

Ettinger Journals

Electron Asymmetry

What is Electron Asymmetry? How
Does It Affect Our Universe?

The Mysteries of Gravity are Addressed by Douglas B. Ettinger

Douglas B. Ettinger
Written 2/1/2013
Published 5/1/2017

I. Contents

I.	Contents.....	1
II.	Introduction	3
III.	The Abstract.....	4
IV.	The Missing Graviton	6
V.	The Building of Atomic Nuclei during Primordial Times Predicts Excess Electrons	7
V.	What Chemical Bonds Tell Us about Electrons	11
VI.	What the Casimir Effect Tells Us about Electrons	12
VII.	Pointing the Way by Asimov on Physics.....	16
VIII.	The Relative Standard Uncertainty for “G”	19
IX.	An Examination of Light Objects Falling to Earth	20
X.	Relative Shorter Distance Electromagnetic (EM) Effects Within and Closely Surrounding Regions of Celestial Bodies.....	22
A.	Solar Winds and a Star’s Fusion Process	22
B.	Herbig-Haro Objects and T-Tauri Stars.....	24
C.	Magnetospheres and the Heliosphere.....	24
D.	Using gravity electrons to Explain Langmuir Sheaths in the Solar System	25
E.	Planetary Auroras	33
F.	The Nature of Earth’s Lightning	36
XI.	Does the Double Layer (DL), or Langmuir Sheath, Require Excess Electrons?	39
XII.	Super-Terminal Raindrops	39
XIII.	Electron Sparging of Comets.....	40
XIV.	The Enigma of Megafauna Living on Earth.....	44
A.	David Esker’s Dinosaur Paradox.....	44
B.	Esker’s Dense Atmosphere is Flawed	45
1.	The Impossibility of a Dinosaur’s Circulatory System.....	45
2.	Scaling Factor as a Function of Time	46
3.	The Puzzling Size and Shapes of the Dinosaurs	46
4.	The Mesozoic Climate Paradox	48
XV.	Frisbees, Bicycles and Dust Devils	52
A.	Horizontal Spinning Masses	54
B.	Vertical Spinning Masses.....	55

C. Dust Devils and Their Big Brothers	56
XVI. Physics Experiments to Prove gravity electrons Do Exist	59
A. The Modified Cavendish Experiment	59
B. Determining an Absolute Ratio of gravity to Regular Electrons	60
C. Dropping Magnets to Verify the Electric Field of Mass	63
XVI. How Does Gravity Communicate in this Universe?	63
XVII. Important Manifestations of Electron Asymmetry	65
XVIII. End Notes.....	65

II. Introduction

All the laws of nature basically originate from symmetry. In physics, there are the laws of invariance or conservation laws; in chemistry, the formation of crystalline and molecular structures; in mathematics, geometric transformations of reflection and rotation; in biology, the division of living cells and similar sides about an axis at least in two dimensions; and in quantum objects, proton and electron parity. Symmetry is harmonious proportion and balance. The lack of symmetry is asymmetry or imbalance.

We humans see evidence of asymmetry every day in normal objects such as plants, rotation of the human body and the fractals of shorelines, but our thinking is dominated by symmetrical objects and concepts. Asymmetry is required in nature even more than symmetry. Without asymmetry, the evolution of life would not be possible. For larger organisms require the asymmetrical positioning of internal organs in order to function on a much larger scale than simple single cells and bacteria. Asymmetry is required for living cells to divide slightly differently for millions and billions of years making it possible for flora and fauna systems to evolve into more complex systems. But asymmetry was much more important at the beginning of time shortly after the beginning of matter when fundamental particles were being created.

From the study of particle physics, we know of the existence of basic particles and anti-particles. When these particles meet, they destroy each other creating energy in the form of gamma rays. All things that exist today are made of particles and do not arbitrarily vanish after meeting anti-particle brethren. Obviously, when particles and anti-particles were being made after the creation of matter an asymmetry of particles over anti-particles occurred owing to our very existence. An example of an anti-particle is the positron that has the opposite spin and charge of an electron with all other properties being the same. When these two particles meet, they annihilate each other creating only energy that obeys the equation $E=mc^2$.

Other known asymmetries in particle physics are created in collider experiments. They are the forward-back asymmetry, the left-right asymmetry and the charge asymmetry of weak interactions. An example is the neutrino only being left-handed and the anti-neutrino only being right-handed. In fundamental physics, parity is considered invariant except for these known asymmetries. Parity is considered a basic property of electromagnetic, strong force and gravitational interactions. This icon of invariance or its violation for basic particles will be studied more closely in this journal.

In molecular physics, asymmetry is always present, although not called such, because of isotopes (differing number of proton and neutron ratios) and ionization (differing numbers of protons and electrons or charge ratios). The forces between the masses of sub-atomic particles vary significantly with no heed for symmetry. The bigger objects such as the all the different types of celestial bodies vary in the same way. Indeed, without asymmetry being the driver for evolutionary change in the particle realm and in the largest objects of the celestial realm, creation would never have a chance to get started from using the basic particles of the universe.

III. The Abstract

One suspected asymmetry, not proven yet, will be examined by this journal. That asymmetry is called electron asymmetry or the imbalance of electrical charges in the universe. Shortly after the creation of matter, when particles were being born, there were significantly more electrons than protons produced. The parity of charges assumed in standard electromagnetism (EM) theory did not exist. But, where is the evidence of this violation of parity? All normal molecular matter, unless in a plasma state, is known to be neutral or have equal amounts of positive and negative charges. Even a star like our Sun is considered to have an equal amount of charges except for local conditions such as flares and sunspots. The only major force created by our Sun is gravitational whose affect reaches far into the galaxy, although minor electromagnetic forces do emanate from this star in the form of solar winds, as they do for any other normal star. These electromagnetic affects are more local and much less significant so it is assumed.

So, let's apply a thought experiment and assume what would happen to an excess of electrons that were created during the beginning of matter creation. Due to known requirement of parity of charge these extra electrons would hurriedly be looking for a mating opposite charge or proton. In doing so they would mix rather evenly among the existing baryons (protons and neutrons). As the baryons began to clump and eventually form the first stars, clouds of plasma, and cooling molecular clouds, these excess electrons would stay nearby the existing protons inside these systems of matter trying their best to match-up with a possible unwed proton.

As time went onward, the first massive stars blew apart creating more massive stars and clouds eventually creating the first galaxies. These massive stars would reform and explode again eventually forming the known observable matrix of smaller-size, longer-lived stars we see today. All the time during these chaotic processes the excess electrons fought hard to maintain an even distribution throughout all the conglomerations of newly created masses to maintain and improve their chances of joining a positively charged proton. Of course, this parity could never be achieved; hence, excess electrons reside in every existing object such as stars, planets, molecular clouds, and the plasma of interstellar and intergalactic space.

If this asymmetry of electrons actually happened and still exists today, then what is its manifestation? Indeed, that manifestation is one of the most important parameters in the universe and was required from the very beginning to form the largest clumps of matters and eventually the first stars. The initial and continuing electron asymmetry is proposed to be gravity. The electromagnetic radiation due to photon emission from these excess electrons locked inside each item of matter - from giant molecular clouds to stars to planets to all smaller separate masses such the iron balls in a Cavendish Experiment (used to determine the gravitational constant, G) cause an attraction known as gravity. These excess electrons in each object containing baryons are trying to attract the protons from any other nearby object proportionally to its mass and closeness. All objects have excess electrons and are trying to attract other objects that have potentially unwed protons or positive charge. Positive charges such as the protons in each object do not repel the other object because they are happily wed to existing electrons within their respective object.

An excellent question in this thought experiment is why the negative charges of electrons inside each object do not repel the other object. Again, we must utilize a second thought experiment. Perhaps the electrons within each object are so busy or pre-occupied by scurrying and competing to find a free proton orbital within their own object that they do not have energy to repel the existing excess electrons of another object. Only the combined energy of excess electrons of each object act as a system to attract protons of another object outside their system. Another way of talking about this condition is to assume the bound state between an electron and a proton for attraction is more powerful and acts farther than the bound state between two electrons for repulsion. Also, the bound state of the individual excess electrons is extremely more than the bound state of the valence electrons acting to form the atoms of a conglomerate of matter. This bound state of the excess electrons reaches way beyond the surface of any conglomerate of matter. This much stronger, far reaching bound state of excess electrons becomes the gravity field of each and every object with any significant mass. This includes items as small as dust particles and rain drops.

Before exploring the actual reality of such a concept, the different electrons including those described above will be categorized. The **valence electrons** are those that makeup all atoms and are equal to the number of protons of the atom's nucleus thus creating neutrality of charge of atoms and molecules unless static electricity is created on the object.

Free electrons are those loosely held by their respective atoms and roam freely to create current in conductive materials or static electricity from loosened electrons such as those that are mechanically rubbed away from the surfaces of dust and water vapor particles in clouds to cause lightening. These free electrons are displaced from their proper valence locations in atoms by electrical currents produced either by magnetic induction (dynamo-type machinery or naturally occurring Birkeland currents), batteries, thermocouples or solar cells. These free electrons are only thought to be regular valence electrons that have been momentarily displaced or energized into a waveform. Given enough time without introducing other exciting energies, these free electrons will return to an open valence or orbital location around some atom. Electrical charge will always seek a balanced or neutral condition within very short periods of time.

Another type of electron, lessor known, will be called the **plasma electron**. This electron is found in the dark glow, normal glow and arcing plasmas found in stars, the solar wind, nova or supernova remnants, planetary auroras, lightning and in man-made devices that create arc welding and other plasma technologies. These electrons are excited enough to completely escape their atomic structure and their crystalline structure to travel between separate bodies of matter such as the solar wind composed of both ions and electrons leaving the Sun and traveling to either its heliosphere double-layer sheath or to the planets. The standard accepted belief is that for every loose electron inside plasma there exists an oppositely charged proton. Parity or symmetry of electrical charges is always preserved despite the chaos of burning and exploding stars, so it is assumed.

Contrary to any standard model a new type of electron is introduced, **gravity electrons**, which are the excess electrons created during the creation of primordial matter. This excess causes the asymmetry between electrons and protons that in turn creates gravity. The excess electrons acting together

produce a force field around each separate conglomeration of matter in seeking more protons to achieve their destined or natural parity. As conglomerations of matter came together initially by electromagnetic forces, enough gravity electrons were in turn gathered to create dominant attractive force fields. This newly evolved gravity force began to attract the separate conglomerations together into stars, planets and other smaller celestial bodies. This gravity force made it possible for celestial bodies to form spherical shapes and hold volatiles to form atmospheres and oceans of liquids or ices. Henceforth, in this paper electrons may be labeled either valence, free, plasma or gravity (excess) types for ease of discussion. Keep in mind that primordial excess electrons can exist either in plasma or in conglomerations of mass. But, only the excess electrons residing within conglomerations of mass will be referred to as *gravity electrons*.

Now that one has this odd concept or hypothesis in mind it is time to examine and possibly re-interpret any known natural phenomena for possible signs of electron asymmetry. Then some actual laboratory experiments will be designed to possibly prove the connection between electron asymmetry and gravity.

IV. The Missing Graviton

The Standard Model for subatomic particles predicts a force carrier for the force of gravity named the graviton. This force carrier or boson has never been detected. The force carrier for electromagnetism is the photon. The Z and W bosons are the carriers for the weak nuclear forces that are responsible for radioactive decay and affect all fermions. The gluons are the force carriers for the strong nuclear forces that powerfully bind protons and neutrons to form atomic nuclei. Understandably, the graviton may be hard to locate since the strong force depending on its range is about 100 times that of electromagnetism, 100,000 times that of the weak force and 10^{39} times that of gravity. All the known force carriers have essentially zero mass but act over these different range of distances.^{1,2}

One basic difference between the nuclear strong / weak forces and the electromagnetic force is the range of attraction. The strong force attraction for nucleons has a range of 1 to 2.5 femtometers (1 fm = 1×10^{-15} meter) with a repulsion force at less than 0.07 fm.³ The weak force has a very short range of 1×10^{-17} to 1×10^{-16} m. At 1×10^{-18} m, the weak force has a similar strength as electromagnetic forces but exponentially decreases. At 3×10^{-17} m, the weak force is 10,000 times weaker than the electromagnetic.⁴ The force of both electromagnetism and gravity act over unlimited distances with similar proportions. This very fact leads to a suspicion that both forces, electromagnetic and gravitational may use the same force carrier.

Matt Strassler, a particle physicist, in his paper "The Strengths of the Known Forces" ² is quoted as saying:

- *The weak nuclear force becomes extremely weak at long distance which is also true of the Higgs force.*
- *Electromagnetism survives to larger distances, but though not very strong is still strong enough to bind up most electrons and atomic nuclei into electrically-neutral combinations, whose electric forces on other objects cancel. [For instance, a hydrogen atom does not have pull on a distant*

electron, because the electron in the hydrogen atom pushes and the proton in the hydrogen atom pulls that electron, with forces that essentially cancel.]

- *The strong nuclear force is so strong that it binds quarks and gluons and anti-quarks together into combinations that similarly have cancelling effects.*
- *But, gravity cannot be arranged to cancel in these ways. There are no particles that generate gravitational forces that push anything apart, so you can't combine two particles so that their gravitational forces on all distant things cancel.*

The reason for Strassler's last statement is that the cause of gravity, excess electrons within a conglomeration of atoms, have no nucleons to push on; these excess electrons can only pull on other neighboring conglomerations of atoms in order to attract other possible single or unpaired protons. This non-parity of charge is what causes the force of gravity between individual masses of bound atoms or molecules.

An example is that a steel ball falling to and impacting Earth does not cause a flow of the excess electrons from either object because the steel ball is either already neutral or has its own excess electrons. When contact is made the excess electrons of each object immediately sense that there are no excess protons in either object and one can assume that both objects are neutral since no arc discharge is observed. But, no one suspects that each object may have an excess of electrons which cannot flow between each other.

Einstein and other atomic physicists predicted a Unified Force Theory that explains that all particles and forces exist under one roof: The Standard Model. The asymmetry of electrons could easily provide the answers for the Unified Force Theory because the missing graviton is no longer required. The force carrier for gravity now becomes the better-known photon for electromagnetism. The Higgs Boson would still remain a mystery unless the Hadron Collider solidifies its recent position about this particle's detection. The Higgs Boson may answer more questions about sub-atomic particle mass measurements, but does not begin to address the enigmatic graviton.

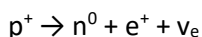
V. The Building of Atomic Nuclei during Primordial Times Predicts Excess Electrons

A justification for excess, or gravity, electrons is found in the predicted nuclear reactions during the beginning of all matter in what is called the Big Bang era. This writer does not entirely endorse the Big Bang theory, especially the so-called inflationary period and dark matter production. However, the general idea of how the lighter elements are responsible for most of the abundance of matter being evolved from immense thermal energy producing neutrons and photons during primordial times is mostly accepted. Those beginning nuclei are ^1H (protium or hydrogen-1), ^2H (D, deuterium or hydrogen-2), ^3He (helium-3), and ^4He (helium-4); the theory produces mass abundances of 75% ^1H and 25% ^4He verified by observations. Also, isotopes lithium, ^7Li and beryllium, ^7Be are formed in trace amounts. Unstable isotopes of ^3H (tritium or hydrogen-3) and ^7Be (beryllium-7) later decay into ^3He and ^7Li . The basic twelve nuclear reactions that produced the stated relative abundances of light atomic nuclei are given below.

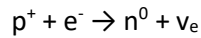
All heavier nuclei were produced much later in the newly created stars because the expanding universe reduced the required density of particles and temperatures to provide the necessary collisions of nuclei over much longer periods of time. A so-called bottleneck was created due to limited amounts of Li and Be and due to unstable nucleons of 8 and 5 protons. For helium-4 to produce heavier nuclei thousands of years are required which only a star can provide. The Big Bang era or the stirring of the primordial soup is limited to the decay time of free neutrons decaying to protons and electrons with a half-life of only 10.2 minutes. Nucleogenesis is thought to have taken a much more than this amount of time per the Big Bang hypothesis. If the expansion time was much more than predicted by the Big Bang's very short inflationary period, the decay of elements with larger atomic numbers would have not taken place and still resulted in similar ratios of so-called Big Bang synthesized elements. The initial genesis of matter could have created clumps that maintained the necessary distances for nuclear reactions. Each and every clump of matter multiplied exponentially producing enough time for each and every new clump's nucleons to maintain the minimum distance for continued reactions and yet keep expanding at much less than the predicted inflationary rate. A postulated rapid inflationary stage of expanding and reproducing clumps can help to explain the absence of atomic numbers any higher than beryllium that exist outside the star birth and star dying processes. An unimaginable super inflationary rate from one singularity is not really required.

