Is the Universe Electric?

By Michael Goodspeed (in collaboration with David Talbott and Wallace Thornhill)

The Ant nebula, Mz3 (rotated). Image Credit: NASA, Space Telescope Science Institute

Mankind's greatest feat of the 20th century was arguably his journey(s) into the vast domain of space. When the first man walked on the moon in 1969, it signified an extraordinary leap in technological evolution, and was a unifying achievement for the entire human race. Astronauts became the heroes of boys and girls everywhere, and space travel, the "final frontier" of human endeavor, emerged as an underlying theme of most science fiction. Authors and filmmakers looked to space to answer the largest philosophical and spiritual quandaries. And space adventures became mythic allegories, illuminating the human condition.

Prior to the Space Age, in the first half of the 20th century, Albert Einstein redefined Sir Isaac Newton's gravitational model of physics. He combined the three measurable physical dimensions of space with the additional dimension of time, in something that is now popularly termed a "continuum" of space and time. This was the foundation of relativity theory, and Einstein's apparent successes encouraged armies of mathematicians to follow his lead continually extending his work into untested territory. One unfortunate

result was that astronomy rapidly became a field dominated by abstract mathematics. In fact, many critics suggest that it is now almost impossible to distinguish astronomical theory from science fiction, as mathematicians describe a universe that, to a dismaying degree cannot be seen, measured, or tested in any practical way.

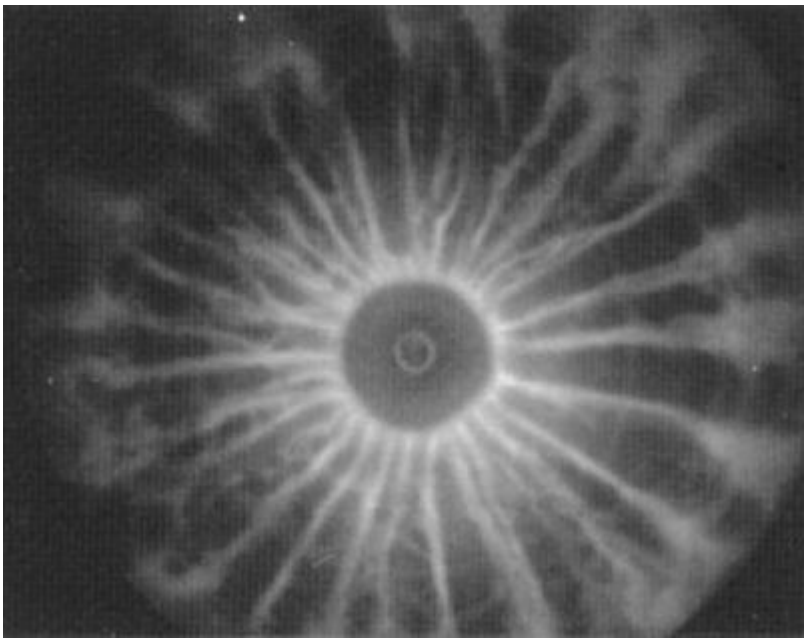
For the better part of two centuries, astronomers have believed that gravity dominates the heavens. The scientific consensus is that approximately 13.7 billion years ago, the Universe began with a primordial explosion called the Big Bang. Debris from this theoretical event created a vast cloud of particles, from which galaxies, stars, planets, and all other celestial bodies eventually formed, under gravitational influences. In our own cosmic neighborhood, we are told that the Sun is powered by an internal nuclear furnace, and that all the planets and moons are isolated bodies that have moved with predictable precision for billions of years. It is also claimed that far removed from the Sun, a cloud of debris produced the icy bodies that we call comets. Periodically, astronomers say, a few of these bodies are dislodged from the cloud, falling toward the Sun, to produce the familiar cometary displays. And all of space is an inert "vacuum" in which electricity plays no significant role.

ELECTRIC PIONEERS

Kristian Birkeland's portrait from a 200 Kroner bank note.
Source: Jacob Lewis Bourjaily, Department of Physics, Princeton University

But space discovery has a habit of contradicting astronomical theory. As early as the late 19th century, a number of scientific pioneers began recording their observations of electrical phenomena in space, and documenting experimental analogs in the laboratory. One such pioneer, the Norwegian physicist Kristian Birkeland, theorized that the earth's

auroras are powered electrically by charged particles from the Sun. For many decades, the scientific mainstream dismissed Birkeland's hypothesis, but in the early 1970's Birkeland was irrefutably validated when satellites detected in the auroras the magnetic signatures of electric currents (called Birkeland currents) tracing to solar activity. More recently, NASA's THEMIS spacecraft stunned scientists when it imaged giant, "magnetic ropes" that reached all the way from the earth to the Sun--a pathway for the charged particles from the Sun, now known to light the auroras.



The Nobel Prize-winning Swedish physicist Hannes Alfven further developed Birkeland's work, and developed a revolutionary model for the role of plasma in the cosmos. Through extensive laboratory experimentation, Alfven and other plasma pioneers discovered that many space phenomena could be replicated in the laboratory in plasma experiments. These include the dense plasma focus (pictured above), a plasma machine that produces, by electromagnetic acceleration and compression, short-lived plasma that is so hot and dense that it becomes a copious multi-radiation source. Whereas mainstream cosmologists rely on exotic, invisible, and internally inconsistent theoretical inventions to explain the "surprising" X-ray and radio emissions we observe in space, plasma cosmologists are able to reproduce these phenomena in a manner that exemplifies the scientific method. This should come as no surprise, because it is now known that all of space is permeated by plasma, which makes up over 99.9% of the visible Universe.

Plasma is often mischaracterized as a "gas," but its conductivity and dynamic response to electricity and magnetism distinguishes it from a gas. The "quasi-neutrality" of plasmas means they tend overall to be electrically neutral. But plasmas can also violate quasi-neutrality, producing charged regions in electrical double layers (DLs) and particle beams. Plasma is a better conductor of electricity even than copper, and it is this characteristic that allows for electrical circuitry throughout the cosmos.

Hannes Alfvén Photo credit: Welinder Jaeger Bergne

Alfven and his colleagues also established that the behavior of electrified plasma can be scaled up an incredible 14 orders of magntiude -- what is observed in the laboratory can occur at galactic dimensions as well. Furthermore, the electric force is incomparably more powerful than gravity. Electric currents across cosmic distances have the power to shape cosmic structure, and at the local scale, to light the sun, to energize planetary auroras, and periodically, to create spectacular comets.

Alfven is now recognized as the father of "plasma cosmology." In this model of cosmic evolution, it was primarily electromagnetic forces that organized matter throughout the Universe. It is now indisputable that magnetic fields pervade the Universe, and Alfven noted that these fields cannot exist without the contribution of ELECTRIC currents. In 1970, in his acceptance speech for the Nobel Prize for Physics, Alfven admonished his colleagues that their models must ultimately fail if they ignored experimental plasma science and the role of electric currents in space. His warning went unheeded.

FAILURES OF BIG BANG COSMOLOGY

Mainstream cosmology's foundation was built on one of the most popular scientific theories of the 20th century, the Big Bang. This theory envisions all of the Universe continually expanding as the result of the primordial, explosive birth event. But according to an increasing number of critics, the Big Bang theory has already lost its theoretical underpinning. Astronomers believe that the Universe is expanding based on their interpretation of a phenomenon observed in space called "redshift." This describes a shift toward longer wavelengths of the spectral lines emitted by a celestial object. Mainstream

theorists believe that the object moving from the Earth causes this. But on many occasions, this belief has been definitively refuted.

