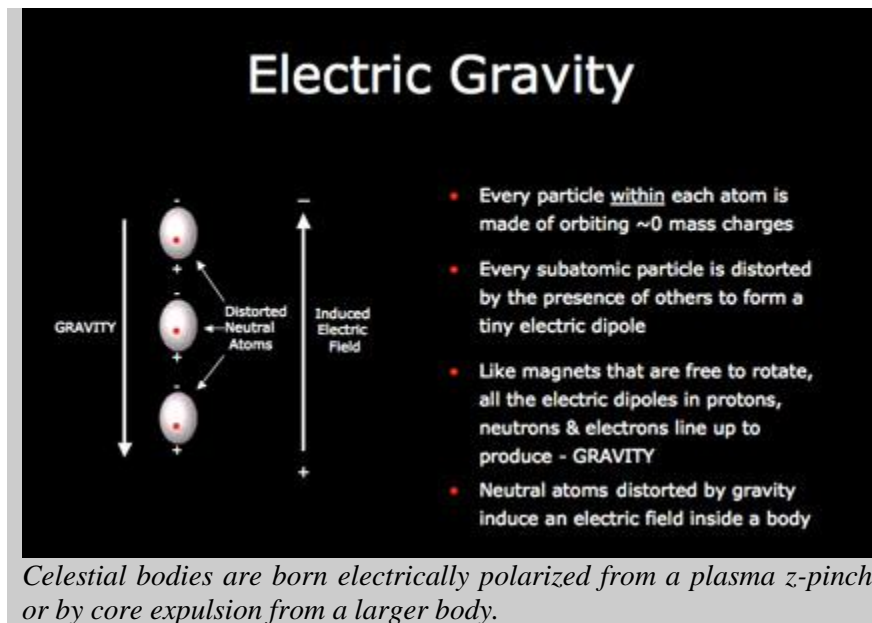
We must have a workable concept of the structure of matter that satisfies the observation that the inertial and gravitational masses of an object are equivalent. When we accelerate electrons or protons in an electromagnetic field they become less responsive to the fields the more they are accelerated. This has been interpreted as an increase in particle mass, which is unhelpful until we understand the origin of mass. If the charged subtrons have little intrinsic mass, how do they, in combination, give the electron, proton and neutron the property of mass?

An electric field will transversely squash the subtrons within an electron or proton. If you cause acceleration at one point in a circular orbit and a deceleration at the diametrically opposite point of the orbit, the result is an elliptical orbit. In the case of an accelerated particle, the orbit will tend to flatten in the direction of the applied force. It seems that as more energy is supplied to accelerate the particle, the more that energy is assimilated inelastically in further distortion rather than in acceleration. In other words, the electric force becomes less and less effective at acceleration, which Einstein would have us interpret as an increase in mass. For comparison, Weber's classical approach to the problem has *"a decrease in the electrical force and not a change in the inertial mass."* [16] This model implies that the charge centres of a proton at rest are more separated than those in an electron at rest. That allows the proton to distort more readily than an electron in the same electric field and may account for their classical differences in size and mass.

"The advantage of this interpretation of the conversion of mass into energy and vice versa is that we are not forced to accept the increase of mass to infinity as a moving mass approaches the speed of light." [17]

What is gravity?

Gravity is due to radially oriented electrostatic dipoles inside the Earth's protons, neutrons and electrons. [18] The force between any two aligned electrostatic dipoles varies inversely as the fourth power of the distance between them and the combined force of similarly aligned electrostatic dipoles over a given surface is squared. The result is that the dipole-dipole force, which varies inversely as the fourth power between co-linear dipoles, becomes the familiar inverse square force of gravity for extended bodies. The gravitational and inertial response of matter can be seen to be due to an identical cause. The puzzling extreme weakness of gravity (one thousand trillion trillion trillion times less than the electrostatic force) is a measure of the minute distortion of subatomic particles in a gravitational field.



The 2,000-fold difference in mass of the proton and neutron in the nucleus versus the electron means that gravity will maintain charge polarization by offsetting the nucleus within each atom (as shown). The mass of a body is an electrical variable—just like a proton in a particle accelerator. Therefore, the so-called gravitational constant—'G' with the peculiar dimension $[L]^3/[M][T]^2$, is a variable! That is why 'G' is so difficult to pin down.

Antigravity?

Conducting metals will shield electric fields. However, the lack of movement of electrons in response to gravity explains why we cannot shield against gravity by simply standing on a metal sheet. As an electrical engineer wrote:

"We [don't] have to worry about gravity affecting the electrons inside the wire leading to our coffee pot." [19]

If gravity is an electric dipole force between subatomic particles, it is clear that the force "daisy chains" through matter regardless of whether it is conducting or non-conducting. Sansbury explains:

"..electrostatic dipoles within all atomic nuclei are very small but all have a common orientation. Hence their effect on a conductive piece of metal is less to pull the free electrons in the metal to one side toward the center of the earth but to equally attract the similarly oriented electrostatic dipoles inside the nuclei and free electrons of the conductive piece of metal." [20]

This offers a clue to the reported 'gravity shielding' effects of a spinning, superconducting disk.[21] Electrons in a superconductor exhibit a 'connectedness,' which means that their inertia is increased. Anything that interferes with the ability of the subatomic particles within the spinning disk to align their gravitationally induced dipoles with those of the earth will exhibit antigravity effects.

Despite a number of experiments demonstrating antigravity effects, no one has been able to convince scientists attached to general relativity that they have been able to modify gravity. This seems to be a case of turning a blind eye to unwelcome evidence. Support for antigravity implicitly undermines Einstein's theory.[22]

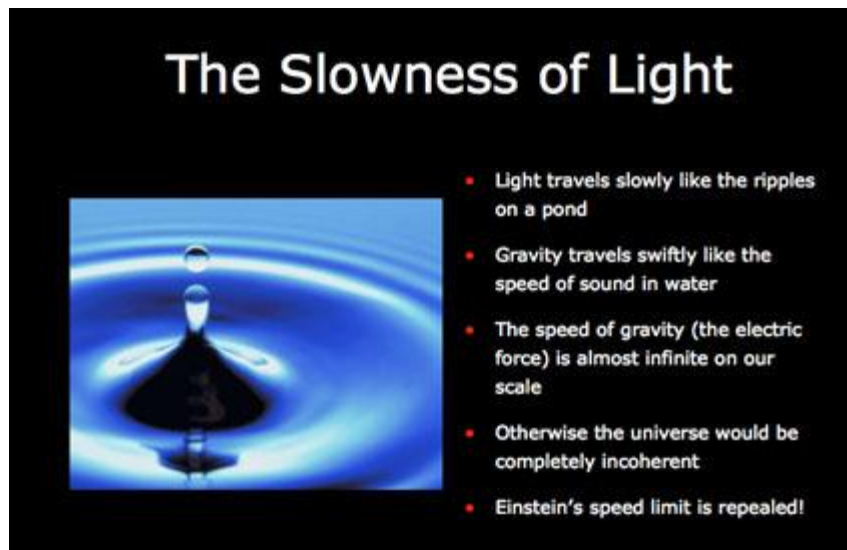
'Instantaneous' gravity

A significant fact, usually overlooked, is that Newton's law of gravity does not involve time. This raises problems for any conventional application of electromagnetic theory to the gravitational force between two bodies in space, since electromagnetic signals are restricted to the speed of light. Gravity must act instantly for the planets to orbit the Sun in a stable fashion. If the Earth were attracted to where the Sun appears in the sky, it would be orbiting a largely empty space because the Sun moves on in the 8.3 minutes it takes for sunlight to reach the Earth. If gravity operated at the speed of light all planets would experience a torque that would sling them out of the solar system in a few thousand years. Clearly, that doesn't happen. This supports the view that the electric force operates at a near infinite speed on our cosmic scale, as it must inside the electron.^[23] It is a significant simplification of all of the tortuous theorizing that has gone into the nature of gravity and mass. Einstein's postulates are wrong. Matter has no effect on empty space. Space is three-dimensional—something our senses tell us. There is a universal clock so

time travel and variable aging is impossible—something that commonsense has always told us. But most important—the universe is connected and coherent.

The real nature of light

However, it leaves the question of what the speed of light means. This is where I part company with Sansbury and others who explain it in terms of a delayed response to an instantaneous signal. In my view, the crucial difference between the near-infinite speed of the electric force and the relative dawdle of light on any cosmic scale is that the electric force is longitudinal while light is an oscillating transverse signal moving slowly through a medium.



If I can use a simple analogy, light travels slowly like the transverse ripples on a pond surface; gravity travels swiftly and longitudinally, like the speed of sound in water. Once again, this is at odds with Einstein's metaphysics because it reinstates Maxwell's aether: Maxwell's electromagnetic theory requires a medium. How can you wave nothing?

The Michelson-Morley basement experiment was heralded as having lain to rest the notion of an aether. It didn't.[24] [Dayton Miller](#) carried out far more rigorous repeats of that experiment at different locations and elevations. He [found a residual](#), which allowed him to conclude that ponderable bodies like the Earth drag the aether with them. He was able to determine the relative motion of the solar system with respect to the aether.



Dayton Miller (left) with Irving Michelson (right). Credit: Case WRU Archives. "Miller's work on ether drift was clearly undertaken with more precision, care and diligence than any other researcher who took up the question, including Michelson, and yet, his work has basically been written out of the history of science."

Others and I have argued that a plenum of neutrinos forms the aether.^[25] Based upon nuclear experiments, I have also proposed that neutrinos are the most collapsed, lowest energy state of matter. In other words they exhibit vanishingly small mass. However, being normal matter composed of subtrons, they are capable of forming electric dipoles. In an oscillating electromagnetic field a neutrino must rotate through 360° per cycle. That would link the speed of light in a vacuum to the moment of inertia of a neutrino. Having some mass, neutrinos must be 'dragged along' by gravitating bodies. They form a kind of extended 'atmosphere' which will bend light. It has nothing to do with a metaphysical 'warping of space.'

The Electric Universe

The confusion about any role for electricity in celestial dynamics has come about because of our ignorance of the electrical nature of matter and of gravity. The classical signposts to an understanding of gravity were in place at the beginning of the 20th century, but after the terrible world wars it seems people were looking for heroes with a new vision. Einstein became an overnight idol of genius and his geometric metaphysics the new fashion in science. The dedication to the Einstein myth has become so entrenched that to say "the emperor has no clothes" invites ridicule. But over almost a century there has been an astronomical price to pay for unquestioning adherence to dogma. A recent review of the history of astronomy concludes,

"The inability of researchers to rid themselves of earlier ideas led to centuries of stagnation. An incredible series of deliberate oversights, indefensible verbal evasions, myopia, and plain pig-headedness characterize the pedestrian progress along this elusive road for science. We must be constantly on our guard, critically examining all the hidden assumptions in our work." [26]

Since scientists have demonstrated their inability to do this, the public must be made aware how science actually operates and is protected from scrutiny. It will require the kind of fearless investigative journalism we often see in politics. Unfortunately, science reporters are part of the problem if they bow to the expert and the lazy dissemination of academic propaganda.

Ultimately cosmology must have no loose ends. The electric universe model is an attempt to connect many strands of knowledge.

"Proposals that eventually pan out in the world are far more likely to exhibit narrative consistency – perhaps what Edward O. Wilson calls 'consilience' in his book of that name." [27]

"The goal of consilience is to achieve progressive unification of all strands of knowledge in service to the indefinite betterment of the human condition." [28]

No matter that there is an avalanche of books and papers supporting big bang cosmology—repetition provides no assurance that one particular interpretation of results is valid.

"Assurance of interpretation can come only by comparing the success of competing hypotheses in interpreting data from disparate areas." [29]

Big bang cosmology fails this test because it brooks no competition.

For example, [plasma cosmology](#) is officially recognized by the largest professional organization in the world, the Institute of Electrical and Electronic Engineers (IEEE), while big bang cosmologists ignore it. The electric universe model is an extension of plasma cosmology. It is based on concepts derived from observations as disparate as petroglyphs and quasar redshift. Big bang cosmologists have no narrative that can compete. But by the simple act of ignoring alternatives they reject them—if the public simply acquiesce and do not speak up.

Wal Thornhill

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The \$6 Billion LHC Circus

Posted on [September 10, 2008](#) by [Wal Thornhill](#)

Science has become an international circus. And opening day for "The Greatest Show on Earth" has arrived. In the 27 km main circus ring we have the Large Hadron Collider (LHC) project, starting up after \$6 billion dollars and thirty years of development. Before the show the clowns have warmed up the audience with [fantastic stories](#) of what we might see. But why should we take clowns seriously?



Professor Higgs, seen here at the LHC, is one of the eminent scientists responsible for perhaps the most expensive circus in science today.

The BBC Horizon program, "The \$6 billion Dollar Experiment," documents the LHC experiment. The LHC accelerates beams of protons in opposite directions around a circular 27 km underground racetrack and then smashes them together head-on. The expense comes from the need to reach particle energies seven times that of earlier particle colliders and to construct a massive particle detector 'cathedral' underground. The energy density reached in the experiment is thought to mimic the earliest moments of the big bang – the origin of the universe.

Most of the experimenters involved are looking for the 'God particle'. The Times Online reported on April 8:

"The mysterious boson postulated by Professor Higgs, of the University of Edinburgh, has become so fundamental to physics that it is often nicknamed the 'God particle'. After more than 40 years of research, and billions of pounds, scientists have yet to prove that it is real. But Professor Higgs, 78, now believes the search is nearly over."

The "God Particle" or Higgs boson was invented by Peter Higgs to explain why other particles exhibit mass. He starts with assuming the existence of a particle that has only mass and no other characteristics, such as charge. So the Higgs particle is like no other in our experience, since all normal matter is composed of electric charges that respond to electromagnetic influences. (Dark matter falls into the same category.) However, we observe that the mass of a charged subatomic particle is altered by the application of electromagnetic forces. At its simplest (and Nature is economical in our experience) it indicates that mass is related to the storage of energy within a system of electric charges inside the particle. That's what $E = mc^2$ is telling us. So how can a massive particle be constructed without electric charge? It shows the problem inherent in leaving physics to mathematicians — there is a disconnect between mathematical concepts and reality.

The notion that subatomic particles exhibit mass as a result of their interaction with imaginary Higgs particles occupying all of empty space like some form of treacle should have caused a sceptical uproar, if it weren't for the appalling apathy of the public toward such nonsense. The 'annihilation' and 'creation' of matter is invoked when particles at particular points arise from 'fields' spread over space and time. Higgs found that parameters in the equations for the field associated with his hypothetical particle can be chosen in such a way that the lowest energy state of that field (empty space) is not zero. With the field energy non-zero in empty space, all particles that can interact with the Higgs particle gain mass from the interaction.

This explanation for the phenomenon of mass should have been stillborn if common sense was used. To begin, the annihilation and creation of matter is forbidden by a principle of physics. It is tantamount to magic. Second, field theory is a purely imaginary construct, which may or may not have physical significance. And third, it is not explained how the Higgs particle can have intrinsic mass but no charge and yet interact with normal matter, which has charge but is said to have no intrinsic mass. Rather than explain the phenomenon of mass, the theory serves to complicate and confuse the issue. The most amazing feature of this \$6 billion experiment is the confused and illogical thinking behind it.

At the heart of the thinking behind the Higgs boson is quantum mechanics, which has a fundamental flaw — it allows effects without a cause. For example, radioactive decay is unpredictable. We do not know what causes an atom to 'spontaneously' decay. Nobel Prize winning physicist Richard Feynman wrote:

"...I think I can safely say that nobody understands quantum mechanics."

[The Character of Physical Law, 1965]

Quantum mechanics is not physics, whose aim is understanding.

Particle physicists would be well advised to study chemistry and the 'London force' between electrically neutral systems of atoms. It is a weak force, sufficient to form solids and liquids, and is always attractive. In other words, it is like [gravity](#). The extreme

feebleness of gravity can be understood as the result of tiny distortions of orbiting systems of charge within the proton, neutron, electron and neutrino.

Of course, particle physicists operate by smashing atoms in violent collisions. But if normal matter is composed of subunits of charge in some resonant state of equilibrium (the simplest picture), then smashing particles together will merely generate new unstable (short lived) resonant systems of charge, which will be interpreted as members of a weird zoo of new particles. The LHC can do no more than that. No matter can be created or annihilated. And since the [big bang](#) and [black holes](#) are the result of the illogical or incorrect application of mathematics to a gravity driven model of the universe, nothing will be learned about either.

The irony of the experiment is that the LHC uses 120 megawatts of electrical power to recreate in a tiny space the presumed conditions that existed shortly after the big bang. But astrophysicists do not recognize the obvious signs of electrical power in space today. It signals a profound disconnect between the 'specialism' of theoretical physics and straightforward electrical engineering principles. The eminent historian of ideas, Jacques Barzun, wrote:

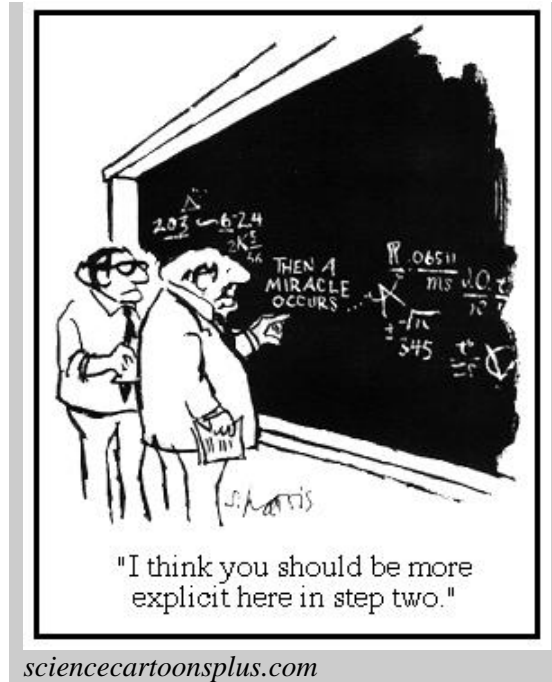
"The rampant specialism, an arbitrary and purely social evil, is not recognized for the crabbed guild spirit that it is, and few are bold enough to say that carving out a small domain and exhausting its soil affords as much chance for protected irresponsibility as for scientific thoroughness."

—*Science: the glorious entertainment.*

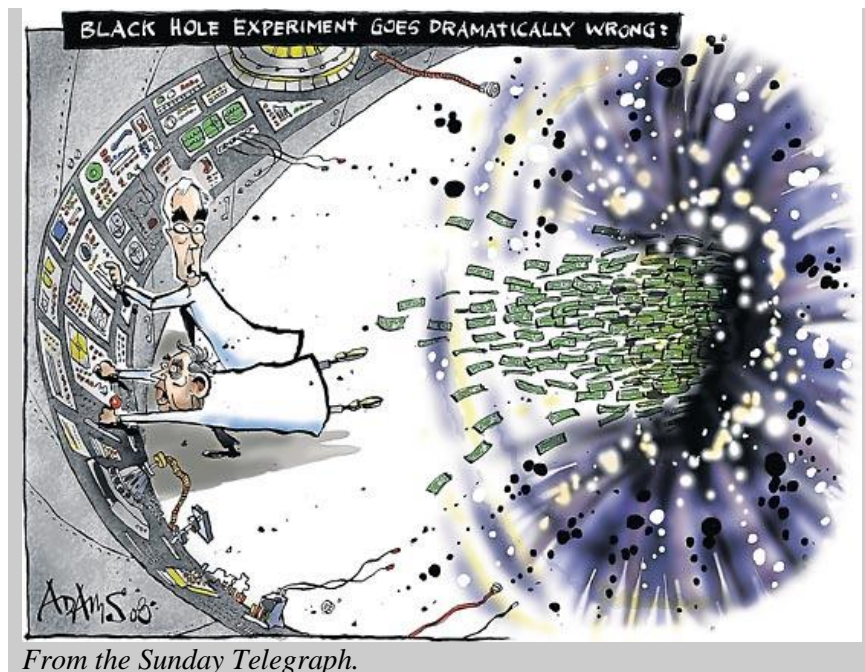
Meanwhile, other circus 'Big Tops' have been erected over Gravity Wave Telescopes, built to see waves that don't exist, and over research establishments of astrophysics and particle physics where it is supposed that 95% of the universe is made of invisible "dark matter" and is powered by undetectable "dark energy."

"To Hannes Alfvén, the Big Bang was a fable – a fable devised to explain creation. 'I was there when Abbé Georges Lemaitre first proposed this theory,' he recalled. Lemaitre was, at the time, both a member of the Catholic hierarchy and an accomplished scientist. He said in private that this theory was a way to reconcile science with St. Thomas Aquinas' theological dictum of creatio ex nihilo or creation out of nothing."

— Anthony L. Peratt, *'Dean of the Plasma Dissidents'*, *The World & I*, May 1988, pp. 190-197.



There is no physics to explain a creation event. Creation is a metaphysical concept. The big bang is a theory created out of nothing. And there is plenty of evidence [contrary to the big bang](#) — that shows the universe is not expanding. It is irrational to ignore the evidence or to explain it away, as is being done with dark matter, dark energy, and black holes. Earlier scary performances by circus clowns about black holes gobbling stars frightened the public. Now the public is being assured there's nothing to worry about if a 'mini black hole' happens to be created by the LHC. What seems to be forgotten is that cosmic rays routinely exceed the energy expected from the LHC.



But it is the search for the "God Particle" to explain gravity that reveals the irrationality of the enterprise. The equation of gravity with "God" comes from the belief that gravity controls the universe. It is no more than that — a belief. Plasma cosmology shows the belief is mistaken. It is an Electric Universe, not a gravitational universe. Clearly, the scientists involved in the LHC experiment have no real idea of what they are doing. We are told by one of the participants with a fatuous grin, "science is what you do when you don't know what you are doing." The LHC is a mammoth engineering and technological undertaking that I predict will serve in future as a monument to human lunacy.

In 1852, Charles Mackay wrote in the preface to his classic work, **Extraordinary Delusions and the Madness of Crowds**:

"Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, and one by one."

Without a doubt, the modern era of physics will soon be deemed a "dark age of science." The very language of 'black hole,' 'dark matter,' and 'dark energy,' portends the end of this mad and dismal era.

Scientists today are herded into large institutions. The ones to watch are those leaving or excluded from the herd. A few of them have recovered their senses and are raising a clamor to acknowledge a [crisis in cosmology](#) and to return to *real* physics.

Each group of specialists urges the other to ever more preposterous performances based on their cherished beliefs, while the public pays dearly. But the audience is becoming bored and restless. There is growing doubt that the circus clowns know what they are doing when they talk about "creation" and the "God particle." When the LHC finds nothing, it will be time to sweep the fertilizer from the main ring and close the circus.

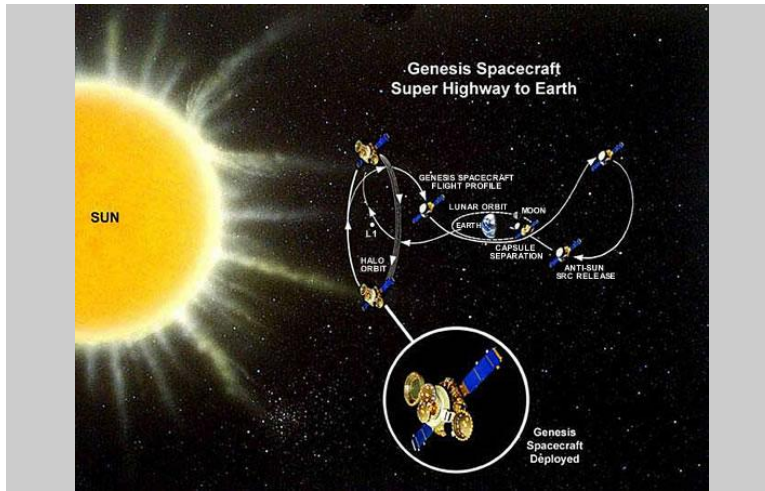
Wal Thornhill

Assembling the Solar System

Posted on [October 23, 2008](#) by [Wal Thornhill](#)

"The Genesis team can take great satisfaction not just in having salvaged their mission, but in underscoring once again how little we know about how our strange and wonderful home planet came to exist."

— Kelly Beatty, *Sky & Telescope*



The purpose of the Genesis mission was to observe the solar wind, entrap its particles and return them to Earth in a Search for the Origin of the Earth.. Credit: NASA/JPL-Caltech.



The Genesis Capsule shortly after its hard landing. The Genesis spacecraft returned to Earth on September 8, 2004, experiencing a "non-nominal" reentry in which both the drogue and main parachutes failed to deploy causing the capsule to impact the surface of the desert at a speed of 193 miles per hour. The impact caused severe damage to the capsule and a breach of the science canister in the field. Credit: NASA/JPL-Caltech.

From the NASA website comes the following report:

"Kevin McKeegan's announcement at the 2008 Lunar and Planetary Science Conference that the pattern of oxygen isotopes on the Sun differs greatly from that of Earth took many planetary scientists by surprise, but the findings may help them explain how Earth and the other planets grew out of the solar nebula, the giant cloud of gas and dust from which the solar system formed. McKeegan heads the UCLA team that is analyzing samples of the solar wind as part of the Genesis mission.

"I learned that experienced scientists were taking bets on the outcome of McKeegan's measurements," said cosmochemist Robert Clayton, "since many were reluctant to believe that the Earth and Sun could have different isotopic compositions."

COMMENT: Given the vast, empty distances between stars, it seems sensible to assume that the Sun and its family of planets were born together. Scientists take for granted that gravity is the only force operating in the universe to cause matter to coalesce to form stars and planets. Astronomers observe dusty disks around some nearby stars and assume that those disks are the 'leftovers' of matter that formed the star. The observations appear to confirm the accepted story of the planets forming from collisions and accretion of matter in the proto-solar disk.



An artist's impression of the solar nebula. Credit: NASA

However, all is not as it seems. There are objections to the nebular disk accretion model that should be considered fatal were it not for the fact that no alternative seems possible — given the gravity-driven view of the universe. For example, a slowly rotating cloud may tend to collapse under gravity but a point is quickly reached where the outward rotational force counteracts further collapse. Rotational energy must be dissipated somehow to enable the cloud to collapse more. Assuming you manage to form the Sun inside a disk another serious difficulty arises. Gravitational interactions with the disk cause protoplanets to swiftly [spiral into the star](#). Then there is the problem that the Sun, as the most collapsed object, should be spinning the fastest (like a pirouetting dancer pulling in her arms). But the Sun spins slowly. Almost the entire angular momentum in the solar system is to be found in the orbiting planets. And the Sun's equator is tilted 7 degrees to the plane of the orbiting planets!

Instead of the expected gradation of properties of the planets with distance from the Sun, we find a 'fruit salad' of characteristics, which don't make any sense in the simple nebular model. For example, the Earth has an abundance of water, yet the region where early Earth formed was too hot for water to be incorporated into a solid body. So, in ad hoc fashion, meteorites had to deliver it later. As one expert on the subject remarked:

"you need to make a special case for each planet."

Gravitational accretion of planets from a dusty disk doesn't work anyway—once a disk, always a disk—look at Saturn's rings. Theory shows it is hard for a planetesimal to get to 1 km in size. But then to avoid fragmentation by collision, a body needs to be 1000 km to provide enough gravity to retain collision debris!

Special requirements abound in the accretion disk model. Even if we assume, despite the objections above, that planets the size of Jupiter can form, we then need a violent phase of activity from the new Sun at just the right time to dissipate most of the matter of the disk while leaving the gas giants with thick atmospheres. But then, how do we explain Jupiter's three times the solar abundance of noble gases?

Perhaps the most significant problem with the gravity-only model is how to explain the circularity and long term stability of planetary orbits. After all, more than two bodies moving under the influence of gravity produce a chaotic system. There is no restoring force when a planet is perturbed in its orbit. Under Newtonian law, the solar system today cannot be the same as it was even in the recent past.

When we look at the nearest 100 bright stars in the solar neighborhood (within ~ 25 parsec radius) there are 40 binary stars, 15 triple stars and 5 quadruple stars. How can an accretion model explain so many multiple star systems? And where do the numerous brown dwarf stars fit? They have a much lower binary star fraction of ~ 15%. And why do stars seem to have a maximum mass of ~ 100 solar masses? As another expert put it, "the theory of star formation fails—mysteries abound!"

The Genesis mission provides at least one more mystery. Oxygen is the third most abundant element in the cosmos, of which the isotope oxygen-16 makes up 99.67%, oxygen-17 0.04%, and oxygen-18 0.02%. Kelly Beatty writes:

The Sun represented a critical missing piece of this isotopic puzzle. Cosmochemists assume that whatever atoms populate the solar wind must be representative of what's in the Sun itself and therefore a sample of the raw mix from which the planets formed. So would the Sun's oxygen ratios match those of Earth or of the ancient meteorites? The very framework of planetary formation hung in the balance.

At the 39th annual Lunar and Planetary Science Conference in Houston, Texas, Kevin McKeegan (UCLA) announced that the Sun has proportionately far more oxygen-16, relative to oxygen-17 and -18, than is present in terrestrial seawater. There's a serious mismatch. Instead, the solar ratios follow the same trend seen in primitive meteorites.

Suddenly, Earth is the odd planet out. "We had little idea what the Sun's ratios should be," McKeegan told me after his presentation. Now, he says, there's "no plausible model" to make Earth with the oxygen ratios it exhibits. "It's always been a challenge to supply Earth with the water it has. And now we're wondering how it got the rocks it has."

That view was echoed by Robert Clayton, a University of Chicago cosmochemist. "The CAIs were thought to be the anomaly and we were normal but this result has turned that idea upside down."

It is obvious that the model of the gravitational formation of stars and planets is a failure. So why are self-congratulatory statements like the following, delivered at an astronomical conference in 2005, being made?

"Two of the great scientific success stories of the last several decades are our growing understanding of the way stars form, and our ability to reconstruct the history of our own Solar System. These two lines of scientific investigation meet in the Sun's protoplanetary disk."

It seems scientists should be alerted to the human propensity for confirmatory bias!

Confirmatory Bias in Science

"This refers to the tendency for humans to seek out, attend to, and sometimes embellish experiences that support or 'confirm' their beliefs. Confirmatory experiences are selectively welcomed and granted easy credibility. Disconfirmatory experiences, on the other hand, are often ignored, discredited, or treated with obvious defensiveness... the most costly expression of this tendency may well be among scientists themselves..."

One study found that the vast majority of scientists drawn from a national sample showed a strong preference for "confirmatory" experiments. Over half of these scientists did not even recognize disconfirmation (modus tollens) as a valid reasoning form! In another study the logical reasoning skills of 30 scientists were compared to those of 15 relatively uneducated Protestant ministers. Where there were performance differences, they tended to favor the ministers. Confirmatory bias was prevalent in both groups, but the ministers used disconfirmatory logic almost twice as often as the scientists did. The costs of this cognitive bias are perhaps nowhere as serious as in the area of scientific publication."

— Michael J. Mahoney, *Cognitive Therapy and Research*, Vol. 1, No. 2, 1977, pp. 161-175.

But despite scientists' beliefs, there is an alternative to the gravity-only assumption of consensus cosmogony. Unfortunately astrophysicists are not trained in plasma discharge phenomena so that they might recognize this fact. As in many other scientific disciplines, the inertia of tradition, institutionalization and specialization to the brink of irrelevance has produced terminal tunnel vision. Astrophysics is hamstrung by an unreal but mathematically tractable view of plasma behavior in space. That view suits the dominant mathematical theorists but denies real physics. The specialty is called 'magnetohydrodynamics.' The name betrays the fundamentally incorrect approach. Magnetohydrodynamics treats space plasma as a mysteriously magnetized gas. So we hear of stellar "winds" and gaseous "shock fronts." The solar wind "buffets" against the Earth's magnetic field.

The 'father' of the subject, Hannes Alfvén, notoriously dismissed his own invention in his Nobel Lecture of December 11, 1970. He warned of the consequences:

"These [magnetohydrodynamic] theories had initially very little contact with experimental plasma physics, and all the awkward and complicated phenomena which had been treated in the study of discharges in gases were simply neglected..."

The cosmical plasma physics of today is far less advanced than the thermonuclear research physics. It is to some extent the playground of theoreticians who have never seen a plasma in a laboratory. Many of them still believe in formulae which we know from laboratory experiments to be wrong. The astrophysical correspondence to the thermonuclear crisis has not yet come.

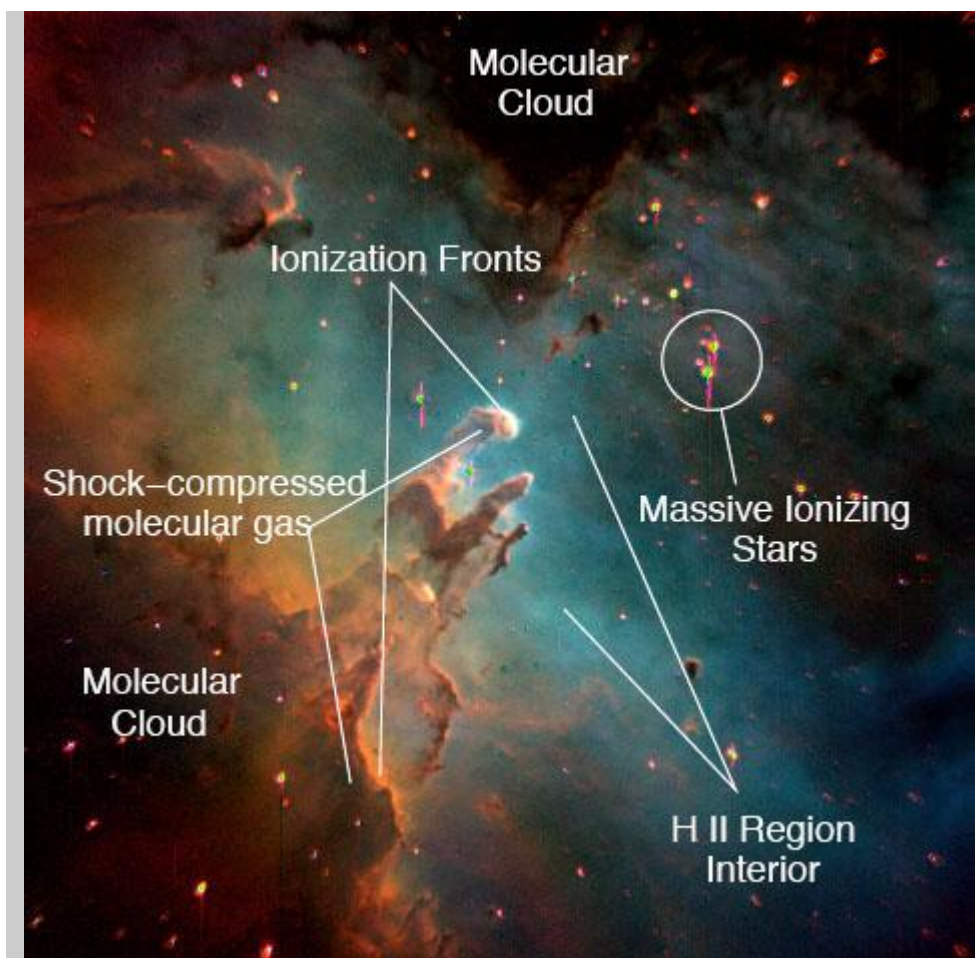
I think it is evident now that in certain respects the first approach to the physics of cosmical plasmas has been a failure. It turns out that in several important cases this approach has not given even a first approximation to truth but led into dead-end streets from which we now have to turn back."

Thirty-eight years later, the thermonuclear crisis remains with us while the unacknowledged astrophysical crisis shows up in the crazy theories we see regularly in

space news. Such is the moribund state of politicised and institutionalised science that we remain heading into a dead-end!

Meanwhile, unnoticed by those who have most to gain from it, the largest professional organization on planet Earth, the Institute of Electrical and Electronic Engineers (IEEE), have a Plasma Cosmology division with a far superior model that is amenable to laboratory testing and verification. It is based heavily on Alfvén's insights and practical laboratory experience of plasma discharge phenomena.

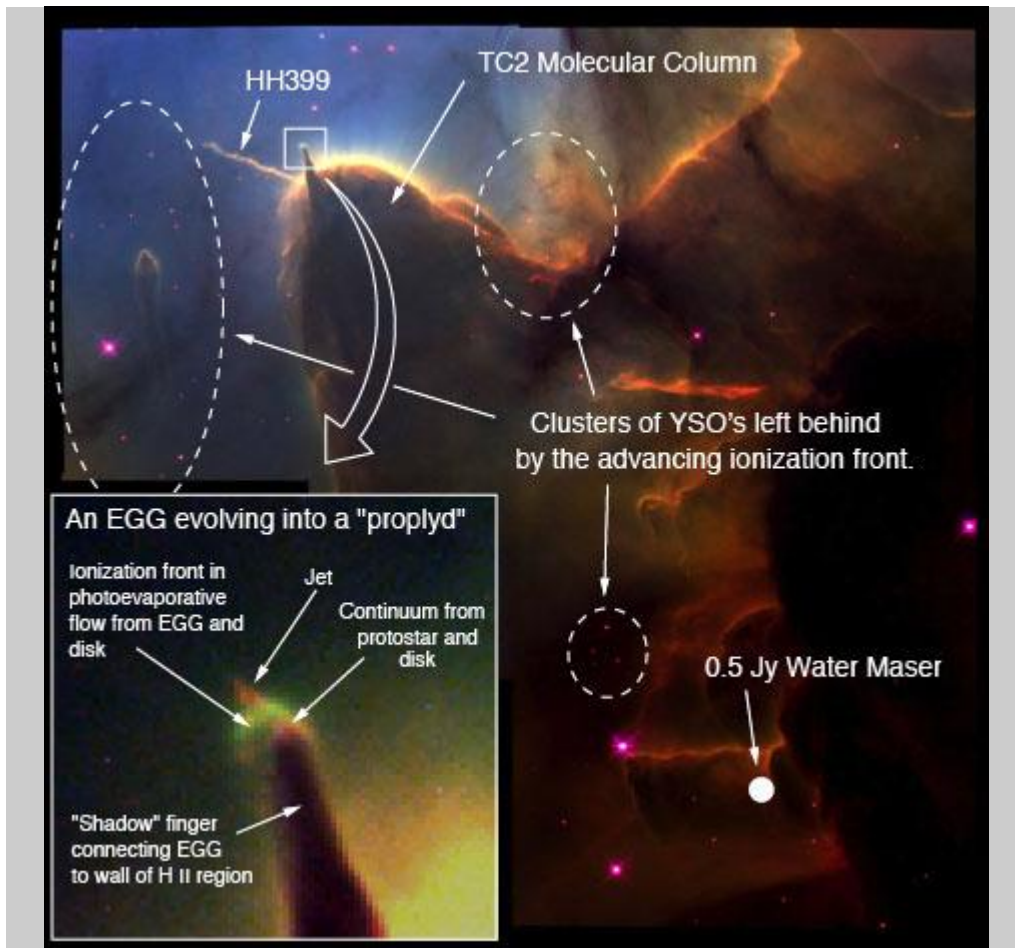
The Electrical Formation of the Solar System



This is a ground-based image of the Eagle Nebula, M16, obtained with the 1.5-m telescope at Palomar Observatory. It is a star formation region hyped by NASA and the media as the "Pillars of Creation." The glowing HII region is ionized atomic hydrogen plasma. Credit: J. Jeff Hester and Steven J. Desch, ASU.

[[HII region Wikipedia](#)]

Astronomers see in this image "thick and turbulent clouds of gas and dust" that are "being sculpted into pillars by radiation and winds from hot, massive stars." The language is misleading and inappropriate. The pillars are not turbulent, they have the characteristic tornadic column form of parallel z-pinch plasma discharge filaments. Z-pinches are the most efficient scavengers of matter in space, having an attractive force that falls linearly with distance from the axis. (Gravity falls off exponentially with the square of the distance). Gravity and turbulence give no explanation for the surprising tornadic forms.



This closeup of a "young stellar objects" (YSO) region shows detail of the Trifid column 2 (TC2). The first stage is called the "emerging gaseous globule" or "EGG." The sequence of events is conventionally: (1) Radiation from a massive star drives an ionization front into surrounding molecular gas. (2) The ionization front (plus winds and previous supernovae drive a shock, triggering collapse of molecular cores. (3) ~100,000 years after triggered collapse, the ionization front overruns the core, forming an EGG. (4) EGGs evaporate in ~10,000 years, exposing the disk. The evaporating disk is a proplyd. (5) In ~10,000 years, disks erode to ~50 AU. Disk evaporation ends, leaving a protostar and bare protoplanetary disk. (6) The massive star goes supernova, injecting newly synthesized elements into surrounding disks. Credit: J. Jeff Hester and Steven J. Desch, ASU.

The notion of "triggered collapse" is merely hand waving. The inset image shows the telltale polar jet aligned with the z-pinch column. The glowing "ionization front" is not

principally a photo-ionization or collisional effect but the glow of a plasma double-layer, energized by electric current. The nearby Herbig-Haro object, HH399, exhibits the typical thin polar corkscrew jet seen in more detail in the Herbig-Haro 49/50 below.



Cosmic Tornado HH49/50 "Tornado" is the description of this jet blasting down from the top of this Spitzer Space Telescope image. Credit: J. Bally (Univ. of Colorado) et al., JPL-Caltech, NASA. Inset: HH34 is another example where the plasma "beading" is clearly visible in the stellar jet. Credit: ESO.

The heated, glowing plasma in these jets can extend for trillions of miles. They do not explosively dissipate in the vacuum of space because of the electromagnetic "pinch effect" of the electric current flowing along the jet. The spiral shape is that of Birkeland current filaments, which are the universal power transmission lines.

Birkeland current pairs have been shown by both experiment and supercomputer simulations to form an axial sump of plasma, segregated radially by Marklund convection. Marklund convection causes helium to form a diffuse outer layer, followed by a hydrogen layer, then oxygen and nitrogen in the middle layers, and iron, silicon and magnesium in the inner layers. So [electric stars](#) should have a core of heavy elements and an upper atmosphere mostly of hydrogen.

Birkeland currents align themselves with the ambient magnetic field direction. The hourglass z-pinch shape has been confirmed in the magnetic field of a star-forming region. (See SCIENCE Vol 313 11 August 2006). And in laboratory z-pinch experiments,

the plasma tends to form a number of "beads" along the axis (see HH34 above), which "scatter like buckshot" once the discharge subsides.

Alfvén proposed the electrical circuit diagram for a star. It is in the form of a simple Faraday motor, which explains why the Sun's equatorial plasma is driven fastest. It also explains the presence of the circumstellar disk, formed and held there by electromagnetic forces and not by weak gravity. And the problem of transfer of rotational energy does not arise because the entire system is held by powerful electromagnetic forces and driven like an electric motor. (The same explanation, of course, applies on a much grander scale to the anomalous rotation of the disk of spiral galaxies). When the star-forming z-pinch subsides, gravity is not able to retain the disk for long and current flowing in the disk (the stellar wind) sweeps the space clear.

Planets do not form from a disk of dust and gas about a star.

"Gravitational systems are the ashes of prior electrical systems."

- Hannes Alfvén.

Due to Marklund convection, stars have cores of heavy elements. Electric stars are not nuclear furnaces! They shine because they remain embedded in the galactic power grid. The decay of the z-pinch exposes the newborn star to a new electrical environment. The critical factor in the star's stability is the current density at its photosphere. If it is excessive, the star may electrically "fission" into two or more pieces in order to expose a greater surface area and reduce the current density to a manageable level. Ejection of stellar matter produces a companion star or "gas giant." That may explain the baffling number of multiple star systems and close-orbiting gas giant planets. Distantly orbiting gas giants, like those in our solar system are another story.

Dwarf stars are born in the same process, probably in larger numbers than the bright stars. They do not require to fission because their electrical stress is low, as evidenced by their light. They may form fewer multiple star systems by a different process—electrical capture—to be explained later.

We have dealt with star birth but not the birth of planets like the Earth. The Electric Universe model of solar system formation goes much further than the plasma cosmology model. Instead of imagining some initial state of the solar system and projecting the model forward in time, it is necessary to first look at astronomical records as far back in time as possible to check the basic assumption that the sky has not changed in that time. This may seem a waste of time given the usual mantra that the Earth is 4.5 billion years old. But all ancient cultures recall an age of splendid but terrifying celestial gods and wonders that departed the skies long ago.

Recent research, published by the authority on the many unique forms of high-energy plasma discharge instabilities, has found that prehistoric astronomers chiselled the most ancient astronomical records into solid rock around the globe. Using global positioning and logging the magnetic orientation of these petroglyphs has resulted in a mammoth 3-D dataset, which is expected to allow us to reconstruct the position and evolution of what might be termed "prehistoric mega-auroras." It extends our understanding of *real* Earth history by about 10,000 years. A significant finding is that the petroglyphs point toward the ancient celestial plasma display having a focus at the south magnetic pole. That is what we expect of cosmic Birkeland currents, which align with the magnetic field.

The implications of this discovery are dramatic and unprecedented. It shows that the Earth and the solar system have a recent history of instability accompanied by planetary electric discharge activity on a scale unimaginable today. The story requires many books to tell. But the principal message is that the solar system is a composite family. Planets have been acquired at intervals long after the Sun was born. So, looking for isotopic signatures in the solar system is something like DNA testing. Familial ties may be established but they will have nothing to do with the Sun!

In a later news item I will discuss further the simple electrical feedback mechanism that swiftly restores stability in a disturbed many-body [electric-gravitational system](#). (For those who can't wait, the subject is dealt with in my paper to the [SIS Cambridge Conference](#) last year). For now I will simply outline the likely origin of the planets and moons in the solar system.

Where did the Earth come from?

It is known that there are more brown dwarf stars than bright stars. Some astronomers have recently realized that a planet orbiting such a star closely could be the place to look for life. But brown dwarfs, like all stars, are an electric discharge phenomenon. Their visible diameter, like that of enormous cometary comas, is an electric discharge phenomenon and much larger than the star's solid surface. So the fundamental mass-luminosity relation used to derive the mass, age and size of a star from the character of its light is inapplicable. The electrical nature of stars removes the foundation of stellar astrophysics!

However, a [binary pair of brown dwarfs](#) has been discovered, which allowed the determination of their masses and diameters by another method. The result was that "both dwarfs are remarkably large for their masses: about the same diameter as the Sun." That's about the same size as the coma of comet Holmes. Their masses were said to be 35 and 55 times Jupiter's mass. The Sun is about 1,000 times the mass of Jupiter, although mass is not a measure of the amount of matter in a body—another major spanner in the works for stellar astrophysics.

Brown dwarfs of that size are considered to be too small to initiate thermonuclear fusion. But that isn't so in an Electric Universe where all bodies receive electrical energy from the galactic circuit. For example, consider Jupiter as an independent body moving in the

galaxy inside its radiant plasma sheath (analogous to a cometary coma). It would be regarded as a brown dwarf star! And even if that glowing sphere were half the size of Jupiter's present magnetosphere, which is 10,300,000 km in diameter, all of Jupiter's large moons would orbit comfortably inside that cocoon.

I have noted the significance of this [earlier](#):

"Since an electric star is heated externally a planet need not be destroyed by orbiting beneath its anode glow. In fact life is not only possible inside the glow of a small brown dwarf, it seems far more likely than on a planet orbiting outside a star! This is because the radiant energy arriving on a planet orbiting inside a glowing sphere is evenly distributed over the entire surface of the planet. There are no seasons, no tropics and no ice-caps. A planet does not have to rotate, its axis can point in any direction and its orbit can be eccentric."

Such an arrangement is far more benign toward life than at present where the energy source, the Sun, subtends a small angle in the sky and the "habitable zone" of orbits is very narrow.

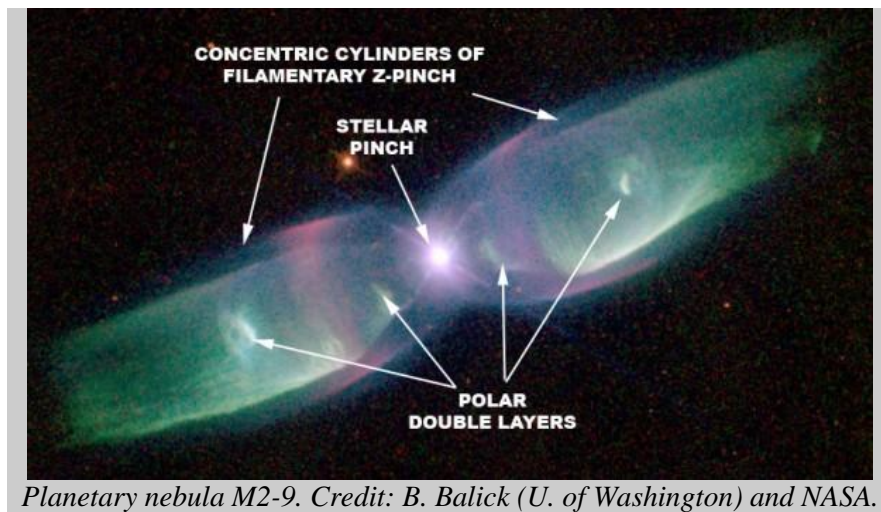
In our neighbourhood, there may be many more brown dwarfs than sun-like stars. They are difficult to detect since they glow mostly in infrared. A spectral class of "L" dwarfs, about one-tenth the mass of the Sun, has been found with an effective temperature of only 700K to 950K (about the same as the surface of Venus at 740K). This is way below the theoretical limit of 1750K for a nuclear powered dwarf star, while it is not a problem for the electric star model. The light from the "L" dwarfs is unaccountably bluer than expected and even exhibits X-rays! Only the electric model has a simple explanation for this conundrum. The higher energy radiation is emitted from the brown dwarf's electrical corona. Therefore the light bathing a satellite will be strongest at the blue and red ends of the spectrum. Skylight on any satellites would probably be a pale purple (see later—the classical "purple dawn of creation"). Photosynthesis relies on red light so plant life could flourish, especially when the atmospheres of the "L" dwarfs contain predominantly water molecules. Satellites would accumulate atmospheres and water would mist down.

Brown dwarfs are noted for their occasional inexplicable polar jets and "flaring." As explained in my electric stars article, stars that do not have bright, tufted photospheres do not have the power feedback control that maintains the steady radiant output of the Sun while the power input varies—as measured by x-rays and sunspot latitudinal migration. So any power surge on a brown dwarf will be met with polar jets and flaring behavior. We know from coronal mass ejections (CME's) on the Sun that this involves hurling matter into space.

Flaring would cause havoc on the satellites of a brown dwarf. In the extreme it would give birth to a new satellite. But existing satellites would suffer deposition of solids, liquids and gases and electric discharge machining of their surfaces. This is a scenario never considered by geologists but which explains all of the enigmas of planetary geology.

OK, let us assume that brown dwarfs and their satellites are the most hospitable places in the universe to establish life. That implies that the Earth was originally a satellite of a brown dwarf. That would explain many things, for example: where we got our water and oxygen atmosphere; why the high latitudes were so warm in the past that we find coal in Antarctica; how the Earth's gravity and atmosphere in the past could have been so different that it supported megafauna and megaflore; what caused the global mass extinctions with instant burial and fossilization; and so on.

But hang on, you say. What about the fact that gravitational capture is highly unlikely? That's true. But this is an Electric Universe. Each star, being an electrical body in a galactic discharge, will have a plasma sheath that limits the weak electric field between the star and the sheath. It is the Sun's heliosphere. The plasma sheath is a "double layer" where almost the entire voltage drop between the star and the galaxy will be found. The heliosphere is about 200 AU across. That's a big target! You could fit about 1,300 such targets between the nearest star and us. The size of this electrical target is important because it is the minimum distance at which the electrical "insulation" between two stars breaks down. I say "minimum" because the polar circuit of each star extends much, much further—as we see where the circuit has been "lit up" in a planetary nebulae.



This beautiful example of a "planetary nebula" shows the classic features of a plasma z-pinch. The current density in the Birkeland current filaments is sufficient to cause the plasma to enter "glow mode." The polar "circuit" is composed of concentric cylinders of parallel Birkeland current filaments. The polar double layers are regions of high electric field and radio "noise." The cylinders pinch down at the star in the characteristic hourglass shape.

So what I'm suggesting is quite radical—that all of the planets and moons in the solar system did not originate with the Sun, they were captured. Capture of a brown dwarf star begins when the plasma sheaths touch and they "see" each other electrically for the first time. The brown dwarf changes from being an anode in a galactic discharge to a cathode in the Sun's environment. The adjustment is drastic. The brown dwarf is no longer a star. It becomes the mother of all comets and subject to a [steady electrical acceleration](#) toward

the Sun. That acceleration will tend to cause the satellites of the brown dwarf to be dislodged from their orbits and, in a dynamic equilibrium, strung out behind in their primary's cometary wake. Since a comet's ion tail is a discharge current, the satellites will experience "mega auroras" and devastating interplanetary discharges to varying degrees.

As a cathode in the Sun's discharge, the brown dwarf will jet matter into space like a comet and lose electrons. This has the effect of reducing the gravity and apparent mass of the late star, which, in turn, modifies its orbit. Conservation of orbital energy requires that the cometary body moves in toward the Sun—in other words, it is captured. We see so-called "non-gravitational" acceleration to a small extent in modern comets. This lowering of the gravitational field of comets has given rise to the mistaken view that they are fluff balls. However they look like solid rock and they are solid rock. The effect on a captured brown dwarf is to turn it into a "low density" gas giant.

As the captured brown dwarf traverses the plane of the ecliptic, it encounters the current sheet of the solar wind. That may cause severe flaring and mass loss in the form of new cometary material. Even today, crossing the ecliptic plane is where comets are most likely to fragment. The enhanced electromagnetic forces encountered in the plane of the ecliptic may cause damped oscillations in and out of the plane until capture is complete. The presence of the newcomer is felt electrically by those planets that encounter its coma or cometary tail. Charge transfer occurs via the filamentary currents in the tail, which serves to space the orbits of both bodies until charge transfer is minimized. Circularization of orbits also occurs due to charge exchange with the solar wind until the voltage excursions in the Sun's weak radial electric field are minimized.

Trying to devise an evolutionary model of the solar system from a simple beginning is not going to work. The expert was almost right, we need a separate story for each of the gas giants. And we need to identify their scattered family members. The simplest approach is to match axial tilts because phase lock with the primary is normal for a satellite. And a spinning planet or moon behaves as a gyroscope and largely maintains its axial direction in inertial space even when disturbed. A disturbance manifests as precession of the spin axis.

For example, based upon other independent evidence, [Saturn, Earth and Mars were of one family](#). Their axial tilts are 26°44', 23°27', and 23°59' respectively. Saturn still has its ephemeral water-ice ejecta rings. And its calculated "density" is the lowest—less than water—a result of its recent severe discharge activity.

A final word about meteorites, comets and asteroids. They have nothing to do with the Sun. They are born at intervals from captured bodies in their cometary phase and during close electrical encounters between planets and moons in the process of capture and orbit stabilization. In 1988 I wrote that chondritic meteorites show all of the features to be expected of material that has been subjected to flash heating, acceleration, collision and ion implantation in a spatially restricted and compressed plasma stream, followed by sudden cooling. Isotopic modification by neutron bombardment and intense radiation are simply explained as the effects of a z-pinch plasma discharge. I predicted that the features

of the enigmatic chondrule shells could be reproduced in the lab in a plasma oven. That remains to be tested.

Planets do not collide.

Electrical forces and modification of orbits by charge exchange dominate in a close encounter. Mars bears the fresh electrical scars of its entry into the solar system with the mighty gash of [Valles Marineris](#) and the giant raised lightning blisters on the Tharsis bulge. An interplanetary discharge is the only way for Martian meteorites to have been launched into space.



It should be no surprise that this story of the formation of the solar system could not be constructed on a purely theoretical basis. It was wishful thinking that such a complex family could be explained with one simple story. We now have the technology in a select few laboratories to generate in miniature and record cosmic electrical discharges. It allows us to verify that prehistoric mankind cut into solid rock their view of the last spectacular and frightening chapter in the history of the solar system — the capture of Earth by the Sun. [Comparative mythologists](#) pointed the way by showing that the bedrock themes of mythology are universal and relate to memories of capricious planetary gods warring with thunderbolts in the heavens and wreaking destruction with them on Earth. It gives an unusual depth of meaning to the memory of "the purple dawn of creation." Prehistoric mankind witnessed the "creation" of a new order in the heavens — the assembly of planets we see today. The serendipitous breakthrough in understanding of petroglyphs and the motivation behind their production requires that this story be examined thoroughly in the light of discoveries from space.

Wal Thornhill

NASA's Dim View of Stars

Posted on [December 22, 2008](#) by [Wal Thornhill](#)

"..astronomers can tell the temperature of the central regions of the Sun and of many other stars within a few percentage points and be quite sure about the figures they quote."

—*A Star Called the Sun*, George Gamow.



The Cone Nebula is a column of dark dust, six light-years long, near some newly formed hot blue stars. The edge of the column, especially the tip, is bright with red light from ionized hydrogen. This nebula and the cluster that illuminates it are about 2600 light-years away in Monoceros. Credit: Michael Gariepy/Adam Block/NOAO/AURA/NSF.

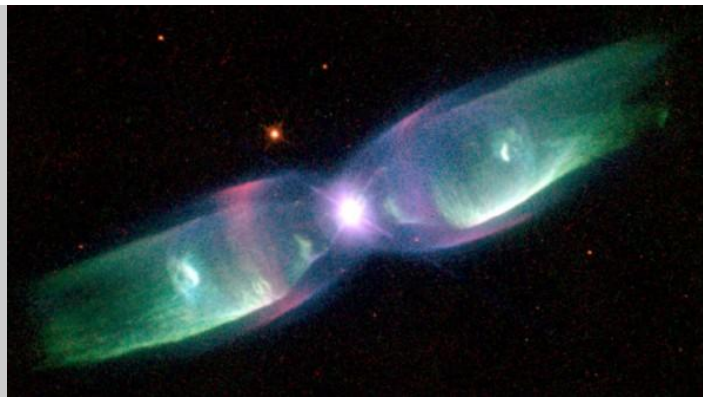
The cone nebula shows a star at the top of a conical-shaped dusty plasma, festooned with lights. The image strikes an instinctive chord—the mythical celestial world mountain around which the stars revolve; the cosmic (Christmas) tree with lights; fireworks displays against a night sky. Why? Because it reflects back to us our own prehistory when a strange drama was taking place in the sky. The Earth was enveloped in a towering polar auroral plasma, flashing with light and with bright celestial bodies at its distant focus. How do we know? Prehistoric mankind around the globe chiselled representations of what they saw into solid rock. The effort required was prodigious, the motivation extraordinary. Modern astronomy seems unable to address the issue, offering instead a comfortable myth of cosmic stability.

Twentieth century technologies have enabled astronomers to see the stars and planets ever more clearly, but their perceptions are clouded by centuries-old beliefs about celestial harmony; that the heat and light of stars is due to some kind of internal fire; that we understand gravity sufficiently to declare that it obeys a universal law and alone governs cosmic evolution. These perceptions have become dogma and dogma hinders progress. So it is not surprising that a growing number of critics see gravitational cosmology of the "Big Bang" as sterile and irrelevant to any real understanding of our place and history in the universe. The fact that it has nothing to say about life itself—the deepest mystery of the universe—is just one of countless signs that the present field of view is too limited.

For the moment I want to feature two reports in December that show astronomers do not understand stars. The view of stars as 'fires in the sky' was understandable when chemical fires were the only source of light that we knew & the only question we asked of stars was 'how do they shine? But that view failed when we realized that stars had to burn steadily for aeons. The discovery of nuclear energy offered an answer to this new question without having to re-evaluate the accumulation of other assumptions about stars.

The thermonuclear assumption was never proved, and observations that contradicted it were never crucial enough to compel astronomers to doubt it. It came full circle and led to a futile decades-long effort to mimic the conjectured process to provide power on the Earth. All the while, a clue to a better answer stared the experimenters and theoreticians in the face: they were using electricity to trigger thermonuclear reactions; maybe the Sun was doing that, too.

We use electricity as a convenient means of lighting and heating that doesn't require the power to be generated on site. We've discovered that thin transmission lines can carry great amounts of power over long distances from generator to light bulb. Nature is parsimonious in achieving its ends; why wouldn't stars get power from natural transmission lines? The satisfying answer is that they do. Radio astronomers can trace the telltale magnetic fields in deep space. The magnetic fields mark filamentary cosmic 'transmission lines' carrying electrical power between galaxies and stars.