So, let's examine all the possible reactions that are established by particle physics to have produced the lighter nuclei prior to stellar nucleosynthesis. These listed reactions are taken directly from Wikipedia's "nucleosynthesis" of 3/6/2015.^{5 6} Beginning with only neutrons and photons (not shown) and an immense amount of thermal and/or perhaps electrical energy in this sequence of reactions is required to achieve the universe's relative abundances and end with some traces of lithium and beryllium. The sequence of a much later decay of reactions for ³H (tritium), ²H (deuterium) and ⁷Be (beryllium-7) are not shown.

All matter shown in these reactions is much too hot for atomic structure; only plasma with separated protons and electrons are possible. The following general sequence of these reactions is indicated by reading left to right and then downward just like reading a book page. The combination of neutrons breaking apart to produce protons and protons fusing with other protons and neutrons creates the various nuclei called isotopes. In the table of reactions, the isotopes or particles are circled that are consumed by another reaction occurring next in the series shown. This sequence of reactions takes place relentlessly and repeatedly countless times to produce a universal mass abundance ratio of 75% hydrogen and 25% helium. The reactions reveal with some subtlety that three free protons are produced in reactions #5, #8, and #12 that are not required for any other subsequent reaction in the series. This possibility may over time statistically produce enough time for some protons to transform into a neutron via inverse beta decay if enough energy is available. Certainly, enough energy is accessible. This transformation occurs by emission of an antielectron (called a positron) and an electron neutrino:



The transformation of a proton to a neutron inside any nuclei is also possible through electron capture:



However, during the time of primordial creation of particles when the temperatures are too high, this reaction is impossible. Positron capture by neutrons inside a nucleus that briefly contains an excess of neutrons is possible. Ample energy overcomes the repulsion between the positron and the positive nucleons which are ordinarily weaker with only minimal protons such as is the case for deuterium, tritium, helium-3 and helium-4 during the initial primordial era.

Hence, the remaining electrons lose their chance to join a proton to become a neutron or be annihilated by an antielectron (positron). These remaining electrons become an excess of negative charge that keep multiplying by a certain statistically proportion to defeat parity of charge. These excess electrons become the gravity electrons that make gravity possible. Without this resulting force of gravity there would be no stars and galaxies.

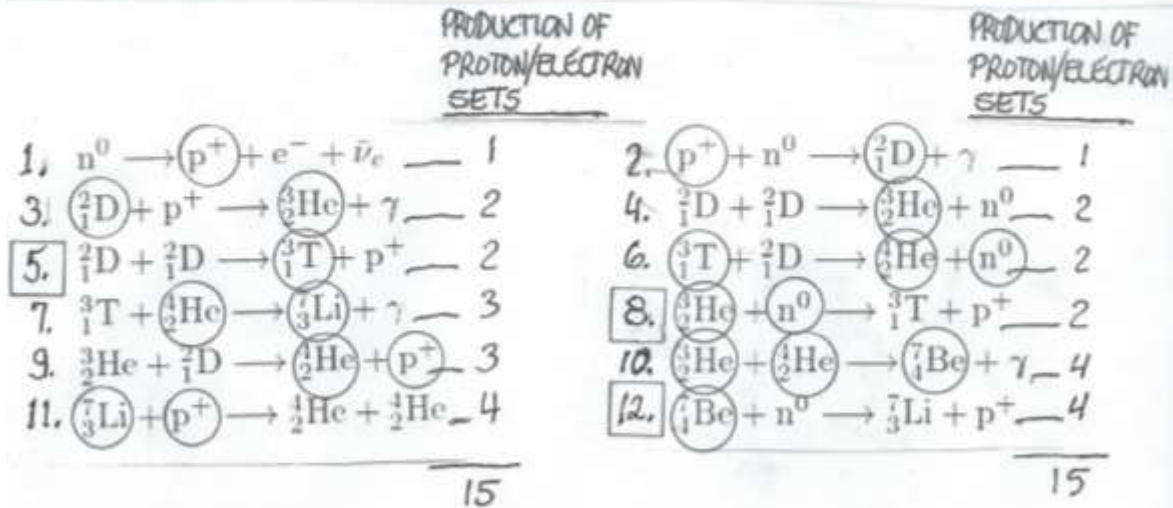
For each series of twelve reactions previously discussed, 30 protons and 30 electrons are produced from the fission of the first neutrons. In these reactions three free protons, p^+ , are produced that are not readily required for the next few reactions in the series. The assumption is made that most of these free protons are available with just the right amount of time for reverse transformation, the production of a neutron and antielectron. Then, these antielectrons are captured by nearby neutrons before they are annihilated by an electron, thereby creating three excess electrons for every series of reactions. Hence, the proportion of excess electrons to the total protons produced for each series of 12 reactions is $[(30 + 3) / 30] \times 100 = 110\%$.

Is this analysis simply coincidental with no meaning? Or, does this treatment give some justification for deriving electron asymmetry? Perhaps the violent stirring of the primordial soup lost track of some free protons and antielectrons and gave the universe extra electrons with no matching positive charge.

Of all the protons produced in these reactions from neutrons, 30 are part of atomic nuclei, one is consumed directly in another reaction, and three are free to have a possible reverse transformation into a neutron, positron and electron neutrino. The positrons are captured by very close neutrons of atomic nuclei or free neutrons leaving behind 3 excess electrons for creating gravity.

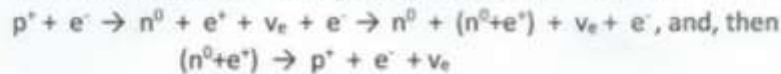
Basic Reactions of Particles and Nuclei Creating Primordial Matter

(Isotopes or particles circled are consumed by one of the next reactions.)



$$\text{TOTAL PROTON/ELECTRON SETS} = 15 + 15 = 30$$

Proton reverse transformation leaving behind one extra electron:



Primordial Particles and Atomic Isotopes:

- p^+ Protium (1 proton – hydrogen atomic nucleus)
- n^0 Neutron (equivalent to 1 proton & 1 electron)
- e^- Electron (neutrons decay into one p^+ and one e^- to maintain parity)
- e^+ Positron (annihilation normally occurs when combining with an electron, but may recombine with a very close neutron)
- ν_e Electron Neutrino
- ${}^2_1\text{D}$ Deuterium (1 proton & 1 neutron & 1 electron)
- ${}^3_1\text{T}$ Tritium (1 proton & 2 neutrons & 1 electron)
- ${}^3_2\text{He}$ Helium-3 (2 protons & 1 neutron & 2 electrons)
- ${}^4_2\text{He}$ Helium-4 (2 protons & 2 neutrons & 2 electrons)
- ${}^7_3\text{Li}$ Lithium-7 (3 protons & 4 neutrons & 3 electrons)
- ${}^7_4\text{Be}$ Beryllium-7 (4 protons & 3 neutrons & 4 electrons)

V. What Chemical Bonds Tell Us about Electrons

Chemical bonds defined in physical chemistry are the different electrostatic forces that are created by electrons within atoms and molecules. Electrons in matter create the different molecules and more complex compounds. Once formed within certain ranges of pressure and temperature these molecules remain very stable and allow for structures like planets and human beings. Without these electrons working in very precise configurations, physical chemistry would not be possible. What one realizes very quickly within the Standard Model of particle physics is that these electrons are all fighting continuously to maintain parity between opposite groups of charges or between themselves and positive protons.

The most important bound states for establishing charge parity are the elements themselves that are composed of equal electrons and protons. Of course, if the atomic nucleus has neutrons, the parity is maintained because each and every neutron is but one proton and one electron. The strange twist about charge parity for the elements is that the electrons exist within various stable shells or clouds around the nucleus. These different shell configurations then lead to molecules composed of combinations of elements by creating atomic and intermolecular bonds which remain neutral.

The strongest intermolecular bonds are covalent, involving the sharing of pairs of electrons between atoms; metallic, involving the electrons dividing their density equally over all atoms that function as a neutral entity; and ionic, involving the attraction of oppositely charged ions created in turn by the exchanges of unstable electrons in atomic outer shells. The chaotic combining of different atoms due to outside conditions is organized very quickly by the electrons that surround the nucleus of each atom. Electrons overcome increasing entropy because they are assiduously maintaining parity.

Very special and weaker intermolecular bonds also reinforce the electron's fierceness to maintain parity. These bonds are the hydrogen bond, involving the interaction of a polar hydrogen atom and another type of polar atom within a molecule; and van der Waals bonds involving the attractive or repulsive forces between molecules or between parts of the same molecules. Experiments have proven specific features of these van der Waals forces: they are a force between two permanent dipoles of a molecule, a force between a permanent dipole and a corresponding induced dipole or a force between two instantaneously induced dipoles. These weaker intermolecular forces are created by electrons from different molecules that are repulsing each other. The electron density is then induced or re-distributed causing different di-pole arrangements. The geometric arrangement becomes somewhat asymmetrical, but the icon of parity of charge is preserved.⁷

From the study of physical chemistry, it becomes imaginably difficult to conceive that the universal parity of charge or the parity of equal electrons and protons is never violated. This view becomes virtually a mental block for scientists considering a possible non-parity between these basic building blocks of the universe. In the chemistry laboratory, excess electrons inside matter as a result of a hypothesized electron asymmetry is impossible to detect. Such an electron would only be identified as a free electron as are those of static electricity.

To find these so-called excess electrons another method outside chemistry must be sought. Electron asymmetry assumes that these excess electrons are in a bound state within the particular object of

matter where they reside. When two objects come in contact with each other, the excess electrons remain in their respective objects because they immediately sense there are no excess protons to join in the other object, although these excess electrons in each object have been continually attracting each other's object hoping to find some positive charge in the other. The electric charges do not repulse each other because the individual fields of influence are very small due to their diligence of staying evenly distributed within their own objects hoping to find a loose proton. The larger field of influence for these excess electrons is the electromagnetic radiation emitted by the overall system beyond the total object boundary. This larger field is what scientists are calling gravity.

VI. What the Casimir Effect Tells Us about Electrons

The Casimir effect has some implications for electron asymmetry. Physical forces arise between typical configurations of two closely spaced parallel plates. The plates are uncharged and are typically metal within a vacuum. These plates can also be dielectric materials and/or be within a liquid. Surprisingly, the net force between these plates a few micrometers apart can either be attractive or repulsive.⁸ So, what causes this strange force? Dutch physicists Hendrik B.G. Casimir and Dirk Polder in 1947 proposed the existence of a force between two polarized atoms and between such an atom and a conducting plate. This force between the plates became known as the Casimir-Polder force, but utilized the van der Waals forces that occur between polarized molecules.⁹

Since Casimir's and Polder's experimentation, the quantum field theory using zero-point energy or virtual particles of quantum fields was adopted as being the best theory, but did not refute Casimir's theory.^{10 11} Hence, two ways of explaining the Casimir effect, vacuum energy and a relativistic van der Waals force, became the result. Also, different mathematical representations, the zeta-regularization of wave vectors and a numerical calculation using tabulated complex dielectric functions of the bounding materials, were developed that agreed roughly (within 15%) with empirical data.¹² The basic point being made here is that most natural phenomena can be represented by acceptable but different theories and different mathematics. Different perspectives can be perfectly valid if there is sufficient mathematical and experimental agreement.

So, let's examine another perspective, electron asymmetry, to achieve this Casimir effect. Gravitational force is ruled out because both attractive and repulsive forces cannot exist as was discovered by the Casimir effect. And, gravity could never produce the equivalent of one atmosphere of pressure for two thin plates with a 10-nanometer separation. Also, the strength of this force falls off rapidly with distance, which is not characteristic of a gravity field.¹³ External electrostatic forces are ruled out because the plates are carefully kept uncharged. What natural forces are left are the very close acting forces of electromagnetism and the nuclear forces. Let's briefly list the range of distances where these forces act to gain an appreciation for the typical gap between two plates that can create the Casimir effect.

This tabulation will use the units of femtometers (fm) which is 10^{-15} meters and is the range of sub-atomic forces. The smallest length in physics is the Planck length which is 1.6×10^{-20} femtometers.¹⁴ A proton diameter is 1.6 to 1.7 fm or about a 0.83 fm radius.¹⁵ A typical atom is about 200,000 fm¹⁶ or about 1/100 of the plate separation of 10 nm listed above which is 10^7 femtometers ($1\text{nm} = 10^{-9}$ m).

Nuclear force range:¹⁷

^ 1 to 2.5 fm

^ at 0.7 fm nuclear force becomes repulsive

^ ≥ 2.5 fm Coulomb force becomes mostly insignificant

Strong nuclear force:

^ ≤ 0.8 fm (radius of nucleon – proton or neutron)

Weak nuclear force:¹⁸

^ 0.01 to 0.10 fm

^ at 0.001 fm the weak force is similar to strength of electromagnetic forces

^ at 0.03 fm the weak force is 10,000 times weaker than electromagnetic

Electromagnetic forces (approximate range):

^ 53,000 fm for the hydrogen atom (empirical data)¹⁹

^ 31,000 fm for the helium atom (calculated)^{xix}

^ 120,000 to 180,000 fm for Van der Waal forces²⁰

^ 30,000 to 200,000 fm for covalent and ionic forces²¹

^ 118,000 to 298,000 fm for atoms of metallic bonds^{xix}

^ 31,000 to 127,000 fm for atoms of non-metallic bonds^{xix}

A typical plate separation of 10 nm is 10,000,000 fm. Obviously, the nuclear forces are not involved since they act over a maximum of only 2.5 fm. And typically, electromagnetic forces as measured or calculated for atoms do not exceed about 300,000 fm. For electromagnetic forces within a molecular structure to extend across 10,000,000 fm is a bit of a stretch. This is where a very special explanation is required by physicists such as vacuum energy or relativistic molecular forces. Call it “hocus-pocus”. Be doubly sure that mathematicians will always jump at any opportunity to prove “hocus-pocus”.

Another possible source for this force attraction or repulsion is proposed by this journal: electron asymmetry. Each plate has additional unwanted electrons inside its molecular structure that creates a faint force which becomes exponentially stronger as the plates almost come into contact. This field must be capable of both attraction and repulsion. At these very close distances the steady continuum of the gravity field (long distance electromagnetic field) breaks down. According to the plate configuration such as the plate composition and/or the dielectric material within the gap these excess electrons may either reside close to the skin of the plate or reside deeper within the molecular structure. The Casimir effect applies to both conductive plates and plates with dielectric materials. No so-called flow of

electrons through a conductor is necessary. Only the surrounding electric field of individual electrons is available.

If the composition of the plates is such that the excess electrons reside on the skin then a repulsive force occurs. If the composition favors that the excess electrons reside deeper within the molecular structure of the plates, then their electrostatic field reaches outward across the 1×10^7 femtometer-gap to try to attract the potentially charged protons of the other plate. Van der Waal forces that are only known to act at distances less than about 3.0 to $6.0 \times 10^5 \text{ fm}^{22}$ need not be relativistic to explain the Casimir effect. The electron asymmetry hypothesis can explain both the necessary force-acting field distance range and the cause for either attractive or repulsive forces depending on plate configuration. This more easily understood perspective can certainly be as valid as any of the other previously presented perspectives.

What is needed are some experiments that will empirically determine the existence of excess, or gravity, electrons inside matter and whether these extraneous electrons trying to achieve parity inside a certain conglomeration of atoms create an attraction with neutral atoms (having virtual, positively charged protons) of another object of matter. Future chapters will outline these experiments.