Left Galaxy NGC 7319. Right: A recently discovered quasar in front of the galactic core. Credit: Jane C. Charlton (Penn State) et al., HST, ESA, NASA

In the 1960's, the astronomer Halton Arp began documenting instances where two or more galaxies and highly redshifted quasars were associated, or even physically connected. Arp's findings contradicted the assumption that their different galactic redshifts meant that the quasar should be millions or even billions of light-years farther away than the galaxy. A dramatic demonstration of this is seen in the galaxy NGC 7319 (picture above). This galaxy is shrouded with such heavy dust clouds that they obscure most of the bright, active nucleus that defines a galaxy of this type. The galaxy has a redshift of 0.0225. In front of its opaque gas clouds, or embedded in the topmost layers of the dust, is a quasar with a redshift of 2.114. What does this tell us? By the Big Bang principles, the quasar must be billions of light years farther from us than the galaxy, because its redshift is so much larger. And yet the galaxy is opaque, so the quasar must be near the surface of the dust clouds or even in front of them.

PLASMA COSMOLOGY VS. BIG BANG

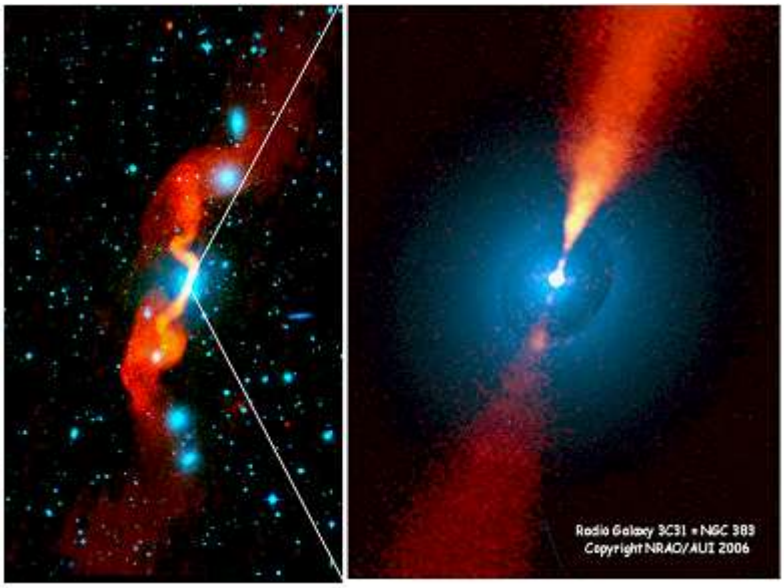
In the eyes of plasma cosmology, celestial objects' redshift is proportional to current density and electrical stress. In other words, if an object has a very high redshift, it is not because it is very far away, but rather because it is in the early stage of a formation in a cosmic plasma discharge. Faintness and high redshift signify youthfulness not distance. If astronomers could simply recognize the undeniable existence of electric currents in space (as Alfven implored them to), then the picture of space would be forever altered.

Another problem for Big Bang cosmology has been the appearance of "clumps" and "voids" in the Cosmos. Critics argued that raw subatomic -- or preatomic -- material expanding outward at nearly the speed of light would produce an evenly distributed cloud with no force present to generate cosmic structure. But in fact, we observe cosmic structure everywhere we look, and the distribution of matter is profoundly uneven. Both

the concentrations of matter, and the "voids" between these concentrations, falsify the inherent, logical "predictions" of the original theory.

The force of gravity is weak and takes time to move things around. The elapsed time since the conjectured Big Bang sets a limit on how big any structure can be. Structures exceeding that limit are, by the cosmologists' own admission, impossible. But astronomers have observed "huge voids" when mapping the Cosmic Microwave Background (CMB) - areas of space where the "temperature" of the CMB is interpreted as lower than that of the surrounding region. But in a plasma universe, the appearance of a vast and remote "void" may be entirely illusory. It is now evident that astronomers imagine they are seeing things at the far edges of the visible Universe that are actually occurring in our own cosmic neighborhood, the Milky Way galaxy. The research of radio astronomer Gerrit Verschuur has demonstrated that the "cosmic microwave background" shown by WMAP is foreground microwave fog. So the "vision" of observers using WMAP is clouded by the local activity of electric current filaments in the Milky Way.

And just as "huge voids" constitute a problem, BB theorists must wrestle at the other end of the spectrum, with massive galactic structure which, by their own measuring stick (redshift = distance interpretation), must have formed in the first phases of cosmic evolution.



We see the signs of electrical influences everywhere in the Cosmos, but astronomers remain impervious to these telltale clues. Consider the image above of the Radio Galaxy 3C31 (also called NGC 383). This galaxy is a MINUSCULE object, little more than a dust mote, when seen against an immense display of highly energetic charged particles. Electrons in twin polar jets, accelerated to near the speed of light are the witnesses to the most intense electrical discharge activity known to science. Our instruments detect this activity through its synchrotron radiation and through the twin lobes of high-energy radio signals. So how is this huge region of electrical activity to be interpreted? In standard models, an electrically-neutral galaxy is asked to generate electrical activity across

volumes of space THOUSANDS of times greater than the volume of the galaxy. But simple electrodynamics says this is impossible! How does a galactic-size, neutral object produce a vast domain of electrical activity around it? A plasma cosmologist looking at this image will see electric currents incomparably larger than the galaxy, being focused down by a plasma "pinch," at energy levels capable of lighting and organizing stars into the ubiquitous galactic spiral structure.

But mainstream astronomers who see this picture can only imagine that a "supermassive black hole" - a nearly infinite compression of matter which they assure us exists in the heart of every galaxy - is devouring material and "spitting it out" to produce X-ray energies. But it's imperative that we understand what astronomers actually mean when they claim to "see" a black hole. Long before scientists began speculating about "dark matter" and "dark energy" (invisible and undetectable entities which we are told make up 96% of the Universe) astrophysicists observed that galactic cores exhibit vastly more concentrated energetic activity than could be achieved by gravity alone, unless something hugely massive (yet incredibly small) were present. So they effectively "divided by zero." They employed the near zero force of gravity to explain a nearly "infinite" compression of matter -- the only thing they could imagine under their theoretical assumptions. It's no longer physics; it is a bizarre mathematical conjecture. They called these speculative, monstrous concentrations of matter "black holes," imagining that they "consume everything around them."