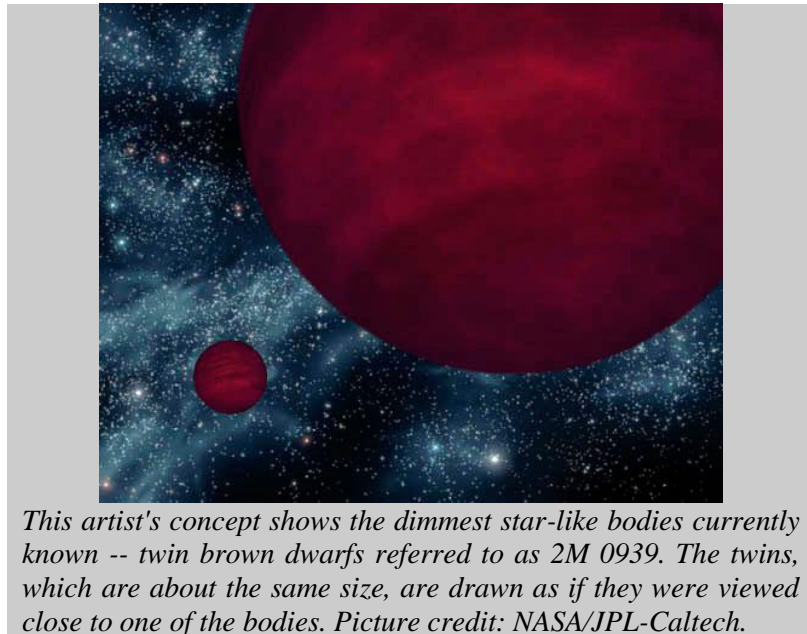
Planetary nebula M2-9. The complex Z-pinch hourglass shape of the external circuitry of a star becomes visible in a planetary nebula where the galactic power is high enough or the plasma is dusty. Gravitational models of stars fail to explain the fine detail of planetary nebulae.

NASA's Dim View of Stars

The latest [report from NASA](#) is a fitting end to [The Year of The Electric Universe](#). It demonstrates that the [electric model of stars](#) envisaged the latest observations while NASA researchers again mask their assumptions by stating them as facts. Ironically, the report refers to some stars as "low-energy fluorescent light bulbs."

As usual, all the science reporting agencies repeat NASA's words without critical comment. Mainstream media rarely do investigative science journalism. The NASA report follows, along with my comments.

Astronomers Find the Two Dimmest Stellar Bulbs



It's a tie! The new record-holder for dimmest known star-like object in the universe goes to twin "failed" stars, or brown dwarfs, each of which shines feebly with only one millionth the light of our sun.

Comment: As we shall see, the notion of "twin failed stars" is a theoretical assumption and not a fact!

In an Electric Universe there is no such thing as a "failed" star. They have no thermonuclear "engine" to fail. All bodies in the galaxy receive external electrical energy from the galactic circuit. Radio astronomers (for the most part unwittingly) trace the circuit by mapping the magnetic fields of galaxies and stars, which fields are generated by the electric current flowing in the circuit. The circuits are unrecognized due to the mistaken conviction that magnetic fields can be 'frozen in' to plasma. The 'father' of

plasma physics, Hannes Alfvén, appealed against this mistaken notion in his Nobel Prize acceptance speech in 1970. But to give up this false belief would require discarding decades of theoretical work and reputations built upon it.

The report continues:

Previously, astronomers thought the pair of dim bulbs was just one typical, faint brown dwarf with no record-smashing titles. But when NASA's Spitzer Space Telescope observed the brown dwarf with its heat-seeking infrared vision, it was able to accurately measure the object's extreme faintness and low temperature for the first time. What's more, the Spitzer data revealed the brown dwarf is, in fact, twins.

"Both of these objects are the first to break the barrier of one millionth the total light-emitting power of the sun," said Adam Burgasser of the Massachusetts Institute of Technology, Cambridge. Burgasser is lead author of a new paper about the discovery appearing in the Astrophysical Journal Letters.

Brown dwarfs are the misfits of the cosmos. They are compact balls of gas floating freely in space, but they are too cool and lightweight to be stars, and too warm and massive to be planets. The name "brown dwarf" comes from the fact that these small, star-like bodies change color over time as they cool, and thus have no definitive color. In reality, most brown dwarfs would appear reddish if they could be seen with the naked eye. Their feeble light output also means they are hard to find. The first brown dwarf wasn't discovered until 1995. While hundreds are known today, astronomers say there are many more in space still waiting to be discovered.

Comment: All stars are an electrical phenomenon. There are no "misfits" in an Electric Universe. All of the assumptions being heaped upon the meagre photons received from deep space merely serve, as usual, to force fit the data to the standard model of stars. The very name, brown "dwarf," assumes that these stars are "compact balls of gas floating freely in space."

In stark comparison, the electric model describes them as "huge" because the light from a star is a plasma discharge phenomenon with only a loose relationship to the physical size of the star and a strong dependence on the electrical environment. Brown dwarfs do not simply cool down over time and wink out. They are externally powered electric lights.

In [December 1999](#) I wrote:

"The apparent size and color of an electric star is an electrical phenomenon. If Jupiter's magnetosphere were lit up it would appear the size of the full Moon... The light of a red star is due to the distended anode glow of an electrically low-stressed star... Red Giants are a more visible and scaled-up example of what an L-type Brown Dwarf star might look like close-up."

The report continues:

Astronomers recently used Spitzer's ultrasensitive infrared vision to learn more about the object, which was still thought to be a solo brown dwarf. These data revealed a warm atmospheric temperature of 565 to 635 Kelvin (560 to 680 degrees Fahrenheit). While this is hundreds of degrees hotter than Jupiter, it's still downright cold as far as stars go. In fact, it is one of the coldest star-like bodies measured so far.

To calculate the object's brightness, the researchers had to first determine its distance from Earth. After three years of precise measurements with the Anglo-Australian Observatory in Australia, they concluded that the star is the fifth-closest known brown dwarf to us, 17 light-years away toward the constellation Antlia. This distance, together with Spitzer's measurements, told the astronomers the object was both cool and extremely dim.

But something was puzzling. The brightness of the object was twice what would be expected for a brown dwarf with its particular temperature. The solution? The object must have twice the surface area. In other words, it's twins, with each body shining only half as bright, and each with a mass of 30 to 40 times that of Jupiter. Both bodies are one million times fainter than the sun in total light, and at least one billion times fainter in visible light alone.

"These brown dwarfs are the lowest power stellar light bulbs in the sky that we know of," said Burgasser. "And like low-energy fluorescent light bulbs, they emit most of their light in a narrow range of wavelengths, in this case in the infrared."

Comment: Burgasser's description of brown dwarfs as "low-energy fluorescent light bulbs" is the closest he comes to the truth. Like fluorescent lights, brown dwarfs require electricity! And the solution to the problem is simple—a single red dwarf with a distended red anode-glow can provide the extra brightness without postulating an unlikely twin.

The report continues:

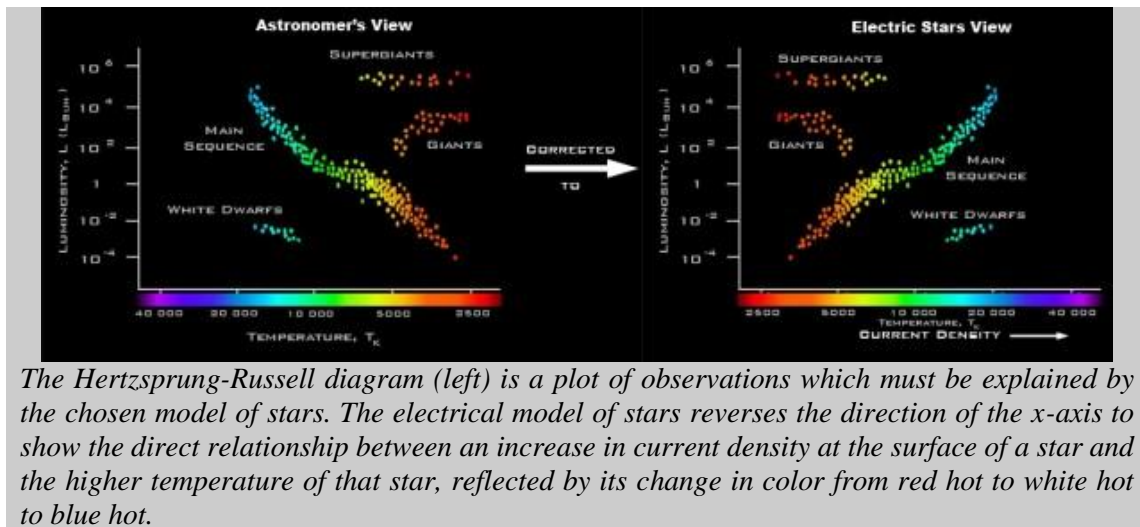
According to the authors, there are even dimmer brown dwarfs scattered throughout the universe, most too faint to see with current sky surveys. NASA's upcoming Wide-Field Infrared Survey Explorer mission will scan the entire sky at infrared wavelengths, and is expected to uncover hundreds of these inconspicuous characters.

"The holy grail in the study of brown dwarfs is to find out how low you can go in terms of temperature, mass and brightness," said Davy Kirkpatrick, a co-author of the paper at NASA's Infrared Processing and Analysis Center at the California Institute of Technology, Pasadena. "This will tell us more about how brown dwarfs form and evolve."

Comment: In an Electric Universe, stars do not evolve. The notion of stellar evolution and the age of stars is an invention of the standard thermonuclear model of stars. And for so long as scientists cling to an unworkable theory of stellar formation by gravitational accretion, new findings will serve only to add to the confusion.

I predict that further discoveries by the Wide-Field Infrared Survey Explorer in this category will require the same ad hoc assumption that the radiant surface area, based on standard theory, must be accommodated by multiple star systems. The odds against finding so many multiple systems will become astronomical.

Success for the Electrical Model of White Dwarf Stars



The Hertzsprung-Russell diagram (left) is a plot of observations which must be explained by the chosen model of stars. The electrical model of stars reverses the direction of the x-axis to show the direct relationship between an increase in current density at the surface of a star and the higher temperature of that star, reflected by its change in color from red hot to white hot to blue hot.

The main sequence is the backbone of the observations but there are sharp discontinuities between the main sequence, the giant stars and white dwarfs. In the standard thermonuclear model of stars, the explanations for these discontinuities are beset by many observational discrepancies and ad hoc patches.

In the electric star model such discontinuities are a natural feature of a plasma discharge. Main sequence stars operate like arc lights in a cinema projector. The plasma discharge at their photospheres is in arc mode. The main sequence is a direct result of increasing the current density at the surface of a star.

The white dwarfs operate more like fluorescent lights, where a fainter coronal glow-mode discharge provides the light. If you can imagine the Sun's bright photosphere being replaced by faint white coronal light, you have the picture. White 'dwarfs' are not dwarfs at all. They are faint, not because they are small but because they produce their light in a different mode of plasma discharge from stars like the Sun. The current density scale for white dwarfs is different to that of the main sequence and this is why they are scattered along a lower-luminosity sequence.

In the case of giant stars, the star's 'surface' is bloated like the glow of a neon light as the star seeks to satisfy its current requirements. The red light comes from a low current density at the large diameters of the (virtual) anode of these stars.

The stellar thermonuclear evolutionary story is that a star of intermediate mass (1-8 solar masses) terminates its life as an Earth-sized white dwarf after the exhaustion of its nuclear fuel. During the transition from a nuclear-burning star to the white dwarf stage, the star collapses to about one fiftieth of the solar radius and becomes very hot. Many such objects with surface temperatures around 100,000 Kelvin (K) are known. Theories of stellar evolution predict that these stars can be much hotter. However, the probability of catching them in such an extremely hot state is low, because this phase is short-lived.

An article was published on December 12 this year in *Astronomy & Astrophysics Letters* which claims to have discovered one of these white dwarfs, "*one of the hottest stars ever known with a temperature of 200,000 K at its surface.*" The temperature is deduced from the emission from nine-fold ionized calcium atoms thought to be in the star's photosphere. It is the highest ionization level of a chemical element ever discovered in a photospheric stellar spectrum.

The stellar atmosphere modelling of a white dwarf based on thermodynamic equilibrium will give erroneous conclusions because charged particles in an electric field will be dethermalized (their random motion reduced while their kinetic energy increases). So it is easy for a white dwarf to multiply ionize calcium atoms because the electrical energy required is equivalent to a mere 211 electron volts and not random thermal energy equal to a temperature of 200,000 to 300,000 K. Using thermal (mechanical) energy is the most difficult and unlikely way of explaining the data.

The white dwarf also challenges the standard stellar evolution concepts because it has a chemical surface composition rich in calcium and helium that is not predicted by stellar evolution models. A [paper in the Astrophysical Journal](#) of February 2005 shows the surprise and confusion created by this star. As usual, mechanical energy in the form of a supposed "shocked wind" is proposed as the origin of weak X-ray emission at 1 keV. And despite the almost infinite number of "knobs" available to twiddle on the standard model, a match with observations has not been reached.

The obstacle to an understanding of white dwarfs comes from using heat (mechanical energy) from within a star to explain highly energetic phenomena outside the star. It is precisely the difficulty encountered with the Sun and its phenomenally hot corona. The conceptual hurdle is exemplified by the paradigm set out in the introduction to the above paper:

*"The hot 106-107 K coroneae on the Sun and other late-type stars are **believed to be** sustained by mechanical energy in their outer convection zones, which is dissipated at the surface through the medium of magnetic fields generated and amplified by differential rotation and convection in the interior."*

[Emphasis added].

In other words, our present understanding of the Sun and therefore most other stars is based on this simple belief that to this day has not been verified. In this circumstance it would be scientifically responsible to question that belief when new data fails to satisfy predictions. As Eddington, the theoretician who gave us the standard model of stars, wrote of white dwarfs when first discovered:

"Strange objects, which persist in showing a type of spectrum entirely out of keeping with their luminosity, may ultimately teach us more than a host which radiates according to rule."

But beliefs are very difficult to shift.

In July this year I wrote:

"A white dwarf is a star that is under low electrical stress so that bright 'anode tufting' is not required. The star appears extremely hot, white and under-luminous because it is equivalent to having the faint white corona discharge of the Sun reach down to the star's atmosphere. As usual, a thin plasma sheath will be formed between the plasma of the star and the plasma of space. The electric field across the plasma sheath is capable of accelerating electrons to generate X-rays when they hit atoms in the atmosphere. And the power dissipated is capable of raising the temperature of a thin plasma layer to tens of thousands of degrees."

Of course, this model will need to be reviewed in the light of new data. But at least it is a new, quite different model that easily meets the basic observational fact of high-energy phenomena outside a star. The strong magnetic fields of some white dwarfs are diagnostic of external electric currents. The spectral line broadening indicates the presence of a strong electric field in the light-emitting region. The electrical energy focussed on the white dwarf is dissipated in an extensive, cool corona instead of a hot, arc-tufted photosphere.

So it is significant that the spectrum of the white dwarf in the cited paper was interpreted as *"evidence that the X-rays originated not from deeper atmospheric layers but from a coronal plasma encircling the star."* The white dwarf *"became the first white dwarf thought to have a corona, albeit a cool one."* The weak X-ray emission is attributed, in ad hoc fashion, to *"a shocked wind."* It's like a dentist using a jet engine to X-ray your teeth.

The presence of anomalies in the star's spectrum, both in the elements present and their state of ionization, is more accurately explained by the electrical model of stars, which have a cool core of heavy elements. The authors note:

"A coronal model requires a total luminosity more than two orders of magnitude larger than that of the star itself."

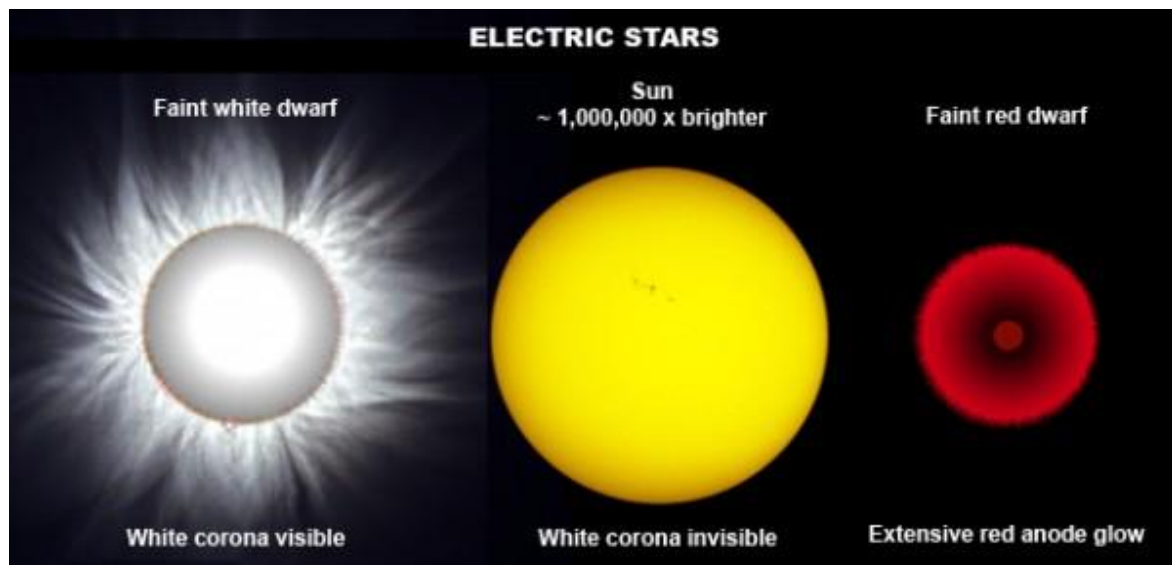
An electric white 'dwarf' emits light from both the corona and the thin, brighter plasma sheath that forms its photosphere.

An electric white dwarf is a far simpler model than the "collapsed degenerate stellar corpse" model. The star is not "dying." It has not evolved from another type of star. It is not an impossible object—a Sun squeezed to twice the diameter of the Earth. Stars cannot suffer gravitational collapse to a theoretical form of 'degenerate matter' that has never been observed—where atoms are squeezed together so strongly that only electrons in adjacent atoms prevent further collapse because they cannot share orbits. Just how far-fetched this notion is can be gauged if we consider that the electric repulsive force exceeds the gravitational force by 39 orders of magnitude!!

Subrahmanyan Chandrasekhar was awarded the [Nobel Prize in 1983](#) for his theoretical work on electron degenerate white dwarfs, which predicted the existence of a relationship between mass and radius for a degenerate white dwarf. This theoretical mass-radius relation is a generally accepted underlying assumption in nearly all studies of white dwarf properties. In turn, these studies, including the white dwarf mass distribution and luminosity function, are foundations for such varied fields as stellar evolution and galactic formation. The notion of stellar collapse led on to more extreme theoretical fictions—neutron stars and black holes. The damage wrought by such an assumption for our understanding of stars and the cosmos cannot be overstated! A recent paper in The Astrophysical Journal warned:

"One might assume that a theory as basic as stellar degeneracy rests on solid observational grounds, yet this is not the case. Comparison between observation and theory has shown disturbing discrepancies."

The paper cited here adds to the discrepancies.



In summary: nearby red and white stars that appear faint are not different to other stars. Red dwarfs are physically much smaller than the Sun but their visible glow discharge is large and of low current density and energy (red).

White 'dwarfs,' on the other hand, are physically larger than red dwarfs but generally smaller than the Sun. Lacking bright anode tufting they have an extended coronal type discharge and photosphere that emits faint whitish light, ultraviolet light and mild X-rays. The spectral lines are broadened, sometimes to the point of disappearance, due to the coronal electric field. This gives the misleading impression that hydrogen (whose spectral lines are smeared the most) is missing in many of these stars and that therefore they are remnants of larger stars that have lost or burned their hydrogen fuel.

Significantly, the larger the white dwarf, the lower the current density and the lower the apparent temperature. This trend has been noted with some puzzlement by researchers. White dwarfs the size of the Sun and a little larger are stars under lower electrical stress than normal. This may occur, for example, in binary star systems like that of Sirius, where one star usurps most of the available electrical energy.

There are no collapsed stars of extraordinary high density. The story of stellar evolution is fiction. The numbers of small red and white stars exceed the number of bright stars. They are formed in the same Z-pinch mechanism in dusty plasma as are all other stars. Or they may be born later by parturition (nova) of an unstable larger star. The economy and success of the Electric Universe model is readily apparent.

The Electric Universe paradigm continues its successful run of discovery and prediction in 2008

In January I declared 2008 The Year of the Electric Universe. And so it has proved to be. Confirming and supportive evidence arrives almost daily. Along with my associated [THUNDERBOLTS.INFO](http://thunderbolts.info) website we attract tens of thousands of visitors each month. This month set a new record. The scientific literacy of visitors is exceptionally high, and a consistent pattern has emerged, verified by hundreds of comments. When newcomers compare the direct evidence for the Electric Universe to conventional interpretations of the same data, offered here and in "[Thunderbolts Picture of the Day](#)," the conclusion becomes clear. We do indeed live in an Electric Universe.

The Thunderbolts Project is attracting volunteers and people wanting to undertake serious study to further their understanding of plasma and the Electric Universe. New books, [educational e-books](#) and videos are being produced and a Japanese version of Thunderbolts of the Gods is due to go on sale in that country early in the new year.

The future is bright in an Electric Universe!

Wal Thornhill

2009

Astronomy Has Little to Celebrate in 2009!

Posted on [January 15, 2009](#) by [Wal Thornhill](#)

For those who haven't noticed, this year is "[The International Year of Astronomy \(IYA2009\)](#)." The International Year of Astronomy will involve 135 nations and thousands of events around the world. It marks the celebration of the 400th anniversary of the first use of an astronomical telescope by Galileo Galilei.

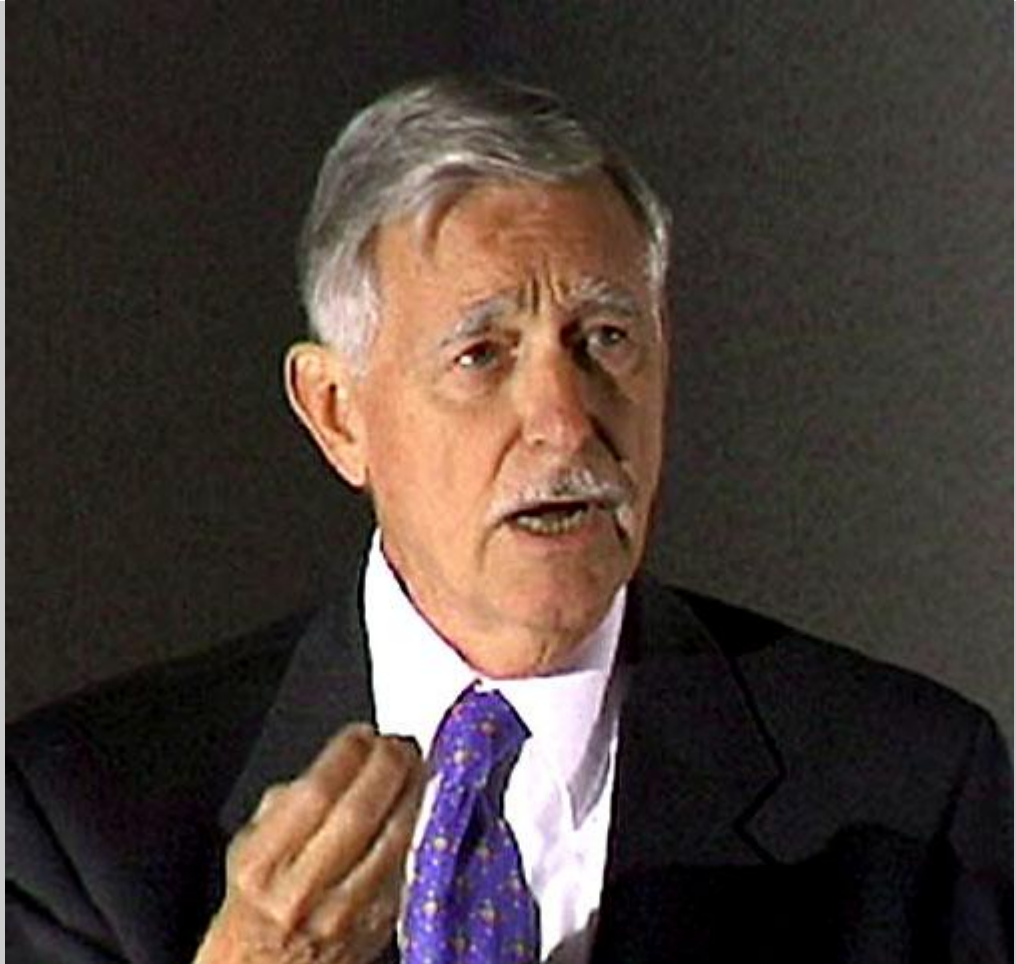


Galileo and the four large moons of Jupiter, which he discovered with his telescope. Portrait: by Justus Sustermans, painted in 1636. Jupiter and Galilean satellites: NASA/JPL.

However, astronomers have little to celebrate in 2009. They have usurped the role of the church and cast out a modern-day Galileo!

Astronomers are repeating the mistakes of the Roman Catholic Church in Galileo's day by refusing to accept what telescopes are showing them. The fear is the same — of

having cherished dogma swept away, and with it their authority. It seems to be the nature of authorities to nurture and perpetuate self-serving [myths](#).



*Halton "Chip" Arp addressing an interdisciplinary meeting in 2000. He is an American astronomer known for his 1966 *Atlas of Peculiar Galaxies*. He is also known as a critic of Big Bang mythology and for advocating a non-standard cosmology incorporating intrinsic redshift of quasars. Photo: W. Thornhill.*

[Dr. Halton Arp](#) is a modern 'Galileo,' in our midst. He was regarded in his early career as a leading young astronomer, but he made the poor career move of proving the Big Bang never happened. Like Galileo, he did this by diligent observation. He showed that Edwin Hubble's intuition about the nature of the universe was simple and correct:

"..if redshifts are not primarily velocity-shifts, the picture is simple and plausible. There is no evidence of expansion and no restriction of time-scale, no trace of spatial curvature, and no limitation of spatial dimensions."

— Edwin Hubble, *Observational Approach to Cosmology*, Oxford 1937.



Edwin Powell Hubble 1889—1953. In 1923 - 25 he identified Cepheid variables in "nebulae" and proved conclusively that they are outside the Galaxy, thus demonstrating that our galaxy is not the universe. Hubble measured distances to galaxies and in 1929 published the velocity-distance relation which, taken as evidence of an expanding Universe, is the basis of Big Bang cosmology

However, theoretical physics, since the time of Einstein, seems to have developed a penchant for religiosity (seeing "the face of God" in an equation or in the Cosmic Microwave Background radiation). We are expected to believe that which can't be detected. Meaningless terms and phrases (the fabric of space time, the Big Bang) punctuate a new secular catechism. And at the heart of modern cosmology is a miraculous creation story. The "theory" of the Big Bang is not science.

"Certain results of observational cosmology cast critical doubt on the foundations of standard cosmology but leave most cosmologists untroubled. Alternative cosmological models that differ from the Big Bang have been published and defended by heterodox scientists; however, most cosmologists do not heed these. This may be because standard theory is correct and all other ideas and criticisms are incorrect, but it is also to a great extent due to sociological phenomena such as the 'snowball effect' or 'groupthink'. We might wonder whether cosmology, the study of the Universe as a whole, is a science like other branches of physics or just a dominant ideology."

—Martin Lopez-Corredoira, astrophysicist.

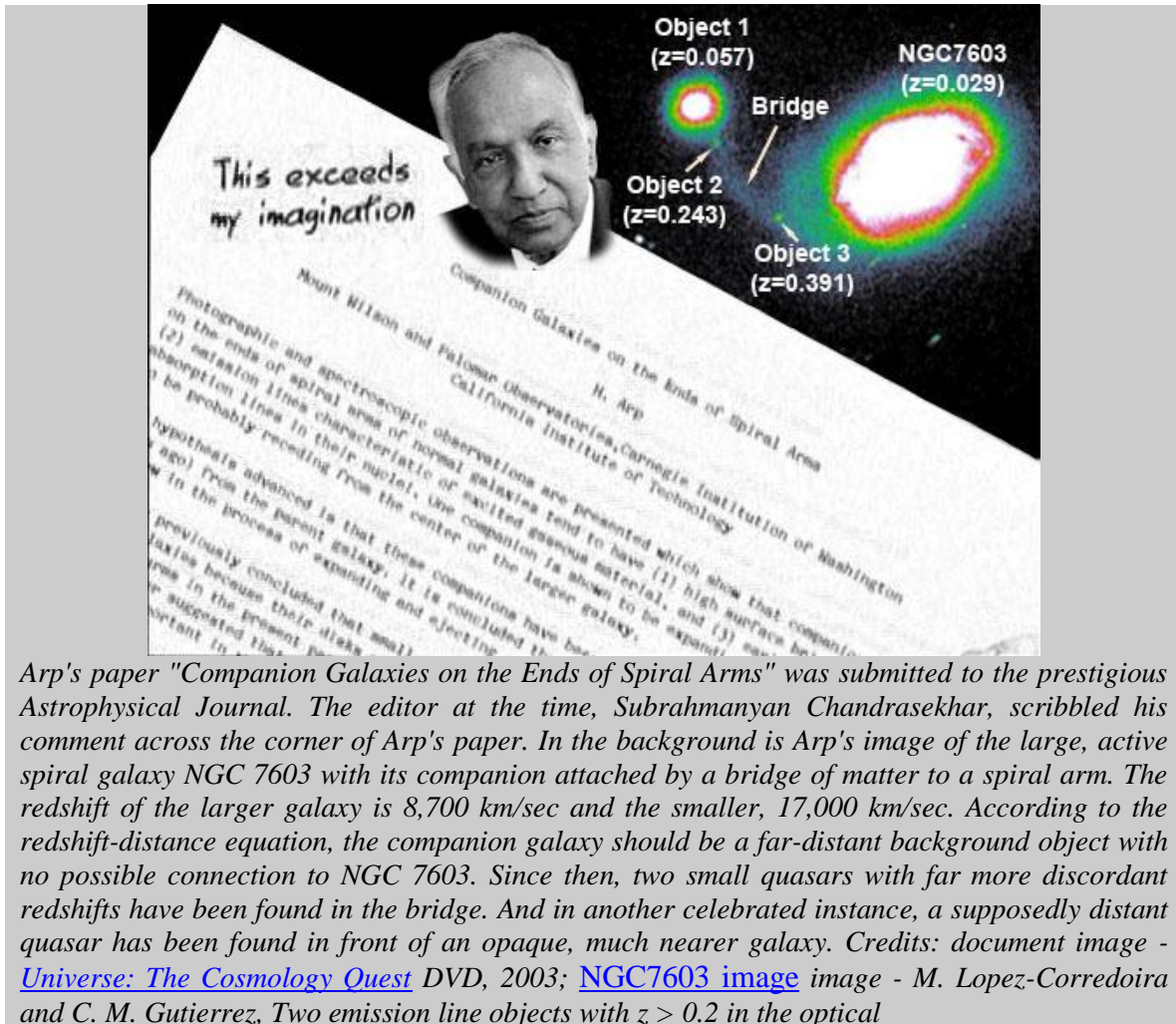
Astrophysicist Michael Disney writes in [The Case Against Cosmology](#):

"...the word 'cosmologist' should be expunged from the scientific dictionary and returned to the priesthood where it properly belongs."

But reassigning cosmology from the astronomical priesthood to the religious priesthood would solve nothing. They were never really separate. For example, physicists like Paul Davies, author of *God and the New Physics* and *The Mind of God*, receive the £1,000,000 [Templeton Prize](#). Until 2001 the name of the prize was Templeton Prize for Progress in Religion! The miraculous creation story of the Big Bang originated from the Belgian Roman Catholic priest and scientist [Monsignor Georges LeMaître](#). The Electric Universe argues that if we want real answers, cosmology should follow in the distinguished steps of the Scandinavians Kristian Birkeland and Hannes Alfvén and be in the practical hands of electrical engineers and plasma experimentalists—not mathematical theorists. And since the Electric Universe is an interdisciplinary synthesis including [human observations of the sky stretching back into prehistory](#), it uncovers the origin of astronomical priesthoods. Once that is assimilated into our collective consciousness we will have a basis for rational cosmology and spirituality.

Cosmology today, like that in Galileo's day, is a state-run enterprise. The outcome is the same—dominance of science, its politics and education, by a few dogmatic "cardinals" of science. So, despite technological marvels, astronomy in 2009 is in the grip of a modern "dark age," ironically reflected in physically meaningless terms like "dark matter," "dark energy," and "black holes." It is long overdue to turn on the electric light!

History Repeats Itself



Arp's paper "Companion Galaxies on the Ends of Spiral Arms" was submitted to the prestigious *Astrophysical Journal*. The editor at the time, Subrahmanyan Chandrasekhar, scribbled his comment across the corner of Arp's paper. In the background is Arp's image of the large, active spiral galaxy NGC 7603 with its companion attached by a bridge of matter to a spiral arm. The redshift of the larger galaxy is 8,700 km/sec and the smaller, 17,000 km/sec. According to the redshift-distance equation, the companion galaxy should be a far-distant background object with no possible connection to NGC 7603. Since then, two small quasars with far more discordant redshifts have been found in the bridge. And in another celebrated instance, a supposedly distant quasar has been found in front of an opaque, much nearer galaxy. Credits: document image - [Universe: The Cosmology Quest](#) DVD, 2003; [NGC7603 image](#) image - M. Lopez-Corredoira and C. M. Gutierrez, *Two emission line objects with $z > 0.2$ in the optical*

"When looking at this picture no amount of advanced academic education can substitute for good judgment; in fact it would undoubtedly be an impediment."
—Halton Arp, *Seeing Red*.

Chandrasekhar did not have the courtesy to send Arp's paper to independent referees. Clearly, "imagination" is Chandrasekhar's codeword for "belief" because Arp's observation of discordant redshifts of connected objects in deep space strikes at the belief in the redshift-distance assumption. Arp's observations show that the universe is, as Hubble thought, essentially static, ageless and infinite. **The miraculous big bang never occurred. Despite all the hubris and ballyhoo, we are ignorant of how the universe came into being.**

Chandrasekhar, described by Arp as "an incomprehensible theoretician," was awarded the Physics Nobel prize in 1983 for his whimsy on the gravitational collapse of stars. From this flight of mathematical fancy, based on a simplistic self-gravitating gas model of stars, has come a science fiction menagerie of neutron stars, quark stars, strange matter stars and black holes. Invalid, unintelligible theory is the foundation of modern gravitational cosmology, but it wins Nobel Prizes.

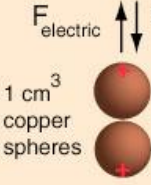
"The greatest mistake in my opinion, and the one we continually make, is to let the theory guide the model. After a ridiculously long time it has finally dawned on me that establishment scientists actually proceed on the belief that theories tell you what is true and not true!"

—Halton Arp, *Seeing Red*.

It is nonsense to believe that a star can collapse, given the ignorance of what an electric star is, and what gravity *really* is and how it relates to the electrical structure of matter. For reasons unknown, Nature has contrived to have the units of charge, positive and negative, carried by particles (the proton and electron respectively) whose gravitational mass differs by a factor of nearly 2,000 times. Out of this simple difference grows the wonderful complexity of plasma behavior and the Electric Universe. Amongst other things, it means that neutral matter in a gravitational field will exhibit electric dipole behavior that assists charge separation and resists gravitational collapse.

Electric Force vs. Gravitational Force

F_{electric}
 1 cm^3
 copper
 spheres



F_{gravity}
 Removal of one valence electron
 out of 5.7×10^{12} would provide
 enough net charge to lift the top
 sphere, overcoming the gravity
 of the entire Earth.

The enormous difference in strength of the electric force compared to gravity is shown in this example. Unfortunately, graduate students in astrophysics are taught that the attractive electric force between unlike charges is so huge that plasma in space must be charge neutral. Observation shows that this is only approximately so. The example above shows that even the smallest departure from charge neutrality can have significant effect! Diagram: Department of Physics & Astronomy, Georgia State University.

A choice is presented, as once before in the days of Copernicus, between a strangely small, finite universe and a sensibly infinite universe plus a new principle of nature.

—Edwin Hubble, conclusion of *The Problem of the Expanding Universe*.
American Scientist, Vol. 30, No. 2, April 1942.

There is no choice! The evidence that the universe is not expanding has been available for decades. Hubble's "new principle of nature" is not new. But it requires "letting go" of some things we "know" that simply aren't so. Quasars are not faint, their light redshifted and star-like, because they are very distant and moving rapidly away from us. Arp has shown that quasars are nascent galaxies, born from the central nucleus or 'womb' of nearby active galaxies. They are born at high velocity with faint and highly redshifted light. As they age, their brightness and mass increases, their intrinsic redshift decreases in quantum steps, and their velocity decreases until they become a companion galaxy of their parent.

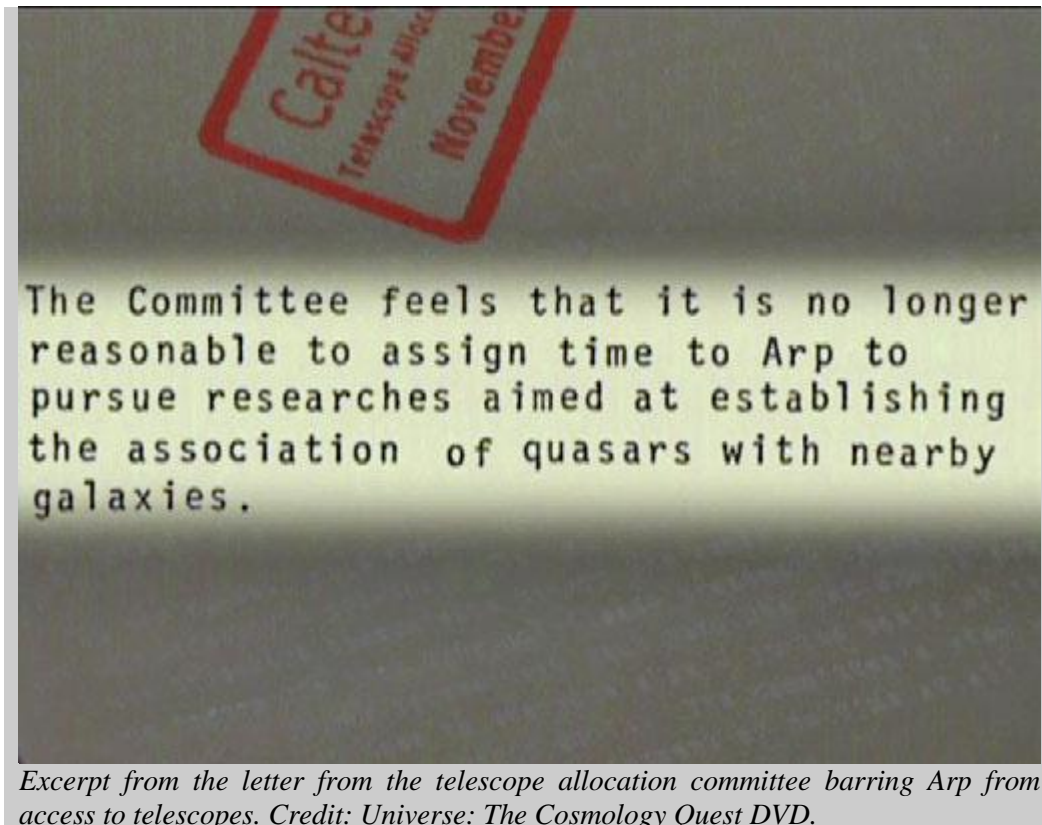
Intrinsic redshift is quite distinct from "tired light" or interaction with intervening particles. The decreasing *quantized* redshift of the light from a quasar shows that the quasar's increase in mass occurs resonantly at the subatomic particle level. (Einstein intuited correctly, I believe, that quantum behavior requires a resonant structure within subatomic particles). It throws into sharp relief how a belief that the masses of the proton and the electron are universally fixed can shackle progress. Yet such a belief has been allowed to flourish when there is no knowledge of the relationship of matter to mass. Homo sapiens sapiens proves to be homo sapiens ignoramus!

Luckily for progress there are always individual exceptions to this general observation about humanity. I consider that Arp's following remark will prove to be prescient:

"...if it turns out that mass is primarily a phenomenon of frequency, that means we might affect it by subtle wave and resonance interventions. If we live in a Machian universe, the atoms in our bodies are in communication with the far universe. If our matter was materialized from a previously diffuse state we carry the information of an enormously complex pattern that is somehow connected with everything else."

—Halton Arp, *Seeing Red*

In an Electric Universe we are not isolated, disconnected and alone.



Excerpt from the letter from the telescope allocation committee barring Arp from access to telescopes. Credit: Universe: The Cosmology Quest DVD.

Arp documents in his book *Seeing Red* that Sir Martin Rees upheld the sorry record of Astronomers Royal in actively denying and frustrating innovation.

"The observers come in now with the belief that we live in a big bang universe and therefore all of their ways of understanding things are tailored to that and they don't come in with the possibility that there are alternatives."

—Geoffrey Burbidge, *Universe: The Cosmology Quest DVD*.

A final word on this subject from Arp:

"One lesson from all of this, which seems obvious, is that scientists have to be absolutely honest and straightforward with the public, the people who are paying their salary. Their primary moral obligation is to report the facts and make available a range of interpretations. They have no paternalistic excuse to guard the public from 'misunderstandings' or 'alarm.' If they cannot explain a matter so that a non-specialist can understand it, they don't understand it themselves and should not cover up this important situation."

—Halton Arp, *Seeing Red*

Astronomy looks set to encounter more surprises and to publish more science fiction this year.

Meanwhile, the Electric Universe has plenty to celebrate in 2009.

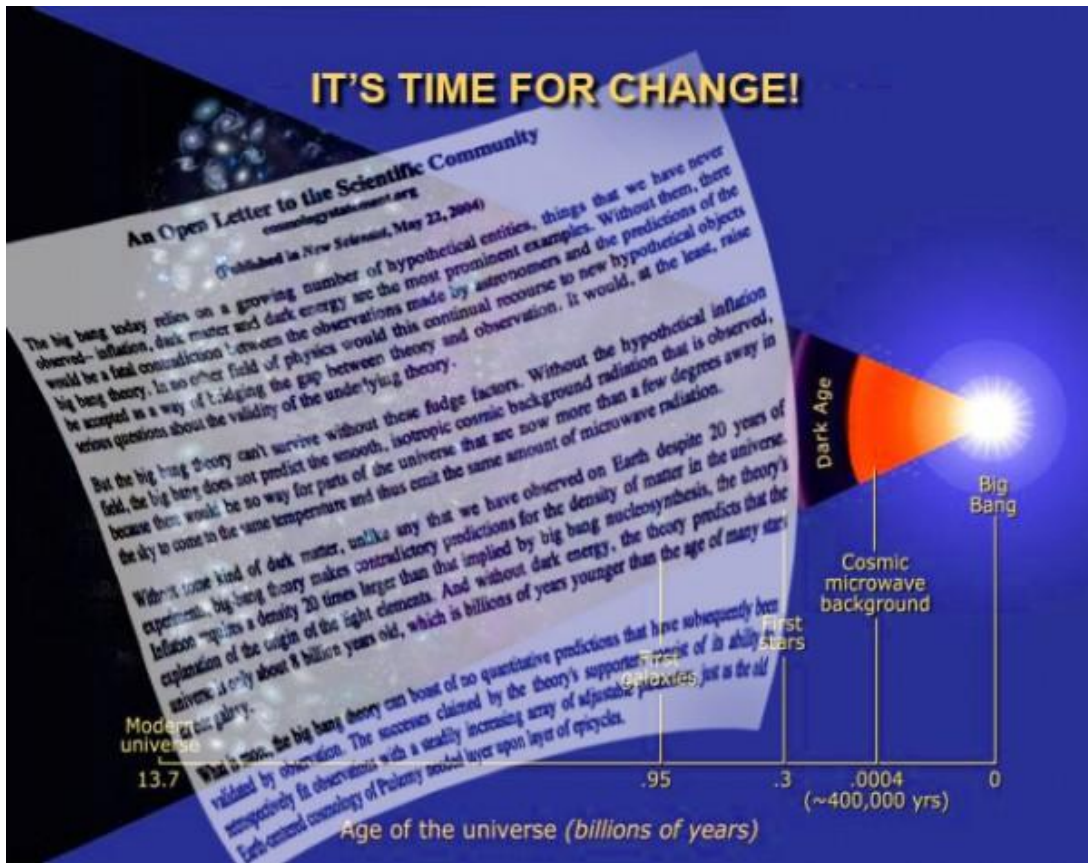
Wal Thornhill

It's Time for Change

Posted on [February 15, 2009](#) by [Wal Thornhill](#)

*But scientists, who ought to know
Assure us that it must be so.
Oh, let us never, never doubt
What nobody is sure about.
—Hilaire Belloc*

Tumultuous times like these encourage questioning of long-held convictions. Our predicament seems the result of complacent reliance on consensus and a failure of commonsense. But for adventurous, practical souls it is a time of opportunity—a time ripe for change.



The American people have voted for change in this time of financial and political turmoil. The world is seeking new answers and renewed confidence in their leaders. It is easy to forget that it is only a few months since there was blind faith in experts who were telling us that our global financial systems were sound. "Trust the economists, they are the experts." We give Nobel Prizes to such people and now find that their mathematical science doesn't apply to the real world. They, and we, have suffered a historic reality check.

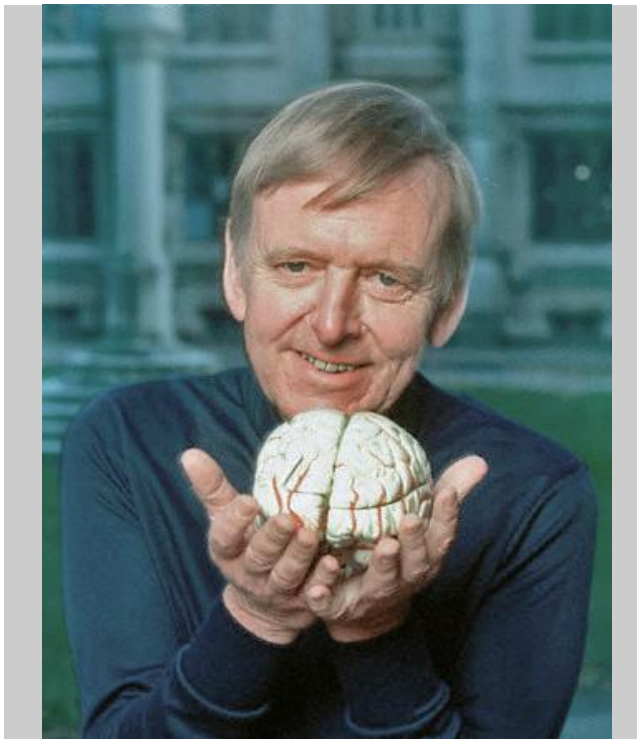
However, what is not readily accepted in this age of the "cult of the expert" is that the same problem applies to all the sciences. The training of experts is so narrow and specialized that, as George Bernard Shaw wrote:

"No man can be a pure specialist without being in the strict sense an idiot."

Perhaps that is why no university on this planet offers a course that seamlessly sews the specialties together into a broad interdisciplinary canvas. The pieces don't match up. The idiots cannot even converse!

This disconnect has allowed a surprising depth of ignorance to hide at the heart of our science. We have a gravitational cosmology that trumpets an understanding of the history of the universe back to the first nanosecond. Yet we do not understand gravity!! We have merely a mathematical *description of what it does* using words that have no real meaning—like "space-time" and an assumption of universality. Meanwhile the dismissal of the fundamental role of the powerful electric force in cosmology borders on pathological.

Entrenched science is constantly bolstered by sensational speculative announcements of "facts." But wildly imaginative constructs such as "dark matter," "dark energy" and "black holes" are fictitious, not factual. Notwithstanding, pronouncements about the big bang have become a quasi-religious ideology, or scientism.



*Dr. Julian Jaynes (1920-1997) is best known for his provocative book, *The Origin of Consciousness in the Breakdown of the Bicameral Mind*, a nominee for the National Book Award in 1978.*

"These scientisms, as I shall call them, are clusters of scientific ideas which come together and almost surprise themselves into creeds of belief, scientific mythologies.... And they share with religions many of their most obvious characteristics: a rational splendor that explains everything, a charismatic leader or succession of leaders who are highly visible and beyond criticism, certain gestures of idea and rituals of interpretation, and a requirement of total commitment. In return the adherent receives what the religions had once given him more universally: a world view, a hierarchy of importances, and an auguring place where he may find out what to do and think, in short, a total explanation of man. And this totality is obtained not by actually explaining everything, but by an encasement of its activity, a severe and absolute restriction of attention, such that everything that is not explained is not in view."

— Julian Jaynes, *The Origin of Consciousness in the Breakdown of the Bicameral Mind*.

It is an evident truism that history repeats itself. Why? One of the reasons is that historiography—the processes by which knowledge of the past, recent or distant, is obtained and transmitted—is not required reading in most university courses. Nor is epistemology, a branch of philosophy concerned with the nature and scope (limitations) of knowledge. What little historical understanding we are given tends to be distorted by a Darwinian perspective, which presents our present state as the culmination of a long upward struggle from ignorance into the light of understanding. Whereas, as Arthur Koestler characterized it:

"The revolutions in the history of science are successful escapes from blind alleys."

The blind alleys have become much longer and the escape more difficult since science became government-funded and institutionalised. Our universities have been tirelessly extending blind alleys for a century since the advent of "modern physics."

"As these institutions founder in metaphysical emptiness, their words as dead leaves, all the texts and icons are there in their midst, waiting to have life breathed back into them."

—John Carroll, *The Western Dreaming*.

As Carroll put it:

"A culture is its sacred stories."

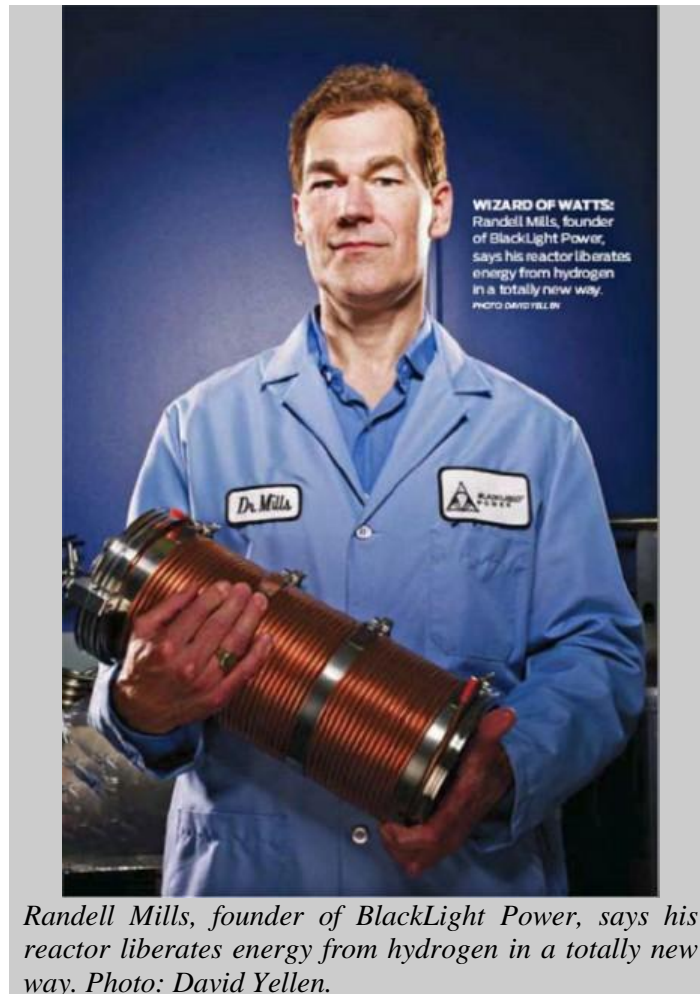
Our scientific culture has its sacred icons and stories. Bertrand Russell wrote of the increasing power of scientific experts and their "sacred stories" over the unscientific masses in his 1931 book *The Scientific Outlook*.

"..to obtain power over any given material, one need only understand the causal laws to which it is subject. This is an essentially abstract matter, and the more irrelevant details we can omit from our purview, the more powerful our thoughts will become. The same sort of thing can be illustrated in the economic sphere. The cultivator, who knows every corner of his farm, has a concrete knowledge of wheat, and makes very little money; the railway which carries his wheat views it in a slightly more abstract way, and makes rather more money; the Stock Exchange manipulator, who knows it only in its purely abstract aspect of something which may go up or down, is, in his way, as remote from concrete reality as the physicist, and he, of all those concerned in the economic sphere, makes the most money and has the most power. So it is with science, though the power which the man of science seeks is more remote and impersonal than that which is sought on the Stock Exchange."

See [*Scientific Technique and Power*](#).

The power of scientists may be remote and impersonal but its effect on us all has the potential to be more negative and long lasting than that of specialists on the global market. *"The scientific community has changed our life more in this [20th] century than any parliament, and yet it feels obliged to justify nothing,"* wrote J R Saul, in *Voltaire's Bastards*. A particular case highlights this problem in the important area of alternative energy sources.

Science History Repeats Itself



Randell Mills, founder of BlackLight Power, says his reactor liberates energy from hydrogen in a totally new way. Photo: David Yellen.

The Institute of Electrical and Electronic Engineers (IEEE) publishes a monthly news magazine, Spectrum. The January 2009 issue has a Special Report: Winners & Losers 2009, The Year's Best and Worst of Technology. There is an article by Erico Guizzo about an alternative energy company, BlackLight Power, and its founder Randell Mills, which deems their technology to be a loser. Why? The subtitle of the article says it all:

"Blacklight Power Says It's Developing A Revolutionary Energy Source—And It Won't Let The Laws Of Physics Stand In Its Way."

The belief that the laws of physics are immutable seems quite peculiar to physicists who draw up the laws. It is a mistake that real natural philosophers would not make. All "laws" are man-made and subject to modification on the basis of new evidence. Also the oft-heard statement that something "defies the laws of physics" makes the arrogant assumption that the speaker knows beyond any doubt which laws of physics apply in a

given real-life situation and that their realm of applicability is not exceeded. It is no use applying Young's modulus to a spring after the spring is stretched beyond breaking point.

In the case of BlackLight Power, Randell Mills claims to have been able to extract energy from the hydrogen atom in a catalytic reaction with a heavy metal that drops the electron closer to the nucleus (proton) than the lowest (so-called ground state) Bohr orbit. Such a fractional Bohr orbit change releases one hundred times as much energy (in the ultraviolet—hence the name "black light") as simply burning hydrogen can achieve. If proven, the process promises a clean, cheap, unlimited power source.

Guizzo writes:

"Last year BlackLight announced that it had a prototype reactor capable of putting out 50 kilowatts of thermal power using a tiny amount of hydrogen. The company said that the device releases energy in one short burst and that it's working to make the reaction continuous. It also said it planned to scale up for pilot operation sometime this year, estimating that its technology could produce electricity for under 2 cents per kilowatt hour. That's on a par with nuclear and coal power plants and considerably better than gas and petroleum plants.

Is this real, or just fodder for a science fiction TV show?

Ask experts in atomic physics and you'll hear that a new form of hydrogen is just fantasy.

"This is scientific nonsense—there is no state of hydrogen lower than the ground state," says Wolfgang Ketterle, an MIT scientist and a Nobel Prize laureate in physics. "Hydrogen is the most abundant element in the universe, and it's had time enough to find its ground state."

Anthony Leggett, a professor of physics at the University of Illinois at Urbana Champaign and also a Nobel laureate, says that quantum mechanics is "consistent with just about everything we know about atomic physics, so the onus is firmly on anyone who wants to discard it to prove his case." He adds, "I don't see that [Blacklight] has got anywhere near doing this."

As the Russian crystallographer Alexander I. Kitaigorodskii observed:

"A first rate theory predicts, a second rate theory forbids and a third rate theory explains after the fact."

Quantum theory doesn't explain anything; it certainly forbids; and its predictions are trivially successful. Some experimental results are dubbed "spooky." This does not suggest an immutable "law of physics."

"I am convinced that quantum mechanics is not a final theory. I believe this because I have never encountered an interpretation of the present formulation of quantum mechanics that makes sense to me. I have studied most of them in depth and thought hard about them, and in the end I still can't make real sense of quantum theory as it stands."

—Lee Smolin.

Quantum mechanics provides a mathematical recipe for what happens in the hydrogen atom but without any real understanding of cause. To suggest that the recipe forbids a new form of cookery is poppycock. To believe that theory can dictate what is real and what is not is a [logical] fallacy. It matters not one jot whether Randell Mills' theory is correct or not. He has been able to demonstrate to the satisfaction of the US Patent Office and scientific observers that his process works.

From an Electric Universe perspective Mills' process makes sense. Electron orbits are simply resonant states in which the transfer of energy between each electron and the nucleus sums to zero over each orbit. It seems that Mills has been able to drop the electron to a new stable orbit closer to the nucleus by resonant catalysis using atoms of a heavy metal, which has myriad resonances. Ketterle's objection that hydrogen has *"had time enough to find its ground state"* is irrelevant because we are not talking about isolated hydrogen atoms. It is merely an assumption to define a ground state of hydrogen until we have observed the behavior of hydrogen in all possible environments and under all possible conditions. The Nobel Laureates complain too loudly, deflecting attention from the logical and scientific fallacies in their own argument. It is they who are talking "scientific nonsense."

"...physics is now faced with a crisis in which it is generally admitted that further changes will have to take place, which will probably be as revolutionary compared to relativity and the quantum theory as these theories are compared to classical physics."

—David Bohm, *Causality and Chance in Modern Physics*.

Not so. This is a Darwinian view. **The only revolution required is a half turn and that we back out of these blind alleys and return to classical physics.**

Guizzo's article continues:

"BlackLight's current prototype reactor consists of a steel cylinder containing 1 kilogram of an industrial chemical called Raney nickel—a powdery, porous nickel aluminum alloy that traps hydrogen gas—coated with a few grams of sodium hydroxide. According to Mills, when you raise the cylinder's temperature, the reactants form sodium hydride. This material acts as a catalyst, absorbing just the right amount of energy— a multiple of 27.2 electron volts— to produce sodium

ions and hydrinos [hydrogen atoms in a fractional Bohr ground state] while generating lots of heat.

The company reports that after an input of 1396 kilojoules, it obtained an output of 2149.1-kJ a 753.1 kJ difference that raised the temperature of the reactor from 85.6 to 518°C in just 35 seconds. Then, according to Mills, comes the best part: if you inject more hydrogen into the reactor, it will combine with the sodium atoms and regenerate the sodium hydride catalyst which then produces more hydrinos and energy. To obtain the additional hydrogen, Mills says, a fraction of the output energy could be diverted to electrolyze water. "A billion watt power plant would consume about 1 liter of water per second," he says.

Mills also claims that the hydrinos, far from being mere waste products, will themselves constitute a pot of gold. Hydrino compounds, he says, have unique properties and could be used in semiconductor devices, high voltage batteries, synthetic diamonds, anticorrosive coatings, and rocket fuel.

This past October, BlackLight announced the "independent validation" of its solid fuel reactor by a group led by Peter Jansson, a professor of engineering at Rowan University, in Glassboro, N.J. The Rowan group performed its own experiments and reported that the significant energy release could not be explained by "conventional chemistry" and may support BlackLight's claim that it has found a novel technology for producing energy.

In a statement after the report was issued, Michael H. Jordan, formerly of Westinghouse Electric and a board member of BlackLight, said that the company's technology "will go down as one of the most important advances in the field of energy in the last 50 years."

However, critics have tended to gag at this unpalatable (for them professionally) news and to adopt a pseudoskeptical stance, for example to discredit rather than to investigate, by implying collusion between Mills and Jansson and calling into question the accuracy of the calorimetry measurements of energy output.