Summary: The Ranges of Sub-Atomic Forces

(1 femtometer = 10^{-15} meter)

(1 nanometer = 10^{-9} meter)

Femtometers

1. Smallest length in physics is the Planck length _____ 1.6×10^{-20}
2. Weak nuclear forces _____ 0.01 to 0.03
3. Strong nuclear forces before becoming repulsive _____ 0.70
4. Radius of nucleon (proton or neutron) _____ 0.83
5. Coulomb force range for nucleons _____ 2.5
6. Radius of typical atom _____ 200,000

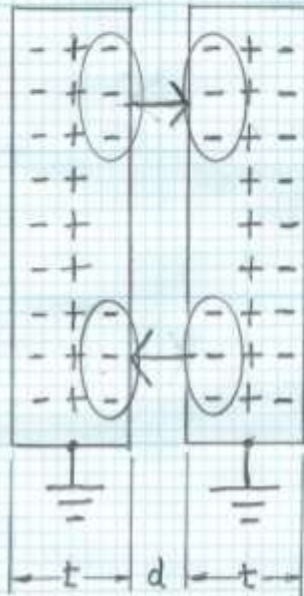
Electromagnetic Forces:

1. Maximum range of covalent forces _____ 200,000
2. Maximum range of metallic bonds _____ 298,000
3. Maximum range of Van der Waals forces _____ 350,000 – 600,000

Typical distance between two parallel plates exhibiting the Casimir effect _____ 10,000,000

Range for gravity for attraction, but no repulsion _____ $\gg 10,000,000$

CASIMIR EFFECT ON PARALLEL PLATES DUE TO 'GRAVITY' ELECTRONS

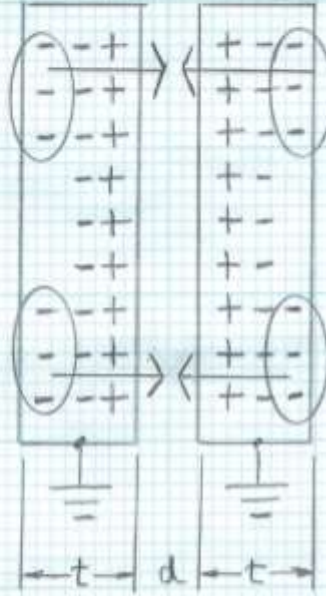


UNCHARGED CONDUCTORS
WITH REPULSION.

LIKE CHARGES OF 'GRAVITY' ELECTRONS GATHER NEAR SURFACE AND REPEL EACH OTHER.

NOTE:

THE CONFIGURATION OF THE PLATES INCLUDING VALUES FOR "d" AND "t" CAN ALSO EFFECT WHETHER REPULSION OR ATTRACTION OCCURS.



UNCHARGED NON-CONDUCTORS
WITH ATTRACTION.

'GRAVITY' ELECTRONS WELL DISTRIBUTED ACT JUST AS GRAVITY FORCE TO ATTRACT VIRTUAL POSITIVE CHARGES OF OTHER PLATE.

VII. Pointing the Way by Asimov on Physics

Many years ago, I read most of Isaac Asimov's books about science, everything from anatomy to particle physics. In particular, I remember chapter five, First and Rearmost, in his book *Asimov on Physics*.²³ This chapter led me to think about electron asymmetry and its manifestation. In this chapter, Asimov is explaining the difference of the strength of forces created by gravity and electromagnetism. The difference is an amazing 2.3×10^{39} times stronger for electromagnetism versus gravity between an electron and a proton one centimeter apart. Of course, this calculation is based on the proton being 1836 times as massive as the electron.

Asimov applied a very thought-provoking analogy by determining what number of electrons and what number of positrons being represented by the Sun and Earth respectively would produce the same force as the gravity force between these same bodies at their normal distance of one AU apart. In this case, the electrons and positrons have identical masses but opposite charges to produce an attractive force like gravity. His calculation, after being corrected in a second edition, came to one million tons of electrons, the mass of a very small asteroid, for the Sun and about 3 1/3 tons of positrons for the Earth.

This analogy gave me the seed for my own idea for electron asymmetry and a calculation follows using a different twist. Asimov is locked into the idea that the immense strength of electromagnetic forces never has a significant number of like-charged particles in one place. These particles would repel each other two strongly. But, what happens is these particles are trapped on a condensed conglomeration of matter and could not escape due to the dielectric of space or of some atmosphere? These objects might try to attract other objects with opposite charges, thereby manifesting the weaker gravity force. That is the basis for my idea.

Let's perform Asimov's calculation, but using a similar number of electrons on the Sun and a similar number of electrons, instead of positrons, on the Earth. The electron asymmetry hypothesis assumes that these electrons are almost evenly distributed inside these celestial bodies and an electromagnetic field is created far beyond the boundaries of these objects. Their fields are attracting any virtual opposite charge exterior to their boundary. Any proton has an opposite charge but is considered virtual because it is already joined to another electron and is already neutral. The object has small fields of repulsion for its excess electrons but only inside its own boundaries. This new concept is not too different from individual protons joining together despite electromagnetic repulsion of like-charges because of the much shorter range of nuclear attractive forces.

The gravity force in units of newtons between the Earth and Sun is:

$$F = G \times [(5.9737 \times 10^{24} \text{ kg}) \times (1.9891 \times 10^{30} \text{ kg})] / (149.6 \times 10^6 \text{ km}^2)$$

$$\text{where } G = 6.67384 \times 10^{-11} \text{ N(m/kg)}^2, \text{ and}$$

$$F = 6.67384 \times 10^{-11} \times 11.882 \times 10^{54} \text{ kg}^2 / 2.238 \times 10^{22} \text{ m}^2$$

$$F = 3.543 \times 10^{22} \text{ N}$$

The mass ratio of the Sun to the Earth is:

$$R_{\text{mass}} = q_{\text{sun}} / q_{\text{earth}} = 1.9891 \times 10^{30} \text{ kg} / 5.937 \times 10^{24} \text{ kg} = 3.350 \times 10^5$$

The mass ratio is used to determine the ratio of excess electrons inside each object since gravity is directly correlated to mass. The force attraction in dynes between two massive objects is determined by Coulomb's Law which includes the multiplication of two quantities of excess electrons as shown below.

$F = 1/K (q_1 \times q_2) / d^2$, the electromagnetic force equation for two objects with charges q_1 and q_2 and a distance of "d" between them.

In reality, this force equation reflects the attractive forces taken together of the Sun's excess electrons and the Earth's virtual positive protons; and the Earth's excess electrons and the Sun's virtual positive protons. The ratio of the protons of the Sun compared to the Earth's is essentially the ratio of their masses which is also the ratio of their excess electrons. This is the reason Newton's equation of universal gravitation works. But in this equation the mysterious "G" is no longer needed.

Continuing with the calculation –

One electron = -1.602×10^{-19} coulomb of charge = -1e, and also

One electron = 9.109×10^{-31} kg of mass ²⁴

One newton (N) = 100,000 dynes = the force between two coulombs of charge one meter apart.²⁵

One coulomb (C) = 3×10^9 esu (electrostatic unit charge) and one esu is the charge that repels 2 unit charges apart by 1 cm with a force of one dyne.²⁶

Hence, by applying Coulomb's Law for the Sun-Earth system, the force of attraction between them is:

$$F = 1/k (q_{\text{earth}})(q_{\text{sun}}) / d^2 \text{ dynes} \text{ }^{27}$$

$$F = 3.543 \times 10^{22} \text{ N} \times 1 \times 10^5 \text{ dynes/N} = 1/k \times q^2 / (2.238 \times 10^{22} \text{ m}^2)$$

where $1/k = \text{unity}$ for the vacuum in space between the Sun and Earth although it could be as high as a factor of ten times higher. However, k, the dielectric constant or relative permittivity, can vary as much as 1.0 to 15.0 for typical solids, is 1.0 for air and about 4.5 for quartz.^{28 29} Possibly, the mantle and crust of planets, the Earth's oceans and satellites can act as an additional strong dielectric, partially shielding its excess electrons. Assuming $1/k = 1$, the solution for q^2 is:

$$q^2 = 3.543 \times 10^{22} \text{ N} \times 10^5 \times 2.238 \times 10^{22} \text{ m}^2 \times 1.0$$

$$= 7.929 \times 10^{53} \text{ coulomb}^2, \text{ which is really}$$

$$= q_{\text{sun}} \times q_{\text{earth}}$$

Solving this equation, along with $q_{\text{sun}} / q_{\text{earth}} = 3.350 \times 10^5$ simultaneously, the values of q_{sun} and q_{earth} are obtained. They are:

$$q_{\text{sun}} = 4.94 \times 10^{29} \text{ coulombs for the Sun, and}$$

$$q_{\text{earth}} = 1.47 \times 10^{24} \text{ coulombs for the Earth.}$$

Then, the mass of the predicted excess electrons for planet Earth is:

$$\begin{aligned} m_{\text{earth}} &= 1.47 \times 10^{24} \text{ C} \times (3 \times 10^9 \text{ esu} / 1 \text{ C}) \times (9.109 \times 10^{-31} \text{ kg} / 1 \text{ esu}) \\ &= \text{about } 3600 \text{ kg or about } 4 \text{ tons.} \end{aligned}$$

$$\begin{aligned} E_{\text{earth}} &= \text{total mass of Earth electrons} = 5.97 \times 10^{24} \text{ kg} / 1.833 \times 10^3 \\ &= 3.26 \times 10^{21} \text{ kg} \end{aligned}$$

The percentage of excess electron mass to total mass of electrons on Earth = $3600 \text{ kg} / 3.26 \times 10^{21} = 1.10 \times 10^{-18}$ percent which is insignificant from a chemistry or mass viewpoint, but is influential from an electrostatic or true gravity-type viewpoint if all excess electrons are taken together for the entire planet Earth.

The mass of the predicted excess electrons for the Sun is:

$$\begin{aligned} M_{\text{sun}} &= 4.94 \times 10^{29} \text{ C} \times (3 \times 10^9 \text{ esu} / 1 \text{ C}) \times (9.109 \times 10^{-31} \text{ kg} / 1 \text{ esu}) \\ &= 1.37 \times 10^9 \text{ kg or about } 1.5 \times 10^6 \text{ tons, the size of a large asteroid.} \end{aligned}$$

$$\begin{aligned} E_{\text{sun}} &= \text{total mass of Sun's electrons} = 1.99 \times 10^{30} \text{ kg} / 1.833 \times 10^3 \\ &= 1.085 \times 10^{27} \text{ kg} \end{aligned}$$

Then, the percentage of excess electron mass to total mass of electrons for the Sun = $1.37 \times 10^9 \text{ kg} / 1.085 \times 10^{27} = 1.26 \times 10^{-18}$ percent which is also insignificant from a chemistry, plasma or mass viewpoint but remains significant electrostatically if all excess electrons are taken together for the entire Sun. And, these excess electrons of the Sun vary according to the incoming current density at the pole regions where a negatively charged solar wind is produced. The approximate electrostatic force computed from Coulomb's Law is actually the weak gravity force.

These values are in close agreement with Asimov's calculation for his electron-positron model, except this model assumes combining or multiplying the charges of two different sets of electrons of which their ratio is determined by the same ratio as their object's masses. In conclusion, Newton's equation of:

$$F = G (M \times m) / r^2 \text{ is really the electrostatic force equation or Coulomb's Law}$$

$$F = 1/k (q_1 \times q_2) / d^2 \text{ and the mystery of } G \text{ is resolved.}$$

The dielectric strength can be used to make minor adjustments on the order of one decimal point. In reality, G (a constant for converting units) is still needed because all current space travel is based on Newton's gravitational equation and is almost perfectly applicable. In actual space probe trips, small retro-rockets make the minor adjustments to achieve the expected location to account for "G" not being exactly constant or the excess electrons not being exactly proportional to a body's mass.

Using Asimov's modified idea to obtain the number of excess electrons inside the Sun and the Earth are only first guesstimates. The dielectric constant is only truly known for short distances. The value of unity is assumed for outer space between the Sun and the other planets just as it is determined for a relatively good vacuum produced in the laboratory only for short distances. However, this dielectric constant could be of a much higher unknown scale way beyond the known dielectric constants such as Steatite materials having $k = 6.1$. The excess electrons that are trapped inside the molecular structure of the Earth's mantle and the plasma of the Earth's core may need a much higher dielectric constant than unity. But, if "k" is many scales of ten larger for such celestial distances, then the excess electrons for electron asymmetry could be much larger than that previously computed. But, the amount of the ratio of excess electrons to the mass for different objects remains comparatively the same enabling the utilization of Newton's equation for universal gravitation.

VIII. The Relative Standard Uncertainty for "G"

There is no better way to measure the masses and densities of celestial bodies than by applying Newton's laws of motion and his law of gravitation. Directly measuring the individual electron asymmetries of celestial bodies is impossible. The relative standard uncertainty for measuring "G" not only represents the measurement capabilities and/or inaccuracies, but also the range of statistical averages of electron asymmetry variance in small objects used for this measurement. In larger bodies this uncertainty or variance of excess electrons increases. However, it is incorrectly assumed that G remains constant for all gravitational sources due to excess electrons being only closely proportional to the masses of the conglomeration of matter where they reside.

If astronomers know the orbital period of a satellite orbiting close to the surface, they can immediately determine the mass or average density of its parent planet. The equations of gravitational force = $(G M m) / r^2 = \text{centripetal force} = (m r 4 \pi^2) / P^2$ and the volume of a sphere = $V = 4 / (3 \pi r^3)$ produces the connection between orbital period, P, and the average density (Volume/mass) of the planet by knowing G. That equation is

$$P^2 = 3\pi / [G \times (V/M)]$$

But, of course, if the periods of the planets and the volumes of their planets are used to determine average planetoid densities, the constant G is indeed assumed constant. However, if G is not perfectly constant due to the variance of electron asymmetry, no one will know for the better. The internal structures of the planetoids are merely chosen or guessed to give the calculated average density.

The value for G in Wikipedia is listed as $G = 6.67384(80) \times 10^{-11} \text{ N (m/kg)}^2$ where the number in parenthesis represents the relative standard uncertainty of 1.2×10^{-4} .³⁰ As recently as January 5, 2007

issue of *Science*, the report of “Atom Interferometer Measurement of the Newtonian Constant of Gravity” by (J.B. Fixler, G.T. Foster, J.M. McGuirk, and M.A. Kasevich) describes a new measurement of this famous constant. The new value is reported to be $6.693 \times 10^{-11} \text{ N (m/kg)}^2$, with a standard error of the mean of $\pm 0.027 \times 10^{-11}$.³¹

These interferometer devices measure forces between and Earth and the smallest possible objects, atoms, in the hope of increasing accuracy. The atoms are ejected upwards and the interferometry takes place while the atoms are falling in free flight. Unlike true systems of masses like those used in the Cavendish experiment for determining the value of “G”, these atoms have no measurable excess electrons. The measurement is based only on the excess atoms of Earth and would be expected to have slightly higher values for their so-called new determination of “G”.

The amount of electron asymmetry may differ by large amounts, but G is still assumed to be constant. Scientists merely make all the equations about a celestial body agree by assuming or adjusting the density and/or moment of inertia of the body which cannot be proven by other ways. So, if these values are different by significant amounts, so what? Predicting space probe trajectories is still very possible and this is what matters. The prediction of the internal structures of celestial bodies may have some error due to unknown electron asymmetry variance, but not enough to make a difference.

IX. An Examination of Light Objects Falling to Earth

Why does a light object like a feather fall to the ground from the perspective of electron symmetry?

Let’s assume that the feather weighs 0.01 grams. Then the force attracting the feather to the ground is:

$$\begin{aligned} F &= (G \times Mm)/r^2 \\ &= 6.67384 \times 10^{-11} \text{ N(m/kg)}^2 \times (5.937 \times 10^{24} \text{ kg}) \times (1 \times 10^{-5} \text{ kg}) / (6367 \text{ km})^2 \\ &= 9.775 \times 10^{-5} \text{ N} \end{aligned}$$

Where M = mass of Earth (kg); r^2 = radius of Earth squared (km^2); G = universal gravitation constant. The force is extremely small but effective in having the feather fall to the ground despite air currents and air density.