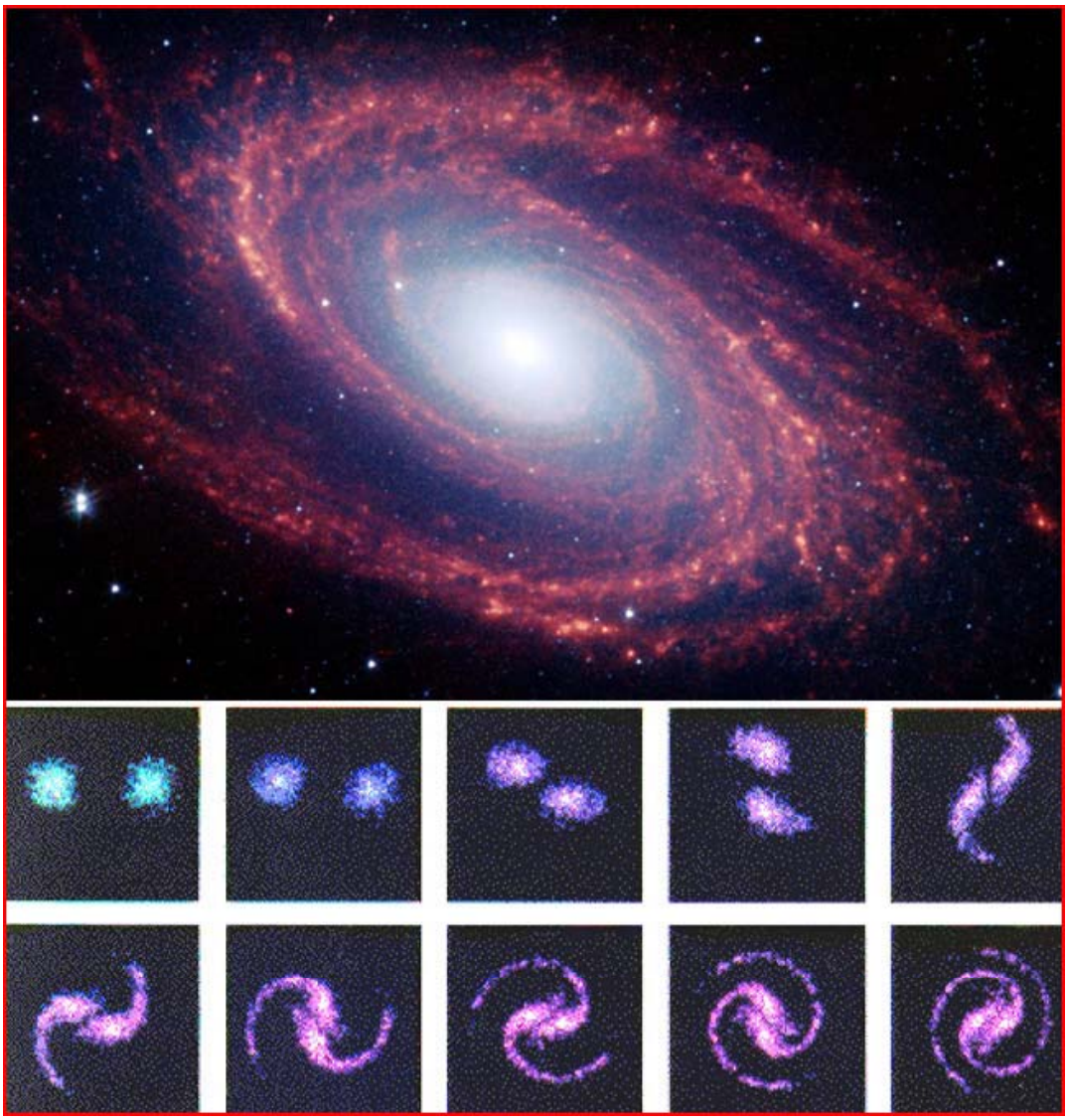
As technology improved, the original black hole theoretical model was quickly contradicted by the observed ejection of vast quantities of matter in thin jets. Suddenly, the theorists imagined that an "accretion disk" and magnetic field (which they claim can somehow exist with no contribution from electric currents) could produce a narrowly-confined jet across millions of light years.

So let's understand this, very clearly -- scientists have never "seen" black holes. They've seen (unanticipated) energetic effects that they imagine can only be caused by the infall of matter, i.e. a theoretical black hole "sucking" and "consuming" everything around it due to its supposed (but impossible) near-infinite gravity. Popular discussion of black holes can only be described as disingenuous in the extreme. The contradictory, unexpected observations are routinely presented as evidence confirming black holes' existence! The improbable jets have never had a reasonable place within gravitational dogma, a fact rarely, if ever, acknowledged in scientific media.

But the abstract and purely mathematical reasoning that led to black holes is wholly unnecessary, according to proponents of the Plasma Universe and Electric Universe. Far from the spotlight of media attention, plasma cosmologists did anticipate many of the "surprising" discoveries of the space age, with no requirement of invisible, non-testable material and objects and mathematical models involving imaginary infinities.

ELECTRICITY IS THE SOLUTION

If the electric force is responsible for organizing galactic structure, then it should be possible to demonstrate through simple laboratory experimentation. And such experiments have been done, with extraordinary success. For example, computer simulations have confirmed laboratory experiments that show the motion of the spiral galaxy can be achieved through nothing other than interactions of electric currents in plasma. Computer models of two current filaments interacting in a plasma have reproduced fine details of these galaxies, where the gravitational schools must rely on invisible matter arbitrarily placed wherever it is needed to make their models "work."



Above: Spiral Galaxy M81, in one of the first images returned of NASA's new Spitzer Space Telescope. Below: Snapshots from a computer simulation by plasma scientist Anthony Peratt, illustrating the evolution of galactic structure through the "pinching" of converging parallel currents.

The photograph of spiral galaxy M81 above is one of the first images returned by NASA's new Spitzer space telescope, an instrument that can detect extremely faint waves

of infrared radiation, or heat, through clouds of dust and plasma that have blocked the view of conventional telescopes. The result is a picture of striking clarity.

Beneath this photograph are snapshots from a computer simulation by plasma scientist Anthony Peratt, illustrating the evolution of galactic structures under the influence of electric currents. Through the "pinch effect", parallel currents converge to produce spiraling structures.

As demonstrated decades ago by Alfven and others, plasma phenomena are eminently scalable -- under similar conditions, plasma discharge will produce the same formations irrespective of the size of the event. The same basic patterns will be seen at laboratory, planetary, stellar, and galactic levels. Duration is proportional to size as well. A spark that lasts for microseconds in the laboratory may continue for years at planetary or stellar scales, or for millions of years at galactic or intergalactic scales.

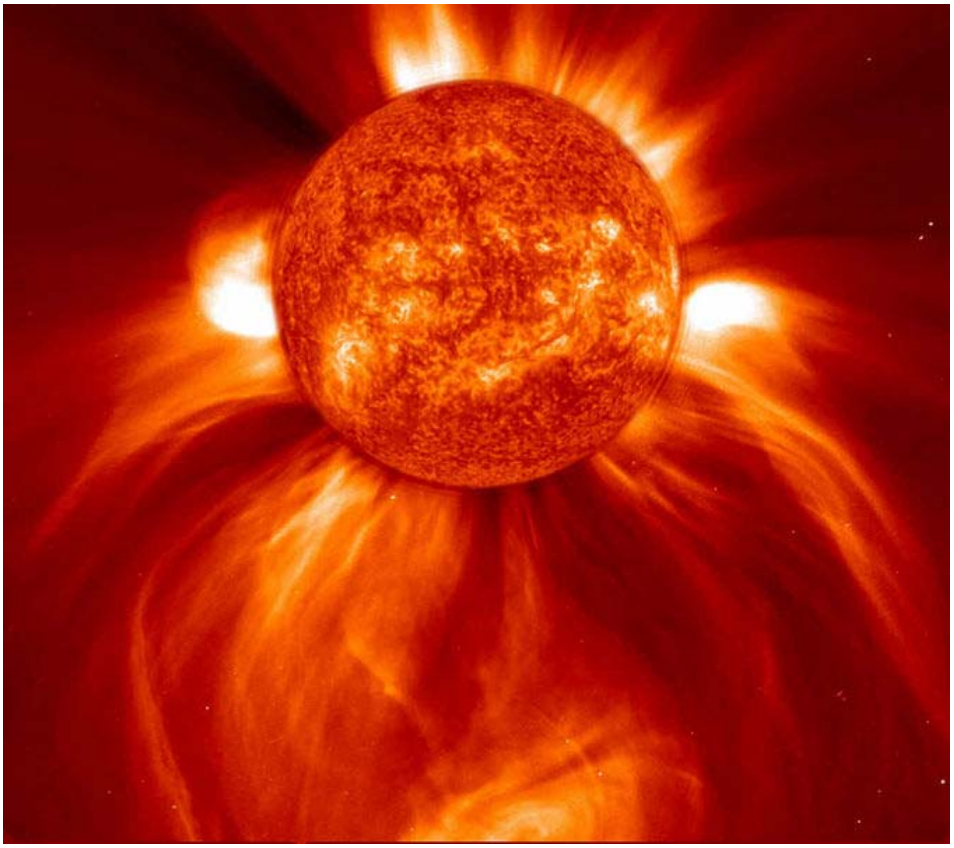
The acceleration of high-energy particles in space, the pervasive magnetic fields in space, and the structure and evolution of galaxies are all better explained by plasma science than by exotic mechanisms that have no analog in experiment or nature. Modern cosmology will remain in crisis until astronomers acknowledge decades of plasma research and begin allowing this research into astronomical literature, rather than ignoring it in electrical engineering journals.

THE ELECTRIC SUN

Today, astronomers assure us that the most fundamental question about the Sun is answered -- it is a thermonuclear furnace. They describe the Sun as a ball of gas so large that its internal pressures generate temperatures of about 16 million K -- producing a continuous "controlled" nuclear reaction. For this reaction to occur, the Sun requires nothing from the space around it.