"Why is it that experts can sometimes be so entirely wrong, and yet so emphatic in their convictions? My own belief is that some of the reason lies in the success of "principles of impotence," particularly in modern physics. Somehow it seems part of the scientific approach to postulate impotence."

—R V Jones, *The Scientific Intelligencer*

Bohr and those who followed him simply adopted the "principle of impotence" in defining the "ground state" of the hydrogen atom. It is no basis for emphatic denial of Randell Mills' work.

A Time for Change in Science Education

President Obama has made science a priority issue under his administration. But given the arcane politics of government-funded science, the great danger is that it will be like the cynical rendition of the appellation "PhD"—merely "piled higher and deeper." As this article highlights, the place to look for real innovation is often outside academia. Some way needs to be found to provide [funding for the mavericks of science](#) because they will get no votes from governmental funding agencies. And for real change we need to fundamentally change the way science is taught at all levels, both secondary and tertiary.



Bruce Alberts, Editor-in-Chief of Science

In the January 23 issue of *Science* Bruce Alberts writes:

"Rather than learning how to think scientifically, students are generally being told about science and asked to remember facts."

"Their science teachers failed to make it clear that science fundamentally depends on evidence that can be logically and independently verified; instead, they taught science as if it were a form of revealed truth from scientists."

This attitude carries over into the way scientists report their findings and the supine attitude of the media.

Alberts remarks:

"Most shocking to me is the finding that many college-educated adults in the United States see no difference between scientific and non-scientific explanations of natural phenomena such as evolution."

But more shocking is the realization that Alberts and most scientists don't recognize the distinction either. Alberts seems unaware that there is no scientific explanation for the fossil record of speciation. Darwin's theory of "survival of the fittest" provides no mechanism that generates discrete yet interdependent organisms. Darwinists have no idea what the "spark" is that brings matter to life or what symbiotic resonances are behind organisms' adaptation to their environments.

Many other "scientific facts" like "black holes" and the "big bang" are merely flawed mathematical constructs. They have not been observed. Teachers and students should be conscious that mathematics operates in a "virtual reality" and is not to be confused with science, which relies on real-world observation, measurement and experiment.

Mathematics describes behavior, it doesn't explain. To make matters worse, mathematicians routinely demonstrate confusion and lack of rigor in their use of language when defining mathematical terms.

"I have no reason to believe that the human intellect is able to weave a system of physics out of its own resources without experimental labor. Whenever the attempt has been made it has resulted in an unnatural and self-contradictory mass of rubbish."

—Basil Mahon, *The Man Who Changed Everything: The Life of James Clerk Maxwell*

So in science curricula the emphasis should not be on "facts" but on clear thinking and skepticism, along with the history of key scientific debates and the philosophy of science. But the most important lesson is that the basic mysteries remain. And it is the many mysteries that can motivate students and the public to take an active interest in science again. As the biologist Rupert Sheldrake has remarked:

"By giving up the pretence that the ultimate answers are already known, the sciences will be freer—and more fun."

I agree. It is time for change and more fun!

Wal Thornhill

The Black Hole at the Heart of Astronomy

Posted on [March 28, 2009](#) by [Wal Thornhill](#)

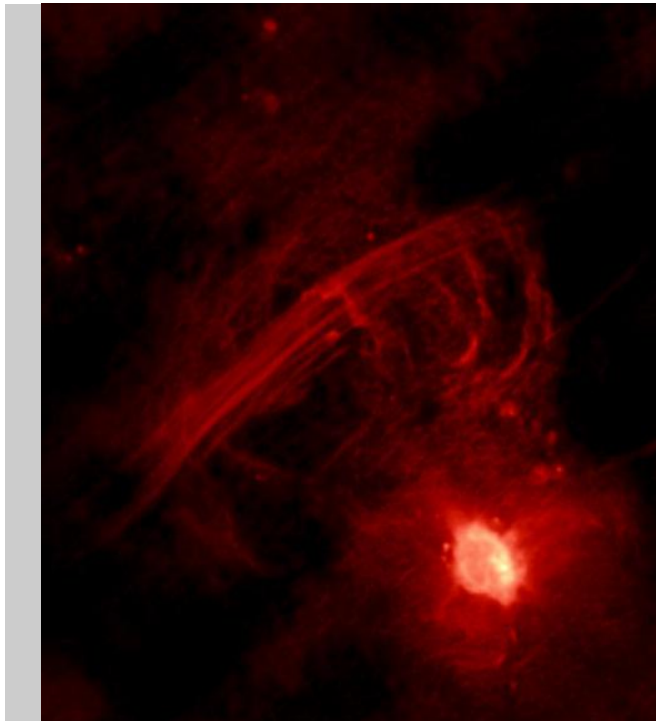
"Astronomical fads have always involved miracle working to some degree, and their discussion in so-called workshops and in the streams of papers that pour into the journals have affinities to the incantations of Macbeth's witches on the blasted heath."

—Fred Hoyle, *Home is where the wind blows*.

The so-called "queen" of the sciences, cosmology, is founded upon the myth that the weakest force in the universe—gravity—is responsible for forming and shaping galaxies, stars and planets. But even if this were true, gravity remains unexplained. How it works is a mystery.

Newton gave us a mathematical description of what gravity does. Einstein invoked an unreal geometry to do the same thing. Newton had the sense to "frame no hypotheses" about how gravity worked. Einstein made it impossible to relate cause and effect—which means that the theory of general relativity is not physics! How, precisely, does matter warp empty space? The language is meaningless. But this hasn't stopped scientists declaring a law of gravitation with a 'universal' physical constant—'G.'

For many years now, astronomers have been reporting that supermassive black holes — several million times the mass of the Sun — exist in nearly every galaxy.



This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies.

*Picture credit:
NASA/JPL-Caltech.*

This image, taken by the Very Large Array of ground based telescopes at radio wavelengths, shows a bright source at the centre of the Milky Way that is thought to surround a black hole. From observations of stars in orbit around the Galactic Center it is concluded that there is indeed a supermassive black hole in this region, approximately 4,000,000 times the mass of the Sun. The structure known as the Galactic Centre Radio Arc (upper left) is described as "hot plasma flowing along lines of magnetic field."

The thoughtless followers of Einstein have fashioned God in their own image as a mathematician but "He" is much smarter and avoids high school howlers like the gravitational "black hole." Yes, a theoretical "black hole" exists—and it sucks the very heart out of astronomy and astrophysics. The astronomer Halton Arp articulated the math howler of dividing by zero to give a near infinite concentration of mass in a hypothetical black hole:

"Since the force of gravity varies as the square of the inverse distance between objects why not make the ultimate extrapolation and let the distance go to zero? You get a LOT of density. Maybe it goes BOOM! But wait a minute, maybe it goes in the opposite direction and goes MOOB! Whatever. Most astronomers decided anyway that this was the only source that could explain the observed jets and explosions in galaxies."

Precisely! And when the gravitational force is as close to zero as doesn't matter, in comparison to the electric force, you must be very careful (as any high school student knows) to not divide by zero, otherwise you introduce infinities. What does it mean for the radius of a physical object to tend to zero?

In the face of discordant data, a scientist is required to check the original works and assumptions that lead to the theory under test. But there are very few such scientists in this modern age. As Sir Fred Hoyle put it, today the pressure is on to "*do what aging gurus tell them to do, which is nothing*" and simply build on the consensus those gurus have established. A fellow Australian, Stephen Crothers, has shown mathematical theorists to be remarkably unintelligent and sloppy in the application of their talent to physical problems. It seems that most of them don't really follow the mathematical arguments anyway (which is not surprising) but are happy to extol the results of others, based on reputation, regardless of the principles of physics or commonsense. Crothers has done his historical and mathematical homework and delivered a paper, The Schwarzschild solution and its implications for gravitational waves, at the Conference of the German Physical Society, Munich, March 9-13, 2009. He concludes, *inter alia*, that:

- "Schwarzschild's solution" is not Schwarzschild's solution. Schwarzschild's actual solution does not predict black holes. The quantity 'r' appearing in the so-called "Schwarzschild solution" is not a distance of any kind. This simple fact completely subverts all claims for black holes.
- Despite claims for discovery of black holes, nobody has ever found a black hole; no infinitely dense point-mass singularity and no event horizon have ever been

- found. There is no physical evidence for the existence of infinitely dense point-masses.
- It takes an infinite amount of observer time to verify the presence of an event horizon, but nobody has been and nobody will be around for an infinite amount of time. No observer, no observing instruments, no photons, no matter can be present in a spacetime that by construction contains no matter.
 - The black hole is fictitious and so there are no black hole generated gravitational waves. The international search for black holes and their gravitational waves is ill-fated.
 - The Michell-Laplace dark body is not a black hole. Newton's theory of gravitation does not predict black holes. General Relativity does not predict black holes. Black holes were spawned by (incorrect) theory, not by observation. The search for black holes is destined to find none.
 - No celestial body has ever been observed to undergo irresistible gravitational collapse. There is no laboratory evidence for irresistible gravitational collapse. Infinitely dense point-mass singularities howsoever formed cannot be reconciled with Special Relativity, i.e. they violate Special Relativity, and therefore violate General Relativity.
 - General Relativity cannot account for the simple experimental fact that two fixed bodies will approach one another upon release. There are no known solutions to Einstein's field equations for two or more masses and there is no existence theorem by which it can even be asserted that his field equations contain latent solutions for such configurations of matter. All claims for black hole interactions are invalid.
 - Einstein's gravitational waves are fictitious; Einstein's gravitational energy cannot be localised; so the international search for Einstein's gravitational waves is destined to detect nothing. No gravitational waves have been detected.
 - Einstein's field equations violate the experimentally well-established usual conservation of energy and momentum, and therefore violate the experimental evidence.

In an audience of theoretical physicists there was stunned silence—and not a single question.

A final official word on black holes from the Astronomer Royal who follows an unenviable tradition of holders of that office being completely wrong and retarding progress:

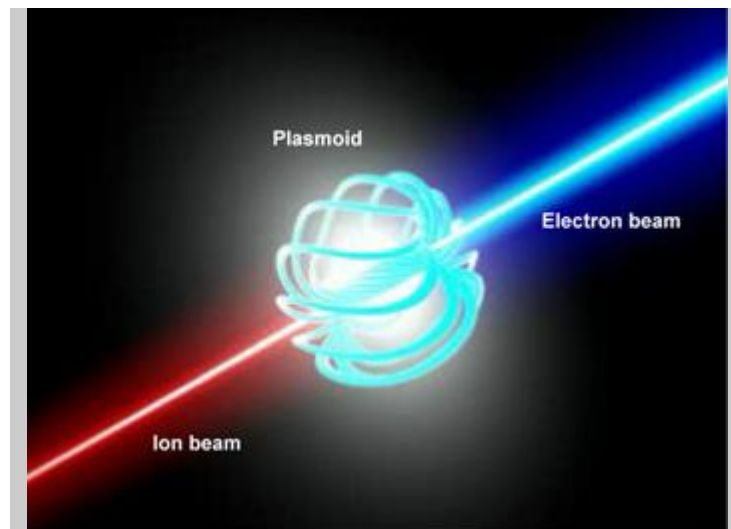
"Black holes, the most remarkable consequences of Einstein's theory, are not just theoretical constructs. There are huge numbers of them in our Galaxy and in every other galaxy, each being the remnant of a star and weighing several times as much as the Sun. There are much larger ones, too, in the centers of galaxies. Near our own galactic center, stars are orbiting ten times faster than their normal speeds within a galaxy."

—Martin Rees, *Our Cosmic Habitat* (2001).

Electric Galaxies have Electromagnetic Hearts

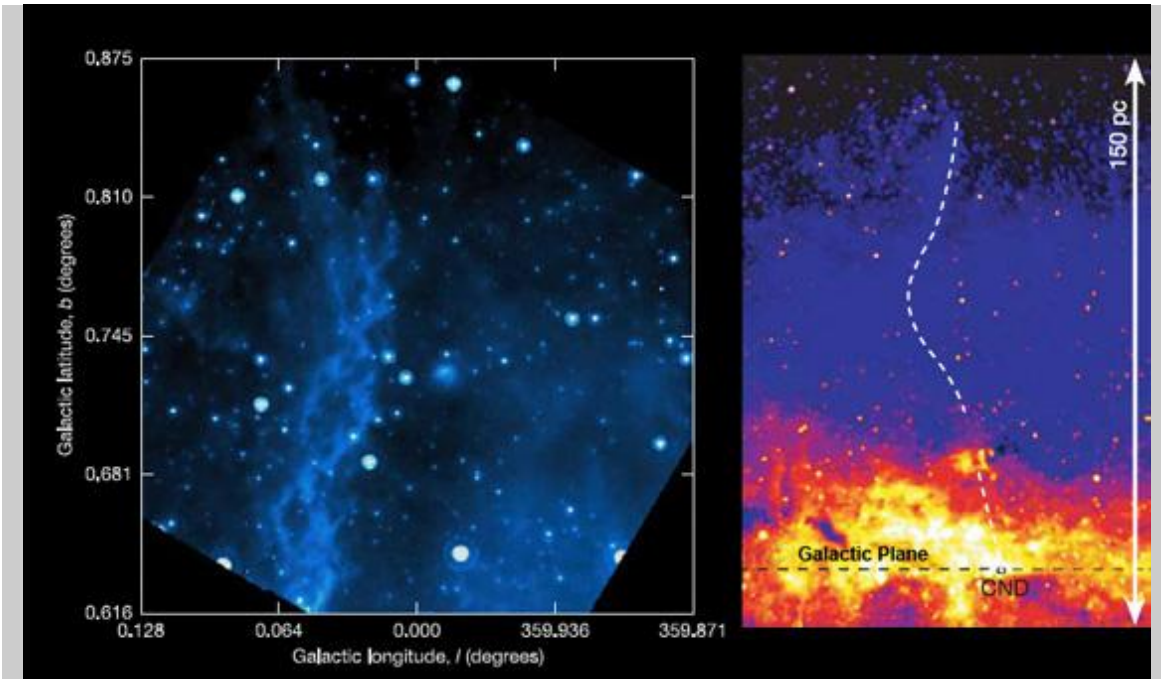
The question for the Electric Universe is therefore: If black holes don't exist, how do we explain recent observations at the center of our own Milky Way?

The well-established study of plasma cosmology shows that [galaxies are an electrical phenomenon](#). It has been found that filaments, arcs, and shells characterize the small-scale structure of molecular gas in the Galactic Center. They are all well-documented electrodynamic plasma configurations. A single charged particle in 10,000 neutral gas molecules is sufficient to have the gas behave as plasma, where electromagnetic forces dominate. Conventional theorists admit to *"no plausible explanations either for the origin of the complex kinematics or for most of the peculiar features."* In May last year I described the plasma focus phenomenon generated at the Galactic Center by filamentary helical "Birkeland" currents flowing in along the spiral arms and out along the galactic spin axis.



This image shows the form of the plasmoid at the center of the galaxy (and the particle jets created when the magnetic field begins to collapse). Image credit: E. Lerner.

A [letter to Nature](#) provides supporting evidence for that model in the form of the infrared "double helix" nebula. The nebula is located about 100 parsecs from the Galactic Center. Its axis is oriented perpendicular to the Galactic plane and is apparently connected to the circum-nuclear disk (CND), which is conventionally thought to be an accretion disk harboring a "supermassive" black hole.



The 80 light-year long Double Helix Nebula (DHN) observed in infrared with the MIPS camera on the Spitzer Space Telescope. The spatial resolution is 6 arcsec. On the right we see the context of the DHN with respect to the Galactic plane taken with the MSX satellite. The spatial resolution is 20 arcsec. The relative locations and sizes of the nebula, the circumnuclear disk (CND), and the proposed channel linking them, are all shown. Credit: M. Morris et al., UCLA.

The double helix is the characteristic form of a Birkeland current filament. Like the filaments in the Galactic Center Radio Arc in the first image, it is a glowing section of the electric circuit connecting the central plasmoid to the galaxy and beyond. The CND is typical of a dusty plasma ring current circulating around a magnetized celestial object. There is no gravitational or dynamical explanation for the twin helical filaments. It has no place in black hole theory. The metaphors and language used in the scientific report are wrong and misleading. The title of the report alone highlights the problem:

"A magnetic torsional wave near the Galactic Centre traced by a 'double helix' nebula."

As usual, there is no explanation for the presence of the magnetic field (which requires an electric current and circuit) or the source of the imagined "torsional wave." The authors admit:

"The absence of a negative-latitude counterpart is another potential weakness of the torsional wave hypothesis, inasmuch as such waves should propagate equally in both directions away from the driving disk, if that disk is symmetric about its midplane" and "One question that our hypothesis leaves unanswered is why the helical structure has two strands."

Researchers also report:

"the magnetic field in the central few hundred parsecs of the Milky Way has a dipolar geometry and is substantially stronger than elsewhere in the Galaxy."

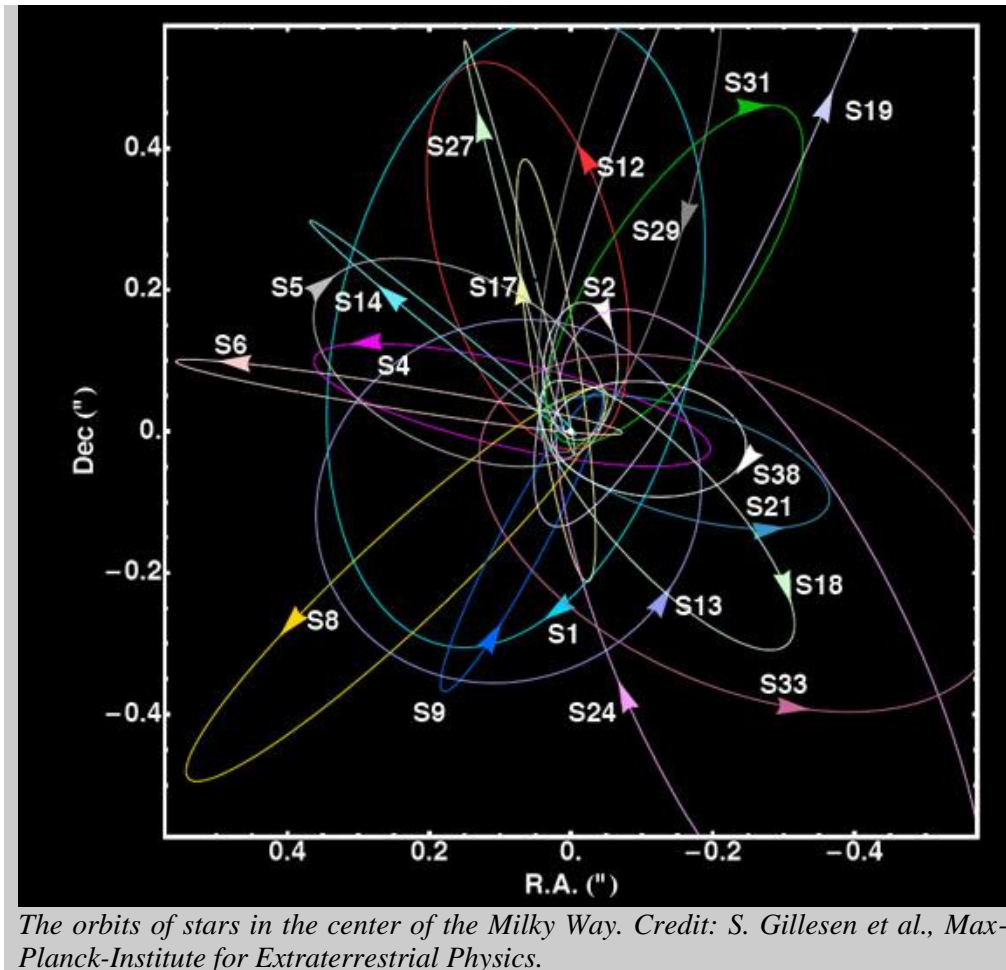
Birkeland filaments align with the ambient magnetic field which is, in turn, generated by electric currents flowing into the central plasmoid.

The energy of the jets seen issuing from active galactic nuclei (AGNs) is attributed to conversion of gravitational energy of accreting matter into radiation. But that does not explain the character of the jets, or the puzzling "quietness" of our own hypothetical black hole. As recently as 26 March in Nature it was admitted:

"the mechanisms that trigger and suppress jet formation in [black holes] remain a mystery."

Meanwhile, the plasmoid is well known in the plasma laboratory as a high-density energy storage phenomenon that produces well-collimated jets after a time that depends upon particle collisions within the plasmoid.

X-ray emission is a signature of electrical activity. There is a persistent high-energy flux from the heart of the Milky Way. The spectral characteristics of the X-ray emission from this region suggests that the source is most likely not point-like but, rather, that it is a compact, yet diffuse, non-thermal emission region, which we should expect from an electromagnetic plasmoid. There is an overabundance of X-ray transients in the inner parsec of the Galactic Center compared to the overall distribution of X-ray sources. Recent observations show that X-ray flares fire roughly every 20 minutes – a regularity that is hard to explain in terms of erratic infall of matter into a black hole. But clockwork regularity of plasma discharges already explains the pulsations from other bodies in deep space. Scientists were also startled when they discovered in 2004 that the center of our galaxy is emitting gamma rays with energies in the tens of trillions of electron volts. The plasma focus is the most copious source of high-energy particles and radiation known to plasma experimenters.



The confidence of astrophysicists in their diagnosis of a "*supermassive black hole*" at the center of the galaxy has been boosted greatly by some brilliant observational work that has allowed the orbits of stars close to galactic center to be determined. Their motion has been used to better estimate the size and massiveness of the assumed "black hole" dwelling there. However, this brings us back to the question of what astrophysicists understand about gravity and mass.

In [Electric Gravity in an Electric Universe](#) I argue for the origin of mass and gravity in the electrical nature of matter. **Mass is not a measure of the quantity of matter.** The 'universal constant of gravitation,' G , is neither universal nor constant since it includes the mathematical dimension of mass, which is an electromagnetic variable. In the powerful magnetic field of a plasmoid, charged particles are constrained to accelerate continuously in the complex pattern of the plasmoid. Like electrons and protons in particle accelerators on Earth, the apparent masses of those particles become enormous as they approach the speed of light. So to report that the object at the center of the galaxy has the mass of 4 million Suns is meaningless in terms of the amount of matter trapped there electromagnetically. The matter there is not constrained by gravity, nor is it there as a result of gravitational accretion. Maxwell's laws apply at the Galactic Center, not Newton's.

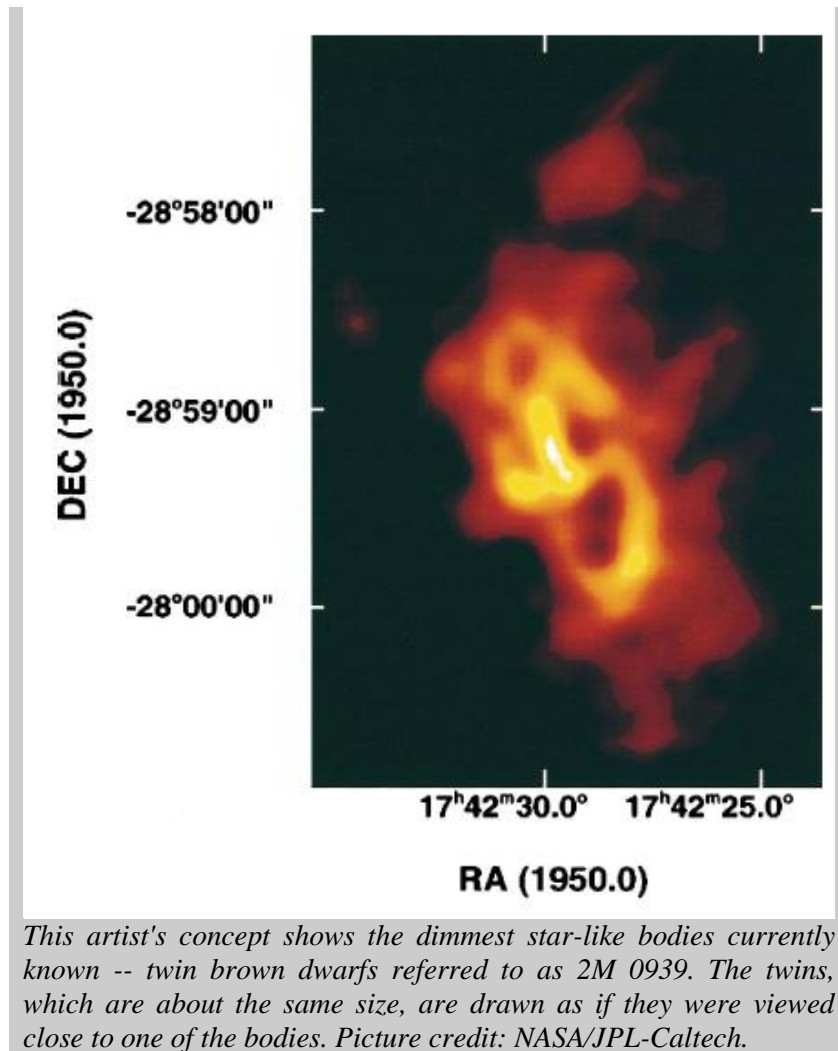
The plasmoid is "quiet" while storing electromagnetic energy. The persistent high-energy flux comes from synchrotron radiation from the circulating charged particles in the plasmoid. Experiments indicate that as soon as the particle densities in the plasmoid filaments reach some critical value, collisions begin to dominate and the plasmoid begins to decay. The density is greatest in the bundle of axial filaments, so that is where the stored energy is released in the form of thin axial jets of neutrons, charged particles and radiation. In the process the axial current is "pinched off," which could focus upon the plasmoid some of the prodigious electromagnetic energy stored in the *intergalactic* circuit. The plasmoid becomes an Active Galactic Nucleus.

A couple of serious problems have been found with the black hole scenario. One is called "the paradox of youth." It is a:

"mystery surrounding the existence of massive young stars in the inner few hundredths of a parsec around the central black hole of the Galaxy. The problem is that according to standard scenarios of star formation and stellar dynamics the stars cannot be born in such an extreme environment because of the strong tidal shear, but are also too short-lived to have migrated there from farther out. None of the solutions proposed so far for the puzzle of the young stars are entirely satisfactory. Their spectral properties are identical to normal, main sequence B0-B9 stars with moderate (≤ 150 km/s) rotation." "The stellar orbits appear overall random, in marked contrast to the ordered planar rotation observed for the much more luminous emission line stars farther out. In addition the stars in the central 0.02 parsec appear to have higher than random eccentricity."

These recent discoveries demonstrate the bankruptcy of gravitational theory.

[Stars are an electrical phenomenon.](#) Stars are not formed by gravitational accretion but in the incomparably more powerful plasma z-pinch. The galactic plasmoid is a concentrated z-pinch with the complex morphology shown earlier. As a z-pinch subsides, experiment shows that a number of consolidated objects that formed along the pinch scatter like buckshot. So stars born in the plasmoid will initially have random eccentric orbits. Stellar rotation is imparted by the pinch vortex and should be similar in the group. The stars beyond 0.02 parsec from the Galactic Center show different kinematics and stellar properties from those stars inside that limit. It indicates a discontinuity in the properties of the plasma environment rather than something intrinsic to the stars.



Infrared image of the mini-spiral at the Galactic Center obtained with the Kuiper Widefield Infrared Camera on the Kuiper Airborne Observatory. Credit: H M Latkavoski et al., Cornell U.

The hallmark of plasma phenomena is their scalability over an enormous size range, from microscopic to galactic. The natural form of the largest visible plasma discharge in the universe, the spiral galaxy, is seen repeated here at the heart of our own spiral **electric galaxy**.

Scientists hope that future very high resolution imaging of the Galactic Center will enable them to detect the features expected of a black hole with a "Schwarzschild radius" of 10 million miles. It is supposed to "*open up a new window for probing the structure of space and time near a black hole and testing Einstein's theory of gravity.*" Given that the Schwarzschild radius "*is not a distance of any kind,*" I confidently predict continuing surprises, puzzlement and theoretical legerdemain in attempts to make the facts fit the unscientific black hole theory. It seems impossible for the courtiers to perceive that the emperors of science have no clothes. Reality is a shared illusion.

I suggest we stop wasting tens of billions of dollars searching for new particles and forces invented by mathematicians chasing fame and a Nobel Prize and spend one percent of that sum investigating the [dense plasma focus](#). Science used to be about simplification. It is the way of the Electric Universe. It is the way out of science's black hole.

Messages from some Dissident Witnesses at the Emperor's Court

"Modern astronomers busy themselves applying accepted theories to new observations in deliberate disregard for the unexpected. They may as well reprint previous papers, close the telescopes, and save the taxpayers' pennies. They've ceased looking for new ideas and have become technicians of the rote.

Astronomy has become a science of answers, of 'secure knowledge,' of ritual. It can be contained on a hard drive. It's a science for robots or parrots. Answers are victories that soon become dead leaves of reminiscence, dry pages of textbooks and scriptures.

A science for humans is a science of questions, of learning, of possibilities and opportunities. Its aim is not to fold the unquestioned into the envelope of the given but to learn new words and to write new narratives."

—Mel Acheson

"It's all about attitude, really. There are scientists who think they may be able to derive a set of equations they boldly term "The Theory of Everything". Then there are those, like me, who admit to themselves and others that what we don't know will always significantly exceed what we do. So it comes down to this: Do we believe the evidence of our eyes, to the extent that it should form the basis of theories in cosmology, or do we rather depend upon our imaginations, expressed in convoluted mathematical dialects, to express our eternal optimism that some day, some how, we might persuade ordinary folk that this is how they should be seeing it."

—Hilton Ratcliffe, *Declaration of Intent: Swimming with the salmon, dining with the bears.*

"The worse things get, the more scientists meet together internationally in the interest (supposedly) of progress. But, as Tommy Gold points out, perpetually meeting together locks people's beliefs together into a fixed pattern, and, if the pattern is not yielding progress, the situation soon becomes moribund. These considerations provide ample motivation for attempts to preserve the status quo in cosmology: religion, the reputations of the aging, and money. Always in such situations in the past, however, the crack has eventually come. The Universe eventually has its way over the prejudices of men, and I optimistically predict it will be so again."

—Sir Fred Hoyle, *Home is where the wind blows* (1994).

Wal Thornhill

Newton's Electric Clockwork Solar System

Posted on [April 21, 2009](#) by [Wal Thornhill](#)




We are told that gravity rules the cosmos. The story of the big bang, the origin of galaxies and stars, and our ultimate fate are founded on this belief. But the March 2009 Astronomy magazine carries the surprising headline, *"Is there something we don't know about gravity?"* The question should be, "why do we think that physicists know *anything* about gravity beyond mathematical descriptions of its observed effects?" All that modern physics has done is to obscure the need for serious investigation of an unsolved problem. Even some effects attributed to the action of gravity, like the bending of light, need not have anything to do with gravity. Indeed, we are so far from

understanding gravity that we don't know the right questions to ask.

For example, orbital dynamicists have long known that Newton's law of gravity applied to the solar system [displays chaos](#) in the short-term—perhaps a few tens of millions of years—not aeons-long clockwork stability. So the first question that must be asked is why does the solar system appear to run like clockwork? This is not done in the usual history of the solar system. A strict application of Newtonian dynamics would render retro-calculation of planetary histories impossible. How can you concoct a history if you have no idea where the group of actors were in the past? Without understanding the cause of stability of the planetary system, the foundation of geology and planetary science is missing! We cannot explain the origin of the solar system.

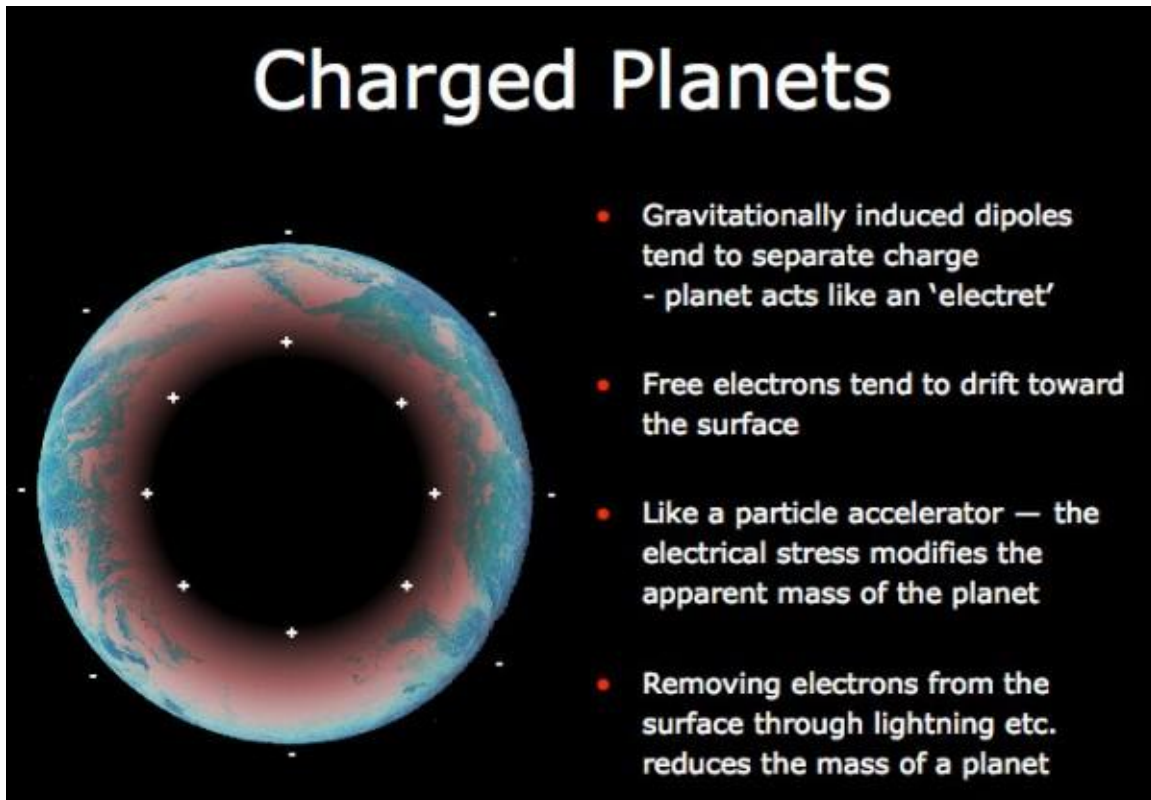
Origin of the Solar System?



- *"Attempts to find a plausible naturalistic explanation of the origin of the solar system began about 350 years ago, but have not yet been quantitatively successful, making this one of the oldest unsolved problems in modern science."*

— Stephen Brush, *A History of Modern Planetary Physics*

To provide clockwork stability there *must* be a feedback mechanism to control orbital spacing. That requirement can be met if the gravity (mass) of a planet is variable. I have argued in [Electric Gravity](#) that this is possible by changing the electrical charge state of a planet. In summary, the Earth's gravity and surface charge causes radially oriented electrostatic dipoles to be formed by most atoms inside the Earth with the inner pole positive and the outer pole negative. This effect is due to the almost 2,000-fold more massive nuclear particles compared to the orbiting electrons. If all subatomic particles are composed of a resonant system of positive and negative charges they are also subject to distortion in the radial electric field to form an electric dipole. Since the particles are free to rotate, their dipoles will line up and the weak dipole force of each particle will add up to produce the effect of gravity.



If the electric field within the Earth changes, the amount of this dipolar distortion will change and the force of its gravity will change. Charge exchange among planets is the key to the orbit stabilizing mechanism in an electric solar system. **The 'clockwork' of the solar system is governed by gravity and its stability provided electrically.**

What we need to find is a means of transferring charge between planets that may provide an orbit stabilizing influence.

Electrically Modified Newtonian Dynamics (EMOND)

In 1983 Mordehai Milgrom of the Weizmann Institute of Science in Israel proposed a modified Newtonian dynamics (MOND) to describe galactic motions. As explained in [Electric Galaxies](#), the motion of galaxies is not gravity dominated. MOND may not be necessary for galaxies. However, some form of MOND is needed to explain stable planetary motion within the solar system.

Conventional celestial mechanics never thinks of the mass of a planet as a variable. However, if the electrical charge on a planet can directly affect its apparent mass to a significant degree, a new and important consideration is introduced to celestial mechanics. Newton's well-known gravitational equation has the force (F) between the Sun and a planet as:

$F = GMm/r^2$ where
 G = the 'constant' of gravitation,
 M = mass of the Sun,
 m = the mass of the planet, and
 r = the distance of the planet from the Sun.

However, G is measured at the Earth's surface and used in this equation for the Sun and every other planet. It is simply assumed that G is universal and has the same value for all celestial bodies.

G has the peculiar dimensions of length cubed, divided by mass and by time squared ($[L]^3/[M][T]^2$). A. K. T. Assis argues that dimensional constants like G should not appear in the laws of physics. They "*must depend on cosmological or microscopic properties of the universe.*" [1] Garcia-Berro *et al* state:

"Questioning the constancy of fundamental parameters is essentially trying to understand a more fundamental theory behind." [2]

We conceal our ignorance of any underlying physical mechanism by tolerating dimensional constants. If mass is an electrical variable, G cannot be constant. Assuming G to be universal as well gives rise to calculated masses and densities of celestial bodies that lead to further conjectures cantilevered upon the already dubious assumptions. Stellar and planetary structure and composition are based upon this erroneous conviction. For example, by using G, measured on Earth, the planet Saturn appears to have a lower density than water!

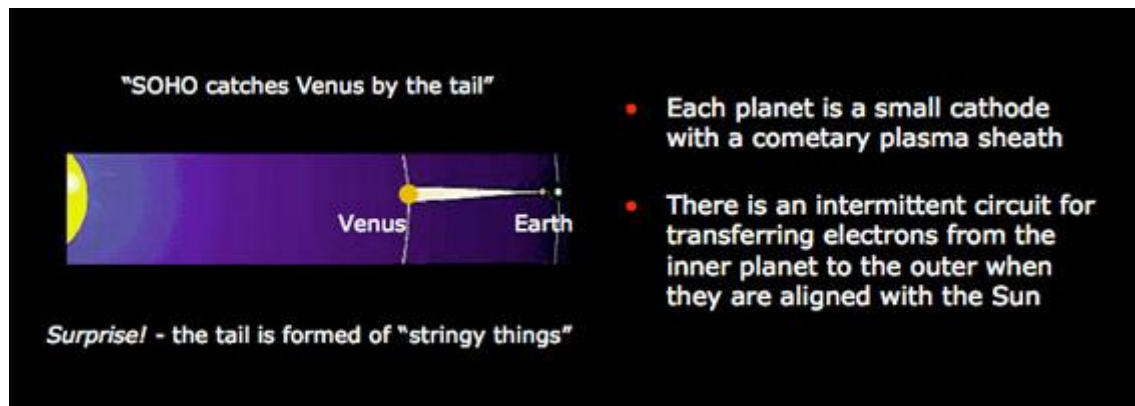
Strong circumstantial evidence for a different gravitational 'constant' for each body at different times comes from the difficulty of establishing its value on Earth. 'G' is the most inconstant of physical constants. [3] The small variations in measurements in modern times are dwarfed by evidence from prehistory. Early dinosaur discoveries forced scientists to conclude that the gigantic animals must have been waders to offset their

crushing weight with the buoyancy of water. However, fossil footprints show them as fleet-footed land animals — an impossibility in Earth's present gravity.

"The force of gravity at the surface of the earth must have been very much lower than it is today." [4]

Whatever happened to the dinosaurs was far more dramatic than climate change from a puny asteroid impact.

The Electric Universe concept of gravity illustrates this "more fundamental theory behind" the conceptual curtain of G. [The Electric Sun](#) is a positively charged anode and the focus of a galactic glow discharge. Most of the voltage difference between the Sun and its interstellar environment occurs at the 'virtual cathode' — the solar wind boundary known as the heliopause. The heliopause is not simply a supersonic shock boundary but a thin protective plasma sheath or 'double layer.' The double layer boundary accelerates solar wind ions into deep space at cosmic ray energies. So cosmic rays give a useful measure of the driving potential of the Sun, estimated to be of the order of 10 billion volts. The order of magnitude and direction of the electric field inside this double layer boundary fits the electric model of interplanetary space as the 'positive column' region of a glow discharge. It is characterized by a weak but constant electric 'drift field.' [5]



Each planet acts as a small secondary cathode in this solar glow discharge and develops an invisible cometary plasma sheath, the tail of which stretches away from the Sun in the plane of the ecliptic. The cometary plasma sheath of Venus was found to stretch as far as the Earth during inferior conjunction. Researchers were puzzled by the coherent "stringy" nature of the Venusian plasma tail. [6] The stringiness is confirmation of Birkeland currents stretching between Venus and the Earth, which transfer charge between the planets. The same kind of electrical exchange takes place between Earth and Mars during opposition, giving rise to the 'blue clearing' of the Martian atmosphere and the electrically driven global dust storms on that planet. Many planetary plasma tails have been found to brush across the plasma sheath of the planet in the next outer orbit. This brushing constitutes an intermittent circuit for transferring charge between adjacent planets when they are aligned with the Sun.

It suggests the following mechanism for orbital adjustment and stabilization:

The total orbital energy of a planet about the Sun is the sum of the planet's kinetic energy (KE) and its gravitational potential energy (PE). That is, if

$$\text{KE} = 1/2mv^2 \text{ and}$$

$$\text{PE} = -GMm/r,$$

using the earlier notation and where v is the velocity of the planet in its orbit, then the total energy (E) of a planet in orbit about the Sun is:

$$E = 1/2mv^2 - GMm/r.$$

For the simple case of a circle,

$$v^2 = GM/r \text{ so that}$$

$$E = 1/2m(GM/r) - m(GM/r) \text{ or,}$$

$$E = -m(GM/2r) \text{ and}$$

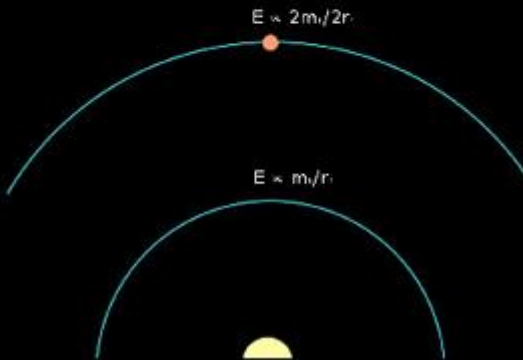
$$r = m(-GM/2E), \text{ that is (assuming the mass of the Sun (M) remains constant),}$$

The orbital radius of a planet (r) is directly proportional to the planet's mass (m) for a given orbital energy (E).

[Note that the mass of an electrically shining Sun does not steadily diminish at the calculated rate of 4.38×10^9 kg/sec by converting mass into radiant energy—as the standard model assumes. However, the Sun does lose mass in the solar wind at about 30% of that rate. It is a trivial rate of change in M . But a more significant and sudden change in M may occur in response to variations in the local galactic electrical environment].

Orbital energy

If the mass doubles, the orbital radius must double to conserve orbital energy

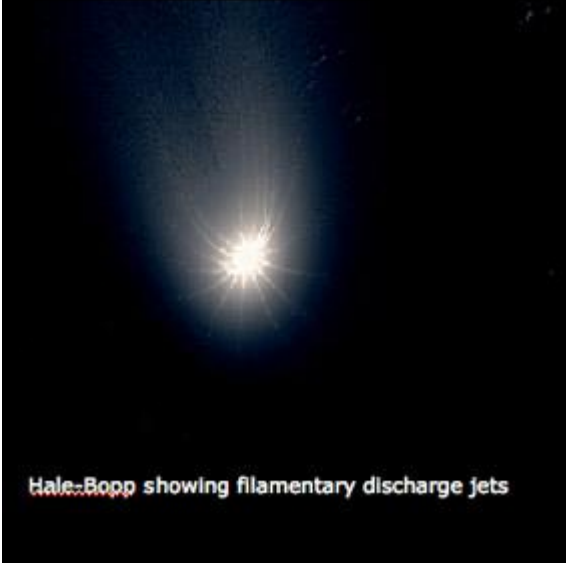


- The total orbital energy (E) of a planet in orbit about the Sun is the sum of the planet's kinetic energy (KE) and its gravitational potential energy (PE)
- $KE = 1/2mv^2$ and $PE = -GMm/r$
- For the simple case of a circle, $v^2 = GM/r$ so that $E = 1/2m(GM/r) - m(GM/r)$
- $r = m(-GM/2E)$, that is, $r \propto m$ for constant orbital energy (E)

If the mass of an inner planet is reduced by charge exchange with the next outer planet, which changes the subatomic dipole distortion, the orbital radius of the inner planet must decrease proportionally to conserve energy. Similarly, the outer planet must gain mass and its orbit expands to conserve energy. The closer the encounter between two planets the more substantial the charge exchange and the greater the resultant orbital adjustments. It seems a highly effective means for collision avoidance and for quickly spacing the planetary orbits to minimize interactions—provided the inner planet diminishes its charge polarization (reduces its mass) in the exchange and the outer planet increases its polarization (increases its mass). Is this possible?

A substantial transfer of electrons from the inner planet to the outer planet along a (visible or invisible) cometary tail may produce the effect we require. Gravitationally induced charge polarization in neutral atoms forms a weak radial electric field inside celestial bodies. Planets behave like spherical electrets with a radial electric dipole polarization. If we remove some of the surface electrons the internal polarization is diminished causing a proportional diminution of the apparent mass and gravity of that body. Conversely, if electrons are added to a body its internal polarization increases, causing a proportional increase in mass.

Comet Accelerations



- Cometary displays are an electric discharge phenomenon
- Any body on an eccentric orbit about the Sun will experience discharge activity
- The discharge will cause non-Newtonian accelerations because the mass of the comet will be changing
- However, gravity *is* the operative force

Hale-Bopp showing filamentary discharge jets

As a secondary cathode in the solar discharge, each planet normally supplies some electrons to the solar wind. In the case of an intense cometary discharge, like that memorialized for Venus, the continuous discharge can circularize and shrink the planet's orbit. **It is an effective capture mechanism** that is unavailable under Newton's gravitational law. Venus now has the most circular orbit of any planet. And as the plasma tail of an inner planet sweeps across the plasma sheath of an adjacent outer planet, electrons are transferred via Birkeland current filaments. The inner planet loses mass and its orbit shrinks toward the Sun. The outer planet gains mass and its orbit expands away from the Sun. Orbital eccentricity is damped by 'cometary' charge exchange with the solar wind, which varies with distance from the Sun. The eventual result is that all planets settle into low eccentricity orbits where they disturb each other the least.

This is an Electrically Modified Newtonian Dynamics (EMOND). It is distinct from MOND which merely twiddled Newton's law to match the observations. MOND is NOT a theory. **EMOND is a theory that requires *no new physics*.**

Gravitational Mysteries Noted in Astronomy Magazine

Astronomical Unit (AU) Inflation

*"The latest measurements by Pitjeva and Standish suggest the AU is increasing about 23 feet (7 meters) per century. **But the AU should not change at all!**"*

EMOND provides a mechanism that can be tested because the Earth's orbit expansion should be a discontinuous function with discrete 'jumps' following major solar storms and at Venus' inferior conjunction. At present the measurements have only been done between the Earth and Mars, which doesn't rule out the possibility that the Sun's mass (M) is changing. In that case, all planetary orbits should change proportionally and simultaneously. This is an important experiment to carry out when a radio transponder is placed on another body in the solar system (other than the Moon).

Mercury's Perihelion

Newton's laws do not explain the rate of precession of Mercury's perihelion. It is offered as 'proof' of the validity of Einstein's theory of gravity. However, Einstein's theory does not explain gravity so we must ask if EMOND can provide the answer. Perhaps so, since subtle changes in the orbit of Mercury will occur as a result of variable charge transfer from the solar wind due to the planet's eccentric, tilted orbit. (See [More on Mercury's Mysteries](#)). Mercury is close to the Sun and should experience a decreasing orbital eccentricity by charge exchange with the solar wind.

Lunar Eccentricity

The Moon's orbit is becoming more elliptical at a rate three times faster than can be explained by tidal factors. The Moon is at the solar wind plasma potential, judging by its lack of any substantial plasma sheath. So it has no significant damping of eccentricity via charge exchange with the solar wind. Meanwhile, for some months each year at full phase the Moon passes through the Earth's plasma sheath, which will give a nudge to the Moon's orbit by transferring charge from the Earth. The repeated electrogravitic 'nudge' in the same region of the Moon's orbit will cause an unaccounted for increase in eccentricity.

The 'Pioneer Anomaly'

Tracking data has shown that both Pioneer 10 and 11 spacecraft have slowed at a constant rate while travelling out of the solar system in opposite directions. [I solved this anomaly](#) in 1999 in terms of the Electric Sun model. It is the only model that explains why the decelerating force remains constant with distance from the Sun, something that gravity or any other diminishing inverse square law force cannot do.

Oddball Orbits

It has long been known that comets have "oddball orbits" that do not obey Newton's law of gravity. The anomalous accelerations are due to the motion of an electrically discharging body in the Sun's weak, radial electric field. In recent years "anomalous orbital energy changes" have also been observed for spacecraft that flew by the Earth for a gravity assist. In their time away from the Earth, the spacecraft establish a charge polarization with respect to the solar wind. When they again encounter the Earth, their masses will have changed. The effect on spacecraft acceleration with respect to the Earth


is of the same variable nature as the "non-gravitational" acceleration of comets with respect to the Sun.

SUMMARY

The modern knee-jerk response to anomalous data is to propose "a new physics." That way, the belief goes, fame and fortune beckons. "New physics" is the main proposition in the Astronomy article. It shouldn't be. Surprise results are a signal that our understanding of the problem is faulty. We should be re-examining the assumptions that underpin our models rather than adding more complexity to patch over the cracks. The vital requirement in this case is to understand gravity!

We observe falling and orbital motions and describe them with equations that we call gravitation laws. We think that we understand gravity because the equations seem to work. [7] But our celestial observations span a very brief and recent interval of human experience. At the same time, scientists regard global legends about bellicose activities of planetary gods in the heavens as 'myth'—read 'fiction.' The stories tell of battles in the skies between planetary gods hurling thunderbolts. The thunderbolts depictions bear no relationship to the puny sparks we call lightning. Instead, the 'thunderbolts of the gods' find their morphology duplicated in the highest energy electric discharges generated in plasma laboratories. The remarkable juxtaposition of planets with the thunderbolt as their 'weapon' goes unremarked. Furthermore, the mythmakers described the planets as spheres, which calls for close encounters with the Earth in prehistory. **It is not the myths but the modern story of the clockwork Newtonian solar system that is fiction.**


Thunderbolts of the Gods



Petroglyphs: Recordings of a Catastrophic Aurora in Antiquity?
by Anthony Peratt and Scott Mainwaring

antiquity, the carving of pictures on rock by man's hand. THE ATOMIC AGE AND THE AL BOREAL

- Globally, petroglyphs show to a high degree of confidence that within human existence the Earth has suffered stupendous electric discharge phenomena in the heavens



Dr. Anthony Peratt
Plasma Cosmologist

The confusion about any role for electricity in celestial dynamics has come about because of our ignorance of the electrical nature of matter and of gravity. The classical signposts to an understanding of gravity were in place at the beginning of the 20th century, but after the terrible world wars it seems people were looking for heroes with a new vision. Einstein became an overnight idol of genius and his geometric metaphysics the new fashion in science. The dedication to the Einstein mythology has become so entrenched that to say "the emperor has no clothes" invites ridicule. But over almost a century there has been an astronomical price to pay for adulatory adherence to dogma.

A recent review of the history of astronomy concludes:

"The inability of researchers to rid themselves of earlier ideas led to centuries of stagnation. An incredible series of deliberate oversights, indefensible verbal evasions, myopia, and plain pig-headedness characterize the pedestrian progress along this elusive road for science. We must be constantly on our guard, critically examining all the hidden assumptions in our work." [8]

The public must be made aware how science actually operates and is protected from scrutiny. It will require the kind of fearless investigative journalism we often see in politics. Science reporters must refuse to bow to the expert and the lazy dissemination of academic propaganda.

Newtonian dynamics does not guarantee stability in a many-body gravitational system; quite the reverse in fact. The electrical nature of mass and gravity simply adds a new dimension to Newton's celestial mechanics. No 'new physics' is required.

"History serves as an appellate court, ready to reverse the judgments of the lower courts, which are limited by the myopia of contemporaneity." [9]

Wal Thornhill

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[5] C. Lacombe et al., *Evidence for the interplanetary electric potential? WIND observations of electrostatic fluctuations*, *Annales Geophysicae* (2002) 20: 609–618.

[6] *Planet's tail of the unexpected*, *New Scientist*, 31 May 1997, p. 18.

[7] *Op. cit.*, L. Endersbee, p. 107. "*The question of the physical basis of the force of gravity is quite profound, and continues to be studiously avoided by most of the physicists and astronomers. We are all aware of the consequences of the force of gravity, but the cause of the force of gravity remains a mystery.*"

[8] Simon Mitton, reviewing *The Milky Way* by Stanley L. Jaki, *New Scientist*, 5 July 1973, p. 38.

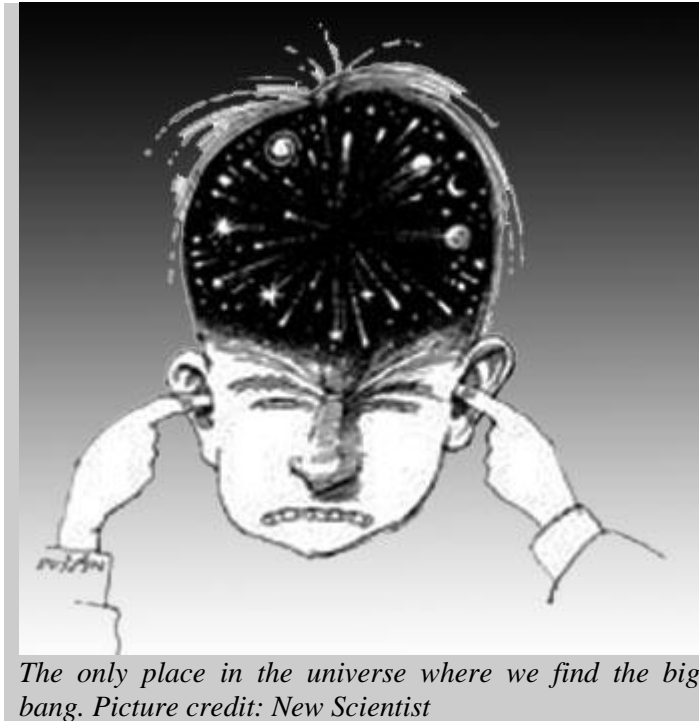
[9] Robert K. Merton, *The Matthew Effect in Science: The reward and communication systems of science are considered*, *Science*, Vol. 159, pp. 56-63.

Cosmology in Crisis—Again!

Posted on [May 24, 2009](#) by [Wal Thornhill](#)

"Nothing comes from nothing. Nothing ever could."

—*from The Sound of Music.*



It seems the toughest thing for scientists to grasp—that a cherished paradigm like the big bang can be wrong. The latest crisis was reported in Physorg.com on May 5th: "[Study plunges standard Theory of Cosmology into Crisis.](#)" The study of dwarf companion galaxies of the Milky Way support the view that a "modified Newton dynamic" [MOND] must be adopted.

"This conclusion has far-reaching consequences for fundamental physics in general, and also for cosmological theories."

One of the researchers involved said:

"It is conceivable that we have completely failed to comprehend the actual physics underlying the force of gravity."

In my [news of April 21st](#) I wrote:

"We are so far from understanding gravity that we don't know the right questions to ask."

There I proposed "Electrically Modified Newtonian Dynamics," or "E-MOND," as the solution for solar system stability. However, the problem involving the dwarf companion galaxies is more fundamental to cosmology. The first problem in physics is to choose the correct concepts to apply to our observations. That determines which physical laws to apply. But that's not the end of it. We must remain aware that all laws are man-made and provisional—they are subject to modification on appeal. Historically, cosmologists have denied that electricity has any relevance in space. They have refused to consider how the laws of plasma physics might apply to their otherwise incomprehensible observations. Provisionality is a formalism to mask dogma.

Richard Feynman, lecturing his students on how to look for a new law in physics, said,

"First you guess. Don't laugh; this is the most important step. Then you compute the consequences. Compare the consequences to experience. If it disagrees with experience, the guess is wrong. In that simple statement is the key to science. It doesn't matter how beautiful your guess is or how smart you are or what your name is. If it disagrees with experience, it's wrong. That's all there is to it."

Sounds simple? Perhaps that is why we see so many proposals for new laws of physics in the mad scramble for a Nobel Prize. But the emphasis is all wrong. It encourages wild guesswork and burgeoning complexity. Complexity facilitates endless "twiddling of knobs" to match new "experience." Theories become practically unfalsifiable and unscientific—as witness, "string theory." Underlying the guesswork in cosmology is the paradigm of the big bang. A paradigm is a system of belief that tends to be taken completely for granted. The guesswork is limited to modifications that don't disturb the conviction. Questioning the established paradigm is resisted. The case of "[the modern Galileo](#)," [Halton Arp](#), is a classic example where the big bang "disagrees with experience" —and the experience is declared to be wrong. Feynman could usefully have added that it doesn't matter how many people believe a theory, "*If it disagrees with experience, it's wrong. That's all there is to it.*"

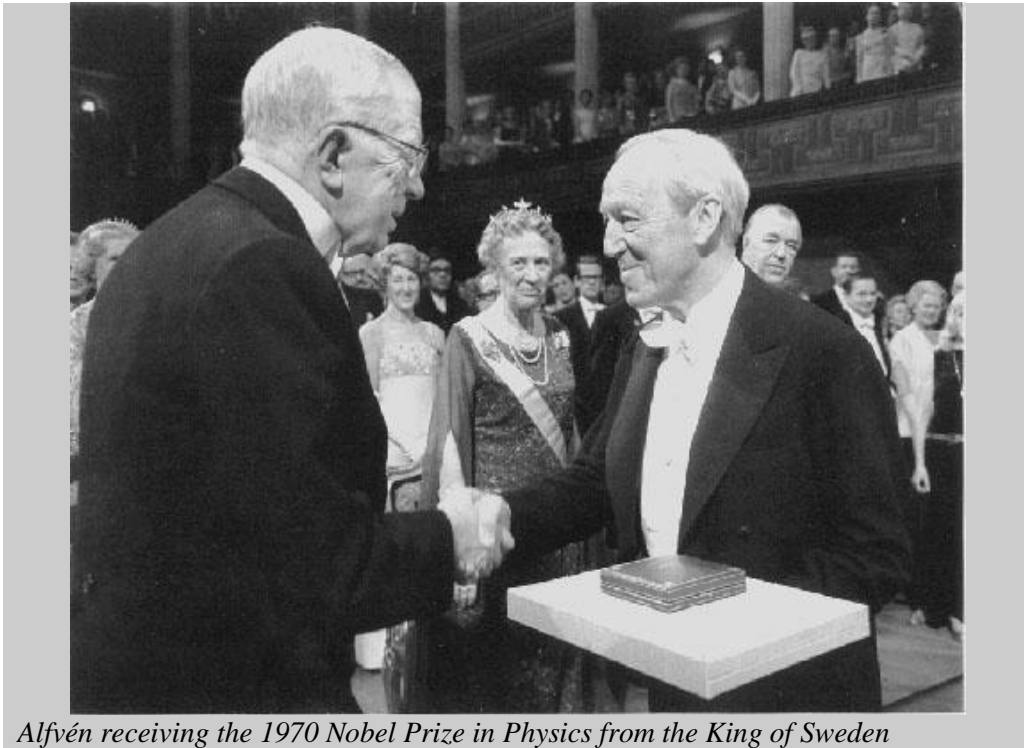
Cosmology is in crisis because from the very outset the "big bang" was not science! The big bang invokes a miraculous creation of the universe from nothing. It is a misguided attempt to manufacture a creation story to complement, or compete with, the biblical Genesis story. But real science doesn't do miracles. There was no contest anyway. The biblical creation story, like those of all other ancient cultures on Earth, has nothing to do with the creation of the universe. To believe so is to misunderstand the ancient meanings of "heaven" and "earth."

A scientific, forensic investigation of mankind's earliest ideas about heaven and earth show that "heaven" was the arena of the planetary "gods," whose behavior was fearfully witnessed by our prehistoric ancestors in a catastrophic period of [awful electrical splendor in the skies](#).