Using Coulomb's Law this same force becomes:

$F(\text{dynes}) = [1/k \times (q_{\text{earth}}) (q_{\text{feather}})] / r^2$; For $q_{\text{earth}} = 1.47 \times 10^{24}$ Coulombs (C), and Earth's average radius = 6367 km and letting $k = 10$ for the dielectric strength of the Earth's mantle and crust, then:

$F = 0.1 \times 1.47 \times 10^{24} \text{ C} \times q_{\text{feather}} (\text{C}) / (6767 \text{ km})^2 = 9.775 \times 10^{-5} \text{ N}$; then solving for $q_{\text{feather}}(\text{C})$, the expected charge of excess electrons in the feather is:

$$q_{\text{feather}}(\text{C}) = 10 \times 9.775 \times 10^{-5} \text{ N} \times (10^5 \text{ dynes/N}) \times (6.767 \times 10^6 \text{ m})^2 / 1.47 \times 10^{24} (\text{C})$$

$$q_{\text{feather}}(\text{C}) = 3.04 \times 10^{-9} \text{ dynes or } (\text{C/m})^2 (\text{m}^2/\text{C})$$

$$q_{\text{feather}} = 3.04 \times 10^{-9} \text{ Coulomb}$$

$$= (\text{one electron} / 1.602 \times 10^{-19} \text{ C}) \times 3.04 \times 10^{-9} \text{ C}$$

$$= 1.9 \times 10^{10} \text{ electrons or esu's, and the mass of these electrons is:}$$

$$m_{\text{feather}} = (9.109 \times 10^{-31} \text{ kg} / 1 \text{ esu}) \times 1.9 \times 10^{10} \text{ esu}$$

$$= 1.73 \times 10^{-20} \text{ kg which is impossible to measure}$$

But the feather still falls to Earth in the weak radiation field surrounding Earth with its excess of 1.9×10^{10} electrons. The Earth's possible net excess of electrons is taken from its previously computed total charge in Coulombs.

Earth's excess electrons (-esu) = -9.176×10^{42} esu, which is incredibly large compared to the feather's electrons. One is reminded that the excess electrons in each object are attracted to the potentially positive charge of protons in the adjacent object.

The following comparison of units is useful for understanding Coulomb's Law verses the Universal Law of Gravitation:

$$\text{Force (dynes)} = 1 / k (\text{a non-dimensional factor}) \times (\text{Coulombs})_a \times (\text{Coulombs})_b / (\text{meter})^2$$

$\text{Force (Newtons)} = G [\text{Newtons} \times (\text{m/kg})^2] \times (\text{kg})_a \times (\text{kg})_b / (\text{meter})^2$, and the conversion from Newtons to dynes is:

$$\text{one Newton} = 1 \times 10^5 \text{ dynes}$$

Since excess electrons cannot be quantitatively measured, Newton's Universal Law of Gravitation will always remain the more practical equation for determining gravity forces. The masses can be easily determined by applying Newton's laws of motion which then can be inserted into the gravitational law to surrender a value for this strange force called gravity, which is indeed just another version of an electromagnetic force.

X. Relative Shorter Distance Electromagnetic (EM) Effects Within and Closely Surrounding Regions of Celestial Bodies

The discussion thus far is about how gravity electrons affect things at atomic and molecular distances and how electron asymmetry affects a much larger range of distances between celestial bodies. Now it is time to consider the effect of electron asymmetry at a shorter range of distances, primarily within and around the boundaries of celestial bodies. These effects are the solar wind or any main sequence star's expulsion of materials; the expulsion of materials of proto-stars such as those found in Herbig-Haro objects and in T-Tauri stars; the heliopause or magnetic field boundary of the solar system, planetary magnetospheres, Langmuir sheaths, magnetic reversals of the Sun and Earth; and planetary lightning. All these effects are due to large electric currents and magnetic circuits of celestial bodies of which electron asymmetry is a basic part. This is why the unbelievable Birkeland currents in interplanetary and interstellar space can exist. These currents are driven by the gravity or excess electrons of this universe trying to find a home or their ground state to achieve impossible parity of charge.

A. Solar Winds and a Star's Fusion Process

Try to visualize a maddening frenzy of unwanted electrons inside the Sun. These trapped refugees want to find a home by joining other protons having no electron partner. The electrons fiercely repel each other while jostling and searching for an unwed proton. The majority of proton-electron pairs are lightly paired because they are in the plasma state where thermal energy overcomes the energy of the bound state of the various electron shells. So, there is constant activity of electrons exchanging different energy levels around protons until separate currents of electrons and ions form. These combined currents called Birkeland currents eventually create circuits within stars, between stars and their planets, between stars and their magnetosphere double-layer sheaths and very possibly between stars and the cores of their galaxies.

Firstly, these excess electrons send out their messengers, the force carriers of photons, to find and attract other bodies with protons. This manifestation is what we speak of as gravity. This is a hopeless process for these electrons, but this virtual hope does give creation the very important means for organizing and conglomerating matter which man calls gravity. The process also helps to create the best parity possible by evenly distributing the excess of electrons amongst all the conglomerations of matter.

Secondly, these electrons scurry all around inside the Sun or any star looking for more free protons. Obeying Maxwellian laws of electromagnetism these electrons travel magnetic field direction from one polar region across the equator to the other polar region and return on a regular basis which results in the recurring solar maxima and minima and sunspot cycles. But, the environment is very chaotic with roiling convection currents and twisted magnetic fields near the surface.

These electrons also travel to the outside surfaces of the Sun, especially in the belt of 30° north and south of the equator, and cause havoc with the existing proton-electron pairs frothing on the surface. They push normal proton-electron pairs to higher elevations above the surface, enabling them to enter the corona, an extended outer layer of plasma, which is heated to over a million degrees Celsius. The thermal energies, along with electrostatic repulsion energy of the excess electrons on the surface,

accelerate the corona material of electrons and ions into a stream of charged particles that creates the solar wind. High voltages across this corona region cause the currents exiting the corona to create high energy plasma arcing. Much higher temperatures than what exist in the photosphere are generated.³² Electrically speaking, the high temperature corona is no mystery.

The Sun's gravity strongly attracts the corona but weakens at the outer levels. The outer coronal atmosphere is highly conductive, creating the very hot temperatures that cause materials to escape supersonically into interstellar space. "While early models of the solar wind used primarily thermal energy to accelerate the material, by the 1960s it was clear that thermal acceleration alone cannot account for the high speed of solar wind. An additional unknown acceleration mechanism is required, and likely relates to magnetic fields in the solar atmosphere." (Wikipedia, Solar Wind, Emission 3/24/2013)³³ Magnetic energy stored in the corona certainly powers sudden flare activity around sunspots that releases large amounts of electrons, ions and atoms over minutes to tens of minutes, but it is questionable that it is responsible for a steady release of electrons and ions above most of its surface.

The solar wind needs a mechanism that can power a constant stream of 1.3×10^{36} particles per second. This correlates to a total mass loss each year of about $(2-3) \times 10^{-14}$ solar masses. (from Wikipedia, Solar Wind, Emission 3/24/2013). This journal is suggesting that the Sun's electron asymmetry concentrates a more steady pattern of negative charge at the surface especially in the equatorial belt to produce the slow solar wind composed of corona materials having a velocity of about 400 km/s and a temperature of about 1.5×10^5 K.³⁴ The additional unknown acceleration mechanism is the repulsive forces of the excess electrons that moved to the surface in the equatorial belt region of the Sun looking for the best chances of achieving parity.

The other solar wind component, the fast-solar wind, is composed of material mostly found deeper in the Sun's photosphere and has a typical velocity of 750 km/s and a temperature 8×10^5 K. "The fast-solar wind is thought to originate from coronal holes, which are funnel-like regions of open field lines in the Sun's magnetic field." These magnetic fields confine the plasma and transport it into narrow necks of the coronal funnel. The plasma is released into the funnel when these magnetic field lines reconnect." (from Wikipedia, Solar Wind, Components).³⁵ Actually, magnetic field lines that envelop electric currents leaving the Sun do not reconnect. This journal is suggesting that the Sun's asymmetry of electrons traveling between the poles well under the surface of the photosphere is producing irregular twisted magnetic field lines that break through the photosphere causing coronal holes and these faster solar winds.

Without electron asymmetry, the Sun and other main sequence stars would lead a quieter, more stable existence. However, it is only a guesstimate that the scurrying excess electrons inside either a proto-star's or a mature main sequence star's boundary cause a much-needed mixing of a star's layers of basic materials when the fusion process begins inside the corona of the star. This paper utilizes the fusion process predicted by the Electric Universe group and not the standard model that predicts fusion of hydrogen and helium on the Sun's internal core. Regardless, of which fusion model you choose, the fusion process would be thwarted if the layer of fused helium and other fusion products was not

continually mixed with the thermally excited surrounding hydrogen by the scurrying excess of electrons. One's intuition can apply inductive reasoning to see the many interconnections inside a star for applying electron asymmetry.

B. Herbig-Haro Objects and T-Tauri Stars

For astronomers studying proto-stars and proto-disks, the beginnings of star systems, Herbig-Haro (HH) objects and T-Tauri stars are very familiar. Herbig-Haro objects that mark very young proto-stars are polar jets released from both the star's poles at high velocities and at great distances, as long as a light-year or longer. T-Tauri stars are proto-stars in their last stages of development before joining the main sequence of stable stars. The young star is achieving equilibrium by violently expelling excess electrons from primarily its equatorial regions into an expulsion ecliptic disk. Because the proto-star is completely plasma and has recently acquired matter, a sorting-out process takes place to achieve the parity of electrical charges. Initially, this recently-birthing, rotating, unstable star expels excess electrons from its polar regions creating HH objects or huge focused Birkeland currents driven by magnetic circuits. These HH objects sometimes being more than several light-years long are proof that they join with other interstellar Birkeland currents. As the proto-star becomes more settled, the excess electrons are expelled from the equatorial regions creating fierce solar winds. Of course, these expelled electrons carry positive ions with them but never enough of each type of charge to achieve parity. As the departed plasma becomes less energetic, the separated electrons and protons become more matched. The expulsion of excess, or gravity, electrons, realizing their dilemma, seek planets within the system or create a magnetosphere with a double-layer sheath, which is a bubble-like structure surrounding the star that interfaces with interstellar space.

C. Magnetospheres and the Heliosphere

Space probes within the past 50 years have proven the existence of magnetospheres surrounding most of the planets and the heliosphere surrounding the Sun, which is a bubble or boundary for the solar wind emitted from the Sun which impinges on interstellar particles well beyond the outer planets. These boundaries also have outer termination shock edges called the magnetopause and heliopause, respectively. Within these areas, the pressure from either the planetary magnetic field or the Sun's magnetic field is balanced with the pressure from the solar wind or the incoming interstellar particles, respectively. The magnetosheath and heliosheath regions between the shock terminations and the magnetospheres contain low energy plasma with high particle energy flux. These sheaths act as cushions to transmit the pressure from the flows of the oncoming particles onto the barrier of the magnetic field of the planet's or the Sun's high-current, double-sheath magnetosphere or heliosphere boundary.^{36 37}

The dipole magnetic effect of most of the planets and the Sun create large lobes of magnetized matter that draw charged plasma toward each of their poles, creating magnetic field vectors similar to what is seen with iron filings surrounding a dipole bar magnet in a simple physics experiment. Hence, the dark glow mode of plasma in the solar wind is converted to a glow mode of polar auroras as both charged electrons and ions are attracted toward any magnetic planet. Of course, the captured electrons and ions entering the Sun's pole regions are coming from intergalactic space. These sparsely dense intergalactic electrons and ions are funneled toward the Sun's poles in large quantities by the large magnetic field

lobes that reach outward twice as far as the planets. These intergalactic particles are gathered and driven by Birkeland currents along the outside edges of the magnetic lobes toward the Sun.

Magneto- and helio- spheres are evidence of gigantic electromagnetic circuitry between the Sun and planets and between the Sun and intergalactic space that produces necessary feedback to maintain charge equilibrium and orbital stability amongst the planets. Orbital stability of the planets can never be maintained by gravity forces alone as continuing perturbations and resonances will prevent stability over even short periods of cosmic time. Strong electrical currents are driven by excess, or gravity, electrons that run along the boundaries of these magneto- and helio- spheres. These formations are called “Langmuir sheaths”, which are double layers of opposite charge.³⁸ Current modeling by the Electric Universe group does not rely on the idea that there exists an excess of electrons that can separate itself from normal plasma having mostly assumed equal charge. One of the basic assumptions of astrophysics today is that electrical forces play no part in cosmology because charge separation in space is impossible. No electron will ever be very far from its proton brother even within an excited plasma. Hence, the Electric Universe scientists³⁹ have great difficulty convincing the establishment that moving plasma can produce charge separation and therefore electric currents. And, how do these electric currents within the plasma form the unexplained filaments seen in interstellar space? Astrophysicists have no conventional explanation, such as mechanical and flow concepts, for these observed filaments, but insist an answer is just around the corner. The introduction of electron asymmetry can certainly come to the aid of the “charge separation in space” enigma. As new plasma is created in Z-pinches of Birkeland currents and in the corona of stars and emitted into interstellar space, the excess, or gravity, electrons hitch a ride hoping to find another conglomeration of matter with some free protons.

D. Using Gravity Electrons to Explain Langmuir Sheaths in the Solar System

In 1923, Irving Langmuir discovered the “Langmuir sheath”, which in the presence of double layers of plasma will tend to insulate a charged object from the surrounding plasma. He also started the nomenclature of “plasma”, the fourth state of matter. This sheath is also called the “double layer (DL) sheath”, possessing opposite charges across two separate layers. The sheath has a strong electric field, while on both sides of the double layer the electric field is much weaker.^{40 41} This phenomenon, discovered in the laboratory, is what creates the magnetosheaths of the planets and the heliosheath of the Sun on a much larger scale.

A true understanding of this insulating sheath idea leads to a completely new cosmology. The insulating Langmuir sheath allows for the proximity of highly charged celestial bodies and helical Birkeland current filament pairs without the expected electrical exchange. “Double layers can accelerate particles to cosmic-ray energies that can also account for rapid pulsing phenomena.” This quote by Anthony Peratt is made in his *Physics of the Plasma Universe* on p.194.⁴² Pulsars and quasars can be explained without the need for neutron stars and black holes. These counter-arguments by Peratt definitely need to be better addressed by the scientific community.

But, let's return to our solar system and analyze the different sheath features that result from:

1. an anodic type Sun, surrounded by a magnetic field
2. a cathodic type Earth, surrounded by a magnetic field
3. a neutral small space probe in space
4. the Moon
5. a typical comet
6. Jupiter's Io.

Langmuir discovered that an isolated probe immersed in plasma will charge up negatively relative to its plasma surroundings. If the probe is given a certain current that produces an equal charge as the surrounding plasma, then no sheath is created. If the current is further increased, a positive sheath will expand around the probe by attracting ions and insulating against electrons. If the probe or wire is insulated, a negative sheath will result because the incoming electrons from the plasma are much faster and must be ejected to preserve parity on the insulated surface. This fast ejection creates a negative sheath of electrons.¹¹ All these different sheath conditions have their counterparts with the different celestial bodies in our solar system.⁴³ The following diagrams show the interplay of the gravity electrons in each case.