Most astronomers and astrophysicists investigating the Sun are so convinced of the fusion model that only the rarest among them will countenance challenges to the underlying idea. Standard textbooks and institutional research, complemented by a chorus of scientific and popular media, "ratify" the fusion model of the Sun year after year by ignoring evidence to the contrary.

But in an "electric universe," there are no "islands" in space. Electric currents flow through the arms of every galaxy, and this principle allows for a new understanding of the Sun and its interactions with galactic circuitry and with its own planetary system. Indeed, a growing number of independent researchers insist that the Sun is electric. It is a "glow discharge fed by galactic currents," they say. And they emphasize that the fusion model anticipated none of the milestone discoveries about the Sun, while the electric model predicts and explains the very observations that posed the greatest quandaries for solar investigation.



LASCO C2 image, taken 8 January 2002, shows a widely spreading coronal mass ejection (CME) as it blasts more than a billion tons of matter out into space at millions of kilometers per hour.

Following the pioneering work of the engineer Ralph Juergens in the 1960's and 70's, the electrical theorists Wallace Thornhill (co-author of The Electric Universe) and Prof. (retired) Donald Scott (author of The Electric Sky) urge a critical comparison of the fusion model and the electrical model. In the electric model, the Sun is the "anode" or positively charged body in an electrical exchange, while the "cathode" or negatively charged contributor is not a discrete object, but the invisible "virtual cathode" at the outer limit of the Sun's coronal discharge. (Coronal discharges can sometimes be seen as a glow surrounding high-voltage transmission wires, where the wire discharges into the surrounding air). This virtual cathode lies far beyond the planets. In the lexicon of astronomy, this is the "heliopause." In electrical terms, it is the cellular sheath or "double layer" separating the plasma cell that surrounds the Sun (heliosphere) from the enveloping galactic plasma.

Artist's impression of the Heliospheric current sheet.
Image credit: Original painting, Werner Heil, NASA, 1977.
The image was developed by Prof. John Wilcox as a tool for visualizing the surface that separates the two magnetic polarity regions produced by the Sun in the solar system.

In an electric universe, such cellular forms are expected between regions of dissimilar plasma properties. According to the glow discharge model of the Sun, almost the entire voltage difference between the Sun and its galactic environment occurs across the thin boundary sheath of the heliopause. Inside the heliopause there is a weak but constant radial electrical field centered on the Sun. A weak electric field, immeasurable across short distances but immense across the vast volume of space within the heliosphere, is sufficient to power the solar discharge.

The visible component of a coronal glow discharge occurs above the anode, often in layers. The Sun's red chromosphere is part of this discharge. (Unconsciously, it seems, the correct electrical engineering term was applied to the Sun's corona.) Correspondingly, the highest particle energies are not at the photosphere but above it. The electrical theorists see the Sun as a perfect example of this characteristic of glow dischargesâ€”a radical contrast to the expected transfer of energy from the core outward in the fusion model of the Sun.

At about 500 kilometers (310 miles) above the photosphere or visible surface, we find the coldest measurable temperature, about 4400 degrees K. Moving upward, the temperature then rises steadily to about 20,000 degrees K at the top of the chromosphere, some 2200

kilometers (1200 miles) above the Sun's surface. Here it abruptly jumps hundreds of thousands of degrees, then continues slowly rising, eventually reaching 2 million degrees in the corona. Even at a distance of one or two solar diameters, ionized oxygen atoms reach 200 million degrees!

In other words the "reverse temperature gradient," while meeting the tests of the glow discharge model, contradicts every original expectation of the fusion model.

For advocates of the nuclear powered model the discovery that blasts of particles escape the Sun at an estimated 400- to 700-kilometers per second came as an uncomfortable surprise. And the fastest wind comes from the cooler coronal holes! Certainly, the "pressure" of sunlight cannot explain the acceleration of the solar "wind." In an electrically neutral, gravity-driven universe, particles were not hot enough to escape such massive bodies, which (in the theory) are attractors only. And yet, the particles of the solar wind continue to accelerate against the Sun's gravity, past Venus, Earth, and Mars. Since these particles are not miniature "rocket ships," this acceleration is the last thing one should expect in an electrically neutral environment.

According to the electric theorists, a weak electric field, focused on the Sun, better explains the acceleration of the charged particles of the solar wind. Electric fields accelerate charged particles. And just as magnetic fields are undeniable witnesses to the presence of electric currents, particle acceleration is a good measure of the strength of an electric field. (For a comprehensive overview of the Electric Sun hypothesis, see Professor (retired) Don Scott’s The Electric Sky, available at Mikamar publishing, www.mikamar.biz).

CHARGED PLANETS

The electric model of the Sun changes the entire picture of the solar system. In this model, the planets are charged bodies moving within the Sun's electric field, and continually engage in electrical transactions with the Sun. We see evidence for this continually provided in official scientific press releases. Atmospheric phenomena on planets that have dumbfounded conventional scientists are explicable and even PREDICTABLE in an Electric Universe.

The aforementioned Kristian Birkeland solved the puzzle of Earth's auroras approximately 100 years ago. But even today, planetary scientists remain resistant to the obvious ramifications of Birkeland's discoveries. Despite the obviousness of electrical connections between planets and the Sun, many still look to gravitational mechanics as the cause of planetary auroras.

On Jupiter, the auroras are 1000 times more intense than anything seen on Earth. Many planetary scientists, oblivious to the electric sun/earth connection, envision the electrical activity at Jupiter's poles -- approximately 10 MILLION volts -- being generated mechanically by the planet's SPIN. Ions from theoretical "volcanoes" on the Jovian moon Io are thought to "somehow" travel to the planet's poles, then interact with the magnetic-

spin generated electricity create an extraordinary "charge exchange" producing the auroras.

What is actually occurring is an electrical connection between the Sun, Jupiter, and its moon, and recent discoveries have revealed this is no uncertain terms. When scientists discovered the most prominent auroral trail, or "footprint of Io," in the Jovian atmosphere, they assumed it must be an effect of "charged separation" generated by Io's "volcanoes." However, this theory was undermined in 2005, when Hubble images of the Jovian aurora revealed a similar "footprint" of Europa and its swirling tail. A research team from the University of Liege, Belgium wrote of this discovery: "Europa is not thought to be volcanic, so what could produce the electrical current that zips along and eventually gives rise to Europa's auroral footprint?"