The spectacle motivated prehistoric humans globally to carve and paint rock faces with similar enigmatic representations (petroglyphs and rock art) of what has only recently been identified as ultra-high-energy auroral type displays. Our forebears were recording something unimagined today—the distinctive evolution of plasmoid "thunderbolts" hurled between celestial bodies on unusual cometary orbits. Plasmoids followed the Earth's magnetic field lines to the magnetic poles. The "earth" was originally the magnificent auroral-type display "created" in the heavens. The antics of the capricious "gods" were remembered and [memorialized by the first civilizations](#) in their prodigious building works to recreate the "kingdom of heaven" on today what we call the Earth. [Thunderbolts of the Gods](#) describes this first scientific documentation of the origin of global themes in myths and religions. It introduces the *real* cosmology of [The Electric Universe](#). Only a [REAL COSMOLOGY](#) can reunite the fragmented sciences and provide a clearer human perspective of the universe.

The Big Bang—One Crisis After Another



Alfvén receiving the 1970 Nobel Prize in Physics from the King of Sweden

A pioneer of plasma cosmology and the Electric Universe, Hannes Alfvén, in his Nobel Prize acceptance speech in 1970, warned of a looming crisis in cosmology due to the ignorance of theoretical physicists about the real behavior of plasma in space. That crisis remains as a long-dormant infection waiting to cripple its host. The symptoms can be seen in attempts to explain auroras and solar activity in terms of unreal magnetic effects ("snapping" and "reconnection" of field lines—try to imagine snapping and reconnecting the lines of latitude or longitude!) and with no clear idea of how the magnetic fields are caused. But any high school student knows that electric currents generate magnetic fields. So magnetic fields in space are an effect of electric currents, not a cause. It seems that graduate physics training skips practicalities and commonsense and focuses on mathematical theorizing and the virtual-reality world of computer modeling. Alfvén was first and foremost a practical electrical engineer.

There are many other crises to be acknowledged by cosmologists.

In 1929 [Hubble](#) and Humason formulated the apparent redshift-distance relation of galaxies in deep space. In the metaphysics of Einstein, an expanding space seemed like it might explain the observations. But as an observer, Hubble remained more clear-minded:

"The assumption that red shifts are not velocity shifts but represent some hitherto unknown principle operating in space between the nebulae leads to a very simple, consistent picture of a universe so vast that the observable region must be regarded as an insignificant sample." [1]

Mathematical theorists eschewed simplicity and commonsense by assuming that the redshift was due to the Doppler effect and employing Einstein's metaphysics so they could retrocalculate the seeming expansion back to a primordial point, or singularity—which has no physical reality. Score: mathematics-1; physics-0. But there is another simple option, unmentioned by Hubble, that instead of some "unknown principle operating in space between the nebulae" there is an intrinsic electric principle responsible for both the redshift and the faintness of a galaxy or quasar.

Recently supernovae in highly redshifted objects have been found to be fainter than expected. Big bang theorists surmised that the expansion of the universe must be accelerating. The response to this discovery was to invent yet another mysterious fudge factor for the unscientific big bang scenario — "dark energy." This follows a tradition established with the conjuring up of invisible "dark matter" where needed to save the Newtonian dynamical model of spiral galaxy rotation. Rather than becoming clearer and simpler, big bang cosmology demonstrates "wild guesswork and burgeoning complexity" with each new discovery.

It is clear that both faintness and redshift are related to a lower intrinsic energy of quasars, galaxies, and the supernovae they contain. I have shown earlier that [supernovae are an electrical discharge phenomenon](#). Neither redshifts nor supernovae can be used as a standard to measure intergalactic distances. If proof were needed for this commonsense assessment, the distinguished astronomer Halton Arp has shown repeatedly that highly redshifted quasars are born from nearby, low-redshift galaxies. The redshift of quasars is a measure of their youthfulness! Because of quasars' physical and statistical connections with nearby galaxies, the faintness of highly redshifted quasars cannot be attributed to distance. Even more compelling is the discovery that intrinsic redshift takes discrete (quantized) values, which proves that the redshift is related to the matter in the quasar and not a measure of speed of recession or some effect upon light in traversing the intervening space.



Halton Arp recognizes the study of electrified plasma as the future of astrophysics. Photo: Jean-Pierre Jans, 2005.

It seems the hardest thing for a scientist to grasp that a cherished consensus belief, perhaps one that is decades or a century old, can be wrong. Following is an excerpt from a report of the most recent crisis in cosmology. It calls into question both the existence of dark matter and our concept of gravity. The bell tolls loudly for the big bang!

Study plunges standard Theory of Cosmology into Crisis

[physorg.com] May 5th, 2009

As modern cosmologists rely more and more on the ominous "dark matter" to explain otherwise inexplicable observations, much effort has gone into the detection of this mysterious substance in the last two decades, yet no direct proof could be found that it actually exists. Even if it does exist, dark matter would be unable to reconcile all the current discrepancies between actual measurements and predictions based on theoretical models. Hence the number of physicists questioning the existence of dark matter has been increasing for some time now.

Competing theories of gravitation have already been developed which are independent of this construction. Their only problem is that they conflict with Newton's theory of gravitation.

"Maybe Newton was indeed wrong," declares Professor Dr. Pavel Kroupa of Bonn University's Argelander-Institut für Astronomie (AIfA). "Although his theory does, in fact, describe the everyday effects of gravity on Earth, things we can see and measure, it is conceivable that we have completely failed to comprehend the actual physics underlying the force of gravity."

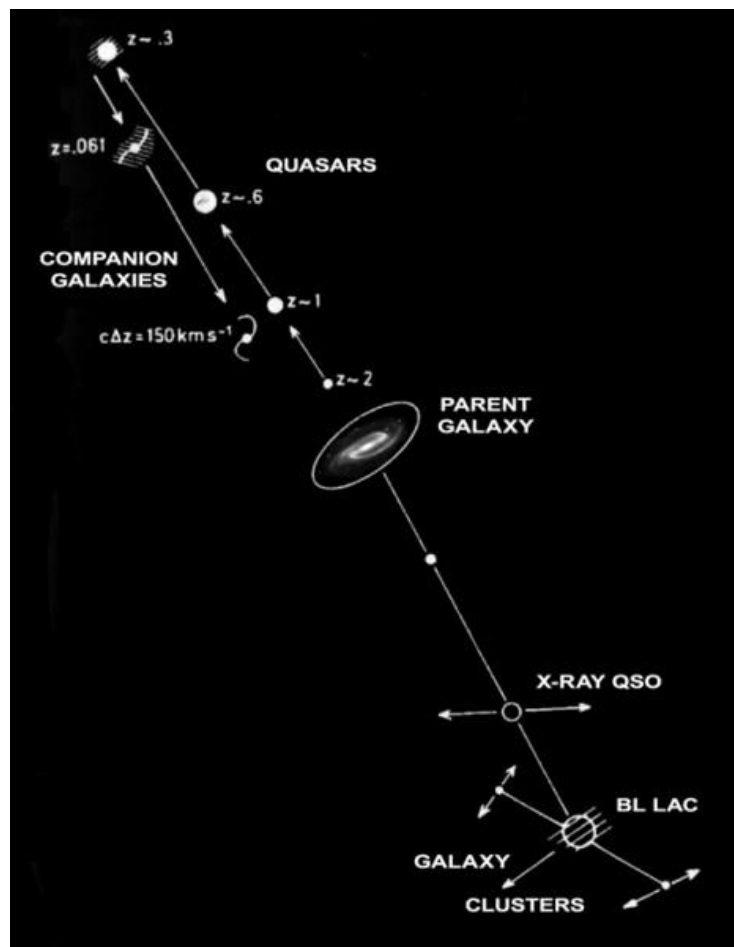
Comment: Newton himself had the sense not to propose "the actual physics underlying the force of gravity." All he did was to provide a mathematical expression *describing* the mysterious instantaneous tension between all matter in the universe. Einstein merely confused the question with his unreal notions of matter affecting empty space. On the other hand, the electrical concept of gravity deals with real-world physics. It uses the observation that matter (subatomic particles) under electrical stress exhibit different masses to draw attention to the fact that Newton's simple law of gravity embodies electrically variable masses. In other words, in an Electric Universe we require Electrically Modified Newtonian Dynamics, or [E-MOND](#), to embellish the usual acronym.

This concept applied at the atomic level also provides a simple solution to the quasar redshift puzzle. Arp and others have shown that the redshift of any object is made up of an intrinsic component and a velocity component. The velocity component is the only one recognized by mainstream astronomers. The intrinsic redshift is a property of the emitting atoms in the object. It decreases with time in discrete or quantized 'jumps.'

Quasars appear to be ejected, deficient in electrons, from their parent active galactic nucleus (AGN). The lightweight electrons remain tangled in the AGN plasmoid for much

longer than the heavier protons and uncharged neutrons. As a result, the quasar has lower initial charge polarization compared to matter on Earth and, from the principle of E-MOND, all subatomic particles in the quasar have lower masses. Therefore, the emitting atoms also have lower masses, and their radiation has lower energy. The result is the observed intrinsic redshift of atomic emissions from quasars and their relative faintness.

Like the atom itself, the constituents of each atom—the protons, neutrons and electrons—can be viewed as resonant systems of charge, capable of exchanging electromagnetic energy for quantum jumps between stable resonant states. The quantum jumps over time to lower redshift values occur as electrons from the parent galaxy's jet arrive at the quasar and increase the quasars' charge polarization. As its mass increases, according to E-MOND, the quasar slows from its high ejection speed at 'birth,' due to conservation of momentum. When the intrinsic redshift value gets down to around $z = 0.3$, the quasar starts to look like a small galaxy or BL Lac object and begins to fall back toward its parent, while continuing to decrease in redshift. Eventually it becomes a companion galaxy. Arp has photos and diagrams of many such family groupings. Many can be traced to three and four generations of ejecting objects.



In an Electric Universe, faintness together with high intrinsic redshift is a measure of youthfulness, not distance and speed of recession.

The report continues...

Two new studies could well lend further support to it [MOND]. In these studies, Professor Kroupa and his former colleague Dr. Manuel Metz, working in collaboration with Professor Dr. Gerhard Hensler and Dr. Christian Theis from the University of Vienna, and Dr. Helmut Jerjen from the Australian National University, Canberra, have examined so-called "satellite galaxies." This term is used for dwarf galaxy companions of the Milky Way, some of which contain only a few thousand stars. According to the best cosmological models, they exist presumably in hundreds around most of the major galaxies. Up to now, however, only 30 such satellites have been observed around the Milky Way, a discrepancy in numbers which is commonly attributed to the fact that the light emitted from the majority of satellite galaxies is so faint they remain invisible.

A detailed study of these stellar agglomerates has revealed some astonishing phenomena: "First of all, there is something unusual about their distribution," Professor Kroupa explains, "the satellites should be uniformly arranged around their mother galaxy, but this is not what we found." More precisely, all classical satellites of the Milky Way – the eleven brightest dwarf galaxies – lie more or less in the same plane, they are forming some sort of a disc in the sky. The research team has also been able to show that most of these satellite galaxies rotate in the same direction around the Milky Way – like the planets revolve around the Sun.

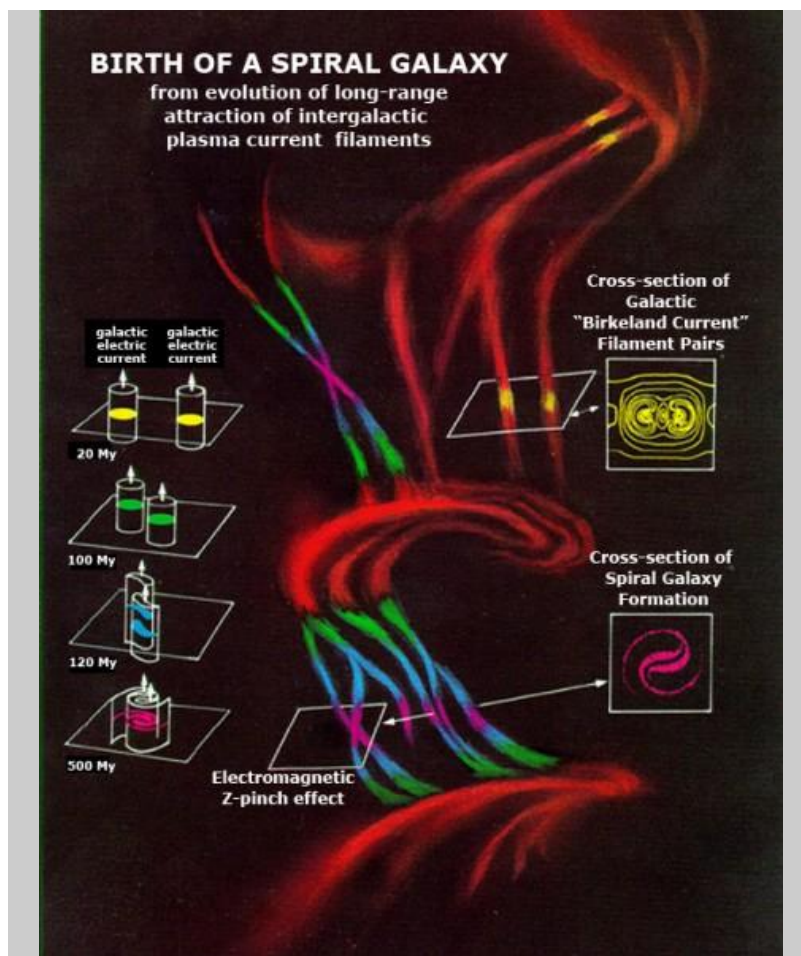
Contradiction upon Contradiction

The physicists do believe that this phenomenon can only be explained if the satellites were created a long time ago through collisions between younger galaxies. "The fragments produced by such an event can form rotating dwarf galaxies," explains Dr. Metz, who has recently moved across to the Deutsches Zentrum für Luft- und Raumfahrt (German Aero-space Center). But there is an interesting catch to this crash theory, "theoretical calculations tell us that the satellites created cannot contain any dark matter." This assumption, however, stands in contradiction to another observation. "The stars in the satellites we have observed are moving much faster than predicted by the Gravitational Law. If classical physics holds this can only be attributed to the presence of dark matter," Manuel Metz states.

Or one must assume that some basic fundamental principles of physics have hitherto been incorrectly understood. "The only solution would be to reject Newton's classical theory of gravitation," says Pavel Kroupa. "We probably live in a non-Newton universe. If this is true, then our observations could be explained without dark matter." Such approaches are finding support amongst other research teams in Europe, too.

The deviations detected in the satellite galaxy data support the hypothesis that in space where extremely weak accelerations predominate, a "modified Newton dynamic" must be adopted. This conclusion has far-reaching consequences for fundamental physics in general, and also for cosmological theories. Famous astrophysicist Bob Sanders from the University of Groningen declares: "The authors of this paper make a strong argument. Their result is entirely consistent with the expectations of modified Newtonian dynamics (MOND), but completely opposite to the predictions of the dark matter hypothesis. Rarely is an observational test so definite."

Source: Bonn University

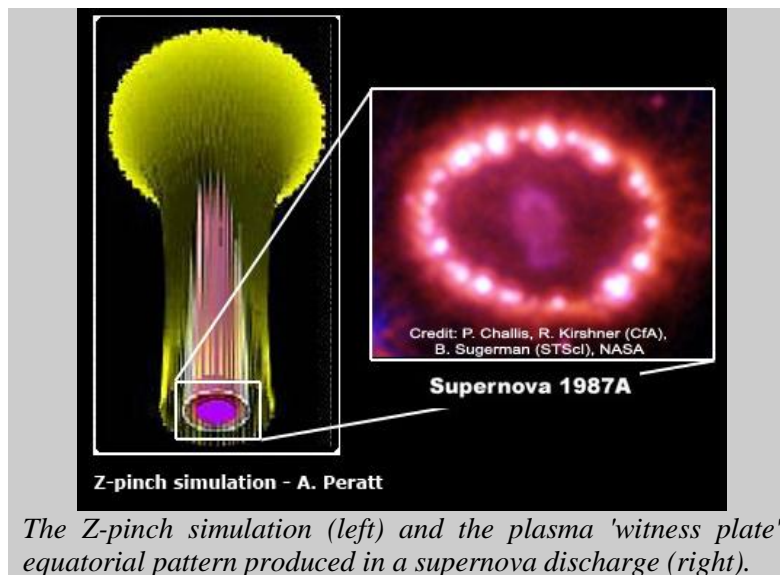


This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies. Picture credit: NASA/JPL-Caltech.

This diagram shows the development of a spiral galaxy like our Milky Way in an Electric Universe.

The long-range ($1/r$) electromagnetic interaction between pairs of intergalactic current filaments, known as "Birkeland currents," attracts matter from a vast volume of space. Where two filaments intersect, they form a spiral galaxy through the powerful electromagnetic "Z-pinch" effect. This concept has been tested in the lab and by 'particle-in-cell' supercomputer simulations. It shows that the extremely weak and limited-range ($1/r^2$) force of gravity has negligible effect in forming a spiral galaxy. It requires no dark matter or MOND!

Formation of the Milky Way galaxy in a cosmic Z-pinch offers a simple explanation for the discovery of satellite galaxies rotating in the same sense in the plane of the Milky Way galaxy.



The immense scalability of plasma phenomena allows us to use the dramatic example of the effects of a plasma Z-pinch on a stellar scale in [supernova 1987A](#) to explain what happens on a galactic scale. The Milky Way is formed in the central plasma column of the Z-pinch. Surrounding the Milky Way axially are a number of interacting plasma filaments arranged in concentric cylinders that have the potential to produce satellite galaxies. The number of filaments follows a characteristic pattern that suggests they will not be found "in hundreds." Peratt writes:

"Because the electrical current-carrying filaments are parallel, they attract via the Biot-Savart force law, in pairs but sometimes three. This reduces the 56 filaments over time to 28 filaments, hence the 56 and 28 fold symmetry patterns. In actuality, during the pairing, any number of filaments less than 56 may be recorded as pairing is not synchronized to occur uniformly. However, there are 'temporarily stable' (longer state) durations at 42, 35, 28, 14, 7, and 4 filaments. Each pair formation is a vortex that becomes increasingly complex."

The rotating "vortexes" of the Milky Way and its satellites are driven electrically and will be in the same sense and roughly coplanar.

On a grand scale, the recently discovered evidence for a preferred handedness and axial alignment of spiral galaxies can be explained simply as the result of the general vector of electric current flow in our small corner of an Electric Universe of unknown size and age, remembering that the big bang notions of the size and age of the universe are worthless. The commentary in the MIT Technology Review is revealing:

"...the axis of this alignment points directly towards the mysterious cold spot in the cosmic microwave background, which was discovered in the southern hemisphere in 2004. Nobody knows what caused the cold spot although there are no shortage of ideas. The cold spot could be evidence that our galaxy sits in the middle of a supervoid, a giant empty bubble, say some researchers. Others say it could be the imprint of a parallel universe beyond our own."

The evidence[2] is available that shows the "cosmic microwave background" (CMB) radiation is not "background" at all. It is a local radio "fog" from interacting Birkeland filaments *within* the Milky Way. The "cold spot" confirms that the "CMB" has no cosmological significance. It is commonsense that one hemisphere will be "colder" than the other, unless we just happen to be dead-center in the electric current stream of our arm of the Milky Way—an unlikely situation. As for the suggestion of a "parallel universe," it is a meaningless juxtaposition of words—sadly a regular feature of modern physics.

Clearly, the accepted gravitational cosmology of the big bang is hopelessly wrong. Galaxies are not formed by collisions and gravitational accretion. Such a mechanism can only produce random results, which we do not observe. The latest crisis for cosmology comes from relying on unempirical mathematical theorists, whose inappropriate training, dogged use of unsuitable concepts and confused language has led us astray for the entire 20th century. We are overdue for a sensible breakthrough in the 21st!

We are not required to guess or invent new laws. The laws we have are sufficient to understand the Electric Universe—when we truly understand those laws and where and when they apply.

Wal Thornhill

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The Mystery of the Shrinking Red Star

Posted on [June 28, 2009](#) by [Wal Thornhill](#)

We cannot see what is not on our mental 'map.' Almost the entire visible universe is in the form of highly-conductive plasma but electrical discharge in plasma is nowhere on the map.



The red supergiant star Betelgeuse, the bright reddish star in the constellation Orion, has steadily shrunk over the past 15 years, according to researchers at the University of California, Berkeley. Betelgeuse's radius is about five astronomical units, or five times the radius of Earth's orbit. The average speed at which the radius of the star is shrinking over the last 15 years is approximately 470-490 miles per hour. That means the star's radius has shrunk by a distance equal to the orbit of Venus

"We do not know why the star is shrinking, considering all that we know about galaxies and the distant universe, there are still lots of things we don't know about stars, including what happens as red giants near the ends of their lives."

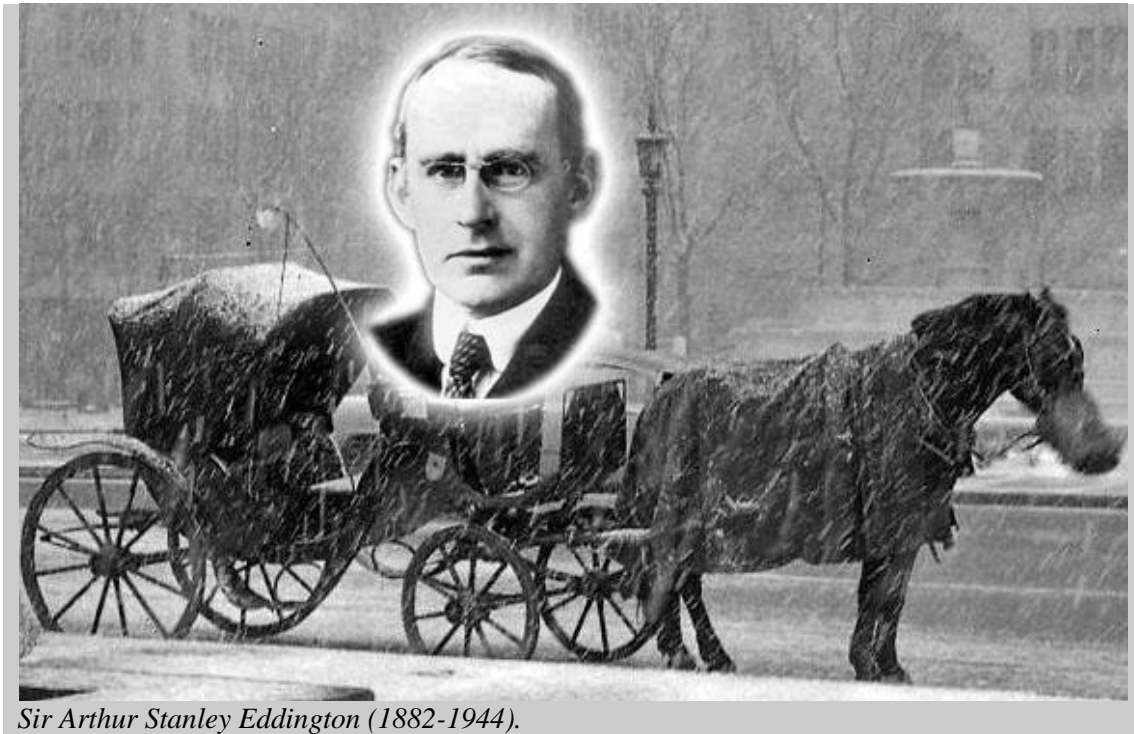
—Edward Wishnow, UC Berkeley's Space Sciences Laboratory.

This is the most recent admission of ignorance about stars. But it will make no difference because astrophysicists cannot see what is right in front of them. Most of their 'mental map' is missing. That is evident from the bold assertion about, "all that we know about galaxies and the distant universe," most of which, when [examined objectively](#), is knowledge that just ain't so. Astrophysicists, using their old-fashioned map of how stars work, will not solve the mystery of the shrinking red supergiant star—Betelgeuse.

A Bit of Stellar Perspective

There is a principle which is a bar against all information, which is proof against all argument, and which cannot fail to keep man in everlasting ignorance. That principle is condemnation without investigation.

—William Paley (1743-1805).



Sir Arthur Stanley Eddington (1882-1944).

I mean by an "old-fashioned view of how stars work," the self-gravitating, self-consuming ball of gas with a thermonuclear heat engine inside to 'pump it up' to the size and brightness we observe. The notion that a star (the Sun) might be powered externally was condemned without proper investigation by the pioneer of the thermonuclear model of stars, [Sir Arthur Stanley Eddington](#). As witness, his opening words in *The Internal Constitution of the Stars* (1930):

"At first sight it would seem that the deep interior of the sun and stars is less accessible to scientific investigation than any other region of the universe."

But immediately Eddington assumed a principle that cannot fail to keep man in perpetual ignorance of the real nature of stars:

"Radiant energy from the hot interior after many deflections and transformations manages to struggle to the surface and begin its journey across space."

This assumption, if correct, would make stars the only known bodies in the universe that transfer internal heat by radiation. Normally, conduction and convection do the job. So it is not a trivial assumption backed up by observation or experiment. The idea that stars are fuelled from the inside did not come from some scientific discovery. It is an idea as old as the discovery of fire. It was introduced as a belief, as an ideological perversion of science.

Eddington had a paternalistic put-down for any of his contemporaries so rash as to suggest that a star might be powered from the outside, and he succeeded very well in squelching any further theorizing in that direction. But his reasoning was flawed by assumptions he failed to recognize as such—for example: "Given, that energy flows out from the interior of a star."

—Ralph E. Juergens.

It is easy to see, with hindsight, that Eddington's influence combined with his peculiar views provided a 'mental map' to divert and to retard progress in understanding stars for a century. The forming, by gravitational collapse, of a star with a superhot core composed of the lightest gas, hydrogen, is a remarkable 'Heath-Robinson' construction based on the choice of an improbable model with consequent unlikely assumptions. It fails the observational test because nothing we observe on the Sun and above the Sun is predictable from the nuclear fusion model. And surprising new discoveries have required ad hoc additions to the model, while many basic observations remain unexplained—like the superhot corona above a "cold" photosphere.

"A star like the Sun is remarkable... We have the strange phenomenon of a relatively cool body in space enveloped in an immensely hot atmosphere. (We can note in passing that the Earth's upper atmosphere is hotter than its surface but this is less remarkable as in the Earth's case the energy comes from without.)"

- Prof. R L F Boyd, F.R.S., *Space Physics – the study of plasmas in space*, Oxford Physics Series. [Emphasis added]

"Science frequently makes choices between alternatives. Once the choice is made, however, scientists tend to unify behind the accepted alternative to the extent of denying and eventually forgetting that there was any 'real' choice made. Subsequent textbooks gloss over any possible alternatives, depicting science as a straightforward march up the one correct path toward truth. Since it is forgotten and denied that such choices existed, the results of these choices are rarely reviewed. Not only is there no provision, or incentive, for such a review, there is positive, and powerful, peer pressure against any such questioning of basic premises."

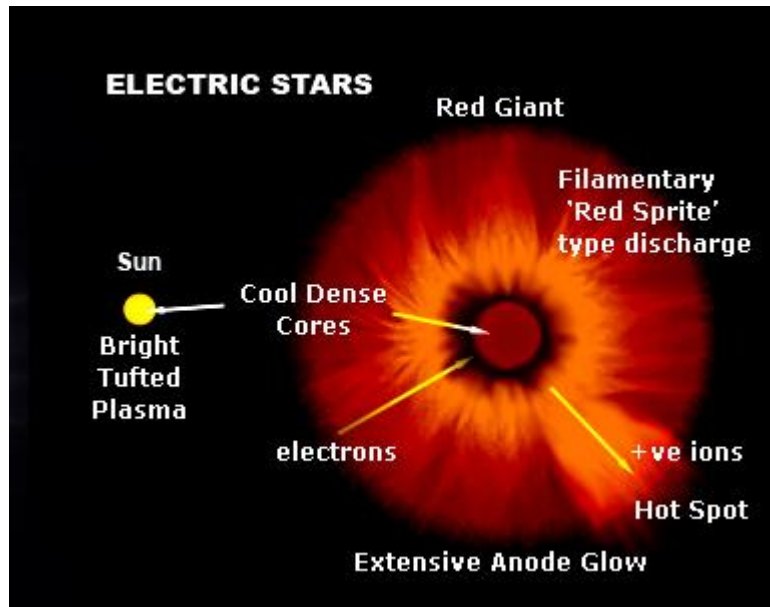
—Don L. Hotson.

The Electric Model of Red Stars

"Everlasting ignorance" of the real nature of stars is not an option. Plasma cosmologists have developed a simple and coherent model of galaxy and star formation using electrical energy operating in omnipresent cosmic plasma. The electric circuit model of galaxies and stars proposed by Hannes Alfvén can be extended to explain the complex magnetic fields and visible phenomena of the Sun. Only the disciplinary fragmentation of the 'mental map' of modern science allows astrophysicists to not see this crucial contribution to their subject. For example, astrophysicists puzzle over the 'rocket motors' they have found in active galactic nuclei, while across the campus plasma physicists announce their discovery of an electrically powered [plasma double layer rocket motor](#)! While as long ago as 1986, at a NASA conference on "Double Layers in Astrophysics," Alfvén said in his keynote address:

*"Double layers in space should be classified as a new type of celestial object." ***

Eddington's ideas should be regarded as a historical aberration of his gaslight era where light and heat were produced from hot gases. Compare that with our electrical world, where electrical energy generated perhaps hundreds of miles distant is used to light our cities and homes, and you can see the simple sense in proposing that Nature operates in the same manner. It makes even more sense when it is understood that plasma naturally forms invisible but detectable cosmic current filaments like our earthly power transmission lines. Stars are like galactic street lights, lighting the path traced by cosmic electrical energy flowing through the galaxy.



Low-mass electrons carry most of the electric current in space plasma. Galaxies and the stars within them seem to be "born" electron deficient by an efficient charge separation process observed in laboratory plasma discharges. Stars operate as positive anodes in a galactic glow discharge. I wrote about red giant stars in [Twinkle, twinkle electric star](#):

Red stars are those stars that cannot satisfy their hunger for electrons from the surrounding plasma. So the star expands the surface area over which it collects electrons by growing a large plasma sheath that becomes the effective collecting area of the stellar anode in space. The growth process is self-limiting because, as the sheath expands, its electric field will grow stronger. Electrons caught up in the field are accelerated to ever-greater energies. Before long, they become energetic enough to excite neutral particles they chance to collide with, and the huge sheath takes on a uniform 'red anode glow.' It becomes a red giant star.

The electric field driving this process will also give rise to a massive flow of positive ions away from the star, or in more familiar words—a prodigious stellar 'wind.' Indeed, such mass loss is a characteristic feature of red giants. Standard stellar theory is at a loss to explain this since the star is said to be too 'cold' to 'boil off' a stellar wind. And radiation pressure is totally inadequate. So when seen in electric terms, instead of being near the end point of its life, a red giant may be a 'child' losing sufficient mass and charge to begin the next phase of its existence— on the main sequence.

Internal heating doesn't cause the giant red glow of Betelgeuse. It is an electrical plasma glow like that seen in a neon tube. And like a neon or fluorescent light tube it is relatively cool. In fact, measurements of temperature (random motion) of a plasma in an electric field (directed motion) will be misleading because the electric field tends to align motions in one direction. Radio measurements of the temperature distribution in Betelgeuse's atmosphere give readings that decrease with distance from the photosphere and are lower

than those derived from the optical and ultraviolet (UV), where the temperature is calculated from theoretical model atmospheres. The radio astronomy findings could be explained by current flowing in radial filaments in the extensive, diffuse envelope of Betelgeuse, like the [red sprites](#) seen stretching up to the ionosphere above earthly thunderstorms.

Betelgeuse's size, seen in the more energetic UV light, is double its already gigantic dimensions in visible light. The existence of high-energy UV light at large distances above the star fits an external power source like that producing the superhot solar corona. What we are seeing is the same kind of plasma sheath effect that turns insignificant rocks in our solar system into comets like the recent [Comet Holmes](#) whose glowing electrical coma exceeded the size of the Sun. The visible disk of Betelgeuse tells us nothing about the physical size of the central condensed body. And like a cometary coma's changing size as it races toward and away from the electrified Sun, red giant stars alter their size in adjusting to their electrical environment.

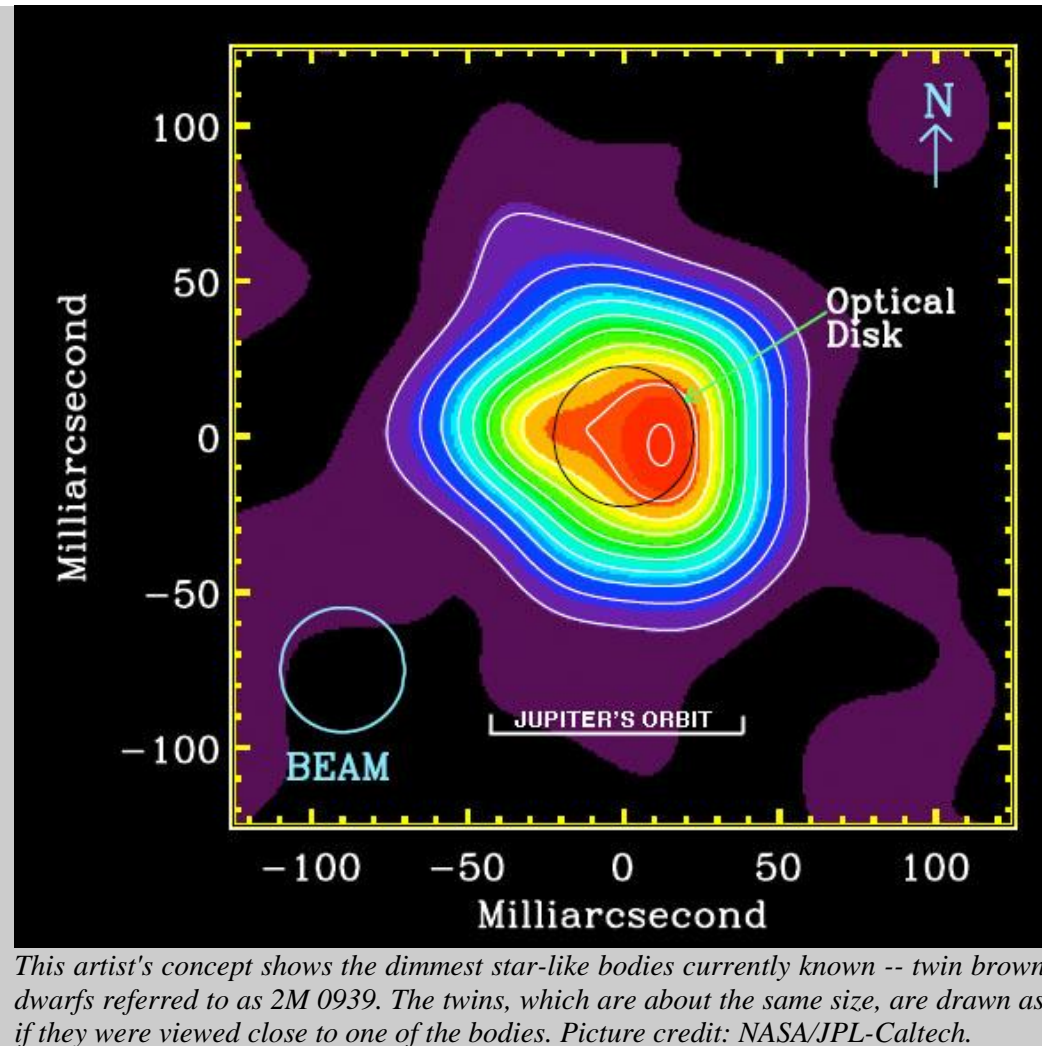
The UV image of Betelgeuse is smooth apart from the occasional hotspot. This is quite distinct from the UV image of the Sun, which typically has a mottled appearance due to many active regions. This smoothness of the light from Betelgeuse is a result of the quite different mode of plasma discharge of dim red stars from that of bright main sequence stars. It is the difference between the diffuse voluminous glow of a neon tube and the pinpoint light from an arc lamp.

The electric model of bright stars shows that there is an exquisitely simple control mechanism introduced by a bright photosphere. The photosphere acts like a [junction transistor](#) to regulate the current flow between the star and its environment. It results in a remarkably steady output of light and heat radiation despite a varying power supply. For example, the Sun, viewed in X-rays, is a [variable star](#). X-rays are generated high above the photosphere and are a measure of electrical power input. They reveal the variability of the Sun's power source. The photosphere generates the radiant output, which is stabilized by its [transistor effect](#).

Dim red stars like Betelgeuse do not have the same power control mechanism. They respond to variation in their power supply instead by varying the surface area of their glowing plasma sheath—in other words, their visible size. Our own Sun varies slightly in size, much to the puzzlement of astrophysicists. However, what is called "the photosphere" of Betelgeuse is physically and electrically nothing like the photosphere of bright stars.

The decrease in diameter of Betelgeuse over 15 years suggests a slow change in the power input to Betelgeuse. Shrinking is a normal response of a glow discharge plasma sheath to an increase in the availability of electrons from the galactic plasma. Such an increase may be due to rising current in the local galactic circuit. Or it may be due to a decrease in dustiness of the plasma near the star (dust particles tend to scavenge electrons). Our Sun registers such a change through the sunspot cycle and X-ray output. It

seems likely that Betelgeuse will expand or oscillate in size in future. The presence of hot spots on Betelgeuse should be correlated with changes in its diameter.



An image of Betelgeuse's atmosphere observed at a wavelength of 7mm with the VLA. Jupiter's orbit shows the scale of the supergiant. Credit: Jeremy Lim, Chris Carilli, Stephen White, Anthony Beasley, and Ralph Marson VLA, NRAO, NSF, NASA.

From Earth, we view Betelgeuse's pole. The radio image of Betelgeuse is not spherically or axially symmetric. This may be explained simply by the electrical model: the current flows toward the magnetic pole, which does not necessarily coincide with the rotational pole, and out in an equatorial current sheet, which may form jets that distort the atmosphere. I believe the hot spots seen on Betelgeuse are the result of bright arc discharges or 'stellar lightning' near the pole. Such lightning causes upwelling of matter from the star high into its atmosphere, which would explain the warm so-called "convective cells" conventionally thought to be responsible for the hot spots. Stars do not convect heat from their interiors. Photospheric granulation is a plasma ['anode tufting'](#) phenomenon.

The report states that Betelgeuse's visible brightness, or magnitude, has shown no significant dimming over the past 15 years despite the star's shrinkage. This seems odd if the bloated atmosphere were due to heating from the star. However, the electrical model may offer a simple solution. As the red supergiant's atmosphere shrinks, the anode glow remains. It is rather similar to merely shortening a neon tube. The luminous efficiency increases with the increasing particle density nearer the star, which could offset the loss of emitting surface.

The conventional model of red supergiant stars like Betelgeuse is a story of the incredibly complicated series of thermonuclear processes that progressively "burn" through the periodic table from hydrogen through helium and on up to iron. Each process is supposed to occupy a thin shell that moves outward as the star ages. But iron is the end of the line for thermonuclear transformation: When the iron core grows so massive that the atoms can no longer resist the gravitational pressure, it collapses into a superdense state, and the star explodes as a supernova. Given that Betelgeuse is the closest red supergiant, the reported shrinkage of Betelgeuse has given rise to fears in major news media about the "dying star" and the damage it might cause on Earth if it were to explode.

Such fear is misplaced. The evolutionary story of self-immolating thermonuclear stars is wrong. Betelgeuse is merely a young star that has not achieved the kind of electrical equilibrium that comes with a bright main sequence photosphere. And [supernovae](#) are galactic "electrical circuit breakers," not a fanciful stellar implosion followed by explosion. There is, in fact, firm evidence of external triggering of supernovae, which is shown in the non-random periodic behavior of extragalactic supernovae. Plasma physicist Anthony Peratt has noted, "Supernovae in the plasma community are viewed as the release of energy from a galactic-dimensioned filament." And the aftermath of a supernova is clearly [an axial Z-pinch plasma discharge configuration](#).

"Astronomers can tell the temperature of the central regions of the Sun and of many other stars within a few percentage points and be quite sure about the figures they quote."

A Star Called the Sun, —George Gamow.

"Logic is an organised system of thought that enables you to be wrong with confidence."

—Charles Franklin Kettering.

** [Pdf available online](#). Warning! – 6.9MB file.

Wal Thornhill

The Simple Electric Universe

Posted on [September 6, 2009](#) by [Wal Thornhill](#)

"Some people in each successive generation believe that theirs is the one that has at last seen everything clearly, that their insights point to the truth, the final answer. Yet scientific discovery marches on and today's truth will become tomorrow's anecdotes."

—Gerrit L. Verschuur, *Interstellar Matters*



The Southbank & the Millennium Bridge, London, August 2009. Cameramen: Chris Phillips, Gerald Pecksen. Photo: John Morgan.

Since my last report I have been in England where I convened a meeting of people actively concerned with the Electric Universe and the problem of educating the public. Gaining attention for a simple electrical model of the universe is a problem because the media is devoted to the science fiction of the big bang. The noted astronomer, Fred Hoyle, wrote prophetically in *Of Men and Galaxies* (1964):

"More and more the professions will cross over into the entertainment field. Those of us who are not employed directly in industry will come to realize that what we are really in is 'show biz.'"

Much earlier, [Georg Christoph Lichtenberg](#) (1742-1799) was even more prescient:

"A man cannot strongly enough ask of Heaven: if it wants to let him discover something, may it be something that makes a bang. It will resound into eternity."

For the sake of science I hope not. The big bang was not "discovered" but contrived by mathematicians following the proposal of a Belgian Roman Catholic priest and astronomer, George Lemaitre, for the origin of the universe from a "primeval atom" or "Cosmic Egg exploding at the moment of the creation." The theory defies physics principles and is unrealistic, needing most of the matter in the universe to be invisible (not even dark) and a mysterious 'dark' energy. Even galaxies must have [mathematical figments](#) (black holes) at their hearts to explain just a few of their characteristics. Hoyle believed one single, usually simple, observation could unseat a strongly established prejudice like the big bang. But when you believe in theories like the big bang, logic has no dominion and any observation can be accommodated.



How is it that cartoonists can see through humbug while others cannot? Credit: Wiley Miller

The Electric Universe is developed upon plasma cosmology, which is a recognized discipline within the practical electrical engineering profession through the Institute for Electrical and Electronic Engineers (IEEE). Refereed papers on plasma cosmology are

published in the IEEE Transactions on Plasma Science. The freewheeling discussion in that journal is reminiscent of the science journals of more than a century ago, not the monoculture of the big bang today. My paper on the electrical nature of supernovae and stars was published there in 2007. [It is curious that astronomers' plot stellar colors and brightness (the Hezprung-Russell diagram) like "Alice through the Looking Glass." Left and right are reversed, which makes it difficult to see the obvious connection between the electrical power arriving at a star and the star's color, size and brightness]. Unlike big bang cosmology, plasma cosmology is subject to experimental tests in the laboratory and follows the Lichtenberg experimental tradition. Any 'bangs' it creates are real and noisy. Plasma cosmology can demonstrate with simple physical principles the electrical formation and behavior of spiral galaxies and stars without recourse to hypothetical dark matter and black holes.

Almost the entire visible universe is composed of plasma—a gas where some of the atoms have lost an electron or two. However, unlike the gases we are familiar with on Earth, plasma reacts strongly to the presence of electromagnetic fields and is a better conductor than copper. Its behavior has been described as complex and "life-like." That should be a clue! The universe is principally an electrical plasma phenomenon.

Electricity exists in space. Magnetic fields detected in space can only be generated by electric currents. Radio telescopes routinely map galactic magnetic fields and their field configuration matches that found in plasma cosmology experiments. If science were the advertised open pursuit of truth, we should expect big bang cosmologists to be rushing to the plasma labs. Not a bit of it. They are principally theoretical mathematicians. We strike the artificial modern barrier of specialism. The cultural historian, Jaques Barzun, defined specialism as:

"a piece of etiquette which decrees that no specialist shall bother with the concerns of another, lest he be thought intruding and be shown up as ignorant. Specialism is born of what the philosopher Arthur Balfour called 'the pernicious doctrine that superficial knowledge is worse than no knowledge at all.' Rampant specialism, an arbitrary and purely social evil, is not recognized for the crabbed guild spirit that it is, and few are bold enough to say that carving out a small domain and exhausting its soil affords as much chance for protected irresponsibility as for scientific thoroughness."

—*Science: the glorious entertainment.*

The plasma cosmologist Eric Lerner, author of *The Big Bang never Happened*, says:

"one of the most destructive features of the methodology of the big bang is that it conveys the idea that only people versed in extremely complicated mathematics can understand the universe... This is, of course, the argument of the emperor's new clothes. If you can't see the emperor's new clothes you must be either stupid or incompetent."

Engineers are neither stupid nor incompetent. Much of the hyped success of science over the last century can be attributed to engineers. And it is engineers who tend to prefer the real-world simplicity of the Electric Universe to the metaphysics of the big bang and black holes.

The Simple Electric Universe

A signature of a good theory is its simplicity. One of the participants at the London meeting concluded:

"I think the Electric Universe is actually very simple."

In essence, everything hinges on the question of whether or not electricity exists in space. The mainstream view is that it does not; we argue that it does. Everything else flows from that.

What we are attempting to do is bring about a scientific revolution; The Electric Revolution. This Revolution will have as far-reaching consequences as the Copernican revolution, which was also based on one simple idea, is the Earth or the Sun at the centre?

Like the Copernican revolution, the data can be interpreted in both ways; Copernicus did not phrase his argument that the Sun was at the centre; he merely suggested that it was an awful lot easier to interpret the data if, for the sake of calculation alone, one pretended that it was. In the same way, I believe we are essentially suggesting that it's an awful lot easier to explain the observed behaviour of the universe if one allows electricity to have a role. Yes, you can develop a gravity-only model that gives the right answers, but having to live with 96% of the resulting universe being dark and unobservable is no better than having to have multiple levels of epicycles to explain the planetary motions around the earth.

That's why it's so simple. Just assume electricity is there and it all becomes a whole lot easier."

—Bob Johnson

History will show that our present big bang cosmology is an unfortunate accident of timing. The foundations of the big bang story were being laid down early in the 20th century. At the same time, electric lights were just being introduced and the study of electric discharges in gases was in its infancy. The result was that Einstein's new, esoteric geometric theory of gravity that treats empty space as an 'object' capable of being warped, was combined with a curious interpretation of the redshift from faint extragalactic objects (that was not favored by Hubble himself as being physically likely) to produce the notion of an expanding universe. The fact that this defied a principle of physics in creating matter from nothing at the beginning, or big bang, seems not to have concerned theorists. It should have. Invoking "the ultimate free lunch" is not science. On the other hand, based on observation the Electric Universe assumes a universe of unknown age and extent.

"Who, indeed, are we as a species to dare ask such mighty questions as concern the origin of the universe and in unique arrogance believe we may have the correct answer within cosmic microseconds of the asking."

—Gerrit L. Verschuur, *Interstellar Matters*.

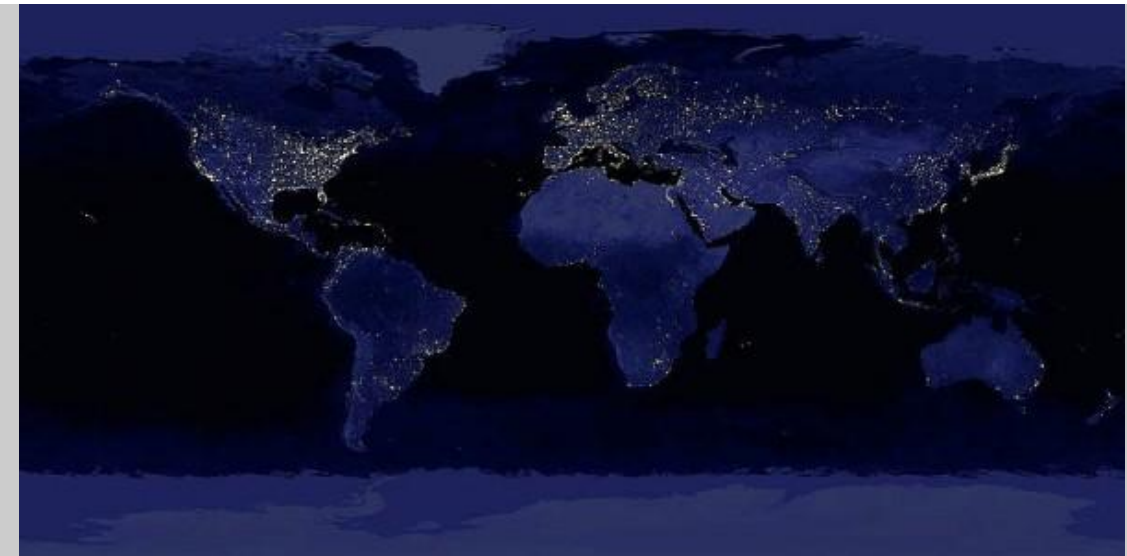


Gerrit Verschuur, radio astronomer and popularizer of astronomy. Past director of the Fiske Planetarium, U. of Colorado, Boulder, CO. Radio astronomy is a crucial tool for mapping cosmic circuitry in an Electric Universe.

The intellectual hubris of big bang theorists is shocking when we find that science cannot explain the simplest phenomena associated with matter. Mass, gravity, magnetism, and light are a mystery. We have equations that describe what happens when a charged particle is accelerated; you drop something from a height; a current passes down a wire; and light strikes a surface. But mathematical descriptions do not constitute a physical explanation.

Meanwhile, the last century has seen great progress in understanding the phenomena of electricity in vacuum tubes, arc lamps, arc welders, industrial electric discharge machining and ultra high-energy experiments at Los Alamos National Laboratories and Sandia Laboratories. Electrical engineers were the first to see striking parallels with astronomical phenomena, beginning with the Earth's aurorae.

The Norwegian, [Kristian Birkeland](#), in the early 1900s set up an electromagnetic observatory inside the Arctic circle. He associated the magnetic effects of aurorae with electric currents flowing between the Sun and the Earth. His electrical "Terrella" or "little Earth" experiments were able to reproduce the features of aurorae, sunspots, comets, etc. The **big lesson** from the Terrella experiments is that they required *external electrical power generated some distance away*. In recent years his name has been applied to the electric currents discovered in space—"Birkeland currents."



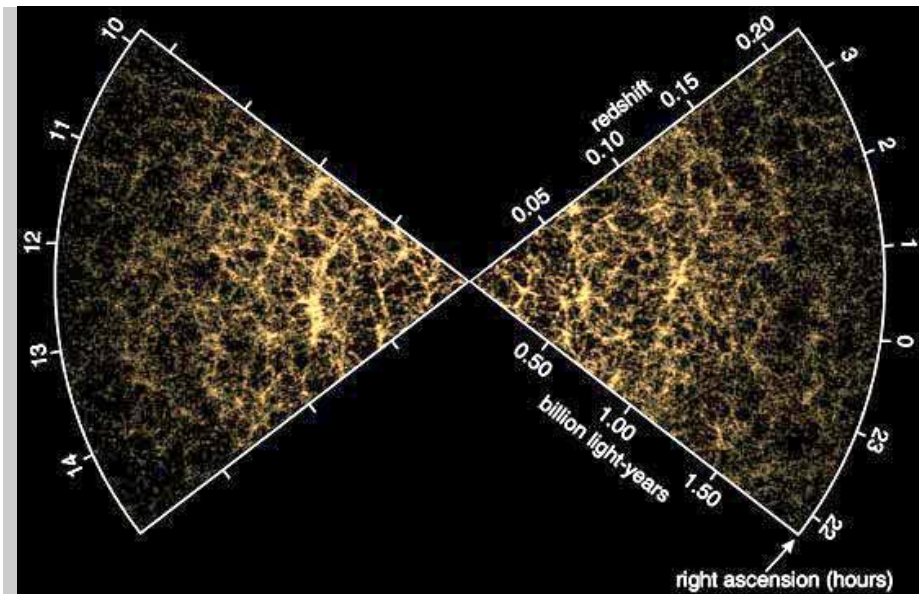
Composite image of the Earth at night. Image by Craig Mayhew and Robert Simmon, NASA GSFC.

Engineers find it easy to light our cities with electrical power generated at some distance from the city. It never occurs to astronomers that Nature uses the same simple method of lighting galaxies. They have never considered that stars might be a cosmic electrical phenomenon, like streetlights tracing the path of power lines. It was Dr. Charles Bruce, a fellow of the Institute of Electrical Engineers as well as of the Royal Astronomical Society, whose work on lightning allowed him to identify [electrical activity on the Sun, on stars and in galaxies](#).

The Nobel Prize winning [Hannes Alfvén](#) was trained as an electrical engineer but went on to produce much of the theoretical underpinning of electrical behavior in the Electric Universe. An article about his work with the title "Alfvén's Electric Universe" appeared in the Boston Globe on Monday, March 20, 1989. Alfvén insisted that it was of prime importance to understand cosmic circuitry. But astronomers ignored him.

So discoveries about lightning and auroras continue to surprise physicists even in this space age. Perhaps there is a good reason for this. Our Earthly experience is one of solids, liquids and gases. The region we inhabit between the ionosphere, some 80km above us, and the surface of the Earth, is one of the rarest environments in the universe. We inhabit part of the .001% or less of the universe where plasma is not to be found naturally except in the lightning bolt and occasional aurora. Plasma has been termed 'the fourth state of matter' but in view of its ubiquity it would be better termed 'the fundamental state of matter.'

It is a state where neutral atoms are mixed with charged particles, positive and negative. These particles may be as small as electrons and protons or may range up to the size of molecules and dust particles. In a gaseous plasma, like we find throughout the universe, the charged particles respond more strongly to electromagnetic forces than they do to mechanical or gravitational forces. One of the results we see in lightning is the constriction of electric currents to form long filaments. And the filamentary nature of plasma in space is well documented. No dark matter, sprinkled where required to save a theory, is necessary.



Survey of the nearby universe maps the distribution of about 75,000 galaxies (small blue dots). The placement of each galaxy in the radial direction is proportional to its distance from the Earth (which is located at the intersection of the two wedges), and its angular position (or right ascension in hours of arc) corresponds to its location along a thin strip in the sky. The galaxies clearly trace a network of filamentary structures. Image courtesy of the 2dF Galaxy Redshift Survey team.

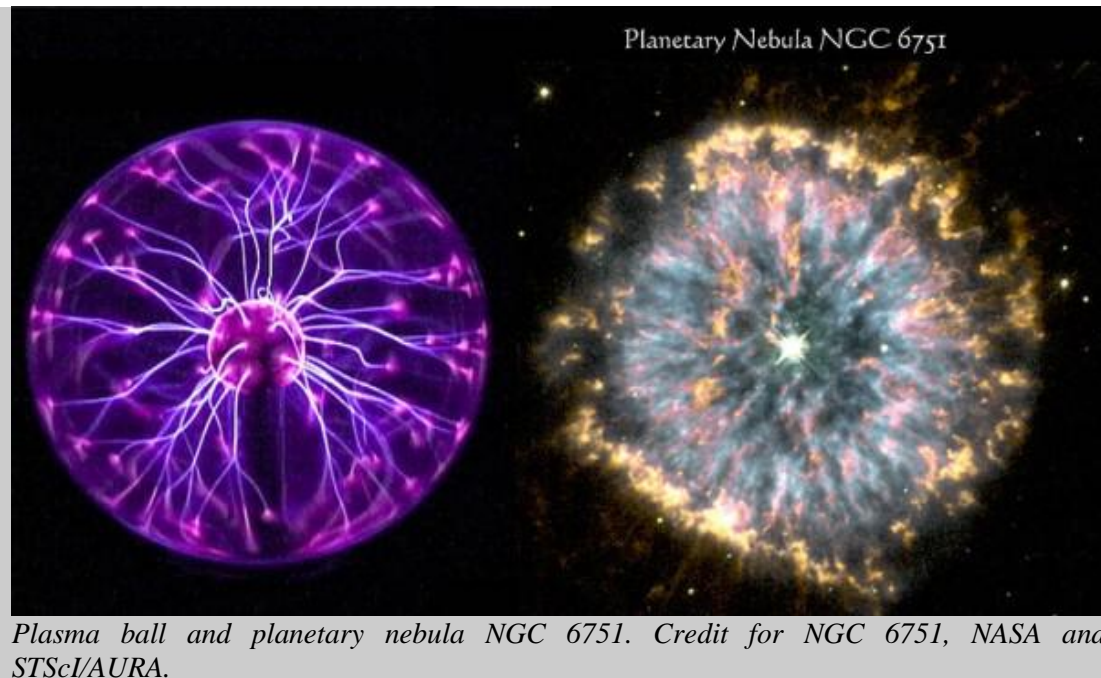
The Electric Universe assumes that Nature is not wilfully hiding her secrets. The complexity we observe in the universe comes from very simple electrical principles, some of which can be tested with very simple apparatus. Science is open to everyone. The visible universe is an electrical phenomenon, from the structure of subatomic particles to the superclusters of galaxies in deep space.



This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies. Picture credit: NASA/JPL-Caltech.

Playing with a magnet and a plasma discharge tube, the "Aurora Borealis Tube Display," by Resonance Research Corporation.

The Electric Universe model is simple enough that it can be taught to young children, but it first requires that cosmology is actually included in the science curriculum and then treated with a reasonable level of importance (the subject of a forthcoming article). For the more mature student, the science curriculum should include studying the behaviour of electricity in gases. Everyone is familiar with lightning. Most have seen fluorescent and neon lights. And the writhing "life-like" filaments in the novelty 'plasma ball' are a favorite with kids. But familiarity with lightning and neon lights does not equate with understanding. Lightning and the plasma behavior inside those glass tubes and balls are a mystery to almost everyone. Yet the environment inside those objects most closely equates to that of the rest of the universe.



The outgoing president of the International Astronomical Union (IAU) 2009, [Catherine Cesarsky](#), said recently:

"I think young scientists should guard themselves against brainwashing. They should look beyond the road maps, even if we put the best we know in them. Also, they should resist specializing too much at the cost of the big picture. The best way to escape [the] bandwagon effect is to look at things from a distance, to connect different ideas."

It is time for another idea in astronomy. The Electric Universe is a new 'big picture' of the universe that "looks at things from a distance and connects different ideas." If science has become 'show biz,' the broad panorama of the Electric Universe is fitted for an Imax theatre show like nothing else before it. The Electric Universe releases us from the confining eggshell of big bang metaphysics and propels us into the real universe. Our future depends on it. The possible scientific, technological and cultural advances will be, as Arthur C. Clarke so ably expressed it, "*indistinguishable from magic.*"

Wal Thornhill

My thanks to Bob Johnson and Gerald Pecksen for their help in London and their valuable views about an Electric Revolution.

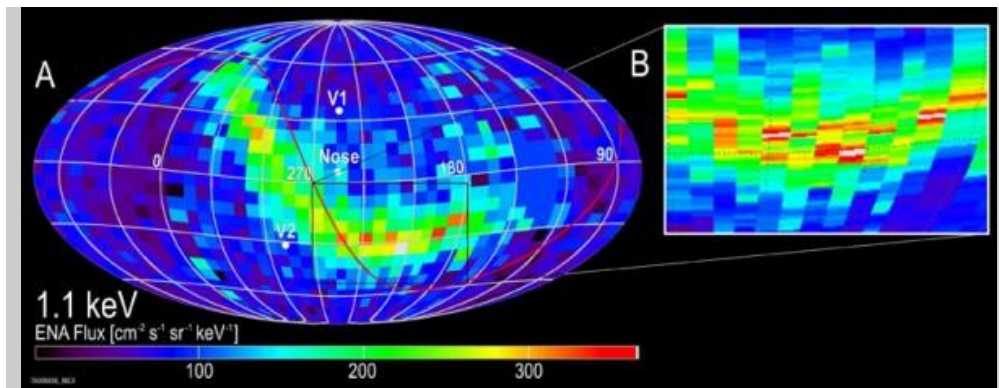
Electric Sun Verified

Posted on [October 20, 2009](#) by [Wal Thornhill](#)

"Is it likely that any astonishing new developments are lying in wait for us? Is it possible that the cosmology of 500 years hence will extend as far beyond our present beliefs as our cosmology goes beyond that of Newton?"