1. **The Sun** has a very strong and large magnetic field that projects outward along the lobes of its heliosphere. This field directs inwardly toward the poles with the plasma particles from interstellar space. The Sun's closer, much stronger magnetic field developed by its massive spinning plasma body, funnels interstellar and intergalactic plasma composed of both matched ions and electrons and the hypothesized gravity electrons into its polar regions. The gravity electrons are pulled along by the neutral plasma to augment the electrical current and field known as Birkeland currents. To maintain charge equilibrium, the Sun's body continually releases plasma from the equatorial regions above its photosphere within the highly energetic corona. Of course, the gravity electrons searching in vain for free protons pile themselves on the Sun's surface looking for another ride with more ionized plasma into space again. The piling of these electrons creates the Langmuir negative sheath bequeathing the necessary energy to power the Sun's high temperature corona. As the voltage drop across the corona reaches a certain threshold, the gravity electrons are discharged in the arc mode along with normal plasma which is called the solar wind. The Sun's surface is the example of a Langmuir negative sheath that creates an anodic celestial body.
2. **The Earth and most other planets** are an example of cathode-type celestial bodies with positive Langmuir sheaths. These planets require a magnetic field that is generated by a spinning inner core of plasma that creates a dipole magnet. This dipole-magnetic affect channels the solar wind toward the planet's poles. The normal plasma drags along some the gravity electrons, but probably a large portion these electrons follow the Earth's magnetosheath and continue into interplanetary space along the tail of this sheath. The continued maintenance of the imbalance of electrons on Earth, as on other planets, is enough to push ions from both the Earth's existing upper atmosphere into the Van Allen radiation belts or plasmaspheres that mostly have positive charge. These belts, or toroids, create the positive Langmuir sheaths that repel further electrons. Equilibrium of these belts is maintained by the bleeding-off of ions in the plasmasphere tail. Of course, the trapped gravity electrons on Earth are constantly trying to escape and create the ionization of the upper atmosphere. Weather conditions inside the atmosphere cause both the mixing and segregation of

charged particles via lightning. This lightning really requires more current than can be supplied by static electricity caused by the wind rubbing against dust and water vapor particles. The process of lightning also requires excess electrons. The topic of lightning is discussed later.

3. **Mankind's space probes** are examples of bodies with very little mass. They are known to create a small negatively charge build-up relative to its surroundings. This thin sheath repels further electrons. Luckily, this small build-up does not affect the space probe's operation unless it crosses the path of a cloud of very high density plasma released from a corona mass ejection (CME). Then the faster gravity electrons reach the probe's surface first and are released by high-temperature arcing back toward the incoming plasma, thus destroying the probe. This typically thin build-up of electrons is an example of another type of Langmuir sheath.
4. **The Moon** is a good example of a celestial body with no significant Langmuir sheath, primarily due to its lack of a magnetic field. The plasma and gravity electrons directly impinge and build-up on the Moon's surface. The interesting result is that the build-up of gravity electrons eventually creates significant voltage drops that occur randomly on the surface. A threshold is finally reached where these excess electrons are electrically discharged in the glow mode, creating moving lights on the Moon's surface. These strange lights were observed by the Apollo mission astronauts and at first were not explained to the public; the initial thought was that they were UFOs. After further review, NASA realized that this phenomenon was electrical and similar to lightening that occurs on Earth but in a more subdued manner. Over millions of years, these small discharges collectively create dust from sputtering the surface materials. These materials then return to the surface to build-up an unusual amount of dusty, powdery regolith over great portions of the Moon's area. The details of this regolith are quoted in Wikipedia's Moon under the topic of "Impact Craters".⁴⁴ "Blanketed on top of the Moon's crust is a highly comminuted (broken into ever smaller particles) and impact-gardened surface layer called regolith, formed by impact processes. The finer regolith, the lunar soil of silicon dioxide glass, has a texture resembling snow and a scent resembling spent gunpowder."⁴⁵ The regolith of older surfaces is generally thicker than for younger surfaces; it varies in thickness from 10–20 km (6.2–12.4 mi) in the highlands and 3–5 km (1.9–3.1 mi) in the maria.⁴⁶ Beneath the finely comminuted regolith layer is the *megaregolith*, a layer of highly fractured bedrock many kilometers thick." Of course, NASA's first gut reaction is to assume these materials are due to thousands of impacts over millions of years. Impacts, no matter how many, cannot produce silicon dioxide with the texture of snow over a gardened surface. Production of silicon dioxide or silica dust from silicates and quartz found in rocks requires temperatures from above 879 K and the Moon's maximum surface temperatures only reach about 390 K. Only millions of small high energy electrical discharges with sputtering over millions of years can produce this affect. More discharges and sputtering in the higher altitudes leads to thicker regolith on average 7 to 15 km more than in the lower mare regions. Common sense would lead one to expect a thicker regolith in the highlands since they act like probes sticking above the average surface height.
5. **Comets** are a very special variety of celestial body. It is mostly accepted, using the recent probe findings, that these smaller mass bodies, varying from one to several kilometers in size, are essentially rocky materials similar to the make-up of asteroids and materials found in the Earth's crust and mantle. Without any magnetic field, these bodies should react similarly as the Moon. But the difference between these satellites and asteroids is their orbits. Comets have highly eccentric, elliptical orbits and approach close to Sun every period. The comet travels from a very sparse plasma in the outer reaches of the solar system sometimes way beyond Neptune. A much denser solar wind or plasma of both ions and electrons is encountered as the comet comes closer to the Sun on its

perihelion. A huge voltage differential or solar wind density-differential between its aphelion and perihelion is traversed. The gravity electrons that begin to build-up quickly on its surface fiercely discharge their potential in jets from the surface, seeking the incoming positive ions of the higher density solar wind. These plasma discharges in the arcing mode create extreme sputtering of the surface materials. The heavier sputtered materials with lower kinetic energy create a large coma surrounding the comet body. The coma becomes plasma in the glow mode and provides even more cause for excess electrons to be ejected in larger jets, seeking the atoms and ions of the ever-increasing coma materials. The jets finally become energetic enough to expel ions, matching electrons and gravity electrons into the direction of the solar wind's electrical field which is always radially away from the Sun. This ejected plasma, also in the glow mode, establishes the legendary comet's tail. Less known is the secondary tail that is oriented very closely backward along the comet's trajectory. This tail is mostly composed of the heavier dust particles created by the same sputtering on the comet's surface. There is enough plasma in the glow mode to generally make this tail seen by telescopes and sometimes the naked eye. These tails have been analyzed to possess hydroxyl ions, OH , which are the combination of single proton ions from the solar wind and oxygen atoms stripped from the comet's oxide-containing surface. NASA probably still believes or hopes these hydroxyl ions are evidence of water that supports the questionable rocky snowball hypothesis. The conclusions of all the space probes traveling to the comets to date are that comets are composed of dry, rocky materials with very little evidence of water.

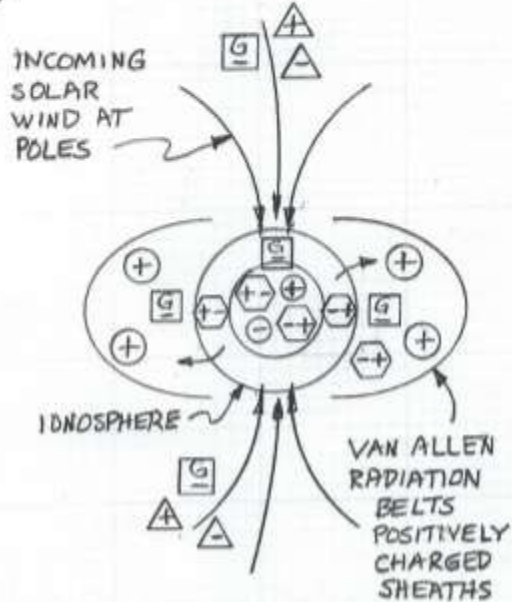
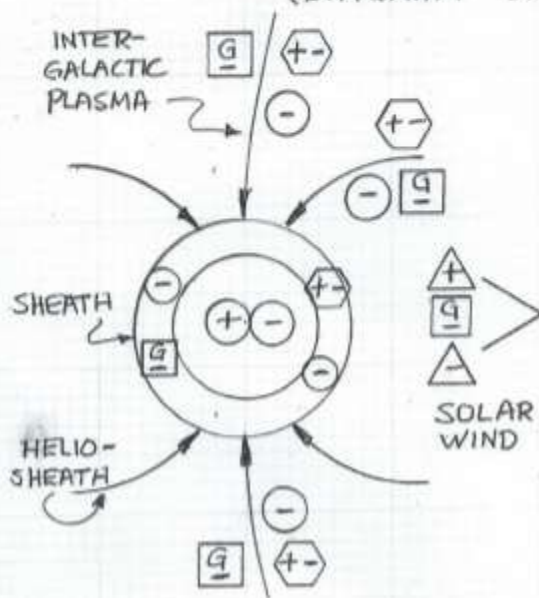
6. **Jupiter's moon, Io**, is another very special celestial body that is creating much confusion among planetary scientists. Is the observed ejecta from Io's surface actually caused by volcanoes or large plasma arc discharges, appearing to be like volcanoes? The most recent observations have revealed a very exciting anomaly; the volcanoes are moving with respect to their past charted locations. This careful surveillance of the volcanoes leads one's thinking immediately toward electrical arcing discharges, ruling out any possibility of volcanoes. The glow is from electrical arcing and not the molten material being emitted from a volcano's caldera. So why are Io's ejections or jets so much more energetic than those on Earth's Moon? The partial Langmuir negative sheath on Io's surface is complicated due to the closeness of a highly magnetic parent planet, Jupiter. The expulsion of materials from Io's surface over thousands or millions of years has created Io's plasma torus, a donut of plasma trapped inside Jupiter's magnetic field and centered approximately about Io's orbit.⁴⁷ This torus acts similarly to the coma surrounding a comet; the positive ions in this torus create a larger voltage potential between Io's surface and its plasma atmosphere that in turn creates more energetic random arcing. Io's topography probably favors certain regions for repeated arcing that then appear as volcanic calderas and cones over short periods of time. Jupiter, due to its incredible mass, gathers very efficiently the sparse solar wind plasma at its poles. Jupiter then builds-up a large amount of gravity electrons that are creating similar Earth-like Van Allen radiation belts. These belts and the magnetic field hold the various plasma torii of its Galilean moons, especially Io's. As seen by frequent lightening in Jupiter's upper atmosphere, the gravity electrons are desperately trying to seek free protons in these torii including Jupiter's magnetosheath. However, an easier escape route is provided by a NASA-discovered flux tube that follows Jupiter's magnetic field lines between its two polar regions exterior to its surface and passing directly through Io.⁴⁸ This flux tube is the electrical current of escaping gravity and other electrons directly impinging on Io, building-up a negatively charged layer, or Langmuir sheath, at random locations on Io's surface. This sheath is shorted by discharges of gravity electrons trying to seek once again free protons in Io's positively charged plasma torus. One can only imagine that equilibrium of Io's plasma

torus occurs periodically by creating a temporary flux tube equatorially toward the next outer moon or its own positively charged torus.

LANGMUIR SHEATHS SURROUNDING

CELESTIAL BODIES

(DIAGRAM 1A)



SUN (OR ANY STAR)

WITH MAGNETIC FIELD
EXTERNALLY RECEIVING PLASMA
FROM BIRKELAND CURRENTS
AND SUSTAINING NEGATIVE
SHEATH AROUND STAR.

MOST PLANETS

(THAT HAVE MAGNETIC FIELDS)
RECEIVE DARK GLOW PLASMA
(SOLAR WIND) FROM SUN.
GRAVITY ELECTRONS ARE CAPTURED
WITH SOLAR WIND AND ARE
DISCHARGED VIA LIGHTENING
AND SPRITES TOWARD MAGNETO-
SHEATH TAIL OF EARTH.

SYMBOL REPRESENTATION :

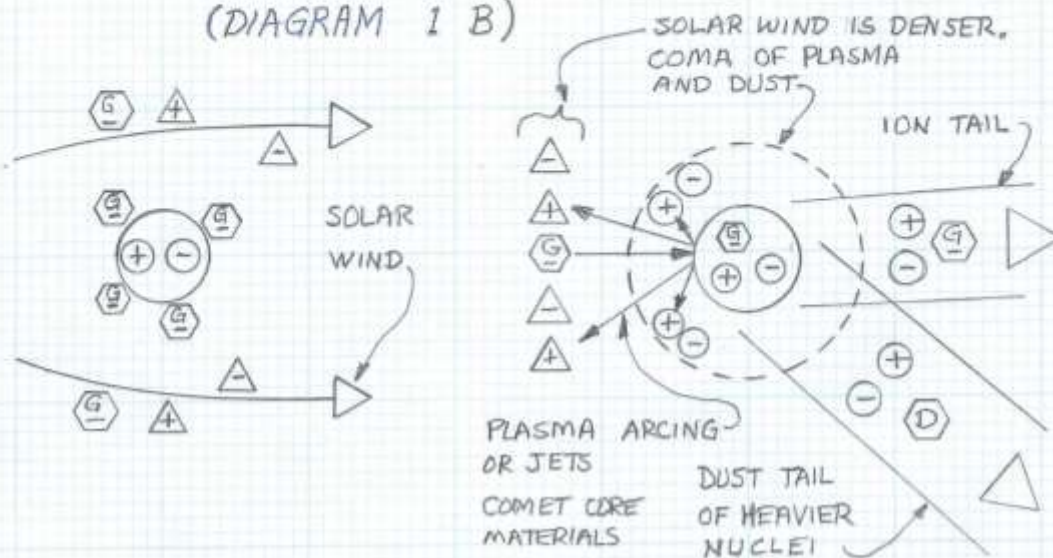
- ⊕ NORMAL ATOM NUCLEI
- ⊖ NORMAL VALENCE ELECTRONS
- Ⓜ GRAVITY ELECTRONS
- ⊕⊖ POLARIZED OR IONIZED ATOMS

- ⊕ SOLAR WIND IONS
- ⊖ SOLAR WIND ELECTRONS
- Ⓜ ATOMS OF DUST

LANGMUIR SHEATHS SURROUNDING

CELESTIAL BODIES

(DIAGRAM 1 B)



SPACE PROBE

THIN SHEATH IS DEVELOPED.

CHARGES BUILD-UP NEGATIVELY
RELATIVE TO ITS SURROUNDINGS.
THEN FURTHER ELECTRONS ARE
REPELLED.

COMET CLOSE TO PERIHELION

SHEATH DISAPPEARS AS PLASMA
POTENTIAL IS ZERO.

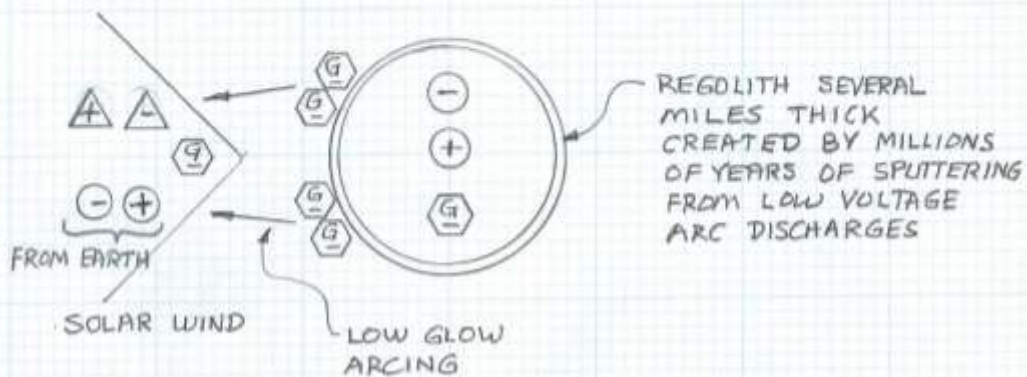
GRAVITY ELECTRONS ARE FASTER
AND BUILD-UP CAUSING HIGH
ENERGY ARCING THAT CREATES
INCREASING COMA AND EVER
MORE VOLTAGE POTENTIAL.

SYMBOL REPRESENTATION :

- (+) NORMAL ATOM NUCLEI
- (-) NORMAL VALENCE ELECTRONS
- (G) GRAVITY ELECTRONS
- (A+) POLARIZED OR IONIZED ATOMS

- (A+) SOLAR WIND IONS
- (A-) SOLAR WIND ELECTRONS
- (D) ATOMS OF DUST

LANGMUIR SHEATHS SURROUNDING CELESTIAL BODIES (DIAGRAM 1 C)



THE MOON: HAS NO MAGNETIC FIELD AND NO SHEATH

THE LANGMUIR SHEATH DISAPPEARS SINCE THE MOON IS NORMALLY AT ZERO POTENTIAL; I.E., THE PLASMA POTENTIAL AND CURRENTS DUE TO RANDOM MOTIONS OF IONS AND ELECTRONS IN THE PLASMA ARE EQUAL.