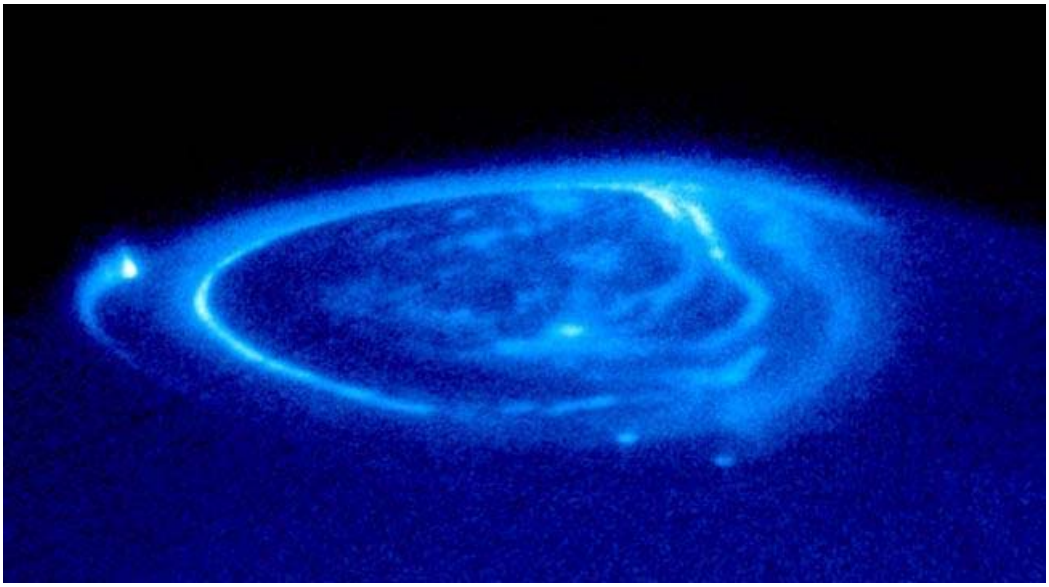


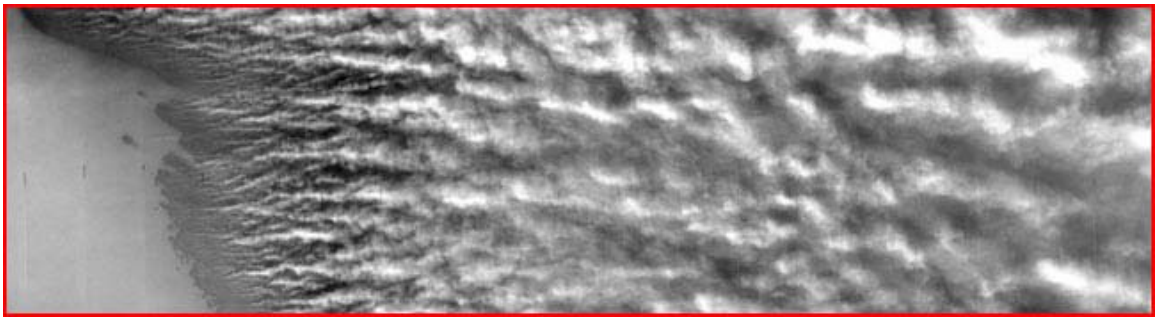
Image of the Jovian aurora, showing three “footprints” of its electrical connections to the moons Io, Europa, and Ganymede. Credit: NASA/CXC/SAO

As if to underscore the point, NASA investigators found that the electrical exchange does not stop with Europa. It includes the third moon Ganymede as well. NASA's Hubble Telescope website now shows an image of the Jovian aurora, with three electrical footprints named, including that from the interaction with Jupiter's third moon. Thus, the original argument that conjectured "volcanoes" produced the signature of electrical transactions in the Jovian auroras has been fully *falsified.*

In fact, a number of scientists have argued for decades that Jupiter is connected electrically to its moon Io. In 1979, Cornell astrophysicist Thomas Gold proposed in the journal Science that the "volcanoes" on Io were actually plasma discharge plumes. Gold's hypothesis was dismissed in the same journal by Gene Shoemaker, et al. But in 1987, plasma physicists Alex Dessler and Anthony Peratt supported Gold's interpretation in an article published in the journal Astrophysics and Space Science. Dessler and Peratt argued that both the filamentary penumbra and the convergence of ejecta into well-defined rings are plasma discharge effects that have no counterpart in volcanoes.

Later, the Galileo probe recorded amazing images of the "volcanoes" and found precisely what was predicted by electrical theorist Thornhill: temperatures so high that they saturated the cameras; MOVEMENT of the "volcanoes" across the surface; and location of "volcanoes" along the cliffs of previously excavated valleys. It is now indisputable that the basis of Shoemaker's "rebuttal" of the Gold hypothesis was incorrect. It is also indisputable that Thornhill's highly specific predictions were correct. And yet, neither the journal Science, nor any other scientific publication, has even revisited the question.

It is now indisputable that the electrical connections between planetary bodies and the Sun are responsible for many of the "puzzling" atmospheric phenomena we see throughout the solar system. On Mars, monstrous dust devils -- some ten times larger than any tornadoes on Earth -- have exposed planetary scientists' disinterest in all things electrical. A NASA press release stated, "When humans visit Mars, they'll have to watch out for towering electrified dust devils." They attribute the electric fields of the "dust devils" to solar heating and the resulting mechanical energy of air convection, acting on dust particles, to separate charge in rapidly moving "dust clouds." But the Martian atmosphere is less than one percent as dense as Earth's, and the mechanical ability of its air to carry dust particles to the apparent speeds and heights of these monstrous vortices is at best improbable. In the Electric Universe interpretation, wind is not asked to do either the improbable or the inconceivable. Charge separation is already present in the Martian atmosphere because the planet is a charged body. And rotating columns of air and dust are a natural consequence of atmospheric electric currents.



Even more astonishing is the recent discovery that dust devils on Mars often occur in massive congregations at the leading edge of storms (above) -- proof positive that they form without any benefit at all from larger regions of circulating air. They are electrical vortices, a phenomenon easily produced in the laboratory without any prior mechanical circulation of air at all.

In meteorological phenomena on Earth, we witness planetary charge as well. It is no longer possible to think of the Earth as an isolated, electrically neutral body when we observe giant bolts of lightning from above storm clouds discharging INTO space. Since the early 1990s, investigators have been documenting forms of lightning called "sprites" and "blue jets" leaping upwards from storms as much as 15 kilometers toward space. Some giant "jets" shoot up to 80 kilometers. These investigators found that every time

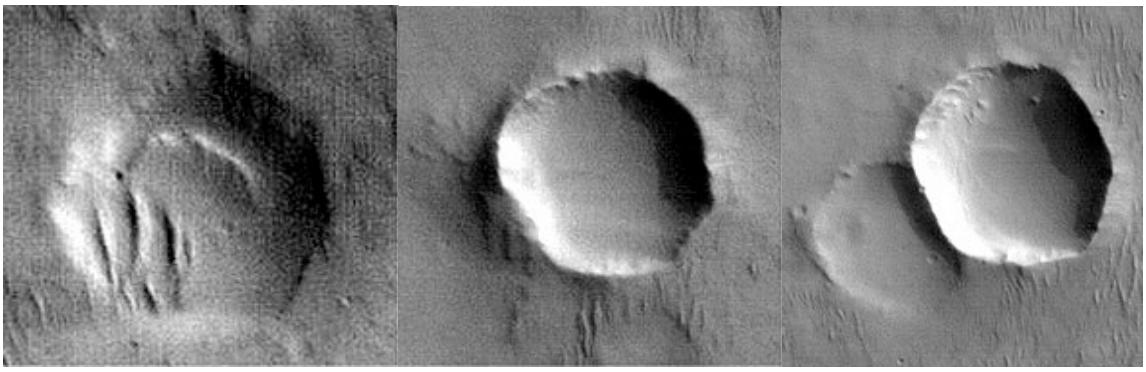
there was a "sprite" above the clouds there was a bolt of positive lightning below the clouds. In other words, a single discharge stretched from space to the Earth's surface.

ELECTRICAL SCARRING

This new understanding of charged planets and moons must alter our understanding of the past as well. In the minds of the electrical theorists, the history of Earth and our solar system is far different than the one envisioned by mainstream astronomers and planetary scientists. The scientific textbooks assure that the planets and moons have moved with clockwork predictability for billions of years. But since the earliest space probes returned detailed images of the planetary surfaces, this vision of the past has been thrown into disarray.

The first pictures of the Moon revealed a surface heavily pockmarked with remarkably fresh looking craters and riddled with long sinuous channels (called rilles). Scientists seeking to interpret these features were constrained by the traditional geologic toolkit. The "debate" over the lunar craters only included two possible causative agents: volcanism, or impact. Eventually, a consensus was reached that meteoric impacts were the primary source of lunar craters, even though they looked like neither.

But on our own Moon, and on every solid body in space, we have observed craters lacking any conventional explanation. In fact, on close observation, many craters show distinct features that are not associated with volcanic or impact craters, but are characteristically created by electric arcs in the laboratory and by electric discharge machining (EDM) used in industrial applications.