—Fred Hoyle, *The Nature of the Universe*

NASA's IBEX (Interstellar Boundary Explorer) spacecraft has made the first all-sky maps of the boundary between the Sun's environment (the heliosphere), and interstellar space. The results, reported as a bright, winding ribbon of unknown origin which bisects the maps, have taken researchers by surprise. However, the discovery fits the electric model of stars perfectly.

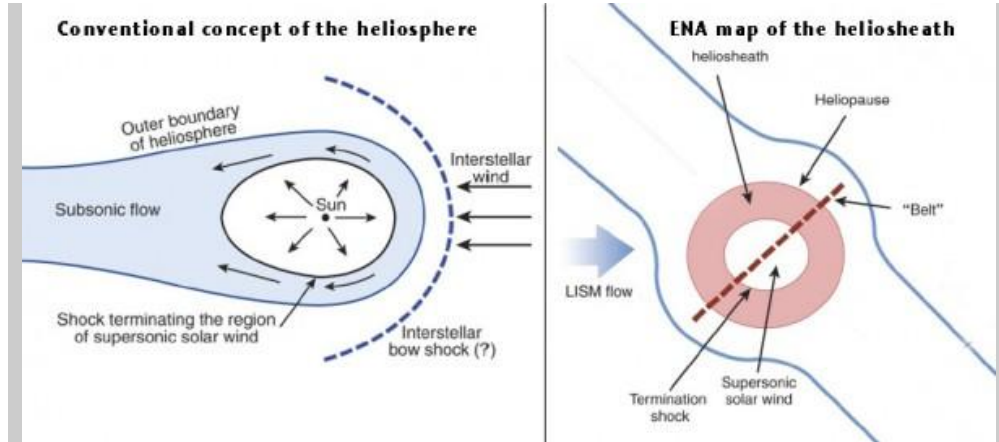


Voyagers 1 and 2 (V1 and V2 above) reached the boundary of the Sun's influence in 2005 and 2007, respectively, taking measurements as they left the solar system. Before IBEX, there was only data from these two points at the edge of the solar system. While exciting and valuable, the data they provided about this region raised more questions than they resolved. IBEX has filled in the entire interaction region, revealing surprising details completely unpredicted by any theories. This shows some of the fine detail of the ribbon in the blow-up section. Credit: SwRI*

[*See [Voyager 1 at the Edge - of What?](#)]

The meter-wide, hexagonal IBEX monitors the edge of the solar system from Earth orbit by "seeing" the heliosphere's outer boundary in the "light" of energetic neutral hydrogen atoms (ENA's). The news releases of October 15 highlighted the difficulties this discovery causes. *"The thing that's really shocking is this ribbon,"* says IBEX principal investigator David McComas of Southwest Research Institute in San Antonio, Texas. Researchers had expected gusts in the solar wind blowing against the boundary to create 20% or 30% variations in ENA emissions, but the ribbon is 10 times that intense—a narrow band blazing across the sky like some Milky Way on fire. Charged particles have apparently become bunched along the ribbon near the boundary, says McComas, but how

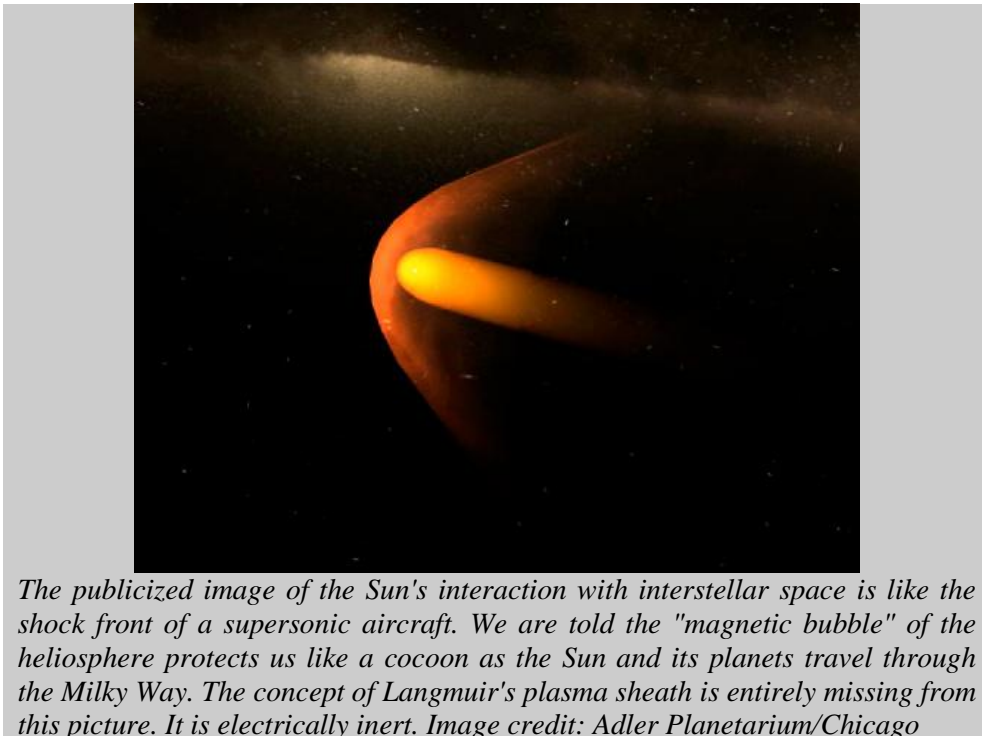
they got there *"is still a big mystery. Our previous ideas about the outer heliosphere are going to have to be revised."* *"I'm blown away completely,"* says space physicist Neil Murphy of NASA's Jet Propulsion Laboratory in Pasadena, California. *"It's amazing, it's opened up a new kind of astronomy."*



Annotated summary of basic findings from the ENA maps of the heliosheath by researchers from the Saturn Cassini mission. Credit: S. M. Krimigis et al., The Johns Hopkins University Applied Physics Laboratory.

"The expectations of NASA scientists are not being met because their shock front model is incorrect. The boundary that Voyager has reached is more complex and structured than a mechanical impact."

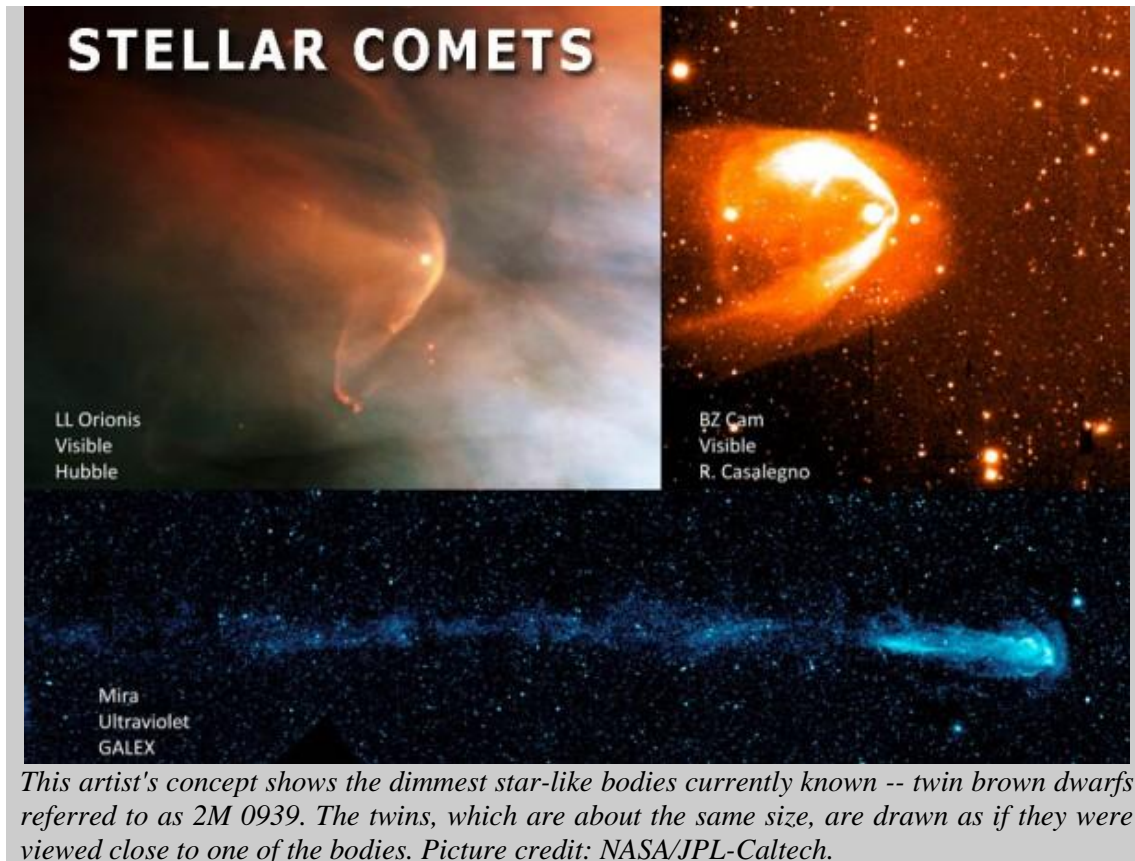
—Wal Thornhill, September 2006.



The publicized image of the Sun's interaction with interstellar space is like the shock front of a supersonic aircraft. We are told the "magnetic bubble" of the heliosphere protects us like a cocoon as the Sun and its planets travel through the Milky Way. The concept of Langmuir's plasma sheath is entirely missing from this picture. It is electrically inert. Image credit: Adler Planetarium/Chicago

IBEX has discovered that the heliosheath is dominated not by the Sun but by the Galaxy's magnetic field. Since the galaxy's magnetic field traces the direction of interstellar electric current flow in space near the Sun, it is a result that conforms to the EU model of [galaxies](#) and [stars](#).

It is necessary to acknowledge that the cometary heliosphere model seems reasonable when some images of stars *do* have a cometary appearance. [Examples of cometary stars](#) are provided in the NASA news report:



This image shows photographs of the heliospheres around other stars (called astrospheres) taken by a variety of telescopes. Credit: SwRI (Note that the title of the original has been changed here from "Astrospheres" because it makes the unsupported assumption that all stars have them in this cometary form).

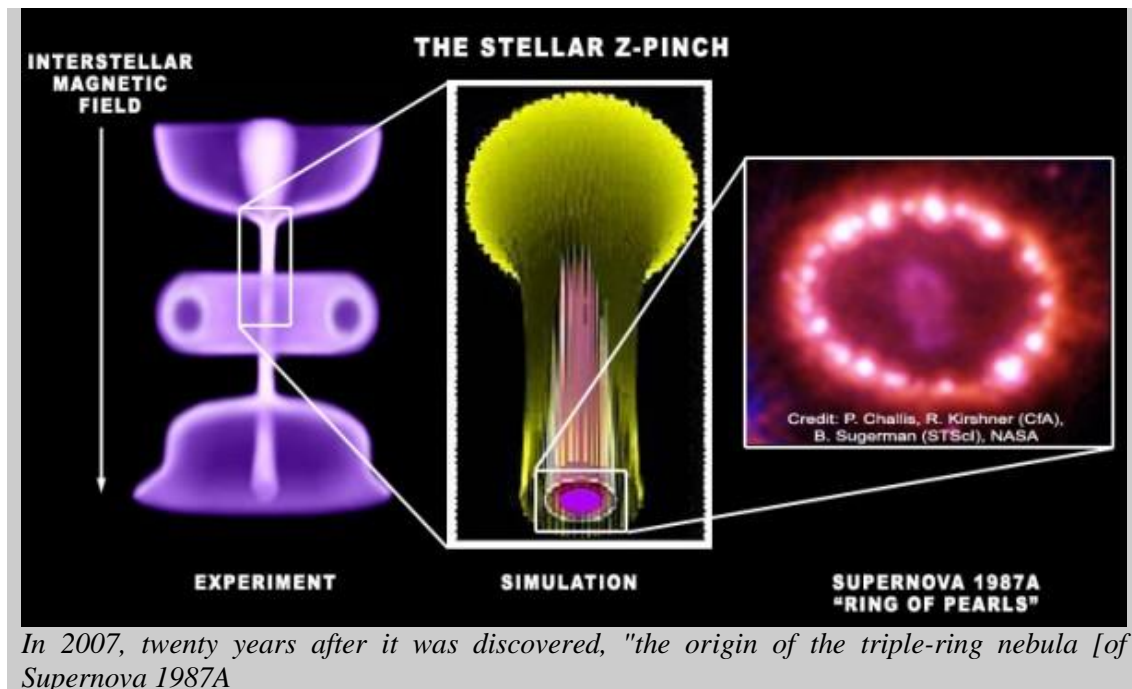
Cometary phenomena are not a simple mechanical effect of an object plowing through a thin gas. Comets are an electrical phenomenon where the comet nucleus is a negative cathode in the Sun's plasma discharge. Examples of cometary stars are uncommon because stars are normally a positive anode in the galactic discharge. Characteristically, cathodes tend to jet matter into the plasma to form spectacular comas and tails, as seen above. Stars may become comets in the process of electrical capture by a more highly charged star. **It is a mistake to assume a cometary astrosphere model for *all* stars.**

However, a more fundamental conceptual error is to invoke stellar and galactic "winds" and the notion of tails being "swept downstream." Astrospheres and comets are plasma discharge phenomena! Electrodynamics govern them. Discussions about the "external magnetic forces of the galactic wind" dominating the shape of the heliosphere highlights a curious blindspot in astrophysics. In 1970 the late Hannes Alfvén counseled against the notion that magnetic fields can exist in space while ignoring their origin in cosmic electric currents and their circuits. Alfvén predicted an imminent "crisis in cosmology." I'm sure he never imagined that scientific revolutions could take a century or more in this era of global communication. But specialism and specialist jargon is the enemy of communication and the wide-ranging investigation needed to compose the "big picture" we call cosmology. And no scientist likes to admit their specialty is in crisis.

For a more detailed perspective on the astrophysical crisis, I recommend my earlier article of April 2007, "[The Astrophysical Crisis at Red Square](#)." There I wrote:

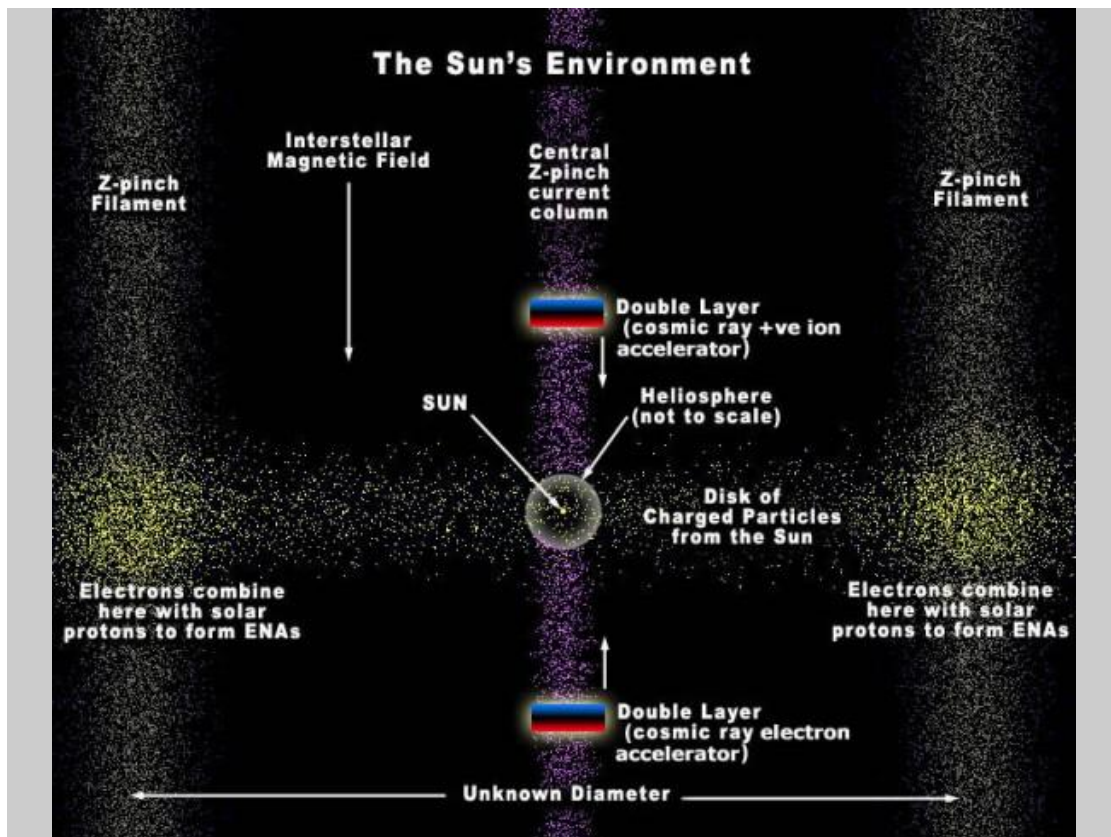
"Alfvén pioneered the stellar circuit concept and it seems his 'wiring diagram' is essentially correct but incomplete because it does not show the star's connection to the larger galactic circuit. Alfvén remarked, "The [stellar] current closes at large distances, but we do not know where." Plasma cosmologists have supplied the answer by mapping the currents flowing along the arms of spiral galaxies. It is but a small step from there to see that all stars are the focus of Z-pinches within a galactic discharge. Normally the current flows in 'dark mode' so we don't usually see the spectacular bipolar 'wiring harnesses' of hyperactive stars."

The diagram appearing in that article is shown below, re-annotated.



Meanwhile, in 2005 I explained all three rings of [supernova 1987A](#) in terms of a stellar plasma Z-pinch. Above we see the essential features of a plasma Z-pinch experiment (left); the details of the concentric Birkeland current filament cylinders (center); and the 'witness plate' resulting from the galactic Birkeland current filaments in that cylinder striking the matter in the disk expelled from the star at the focus of supernova 1987A. The bright beads are like the effect of a ring of searchlights punching through a thin cloud. The tendency for pairing of the bright circular spots and the extremely slow expansion rate of the equatorial ring suggest the Z-pinch model is correct.

A normal star will have the same Z-pinch environment as a supernova but at a much lower energy. So instead of a brilliant ring of lights in the sky, astronomers detect a 'bright ribbon' of ENA's, caused by modest excitation of matter from the Sun's stellar "wind" by the local galactic Z-pinch.



This diagram shows a conceptual cross-section along the central axis of the stellar Z-pinch at the Sun's position. Whether the double layers exist within or outside the heliosphere is unknown. The diameter of the encircling cylinder is unknown. That of supernova 1987A is of the order of a light-year, which would make the diameter of the heliosphere more than 600 times smaller! Note that as a rotating charged body the Sun's magnetic field is not aligned with the interstellar magnetic field and Z-pinch axis. The Sun's magnetic field only has influence within the tiny heliosphere but it is modulated by galactic currents. Alfvén's axial "double layers" (DLs) have been included although their distance from the Sun is unknown. DLs are produced in current carrying plasma and are the one region where charge separation takes place in plasma and a high voltage is generated across them (see discussion below).

The Z-pinch model offers a simple explanation for the "giant ribbon" found wrapped around the heliosphere. The Z-pinch is naturally aligned with the interstellar magnetic field. Solar "wind" ions are scattered and neutralized by electrons from the Birkeland current filaments to form ENA's coming from the Z-pinch ring, a giant ring about the solar system and orthogonal to the interstellar magnetic field.

The Sun's heliospheric circuit is connected to the galaxy via the central column and the disk of charged particles. The current path is traced by magnetic fields. The "open" helical magnetic fields discovered high above the Sun's poles by the Ulysses spacecraft are supportive of Alfvén's stellar circuit model. And the solar "wind" would seem to connect to the broader disk of charged particles about the heliosphere.

Given the detail in this model we should expect, as more data comes in, that researchers may find in the ENA "ribbon," bright spots, filamentary structures, and movement of the bright spots consistent with rotation of Birkeland current filament pairs and their possible coalescence.

The Science journal reports the opinion of one of the researchers that:

"sorting out the heliosphere's true shape will take more time ...the geometry's tough. The shape is no doubt somewhere between the two extremes of ideal comet and pure bubble, but all agree that researchers will have to understand how the ribbon forms to know the heliosphere's true shape."

That is true, but scientists will continue to suffer surprises while they have "no doubt" that the galactic wind and the interstellar magnetic field are the dominant forces that shape the heliosphere.

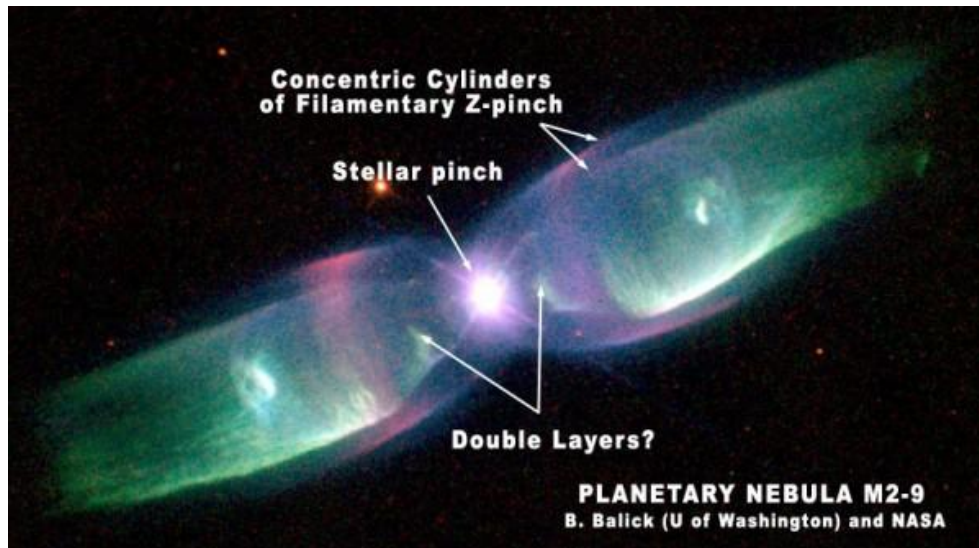
Researchers are keen to see how changes in the solar wind affect the ENA observations as the sun moves toward the maximum of its 11-year cycle. Such observations are very important. The solar cycle is controlled by its local galactic Z-pinch, so any variation in ENA's may provide some clues about the origin of the quasi-cyclic variability in the circuit supplying DC electrical power to the Sun or "solar cycle." The "brightness" of the ENA's should vary, probably out of phase with the solar cycle.

In 1984 Alfvén predicted from his circuit model of the Sun there are two double layers, one connected to each pole at some unknown distance from the Sun or heliosphere. He wrote:

"As neither double layer nor circuit can be derived from magnetofluid models of a plasma, such models are useless for treating energy transfer by means of double layers. They must be replaced by particle models and circuit theory... Application to the heliospheric current systems leads to the prediction of two double layers on the sun's axis which may give radiations detectable from Earth. Double layers in space should be classified as a new type of celestial object."

— *H. Alfvén, Double Layers and Circuits in Astrophysics, IEEE Transactions On Plasma Science, Vol. PS-14, No. 6, December 1986.*

There is some other research to be encouraged by this ENAs discovery, which should throw further light on the Sun's electrical environment. The axial double layers should be detectable as nearby, fluctuating radio and cosmic ray sources. In fact their oscillation may modulate the current flow and be a source of the solar cycle. Already there has been a [report](#) of an unexplained high-energy cosmic ray "hot spot" roughly in the direction of the inferred "heliotail." The energies of the cosmic rays are in the range possible by acceleration in a galactic double layer (Carlqvist). Confirmation may soon come from observations of high-energy cosmic-ray electrons. The electrons undergo synchrotron and inverse Compton scattering losses and thus cannot travel very far from their sources, which makes them sensitive probes of nearby galactic sources and propagation. If the diagram above is close to the real situation then we might expect cosmic-ray electrons to arrive from the double layer in the opposite direction in the sky to the nuclear cosmic rays.



The EU model is based on a hierarchy of repeated patterns of plasma behavior, from the size of a galaxy down to a few centimeters in the laboratory. Therefore it is subject to experimental confirmation, unlike most astrophysical theory today. So discoveries from space like this one should trigger experiments in plasma laboratories around the world instead of theorists wasting resources by conjuring up ever more complex and unlikely models based on invalid concepts of space plasma. IBEX's recent results that have taken researchers by surprise have given yet more strength to the EU model, a model that confidently predicts that the shape of the Sun's galactic plasma environment is the hourglass, Z-pinch shape of planetary nebulae and supernovae, aligned with the local interstellar magnetic field. The beautiful symmetrical patterns that arise in plasma discharges from very simple principles renders all modeling that ignores the electrical nature of matter and the universe worthless.

Wal Thornhill

Science, Politics and Global Warming

Posted on [December 23, 2009](#) by [Wal Thornhill](#)

"In the end, science offers us the only way out of politics. And if we allow science to become politicized, then we are lost. We will enter the Internet version of the dark ages, an era of shifting fears and wild prejudices, transmitted to people who don't know any better. That's not a good future for the human race. That's our past."

—Michael Crichton, *"Environmentalism as Religion,"* (A lecture at the Commonwealth Club, San Francisco, CA, September 15, 2003).



The Global Warming circus in Copenhagen was politics driven by a consensus that, by definition, has nothing to do with science. The apocalyptic nonsense that opened the meeting highlighted that fact. How many who attended or demonstrated at the meeting actually understand the (disputed) scientific grounds for the hysteria? Meanwhile, leading science journals allow skeptics of Anthropogenic Global Warming (AGW) to be labelled "deniers" and refuse them the right of reply. It is doctrinaire denouncement, not science. It is the journal editors who are denying the scientific method by censoring debate. It is they who are peddling ideology.

Despite the glossy media image, modern science is a mess. When the fundamental concepts are false, technological progress merely provides science with a more efficient means for going backwards. At the same time, government and corporate funding promotes the rampant disease of specialism and fosters politicization of science with the inevitable warring factions and religious fervor.

"Science has become religion! ...although religion may have borrowed some of the jargon of science, science, more importantly, has adopted the methods of religion. This is the worst of both worlds."

—Halton Arp

There have been several warm climatic periods documented in history that had nothing to do with human activity. There seems to be evidence that the Earth has actually been cooling since 2001, in line with reduced solar activity. So it would be more realistic to consider climate change as a normal phenomenon and to plan accordingly because despite all of the hoopla in the media, modern science is founded on surprising ignorance. An iconoclastic view suggests the following:

- cosmologists have been misled by theoretical physicists who don't understand [gravity](#), which forms the basis of the big bang theory. Imaginary 'dark matter,' 'dark energy,' and black holes have been added to make models of [galaxies](#) and

star birth appear to work. When all else fails, mysterious magnetic fields are invoked. The bottom line is that cosmologists presently have no real understanding of the [universe](#);

- astrophysicists don't understand [stars](#) because they steadfastly ignore plasma discharge phenomena;
- particle physicists don't understand [matter](#) or its resonant electrical interactions. They prefer to invent imaginary particles;
- geologists have been misled by astronomers about [Earth's history](#);
- biologists have had no practical help from theoretical physicists so they don't understand what might constitute the 'mind-body connection' or 'the spark of life;'
- and climate scientists have been misled by astronomers and astrophysicists so they have no real concept of recent Earth history in the solar system and they don't understand the [real source of lightning](#) and the [electrical input to weather systems](#). For example, the major city in northern Australia, Darwin, was utterly destroyed in tropical cyclone 'Tracy' in 1974. The catastrophe was described in part, "At 3am, the eye of the cyclone passed over Darwin, bringing an eerie stillness. There was a strange light, a diffuse lightning, like St. Elmo's fire." There was no solar energy being supplied to the 150km per hour winds at 3 in the morning. "A diffuse lightning" is an apt description of the slow electrical discharge (distinct from impulsive lightning) that drives all rotary storms and influences weather patterns. That is why the electrically hyperactive gas giant planets have overwhelmingly violent storms while receiving very little solar energy.

Yet with these unacknowledged shortcomings we have bookshelves filled with textbooks, science journals and PhD theses, mostly unread, that would stretch to the Moon, fostering the impression that we understand most things. And the public is assailed with documentaries that breathlessly deliver and repeat fashionable science fiction as fact. How can this be?

Science has left its classical and philosophical roots, rather like surrealist art departed from realism. The analogy is fitting. It is demonstrated by the fondness for expressing theoretical models in artists impressions, computer animations and aesthetic terms. The artist/philosopher [Miles Mathis](#) is of the opinion that:

"Science has become just like Modern Art. The contemporary artist and the contemporary physicist look at the world in much the same way. The past means nothing. They gravitate to novelty as the ultimate distinction, in and of itself. They do this because novelty is the surest guarantee of recognition."

So why does the media not have science critics alongside art critics? Has science become sacrosanct? Bluntly, the answer is yes. No science reporter wants to have the portcullises lowered at the academic bastions. Happily, the Internet allows the curious to circumvent such censorship.

The Anthropogenic Global Warming (AGW) Debate

"Mother Nature doesn't care what humans believe in."

—*Bill Gaede*

History makes it clear that *climate does change*. The real question is whether our activities today are a significant cause of global warming. We cannot simply label those who question Anthropogenic Global Warming (AGW) as "deniers" because climate science is not so well established, nor is the data so clear, that it can blame our CO2 emissions for climate change. In fact, the data suggests quite simply that [global warming is not man-made](#). But like most of modern science, climate research suffers the negative aspects of specialism, which blinkers researchers and obstruct any global synthesis. Specialism allows a mistaken belief to infect one discipline and spread like a virus to others it touches. Other well-meaning specialists infected climate science before its birth with their misconceptions. As we shall see, theoretical astrophysics transmits the most virulent 'bugs' because it underpins our view of the Earth's situation in the cosmos. In climate science, which involves the entire Earth, we must truly understand the space environment as well. There may be a source of energy that has not been considered.

There is a human aspect to the debate. Why do we keep repeating the mistakes of the past? Why can't we 'get a grip' and witness our self-delusion and hubris in believing that in the last instant of our existence we have uncovered the secrets of the universe? Why do we so strenuously ignore the evidence for [recent global catastrophe](#) and, by doing so, not recognize the origin of our innate fear of doomsday? Is the AGW debate fuelled by the subconscious urge to vicariously revisit calamities that dimly echo from prehistory and keeps us firmly stuck in the past? Ignorance and fear are our undoing. And both are at the heart of the AGW debate.



This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies. Picture credit: NASA/JPL-Caltech.

We have an unexplained enthrallment with stories of the end of the world.

To help us feel safe in this unpredictable universe we favour fairy stories to the truth. We cannot tolerate uncertainty. No matter how far-fetched the idea, if the climate is changing we must take the blame so that a remedy seems possible. But that exposes us to exploitation by authorities. It is a familiar pattern of behavior. The early astronomer/priests attained great power by presenting the facade of human control in being able to predict frightening eclipses. More recently, astronomer/priests received considerable funding and recognition by playing on our doomsday fear of comets. This game has been so successful that the same people are doing it again by pointing at Dante's inferno on Venus and suggesting a similar fate for the Earth. But for the adventurous few who accept the uncertainty of our existence, the fossil record and the ravaged faces of other planets and moons bear witness to a dynamic history of the solar system. It is abundantly clear that the [story of Venus](#) is quite different to that of the Earth. The scare campaigns only work because of our frightful ignorance.

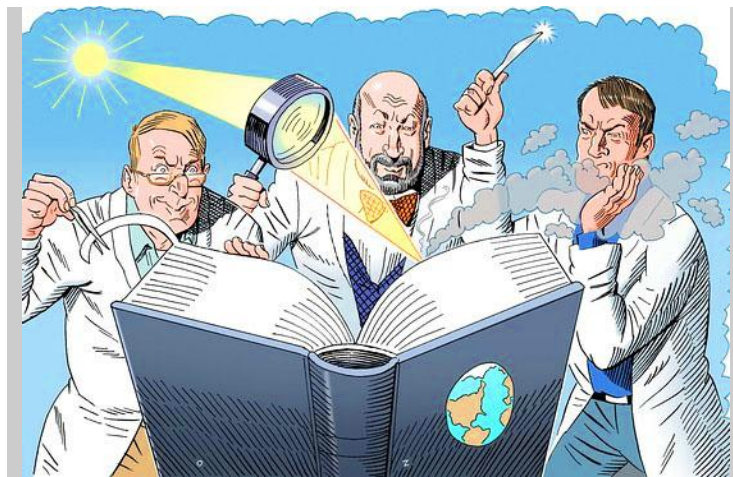
"It's very disturbing that we do not understand the climate on a planet that is so much like the Earth," said Professor Fred Taylor, a planetary scientist based at Oxford University and one of the ESA's chief advisers for the Venus Express mission. **"It is telling us that we really don't understand the Earth. We have ended up with a lot of mysteries."**

[Emphasis added]

Professor Taylor had written earlier about the Venusian north polar vortex:

"the absence of viable theories which can be tested, or in this case any theory at all, leaves us uncomfortably in doubt as to our basic ability to understand even gross features of planetary atmospheric circulations."

Such an admission by a leading expert should be of fundamental concern to climate scientists. But apparently not. They are content with computer models that cannot predict "even gross features of planetary atmospheric circulations" provided the data can be manipulated to fulfill their beliefs.



Credit: Martin Kozlowski, Wall Street Journal

The recent publication on the Internet of more than ten years of emails from the Climate Research Unit (CRU) of East Anglia University in England underscores the way science is done, as distinct from the way it is said to be done. The media performances of politicians and climate scientists trying to downplay the significance of the [scandalous behavior](#) revealed in the emails have been notable for the emotive language used to describe those who dare to question climate change ideology. They are "deniers," or "stooges" for the coal and oil industries. In the worst examples, skeptics have been equated with holocaust deniers. The disingenuous excuse for the emails is that the "robust private exchanges only show that scientists are human." Precisely! That's why some of those emails propose not sharing the raw climate data and others suggest preventing dissident authors from publishing in peer-reviewed journals.

The misappropriated emails may be the "normal repartee and discussion between climate scientists" claimed dismissively by Professor Andy Pitman, co-director of the Climate Change Research Centre, University of New South Wales. But they reveal frustration and anger with skeptics of AGW. They show how scientists allow their feelings to override scientific objectivity. However, I agree with him that the emails do not represent a scientific conspiracy. It is "only human" to defend one's core beliefs and status irrationally and by any means. It is significant that those who disagree with AGW are labelled "deniers." That smacks of religious conviction. It makes the arrogant and unscientific assumption that AGW is a fact beyond question, and that the "deniers" are operating merely from a misguided contrary belief. The 'scientific method' seems an empty ideal trumpeted by scientists who don't trouble to observe it. Real science requires that competing views from skeptics be welcomed and examined objectively and dispassionately in the search for truth. But competition implies a victor and the vanquished. Alas for science, it's a political and ideological battlefield and not a court of reason. (See [this report](#) of a meeting between government advisers and well-credentialed AGW skeptics).

"It's like religion. Heresy [in science] is thought of as a bad thing, whereas it should be just the opposite."

—Dr. Thomas Gold

Professor Tim Flannery, Chairman of the Copenhagen Climate Council and a media celebrity in Australia, in the opening to a television interview about the emails controversy was conveniently provided an "Aunt Sally" by the interviewer who asked if he was a part of "*a vast left-wing conspiracy to de-industrialize the western world.*" It was a leading question, easily turned to Flannery's advantage. He merely listed big companies who were on the committee. He didn't mention the beneficiaries—all of the usual suspects who want to trade in carbon—the big banks. He accused "*skeptics and those who don't want to see action on climate change*" of choosing their timing carefully in releasing the emails, the transparent implication being that the (generally unpaid) skeptics are the conspirators.

Flannery admits, "*we don't understand all of the factors that affect Earth's climate.*" So why do we foolishly indulge experts? Why can't we recognize the narrow limitations and often self-interest of specialist views and weigh them accordingly? Why do we still suffer the financial experts and grossly overpaid businessmen who couldn't see the global financial meltdown coming? Sub prime carbon is on its way. The problem is that we are not exposed to the skeptics and their views. Academia, politicians and the media see to that.

"It's not easy being seen if you find information that does not support the accepted views because the supporters of the accepted views have publicity, money and power to grant degrees. Going along is how proponents of the accepted view obtained their degrees, how they obtained funding and how they obtained their publicity. So how could so many smart people have got it so wrong? A few got it wrong; the rest went along. Self interest, not science, ensured the status quo."

—C. J. Ransom.

Human nature is the greatest impediment to scientific progress.

The CRU emails expose the anonymous peer review system as a means of excluding challenges to ideology. They reveal the "herd instinct" in science. Journal editors are the "sheep dogs." As the late lamented skeptic, Tommy Gold, observed:

"The sheep in the interior of the herd are well protected from the bite in the ankle by the sheep dog."

Of course, none of this is news to the dissident scientists who are vital to science progress. They are forced to publish in obscure journals, or self-publish, which lays them open to the accusation that their work is not peer-reviewed. And there's the catch-22. Often they have no mainstream peers. We must learn to ignore such hollow arguments and insist on open debate.

What's Wrong with Climate Science?

The unpleasant reality is that modern science is an inverted pyramid of hypotheses and beliefs teetering on a foundation of surprising ignorance and historical wrong turns. For example, the ideology of climate science is based on the story of the [history of the solar system and the Earth](#). However, the usual story is a fable based on gravitational theory while [gravity](#) itself remains a mystery. Many-body gravitational systems are inherently chaotic, so that it would be a miracle if the order we see in the solar system today were long established, according to that model. But the climate change models take for granted an undisturbed Earth. The models also rely on steady radiant energy generated in the interior of the Sun. But what if that global-warming plasma ball in the sky is powered from the outside? Would not all the planets share in some of that energy? And if so, there is no climate model that accounts for it.

I wrote in February 2007, in [Global Warming in a Climate of Ignorance](#):

"Like Darwin's theory of evolution and Big Bang cosmology, global warming by greenhouse gas emissions has undergone that curious social process in which a scientific theory is promoted to a secular myth. When in fact, science is ignorant about the source of the heat — the Sun."

Climatologists rely on astrophysicists for the basic assumptions they employ in their climate models. In particular, it is assumed that the Sun is a steady source of radiant energy and that the Earth and its atmosphere have been a closed, undisturbed system for longer than man has walked the Earth. However, the theory of how the Sun works is of Victorian vintage. It was formulated in the gaslight and horse and buggy era, long before the space age showed that space is not empty.



It was scientists a century ago with no experience of plasma who developed the theory of how the Sun works by applying perfect gas laws. It will be as amusing to future scientists, as the medieval belief in a flat Earth is today.

Space is teeming with charged particles, known as plasma. And plasma is a better electrical conductor than copper wire. Meanwhile, the [geological](#) and [mytho-historical record of past global catastrophes](#) shows that we cannot simply assume an Earth undisturbed by external factors, even within the memory of mankind.

When Eddington put together his solar model in the 1920s the Sun was thought to be isolated in the vacuum of space. There could be no external source of energy causing it to shine. Therefore, it was assumed, the Sun must provide its own fuel to shine for billions of years. Decades earlier, Kristian Birkeland determined that charged particles from the Sun must cause the auroras. So the Sun has an electrical environment. But Birkeland's discovery was not considered. It had no explanation at the time.

The next very peculiar assumption was that the Sun is composed mostly of hydrogen because it is the dominant element found radiating at the top of the Sun's atmosphere. That is like saying, if the top of the Earth's atmosphere were to be radiant, that the Earth must be composed mostly of nitrogen and oxygen. It is quite bizarre to propose that the lightest elements dominate the very core of celestial bodies.

"No source of energy is of any avail unless it liberates energy in the deep interior of the star. It is not enough to provide for the external radiation of the star. We must provide for the maintenance of the high internal temperature, without which the star would collapse."

— A. Eddington, *The Internal Constitution of the Stars*.

The Sun's fuel could not burn at the surface, like any normal fire, because a ball of inert hydrogen of the Sun's mass requires somehow to be 'blown up' against gravity to be the size we see. A solution came to hand at the crucial moment; it had to be internal thermonuclear energy. The thermonuclear theory was cleverly force-fitted to the requirements but then there was the small problem that the lethal X-rays from the hypothetical thermonuclear core had to be 'toned down' before reaching the surface to give the relatively cool, benign radiance of the Sun. To do this, another strange assumption was introduced. The Sun, unlike any other body known, must transfer heat internally by radiation.

With such a far-fetched model it is little wonder that every observable aspect of the Sun denies it. It is one of the most amazing examples of group delusion that it persists. The temperature rises to millions of degrees as you move away from the Sun, which commonsense tells us must be due to energy arriving from outside the Sun. The surface of the Sun is not a seething convective cauldron transferring heat from the interior. It is ordered and granular. What's more, where the granulations are pushed aside in a sunspot, it is cooler down below. And the Sun and the solar system are threaded by magnetic fields, which signify electric current flows.

The solar discharge has a very effective [feedback system](#) to maintain steady radiant output while the electrical power input varies. In fact, the solar radiant energy is termed a "solar constant," which is critical to the AGW argument. **However, no account is taken of the variable electrical power focused on the Sun but intercepted by the planets.** The [electrical connections](#) have been traced from the Sun to the Earth's magnetosphere; from the magnetosphere to the ionosphere; and from the ionosphere into weather systems. No one can claim to be "a climate expert" while ignorant of the electrical nature of the solar system. This common energy source explains the reports of simultaneous warming on other planets. The Sun's galactic power source is the main driver of climatic variability. Human carbon emissions count for nothing in comparison.

Having an incorrect model of stars means that expectations are not fulfilled by observations. For example, in November [a paper](#) appeared in the Monthly Notices of the Royal Astronomical Society which expressed "a huge problem" with the behavior of a

group of [variable red giant stars](#). Typically they were found to vary in radius by twenty solar diameters, which should "lead to changes in [the effective temperature of the star] that are vastly greater than the directly observed changes from spectra or photometric colour." But this is not a problem if the energy that lights a star comes from without rather than within. In fact it is normal behavior in a plasma discharge tube to observe little change in color or brightness of glowing regions as they expand or contract in response to changes in electrical input.

If astronomers have bestowed an invalid theory for the Sun, the source of our warmth and weather on Earth, then climate science is adrift from reality. We can forget the portentous climate models. Climate scientists are unaware of a principal driver of weather systems on Earth and all the planets. The strongest winds are on the most distant planet from the Sun and even the Sun has been found to have weather. Like computer generated doomsday movies, computer climate models can be programmed to give the same illusion of apocalypse.

Insulated from dissent by peer review and strict disciplinary boundaries, much theoretical science has become as useful as medieval clerics calculating how many angels can dance on the head of a pin. Only now there are supercomputers to reify and count the imaginary seraphim. The result is far-reaching inertia in the market of ideas. The tales our grandparents handed down tend to remain the basis of our ideology in the 21st century.

The ideology that underpins the climate change debate is that which assumes billions of years of undisturbed clockwork motion of the planets: "Once upon a time, long, long ago, all of the planets were formed from a dusty disk about the newborn Sun." Like any good fiction it introduces a crisis. For reasons only guessed at, disaster strikes our "twin" planet, Venus. It suffers a "runaway greenhouse" catastrophe in its carbon dioxide atmosphere and the surface becomes as hot as a furnace. Forget the fact that the "science" has been made up to fit the story.

[Venus is not the Earth's twin](#). The spectre of a similar fate on the Earth is merely the latest doomsday scare. The one before was a comet impact, and before that a nuclear holocaust. Apocalyptic nightmares are an instinctive part of human nature. It is a legacy of recent catastrophe in the solar system that involved our distant ancestors and which still echoes down the millennia. Scientists, being human, are not immune from this irrational fear. In fact, as the examples show, they are well placed to take advantage; to raise their status and their funding by playing on that fear.

"I have been interested, for a long time, in the psychological process of discovery as the most concise manifestation of man's creative faculty – and in that converse process that blinds him towards truths which, once perceived by a seer, become so heartbreakingly obvious."

—Arthur Koestler, *The Sleepwalkers*.

A search for the truth must first establish a sound foundation and that requires a broad historical perspective that few scientists ever achieve. (Those who do take the trouble generally ask awkward questions and are ostracized as deniers, skeptics or cranks). Scientific truth cannot be arrived at democratically. Either something is true or it is not. The claim that most scientists believe in anthropogenic global warming (AGW) is worthless. The majority of scientists once believed the Earth is the center of the universe. Koestler is right, history shows that major progress is achieved by individuals, call them seers, and not by bureaucratic institutions. But seers are the people who today are shut out by peer review. **Generally, seers have no peers.**

"The established system may prevent stupid research but it also slows down originality and innovation, promotes timidity and conformity. Innovation, however, is absolutely necessary in science. At least in the USA and in England science was less institutionalised in the 19th century. A scientist like Darwin, who held no academic position and received no public funds, would probably not have been able to do his research on evolution under today's circumstances. Important breakthroughs back then were mostly produced by researchers who were neither professional scientists nor part of a bureaucratic system."

—Interview with Rupert Sheldrake, *Die Zeit*, July 11, 2002.

"Most of what you get taught is lies. It has to be. Sometimes if you get the truth all at once, you can't understand it."

—Terry Pratchett



"By far the most terrifying film you will ever see." Ironically the montage shows the most powerful electrical storm on Earth — the tropical cyclone. The scariest thing about the film is the misuse of science.

All science is provisional. There is no "inconvenient truth" about the climate. Any inconvenience is self-inflicted. At this early stage of science we do not understand the climate or the Sun. But that kind of uncertainty is not to be tolerated by experts who have achieved massive funding and a kind of fame with their dire predictions. This poses a big problem for the rest of us. How long will it take for the media to wake up that they have been taken for a ride? Hopefully we won't have to wait until the climate is obviously cooling again. You see, the Sun, like all electric stars, is a variable star.

We all, like Michael Crichton, wish to see "a good future for the human race." But please don't lazily turn to experts for answers. The past shows they will be the last to know. Look instead to those they push away to the boundary and use your own judgement and commonsense. To break away from our past we must first understand it. And if you would see the future, become a 'boundary rider' of science.

Wal Thornhill

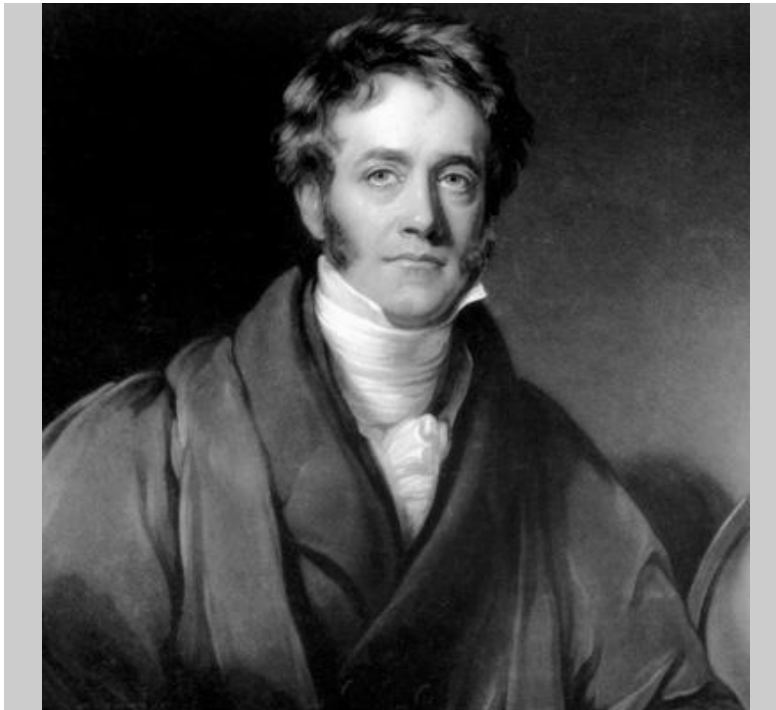
2010

Our Misunderstood Sun

Posted on [March 1, 2010](#) by [Wal Thornhill](#)

"We stand on the verge of a vast cosmical discovery such as nothing hitherto imagined can compare with."

—*Sir John Herschel in 1850, upon the discovery of a link between magnetic storms on Earth and sunspots, to Michael Faraday, the vaunted experimentalist who was investigating the links between electricity and magnetism.*



Sir John Herschel from 1846 The Year-book of Facts in Science and Art By John Timbs, London: Simpkin, Marshall, and Co.

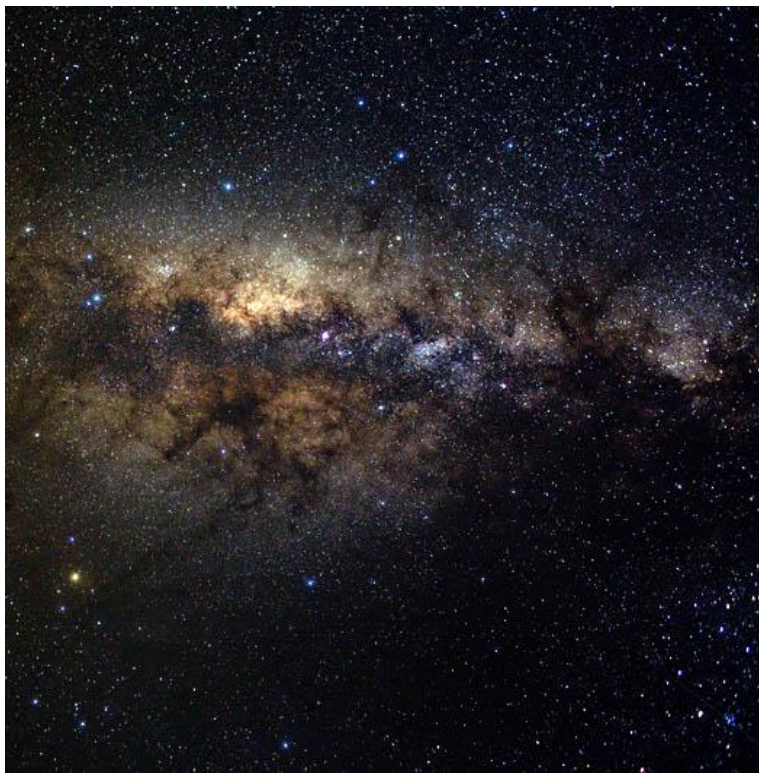
Incredibly, one hundred and sixty years later in the space age, Herschel's "vast cosmical discovery such as nothing hitherto imagined can compare with," of an Electric Universe, remains "on the verge." Mistaken ideas have diverted scientists down the path of Ptolemy once more, adding endless epicycles to theory to save appearances. Meanwhile the object central to the problem is the same and in full view. It is our misunderstood Sun.

"The modern astrophysical concept that ascribes the sun's energy to thermonuclear reactions deep in the solar interior is contradicted by nearly every observable aspect of the sun."

—*Ralph E. Juergens (1980)*

This year is going to be very busy publicizing the Electric Universe in England and Australia while receiving an award from a European Academy of Science for the work. So my articles will probably be sparser as I attend to other demands this year. Meanwhile, observational support for the Electric Universe arrives almost daily in the scientific press and my friends and colleagues at thunderbolts.info provide an up-to-date resource for those following this adventure.

Astronomers in the Dark



The Milky Way is a blazing spectacle in the southern hemisphere sky. The stars remind me of a high school experiment in a darkened room; the radiant pinpoints of light appearing on the glass walls of an electric discharge tube as a near vacuum is reached inside the tube. It provides an exciting alternative perspective of the cosmos that is denied to almost everyone because it is 'off the map' of our education. Nowhere in any astronomy textbook or magazine will you find mention of electric discharge in space. The concept of electrically powered stars is never considered. Plasma science was in its infancy and nuclear energy the new sensation when the mathematical physicist Arthur Eddington (1882-1944) wrote *The Internal Constitution of the Stars* (1926). His theoretical work in stellar physics seemed to solve the puzzles of powering the Sun for billions of years and how the Sun could remain so huge against the tendency to collapse due its own strong gravity.



"It is not enough to provide for the external radiation of the star. We must provide for the maintenance of the high internal temperature, without which the star would collapse."

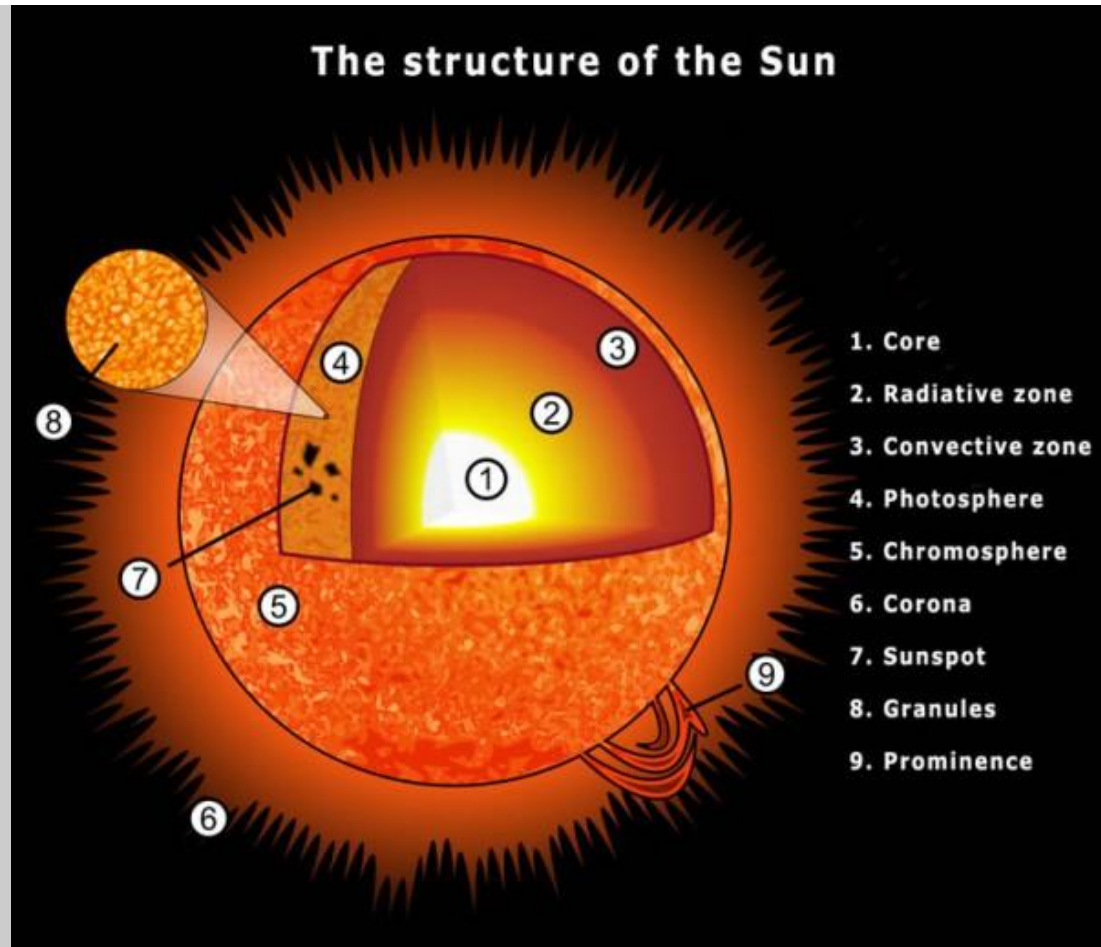
—A. Eddington, *The Internal Constitution of the Stars*

But this constraint arises from the peculiar self-gravitating gas model Eddington chose and not the star. None of the myriad bizarre phenomena seen on and above the photosphere are explained by his purely theoretical solution to the problem. A balance between gravitational attraction and inflating thermal energy does not determine the size of the Sun. That is why star sizes vary by at least ± 10 percent from the theoretical (see later). A photosphere is a brilliant electrical discharge phenomenon, which is little influenced by the physical size of the star hidden within.

"The problem of the source of a star's energy will be considered; by a process of exhaustion we are driven to conclude that the only possible source of a star's energy is subatomic; yet it must be confessed that the hypothesis shows little disposition to accommodate itself to the detailed requirements of observation, and a critic might count up a large number of 'fatal' objections."

—A. Eddington, *The Internal Constitution of the Stars*.

Perhaps because of Eddington's influence, his intolerance of criticism and lack of an alternative theory, no "fatal objections" were raised. The development of Eddington's theories was ruled more by mathematical aesthetics than empirics. Somehow an explosive nuclear energy source in the core had to be initiated and then tamed. The lethal radiation from the core needed to be contained and 'cooled' by collisions in a so-called radiative zone inside the Sun. After about 171,000 years, on average, the more benign energy is transferred to space by convection and subsequent radiation. There is no experimental confirmation of such a bizarre body composed principally of hydrogen, transferring energy internally by radiation, or of the hypothetical thermonuclear reactions at its core. Observations of the Sun are forced to fit the model and anomalies abound.



This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies. Picture credit: NASA/JPL-Caltech.

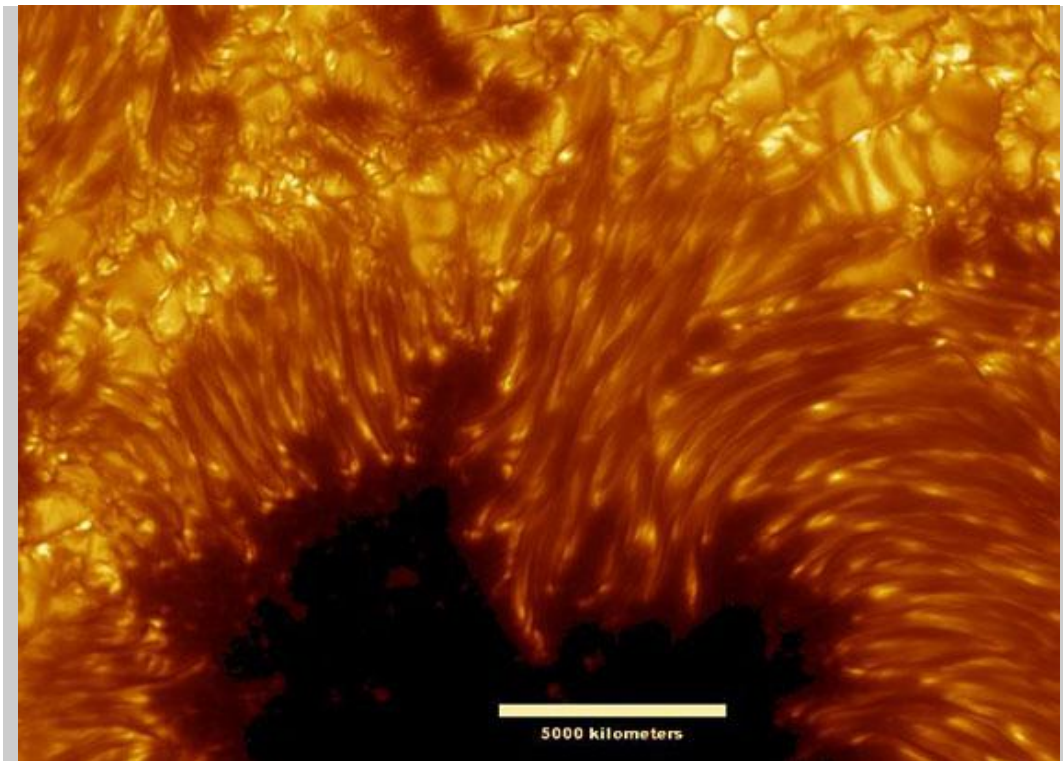
This simple diagram of the hypothetical standard solar model gives no inkling of the complexity of the phenomena seen in the photosphere and above. Image courtesy of Wikimedia Commons.

"We should expect on the basis of a straightforward calculation that the Sun would 'end' itself in a simple and rather prosaic way; that with increasing height above the photosphere the density of the solar material would decrease quite rapidly, until it became pretty well negligible only two or three kilometres up ... Instead, the atmosphere is a huge bloated envelope."

—F. Hoyle, *Frontiers of Astronomy*

"Essential to the received theory is the conviction that inside the sun is a steep temperature gradient, falling toward the photosphere, along which the internal energy flows outward. If we stack this internal temperature gradient against the observed temperature gradient in the solar atmosphere, which falls steeply inward, toward the photosphere, we find we have diagrammed a physical absurdity: The two gradients produce a trough at the photosphere, which implies that thermal energy should collect and become stuck there until it raises the temperature and eliminates the trough. That this does not occur seems to bother no one. But suppose we remove the hypothetical internal temperature gradient. What then? Why then we see that the sun's bloated atmosphere and the "wrong-way" temperature gradient in that atmosphere point strongly to an external source of solar energy."