HOWEVER, ELECTRONS TRAVEL FASTER THAN IONS AND ARE ABLE TO BUILD-UP IN RANDOM POCKETS OF EXCESS NEGATIVE CHARGE THAT PERIODICALLY DISCHARGES IN EITHER THE GLOW OR ARC MODE. THE ARC MODE SPUTTERS SURFACE

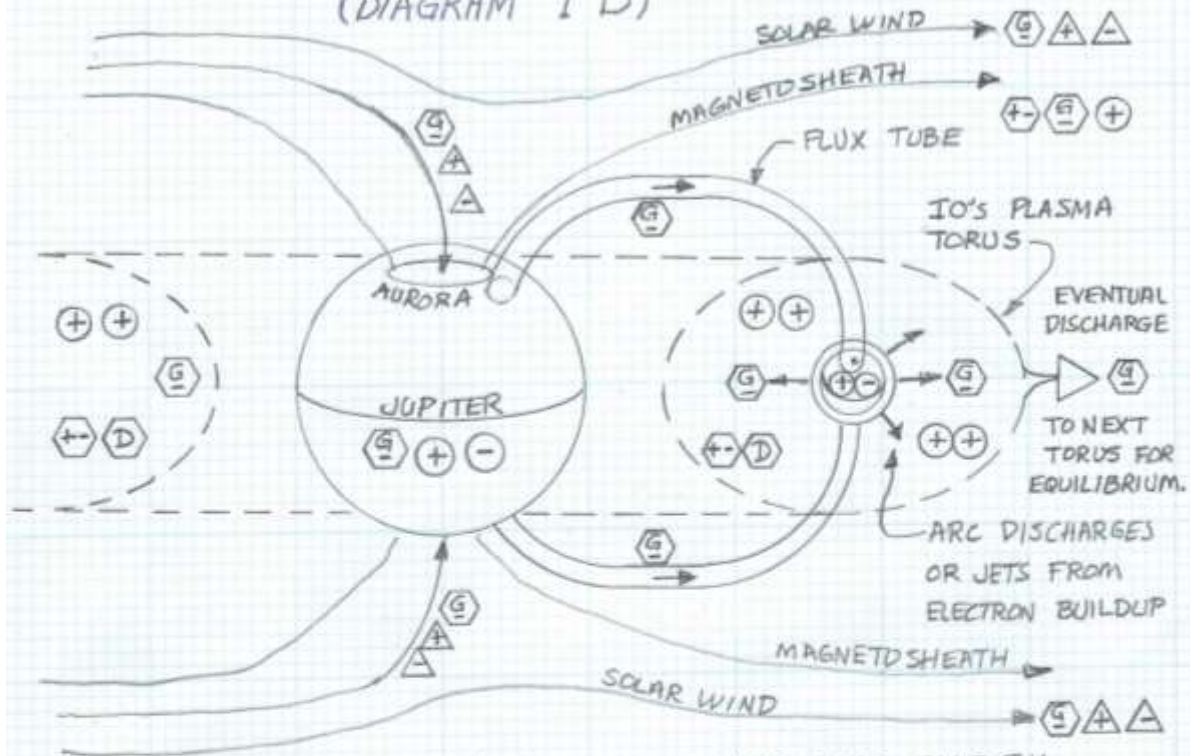
MATERIALS BECOMING REGOLITH.

SYMBOL REPRESENTATION :

⊕	NORMAL ATOM NUCLEI	⊕	SOLAR WIND IONS
⊖	NORMAL VALENCE ELECTRONS	⊖	SOLAR WIND ELECTRONS
ⓐ	GRAVITY ELECTRONS	ⓐ	ATOMS OF DUST
⊕→	POLARIZED OR IONIZED ATOMS		

LANGMUIR SHEATHS SURROUNDING CELESTIAL BODIES

(DIAGRAM 1 D)



JUPITER'S MOON IO WITH NEGATIVE SHEATH

IO'S OBSERVED ARC DISCHARGES CONFUSED WITH VOLCANOES ARE DUE TO LARGE BUILD-UP OF 'GRAVITY' ELECTRONS COMING FROM JUPITER'S FLUX TUBE OF CURRENT.

SYMBOL REPRESENTATION :

- | | | | |
|------|----------------------------|-----|----------------------|
| (+) | NORMAL ATOM NUCLEI | (A) | SOLAR WIND IONS |
| (-) | NORMAL VALENCE ELECTRONS | (A) | SOLAR WIND ELECTRONS |
| (G) | GRAVITY ELECTRONS | (D) | ATOMS OF DUST |
| (+-) | POLARIZED OR IONIZED ATOMS | | |

E. Planetary Auroras

Planetary auroras provide excellent evidence of the electrical and magnetic nature of our solar system. These polar displays prove the existence of the magnetic fields of the various planets and how these fields capture the plasma, both ions and electrons, from the solar wind. The activity of these auroras provides a direct correlation with the activity on the Sun such as prominences, sunspots and corona mass ejections (CMEs). Aurora activity can be seen on the outer planets as far away as Neptune, indicating the full extent of the Sun's emissions of plasma.

Heinrich Geissler in 1857 demonstrated an electrical glow discharge inside a partially evacuated glass cylinder container filled with rarified gases. A high voltage was applied across electrodes mounted at each end. The electric current flows through the tube and dissociates electrons from the gas molecules creating ions that, when the electrons recombine, emit light by fluorescence. This was the first laboratory illustration of the process for auroras.⁴⁹ Kristian Birkeland, in 1908, experimented with a terrella, or magnetized anode, inside an evacuated chamber to show electrically a typical aurora arc about the poles of a magnetic field of a magnetized sphere such as Earth.^{50 51}

The Earth is constantly immersed in the solar wind that typically is travelling at 400 km/s, at a density of 5 ions/cm³ and a magnetic field intensity of around 2 to 5 nT (nanoteslas). By comparison, the Earth's surface field is 30,000 to 50,000 nT.^{52 53} Auroras and their colors result from the emission of photons in the Earth's atmosphere above 80 km from ionized nitrogen atoms regaining an electron, and oxygen and nitrogen molecules returning from an excited state to ground state.⁵⁴ These atmospheric particles are ionized by the collision of particles by incoming very fast electrons and protons coming from the solar wind and conducting along the magnetic field lines of the Earth's magnetosphere into a cone-like shape over each pole.⁵⁵

The auroras are associated with Birkeland currents which flow down into the ionosphere on one side of the pole and outward on the other side. See the following diagram. Some of the current leaves directly through the ionospheric "E" layer, the upper atmosphere, and even through the conductive oceans along field lines going toward the equator and closing into a theoretical "partial ring current" that traps the plasma magnetically. The ionospheric plasma is considered as an ohmic conductor that has a driving voltage.^{56 57} Electric field experiments, with probes in orbit above the north pole, measured 40,000 volts and rose to 200,000 volts during intense magnetic storms.^{58 59} Planetary scientists still seriously question how these currents can be isolated and travel through space as if they were transmission lines. Hans Alfvén devised the double layer (DL) which was then later proven by space probes travelling through the Earth's magnetosheath boundary.⁶⁰

Alfvén developed these field-aligned electric currents in the aurora because of his double-layer structure in plasma that consists of two parallel layers with opposite electrical charge. The sheets or filaments of charge cause a strong electric field and corresponding sharp change in voltage across the DL. Ions and electrons are accelerated, decelerated or reflected by the electric field, causing the Sun's heliopause and planetary magnetopauses.^{61 62 63} The Earth's magnetic field traps ions within the Van Allen radiation belts that are then struck by the solar wind's ions and electrons. These solar wind particles then separate into two separate layers that create a boundary around the Van Allen belts. The concept can

be understood by imagining a fast race car coming upon a crowd of loosely packed people on a highway. To avoid navigating by weaving through the crowd, the race car driver goes completely around the outside of the crowd. The solar wind particles do the same thing to avoid collisions or EM forces with the Van Allen ionized heavier atoms by creating their own highway of double layers around the much slower cloud of particles. The Van Allen belt particles, besides being heavier and denser, may also have a different thermal energy, which identifies the belt as a plasma with different characteristics from the solar wind.^{64 65} The double layer is created since the slower moving ions need one lane and the much faster lighter electrons use another lane, just like buses and trucks using one lane and the faster moving vehicles using the passing lane. The double layer, DL, intuitively makes sense.

The double layer concept is enhanced by adding the hypothesized gravity, or excess electrons, that escape the Sun and are accompanying the solar wind stream. These excess electrons can be responsible for creating the very thin membranes (typically 10-Debye lengths) compared to the size of the overall plasma stream or filament, since neutrality of charge cannot be met. The widths of these thin membranes vary from a few millimeters for laboratory plasmas to thousands of kilometers for astrophysical plasmas.^{66 67}

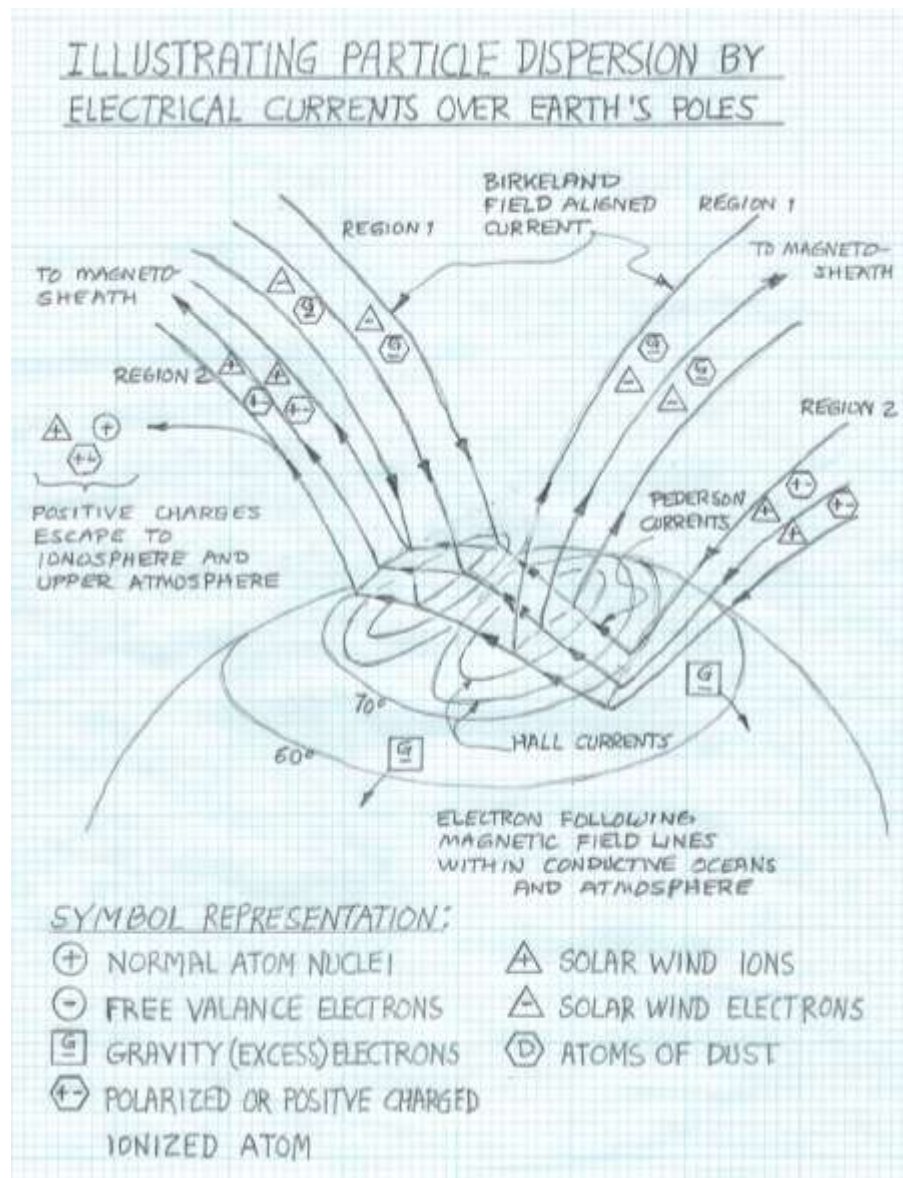
An ionospheric dynamo region at a height of 85 to 200 km has plasma that is conductive. Atmospheric tidal winds, due to differential solar heating and gravitational lunar forcing, move the ionospheric plasma against the geomagnetic field lines that are strongest at the pole regions, thus generating electric fields and currents, just like a dynamo coil moving against magnetic field lines.^{68 69} The electric currents, called Pederson currents, gyrate around the magnetic field lines and can be detected on the ground.

The aurora regions lie between about 15° and 20° geomagnetic-latitudes for both poles. High energy particles from the magnetosphere ionize the neutral gas at the height of 110 to 120 km.⁷⁰ During disturbed conditions, such as from corona mass ejections (CME), the conductivity becomes higher, moving the aurora regions toward the equator. At heights above 200 km, collisions between neutral particles and plasma become rare because of the much lower density of atmosphere. At these higher levels, both the incoming ions and electrons gyrate about the geomagnetic lines of force, becoming almost like transmission lines in space, thus creating the magnetosphere.

The following illustration of particle dispersion in the troposphere and ionosphere over the Earth's poles indicates the flow of ions and electrons.^{71 72} The solar wind's electrons and gravity electrons follow the magnetic field inward along the strong polar magnetic field in one layer, called "Region 1". The bulk of the current flow, called Pederson currents, is then diverted across the surface of the Earth and then outward when it meets the magnetic field on the opposite side of the pole. The other layer of the DL, called "Region 2", travels alongside the "Region 1" layer, but in the opposite direction. "Region 2" carries the solar wind's ions and other polarized ions being swept along from the Earth's magnetosheath. Gyrating Hall currents are created perpendicular to the Earth's varying magnetic field over the poles and helps to expel charged particles into the ionosphere, the lower atmosphere and the very conductive oceans.^{73 74} This network of particles following the Earth's magnetic field lines maintains the magnetic field strength on the Earth's surface used for navigation purposes. These high

atmospheric and oceanic charged particles are energetic and restless, always moving toward the equator and into a steady ring current surrounding the Earth's lower latitudes. These same charged particles play a big part in the Earth's weather patterns and continue to replenish the Van Allen belts with more ions, since these radiation belts lose particles over time through the Earth's magneto-tail.

The gravity electrons, that are added to the Earth's inventory of total atoms from the solar wind, entering mostly via the poles, discover the error of their ways and are anxious to escape the Earth and rejoin the solar wind in its maddening search for parity of charge in this universe. This escape process leads to other phenomena, called lightning and sprites. Much of the positive charges collect and are stored in the cloud cover of Earth's atmosphere which sets up a huge capacitance with the excess electrons, both in the atmosphere and on the surface. This capacitance eventually leads to a breakdown of the atmosphere's dielectric; then high energy plasma discharges are created between clouds, and between clouds and the surface. Essentially, this lightning occurs on all the planets with atmospheres.



F. The Nature of Earth's Lightning

Lightning is nature's way of equalizing charge within the atmospheres and surfaces of anodic celestial bodies, like planets and their satellites. Even our moon with no atmosphere maintains low glow, mostly unseen, random discharges. These plasma discharges over millions of years have produced the thick regolith on the moon's surface through a process called sputtering. From space probes, lightning in the upper atmospheres of Jupiter and Saturn is readily observed. The Sun continually supplies unbalanced charges via the solar wind to the planets and their satellites. Earth's lightning is ubiquitous and easily observed due to its strong magnetosphere efficiently collecting solar wind particles and its atmosphere continually gathering these particles and creating unbalanced charges within clouds, between clouds and between clouds and the ground. The accepted dogma for lightning is that is merely electrostatic discharge created when "the rising ice crystals collide with graupel (soft hail), the ice crystals become positively charged and the graupel becomes negatively charged." ⁷⁵

Currently, in mainstream science, no thought is given to the big picture of ions and electrons being collected from the solar wind and distributed throughout the world in the atmosphere and on the surface by various mechanisms. When too much voltage potential builds up, then most lightning occurs despite the static charges created by kinetic energy. The mystery for most scientists is that the amount of energy created by a typical lightning bolt cannot be solely explained by the meager amount of energy created by the wind's kinetic energy.