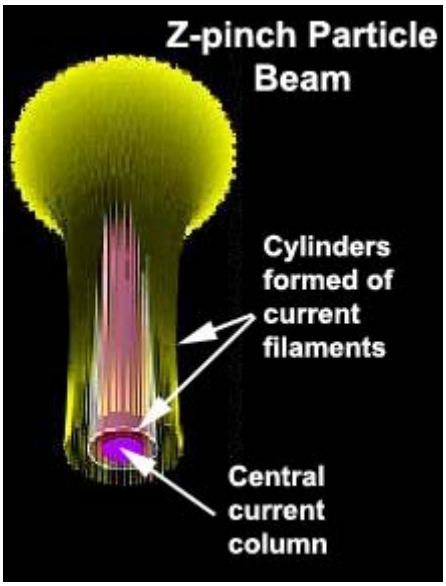


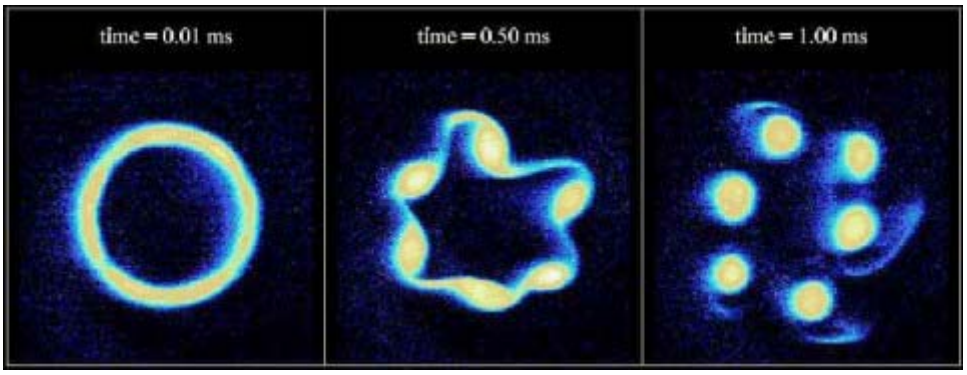
NASA images showing three of many “hexagonal” craters on Mars. From: http://www.mroimages.com/angular%20craters.html

Above, you see just three of the many "hexagonal" craters observed on Mars. It goes without saying that hexagonal cratering patterns are difficult, if not impossible, to explain with the impact hypothesis. And incredibly, many dozens of such formations have been imaged on various planetary surfaces. The unique morphology is of special interest, because it links directly to experimental work with plasma discharge in the laboratory.

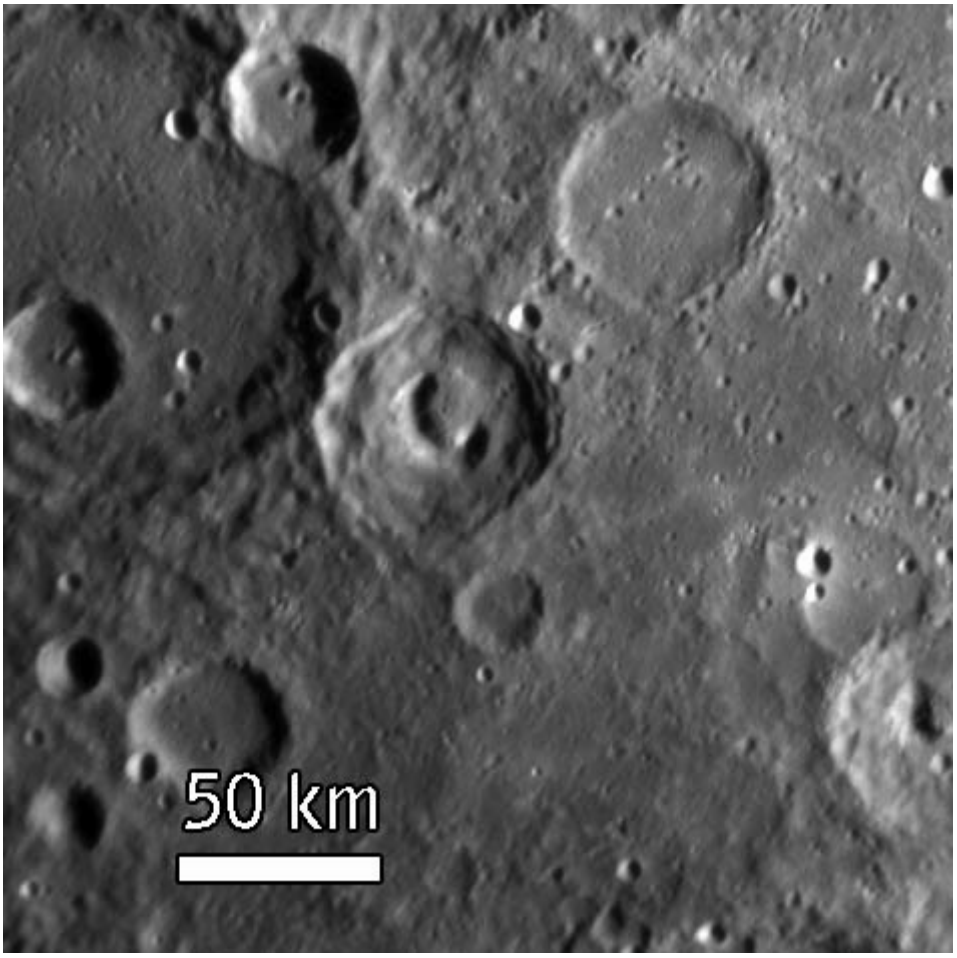
The images of hexagonal craters on planets reminds one of the polar vortex configurations seen in the upper atmospheres of both Venus and Saturn. According to the

leading proponent of the Electric Universe, Wallace Thornhill, these spiral vortexes are due to concentrated electric current flows along the magnetic field direction to the poles. They show precisely the configuration and motion of Birkeland current filaments in plasma discharge experiments. It was Thornhill's understanding of the electrical nature of the vortexes that led him to explicitly predict that BOTH of Saturn's poles would be hot -- a WILDLY unconventional prediction that was recently CONFIRMED.

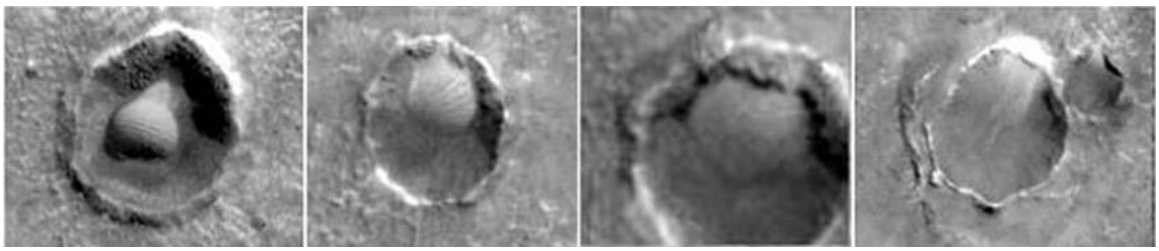




Above are images of vortex formations formed in cylindrical particle beams. Over a century ago, Birkeland produced vortex structure and vortex interactions in charged particle beams through low vacuum in his "terrella" cathode experiments. The circular pattern in the discharge will switch to a polygon as parallel Birkeland current filaments in the cylinder are drawn together by long-range attractive electromagnetic forces and short-range repulsive forces causing them to rotate in pairs and form vortices.



Consider the image above of a hexagonal crater recently imaged on Mercury.
At the center of the hexagonal crater is the pattern formed by the twin filaments of the central Birkeland column, which has created the strange cratering pattern.



One of the enduring mysteries of the Martian surface is the field of "domed craters" in the Arrhenius Region on Mars.

Countless other distinct cratering patterns are seen on planets and moons that show all the characteristics of electrical scarring documented in laboratory experiments. These include the giant, domed craters on Mars (above), whose most prominent features were replicated

by plasma physicist Dr. C.J Ransom, using nothing more than an electric arc on an iron mineral-rich surface.

The domed craters of Mars find a striking counterpart in the laboratory experiments of plasma scientists C.J. Ransom.