— Ralph E. Juergens, (1972)



This artist's concept shows the dimmest star-like bodies currently known -- twin brown dwarfs referred to as 2M 0939. The twins, which are about the same size, are drawn as if they were viewed close to one of the bodies. Picture credit: NASA/JPL-Caltech.

This stunning image shows remarkable and mysterious details near the dark central region of a planet-sized sunspot* in one of the sharpest views ever of the surface of the Sun. Along with features described as hairs and canals are dark cores visible within the bright filaments that extend into the sunspot, representing previously unknown and unexplored solar phenomena. The filaments' newly revealed dark cores are seen to be thousands of kilometers long but only about 100 kilometers wide. Image courtesy of the Swedish Solar Telescope.

[*See [Sunspot Mysteries](#)]

"The amazing zoo of structures and dynamic phenomena on the Sun are not well understood in general, though they have been observed for a very long time."

—Dan Kiselman, Royal Swedish Academy of Sciences, Institute for Solar Physics



Ralph Juergens.

Simple observation shows the ordered granulation of the photosphere does not behave as expected of turbulent convection in hot hydrogen. The pioneer of the discharge model of the Sun, Ralph Juergens, wrote in 1979:

"The idea of turbulent convection delivering endless loads of energy upward from the unseen depths of the Sun conflicts not only with the ordered structure of the photosphere but also with the observable integrity of individual granules. The nodules of plasma appear, endure for some minutes, then fade away... Minnaert once published an analysis of photospheric behavior in terms of the Reynolds number. He found the critical value to lie near 10^3 . The actual Reynolds number of the photosphere, as calculated from observable characteristics of the plasma, turned out to be in excess of 10^{11} , which is to say, at least 100 million times greater than the critical value. Clearly, then, any convective motion in the photosphere should be violently turbulent and highly disordered, as Minnaert indeed pointed out. Practically in his next breath, however, Minnaert asserted that 'The variable forms of the granules and their short lifetimes are evidence of nonstationary convection.' Such an abrupt about-face is startling. Apparently Minnaert, himself, was disquieted; he immediately set out to minimize his non sequitur by suggesting ways and means for disregarding the classical theory of turbulence to make things come out right for the photosphere."

—Ralph E. Juergens

Sunspots are dark instead of bright, which is prima facie evidence that heat is not trying to escape from within. And the Sun's corona is millions of degrees hotter than the photosphere. These simple observations point to the energy source of the Sun being external. Add to this the dominant influence of magnetic fields on the Sun's external behavior and we arrive at the necessity for an electrical energy supply. It is the "subtle radiation traversing space which the star picks up," and which Eddington immediately dismissed because his gravitational model required energy to be generated at the core of the star to bloat it to the observed size.

"In seeking a source of energy other than contraction the first question is whether the energy to be radiated in future is now hidden in the star or whether it is being picked up continuously from outside. Suggestions have been made that the impact of meteoric matter provides the heat, or that there is some subtle radiation traversing space which the star picks up. Strong objection may be urged against these hypotheses individually; but it is unnecessary to consider them in detail because they have arisen through a misunderstanding of the nature of the problem. No source of energy is of any avail unless it liberates energy in the deep interior of the star."

—A. Eddington, *The Internal Constitution of the Stars*.

Eddington's legacy to stellar physics has been a return to Ptolemaic science where endless 'epicycles' are added to theory in an attempt to save appearances.

It is now almost a century since the thermonuclear theory of stars was formulated. It is an urban myth. Science has many urban myths that have a life of their own. Such myths are difficult to dispel when eminent scientists promote them, educators parrot them, [the media](#) dramatizes them, and students are discouraged from dissent.

"It is a strange thought, but I believe a correct one, that twenty or thirty pages of ideas and information would be capable of turning the present-day world upside down, or even destroying it. I have often tried to conceive of what those pages might contain, but of course I am a prisoner of the present-day world, just as all of you are. We cannot think outside the particular patterns that our brains are conditioned to, or, to be more accurate, we can only think a very little way outside, and then only if we are very original."

—Fred Hoyle, *Of Men and Galaxies*

Our mental 'map' of the world is strongly influenced by the things we experience in our early years. Our formal education tends to set the patterns that we follow for the rest of our lives. But not so for everyone. There are always those adventurous few who venture off the beaten path. For them, losing sight of landmarks can be exhilarating, but the difficulty of relating discoveries upon return can be high. Not least is the problem of

dismissal by the "*specialized gate keepers*" of knowledge. Excessive institutionalisation may have made acceptance of new paradigms more difficult now than in Galileo's time.

"We can only discuss or make intellectual advances by passing through the existing body of learning. This is such an enormous task, made even more enormous by the multitudes of specialized gate keepers, that no one can produce integrated thought." "...we are faced by a crisis in language and communication. This crisis is being accentuated, not eased, by the Universities."

—J R Saul, *The Unconscious Civilization*

Having a trailblazer's map, like that provided by Ralph Juergens, is like having access to Google Earth while scientists puzzle over medieval maps with their rubric at the borders, "beyond there be dragons," and where Terra Incognita is huge and "dark." So it is the belief that the unknown depths of space are filled with "dark matter" and "dark energy" and all-devouring dragons or black holes. Modern astronomy is completely in the dark.

The standard theory of stellar interiors is the result of bad timing. It is an historical accident that is long overdue for investigation. But the history of ideas and scientific debates are rarely put in context for students. The losers and their arguments are minimized and forgotten. However, debates are rarely won on scientific grounds. Politics and personalities, then as now, play a major role. So the contests should be revisited occasionally to check the assumptions that were made. It should be compulsory before indulging in post-modern metaphysics; the idea that knowledge is constructed, not discovered. But it is rare today to see a scientific paper cite others more than a few years old. Notably, those few scholars who trouble to delve into historical scientific debates find the 'truths' they have been taught not so assured after all. It is often they who question the consensus view and find publication difficult as a result. The historical perspective required for healthy skepticism is lacking in science today.

When we assign names to theories — Newton's law of gravity, Einstein's theories of relativity— we impede progress by attaching ideas to celebrities. To question these theories is seen as an attack on the celebrity, with all of the attendant visceral responses to such an 'intrusion.' But the history of science shows that it is often an intruder's fresh ideas that eventually trigger the biggest advances. Dr. Bernard Newgrosh calls such intruders "eminent outsiders." His favorite example is none other than the astronomer William Herschel (1738-1822), "*who was born in Hanover, joined a regimental band at 14, went to England at 21 and worked as a musician and composer. He also instructed himself in mathematics and astronomy and constructing his own reflecting telescopes.*" Another was Michael Faraday (1791-1867), who "*was born in Surrey, apprenticed to a book-binder and was largely self-educated.*"

Newgrosh notes:

"how easy it used to be even for entirely self-taught outsiders and part-time amateurs to break into mainstream academia... Not only does this not happen in the modern world, where academia is distrustful of outsiders and its publications are by and large closed to non-members of the academic elite but the general perception is that if you have no academic qualification you cannot be recognized as having any expertise."

The Royal Society is a club that would reject a Herschel or Faraday today.

The Royal Society celebrates its 350th anniversary this year. The book, ***Seeing Further: The Story of Science and the Royal Society***, edited by Bill Bryson, is being released to honor the event. Robin McKie, science editor of the Guardian, in his review writes:

"The book is low, to the point of non-appearance, in human interest and is just a little bit too smug for its own good. Then there is the creeping feeling of worthiness that slowly envelops the reader, as you encounter, again and again, noble minds revealing the wonders of nature. It is like reading a piece of upmarket vanity publishing. I wanted to like it more but couldn't."

Human interest comes chiefly from reading about the clash of ideas and personalities in their proper historical context. This kind of adulatory book about scientists written by the usual publicity hounds is not the way to advance science. It reinforces the status quo and discourages dissent. It is boring and discourages student participation in science, as universities report with growing concern. To stop the rot requires that we challenge students with the idea that "a vast cosmical discovery" awaits the adventurous. And all of the arts and sciences will be profoundly influenced. What better motivation could educators offer students?

However, bringing about a fundamental scientific paradigm shift is arguably more difficult today than at any time in history. And nothing could be more difficult than to wring an acknowledgement that our cherished story of how the Sun and stars work is wrong, despite the disquiet expressed by experienced astrophysicists at their meetings. The following quotes are from a recent colloquium by a well-known astrophysicist and expert on stellar interiors:

"If we understand what is going on in the Sun, we can turn and look outwards to every other star and transfer that knowledge to those other stars."

"The standard solar model predicts no motion in the photosphere. The solar surface is a mess."

"There is a gap in our understanding of stellar evolution. Some of the things we're finding are not what we expected."

"The radii of some stars are out by ± 10 percent according to our models."

Rapid change needs a metaphorical bushfire to sweep through the 'old growth' on our campuses. But what 'firestorm' could result from misunderstandings about the Sun? The [contrived crisis of anthropogenic global warming](#) (AGW) may be a timely example. But AGW tends to be an unfalsifiable hypothesis in the short term. If you are buried in snow, the argument goes, it is AGW that is causing the "extreme weather." We may have to wait for years before it becomes evident that the climate changes regardless of what we humans do. The cosmological fact is that the source of warmth, our Sun, is a [variable star](#). This was termed an "[unorthodox idea](#)" as recently as last week on the Solar Dynamic Observatory (SDO) website:

For some years now, an unorthodox idea has been gaining favor among astronomers. It contradicts old teachings and unsettles thoughtful observers, especially climatologists. "The sun," explains Lika Guhathakurta of NASA headquarters in Washington DC, "is a variable star."

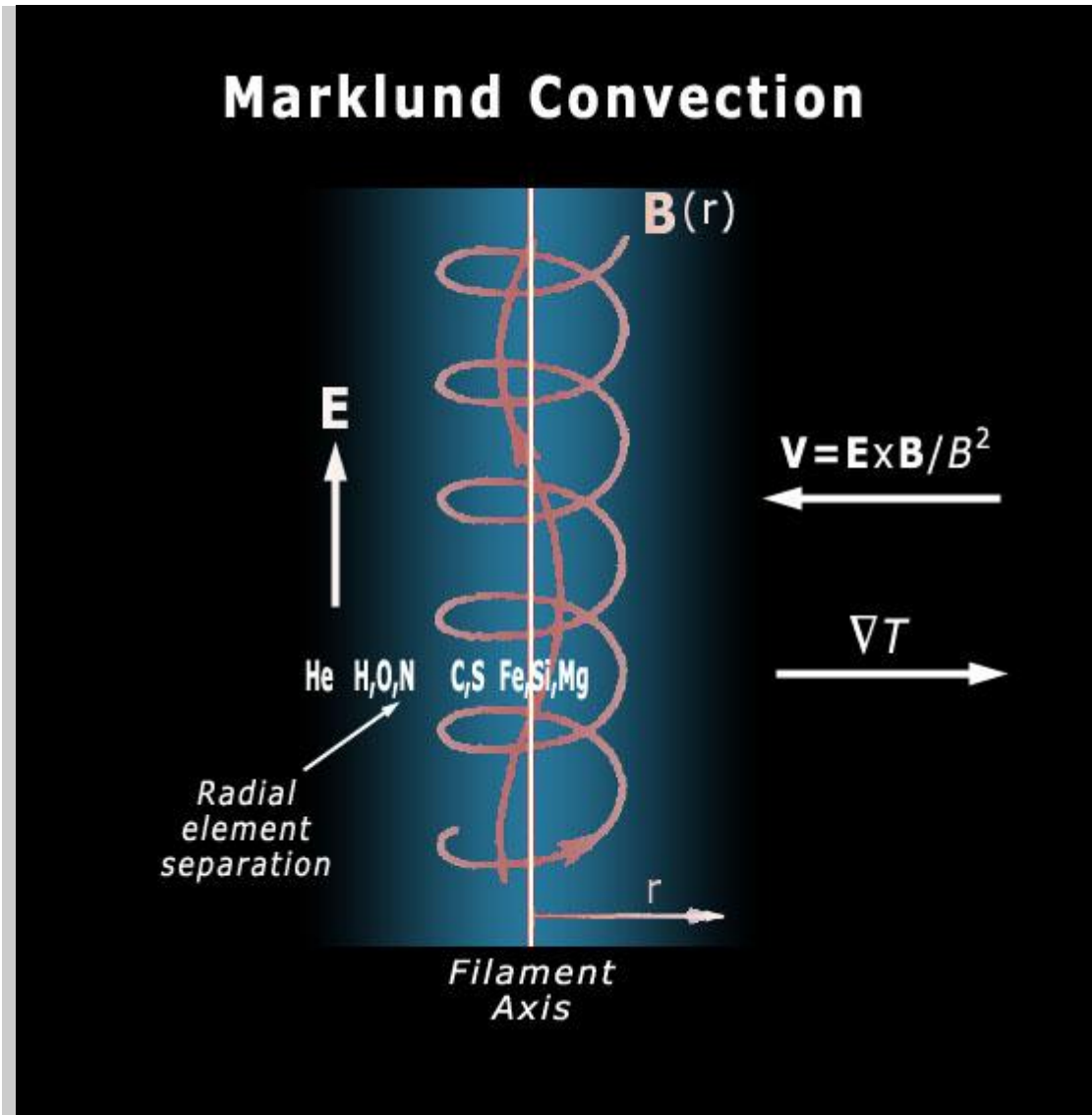
However, with the short attention span of the media, science will probably ride out the inevitable failed prediction. The jungle of institutionalized and government funded science is more fire-proof than the major US banks in the worst of the global financial crisis. And the media is sycophantic toward academics to the point of being irrelevant.

"I would assert that there are probably as many as twenty really major discoveries in physics which are waiting around for somebody to pick up and which involve no major facility. I would suspect that to have a major facility would be an active handicap, since it is usually the case that the facility dictates the scientist's thoughts rather than the other way about."

—Fred Hoyle, *Of Men and Galaxies*

Cosmic Electric Lights

The electrical model of the Sun discards the problematic birth of stars by gravitational accretion. Stars are formed following Marklund convection of charged particles in dusty plasma toward the axis of galactic Birkeland current filaments.



*General form of the magnetic field line pattern in a force-free axisymmetric filamentary structure. The filament is transparent so the temperature decreases toward the axis due to a preferential cooling of the densest regions. So the ionized components of the plasma are convected inwards with a velocity V across a temperature gradient, ΔT . Diagram adapted from Marklund, G. T., "Plasma convection in force-free magnetic fields as a mechanism for chemical separation in cosmic plasma", *Nature*, vol. 277, Feb. 1, 1979, p. 370, 371.*

It is a very efficient mechanism which results in scavenging matter with a long-range $1/r$ force. Marklund explains:

"In my paper in Nature the plasma convects radially inwards, with the normal $E \times B/B^2$ velocity, towards the center of a cylindrical flux tube. During this convection inwards, the different chemical constituents of the plasma, each having its specific ionization potential, enter into a progressively cooler region. The plasma constituents will recombine and become neutral, and thus no longer under the influence of the electromagnetic forcing. The ionization potentials will thus determine where the different species will be deposited, or stopped in their motion."

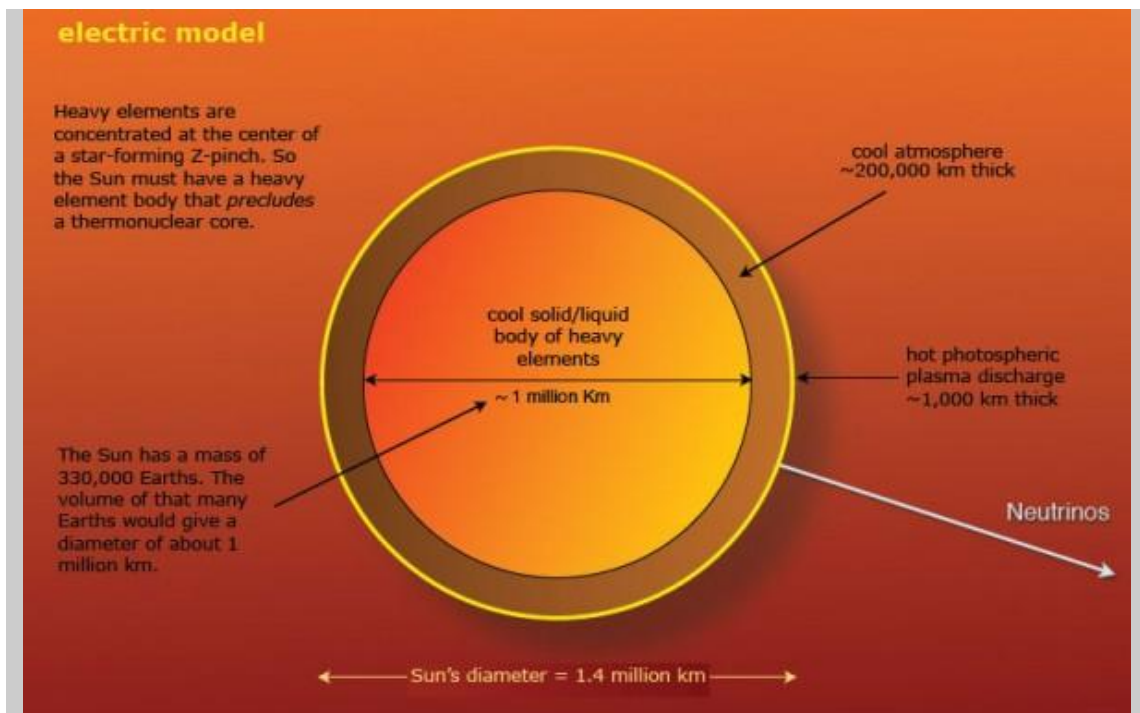
Stars formed in this way have an outer envelope of helium and hydrogen. Working inwards, hydrogen, oxygen and nitrogen will form the atmospheric middle layers, and iron, silicon and magnesium will make up the core, which is cool. There is no thermonuclear engine in stars!



This infrared image of the Orion nebula shows the new (red) stars forming along twisting current filaments in a dusty plasma. Credit: ESO/J. Emerson/VISTA & R. Gendler. Acknowledgment: Cambridge Astronomical Survey Unit.*

[*See also [Orion Nebula tpod](#)]

Dr. Carl A. Rouse is called "*a quiet maverick of an astrophysicist whose 'nonstandard' models of the interior of the Sun have been provoking the solar physics community for nearly 40 years.*" He found from his study of pulsating variable stars that there is something wrong with the standard model of the interior of stars. Using the usual assumptions he could not match the observed mass, luminosity and radius of the Sun! He found that his model worked only by assuming the Sun has a core of heavy elements. What is more, he can reproduce the observed helioseismic oscillations. Rouse's work deserves more attention because it fits the plasma cosmology story of star formation in a Z-pinch, with the heavy elements concentrated at the core. It also matches the Electric Universe model of electric stars, where the solar neutrino deficit is no longer "one of the greatest unsolved problems of solar physics" because sunshine is a spherical electric discharge phenomenon powered by the galaxy. It explains simply why the solar irradiance exhibits modulation identical to that of neutrinos. Nuclear reactions occur on the Sun like they do in atom smashers on Earth, by concentrating electrical energy onto a target.



This diagram is from The Sun e-book. The simplistic estimate of the size of the body of the Sun is intended to show that the atmosphere of a star can contribute a substantial amount to its apparent size, given by the thin yellow photosphere.*

[\[The Sun e-book\]](#)

In September last year the National Solar Observatory featured a news item, "Solar Polar Vortex?":

"Typically, the differential [solar] rotation shows speeds of rotation of about 2000 m/s near the Equator and about 1000 m/s near latitudes of 80 degrees. The differential rotation has undergone changes over surprisingly short periods of time. In short, the central latitudes have been somewhat constant, whereas the regions near the Equator and the poles have changed substantially in a semi-periodic fashion, which appears to be correlated with the solar magnetic cycle... The increases in spin appear to be short lived but occur during times of high magnetic activity. In a few cases, dramatic increases in spin approaching 400 m/s have occurred."

That is dramatic! So is the fact that this behavior of the Sun is not a surprise in the electrical model. Alfvén's circuit model of the Sun shows the current flow concentrated at the poles and the equator. The changes in the solar magnetic field are caused by changes in the electric current flowing through the Sun. The rapid changes in speed of the polar vortex are simply electrical atmospheric effects like those seen on the gas giant planets. In fact, since all polar atmospheric vortexes are driven by rotating [Birkeland currents](#), similar odd features seen at Saturn and Venus ([polygon](#), [hot spot vortex](#)) should someday be detected on the Sun.

The renowned solar astrophysicist, Eugene N. Parker, wrote in his Special Historical Review article in *Solar Physics*:

"...the pedestrian Sun exhibits a variety of phenomena that defy contemporary theoretical understanding. We need look no farther than the sunspot, or the intensely filamentary structure of the photospheric magnetic field, or the spicules, or the origin of the small magnetic bipoles that continually emerge in the supergranules, or the heat source that maintains the expanding gas in the coronal hole, or the effective magnetic diffusion that is so essential for understanding the solar dynamo, or the peculiar internal rotation inferred from helioseismology, or the variation of solar brightness with the level of solar activity, to name a few of the more obvious mysterious macrophysical phenomena exhibited by the Sun."

Such frank admissions should be a warning that scientists don't understand the Sun or stars at all. All of the problems can be put down to an invalid model. An outstanding clue is the *"intensely filamentary structure of the photospheric magnetic field,"* which is diagnostic of electric Birkeland currents impinging on the photosphere. Another clue is the even spacing of those magnetic filaments at the photosphere (current filaments impinging on an anode are spaced evenly apart). And the attraction between sunspots with the same magnetic polarity seals the argument (parallel electric currents attract).

A good measure of a theory is its ability to predict the outcome of new observations or explain them without introducing additional ad hoc concepts. Stellar theory fails this test miserably. For example, most stars are in binary or multiple systems (gravitational theory

has problems with this too). So it is vital that stellar theory works for them. However, the theories of mass transfer between binary stars and their resulting evolution give the wrong element abundances, even after all of the adjustable parameters are pushed to their limits. Our expert again:

"Something is clearly wrong."

"Some of the things we're finding are not what we expected. We've all been carefully taught in the wrong way."

"We need theories that are not so infinitely flexible."

Just so. Complexity does, however, provide security of tenure. It allows researchers to waste their talents and our money endlessly playing with computer models to approximate surprising new observations. The work is futile because it is not designed to make predictions whose falsification could end the game. There is no thought of any alternative to the thermonuclear model of stars. It is a self-perpetuating pastime.

"Even good scientists do GIGO (garbage in – garbage out). Astrophysicists have a long history of plugging in the answer they want to see."

The "infinitely flexible" astrophysical theories are impossible to falsify. Cosmology at present is not real science.

Theoretical astrophysicists have missed something important in their education. They are taught a theoretical form of plasma physics involving frozen-in magnetic fields that was warned against by Hannes Alfvén as not applying in space plasma. They do not attend plasma science conferences comparing real plasma lab experiments with observations of cosmic plasma. They seem oblivious that there is an electrical engineering (IEEE) discipline of plasma cosmology. Like the stars, plasma cosmology has a bright future.

Countless billions of dollars have been wasted based on the thermonuclear model of stars. For example, trying to generate electricity from thermonuclear fusion, "just like the Sun." The thought that solar scientists have it completely backwards has not troubled anyone's imagination. The little fusion power that has been generated on Earth has required phenomenal electric power input, "just like the Sun!" The Sun and all stars **consume** electrical energy to produce their heat and light and cause some thermonuclear fusion in their atmospheres. The heavy elements formed there are seen in stellar spectra. It explains why the expected solar neutrino count is low and anti-correlated with sunspot numbers. It explains why many stars are considered "chemically peculiar." Get the physics right first and the mathematics will follow.

It is no surprise that 'journeyman science' and its spin-off technology advances more rapidly in the age of the Internet than in the past. But it comes as a shock that fundamental science is moribund. That doesn't stop some scientists with more hubris than commonsense to declare a 'theory of everything' is within reach. Typical of this

misguided age is the notion that such a theory will be found in a concise statement printable in arcane mathematical runes on a T-shirt. It reveals that perhaps the greatest problem for physics is the cult of celebrity attached to mathematicians and their consequent dominance of the field. Perhaps the worrying decline in interest in physics can be put down to the overemphasis on mathematical theory. The clash of philosophical concepts is far more intriguing and ultimately useful. Mathematics should be the cart behind the horse of physics, not the reverse. Mathematics describes actions, it cannot explain them. Mathematics is not physics!

"I am acutely aware of the fact that the marriage between mathematics and physics, which was so enormously fruitful in past centuries, has recently ended in divorce."

—Freeman Dyson

As the astrophysicist said, *"If we understand what is going on in the Sun, we can turn and look outwards to every other star and transfer that knowledge to those other stars."* But we have not even begun to understand the Sun or the universe we live in. We must wait to see who the real scientists are—those who respond wisely to the distress of encountering fundamental disagreement.

"Science is one thing, wisdom is another. Science is an edged tool, with which men play like children, and cut their own fingers."

—Sir Arthur Eddington

Wal Thornhill

Deep Impact 2

Posted on [October 27, 2010](#) by [Wal Thornhill](#)

What can be said about the Deep Impact spacecraft's imminent second rendezvous with a comet? From NASA websites comes the following information:



NASA's EPOXI mission will fly by comet Hartley 2 on Nov. 4, 2010. Image credit: NASA/JPL-Caltech.

The Deep Impact spacecraft is about to rendezvous with another comet. It will be the fifth comet to be observed in a close flyby by a spacecraft. The mission is called by the peculiar acronym, EPOXI. EPOXI is a combination of the names for the two extended mission components: the extrasolar planet observations, called Extrasolar Planet Observations and Characterization (EPOCh), and the flyby of comet Hartley 2, called the Deep Impact Extended Investigation (DIXI). The spacecraft continues to be referred to as "Deep Impact."

The DIXI component (Deep Impact Extended Investigation) of the EPOXI mission will observe comet 103P/Hartley 2 to compare it with comets observed by other spacecraft missions. Comparisons with data from Tempel 1, taken with the exact same instruments, will be particularly useful for determining which cometary features represent primordial differences and which result from subsequent evolutionary processes.

Comment: The Deep Impact mission to comet Tempel 1 was perhaps the most successful space mission for [confirming Electric Universe predictions](#) and confounding the consensus view of comets as inert, primordial icy bodies. If the scientific method were truly applied, the puzzles from Deep Impact 1 should have been cause for a review, not just of the current paradigm but also of every choice that led up to it.

"Of all the forces we know, there is none stronger than a paradigm."

—Robert Stirniman

My predictions were based upon a distinctly different hypothesis of the origin and nature of comets. It assumes nothing about their inaccessible primordial origin. It is based on the broadest human observations of the heavens. My colleagues have amassed a powerful forensic case, based on the earliest recorded human memories and prehistoric petroglyphs, for electrical exchanges between solar system bodies during a period of recent planetary chaos. It is significant that global traditions associate the thunderbolt with stones from heaven, or meteorites. More compelling is the discovery on Earth of recent meteorites from Mars. The message is clear. [Comets, asteroids and meteorites](#) all originate from rocky planets and moons, lofted into space by overwhelmingly powerful electrical discharges.

This website carried the only prediction of the unexpected initial flash before impact:

"before physical impact occurs, we may expect a sudden discharge between the comet nucleus and the copper projectile. It will have the characteristic light-curve of lightning, with rapid onset and exponential decay. The question is, will it be a mere spark or a powerful arc?"

Also, I predicted that instead of seeing very little impact effect:

"the energetic effects of the encounter should exceed that of a simple physical impact, in the same way that was seen with comet Shoemaker-Levy 9 at Jupiter."

With these successful predictions, what might we expect from Deep Impact 2?

NASA:

DIXI Science Objectives

At the heart of NASA's Solar System Exploration endeavor is the need to understand the origins of planets, asteroids, comets and objects in the Kuiper belt. In the EPOXI mission, the interest is in both how the Solar System originated and how it is evolving. In either case we are interested in comets because it is thought that they tell of conditions that prevailed in the early stages of Solar System formation. They are original members of the Solar System and are little changed because they have spent most of their lives in frigid regions of the Solar System.

Comment: The story of the formation of planets from the 'leftovers' of the gravitational formation of the Sun is purely hypothetical because a body less than 1000 km diameter will fragment in a collision. The hypothesis falters trying to achieve bodies 1 km in size!

As if that weren't enough, in the words of one expert, "it needs a different story for every planet." Referring to the Stardust mission analysis of dust from the tail of comet Wild 2, Dr. Phil Bland, Reader in Meteorics and Planetary Science, Imperial College, London, wrote in the *Times*:



"The composition of [comet] minerals is all over the place, which tells us that the components that built this comet weren't formed in one place at one time by one event. Fundamentally we still don't know how you make planets from a cloud of dust and gas."

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However, the story goes that comets enter the inner system when disturbed from an invisible cloud of icy objects located about 1000 times the distance of Pluto, good fraction of the way to the nearest star. The disturbance is thought to be due to a passing star or the movement of the Sun above and below the galactic plane. But many astronomers have pointed to the lack of evidence for sporadic comet showers that such disturbances should unleash and concluded that such events could only account for about one-fifth of the comets we see.

The astronomer, the late Tom Van Flandern, devised a scale model that demonstrates the implausibility of this theory.

"If the Earth's orbit were represented by the period at the end of this sentence and Pluto's orbit by a circle of one centimetre diameter, then the nearest star is 41 metres away. The Oort cloud of comets would orbit near a sphere 6 metres in diameter containing one comet per cubic millimetre. The comets would move at about 3 millimetres per 1000 years. They are effectively motionless. Passing stars on rare occasions 'whiz' past at a metre per 1000 years and stir up the nearby comets. Less than 1 in 10,000 disturbed comets will be knocked onto a path that will target the 1 millimetre or so sphere surrounding the Sun where a comet might be seen from the Earth."

Having visualized this, Van Flandern makes the point that the volume of a sphere encompassing Pluto's orbit is so vast that all the 200 billion stars in our galaxy would fit inside with room to spare. He writes:

"But the volume enclosed by the comet cloud is a billion times greater yet. It truly is unimaginably large, surviving as a plausible idea in large part because our intuitions fail so miserably to comprehend the vastness of this volume."

This is another example from astronomy of an improbable model based on invisible matter. One serious observational difficulty with the idea is the total lack of comets on hyperbolic orbits. Yet the model persists unquestioned!

The recent discovery that stars form like a string of pearls conforms to the laboratory tested electromagnetic pinch theory of plasma cosmology. The Electric Universe model goes further in proposing both electrically mediated stellar capture, and expulsion of planetary bodies, satellites and rings of debris from stars and gas giants in that process and while achieving order in the new planetary system. In other words, [the history of the solar system is complex and episodic](#). Our weird assortment of planets and moons supports this view. Each body has its own unique origin and history.

Comets and asteroids are, in this picture, the debris from these interplanetary electrical events and are not "primordial." This hypothesis was recently buttressed by the 'surprising' discovery of high-temperature minerals captured from a comet tail by the Stardust spacecraft. Like the planets, each comet has a complex history. Comets may have different planetary parents or be torn from different surface materials on the same planet. They may be more or less electrically burnt and scarred in their 'birth' process. Researchers noted, "the fact that the shapes and topographies of three comets in Jupiter's family (Borrelly, Wild 2, and Tempel 1) are so different from one another raises the question of whether any comet is typical when looked at closely." Such a question should not arise if all comets were formed in a distant, homogeneous Oort cloud.

NASA again:

Observations to be made during the comet portion of the EPOXI mission are motivated largely by unexpected discoveries made during the Deep Impact mission. They are: frequent outbursts originating on the surface that radiate outward in a fanlike fashion; surface features not seen before, such as exposed edges of surface layers and relatively large flow-like features; spatial asymmetry of gases in the inner coma; evidence for shallow penetration of solar radiation; and small patches of water ice on the surface.

Comment: A history of unexpected discoveries is the hallmark of a failed hypothesis. The electrical model of comets was able to predict or simply explain all of the discoveries made during the Deep Impact mission. The "outbursts" from the comet are in the form of 'cathode jets,' which are bursty in nature and tend to jump around from one high point or sharp edge to another. The so-called 'volcanoes' on Io are also intermittent cathode jets, which show the "fanlike" ejecta and, unlike terrestrial volcanoes, move about the surface of the moon.



*This Voyager 1 image of Io shows the active 'volcanic' plume of Loki on the limb.
Credit: NASA/JPL*

The surface features of Tempel 1 are characteristic of electric discharge machining. The asymmetry of gases in the inner coma is discussed later. The shallow penetration of solar heat, shown by the rapid cooling of the unlit surface, and small patches of surface ice are not a problem because the jets are not heat related.

In order to better understand how comets formed and evolved we will compare EPOXI observations with previous flyby observations of comets Halley, Borrelly and Wild 2 – Giotto and Vega at Halley, DS1 at Borrelly, Stardust at Wild 2, Deep Impact at Tempel 1 – looking for both similarities and differences.

The discoveries made by Deep Impact at Tempel 1 raised several new questions:

- *Can the heterogeneity of gases in the inner coma be related to the formation of the comet by the accretion of different kinds of cometesimals from different parts of the solar system?*

Comment: No. The cometesimal hypothesis is conjectural and unsupported by attempts to model accretion of impacting objects. Also the orbits of comets do not conform to their supposed origin in a hypothetical 'Oort cloud' at great distance from the solar system. Van

Flandern proposed that the observed 'families' of comets could be traced to an inner solar system origin, which he attributed to perhaps four distinct (but unexplained) planetary explosions.

- *Do other comets show the frequent, short outbursts seen by Deep Impact at Tempel 1 and why do they happen?*

Comment: The EU model predicts that all active comets will exhibit frequent, short outbursts in different spots on their surface. The outbursts happen because they are electrical discharge phenomena, known technically as (cold) cathode jets. Their onset will be as sudden as an electric spark (described in one report as "nearly instantaneous") and their duration extended only because space plasma has a limited current carrying capacity. The jets will focus on an extremely small bright area generally situated on a raised point or edge of the comet surface. In [July 2004](#), I wrote in relation to Comet Wild 2:

"In the electric theory, unresolved bright spots are to be expected where the cathode arcs impinge on the nucleus and give rise to the cathode jets. What do we find? "The most significant albedo, or at least brightness, features are rare small bright spots that occur in multiple images at different phase angles ...ruling out the possibility that it is a phase effect or image artifact. In stereo images, it [a <50-m bright spot at the edge of a flat-floored depression] has no height. There is an adjacent shadow-like dark spot that could be the shadow of an optically thick jet... The bright spots are small and rare, suggesting that they may be short-lived."

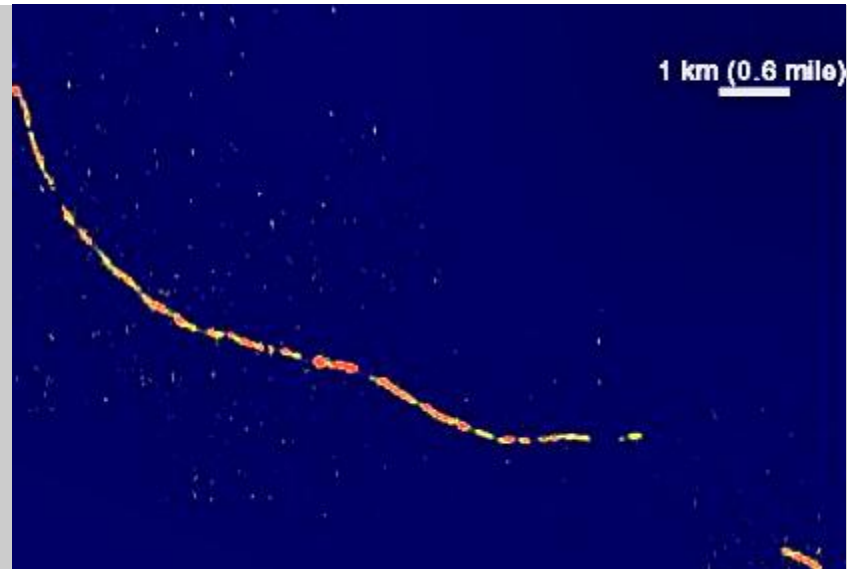
Some of the jet sources are reported as tending *"to coincide with the locations that are brighter than average."* The jets will form on the comet nucleus closest to its plasma sheath and where the electric field is strongest. Since the plasma sheath is generally closest in the solar direction, it has given rise to the notion that solar heating is responsible for comet jets. However, the solar wind strongly influences the comet's plasma sheath, which may give rise to jets occurring on unlit areas of the comet.

In comparison, jets due to heating can be expected to have a slow onset and persistence in the same location only while receiving maximum sunlight.

NASA again:

- *Do other comets have exposed layers and large scale flow-like features bounded by scarps? What causes them?*

Comment: All comets should exhibit electrostatic cleaning of their surfaces and spark machining, which produces flat surfaces surrounded by terraces or scarps. An example is the so-called 'calderas' on Io, which are larger in scale and have been imaged in the process of spark machining of the 'caldera' wall.



The "volcano" Pele glows in the night in this close-up image of Jupiter's moon Io, obtained by NASA's Galileo spacecraft in the closest-ever Io flyby on October 10, 1999. Only surfaces hotter than 600 degrees Celsius (1,100 degrees Fahrenheit) are visible in this image. The hot spots are due to cathode arcs that form a thin, curving line more than 10 kilometers (6 miles) long and up to 50 meters (150 feet) wide. The cathode arcs follow the sharp-edged margin of Pele's caldera. Image credit: NASA/JPL/University of Arizona

- *Is the dark side of a comet extremely cold because heat cannot penetrate very far below the surface?*

Comment: Yes. The consensus view of comet jets being formed by heat conduction to volatiles beneath the surface is a desperate and unlikely hypothesis featuring unverifiable guesses about what lies hidden inside a comet. Also, it requires impossibly perfect cylindrical venturies in the surface rock to produce the observed fan-like jets.

- *Does the dilapidated shape of craters tell us that comets were formed earlier than previously thought?*

Comment: NO. All comets were formed recently in catastrophic planetary electrical encounters. The craters are not due to impact. They are electrical craters that are having their sharp edges eroded each time they approach the Sun.

- *Does the distribution of volatiles, such as the ices of water or carbon dioxide, result from an evolutionary process or did it occur during the initial formation?*

Comment: Most of the volatiles detected in cometary comas are formed not by solar heating but by electrical 'cathode sputtering' of the high-temperature minerals on the comet surface. The evidence for this comes from the 'puzzling' abundance (densities at

least 100 times greater than expected) of negative ions near the nucleus. The negative ions combine with the positive hydrogen ions from the solar wind to give, amongst other things, the OH radical, which is then misinterpreted as signaling the presence of water ice on the comet. That is why all other means of detecting significant water ice on comets have generally failed.

Comets have not undergone "an evolutionary process." They are the debris resulting from electrical discharge sculpting of planetary surfaces. They belong to 'families,' which characterize their parent planet. They were born in an intense plasma discharge environment which tends to drive off volatiles. However, as chondritic meteorites show, there are plasma effects which tend to produce surface layering and fragment agglomeration.

- *How can we distinguish characteristics set in place during the initial formation of a comet from those that evolved later?*

Comment: First, the formation mechanism of comets needs to be understood. And that requires that scientists accept the possibility that the Stardust mission's detection of high-temperature minerals in comet tail dust signalled the falsification of the consensus 'dirty snowball' hypothesis of comet formation. Instead, we witnessed the dreaming up of another post hoc story to cover this fundamental challenge to comet theory; "somehow, the high-temperature minerals must have been blown to the outer reaches of the solar system."

Outbursts

One of the significant findings made during the primary Deep Impact mission that, hopefully, will be studied during the EPOXI mission was the presence of frequent, sporadic, fan-shaped outbursts of brightness in the coma that are correlated with the comet's rotation.

This discovery is significant for the following reasons. First, outbursts of Tempel 1, unlike observations of previous comets, have been monitored continuously and at regular intervals, allowing their study as they develop. Second, outbursts of Tempel 1 were from a relatively inactive comet. Third, groups of outbursts correlate with the rotation of the comet. Fourth, the intensity rises very rapidly to its maximum, in a matter of minutes. Fifth, the outbursts often appear to emanate from localized regions on the surface.

Questions for study outbursts at Hartley 2 include the following:

- *Does Hartley 2 exhibit rapidly rising outbursts?*

Comment: Yes.

- *What is the significance of the rapid rise time?*

Comment: It is an electric discharge with a sudden onset like lightning.

- *Do Hartley 2's outbursts, if any, correlate with local sunrise?*

Comment: Not necessarily. The outbursts should correlate with changes in distance of the surface from the comet's plasma sheath. This will be principally due to the rotation of high points on the nucleus toward the Sun and changes in the proximity of the plasma sheath due to interaction with the solar wind. The evidence for this electrical correlation comes from the flaring of Halley's comet in the deep-freeze of space beyond Saturn at the time a solar outburst passed through the region.

- *Can surface features, such as the presence of ices, differences in chemical composition or topographical features, be associated with the sources of the fan-like structures?*

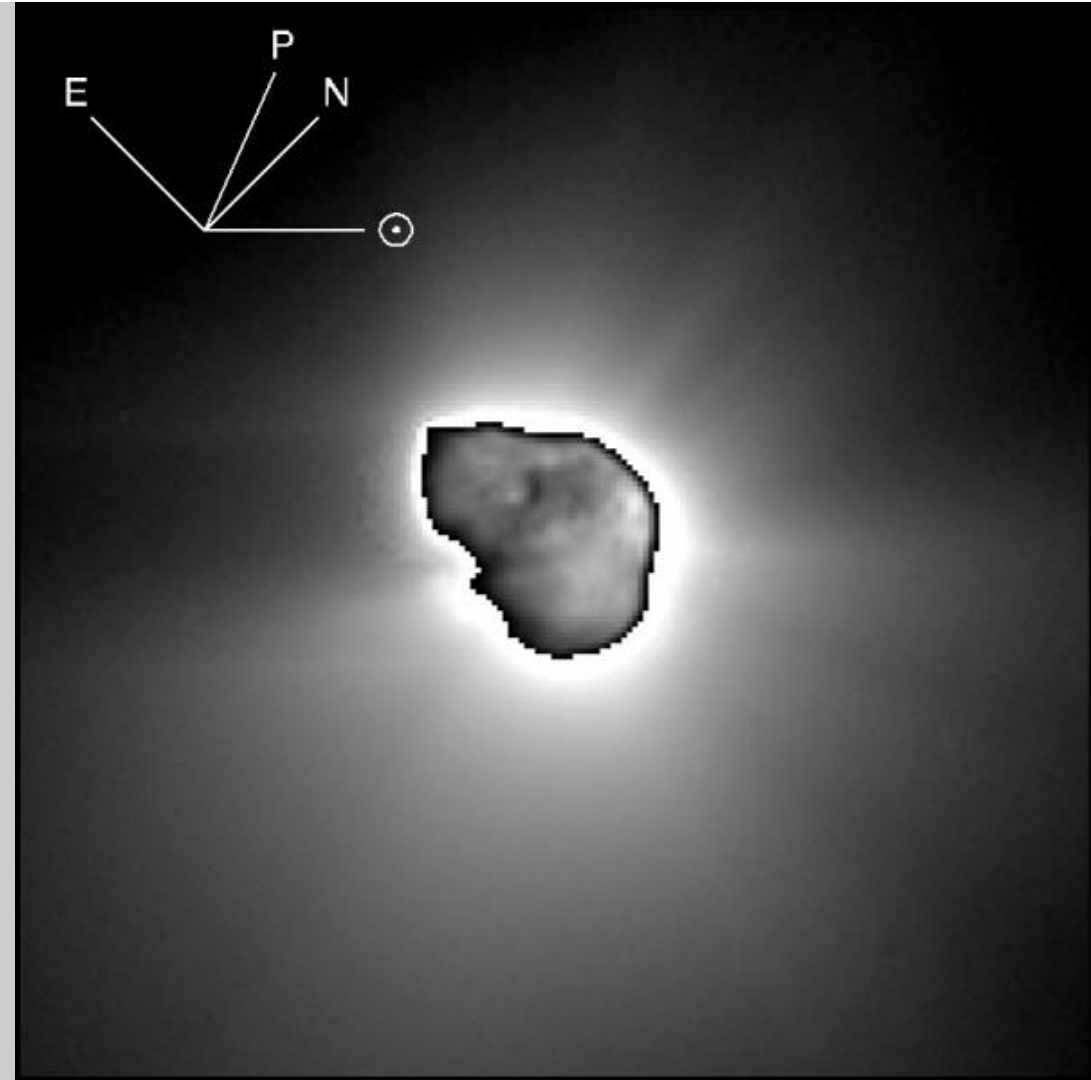
Comment: Contrary to all expectations, the 'fan-like structures' (jets) will tend to emanate from sharp-edged topographical highs. Chemical composition that enhances conductivity, or cold-cathode electron emission, of surface rocks will be favored as jet sources.

- *What processes within the comet cause the outbursts to occur?*

Comment: Just as there are no causes within the Earth to cause lightning to strike, there are no processes operating within the comet to cause the outbursts. Both are simply evidence of the location of the electrical breakdown path and are therefore surface/atmospheric effects rather than processes within the body. The comet nucleus behaves like a passive electret subjected to external electrical stress.

- *Does the loss of material from the outburst contribute significantly to the loss of material from the surface. If so, are there any evolutionary consequences?*

Comment: The loss of material is entirely from the surface except when rising internal electrical stress from surface discharge activity may cause a comet to explode like an overstressed capacitor. The electrical disintegration of a comet is the only evolutionary consequence.



This image is a composite of two exposures - a long one where the nucleus was overexposed (showing the coma) and a shorter exposure of the nucleus that underexposed the coma. In addition, the coma is grey-scaled logarithmically to show structure while the nucleus is inset with linear contrast levels, scaled so that it is not saturated. CREDIT: NASA/UM/Tony Farnham

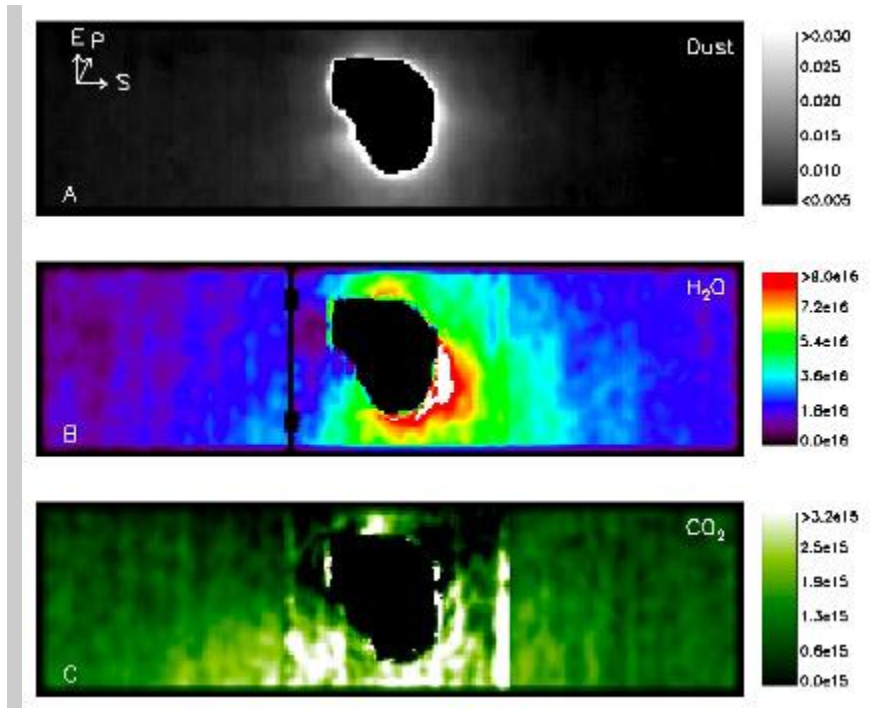
Jet Activity in the Coma

During the encounter with Tempel 1, jets of material were observed spiking out from the surface of the comet. As the comet rotated, observations made from different angles enabled analysts to trace the jets to their origin on the comet's surface. Indeed, other observations show jets rising directly from the surface. Although many jets have been observed, only one weak jet seems to be associated with one of the three patches of water ice on the surface.

Comment: "Jets rising directly from the surface" are characteristic of cathode jets, which are constrained by the electric field to rise perpendicularly. There is no reason to expect gas rising from beneath the comet surface, as the consensus model holds, to form a jet or to rise perpendicularly.

- *Interestingly enough, some jets appear to persist even though their sources are on the dark side of the comet. This phenomenon, if observed, can tell us about the thermal properties of Hartley 2's nucleus. Note that jets may have been observed coming from the dark side of comet Wild 2.*

Comment: As explained earlier, the jets are not due to solar heating. Therefore they may appear on the dark side of the nucleus. They will tell us nothing about the thermal properties of a comet based on the solar heating model.



Results from the Infrared spectrometer in work lead by Lori Feaga of University of Maryland, show asymmetric distributions of both water and carbon dioxide gases in the coma of Tempel 1. The water is enhanced in the sunward direction, where sunlight sublimates water ice. The carbon dioxide (CO_2) is enhanced off of the southern hemisphere of the comet. This suggests that the composition of the nucleus of the comet is not uniform, and is heterogeneous. CREDIT: NASA/UM/Lori Feaga

Relating The Coma To The Nucleus

We have already noted above the spectacular outbursts and jets observed on Tempel 1. Here we describe the more delicate features of the coma that we will seek to relate to features on the surface of the nucleus.

When examined with the spectrometer in Deep Impact's High Resolution Instrument, it was discovered that Tempel 1's coma has an excess of water vapor on its sunward side. It is most pronounced along the direction toward the sun. Further, an excess of carbon dioxide vapor was found above Tempel 1's southern hemisphere. Why these things are true is a matter for further analysis hopefully aided by observations of Hartley 2.

Comment: The electrical model of comet behavior offers a simple answer to why an excess of water 'vapor' was found on Tempel 1's sunward side. First, it is an unwarranted use of the word 'vapor.' It is the OH radical that is detected. It is an assumption that it is formed by the breakdown of H₂O 'vapor' by solar UV radiation. As explained earlier, electrical sputtering of rocky minerals on the comet nucleus will tear molecules apart, producing O⁻ ions which combine with protons (H⁺) from the solar 'wind' to produce OH. The sunward side of the coma is the place where the coma is most compressed and where we should expect OH to be most concentrated.

The localized CO₂ signature, usually identified by carbon monoxide (CO), most likely represents sputtering from a localized carbon-containing mineral. It must also be considered that CO ions will have a unique trajectory under the influence of electromagnetic forces associated with the cathode jets. Once again, this finding doesn't necessarily represent the sublimation of carbon dioxide ice. In fact, "it seems that CO is produced only in part by the cometary nucleus and in greater proportions by some extended source in the coma," which suggests perhaps recombination of carbon and oxygen ions at some distance from the nucleus should also be considered.

We would like to trace features in Hartley 2's coma to areas of heightened activity on the comet's surface. Having done so, we can entertain questions such as the following. What fraction of the dust and gas in the coma comes from active areas? What fraction of Hartley 2's area shows heightened activity? To what degree do the localized areas differ in composition? Can the differences be attributed to the presence of cometesimals that the nucleus accumulated in different parts of the Solar System as the then-forming comet migrated outward from the sun? On the other hand, differences may not be evidence of cometesimals at all, but rather they may be layered accumulations of dust and ice that solar activity has eroded at different rates because of differences in composition or because the comet's spin axis changes.

Comment: Here we see an attempt to explain an inhomogeneous comet nucleus. As pointed out earlier, hypothetical impacting cometesimals would fragment, not coalesce. And now we see an ad hoc addition to the original theory of comet origins as "leftovers"

from a primordial solar nebula. In order to explain high-temperature minerals in comets, some heavy elements must have somehow "migrated outward from the sun" against gravity! The conventional story of comets becomes more complex and bizarre with each new attempt to save it.

The mass of a typical comet is thought to be roughly half ice. Not all of the ice is made of water or carbon dioxide. More complex carbon-based molecules are present. In order to learn more about these ices, the coma near Hartley 2's surface will be compared spectroscopically with the coma farther out. What we hope to observe is that these complex molecules dissociate under the action of solar radiation and then, perhaps, recombine to form different molecules.

A small amount of water ice was discovered on the surface of Tempel 1 and it remains to be seen whether there is water ice on Hartley 2. If so, can it be correlated with any features in the coma?

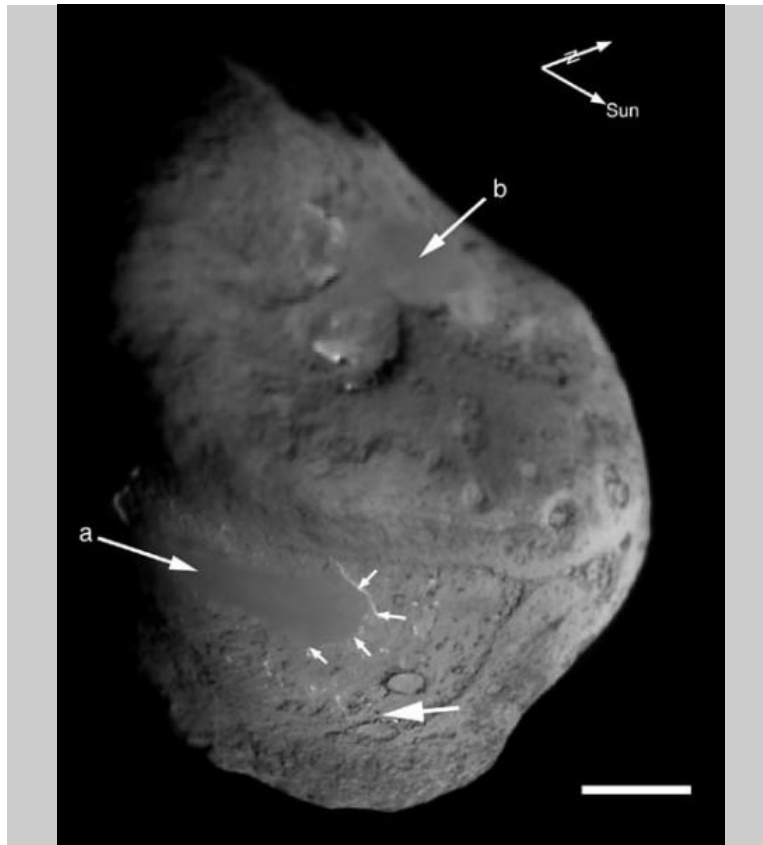
Comment: It is amazing that comets are still thought to be "half ice" after the non-detection of ice on so many comet flybys. The spectroscopic survey is very important. I predict that photo-dissociation will be found totally inadequate to explain the degree and nature of ionization of molecules close to the nucleus. It has been known since the Giotto spacecraft flew through the inner coma of comet Halley that:

"negative ions occurred with densities 100 times greater than expected, and the discrepancy is still not well understood."

Only a week ago, NASA reported about comet Hartley 2:

"recent observations of comet Hartley 2 have scientists scratching their heads, while they anticipate a flyby of the small, icy world on Nov. 4. Our observations indicate that cyanide (HCN) released by the comet increased by a factor of five over an eight-day period in September without any increase in dust emissions. We have never seen this kind of activity in a comet before..."

This is simply another piece of contrary evidence suggesting that comets are not a homogeneous aggregate of primordial ice and dust.



Comet Tempel 1 Composite Map. Arrows a and b point to large, smooth regions. The impact site is indicated by the third large arrow. Small grouped arrows highlight a scarp (a cliff or steep slope along the edge of a plateau) that is bright due to illumination angle. They show a smooth area to be elevated above the extremely rough terrain. The white scale bar in the lower right represents 1 km across the surface of the comet nucleus. The two directional arrows (vectors) in the upper right point to the Sun and Celestial North. CREDIT: NASA/UMD/M. F. A'Hearn et al., Science 310, 258 (2005).

Talps and Layers

The primary Deep Impact mission discovered surface features on Tempel 1 that shed light on the mechanisms by which, at least some, comets were formed. These features are called talps or layered piles. They consist of layers of material that are fairly large relative to the size of the comet. In high-resolution images, the lower smooth flat area shows signs of flowing from left to right. Its source at the left end is in an obscure area, its right end is marked by a scarp e.g. a steep slope or cliff, some 20 meters high.

Recent theory has it that talps were laid down one after another during low speed collisions between a growing nucleus and smaller, readily deformable, objects.

Further, the theory holds that there are more talps beneath the surface and that they are the "predominant building blocks" of the nucleus.

All this is thought to have happened in the earliest days of the Solar System while comets were still forming. Therefore, we say that the material is pristine. On the other hand, the scarps are thought to have formed later by the erosive effect of volatile material escaping from the nucleus after having been turned from ice to gas by the heat of the sun.

Be it noted that there is some evidence of layering and smooth flowlike areas on other comets. For example, layering in both Borrelly and Wild 2 and the suggestion of smooth flowlike areas on Borrelly.

The flat areas are theorized to be composed of a powdery substance. Some layers are seen edge on. Up to seven layers have been identified in the region just above and to the right of the large flat area.

Comment: When the wrong concept (primordial accretion) is used, it is impossible to "shed light on the mechanisms by which comets were formed." When the right concept is used, it is possible to confirm it by observation and experiment. We have not observed, in modern times, a cosmic thunderbolt capable of wrenching mountains from a planet into space. The closest we see are coronal mass ejections of billions of tons of matter from the Sun. And we have petroglyph evidence of the Earth having experienced a "mega-aurora" in prehistory. Also, there was the surprising discovery of meteorites arriving from Mars that do not show the expected signs of an impact origin. But gravity and mechanical impact are the only tools available in the poor astrophysical toolbox.

If asteroids, comets and meteorites are fragments of large, well-differentiated celestial bodies, we may expect them to exhibit any stratification due to their origin. There should also be evidence of blast, electrostatic and shock heating effects from a plasma discharge. I wrote a paper in 1987 that outlined a simple answer to 17 enigmas found in common chondritic meteorites. Most of the mysteries centred around a feature that seems shared by chondritic meteorites and comets — the presence of Calcium-Aluminium rich inclusions (CAIs). CAIs formed by flash-heating at high temperatures for a few seconds, which argues for a highly localized event. I proposed:

"The arc of material leaving the fissioning parent body would be composed of ionised gases, liquids and solids ranging in size from microns up to asteroid or planetoid dimensions. Electric discharges would take place between the parent planet and the highly charged departing matter."

I argued that chondritic meteorites have all of the features to be expected from powerful lightning in a very dusty plasma and suggested an experiment to be carried out in a plasma oven.

In 1995 a paper was published in *Icarus* by a leading expert on dusty plasmas. He concluded:

"...lightning is a viable mechanism for chondrule formation worthy of more complex theoretical and also laboratory investigations."

Of course, the paper doesn't discuss the origin of the lightning. Even on Earth that is not understood! And it should be remembered that all of the giant planets have ephemeral ring systems and many satellites, which are indicative of past expulsion of matter.

I have dealt earlier with the surface features of comets. They show the classic signatures of electric discharge machining. The flat areas are not "composed of a powdery substance." They have been etched clean by electric discharge. The unexpectedly fine powder found in all comet jets is further evidence of cathode sputtering. The powder does not exist in this form on the comet nucleus and could not be produced in the quantity observed at comet Tempel 1 by the impact alone.

Allowing electrical effects into astronomy, astrophysics and planetary science will be the greatest scientific revolution in history.

I leave the last word to Tom Van Flandern:

"As science progresses we will eventually unravel the mystery of our origins, and the solution will come sooner if our minds are prepared to accept the truth when it is found, however fantastic it may be. If we are guided by our reason and our scientific method, if we let the Universe describe its wonder to us, rather than telling it how it ought to be, then we will soon come to the answers we seek, perhaps even within our own lifetimes."

- *Science Digest*, April 1982.

Sadly, Tom did not live to see any progress. Science as an ideal in the search for the truth has yet to deal with human nature.

Wal Thornhill

2011

Alfvén Triumphs Again (& Again)

Posted on [May 9, 2011](#) by [Wal Thornhill](#)

The lack of news reports in recent months has been due to a very heavy workload in preparing papers, a course and presentations. This work continues with the upcoming Natural Philosophy Alliance's [18th annual conference](#) at the University of Maryland, July 6-9, where I will give two papers including the invited John Chappell Memorial Lecture.