Earth's surface is an extremely active charged anode. Lightning frequency is estimated to be about 40 to 50 times a second, or nearly 1.4 billion flashes per year. This frequency varies due to elevation, latitude and prevailing wind currents. Hence, roughly 70% of lightning occurs over land where opposites charges are the closest; in the tropics where atmospheric convection is the greatest, producing more kinetic energy to create electrostatic conditions; and at lower latitudes where Earth's surface is closest to the largest electric charge flow along Earth's geomagnetic equator, called the "dynamo region". ⁷⁶

The Earth holds an electric field at its surface of between 50 to 200 volts per meter, since it is immersed in the streams of ions coming from the Sun's solar wind. The electric field is never allowed to equalize, due to the constant delivery of charged particles from the Sun and due to Earth's rotation creating thermal gradients, magnetic reverberations (detected by NASA's THEMIS spacecraft) and atmospheric mixing from the weather. The average potential between ground and the ionosphere called the "atmospheric electric potential" is 240,000 volts, but can reach as high as 400,000 volts.⁷⁷ Certainly, mankind should learn how to use this voltage potential to his benefit.

Cloud to ground lightning (CG) is well studied. A channel of ionized air, called a "leader", is started from a region of dense charge. Negative leaders propagate from regions of negative charge within thunderclouds and positive leaders propagate from positively charged regions on the ground. The negative leaders continue to propagate and split in a tree-like pattern as they move downward. The ionic channel from the ground takes a comparatively long amount of time (hundreds of milliseconds) in comparison to the resulting discharge, which occurs within a few microseconds. The electric current that establishes the plasma channel measures in tens to hundreds of amperes, which is dwarfed by the subsequent current during the actual discharge.⁷⁸ Where did the extra, immense number of electrons

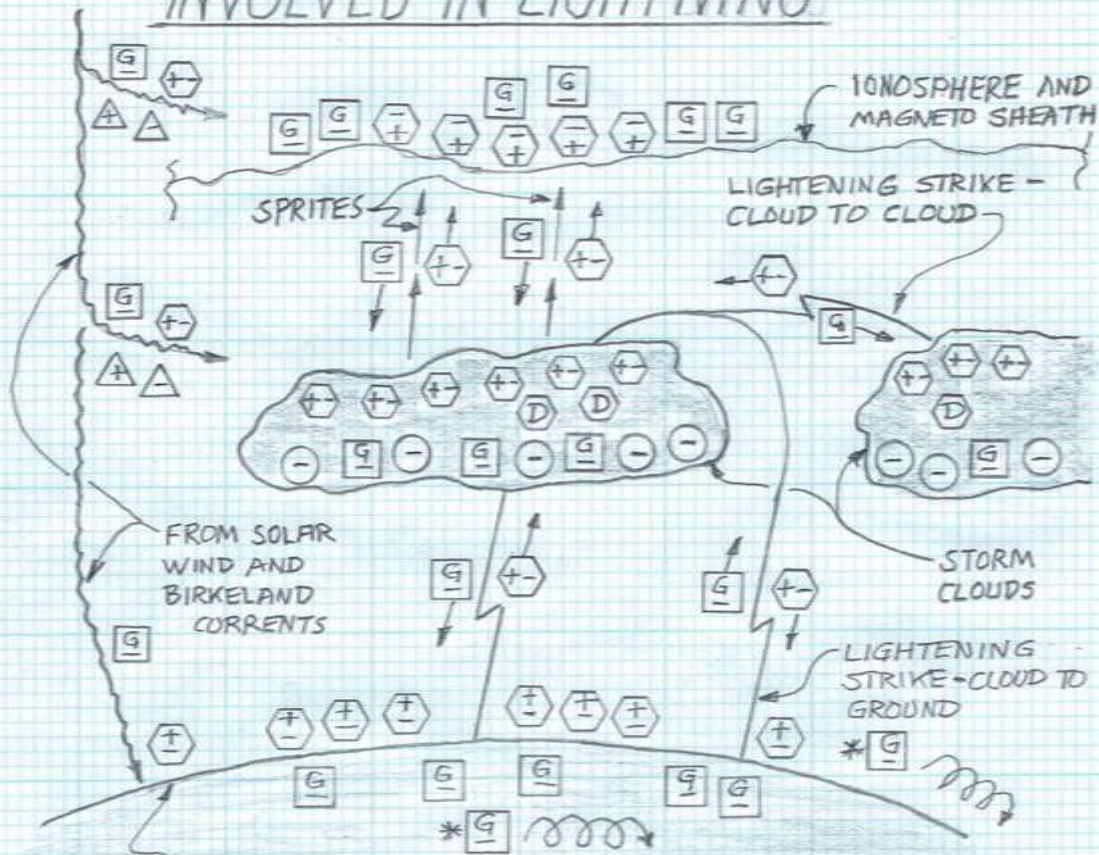
come from? These electrons are the excess, or gravity, electrons, that also are arriving from the Sun and collecting in the ionosphere and eventually transferring to the lower atmosphere.

The initiation of outward leaders is not understood. The electric field strength within the thundercloud is not typically large enough to initiate the process. Many hypotheses have been proposed, such as showers of relativistic electrons created by cosmic rays or locally enhanced electric fields coming from elongated and polarized water droplets or ice crystals. However, the hypothesis for this journal is simply that the supply of excess electrons creates enough unbalanced charge to start leaders from the clouds that, in turn, attract positive leaders from the ground. Once a plasma channel is created, the excess electrons rush to Earth to seek charge parity. The subsequent imbalance in the grounded Earth causes more positive ions to move to the surface and maintain the lightning discharges between Earth and its atmosphere in a thunderstorm.

The electric discharge phenomenon is not only limited to lightning at 10 to 20 km in the troposphere. Blue jets at 20 to 40 km above storm clouds in the stratosphere continue to discharge ions upward. These blue jets are neutral or molecular nitrogen being ionized. Going higher into the mesosphere, sprites occur at 60 to 90 km and elves at 80 to 90 km. This upper atmospheric lightning occurs in clusters, preceded by a reddish halo due to the excitation of molecular nitrogen. Air glow is found at 70 to 100 km and auroras are typically at 100 to 300 km. Above aurora level, nitrogen gas is hardly present enough to create any ionization.^{79 80} The positive ions keep moving upward to join the ionosphere and, eventually, the magnetosheath. At this point gravity electrons either split to enter the Earth's atmosphere at the poles or continue onward as Birkland current along the Earth's magnetosheath. A diagram follows that models the structure of particles involved in lightning. This structure of particles is broken down into solar wind ions and electrons or gravity electrons coming from the Sun; and into free valance electrons, atoms of dust and polarized or positively ionized atoms from Earth.

The current academic world still does not believe any significant electric charge separation can occur in stellar Birkland currents or in the upper atmosphere. However, the hypothesis of this journal and a group called the "Electric Universe" is that "tidal winds", as recorded by NASA's THEMIS spacecraft (also called "spacequakes"), move the ionosphere plasma against Earth's magnetic field, inducing powerful electric fields and charge flow. This circuit of charge flow around the Earth's equator is directly connected and affected by the Birkland currents coming from the Sun. This "dynamo region" is estimated to generate 140,000 ampere current through induction or transformer action. The dynamo region is the primary coil while the rotating Earth with its electrical currents within the oceans and lower atmosphere acts as a secondary coil.⁸¹ This secondary coil also pumps up and maintains the Earth's inner core magnetic field. This complicated circuitry of the Earth's atmosphere and oceans is also fed by excess, or gravity, electrons, which are transferred by continuing CG lightning discharges. The connection between the Sun's electrical output and Earth's climate/weather is the atmospheric electromagnetic fields.

MODELING STRUCTURE OF PARTICLES INVOLVED IN LIGHTNING



EARTH'S SURFACE AND NEAR-SURFACE ATMOSPHERE POSITIVELY IONIZED, BUT GAINING SURGES OF EXCESS ELECTRONS THAT SOMETIMES ARE REPELLED OR SPIRAL ALONG ALONG EARTH'S MAGNETIC FIELD LINES EITHER IN THE CONDUCTIVE OCEANS OR THE ATMOSPHERE.

SYMBOL REPRESENTATION:

- | | | | |
|----|--|----|--|
| ⊕ | NORMAL ATOM NUCLEI | △ | SOLAR WIND IONS |
| ⊖ | FREE VALANCE ELECTRONS | △ | SOLAR WIND ELECTRONS |
| Ⓜ | GRAVITY (EXCESS) ELECTRONS | Ⓜ | ATOMS OF DUST |
| ⊕⊖ | POLARIZED OR POSITIVE CHARGED IONIZED ATOMS. | *Ⓜ | ELECTRONS SPIRALLING ALONG MAGNETIC FIELD LINES IN BOTH ATMOSPHERE AND CONDUCTIVE SALTY OCEANS |

XI. Does the Double Layer (DL), or Langmuir Sheath, Require Excess Electrons?

The Double Layer (DL), also referred to as the Langmuir sheath, is presumably evidence of charge separation that defies the parity of charge. But, what really causes this sheath of charges to occur? Supposedly, the electron particle, with much less mass than the proton and other ionic nuclei, is causing these electrons to have higher velocity and acceleration. Why don't the electrons traveling parallel to the positive charges sense the opportunity to join and eventually achieve parity? The electrons should slow down, or be dragged by, the positive charge attraction that occurs across the relatively thin "Debye" membrane.

The possible reason is that the excess electrons that are always present in a plasma of particles are causing a race with all other electrons to get ahead where there may have a better opportunity to achieve parity. This is why the electrons, in general, travel faster than the larger, more massive particles. And, as the sheaths grow to immense membrane thickness such as those found in interstellar and intergalactic space, the electrons accelerate to maddingly higher velocities and to very intensified frequencies, until the induced magnetic fields surrounding these sheaths create a Z-pinch. In the scale of galactic dimensions these Z-pinchs can create stars of varying sizes. Without the excess electrons, normally paired electrons would be very happy to mosey along with the slower particles of positive charge sensing that parity can be achieved at any time when the plasma system loses its heat energy.

It is easy to imagine that not only did excess electrons or gravity electrons cause gravity, but that they also were the main ingredient for causing the original conglomeration of matter of the simplest ions to be created. Without them, Langmuir sheaths, Z-pinchs and star-making would not be possible.

XII. Super-Terminal Raindrops

As objects, such as raindrops, fall, the force of gravity pulls them downward while the atmosphere resists. When the forces are matched, the object reaches "terminal velocity". However, raindrops are measured to move faster; hence, these raindrops are called "super-terminal". The velocity for individual drops varies according to their size or mass, but about 20% travel as much as 10 times faster for their size.⁸² One chief concern by meteorologists is that rainfall volumes are overestimated. Doppler radar measures the speed of drops and then infers the average size of the drops. The radar measures rainfall over thousands of square kilometers and multiplies the number and size of average drops to give the total volume of water.

Numerous reasons have been advanced to account for such super-terminal speeds. One reason is that larger drops fragment and impart higher velocities to the resulting smaller drops. However, it is believed that the fragmented drops would quickly slow to their natural terminal speed. Other reasons were published in the *Water Journal's* "Evidence of Coherent Dynamics in Water Droplets of Waterfalls", by various researchers.⁸³ Water droplets have charges on their surfaces easily detected even with a very simple commercially air-ion counter. The general finding is that the positive charges of less than 15% are on one side, with the remaining negative charge being on the opposite. The charge formation is proposed to originate from oriented molecular dipoles at the water-vapor boundary forming an

electrical double layer where the outer boundary gathers an excess of electrons. The charge difference was described in great detail by the previous reference, where measurements were taken at waterfalls in Austria. One belief is that the river flows over rock surfaces and suspended solid particles giving rise to the mixed coherent state involving quasi-free electrons.

However, good explanations for electrical double layers disobeying electrostatic theory and for why the charged drops actually do generate super-terminal speeds are lacking. This paper proposes that excess, or gravity, electrons cause this phenomenon. Excess electrons on both the ground's surface and in flowing fresh water adheres to the droplets in waterfalls. Then, these particles of atomic mass have more than the average number of electrons per normal volume of atoms, thus creating a larger than normal gravity force. The larger gravity force in turn accelerates the droplets to higher or super-terminal velocities. The attractive force between bodies, namely those between Earth and the water droplets, increases in random amounts due to special conditions. The uneven and increased adherence and collection of more gravity electrons than normally exists, provides opportunities for the universal law of gravitation to be invalidated. Under normal conditions, only a negligible amount of gravity and/or outer valence electrons are exchanged between discrete parts of matter and cannot be detected.

XIII. Electron Sparging of Comets

Sparging is a method in chemistry that involves bubbling chemically inert gas, such as nitrogen or helium, through a liquid. This technique is used to remove dissolved gases, for example oxygen, from the liquid. This same term will be used by this journal to describe the removal of gravity electrons from a comet as it enters the higher density region of solar wind near the Sun. The solar wind electrons bombard the comet, building up a negative charge on its surface which eventually arc discharges toward the incoming solar wind ions, creating the comet's coma and tails. The process of constantly discharging solar wind electrons from the comet's surface carries away additional electrons on the comet's surface that include gravity electrons. This displacement of gravity electrons pulls more electrons from the comet core's interior. This ongoing collecting and discharging of solar wind electrons takes away, or sparges, both normal valence electrons and gravity electrons from the comet's body.

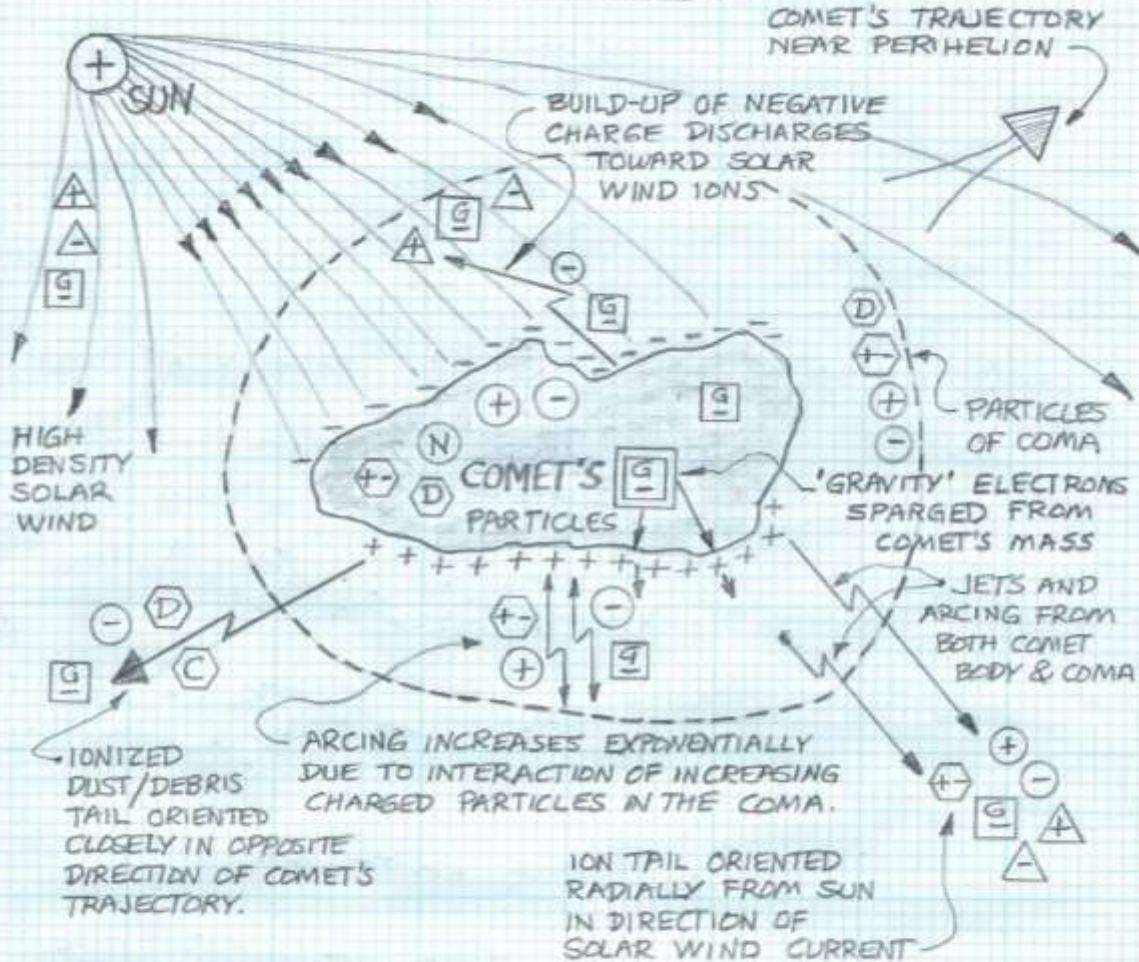
For each cometary orbit around the Sun, the comet's body keeps losing more and more of its own electrons, including excess electrons, erringly following normal electron flow toward the positively charged coma, believing parity of charge is close at hand. These electrons are then both lost to the expanding coma and to the cometary tails to become magnetosheaths of current, just as those surrounding Earth and creating the Earth's magnetosheath tail. How do we know this happens? Because a normal comet's body of mostly rock has unusually low density, well below that of water or ice. Space probes with gravimeters have measured a comet's mass and then estimated its volume, thereby concluding these bodies have low densities, which does not make any sense.