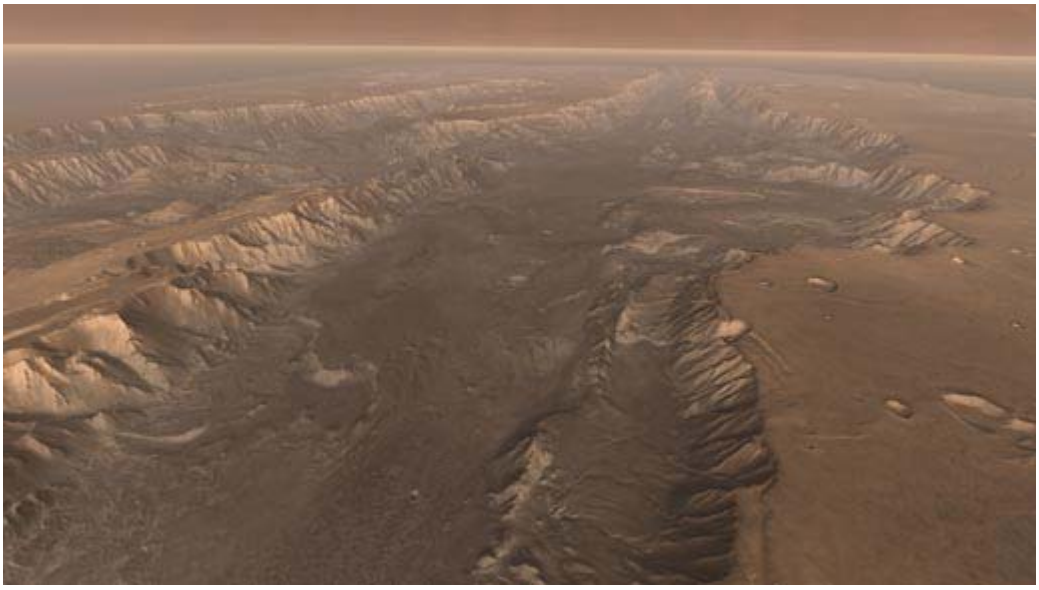
To consider an electric source for these features, scientists would have to entertain electrical discharge events more energetic than anything they could envision. The notion of planetary instability and violent electric arcing between planets and moons is totally incompatible with most everything astronomers believe about space physics and celestial mechanics.

When considering planetary history, astronomers are handicapped in two ways: 1) For reasons that are perfectly understandable, they assume that the present serenity and predictable movements of planets and moons can be projected backwards indefinitely. 2) Since most have little or no training in electrodynamics and plasma discharge, their concepts of electricity in space are limited to elementary electrostatics and magnetism, a weakness that has fostered great misconceptions in the space sciences. They cannot imagine how the inert "vacuum" of space could give rise to the high-energy events investigated in specialized plasma discharge experiments.

For today's electrical theorists, no small adjustment to perception will suffice. A sweeping revision is necessary, one that recognizes the predictable effect when a charged planet or moon moves through an electrified plasma. Where field strength is high, the result will be global electric discharge, as cosmic "thunderbolts" rake across the surface, creating entirely new topography.

Evidence of global electrical scarring is seen on planets and moons throughout the solar system. From the stupendous, 3000 mile-long trench on Mars called Valles Marineris, to the "looping rilles" on Jovian moon Europa, to the great chasm known as the Grand Canyon here on Earth, we see the telltale signs of an earlier epoch of planetary violence

[These features are far too numerous to discuss in detail in here, and will be the topic of a future “electrical scarring” monograph by David Talbott and Wallace Thornhill]. If these events occurred as the electrical theorists insist they did, then they surely registered an extraordinary impact on the minds of the ancient witnesses.



Scene from "Flight Through Mariner Valley," a video produced for NASA by the Jet Propulsion Laboratory. The greatest chasm in the solar system, Valles Marineris.

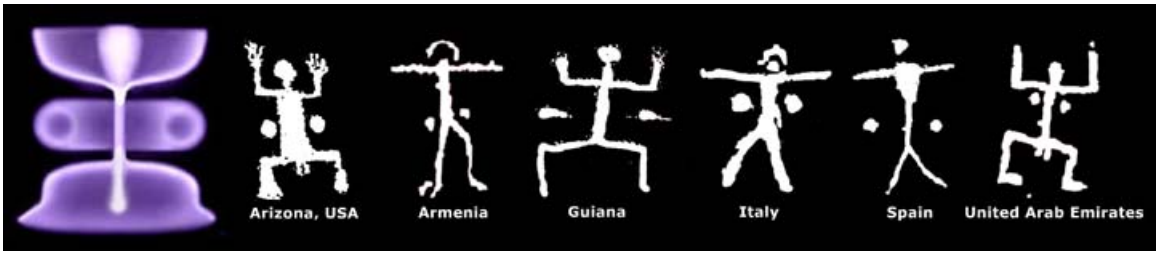
PLASMA IN THE LAB AND IN ROCK ART

What evidence exists that the ancients looked upon a sky very different from the one we see today? Today, plasma scientists are comparing electrical discharge formations in the laboratory to rock art images around the world. For over three decades Dr. Anthony Peratt, a leading authority on plasma phenomena, concentrated his laboratory research on the unstable formations that develop in high-energy electrical discharge. He recorded the evolution of these configurations through dozens of phases. Some of the most elaborate discharge forms are now called "Peratt Instabilities" because he was the first to document them.

But Peratt's most recent work has taken him in a new direction, and the results offer a remarkable link between plasma science and things once seen in the heavens. In September, 2000, in response to communication with David Talbott, Peratt became intrigued by the striking similarity of ancient rock art to the discharge formations he had documented. Suddenly he was seeing, carved on stone by the tens of thousands, the very forms he had observed in the laboratory. The correlation was so precise -- down to the finest details -- that it could not be accidental. The artists were recording heaven-spanning discharge formations above them.

The illustrations of one interesting formation -- the "squatter man" shown above -- are taken from Peratt's paper in "Transactions on Plasma Science" of the Institute of Electrical and Electronics Engineers, in December 2003. Peratt states his conclusion forthrightly: The recurring petroglyph patterns "are reproductions of plasma phenomena in space".

Peratt's findings are particularly significant in their contrast to traditional explanations of rock art. The majority of rock art authorities, particularly those with primary interest in Native American sources, argue that only images of the sun, moon, and stars reflect actual celestial phenomena. Apart from such associations, most authorities claim that global patterns do not exist. Rather, they tell us, the ancient artists projected onto stone the subjective content of shamanistic trances. Peratt's investigations say the opposite, and they confirm dozens of patterns of rock art that occur globally. Through massive labors, some apparently taking whole lifetimes according to Peratt, the artists recorded immense discharge phenomena in the heavens.



Far left: A graphic three-dimensional illustration of a plasma-discharge form, documented by plasma scientist Anthony Peratt. Accompanying this image, an assortment of rock art “stick men” representing variations of this plasma-discharge form.

The "squatter man" configuration depicted above occurs when a disk or donut-like torus around a linear discharge column is bent by magnetic fields induced by intense current flow. From the viewpoint of the observer, the edges of the upper disk may appear to point up (forming "arms") and those of the lower torus may appear to point down (forming "legs"). The underlying "hourglass" pattern, with many subtle variations, occurs around the world.

If Peratt's conclusions are correct, then only a few thousand years ago the terrestrial sky was ablaze with electrical activity. The ramifications of this possibility will directly affect our understanding of cultural roots. What was the impact of the recorded events on the first civilizations? What was the relationship to the origins of world mythology, to the birth of the early religions, or to monumental construction in ancient times? This subject is also far too rich and complex to cover adequately here, and will be addressed in greater detail in a future chapter in this series.