Meanwhile I attend scientific meetings and accumulate reports supporting the Electric Universe paradigm. A science journalist dubbed me "the boundary rider of science." And it is from that broad perspective that I see our sciences like juggernauts speeding down their blind tunnels of specialization and one can only wait for the inevitable crash. Modern science attempts to describe our reality using meaningless language (e.g. "the fabric of space-time") and invalid metaphors with the result that ever more forces, unreal dimensions and invisible or virtual matter are invoked. It seems to me that our salvation lies with engineers who must deal with the real world. For it was an outstanding and outspoken electrical engineer and physicist, Hannes Alfvén, who gave us an electrical engineer's practical explanation of many of the mysteries of the universe—known as plasma cosmology. But in a classic academic 'Catch-22,' because it's not mainstream students are not given the opportunity to consider it at any university.

Alfvén emphasized the influence upon him of Kristian Birkeland's earlier research into the electrical nature of the aurora and other phenomena in the solar system. Birkeland

seemed to intuitively sense the real electrical nature of space but was too far ahead of his time. The theory of electric discharges was still in a very primitive state. He wrote:

"It seems to be a natural consequence of our point of view to assume that the whole of space is filled with electrons and flying ions of all kinds. We assume each stellar system in evolution throws off electric corpuscles into space. It is not unreasonable therefore, to think that the greater part of the material masses in the universe is found not in the solar systems or nebulae, but in 'empty' space."

Birkeland met overwhelming resistance, particularly from Sydney Chapman who was perhaps the most influential scientist in the field of geophysics in the period 1920-1960. But in 1973 satellites confirmed the existence of electric currents aligned with the magnetic field. These field-aligned currents are now called "Birkeland currents." In 1987, reflecting his own struggle with orthodoxy, Alfvén wrote tartly:

"Since Chapman considered his theory of magnetic storms and aurora to be one of his most important achievements, he was anxious to suppress any knowledge of Birkeland's theory. Being a respected member of the proud English tradition in science, and attending – if not organizing – all important conferences in this field, it was easy for Chapman to do so. The conferences soon became ritualized. They were opened by Chapman presenting his theory of magnetic storms, followed by long lectures by his close associates who confirmed what he had said. If finally there happened to be some time left for discussion, objections were either not answered or dismissed by a reference to an article by Chapman. To mention Birkeland was like swearing in the church."

Many dissident scholars have echoed the comparison of modern institutionalized science with a religious order.

Alfvén's plasma cosmology is an excellent theory when measured by its successful predictions. Despite this;

"..the continuing resistance to Alfvén's work is based on a widely held opinion that his predictions are not derived from a plausible physical theory (i.e., a theory that conforms to the dominant paradigm). If a theory is not acceptable, it does not gain credit by making successful predictions. This would imply that the role of prediction as a means of evaluating scientific theories has been exaggerated."

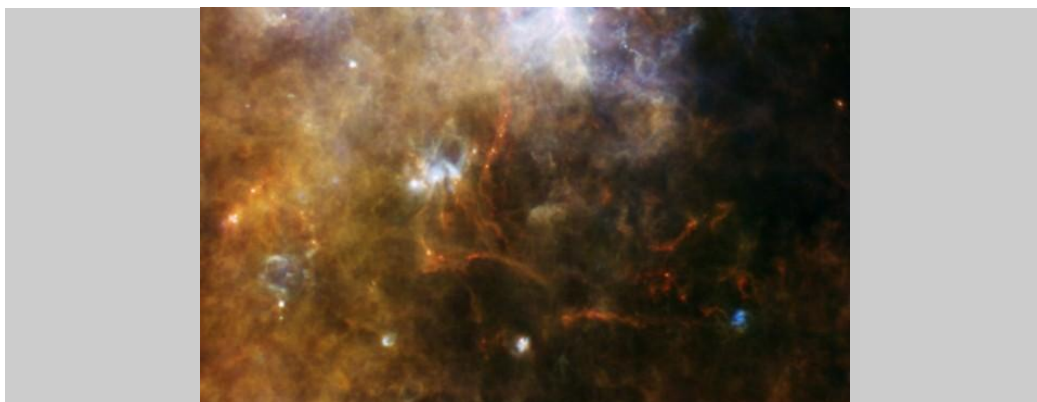
—Stephen G. Brush, [*Alfvén's Programme in Solar System Physics*](#), IEEE Transactions On Plasma Science, Vol. 20, No. 6, December 1992, p. 577.

Now two new reports stand out in relation to Alfvén's predictions so that ultimately he cannot be ignored. The first concerns the birth of stars and the second the electric circuit of the Sun.

Electric Star Birth



The European Space Agency's Herschel Space Observatory (formerly called Far Infrared and Sub-millimetre Telescope or FIRST) has the largest single mirror, at 3.5-metres in diameter, ever built for a space telescope. It is an infrared telescope, named after Sir William Herschel, the discoverer of the infrared spectrum. The telescope has been giving astronomers an unprecedented look inside the cosmic womb of stars, known as molecular clouds, to find (surprise, surprise) that stars are formed in "an incredible network of filamentary structures, and features indicating a chain of near-simultaneous star-formation events, glittering like strings of pearls deep in our Galaxy." Although described as "incredible" by astronomers, this description precisely matches the decades-old expectations of plasma cosmologists!



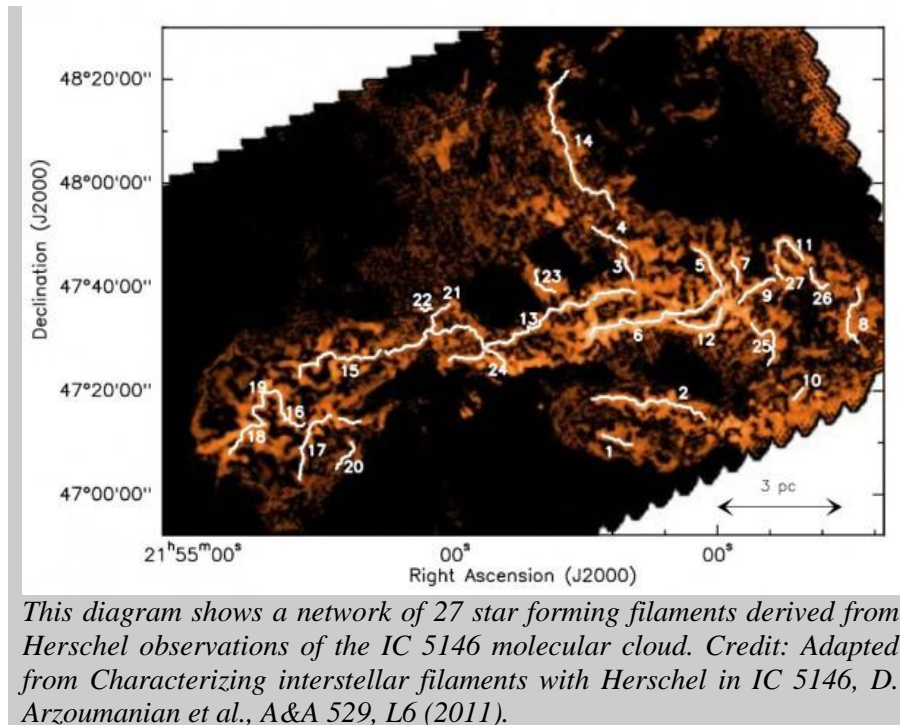
"An incredible network of filamentary structures" seen in a cloud of cold gas in the constellation of the Southern Cross. The ESA report dated 2 October 2009. "That a dark, cool area such as this would be bustling with activity, was unexpected. But the images reveal a surprising amount of turmoil: the interstellar material is condensing into continuous and interconnected filaments glowing from the light emitted by new-born stars at various stages of development."

[\[2009 ESA report\]](#)

In an ESA report last month the high-resolution of the Herschel space observatory produced another surprise:

*"The filaments are huge, stretching for tens of light years through space and Herschel has shown that newly-born stars are often found in the densest parts of them... Such filaments in interstellar clouds have been glimpsed before by other infrared satellites, but they have never been seen clearly enough to have their widths measured. Now, Herschel has shown that, **regardless of the length or density of a filament, the width is always roughly the same.** This is a very big surprise," says Doris Arzoumanian, Laboratoire AIM Paris-Saclay, CEA/IRFU, the lead author on the paper describing this work. Together with Philippe André from the same institute and other colleagues, she analysed 90 filaments and found they were all about 0.3 light years across, or about 20,000 times the distance of Earth from the Sun. This consistency of the widths demands an explanation."*

[Emphasis added]



[\[A&A paper\]](#)

So what is the favored conventional explanation? What else but "sonic booms" generated by "exploding stars!" But where are these exploding stars? And explosions should impose some degree of radial curvature on these filaments. But what we see is more like the tortuous paths of cloud-to-cloud lightning bolts. For that is what they are, in fact, on a cosmic scale.

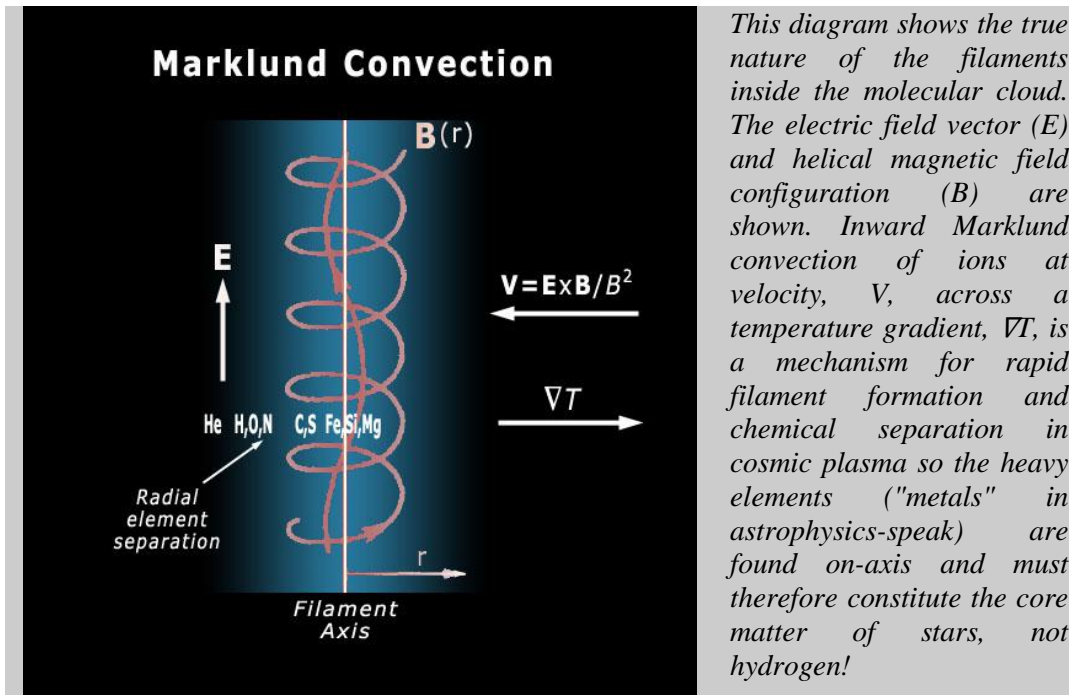
The 'father' of plasma cosmology, Hannes Alfvén, wrote in 1986:

"That parallel currents attract each other was known already at the times of Ampere. It is easy to understand that in a plasma, currents should have a tendency to collect to filaments. In 1934, it was explicitly stated by Bennett that this should lead to the formation of a pinch. The problem which led him to the discovery was that the magnetic storm producing medium (solar wind with present terminology) was not flowing out uniformly from the Sun. Hence, it was a problem in cosmic physics which led to the introduction of the pinch effect..."

However, to most astrophysicists it is an unknown phenomenon. Indeed, important fields of research, e.g., the treatment of the state in interstellar regions, including the formation of stars, are still based on a neglect of Bennett's discovery more than half a century ago... present-day students in astrophysics hear nothing about it."

[Emphasis added]

The constant width over vast distances is due to the current flowing along the Birkeland filaments, each filament constituting a part of a larger electric circuit. And in a circuit the current must be the same in the whole filament although the current density can vary in the filament due to the electromagnetic pinch effect. Therefore the electromagnetic scavenging effect on matter from the molecular cloud, called Marklund convection, is constant along each current filament, which simply explains the consistency of widths of the filaments. The stars form as plasmoids in the Bennett-pinches, also known in plasma labs on Earth as Z-pinches.



In May last year in a similar star-forming cloud, Herschel uncovered:

"[an] impossible star in the act of formation... This is because the fierce light emitted by such large stars should blast away their birth clouds before any more mass can accumulate. But somehow they do form. Many of these 'impossible' stars are already known, some containing up to 150 solar masses, but now that Herschel has seen one near the beginning of its life, astronomers can use the data to investigate how it is defying their theories."

The answer is simple. Astrophysicists' theories bear no relation to reality. The luminosity of a star is not related to its massiveness because no nuclear fusion is taking place in its heavy element core. And the massiveness of a star is not related to its size because the photosphere is not a surface in the usual sense but rather an electric discharge phenomenon some distance above the surface of the star. There are no "impossible stars." The light of a star comes from the available electrical energy coursing along the enveloping Birkeland filaments. As for "sonic booms" caused by the pressure of light from the star, that force is negligible compared to the electromagnetic forces in the enveloping plasma. And any such collision would serve to further ionise the dust and gas and make it more susceptible to the electromagnetic force. However, if any reservation remains about the electrical environment of the Sun (and therefore all stars) then the following report should dispel that doubt.

Alfvén's Solar Circuit Confirmed

On May 3, the New Scientist published an important article by Anil Ananthaswamy, "[Strange cosmic ray hotspots stalk southern skies.](#)"

Cosmic rays crashing into the Earth over the South Pole appear to be coming from particular locations, rather than being distributed uniformly across the sky. Similar cosmic ray "hotspots" have been seen in the northern skies too, yet we know of no source close enough to produce this pattern.

"We don't know where they are coming from," says Stefan Westerhoff of the University of Wisconsin-Madison. Westerhoff and colleagues used the [IceCube](#) neutrino observatory at the South Pole to create the most comprehensive map to date of the arrival direction of cosmic rays in the southern skies.



IceCube uses neutrino detectors buried at the South Pole. IceCube detects muons produced by neutrinos striking ice, but it also detects muons created by cosmic rays hitting Earth's atmosphere. These cosmic ray muons can be used to figure out the direction of the original cosmic ray particle. (Image: NSF/B Gudbjartsson).

Between May 2009 and May 2010, IceCube detected 32 billion cosmic-ray muons, with a median energy of about 20 teraelectronvolts (TeV). These muons revealed, with extremely high statistical significance, a southern sky with some regions of excess cosmic rays ("hotspots") and others with a deficit of cosmic rays ("cold" spots).

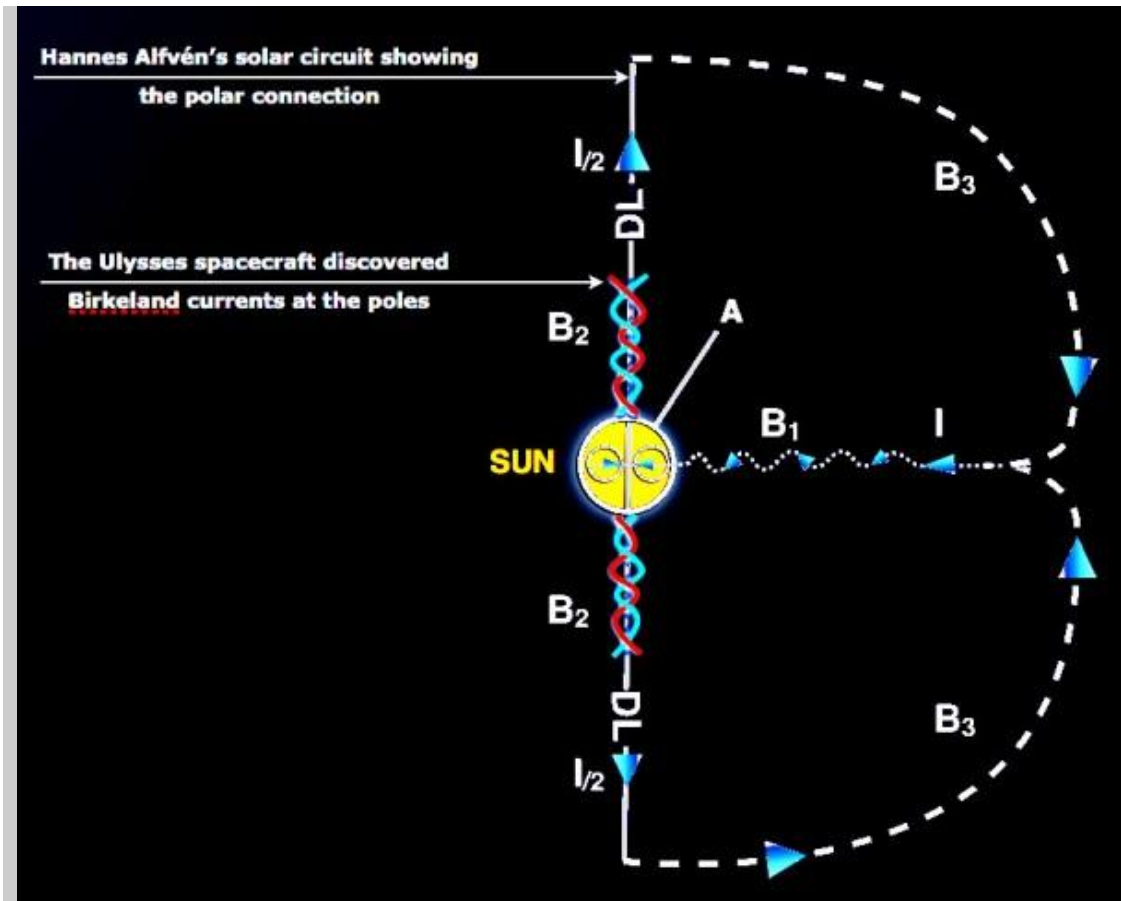
Over the past two years, a similar pattern has been seen over the northern skies by the Milagro observatory in Los Alamos, New Mexico, and the Tibet Air Shower array in Yangbajain. "It is interesting that the pattern can be matched between [these experiments], at least qualitatively. They have very different techniques and systematic effects," says cosmic-ray physicist Paul Sommers at Pennsylvania State University in University Park. "I regard those hotspots as a good mystery."

It's a mystery because the hotspots must be produced within about 0.03 light years of Earth. Further out, galactic magnetic fields should deflect the particles so much that the hotspots would be smeared out across the sky. But no such sources are known to exist.

In the 1920s Irving Langmuir and Harold Mott-Smith showed that in a discharge tube the plasma sets up a thin boundary sheath which separates it from a wall or from a probe and shields it from the electric field. The electric field in this sheath, or 'double layer' of separated charge, accelerates charged particles. In 1958 Alfvén suggested that this

phenomenon might be important in space plasmas. Sources of cosmic rays situated along the Sun's axes were predicted by Alfvén in 1986 in an IEEE publication and NASA Conference Publication 2469, "[Double Layers in Astrophysics](#)." [Warning: 13 Mb pdf file]. He explains:

"Since the time of Langmuir, we know that a double layer is a plasma formation by which a plasma — in the physical meaning of this word — protects itself from the environment. It is analogous to a cell wall by which a plasma — in the biological meaning of this word — protects itself from the environment. If an electric discharge is produced between a cathode and an anode there is a double layer, called a cathode sheath, produced near the cathode that accelerates electrons which carry a current through the plasma. A positive space charge separates the cathode sheath from the plasma. Similarly, a double layer is set up near the anode, protecting the plasma from this electrode. Again, a space charge constitutes the border between the double layer and the plasma. All these double layers carry electric currents."



Results from the Infrared spectrometer in work lead by Lori Feaga of University of Maryland, show asymmetric distributions of both water and carbon dioxide gases in the coma of Tempel 1. The water is enhanced in the sunward direction, where sunlight sublimates water ice. The carbon dioxide (CO₂) is enhanced off of the southern hemisphere of the comet. This suggests that the composition of the nucleus of the comet is not uniform, and is heterogeneous. CREDIT: NASA/UM/Lori Feaga

Alfvén's Heliospheric Circuit. The Sun acts as a unipolar inductor (A) producing a current which goes outward along both the axes (B2) and inward in the equatorial plane along the magnetic field lines (B1). The current must close at large distances (B3), either as a homogeneous current layer, or — more likely — as a pinched current. Analogous to the auroral circuit, there may be double layers (DLs) which should be located symmetrically on the Sun's axes. Such double layers have not yet been discovered. Credit: Original diagram by H. Alfvén, NASA Conference Publication 2469, 1986, p. 27.

In the circuit model, it was noted that every circuit that contains an inductance is intrinsically explosive. This is true because a conductive circuit will tend to supply all of the inductive energy to any point of interruption of the circuit. Double layers are known to tend to interrupt current in a plasma. Hence, the entire energy of a circuit can be released at the point where a double layer forms regardless of the source of the energy of the circuit.

Because of their property of generating cosmic rays, synchrotron radiation, radio noise, and occasionally exploding, Alfvén proposed:

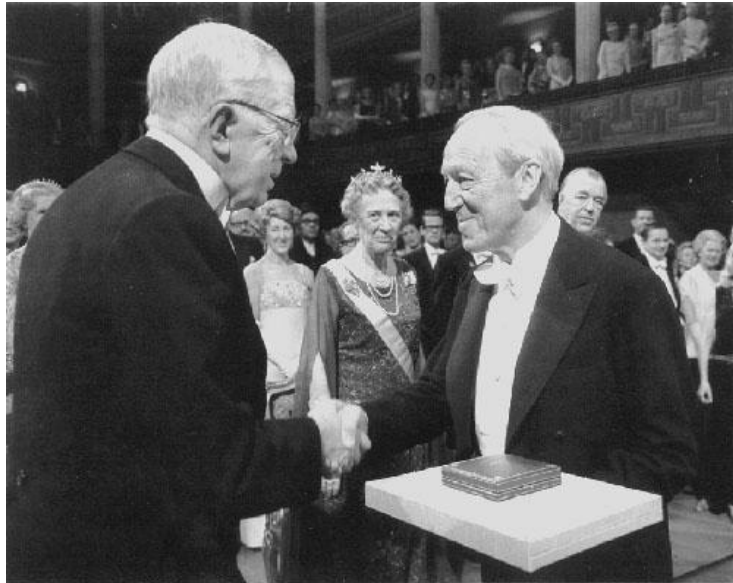
"DL's may be considered as a new class of celestial objects... For example, the heliospheric current system must close at large distances, and it is possible — perhaps likely — that this is done by a network of filamentary currents. Many such filaments may produce DL's, and some of these may explode."

To give an idea of their omnipresence in space, DLs are implicated in the earth's auroral regions, extragalactic jets, stellar jets, novae and supernovae, X-ray and gamma-ray bursts, X-ray pulsars, double radio sources, solar flares, and the source of cosmic ray acceleration.

It seems that Alfvén's DLs have been detected in the form of "cosmic ray hotspots" generated in Birkeland current filaments "less than 0.03 light years" from the Sun. The hotspots should be found to align with the local interstellar magnetic field. The median energy of the cosmic rays reported at 20 TeV is within the range expected from a cosmic DL.

POSTSCRIPT:

Alfvén didn't go so far as to consider a star as an electrical discharge phenomenon. But if stars are electrically powered from a galactic circuit then the consequences of this fact alone for science and society are profound. We have been following a mirage of knowledge that leads into a desert of ignorance. Our story of the Sun is a myth. The holy grail of nuclear fusion energy "like the Sun" is a false trail. In fact our entire cosmology of the big bang, galaxy formation, the formation of the Sun and its family of planets, and the history of the Earth is fiction. It ignores the most powerful organizing electric force in favour of the feeblest force— gravity. Most of our 'big' science, like the costly fusion experiments and space missions, has been misdirected and wasteful. All sciences must be re-examined from a fresh interdisciplinary perspective based on an interconnected Electric Universe.



And a final word from Alfvén, who took the unprecedented step of predicting in his December 11, 1970 Nobel prize acceptance speech the eventual crash of astrophysics at the end of its long dark tunnel:

"In conclusion, it seems that astrophysics is too important to be left in the hands of theoretical astrophysicists who have gotten their education from the listed textbooks. The multibillion dollar space data from astronomical telescopes should be treated by scientists who are familiar with laboratory and magnetospheric physics, circuit theory, and, of course, modern plasma physics. More than 99 percent of the Universe consists of plasma, and the ratio between electromagnetic and gravitational forces is 10^{39} ."

—H. Alfvén, NASA Conference Publication 2469, 1986, p. 16.

Wal Thornhill

Science Needs Natural Philosophers

Posted on [August 29, 2011](#) by [Wal Thornhill](#)

"Those who regard philosophy as a 'soft' and unscientific discipline, in contrast to the 'hard' and scientific fields of mathematics and physics, have accepted a Big Lie. The ideas of mathematicians and physicists can be no more objective or certain than the philosophic ideas on which they depend. Philosophy is the discipline that tells us how to be objective and how to achieve certainty. Without a theory of knowledge, how would mathematicians or physicists know the relationship of their concepts and generalizations to reality? It is the inductive science of philosophy that teaches the 'hard' scientist how to be scientific."

—Leonard Peikoff in *The Logical Leap* by David Harriman

The slide features a dark background with white text. On the left, there is a photograph of Stephen Hawking. On the right, there is a portrait of Immanuel Kant. The title 'The Death of Physics' is at the top. Below the title, there are three bullet points. At the bottom, there is a footer with the text 'NPA Conference July 2011', '2 of 45', 'www.holoscience.com', and '© Wal Thornhill 2011'.

The Death of Physics

Stephen Hawking (1942 - ?)

Immanuel Kant (1724 - 1804)

- "Philosophy is dead" —Stephen Hawking
- He's right! —ever since Kant claimed that the world we observe is *all in the mind*.
- Following Kant and Einstein, modern physics is also dead!

NPA Conference July 2011 2 of 45 www.holoscience.com © Wal Thornhill 2011

Regrettably, the inductive principle of **natural** philosophy has been dismissed in the 'mob rule' culture of science today. And modern philosophy may be the culprit. The corruption in philosophy seems to have spread from Immanuel Kant's 18th century philosophy that led to 'positivism,' which limited the goal of science to merely describing regularities in the behaviour of appearances. Peikoff writes:

"When, thanks to Kant, the most advanced science departs from the proper method—for example, when physicists renounce causality in the subatomic realm and revert to the menial job of 'saving appearances,' or when they entirely detach theory from reality and wander around in an eleven-dimensional geometry of spacetime—the cultural consequences are devastating. People hear about such views and conclude: If this is rationality, who needs it? There must be something better."

Stephen Hawking (correctly for once) declares in his latest book, *"Philosophy is dead."* But so is modern physics, and for the same reason, although the corpse refuses to lie down. Kant's influence has morphed into the oxymoronic "thought experiment." Science has become surreal and illogical with the sainted Einstein as its exemplar and holy relic. A return to classical natural philosophy is urgently needed to restore sanity.

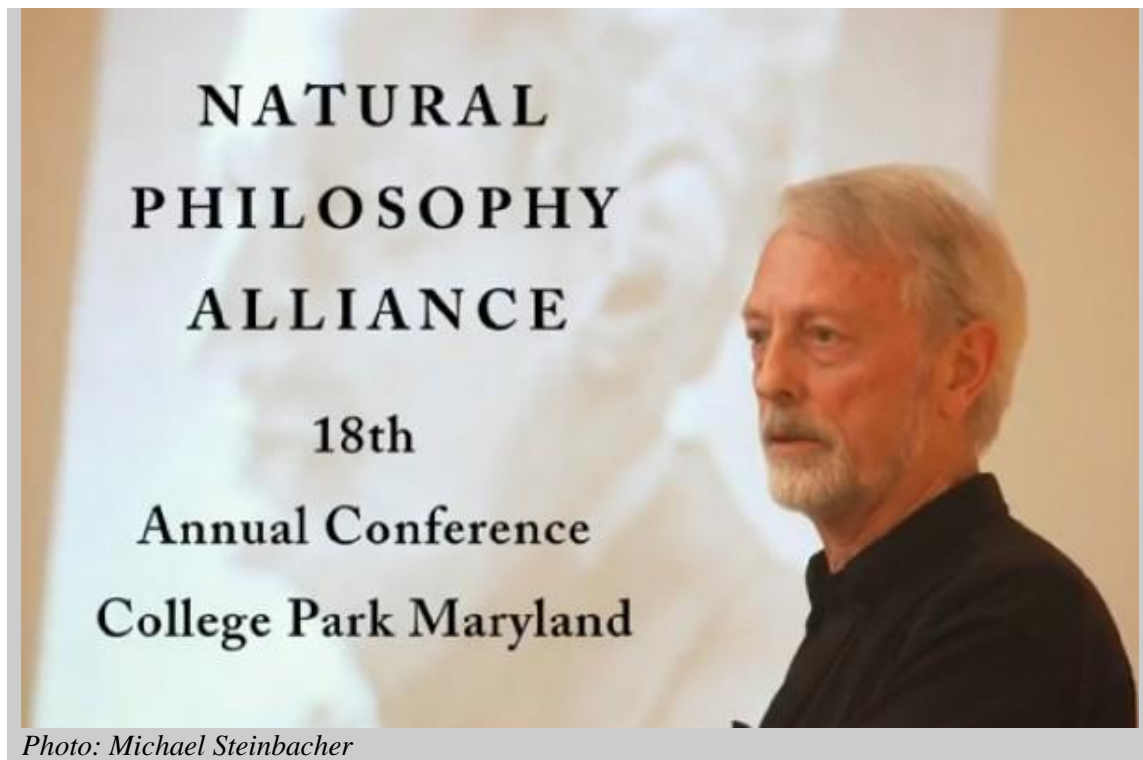


Photo: Michael Steinbacher

Last month I had the honour of delivering my paper, [Stars in an Electric Universe](#), as the 2011 John Chappell Memorial lecture at the Natural Philosophy Alliance (NPA)* 18th Annual Conference at the University of Maryland. The same evening, several scientists I hold in high regard, including Dr. Halton Arp and Dr. Harold Aspden, were presented (in absentia) with the Sagnac Award** for "a lifetime commitment to excellence in scientific pursuit." Arp has been called "a modern Galileo" for his observations that reveal the accepted 'big bang' cosmology to be false:

"After all, to get the whole universe totally wrong in the face of clear evidence for over 75 years merits monumental embarrassment and should induce a modicum of humility."

Aspden uses simple observations to show the Sun is not powered internally:

"We can be sure that energy is finding its way into heavy ions in a plasma contrary to accepted scientific principles and those in authority having concern for our energy future should heed the message."

* From the [NPA website](#):

"Natural Philosophy" is the name by which "physics" was known in the time of Isaac Newton, and well into the 19th century. We return to it mainly in order to emphasize that the more profound and circumspect approach to nature during those years is needed once again. We seek renewed respect for philosophy, especially for logic; and also for the everyday application of reason and of respect for evidence known as common sense — which should be considered a foundation for, rather than a contrast to, genuine science.

** The award namesake, French physicist Georges Sagnac (1869-1926), was an associate of Nobelists Pierre and Marie Curie, Jean Perrin and Paul Langevin at the Sorbonne in Paris. Sagnac conducted experiments in 1913 demonstrating a net difference between light paths moving in opposite directions on a rotating platform. Many alternative scientists believe his 'Sagnac Effect' challenges the theories of Sagnac's contemporary, Albert Einstein. Yet in spite of its challenge and repeatability, Sagnac's experiment receives only passing mention, if any, in physics textbooks, and little is known about Sagnac himself. So just as Sagnac was not recognized for his major contributions, the Sagnac Award is intended to honor those unsung heroes making largely unrecognized, but significant contributions to science today.

The NPA has more than two thousand members and a record number of more than 200 registered for the 18th conference. This is excellent for a self-funded organization. Many papers were submitted in absentia with the result that this year's Proceedings has 123 authors, runs to 731 pages, and weighs 1.7 kg (3.75 lb)! Amazingly, the massive volume was available at the conference as a valuable reference.



Time for relaxed discussion with Thunderbolts team members Jim Johnson and Michael Gmirkin who both spoke at the conference. Photo: Michael Steinbacher.

The atmosphere of the three days NPA conference was invigorating because there was a general recognition that science lost its way early in the 20th century so the future is bright for iconoclasts. Not that there was consensus about the way forward, apart from the long overdue burial of relativity theory. Controversial ideas were respectfully received and discussed. It reminded me of the freewheeling dialogue to be found in science journals at the end of the 19th century. The contrast with modern mainstream conferences, where it is foolhardy to speak against the majority view, could not have been greater. And the attendances did not decline each day as they often do at conventional scientific meetings where the tacit agenda is to have a holiday on public funds at some exotic location. International conferences were a rare event in the first half of the 20th century. In the age of the Internet they have become a poorly justified junket.

The Electric Universe paradigm was [well represented](#) at the NPA conference, with eleven speakers and a special 'Evening with the Electric Universe.' From the EU perspective it was refreshing to find an accord with other scholars that our current beliefs in science need root and branch revision. Chief amongst the casualties is Einstein and his illusory theories of relativity. This result was clearly predicted in 1933 by the Australian, Arthur Lynch, who wrote in *The Case Against Einstein*:

"I have no doubt that there will arise a new generation who will look with a wonder and amazement, deeper than now accompany Einstein, at our galaxy of thinkers, men of science, popular critics, authoritative professors, and witty dramatists, who have been satisfied to waive their common sense in view of Einstein's absurdities. Then to these will succeed another generation, whose interest will be that of a detached and half-amused contemplation; and in the limbo of forgotten philosophies they may search for the cenotaph of Relativity."

That it has taken so long for the blinders to begin to fall away speaks volumes for how difficult it is to shake beliefs. We seem incapable of learning from history so we are repeating the Galileo story in the 21st century. This time it is the creed of scientism and the pseudo-religion of the big bang that stands in the way of progress. In truth, we have no real understanding of matter, light, magnetism, gravity, quantum behavior, subatomic particles, stars, galaxies, or... need I go on? Stories of creation and what did and did not happen in the universe over the past 13.7 billion years are crackpot schemes by celebrities of less talent than many in the NPA but greater prestige. We have too much information and too little real understanding. Many of the things we are taught "just ain't so." This realization frees the mind to view everything afresh. It is the spark required to rekindle enthusiasm for science and drive progress. There is so much to be discovered.

In *Nature*, earlier this month, is an editorial by Dr. Michael Turner titled, "**The dark clouds over US astronomy.**" He bemoans the cuts in funding for astronomy and NASA. He writes:

*"It is barely 12 months since US astronomy was shown the future, with the release of **New Worlds, New Horizons in Astronomy and Astrophysics**, the latest decadal survey by the National Academy of Sciences. The survey offered a strategy — based on realistic budgets and leveraged by international and private partnerships — to realize dazzling opportunities, including searching for life on other planets, identifying dark matter and understanding dark energy. It also promised to reveal the evolution of the first stars and galaxies and to probe whether supermassive black holes are accurately described by general relativity."*

These projects would merely add to the phenomenal waste of time, manpower and public funds by many top scientists today. I need only cite the Large Hadron Collider search for the mythical [Higgs boson](#); the International Thermonuclear Experimental Reactor (ITER) which is supposed to produce fusion power "[like the Sun](#)"; and the Laser Interferometer Gravitational Wave Observatory to detect something [we do not understand](#). The ITER began in 2007 and the first plasma is not expected until 2019! **Not a single one of the proposed NAS projects mentioned is based on any real physical understanding.** Turner says:

"NASA is going to need a steady stream of exciting science results to capture the public's imagination."

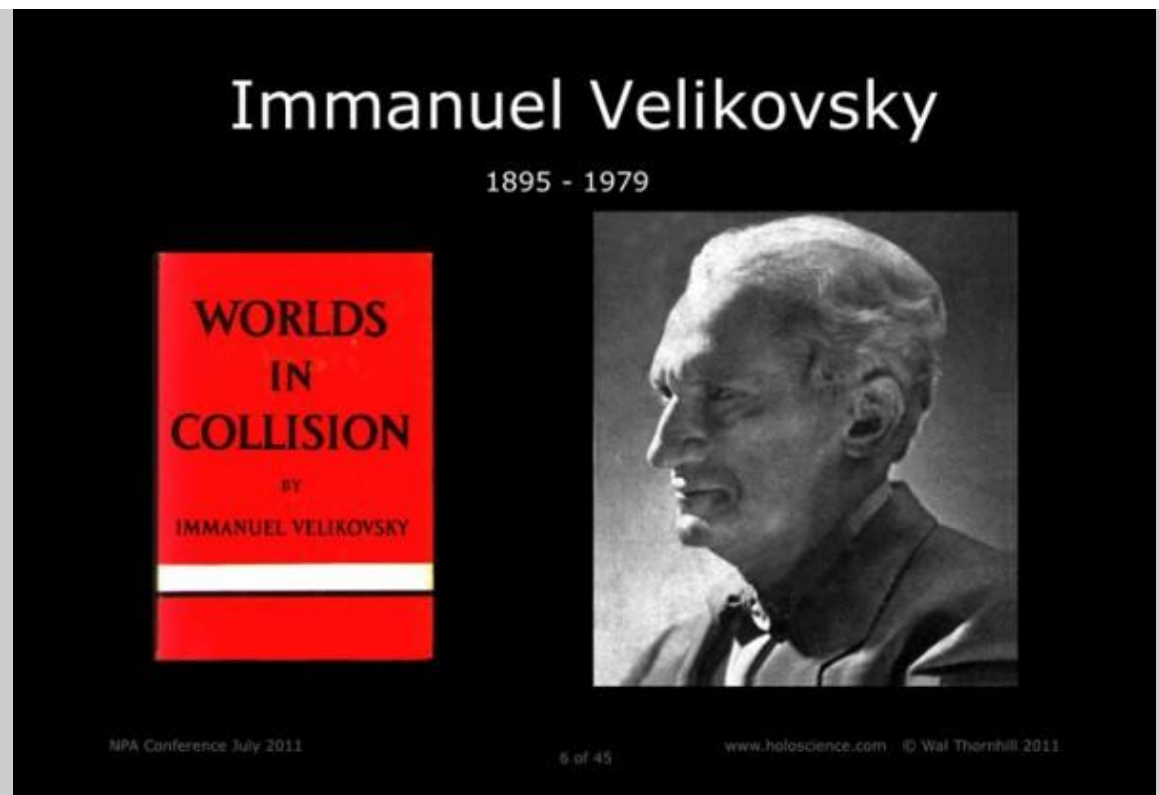
What NASA gets is a steady stream of surprises, which proves my point. NASA has wasted countless billions in ill-advised space research. Turner exposes the importance of 'showbiz' to fund this misguided activity. But with no real understanding the "science results" become virtual-reality fiction in the media. If only education taught critical thinking instead of mesmerizing fiction, the meaningless language and illogicality of science programs would be obvious. For example, I endured a BBC program last evening, "*Who's Afraid of a Big Black Hole?*", where Prof. Douglas Leonard pontificates

that black holes form when stars implode in less than a second "...and stars continue imploding all the way down to a point." A "point" is a location in a coordinate system: it is not an object, much less a meaningless "black hole." Such gobbledygook could not survive if inductive natural philosophy were reinstated to its primary position in science.

How can science be so far 'off the rails' when it is supposed to be self-correcting? The mistake comes from believing that science is a perfectly rational human pursuit, unlike any other. The polymath psychoanalyst Immanuel Velikovsky was perhaps uniquely qualified to declare in an interview:

"Man is irrational in everything he does."

To restore rationality we must first understand ourselves. In an extraordinary multidisciplinary forensic investigation, which Velikovsky published in his 1950 best seller, *Worlds in Collision*, he uncovered mankind's forgotten experience of doomsday — the end of the world — and our (understandable) irrational response to the trauma. *"Man is a wounded animal. His survival is astonishing. But his inability to heal his wounds is tragic,"* wrote Dr. Roger Wescott.



The striking red cover of Velikovsky's Macmillan edition of his book, which was like a red rag to a bull for astronomers. The publishers were forced to transfer the best seller to Doubleday by unprecedented threats from academics.

Since Velikovsky's discovery was a prehistoric cosmic drama involving the Earth and other planets, some of our craziest collective behavior surrounds astronomy and its antecedent astral religions. He wrote:

"I was greatly surprised to find that astronomy, the queen of sciences, lives still in the pre-Faraday age, not even in the time of kerosene lamps, but of candles and oil."

This referred to Faraday's study of electricity and the fact that the cosmic thunderbolt was memorialized in all ancient cultures as the primary 'weapon' during planetary encounters. Therefore electricity must play a role in the cosmos, particularly at times of [orbital chaos](#). But our high-priests of astronomy deny it. Meanwhile, spacecraft and radio telescopes routinely reveal magnetic fields in space, which are the signature of electric 'dark currents' flowing in the thin plasma. This was my point of departure into the Electric Universe paradigm.

The consequences of the false beliefs of the 'blinker' herd are immense due to the widespread impact, not only on science, but on human culture too. There should be no need to list examples of mankind's irrational behaviour. It is plainly evident in our wars, religions, politics, business, economics, etc. War is a surrogate for doomsday, which we have a dreadful impulse to repeat under the aegis of our various gods. When faced with cataclysm, our response can be to misinterpret or to deny it. Our religions misinterpret it by anthropomorphising the behaviour of the capricious astral gods and assuming the catastrophic references are metaphors. Our sciences deny it by clinging to a Newtonian 'clockwork' planetary system, undisturbed for aeons, despite the clear evidence of devastated landscapes on rocky planets and moons, the Earth included. Meanwhile, we behave like 'Chicken Little' at the appearance of a comet and subconsciously find fleeting catharsis in a glut of disaster, war, and mayhem on TV and in movies.

The Electric Universe paradigm is a natural philosophy based on forensic human evidence spanning millennia. Understanding our past is the way to the future. There is no future for us if we cannot learn this lesson.

Wal Thornhill

Postscript:

IT'S OFFICIAL! EU CONFERENCE IN LAS VEGAS, JANUARY 6-8, 2012.
The theme of the conference will be "Electric Universe 2012 — The Human Story."

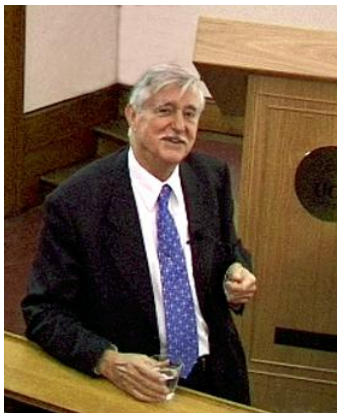
Gravity Probe B and Related Matters

Posted on [September 5, 2011](#) by [Wal Thornhill](#)

The following article is by Jeremy Dunning-Davies, Senior Lecturer in Physics at the University of Hull and member of the Royal Astronomical Society and Natural Philosophy Alliance.



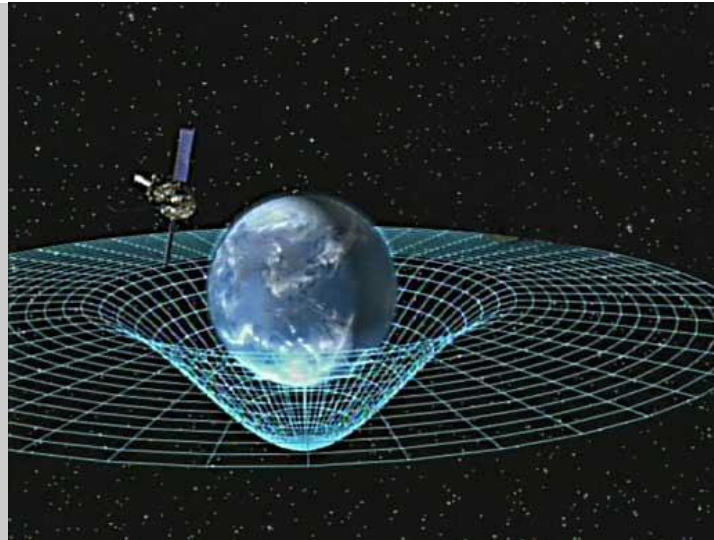
In a posting on the Thunderbolts web site on [June 6th](#), Mel Acheson commented on the recent claims of finding a spiral galaxy in the southern skies which looks remarkably like the Milky Way, but double its accepted size. The article rightly draws attention to the fact that both the size of this galaxy and its distance from us are determined by utilising red-shift data. It is pointed out, quite correctly, that 'the result is as certain as mathematics can be'. However, this is followed by the observation that everything based on red-shift measurements must be in doubt. The problems associated with the interpretation of any red-shift data have been around for many years but have been consistently buried under the proverbial carpet. The careers of several people, notably Halton Arp, have been disrupted if not actually ruined because they have questioned the validity of the conventional interpretation of this type of data.



Dr. Halton Arp at University College London, October 2000. Photo: W. Thornhill

This is a sad, if not disgraceful, story and would be disgusting if it was an isolated case in this truly fascinating subject of astronomy/astrophysics. Unfortunately, it is not an isolated case; it is one of many.

However, no sooner had one had time to digest the contents of this article than one was greeted by the eye-grabbing headline – 'Gravity probe shows Einstein got it right again' – in the June issue of *Astronomy and Geophysics*, the house journal of the Royal Astronomical Society. The said article appeared in the News section and claimed the NASA mission involved 'was to carry out the most sensitive test yet of general relativity' and it had concluded that 'Einstein was right'. One immediately wondered to what the word 'again' referred precisely but, on reading the article, I was struck by some of the data quoted: it is apparently one of NASA's [longest running projects](#), the idea first being proposed in 1959 and initial funding coming in 1963. It has involved more than 100 postgraduate students and 350 undergraduates. One immediately wonders about the total cost and, also, how much indoctrination of potentially good scientists has been achieved. Over the period involved, the sum of money involved must have been considerable and, when one then contemplates all the other high-profile, expensive experiments, such as the Large Hadron Collider and LISA, being run at the present time, one ponders yet again the wisdom of all this enormous expenditure. Then one looks at the claim that 'the probe measured the misalignment of the gyroscope spin axis and the reference star to a startling precision of 0.0005 arcsec', and wonders. Some figures here and in other experiments also raise the query about the position of the actual boundary between noise and genuine physical effect. In fact, does such a boundary exist and, if so, is it one which moves over time as measurement techniques improve? However, all these projects have one thing in common; they all conform to present-day conventional scientific wisdom and therein, in my view, lies one of the problems.



Artist concept of Gravity Probe B orbiting the Earth to measure space-time, a four-dimensional description of the universe including height, width, length, and time. Image and caption credit: NASA

[But as a natural philosopher asked, "If time is a dimension, point me in the direction of time? -WT]

As is explained on the [official NASA web page](#):

... this experiment, launched in 2004, used four ultra-precise gyroscopes to measure the hypothesized geodetic effect, the warping of space and time around a gravitational body, and frame-dragging, the amount a spinning object pulls space and time with it as it rotates. Gravity Probe B determined both effects with unprecedented precision by pointing at a single star, IM Pegasi, while in a polar orbit around Earth. If gravity did not affect space and time, Gravity Probe B's gyroscopes would point in the same direction forever while in orbit. But in confirmation of Einstein's theories, the gyroscopes experienced measurable, minute changes in the direction of their spin, while Earth's gravity pulled at them.

It might be noted that, in this NASA document, reference is continually made to space and time, rather than to space-time and in order to illustrate ideas to the uninitiated, one of the principal investigators, Francis Everitt, said:

"Imagine the Earth as if it were immersed in honey. As the planet rotates, the honey around it would swirl, and it's the same with space and time."

A useful analogy? Possibly, but it very definitely refers to a happening in everyday three-dimensional space which occurs over time. It would seem that, if there were any frame dragging here, it would refer to the frame, fixed in the moving body comprising the usual coordinate axes, being dragged through the honey. Is this the same thing as that to which the experiment refers? If so, why all the talk of space-time? However, more of that when, for this particular example of Gravity Probe B, it is wondered what scientific queries come to the mind of an admitted sceptic as far as modern scientific conventional wisdom is concerned?

The first paragraph of the RAS report summed it all up. Primarily, it was, as mentioned already, to carry out the most sensitive test of general relativity. The remainder of that first paragraph went on to say that 'the team measured the predicted distortion of space-time around Earth from the mass of the planet, and demonstrated that the rotation of the Earth does indeed twist space-time, causing frame dragging'. The uninitiated are probably impressed immediately but anyone with a modicum of appropriate knowledge might well ask 'But what is space-time and what frame is being dragged?' This seems a good, relevant question, particularly in view of earlier comments made here. In truth, space-time is a purely mathematical construct. It is a four-dimensional mathematical space in which three of the axes represent our familiar spatial coordinates and fourth axis represents time. The four axes are mutually perpendicular to one another and this, in itself, indicates the entity to be a mathematical concept rather something genuinely physical. Hence, any point in such a space does tell the observer where a body is at a particular time and the name 'space-time' does seem eminently appropriate – but the space is mathematical; it is not reality as we know it in our everyday lives. Once this

question concerning the meaning of the word 'space-time' is answered, the follow-up question must be 'What is the metric (where by metric is meant the square of the distance between two neighbouring points in the space) considered here?'



Stephen Crothers, Laureate of the Telesio-Galilei Academy of Science, 2008.

In general relativity, the Einstein field equations form the starting point for almost everything but there are several solutions to these equations. The first, and the one about which we often hear mention, was due to Karl Schwarzschild. For Gravity Probe B, it emerges that the basic work was due to Leonard Schiff and was published in *Physical Review Letters* in 1960 (volume 4, pages 215-7) and, probably as expected, the Schwarzschild metric was involved. However, which form of that metric was used, the original or the later modified version? This is an extremely important query because, as has been pointed out on several occasions by both myself and Stephen Crothers, the version of the Schwarzschild metric that appears in almost all modern texts is not the version which appears in the original paper. It might be wondered also if using this metric is correct in any case. What is implied physically by assuming this particular metric? One has to look very carefully at any

assumptions made in deriving these expressions to see just how precisely they apply to situations under consideration. It seems that such detailed scrutiny is rarely performed and often one suspects basic results do not necessarily apply in the experimental/observational situations under consideration. As for the frame dragging, it would seem the frame to which reference is being made is that of the mathematical four-dimensional space-time and so, yet again, the person primarily concerned with what is happening in our effectively three-dimensional world must wonder what is really going on and what relevance this expensive project has to physical reality.

The other major thought to be occasioned by this news article concerns the general theory of relativity itself. Considering the time and money undoubtedly spent on this Gravity Probe B mission, it might seem inevitable to some sceptics that a positive result would have to ensue. Always remember that, in true science, a negative result can be as important, if not more important, than a positive one but to the public, which in the end pays all the bills, only positive results herald any sort of success. Be that as it may, the question of the true status of general relativity within science should be assessed. Soon after the theory first appeared, it was credited with success for solving the old problem associated with the shift of the perihelion of Mercury. But why? A satisfactory explanation had already been provided in 1898 by a German schoolteacher, P. Gerber, who published his findings in *Zeitschrift für Math u Phys.* (vol. 43, p 93). For some reason this seems to have been ignored even though it concerned a well-known outstanding problem and Gerber had published in a highly prestigious journal. Of course, the dubious expeditions of 1919 which led to the claim that the theory correctly predicted the bending of light rays were possibly the clincher as far as popular acclaim was concerned.

However, is general relativity required to explain these phenomena? The answer is an emphatic 'No!' Apart from other publications by such as Harold Aspden, Bernard Lavenda eventually succeeded in publishing an article in 2005 entitled Three Tests of General relativity as Short-wavelength Diffraction Phenomena (Journal of Applied Science, vol 5, no. 2, pp. 299-308). It might be noted that this article didn't claim general relativity incorrect, merely that there was an alternative method for obtaining various physical results. One genuinely wonders if Lavenda's approach could be used to consider the situation examined by Gravity Probe B.

The end result, however, is that enormous sums of public money are continuing to be spent on pet projects of a select few and the contention has to be that this is retarding true progress in science. On the other hand, has a slight chink appeared in the armour? A recent BBC posting refers to the Sun emitting vast amounts of magnetically charged plasma, a great deal of which enters the Earth's atmosphere. The short introduction actually informs the reader that, aside from the three commonly known states of matter – solid, liquid and gas – there is another state, called plasma. It seems amazing that such a statement is felt necessary in 2011 and is possibly another indication of the present state of science and popular scientific knowledge. The article then goes on to say that 'a team of scientists at UCL's Mullard Space Science Laboratory in Surrey is working to find out more about how the Sun's plasma behaves and affects our planet. Dr. Lucie Green from the team – who is revealing her research at this year's Cheltenham Science Festival – explains the properties of plasma.' I would strongly suspect, Dr. Green might save herself a lot of time and effort as well as saving someone else a lot of money if, before proceeding with her investigations, she contacted several notable names associated with long term research into plasma cosmology and (dare I say it?) electric universe ideas. When one reflects on how much information is already out there – much related to the Sun being stored in records held at Kew in London if the information in Stuart Clark's *The Sun Kings* is any guide – the above apparently important scientific news item from the BBC takes on a new light and might be viewed by some as a genuine cause for worry in knowledgeable scientific circles. Have these people not heard of the work of Birkeland, Langmuir, Alfvén and Peratt, let alone such as Bruce and Juergens? If not, one may only despair even more about the inadequacies of our modern educational system. On the other hand, as indicated above, a true optimist might see the article as indicating a chink appearing in the armour of at least the British scientific establishment. I wonder?

Jeremy Dunning-Davies

A Nobel Prize for the Dark Side

Posted on [October 6, 2011](#) by [Wal Thornhill](#)

"Science today is about getting some results, framing those results in an attention-grabbing media release and basking in the glory."

—Kerry Cue, Canberra Times, 5 October 2011

On October 4, 2011 the Nobel Prize in Physics was awarded to three astrophysicists for "THE ACCELERATING UNIVERSE." Prof. Perlmutter of the University of California, Berkeley, has been awarded half the 10m Swedish krona (US\$1,456,000 or £940,000) prize, with Prof. Schmidt of the Australian National University and Prof. Riess of Johns Hopkins University's Space Telescope Science Institute sharing the other half. The notion of an accelerating expansion of the universe is based on observation of supernovae at high redshift, known as The High-Z SN Search.



Results from the Infrared spectrometer in work lead by Lori Feaga of University of Maryland, show asymmetric distributions of both water and carbon dioxide gases in the coma of Tempel 1. The water is enhanced in the sunward direction, where sunlight sublimates water ice. The carbon dioxide (CO₂) is enhanced off of the southern hemisphere of the comet. This suggests that the composition of the nucleus of the comet is not uniform, and is heterogeneous. CREDIT: NASA/UM/Lori Feaga

Saul Perlmutter pictured with a view of the supernova 1987a in the background. Photo: Lawrence Berkeley National Laboratory



Brian Schmidt of the Australian National University. Photo by Belinda Pratten.

However, accelerating expansion requires a mysterious source of energy in space acting against gravity, dubbed "dark energy." Calculations show that the energy required is equivalent to 73% of the total mass-energy of the universe! Historians will look back at science today with disbelief and amusement at the 'science' of today. Following equally mysterious 'black holes' and 'dark matter,' if we continue to discover darkness at the present rate we shall soon know nothing!

"The present boastfulness of the expounders and the gullibility of the listeners alike violate that critical spirit which is supposedly the hallmark of science."

—Jacques Barzun, Science: the glorious entertainment

I attended a public lecture recently on "Cosmological Confusion... revealing the common misconceptions about the big bang, the expansion of the universe and cosmic horizons," presented at the Australian National University by an award winning Australian astrophysicist, Dr. Tamara Davis.



The particular interests of Dr. Davis are the mysteries posed by 'dark matter' and 'dark energy,' hence the title of this piece. The theatre was packed and the speaker animated like an excited schoolchild who has done her homework and is proud to show the class. Her first question to the packed hall was, "How many in the audience have done some physics?" It seemed the majority had. So it was depressing to listen to the questions throughout the performance and recognize that the noted cultural historian Jacques Barzun was right. Also, Halton Arp's appraisal of the effect of modern education seemed fitting, "If you take a highly intelligent person and give them the best possible, elite education, then you will most likely wind up with an academic who is completely impervious to reality."

Carl Linnaeus in 1758 showed characteristic academic hubris and anthropocentrism when he named our species *Homo sapiens sapiens* ("Sapiens" is Latin for "wise man" or "knowing man"). But it is questionable, as a recent (18th August) correspondent to Nature wrote, whether we "merit a single 'sapiens,' let alone the two we now bear." To begin, big bang cosmology dismisses the physics principle of no creation from nothing. It then proceeds with the falsehood that Hubble discovered the expansion of the universe. He didn't, he found the apparent redshift/distance relationship (actually a redshift/luminosity relationship), which to his death he did not feel was due to an expanding universe.

This misrepresentation is followed by the false assumption that the evolution of an expanding universe can be deduced from Einstein's unphysical theory of gravity, which combines two distinct concepts, space and time, into some 'thing' with four dimensions called "the fabric of space-time." I should like to know what this "fabric" is made from and how matter can be made to shape it? Space is the concept of the relationship between objects in three orthogonal dimensions only. Time is the concept of the interval between events and has nothing to do with Einstein's physical clocks. Clearly time has no physical dimension. David Harriman says:

"A concept detached from reality can be like a runaway train, destroying everything in its path."

This is certainly true of Einstein's theories of relativity.

Special relativity is no different to declaring that the apparent dwindling size of a departing train and the lower pitch of its whistle are due to a real shrinking of space on the train and slowing of its clocks. We know from experience that isn't true. The farce must eventually play out like the cartoon character walking off the edge of a cliff and not falling until the realization dawns that there is no support. But how long must we wait? We are swiftly approaching the centennial of the big bang. The suspense has become tedious and it is costing us dearly. Some people are getting angry.

All of the 'dark' things in astronomy are artefacts of a crackpot cosmology. The 'dark energy' model of the universe demands that eventually all of the stars will disappear and there will be eternal darkness. In the words of Brian Schmidt:

"The future for the universe appears very bleak."

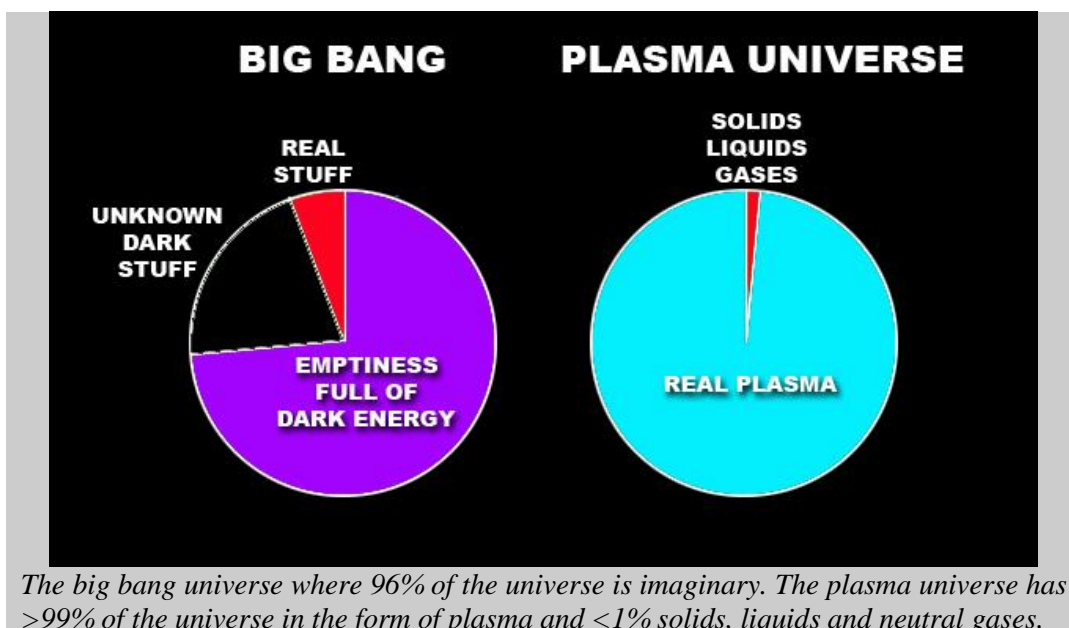
He confirms my portrayal of big bang cosmology as "hope less."

The Nobel Prize Committee had the opportunity to consider a number of rational arguments and evidence against an accelerating expanding universe:

1. General Relativity (GR) is wrong — we don't understand gravity. Brian Schmidt mentions this possibility and labels it "heretical." But GR must be wrong because space is not some 'thing' that can be warped mysteriously by the presence of matter. The math of GR explains nothing.

2. Supernovae are not understood. (Schmidt mentions this possibility too). This also should have been obvious because the theory is so complex and adjustable that it cannot predict anything. The model involving a sudden explosion of an accreting white dwarf is unverified and does not predict the link between peak luminosity and duration of supernovae type 1a 'standard candles' or the complex bipolar pattern of their remnants.
3. The universe is not expanding — Hubble was right. If the redshift is not simply a Doppler effect, "the region observed appears as a small, homogeneous, but insignificant portion of a universe extended indefinitely both in space and time."
4. Concerning intrinsic redshift, Halton Arp and his colleagues long ago proved that there is, as Hubble wrote, "a new principle of nature," to be discovered.
5. There can be no 'dark energy' in 'empty space.' $E=mc^2$ tells us that energy (E) is an intrinsic property of matter. There is no mysterious disembodied energy available to accelerate any 'thing' much less accelerate the concept of space.

In failing to address these points the Nobel Committee perpetuates the lack of progress in science. We are paying untold billions of dollars for experiments meant to detect the phantoms springing endlessly from delusional theories. For example, gravitational wave telescopes are being built and continually refined in sensitivity to discover the imaginary "ripples in the fabric of space-time." The scientists might as well be medieval scholars theorizing about the number of angels that could dance on the head of a pin. By the end of 2010, the Large Hadron Collider has now cost more than US\$10 billion searching for the mythical Higgs boson that is supposed to cause all other particles to exhibit mass! Here, once again, $E=mc^2$ shows that mass (m) is an intrinsic property of matter. It is futile to look elsewhere for a cause. In a scientific field, it is dangerous to rely on a single idea. The peril for cosmologists is clear. They have developed a monoculture; an urban myth called the big bang. Every surprising discovery must be force-fitted into the myth regardless of its absurdities. Scientists are presently so far 'through the looking glass' that the real universe we observe constitutes a mere 4% of their imaginary one.



The 'Alice in Wonderland' aspect of big bang cosmology is highlighted by the fact there is a competing 'plasma cosmology,' which is recognized by practical electrical engineers but unknown or dismissed by the mythmakers. Plasma cosmology deals with the dominant (>99%) form of matter in the visible universe. Plasma cosmology can demonstrate the formation and detailed rotation pattern of spiral galaxies, both by experiment and particle-in-cell computer simulation, using Maxwell's laws of electromagnetism alone. The puny force of gravity can be ignored! Plasma cosmology can also explain the activity in the centres of galaxies without resort to the mythical dark gravitational beast — the 'black hole.' The Electric Universe goes further and also explains the gravitational effects observed at the center of the Milky Way in electrical terms. So much for the gravitational cosmology of the big bang! No invisible 'dark matter' need be conjured up and placed where needed to save the plasma model.

The most profound and important demand we must make of astrophysicists is to justify their unawareness of this freely available 'second idea.'

'Dark energy' is supposed to make up 73% of the universe. The evidence interpreted in this weird way comes from comparing the redshift distances of galaxies with the brightness of their supernovae type 1a, used as a 'standard candle.' It was found that the supernovae in highly redshifted galaxies are fainter than expected, indicating that they are further away than previously estimated. This, in turn, implied a startling accelerating expansion of the universe, according to the big bang model. It is like throwing a ball into the air and having it accelerate upwards. So a mysterious 'dark energy' was invented, which fills the vacuum and works against gravity. The Douglas Adams' "Infinite Improbability generator" type of argument was called upon to produce this 'vacuum energy.' The language defining vacuum energy is revealing: "Vacuum energy is an underlying background energy that exists in space even when the space is devoid of matter (free space). The concept of vacuum energy has been deduced from the concept of virtual particles, which is itself derived from the energy-time uncertainty principle." You may notice the absurdity of the concept, given that the vacuum contains no matter, 'background' or otherwise, yet it is supposed to contain energy. Adams was parodying Heisenberg's 'uncertainty principle' of quantum mechanics. Quantum mechanics is merely a probabilistic description of what happens at the scale of subatomic particles without any real physical understanding of cause and effect. Heisenberg was uncertain because he didn't know what he was talking about. However, he was truthful when he wrote:

"we still lack some essential feature in our image of the structure of matter."

The concept of 'virtual particles' winking in and out of existence defies the aforementioned first principle of physics:

"Thou shalt not magically materialize nor dematerialize matter."

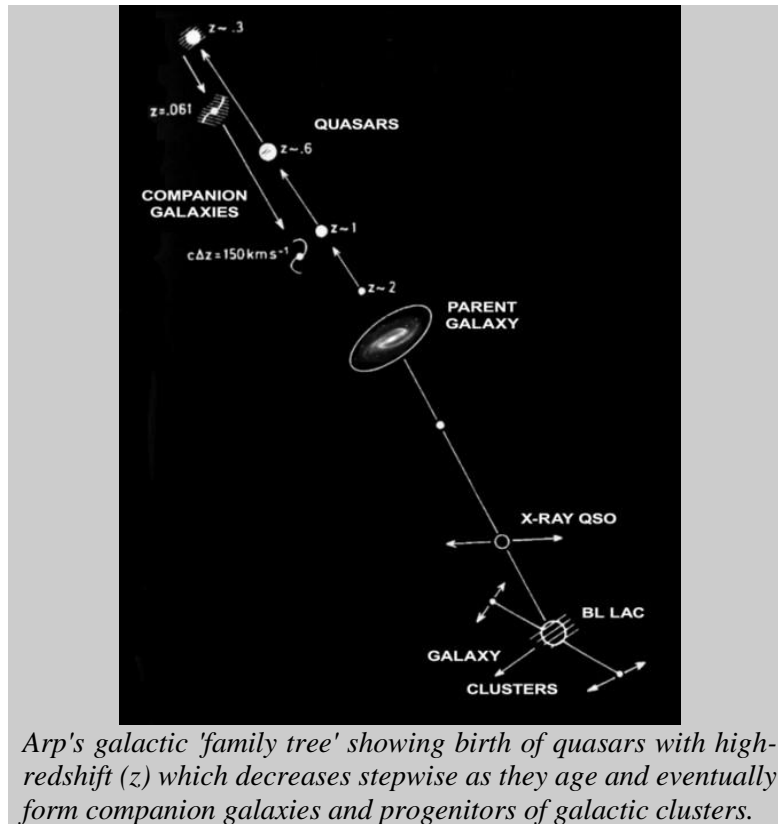
Calling that matter 'virtual' merely underscores its non-reality.

Indeed, the 'discovery' of the acceleration of the expanding universe is an interpretation based on total ignorance of the real nature of stars and the 'standard candle,' the supernova type 1a. A supernova type 1a is supposed to be due to a hypothetical series of incredible events involving a white dwarf star. But as I have shown, a supernova is simply an electrical explosion of a star that draws its energy from a galactic circuit. The remarkable brilliance of a supernova, which can exceed that of its host galaxy for days or weeks, is explained by the kind of power transmission line failure that can also be seen occasionally on Earth. If such a circuit is suddenly opened, the electromagnetic energy stored in the extensive circuit is concentrated at the point where the circuit is broken, producing catastrophic arcing. Stars too can 'open their circuit' due to a plasma instability causing, for example, a magnetic 'pinch off' of the interstellar Birkeland current. The 'standard candle' effect and light curve is then simply due to the circuit parameters of galactic transmission lines, which power all stars.



Spectacular arcing at a 500,000 Volt circuit breaker.

What of the fainter and more short-lived supernovae in highly-redshifted galaxies? Arp has shown that faint, highly-redshifted objects, like quasars, are intrinsically faint because of their youth and not their distance. Quasars are 'born' episodically from the nucleus of active galaxies. They initially move very fast along the spin axis away from their parent. As they mature they grow brighter and slow down, as if gaining in mass. Finally they evolve into companion galaxies. The decreasing quasar redshift occurs in discrete steps which points to a process whereby protons and electrons go through a number of small, quantized (resonant) increases in mass as the electrical stress and power density within the quasar increases. The charge required comes via an electrical 'umbilical cord,' in the form of the parent galaxies' nuclear jet. Based on Arp's discovery and the electric model of galaxies and stars, both stars and supernovae type 1a are naturally dimmer, and the supernovae more short-lived, in high-redshift galaxies than in low-redshift galaxies because of the smaller galactic power density and lower mass (energy) of all subatomic particles making up the former.



But I don't expect a Nobel Prize for this sensible explanation. Otherwise I could meet the fate of the hapless student who created the 'Infinite Improbability generator' in Douglas Adams' wonderful Hitchhiker's Guide to the Galaxy:

"...when just after he was awarded the Galactic Institute's Prize for Extreme Cleverness he got lynched by a rampaging mob of respectable physicists who had finally realized that the one thing they really couldn't stand was a smart-ass."

The use of the title The Dark Side for Dr. Davis' cosmology talk seems unconsciously apposite. It was Joseph Campbell who said:

"We live our mythology."

And George Lucas attributes the success of his Star Wars films, which rely on a degenerate, evil 'dark side,' to reading Campbell's books. The triumph of the big bang myth over common sense and logic supports Campbell's assessment. And the showbiz appeal of Lucas' mythic approach to storytelling is evident in the 'dark side' of cosmology. Scientists live their mythology too. Science's "cosmic confusion" is self-inflicted.

The Electric Universe paradigm is distinguished by its interdisciplinary origin in explaining mythology by the use of forensic scientific techniques. It demands the lonely courage to give up familiar landmarks and beliefs. Sitting in the tame audience the other

evening, listening to the professor of astrophysics, I was reminded of The Galaxy Song from Monty Python, which ends with the painfully perceptive lines:

"And pray there is intelligent life somewhere up in space, 'cause there's buggers all down here on Earth!"

Wal Thornhill

2012

Science's Looming 'Tipping Point'

Posted on [November 18, 2012](#) by [Wal Thornhill](#)

"It is essential in these exuberant times to pay critical attention to both the observational constraints and to the basic mathematical laws, with a clear sense of what is solid theory and what is only unsupported speculation. This seeming platitude is offered here without jest, because at the present time there are 'theories' – scenarios sometimes quite detailed – seriously and often passionately held, for almost every exotic astronomical object that is not resolved in the telescope. In contrast, the one star that can be properly resolved – the pedestrian Sun – exhibits a variety of phenomena that defy contemporary theoretical understanding."

— [Eugene N. Parker](#)



A 'tipping point' in science is supposed to happen when the weight of evidence against a theory tips the balance of opinion against it. But we are dazzled in this space age by computer-generated 'virtual reality' and the sheer technological brilliance of *applied* science. So it can come as a surprise to be told that modern *theoretical* science is in crisis. Today's inverted science pyramid rests on the mathematics of imaginary particles and energy described by an acausal quantum theory that no one can explain. Occasionally, the more candid scientists admit they don't understand basic phenomena like mass, gravity, magnetism, lightning, galaxies and even the Sun! So it is not surprising that planets, stars and galaxies are being discovered that '*shouldn't exist*' and most of the visible universe seems to be a mere impurity overwhelmed by mysterious 'dark matter' and 'dark energy.' In its role as a consensual belief system today's 'settled science' is now confronted with surprising contradictions more frequently than they can be fitted to the dogmas. And because the fundamental mysteries persist unrecognized, [Nobel Prizes](#) are awarded for

purely imaginary discoveries in physics. The weird nature of those discoveries should serve to warn us that science is at a tipping point of unparalleled magnitude.

Dysfunctional Science

Science is at a tipping point because, having fragmented into specialties and sub-specialties, it is no longer equipped to deal with falsifying data. The barricades of technical jargon and self-serving politics prevent the specialists from seeing what would be all too obvious from a higher vantage point. Such a system is averse to outside challenges by *'those who transcend the conventional,'* and leading authorities feel free to ignore them. Of course, before the modern barriers went up, crucial scientific contributions were accepted from many 'outsiders' like William Herschel and Michael Faraday, those who *"may be free of current dogmas and prejudices, able to see the world with fresh eyes."* [Albert Einstein] Few universities have shown the courage to insist on a broad and balanced picture of present knowledge or an even-handed comparison of theoretical assumptions and available alternatives. To apply such basic standards today would risk discrediting entire departments.

Dysfunctional Education

In truth we could be as far from a meaningful *"theory of everything"* as stone-age man was from setting foot on the Moon. Our universities foster narrow, theoretical lockstep. Essential self-correction would require the opposite, a broader horizon, with an eye to ideas and critical facts across many disciplinary boundaries. That would, in fact, mean a return to the interdisciplinary ways of natural philosophy. Knowledge should be open to criticism, and criticism should not be limited to one's closest peers. It is one of the worst failings of modern education that students are not encouraged to cultivate critical thinking or to explore broader possibilities. Today's 'good student' is asked to conform, to absorb pre-packaged knowledge much like modern fast food. But instead of certainties, we should be feeding students with doubts and mysteries, for they stimulate the imagination and motivate individual research. That is the way to achieve breakthroughs:

"Intensive and narrow scientific training will guarantee that you will never make a scientific breakthrough.. we must forge a pioneering education, whose purpose is to produce the imaginative generalists who can take us into the uncharted future."

[Root-Bernstein —Sparks of Genius]

Computer Games and the Media

Researchers today have computers to simulate almost anything they can imagine. The combination of computing power and imagination produces the ultimate computer games, a virtual world where unbridled fantasy can flourish. *"You can sell anything if you dress it up correctly... You can give a result which is complete 'garbage' but taken out of context, reviewers can't tell the difference,"* says one astrophysicist. Harsh words? Not if

you read the numerous papers where simulations are said to 'prove' a theory. Each 'surprising' discovery results in ad hoc computer models built from 'off-the-shelf' ideas and software that are forced to approximate what it is imagined has been discovered. Attractive computer-generated 'artists' impressions' help with funding. The design of research labs revolves around simulation and visualization technology, the Large Hadron Collider (LHC) for example. So science libraries are now filled with an excess of unreadable and unread technical literature, while the distinction between nature itself and the 'virtual worlds' of the popular media grows increasingly blurred. In this deadly loop the virtual world gets the publicity and funding. And all the while the inspiration that attracts young minds to true discovery progressively declines.

In *How Einstein Ruined Physics*, Roger Schlafly, himself a PhD in Mathematics from Berkeley, writes:

"Modern physics has been taken over by academic researchers who call themselves theoretical physicists but who are really doing science fiction. They are not mathematicians who prove their results with logic, and they are not scientists who test their hypotheses with experiments. They make grand claims about how their fancy formulas are going to explain how the world works, and yet they give no way of determining whether there is any validity to their ideas."



Mathematics is a great tool but it isn't physics. A lucrative prize has been recently awarded to an Australian astrophysicist who encourages students to emulate him and "look at things as math problems rather than as physical problems." This is from a person who gave us imaginary 'dark matter' to allow the math to match the physical problem. To his credit, Albert Einstein showed better understanding:

"To the extent that the laws of mathematics refer to reality, they are not true; and to the extent that they are true, they do not refer to reality."

Research Funding

Consensus science and the desperate need to publish papers in a few 'recognized' journals drives peer-review censorship, selective data publication, confirmatory bias, and in some cases fraud. Requests for research funding should be subject to public cross-examination. If the research cannot be explained and justified to well-educated arbitrators, drawing

upon qualified criticism, what is the basis for confidence in today's multi-billion dollar scientific adventures? "Trust us, we're the experts," is not acceptable. Blind trust has led to misbegotten multi-billion dollar projects like the \$9 billion Large Hadron Collider and the \$16 billion, 30 year long International Thermonuclear Experimental Reactor (ITER), which when viewed critically, fall far short of the scientific justification the public has every right to expect.

Cosmology as Myth

Today's cosmology, in attempting to give us the biggest picture, competes with religion by investing in an alternative creation myth, one that shatters the observed laws of physics. The myth is called 'the big bang' and it makes no sense. What we observe is that matter 'locks up' electromagnetic energy, which manifests as mass according to $E = mc^2$ (no hypothetical Higgs boson is required). But we have no idea how energy can create matter (whatever that ultimately is). So we can say nothing about creation of the universe. Though it purports to explain observed phenomena, the big bang requires one to rationalize an immense field of accumulating anomalies, forcing cosmologists to devote most of their time to inventing ways around the contradictions by introducing purely theoretical constructs like dark matter, dark energy, black holes and much more. The exotic vocabulary that has emerged fails every reasonable test of Occam's Razor. Unexpected results are met with ad hoc solutions. **There is *always* an answer.**

The big bang myth, with its bizarre portrayal of our situation in the universe, afflicts society through its hopelessness and waste of money and resources. Modern cosmology is exposed as a competing secular religion with its creationism and end of the world scenarios. Science has not yet thrown off the shackles of our misunderstood past.

Cosmology by Computer Models

One measure of a successful cosmology is its ability to predict probable new discoveries and avenues for research in other disciplines. Big Bang cosmology fails this test. Today, incessant surprise at discordant astronomical data never causes a radical rethink of basic assumptions. "Back to the drawing board" never means starting afresh. The mysteries mentioned earlier are untouched. No one reads the original papers from which dogma sprang. Surprises merely drive the science-media-funding circus to further improvised absurdities — 'proven' by computer models. But computer models cannot prove anything. Most are based on invalid concepts, such as treating space plasma as a magnetized gas, and have so many adjustable parameters that the models are not falsifiable. Physicists are trained to work in an intellectual vacuum. The result is a lack of real progress that is disguised by increasingly bizarre scientific headlines and promises of future success, which never arrive. Consider the decades-old pledge of limitless clean thermonuclear energy, 'like the Sun.' Failure to deliver has never caused any second thoughts about the Sun. But that may be a clue.

First Understand the Sun



Martin Rees, one of the world's most eminent astronomers, is a professor of cosmology and astrophysics at the University of Cambridge and the UK's Astronomer Royal. In his book, *New Perspectives in Astrophysical Cosmology* [C.U.P. 2000] he writes:

"The best understood cosmic structures are the smaller ones: the individual stars."

Nothing could be further from the truth! Not one of our own star's features — the corona — the chromosphere — the granular photosphere — sunspots — is to be expected based on the standard thermonuclear fusion model. As new data floods in from solar probes and those focused on the Sun's boundary with interstellar space it becomes blindingly obvious — we don't understand the Sun. And **without understanding the Sun we know nothing about the universe!**

The Sun is the tipping point, the point of departure from old big bang cosmology. Rees writes in the introduction to his book:

"Gravity, almost undetectable between laboratory-scale bodies, is the dominant force in astronomy and cosmology. The basic structures in our cosmic environment – stars, galaxies, and clusters of galaxies – all involve a balance between gravitational attraction and the disruptive effect of pressure or kinetic energy."

Three things stand out immediately. First, gravity is the weakest force in the universe. Second, gravity is **not** understood. And third, although magnetic fields are detected on the Sun and everywhere in space, there is no mention of the necessary generative electric currents in plasma, which constitutes 99.999% of the visible universe! This is a doctrinaire failure to notice the obvious.

Astrophysicists have equations describing what gravity **does** and a meaningless hyper-geometric story about space being warped by the presence of matter. There is no thought given to the most basic problem — how matter produces the effects of mass and gravity. Nowhere in cosmology is the electrical structure of matter and **the electric force, which is 39 orders of magnitude stronger than gravity**, considered important. So long as we cling to mistaken and out-dated concepts we will never understand the Sun or any other star.

A New Sun Rises in the Electric Universe

There is a new cosmology poised for recognition. The Electric Universe is inspiring people of all ages. It is easy to understand. It is an expansive and inclusive science that motivates 'garage tinkerers' to perform their own experiments. It merges science and the humanities at a deep level. Those who know it say, "*It just makes sense.*" For the first time we begin to understand our existence on this fragile blue planet and our connection to the Sun and the amazing universe.

Even at this early stage in its development, the Electric Universe has been successfully predicting and explaining surprising discoveries. It is unique in the space age in that it grew from forensic investigation of the earliest astronomical references. It did not assume that the sky has always appeared like today or that the orbits of the planets can be simply retro-calculated into prehistory. The research culminated in the identification of weird prehistoric petroglyphs as faithful recordings of mighty electrical discharges in prehistoric skies. When combined with modern plasma science and recent discoveries from space probes it was evident that electricity plays a key role in celestial dynamics. This raised the issue of the electrical nature of the central body in the solar system — the Sun.

There is practically no scientific or cultural activity that is untouched by the Electric Universe, which is the hallmark of a *real* cosmology. The Electric Universe is based on real-world experiment and observation and not on oxymoronic 'thought experiments' or unfettered speculation about what might be going on unseen inside a star or in deep space. It shows more clearly what remains to be discovered and the preferred directions for future study and exploration.

A Disturbing Electrical Solar System

This interdisciplinary investigation climaxed in 2000 at a meeting in Portland, Oregon when the electrical nature of the solar system was confirmed. Such evidence had been accumulating since [comet nuclei](#) came under close scrutiny by spacecraft. But at the meeting, a leading authority in plasma science established that unusual powerful electrical activity had once involved the entire Earth. He recognized enigmatic prehistoric petroglyphs as representing evolving plasma instabilities he had seen in images from the most powerful lab-generated electrical discharges. The scientific papers announcing the discovery termed the phenomenon a 'super-aurora,' implying the Sun was responsible, and dated sometime about the end of the last ice age.

However, it confirmed other converging evidence that globally, ancient peoples identified certain planets with a dreadful weapon called the 'thunderbolt of the gods.' The many descriptions and artistic representations of these 'thunderbolts' showed they were high-energy plasma discharges. Those now distant planets were associated with chaos and terror on Earth. Certain planets were also depicted in a closely spaced 'grand conjunction' that is impossible in a gravity-only universe but was chiselled by the thousands into rock. The Sun was *not* responsible for the 'super-auroras.'



"The Great Day of His Wrath" — John Martin c. 1853

All the evidence supported an earlier analysis that we are the descendants of deeply traumatised survivors of prehistoric celestial 'doomsday' experiences. Those cataclysms seemed to trigger the mysterious sudden rise of the first civilizations. The events were memorialized in the early religions and prodigious architecture and monuments; and they were re-enacted in destructive wars. The mysterious stories of planetary gods battling in the heavens with thunderbolts is dismissed today without a second thought because it doesn't fit the comforting myth of an electrically sterile, Newtonian clockwork planetary system wound up billions of years ago. Yet in the 21st century we still instinctively inflict war and senseless destruction while invoking those forgotten planetary gods. Perhaps the most important lesson from the Electric Universe is societal. Healing the compulsion to revisit doomsday-inspired insanity requires that we face the reality of our chaotic past on this planet. The implications for science, the humanities, and our future survival are profound.

An Electric Sun?

Powerful electrical exchanges between planets on eccentric orbits in the time of prehistoric humans imply an electrical mechanism at work in the solar system to swiftly restore order. **Gravity, working alone, tends to increase chaos rather than restore and maintain order.** Therefore the central issues are the true nature of gravity and the body central to our existence – the Sun. In the past some scientists have drawn analogies between lightning and features on the Sun. The British physicist C. E. R. Bruce wrote:

"It is not coincidence that the photosphere has the appearance, the temperature and spectrum of an electric arc; it has arc characteristics because it is an electric arc, or a large number of arcs in parallel." The Italian solar astronomer Giorgio Abetti wrote, "It is likely that the problem of the dynamics of the explosions affecting the prominences will only be solved when the electrical conditions obtaining in the chromosphere and inner corona are better understood."

However, our most cherished belief is that we understand how the Sun works with no reference to electricity. Unconsciously, perhaps out of our existential fears, scientists have produced a comforting story that the Sun will continue to shine steadily for billions of years, courtesy of nuclear fusion. But is this so? A century will soon have elapsed since the promise of fusion power 'like the Sun' began to drive energy research. It has cost the public dearly while producing nothing. Sir Arthur Stanley Eddington gave us the basis for the Standard Solar Model in *The Internal Constitution of the Stars*, published in 1926. The Standard Solar Model refers to specific calculations based on a set of basic assumptions that are accepted as valid. Eddington wrote,



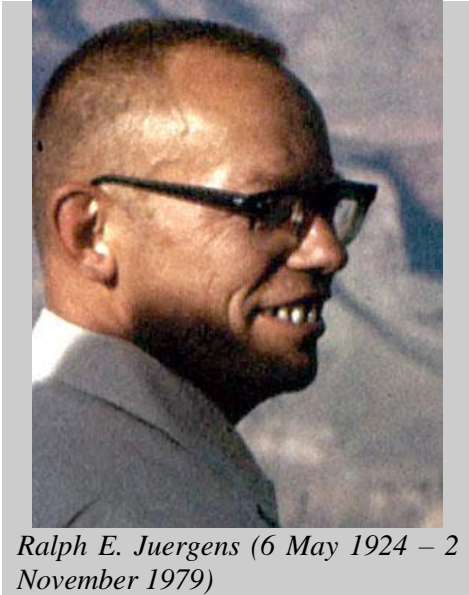
"In seeking a source of energy other than contraction the first question is whether the energy to be radiated in future is now hidden in the star or whether it is being picked up continuously from outside. Suggestions have been made that the impact of meteoric matter provides the heat, or that there is some subtle radiation traversing space which the star picks up. Strong objection may be urged against these hypotheses individually; but it is unnecessary to consider them in detail because they have arisen through a misunderstanding of the nature of the problem. No source of energy is of any avail unless it liberates energy in the deep interior of the star.

It is not enough to provide for the external radiation of the star. We must provide for the maintenance of the high internal temperature, without which the star would collapse."

Having dismissed external inputs, Eddington simplified the problem by defining the Sun as an isolated 'ideal gas sphere' subject to self-gravitation and a central heat source to 'blow it up' to the size we see. His model was limited because he had *no practical experience* of electric discharge phenomena in a near vacuum, otherwise he might have seen the photosphere as an *atmospheric* electric discharge phenomenon and not the *surface* of the Sun.

This highlights a fundamental problem with modern computer modelling. How well do we understand what we are looking at? Our interpretation is limited by our experience and imagination. No one has any experience of the interior of a star so the complex Standard Solar Model is purely imaginary. Never mind that it's not understood how to collapse a molecular cloud to form a star and no known physical body transfers internal heat through a 'radiation zone.' Nevertheless, the complexities involved in trying to get the Standard Solar Model to mimic what we observe have kept theorists busy for a century — without success! Surely it's overdue for a total rethink?

An Engineer's Model of the Sun



Ralph E. Juergens (6 May 1924 – 2 November 1979)

It seems not to have occurred to anyone since Eddington, with the notable exception of an engineer, the late Ralph Juergens of Flagstaff, Arizona, that sunshine may be produced by "*some subtle radiation traversing space which the star picks up.*" Juergens was involved in the interdisciplinary research mentioned earlier and he saw the need to investigate the electrical nature of the Sun and solar system. He published a seminal paper in 1979, *The Photosphere: Is it the Top or the Bottom of the Phenomenon we call the Sun?* He emphasised the fact that none of the observed features of the Sun such as the corona, chromosphere, spicules, granulation, sunspots etc., had any business being there in the Standard Solar Model. For example:

"..the established theory of stellar energy is embarrassed by the mild behavior of the Sun's photospheric granules."

The photospheric granules are supposed conventionally to be the tops of vigorous convection cells driven by the Sun's central nuclear furnace. Internal convection is essential to the Standard Solar Model because convection is supposed to 'somehow' generate the Sun's complex magnetic fields.

Juergens' observation about the "*mild behavior of the Sun's photospheric granules*" foreshadowed a recent discovery by a team of scientists who have developed an 'MRI' of the Sun's interior plasma motions. Shravan Hanasoge, an associate research scholar in geosciences at Princeton University and a visiting scholar at NYU's Courant Institute of Mathematical Sciences is reported as saying,

"..our results suggest that convective motions in the Sun are nearly 100 times smaller than these current theoretical expectations. If these motions are indeed that slow in the Sun, then the most widely accepted theory concerning the generation of solar magnetic field is broken, leaving us with no compelling theory to explain its generation of magnetic fields and the need to overhaul our understanding of the physics of the Sun's interior."

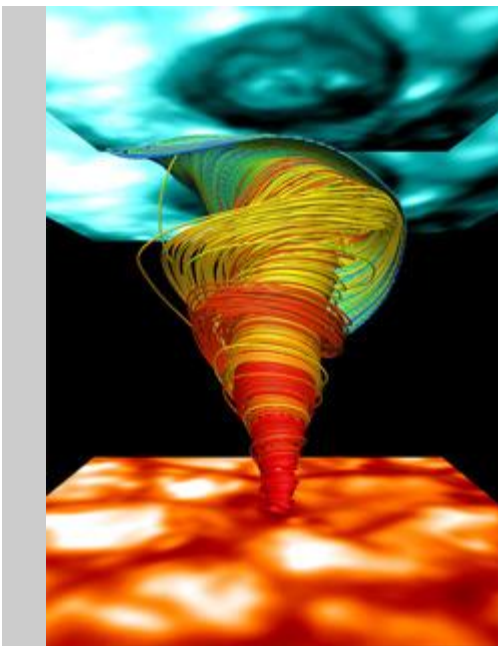
[reprinted from materials provided by New York University.]

This discovery alone should be a 'tipping point' for the Standard Solar Model. But foundational beliefs die hard. Earlier there was '[the solar neutrino problem](#),' which for many decades directly discounted the thermonuclear model of the Sun when the neutrino fluxes were found to be 3 or more times less than expected. That problem has been [swept](#)

[under the carpet](#) by assuming that neutrinos change on their way from the Sun's core to the detectors on Earth. Conveniently for theorists, there is no way of verifying this for the foreseeable future. Meanwhile it has been found that the neutrino count varies inversely with sunspot number, which is a photospheric effect that cannot be influenced by anything going on in the Sun's core. All of the action seems to be happening in the photosphere itself, which emphasizes Juergens' unusual question.

A recent article in *Nature* (28 June 2012), *Swirls in the corona*, unintentionally answers both Juergens' question and the most intractable problem for the Standard Solar Model:

"The high temperatures associated with the Sun's corona have made explaining its existence one of the most long-standing problems in astrophysics."



Visualization of the spiralling ionized plasma using 3D numerical simulations of a magnetic tornado in the solar atmosphere. (Courtesy: Wedemeyer-Böhm et al.)

The article highlights the discovery of 'super-tornadoes' in the chromosphere, between the corona and the photosphere. It is estimated there are more than 10,000 of them continuously present in the quiet Sun. The researchers have leapt to a possible heating mechanism for the corona via these super-tornadoes, which are connected magnetically to vortexes in the photosphere. However, it is not clear how the tornadoes are formed or how energy is transferred from the super-tornadoes to the corona. Predictably, all of this energy is supposed to be driven by convective motion and trapped magnetic fields beneath the photosphere. But we have just seen there is insufficient photospheric convection to produce the Sun's magnetic fields.

More recently another report in *Science* (28 September 2012), *How Oblate is the Sun*, notes:

"...the Sun appears not to be as flattened as it should be... The new oblateness measurements beg explanation."

This is a measure of the uselessness of the Standard Solar Model to predict or explain even the most basic observations about the Sun.

"Observations give a wealth of detail about the photosphere, chromosphere and the corona. Yet we have difficulty in matching the observations with a theory."

[*Solar Interior & Atmosphere*, J.-C. Pecker]

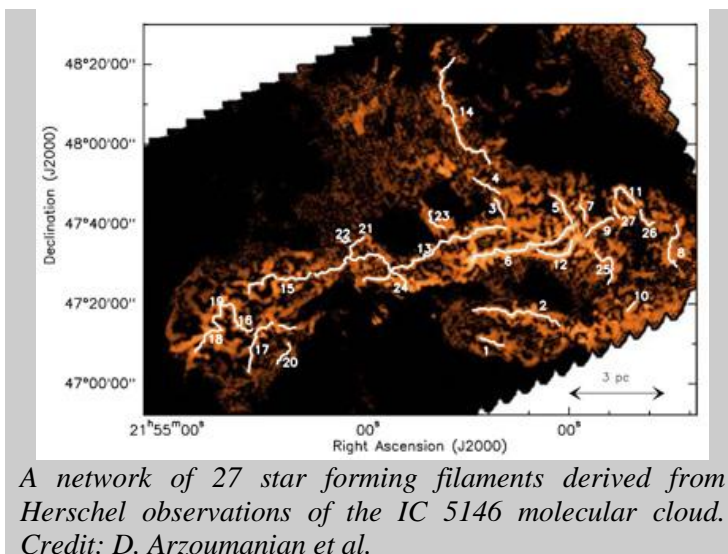
But students and the public through the media are unaware of this. It seems that scientists forget this unpleasant truth too when they sign off on research that will produce thermonuclear power 'like the Sun.'

These recent discoveries support Juergens' external electrical powering of the Sun. Together with findings about the [Sun's interface with the galaxy](#) at the heliopause that deny all previous theoretical models, they put an emphatic end to standard solar theory. The photosphere is the bottom of the phenomenon we call the Sun. The Sun may now be easily understood and the electrical model confirmed empirically since what we can see is all we need to know. [The Thunderbolts Project](#) is dedicated to this task.

The following paragraphs briefly demonstrate the simplicity and unity of the electrical model of the Sun. It is a single model that explains long-standing mysteries of the Sun and can be [applied to all stars](#), from brown through red to blue-white, and dwarf to giant. Stellar differences can all be understood in terms of the three different modes of plasma discharge — dark, glow and arc. The Electric Universe meets all of the demands of a good theory. It follows sound electrical engineering principles and space plasma science as recognized by the Institute of Electrical and Electronic Engineers (IEEE)

Electrical Star Birth

Glossy media presentations show the Sun and planets forming from a rotating dusty cloud. So it will surprise most people that experts consider star formation an "*open question*," and as "*the most important challenge in astronomy over the next decade*." [R. de Grijs (2012)] The challenge becomes more difficult as telescopes improve. I predict that it will become impossible when new instruments like the [James Webb Telescope](#) and the [Square Kilometer Array](#) become operational. Unexplained magnetic fields are involved. "*Something creates and maintains micro-Gauss coherent magnetic fields on an enormous scale*." [B. Gaensler (2008)] So common sense suggests we should turn to plasma cosmology, which explains star formation simply in *electromagnetic* terms.



Stars form in molecular clouds by a process of [Marklund convection](#) toward current filaments that look just like a cosmic form of cloud-to-cloud lightning. This discovery was a surprise to theorists who rely on spherical $1/r^2$ gravitational accretion of matter toward a center of mass. In sharp contrast, Marklund convection concentrates matter along a current filament with a long-range and more powerful $1/r$ electromagnetic force.

Significantly, Marklund convection separates the chemical elements with the coolest and most easily ionized elements, such as iron and silicon, nearest the axis. With sufficient matter along the filament, gravity assists in forming separate stars and smaller bodies rather like glowing beads along a lightning channel with *cool cores of heavy elements* and atmospheres of hydrogen and helium. Note that a thermonuclear reaction cannot ignite in a cool heavy element stellar core!

Electrical Planet Origins

If the heavy elements are concentrated in stellar cores, how do we account for planet formation with heavy element cores? With over 800 'exoplanets' discovered the standard accretion model is in increasing difficulties. The first problem was finding 'hot Jupiters' orbiting stars closely. The accretion model says that it's impossible for them to form there. So the gas giants must have somehow 'migrated' inwards from a more distant orbit. But the accretion model requires our gas giants to *migrate before they formed* so that the inner planets have the time necessary to achieve their elemental composition!

But what of stars that sport 'accretion disks?' It is simply assumed that the disks are due to gravitational in-fall. However, gravity is easily overcome by electromagnetic repulsion, as we observe in solar mass ejections. Consequently, *stars have expulsion jets and disks rather than accretion disks*. Sometimes, for dynamic reasons or to spread the electrical load over a greater surface area, forming stars will electrically fission into binaries or multiple star systems. This scenario may explain some of the surprising abundance of multiple star systems and close orbiting 'hot Jupiters.'

Also, the birth of plentiful brown dwarf stars and smaller bodies in proximity along an electrical umbilical cord provides the opportunity for capture by bright stars to form planetary systems. *Capture is greatly enhanced by electrical energy exchange* where the cross-section for capture is that of a star's huge electrical boundary, called the heliosphere (~200 AU wide), or 'astrosphere.' Brown dwarfs captured by a bright star will have their power source stolen, lose their radiance and become gas giants. This explains a mystery known as the 'brown dwarf desert,' around main sequence stars.

The capture process of a brown dwarf involves drastic electrical readjustment from being an anode to a cathode, which the captured star achieves by a cometary-type electrical expulsion of matter from its heavy-element core and atmosphere, forming satellites and rings. Some of the expelled debris escapes to become families of comets, asteroids and meteoroids. It is a process entirely analogous to the observed electrical splitting of comet nuclei, often as they too approach the Sun.

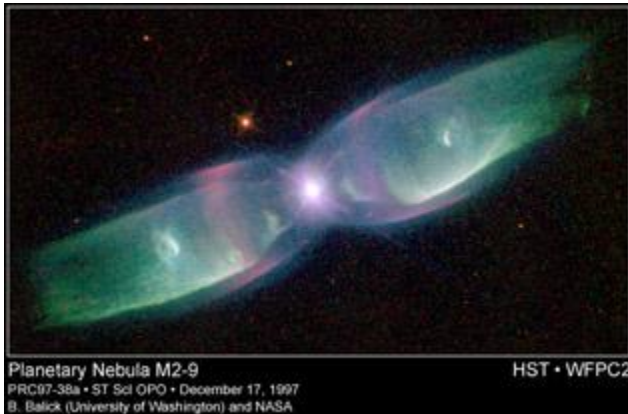
The applicability of this model to the solar system is obvious with the distant gas giants sporting rings and many satellites. Saturn, with its spectacular ring system, appears to be the most recently captured. The inner planets are satellites lost to the gas giants/former dwarf stars. Astronomers have recently begun to suggest that the environment close to a dwarf star is conducive to life. But there is [far more to this idea](#) in an Electric Universe. So the Sun's weird assortment of planets and their satellites are an adopted family and not

primordial. Comparing gyroscopically stable axial tilts may show some familial associations. Significantly, [Saturn, Mars and Earth seem related](#) via this hypothesis.

Gravitational systems are essentially chaotic because orbital perturbations are not corrected. With intruders upsetting the solar system the obvious question is how come the planets move like clockwork? It is important that an effective 'damping' mechanism operates to enforce order in the solar system. The Electric Universe simply proposes that protons, neutrons and electrons, like the atoms they form, have orbital structures too and can be distorted in an electric field to form tiny electric dipoles. [Gravity can then be understood](#), like a form of molecular bonding, as the force between induced weak electric dipoles in all subatomic particles in a body. This gives the crucial ability to modify a planet's gravity and orbit by altering the charge on its surface. Such a gravity model mitigates against collisions by spacing orbits so that planets exchange electric charge the least via their cometary plasma sheaths.

Electrical Star Light

The Electric Universe model of a star proceeds where plasma cosmologists left off. It seems that stars continue to receive electrical energy from the galactic current filament in which they formed. This has been [recently established](#) by the 'surprising' influx of energetic neutral atoms (ENAs) from a ring about the solar system, aligned across the interstellar magnetic field. The ring with its 'bright spots' indicates the presence of an electromagnetic 'pinch' in the co-axial interstellar current cylinders that power the Sun.



This 'planetary nebula' shows a typical star's co-axial circuit in a more active 'glow mode.' The electromagnetic plasma 'pinch' centered on the star is clearly evident.

So the photospheres of stars should be viewed as a global electric discharge phenomenon at the very top of their gravitationally stratified atmospheres where the lightest elements, hydrogen and helium, are in abundance. The

problem for solar theorists is that there is no explanation for lightning in the Earth's gravitationally stratified atmosphere! Much less are [the weird phenomena above lightning storms](#) understood. And lacking that understanding the relevance of electrical activity in the photosphere goes unnoticed today, although several scientists in the past sensed it. For example the solar physicist Giorgio Abetti wrote:

"[Solar] prominences can be explained as electrical discharges."

[*The Sun* (1963)]

And Eddington himself wrote:

"If there is no other way out we may have to suppose that bright line spectra in the stars are produced by electric discharges similar to those producing bright line spectra in a vacuum tube."

[1926]

A fundamental mistake is that students are taught the conductivity of space plasma is so high that any electric field in it can be set to zero. But experience in gaseous discharges shows that currents and not electric fields in plasma are important. Everywhere we look in space we find magnetic fields, which are the result of electric currents. So it is not correct, as Hannes Alfvén pointed out, to merely treat the solar wind as a magnetized gas, which is the conventional approach. Alfvén showed that the solar 'wind' must be a 'dark' current that flows in a circuit between the Sun and its galactic environment. Most importantly, the electric field in the bulk of the plasma within the heliosphere is not zero, but vanishingly small — just sufficient to accelerate the solar 'wind' protons away from the Sun and then reversing direction to bring the solar wind mysteriously to a halt at the heliosphere boundary, or 'virtual cathode' of the solar discharge. The latter recent discovery was a total surprise.

"There no longer exists any guidance on what constitutes getting out of the Solar System and into the Galaxy."

[S. Krimigis, *Nature* 489:21, 2012]

Stars as Positive Anodes

Juergens identified the many observed discharge phenomena on the Sun as characteristic of those above a positive anode. The interplanetary plasma potential 'locks' to that of the anode — the Sun. So the electric driving potential of the Sun is confined largely to the distant heliosphere boundary — in the region being encountered by the two [Voyager spacecraft](#), where the solar wind has 'mysteriously' come to a halt. It is not a mystery when the [electrical model](#) is applied to the Sun. The heliospheric plasma sheath is the 'virtual cathode' in the Sun's circuit. The electric field first reverses on approaching the cathode, causing the protons to decelerate with no evidence of a galactic 'head wind.' Beyond that region the protons will accelerate rapidly away to become cosmic rays. The electrons coming from that vast 'virtual cathode' sphere are focused down a trillion times by the time they reach the photosphere and produce the radiance of the Sun.

The evidence to look for is filamentary currents following the ambient magnetic field direction down to the photosphere. Such filaments are seen at all scales in the Sun's corona, chromosphere and photosphere. The Sun's corona is simply a coronal discharge effect where diffuse plasma is apparently heated to millions of degrees by the electric current flowing through it. Referring back to Swirls in the corona, energy is not transferred from the Sun up to the corona via magnetic "super tornadoes" but in the

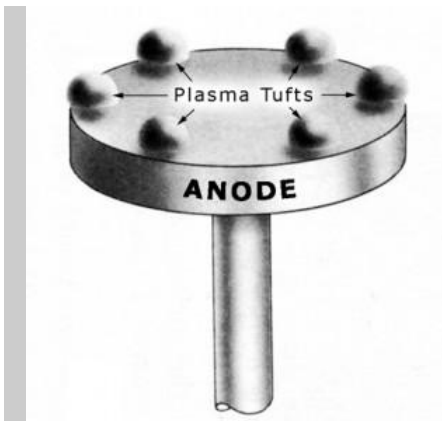
opposite direction, down toward the Sun by electromagnetic tornadoes. The "super tornadoes" are typical of [plasma self-organization](#) at high current densities, in which the current filaments take a helical path, or 'tornado.' This phenomenon is important when we look in detail at the photosphere.

Photospheric "Granulation"

The photosphere can now be examined for anode phenomena. The solar [plasma discharge switches](#) from dark-mode in interplanetary space, where it is referred to inaccurately as the 'solar wind,' to glow-mode in the corona and chromosphere, to arc-mode in the photosphere. The photosphere exhibits complex structure in the form of granulation and sunspots, neither of which are explained or to be expected if the Sun were simply radiating internal energy. Juergens wrote:

"...the idea of thermal convection as the explanation for granulation in the photosphere – a concept that at first seemed handsomely supported by a resemblance between granules and blocky cells in molten wax – fares rather badly when subjected to scrutiny. Nevertheless, so compelling is the conviction that the Sun generates its own energy that such practical difficulties are generally disregarded. The consensus has it that convection there must be, and therefore photospheric granulation must somehow be a manifestation of the process."

Instead, Juergens identified solar granulation as a "tufted anode discharge" phenomenon where a "dense, highly luminous, secondary plasma springs into being in the embrace of a thinner, less luminous, primary plasma."



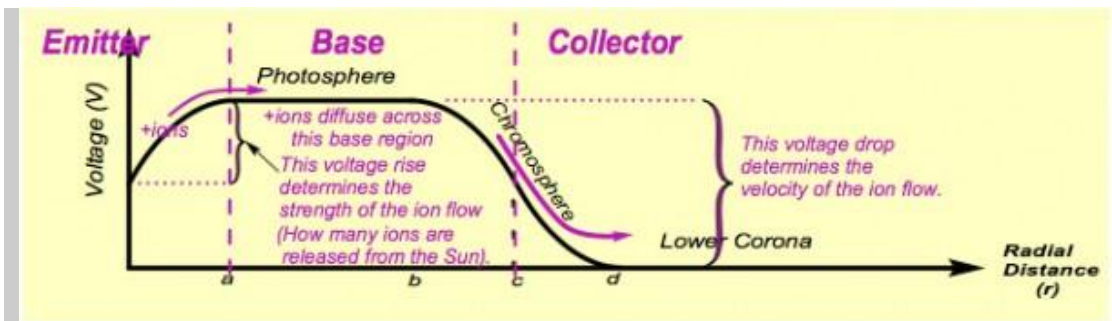
The plasma tufts float and move about above the anode. Having a net positive charge they space themselves symmetrically apart on the anode surface. [F. H. Clauser, Plasma Dynamics]

Irving Langmuir explained anode tufts as a region of increased ionization of the plasma in response to excessive current to the anode. It seems the granulations of the photosphere are the tops of millions of closely packed anode tufts separated by their plasma sheaths from the primary plasma of the Sun's ionosphere, which forms the dark lanes between the granulations.

The body of the Sun is much smaller than that occupied by the photosphere. So the Sun's almost perfect spherical shape can perhaps be attributed to electromagnetic forces combined with the need to achieve the highest packing density of the anode tufts at the top of the Sun's ionosphere. The resultant spherical symmetry of the discharge following magnetic field lines in 'force free' mode down to the photosphere results in the Sun's dipole magnetic field not having the predicted bar-magnet shape, or crowding of field lines near the poles. This answers the surprising fact that the Sun's magnetic field lines spread out uniformly from the photosphere.

Anode Tufts and the Solar Constant

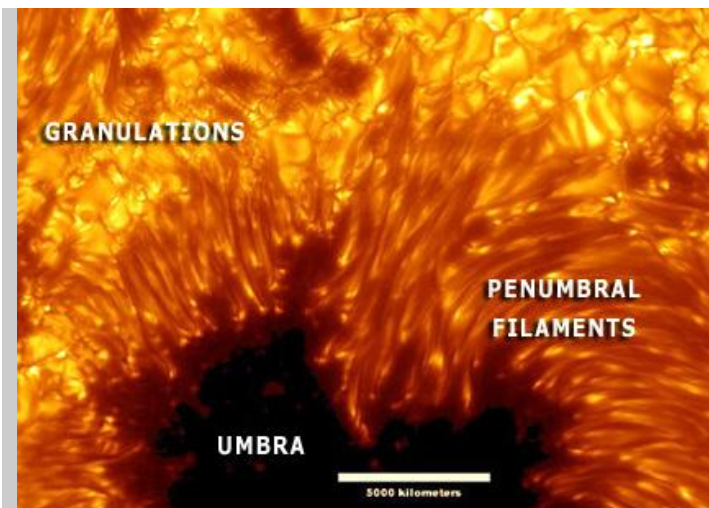
Juergens refers to the curve of the electrical potential distribution across an anode tuft. Electrical engineer Dr. Donald Scott recognized the curve as characteristic of the voltage curve across a transistor. This insight offers a simple explanation for another mystery of the Sun — how does the heat and light of the Sun remain steady to within 0.1 percent (the 'solar constant') while its output in X-rays varies markedly with the solar activity cycle? The answer is '[electronically](#)!' The X-rays come from the corona and solar flares, which respond directly to the varying galactic power input. However, a small shift in voltage of the tuft plasma relative to the body of the Sun is sufficient to regulate the current through the tuft, and hence the heat and light from the photosphere.



Schematic of the photospheric tuft transistor analog. The cool body of the sun is at the origin. Courtesy of D. Scott.

Mysterious Sunspots

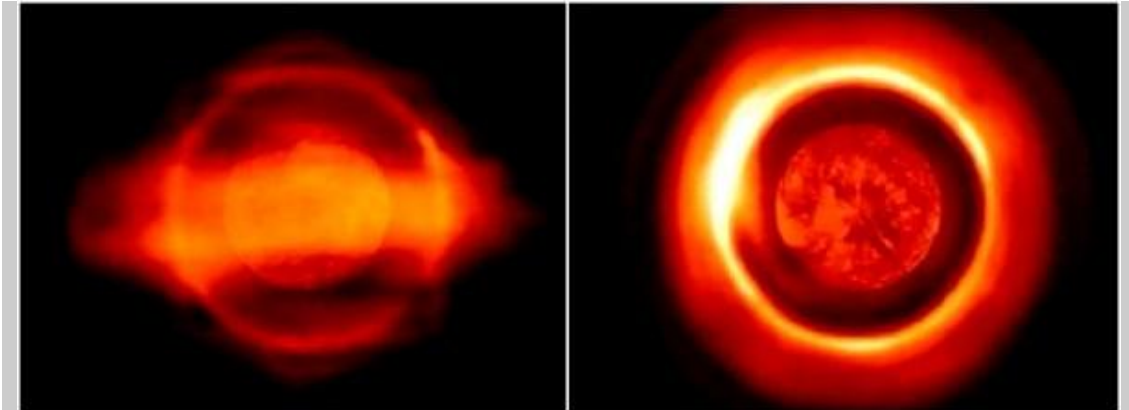
To have any confidence in our understanding of the Sun, and stars in general, we must first be able to explain simply the things we can see. Therefore it is crucially important to [understand a sunspot](#) because it is the only place on the Sun that gives a glimpse below the bright photosphere. Sunspots show a formation like the pupil and iris of an eye, the pupil being the dark umbra and the iris the filamentary penumbra.



Closeup of section of a sunspot.

Sunspots have been described as "*a phenomenon lacking scientific explanation.*" [E. N. Parker] The lack stems from narrow training that doesn't recognize plasma discharge phenomena. Anyone who has seen the snaking filaments in a novelty plasma ball will have seen how electric currents in plasma naturally form filaments. Filamentary structure is seen at all heights in sunspots. But astrophysicists talk instead of magnetic 'flux

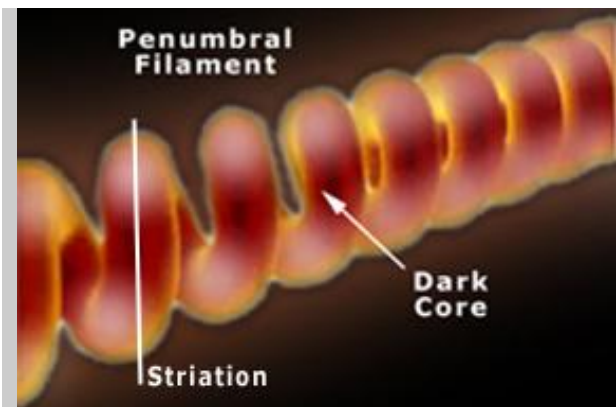
tubes' as if magnetism can be present without an electric current. Notably, sunspots of the same magnetic polarity do not repel each other. This requires that sunspots are bundles of parallel current filaments drawn together according to Ampère's law and punching through the photosphere. Sunspots are the footprints of concentrated discharges from a plasma doughnut or 'plasmoid' electromagnetic energy storage ring encircling the Sun above its equator.



The solar plasmoid has been imaged in UV by SOHO. Kristian Birkeland performed his Terrella experiment demonstrating the effect more than one hundred years ago.

Anode Tufts have Structure

High-resolution images of sunspots allow us to see the structure of anode tufts below the photosphere. They show the photospheric granulations sit atop glowing penumbral filaments. The invisible twisting tornadic form of plasma discharge detected in the corona is [visible in arc-mode](#) on a finer scale in the penumbral filaments. It is typical for plasma phenomena to scale the same patterns over a vast magnitude range.

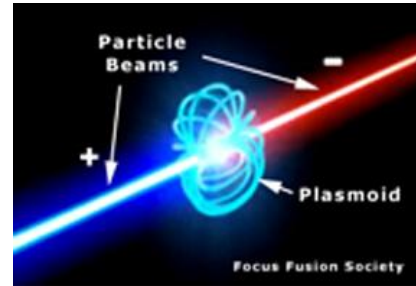


A penumbral filament is a semi-transparent tornadic plasma discharge. Where the filament current density is high it brightens to form moving striations. The darker core is visible only at favorable angles of the filament axis to the observer.

[Time-lapse movies of penumbral filaments](#) show steady downward movement of their bright point-like lower ends called 'penumbral grains,' which are generally brighter than the photosphere. Conventionally, the *observed* vertical velocities of matter do not suffice to transport the energy radiated away by penumbrae. ***So convection is not the answer.*** Can we find electric discharge activity in the Earth's gravitationally stratified atmosphere for analogs to the activity seen in the penumbral filaments? Earthly tornadoes suppress lightning activity over a wide area by providing an intense but slow helical discharge

path to ground, which can account for their powerful effects and longevity. And like a tornado, the solar atmosphere is lofted up the penumbral filament to produce the enigmatic 'Evershed flow' out of the sunspot.

By analogy, the bright penumbral grains may be lightning in the more dense atmosphere at the base of a glowing tornadic funnel. Or more likely, they may be a further stage of plasma instability called a dense plasma focus (DPF) where both matter and electromagnetic energy is intensely concentrated in a tiny 'plasmoid.' In the lab [the DPF is the simplest and most promising fusion energy source.](#)



All Bright Stars Produce Heavy Elements

Experimentally, a DPF produces nuclear fusion and is a copious source of neutrons. Neutron capture in a dense plasma environment of protons and positive ions is necessary to 'build' the heavy elements from the lighter elements. So here we have a straightforward possible solution to the continuous **production of heavy elements by all stars**. The resultant complex nucleosynthesis in the photospheric granules can also be expected to produce a mix of different neutrino types. The observed neutrino modulation by sunspots is then easily explained because the sunspots clear areas of the photosphere of granulation. Common sense demands an alternative to the conventional story of heavy-element production only from rare dispersive supernova explosions, followed by somehow accreting the scattered matter to form the 'next generation' of stars containing more heavy elements. Clearly, the electrical model of the Sun does not require the unverifiable complexity of stellar thermonuclear cookery and stellar evolution through self-immolation.

Umbral 'Dots'

Viewing the Sun as a body with global electrical activity in its ionosphere provides a clue to another solar mystery. Sunspots have an intense magnetic field, which identifies the umbra as the imprint of a powerful field-aligned plasma discharge punching through the bright photosphere to lower levels. So the dark umbra is not uniformly dark. It is packed with a kind of granulation known as 'umbral dots,' which are finer and longer lived than photospheric granules and are hotter (~6200K) than the photosphere. These are characteristics we might expect from a lightning discharge at higher current and atmospheric densities than are present in the photosphere above. Significantly, penumbral filaments tend to split in a 'Y' shape at their bases and seem involved in the formation of umbral dots. At higher atmospheric density a plasma discharge tends to split into thinner filaments. It is a phenomenon observed stretching between the glows in the ionosphere to the lightning at ground level in major Earthly thunderstorms. Lightning also heats and accelerates gas upwards in the lightning channel from the higher-pressure region to the lower. That may account, in part, for the hot umbral dots against the dark background of the cool body of the Sun.

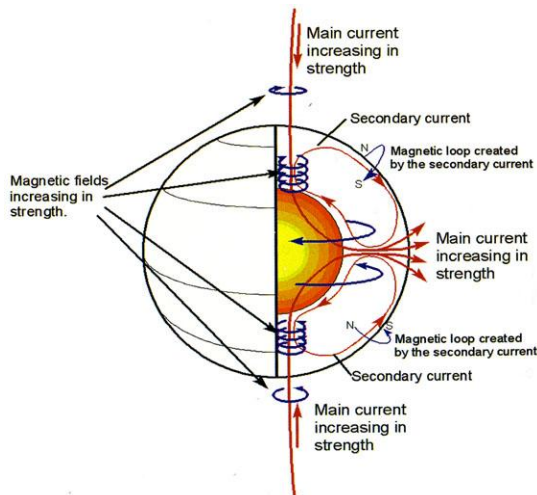
The Solar Cycle

The solar cycle is an enigma for the standard solar model.

"The solar activity cycle has fascinated scientists and amateurs alike for over a century, but its mystery remains, and even deepens, as we collect new data that reveals its full complexity."

[D. M. Rabin et al., *Solar Interior & Atmosphere*]

Attempts to model the solar cycle have relied on a hypothetical dynamo inside the Sun, in other words, the inductive action of fluid motions pervading the solar interior, to explain features that occur outside the Sun. But nothing remotely resembling consensus currently exists as to the mode of operation of the solar dynamo. And the coup de grace seems to have been delivered by the recently discovered lack of fluid motions beneath the photosphere.



In the Electric Universe model, the solar sunspot cycle is simply the result of varying the direct current (DC) input to a plasma discharge focused on the Sun. For a continuous current to flow there must be a circuit. Hannes Alfvén provided the circuit but misidentified the Sun as a *generator* in a local closed circuit instead of a *load* in a galactic circuit. Dr. D. Scott provided an electrical engineer's perspective of the Sun's magnetic field changes due to a changing input current. The simplicity is obvious. The reversal of the Sun's dipole field and sunspot order during the solar cycle is a natural result

of a transformer action as the main current increases and decreases but never reverses. The solar cycle is to be expected since plasma circuits are notorious for their oscillatory tendency.

Stellar Mass

Hidden in plain sight is the well-known relationship between mass and energy, $E = mc^2$, which tells us that mass is an electromagnetic variable. The higher the electrical stress on a body, the greater is the internal charge polarization and hence the greater is the body's mass. The mass of a star cannot tell us how much matter is in the star. So estimates of the composition of celestial objects based on their measured mass and the volume of their photosphere are invalid. The mass of a star gives no information about the size or composition of its heavy element core or the internal structure of the star. The fact that the relation breaks down for white dwarfs and red stars is due to the fact that their

luminosity is generated by extensive coronal and chromospheric glow mode discharges respectively.

The Mass-Luminosity Relation

The stellar *mass–luminosity relation* is important in the conventional model because, in an attempt to match observations, a tottering tower of theory has been built. The model is impossible to verify and requires an ad hoc system of complex thermonuclear 'cooking' and the effects of the resulting 'burnt ashes' on the internal structure of stars. If we discard standard theory, we require an electrical explanation.

The *mass-luminosity relation* for bright stars indicates that both variables are related to the degree of electrical stress suffered by a main-sequence star. Variations in the M-L relation for different mass ranges may be attributed to differences in the manner of a plasma discharge to cope with the current density at the photosphere. For example, the luminosity depends on the brightness and size of the photosphere, which expands and changes color from yellow to blue-white to meet increasing electrical stress.

Beyond the Tipping Point

What is it going to take to tip out the old beliefs? Change can occur slowly from the bottom up or rapidly from the top down. Unfortunately, forces from the top tend to favour stasis over change. Modern science has become a monolithic structure funded by governments and tied to political outcomes. Radical change is arguably more difficult to achieve in such a situation than at any time in the past. Funding of dissident scientists is not available, their publication in leading science journals disallowed by the anonymous peer review system and their careers jeopardized. Meanwhile the media lazily accept what they are fed by 'experts.'

It is perhaps a fitting irony that the Internet, which was built for communication between scientists, now provides the means to bypass censors to reach a global audience. Powerful news organizations are finding this to their great discomfort. So while the emperors of science strut their nakedness, scholars from many disciplines have been converging on a new science called the Electric Universe, which offers an unparalleled scientific and cultural Renaissance. The [Thunderbolts Project](#) was established as a focal point for this movement. It now has funded scholarships for students, experiments and an annual conference. Join us at the [Thunderbolts Project's January 2013 annual conference](#) called "The Tipping Point."

"We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time."

—T. S. Eliot

Wal Thornhill