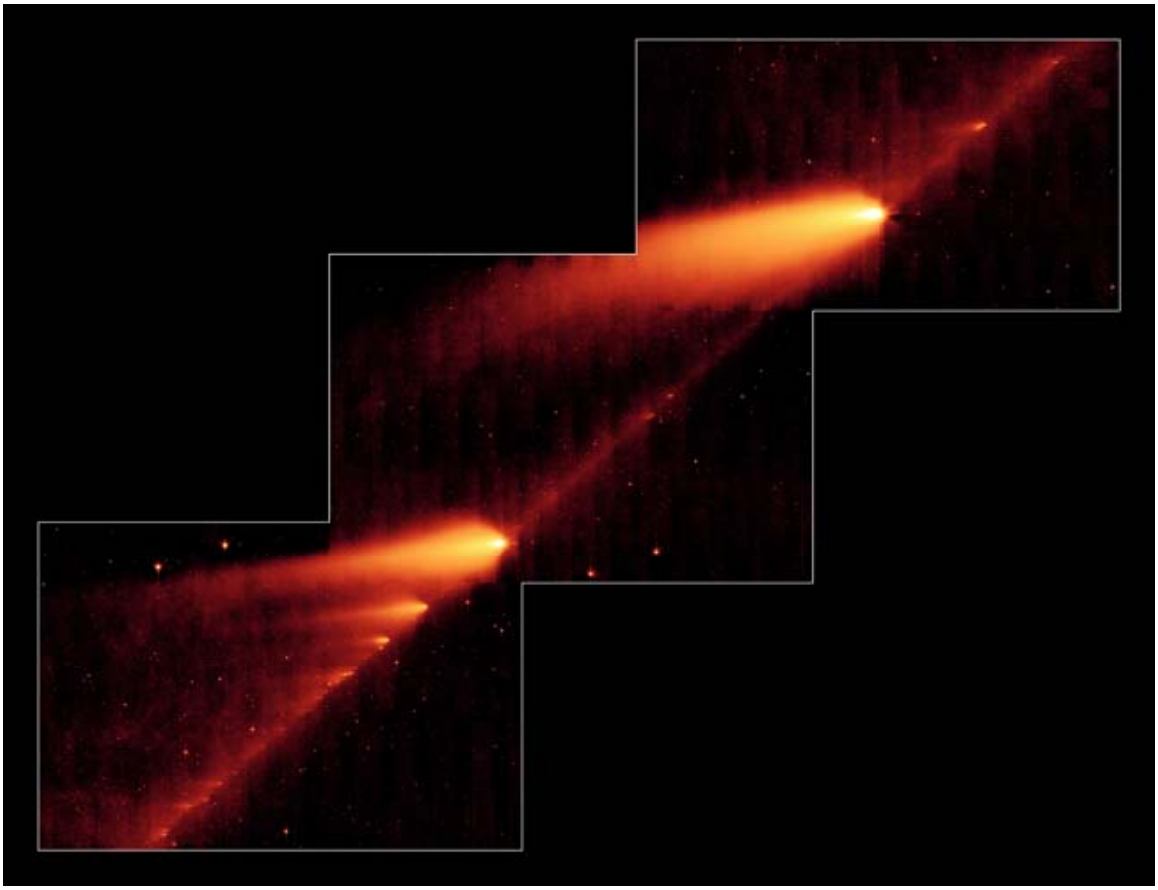
ELECTRIC COMETS

The electrical hypothesis also helps clarify the "astonishing" behaviors of comets. For over a century, virtually all astronomers have viewed comets as loose aggregates of snow

and dust, or "dirty snowballs," that slowly melt in the solar heat. But dating back to the late 19th century, a number of scientists noted the seemingly unavoidable electrical properties of comets. Amazingly, in the early 1900s, the aforementioned Kristian Birkeland was able to replicate cometary jets from a cathode in a vacuum tube. Birkeland wrote: "From a cathode of graphite there came long, steady pencils of light, which greatly resembled the so-called eruptions or jets in comets."

In the early 1970's, the engineer Ralph Juergens proposed that comets are negatively charged bodies that experience great electrical stresses as they approach the more positively charged environment of the Sun. Comets may also discharge electrically if the plasma structure that surrounds them is disturbed by other influences, such as the plasma sheath of a planet.

The electrical model explains countless cometary "mysteries," the list of which grows longer with every year. Astronomer Stuart Clark has said of comet science: "We have now had four close encounters with comets, and every one of them has thrown astronomers onto their back foot."



This infrared image from NASA's Spitzer Space Telescope shows the broken Comet 73P/Schwassman-Wachmann 3 skimming along a trail of debris left during its multiple trips around the sun. The flame-like objects are the comet's fragments and their tails, while the dusty comet trail is the line bridging the fragments. Credit: NASA/JPL

The discoveries and observations that have startled and/or confounded mainstream cometologists include: supersonic jets exploding from comets' nuclei; the inexplicable confinement of these jets into narrow filaments, spanning great distances, up to MILLIONS of miles, defying the behavior of neutral gases in a vacuum; jets occurring on the dark sides of comet nuclei; comet surfaces with sharply carved relief -- the exact opposite of what astronomers expected under the "dirty snowball" model; unexpectedly high temperatures and X-ray emissions from cometary comas; a short supply or complete absence of water and other volatiles on comets' nuclei; mounting evidence for the production of the radical OH in cometary comas, due to charge exchange with the Sun (the process that misled astronomers into thinking they were seeing evidence of water removed from the surface.); mineral particles that can only be formed under extremely high temperatures -- the last thing one would expect from a chunk of dirty ice arriving from the outermost reaches of the solar system; comets flaring up while in "deep freeze," beyond the orbit of Saturn; comets disintegrating many millions of miles from the Sun; comet dust particles more finely and evenly divided than is plausible for sublimating "dirty ices"; ejection of larger particles and "gravel" that was never anticipated under the idea that comets accreted from primordial clouds of ice, gas, and dust; the unexplained ability of a relatively minuscule comet nucleus to hold in place a highly spherical coma, up to millions of miles in diameter, against the force of the solar wind.

The energetic blast from a copper projectile launched by NASA's Deep Impact probe into the comet Tempel 1, stunned NASA investigators. Credit: NASA/JPL

Recent years have presented greater opportunities to test the electric comet hypothesis. Prior to NASA's 2005 Deep Impact mission, Australian physicist Wallace Thornhill, in collaboration with the website Thunderbolts.info, offered a series of predictions based on an electrical interpretation of comets. Among these predictions, Thornhill stated that when NASA's 800-pound projectile smashed into the Comet Tempel 1, the resulting explosion would be far more energetic than NASA anticipated. He also predicted that an electrical "flash" might precede the impact and explosion, as the copper projectile neared the highly-charged comet nucleus. And this is precisely what happened on July 4, 2005, much to the astonishment of NASA and astronomers around the world.

Other successful Thornhill predictions included: the inability of the mission to detect quantities of water necessary to support the standard model; a sharply sculpted comet surface (the precise OPPOSITE of what one expects of a "dirty snowball"); and the rearrangement of the comet's jets due to charge redistribution.

More recently, in October of 2007, astronomers faced another cometary surprise in the sudden, inexplicable brightening of Comet Holmes 17P (above.) In less than 24 hours, the comet grew from a small 17th magnitude to a magnitude of 2.5 – such a vast diameter that it was visible by the naked eye on Earth. Holmes continued expanding until by mid-November it had become the “largest object in the solar system,” even surpassing the SUN in volume. The coma’s diameter had grown from 28,000 km to 7,000,000 km!

Astronomers could not explain this stupendous display, particularly since at the time of its flare-up, the comet was moving AWAY from the Sun. From the electrical perspective, outbursts from comets at great distances from the Sun seem to correlate with sudden changes in the solar “wind” plasma environment due to a solar storm. In support of this notion, there was a large spike in the density of the solar wind on October 22 at 19:15, two days before the comet’s flare up.

These recent developments exemplify the proven ability of the electric model to both predict and explain "surprising" space discoveries. As the team at Thunderbolts.info hopes to demonstrate, the inspiration and sense of wonder with which human beings once regarded space exploration can still be recaptured. The heavens are far more alive and dynamic than envisioned in the sterile, gravitational models that dominate mainstream astronomy. Nothing in the Universe exists in isolation. And the force that connects all is the same force that lights the sun, creates the energetic displays of comets, and organizes galactic structure. That force is electricity.