The gravimeters, in reality, are measuring the amount of gravity electrons in the comet, which are typically lower than other massive bodies because of this sparging process. The comet's gravity electrons are no longer proportional to the mass of the comet. Hence, it is wrongly assumed that the densities are lower than what really exists. Some measured densities of comets^{84 85} are 67P at 0.4

gm/cm³, Wild 2 at 0.6, Halley at 0.6, Hartley 2 at 0.22 and Borelly at 0.3, which is based solely on gravity being dependent on mass and not gravity electrons. These comets definitely appear to have rocky compositions and hard surfaces, unlike the expected dirty snowballs that were postulated not too long ago. Be reminded that the densities of most rocky materials are between 2.2 and 2.7 gm/cm³ and ice is 0.9. Dense oak wood is between 0.6 and 0.9. This unexpected anomaly of comet densities being 0.2 to 0.6 can only be answered by admitting scientists do not know what gravity is or how to measure an anomalous condition.

Of course, space scientists have developed a poorly constructed argument that typically, comet bodies are lumps of debris with a large amount of open spaces. The debris is weakly held together by the debris' combined gravity field. However, an impactor experiment and a probe lander revealed a very hard surface held together tightly, like crystalline silicate materials.⁸⁶ Their explanation is incongruent, due to their original postulation that all cometary materials were accreted from small dusty, cold particles of a primordial accretion disk surrounding the young proto-star. The measured material compositions of these comets require very high temperatures, pressures and water, which can occur only on the rocky terrestrial planets and solid moons of the solar system. This logic then leads to these planets and moons having subsequent collisions or high energy impacts leading to ejected debris that created the asteroids and comets. Space scientists have just learned recently that comets and asteroids are the same animal; the only difference is that comets are like asteroids, but, having more eccentric elliptical orbits and come closer to the Sun to experience the higher densities of solar winds and CME particles.

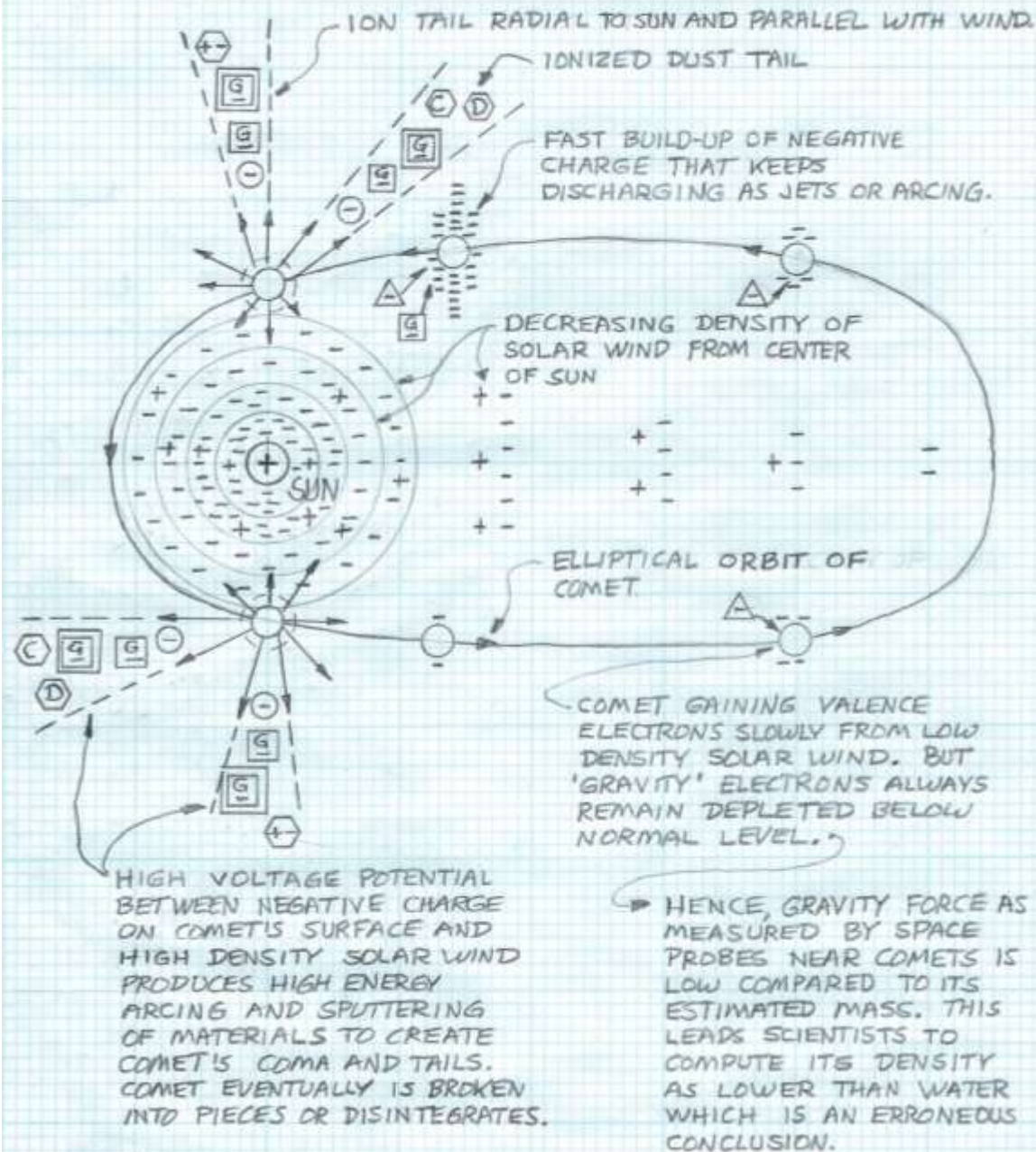
SPARGING OF 'GRAVITY' ELECTRONS FROM COMETS - 1



SYMBOL REPRESENTATION :

- | | |
|---------------------------------------|-------------------------------|
| ⊕ CHARGED ATOM NUCLEI | △ SOLAR WIND IONS |
| ⊖ FREE VALANCE ELECTRONS | ▽ SOLAR WIND ELECTRONS |
| Ⓝ NEUTRAL ATOMS/MOLECULES | ⓓ ATOMS OF DUST |
| ⓖ 'GRAVITY'(EXCESS) ELECTRONS | Ⓢ COMET DEBRIS |
| Ⓢ POLARIZED OR POSITIVE IONIZED ATOMS | ⓐ SPARGED 'GRAVITY' ELECTRONS |

SPARGING OF 'GRAVITY' ELECTRONS FROM COMETS-2



The previous diagrams show the electrical nature of a comet as it approaches the perihelion of its orbit and encounters much higher densities of solar wind particles: negative electrons, negative gravity electrons and positive ions. A build-up of negative charge creates an arc discharge toward the incoming positive ions. The arc discharges sputter surface material and eject dust above the comet's surface to form a coma. The arcing increases exponentially due to the interaction of increasing charged particles in the coma. The coma becomes magnetized and develops two comet tails. One tail is highly ionized dust and larger debris oriented closely in the opposite direction of the comet's trajectory. This tail is affected

more by celestial mechanics. The other ion tail is oriented radially from the Sun, follows the direction of the solar wind current and is affected more by electromagnetic fields. After thousands of orbits, eventually, enough material is removed by sputtering to cause a disintegration and break-up of the comet core. The really important question about comets is why they differ from normal asteroids by orbiting in more elliptical orbits. And, why do asteroids exist in the first place? These answers are sought in other papers found at www.ettingerjournals.com.

XIV. The Enigma of Megafauna Living on Earth

A. David Esker's Dinosaur Paradox

Dinosaurs, Earth's largest land animals, existed 250 to 65 million years ago, in the Mesozoic era, as attested by the fossil record and modern dating methods. At first, paleontologists determined that megafauna were slow-moving and cold-blooded like our existing reptiles. Much later, studies led to these animals being warm-blooded and much more mobile, similar to Earth's existing largest land animals. Eventually, birds were considered to come from their genealogy tree.

A basic problem arose in that these species of the Mesozoic era far exceeded the obtainable size and weight of modern day species. Today's largest elephants weigh in at about 11 tons, whereas the authoritative mass estimates of Triceratops is six to 12 tons, T-Rex is six to nine tons and Brachiosaurus is 23 to 88 tons. David Esker, author of the website, www.dinosaurtheory.com,¹ developed a hypothetical scaling factor of 3.2 based on the height and mass of Mesozoic species versus today's. The mass of the largest sauropods is 2.3 to 3.5 compared to today's elephants. As Esker stated, "The vertical 8.0-meter heart-to-head difference of the Brachiosaurus compared to the 2.5-meter heart-to-head difference of today's giraffe producing a scaling-factor of 3.2."

Esker presented convincing arguments that these largest Mesozoic species did not have adequate bone strength to support them, assuming the same bone strength as today. The muscle strength to lift and move such massive animals on land was not adequate, assuming the same muscle density and strength as today's animals. Inadequate blood pressure and too much stress on the heart muscle would occur for the tallest dinosaurs. Esker also presented a chapter on how the largest flying animal, the pterosaur, could not have flown in today's atmosphere. Numerous attempts to simulate a pterosaur all failed.

David Esker argued further, that many dinosaur species evolved to have very large hind legs in comparison to their front appendages and that many had very long muscular tails that were not dragged, but suspended, and cantilevered from their barrel-like bodies. These unusual body features were due to animals in the Mesozoic era living in an atmosphere that was 2/3 the density of water, based on Esker's scaling factors. The buoyancy of this almost liquid-like atmosphere helped support these megafauna; their muscular tails and sometimes long necks and larger hind legs helped propel them in this dense atmosphere on land. This idea comes from sea animals, like the whale, that can support their weight using the buoyancy of water and using their tails for propulsion.

¹ David Esker, M.S. Physics; author of www.dinosaurtheory.com

Esker's hypothesis is very intriguing and cannot be ignored. He claims the thicker atmosphere came from the interior of the Earth, as is predicted for all other planetary atmospheres. Due to internal heat from constant tidal acceleration forces, the lighter volatiles rise to the surface in a process called differentiation. He claims that all terrestrial planets originally had about 96% CO₂, 3.5% Nitrogen, and a trace of Argon, similar to what Venus and Mars currently have. But, since Earth has the appropriate distance from the Sun where water can exist as a liquid, Earth's atmosphere evolved into 78% Nitrogen, 21% Oxygen, 1% Argon, and a trace of CO₂. Oxygen was added over time, due to life-producing O₂ through the process of photosynthesis. Carbon dioxide was removed, and still is, by chemical reactions with water that cause carbonated rock to form.

Planet Earth was favored to have the most atmosphere, especially during Mesozoic times, compared to the other terrestrial planets, due to the combination of its overall density, distance from the Sun and tidal influence of an additional celestial body, the Moon. The other inner planets were too close or too far away to have the advantage of liquid water on their surface. And, some of the other planets did not have enough mass to hold their forming atmospheres, such as Mercury and Mars. Also, adequate tidal influences of both the Sun and Moon created continuous internal heat that caused, and continues to cause, the lighter volatiles of water, CO₂, methane, ammonia, nitrogen, argon, hydrogen and helium to rise to the surface and form a thicker atmosphere and liquid ocean, especially during much earlier times. Esker used this inductive reasoning to justify his denser atmosphere during the time period of the megafauna. David Esker presents a wonderful, thought-provoking hypothesis and makes one think outside the box. However, among some many excellent ideas, his overall concept is flawed. But still, all the questions that Esker raises must be answered.

B. Esker's Dense Atmosphere is Flawed

1. The Impossibility of a Dinosaur's Circulatory System

The denser atmosphere does not address how the circulatory system of these animals, especially those with super long necks and tails, works. Either these animals only held their heads as high as their heart or they may have had several hearts placed in series along the neck to supply adequate blood pressure to the head. However, another answer is that there could have been less gravity. Esker did carefully consider less gravity and a faster-spinning Earth, but considered these reasons would be insignificant. His gravity and spinning Earth evaluations were based on a shrinking Earth and a slower rotation of 23 days lessening centripetal forces. He does not have the ability to think further that gravity may be reduced by a significant amount based on the concept of gravity electrons that cause gravity. Does the dinosaur enigma tell us that Earth's gravity could have changed significantly due to Earth's close encounter with other celestial bodies in the distant past? Perhaps in these close encounters, gravity electron exchanges occurred that sometimes increased and sometimes decreased these electrons, thus changing Earth's gravity and not its mass. This could explain why, at different times in Earth's history, megafauna could exist. Also, the differences in Earth's gravity appear to be preceded by mass extinction events which may accompany a close encounter of another celestial body. The interaction of electromagnetic phenomena between celestial bodies could cause different types of catastrophic events on Earth's surface that can be linked to mass extinctions.

2. Scaling Factor as a Function of Time

Esker derived a scaling factor from comparing the largest Mesozoic animals 150 million years ago with the largest animals of today. He determined and plotted this scaling factor 400 million years ago to the present. The plot dramatically reveals that the scaling factor in the Paleozoic era in the Devonian period was as high as it was in the Jurassic period in the middle of the Mesozoic era, but dropped to today's present level during the Permian period at the end of the Paleozoic era. The reason given by paleontologists is that a very large mass extinction event occurred to flora and fauna that included both land and sea. Apparently, the atmosphere remained unaffected since the megafauna evolved and recovered from the previous Paleozoic era levels and sizes. So why did the dense atmosphere of the Cretaceous period become a thin atmosphere of today, as predicted by Esker? What was the trigger for lessening the Earth's atmospheric density? And, why did the Earth take so long to remove CO₂ and add it to the carbonated rock? Life is known to have started almost 2.9 billion years BP, thereby starting photosynthesis and oxygen production very early. Water should have differentiated to the surface and condensed from steam to liquid oceans at least 2 billion years BP, especially since the Moon is reasoned to have been closer. No reason is provided by Esker for why the Earth took so long, almost 2.4 billion years, for CO₂ to be transferred to carbonated rock. My conclusion is that Esker's explanation of evolving planetary atmospheres is correct, but the evolution of Earth's atmosphere to its present condition should have occurred long before the dinosaurs of both the Paleozoic and Mesozoic eras appeared on the land surface. I am very suspicious that megafauna similar to our anatomy and respiratory system could have processed an atmosphere with such a small fraction of oxygen compared with carbon dioxide, postulated to be more than 90%.

3. The Puzzling Size and Shapes of the Dinosaurs

Esker asks an important question: why do many dinosaurs have long, strong muscular tails and longer, larger back legs? Maybe the atmosphere was denser and CO₂ was more abundant in the ancient atmosphere. Catastrophic events could easily cause more CO₂ to be released from the crust, and even the mantle, via earthquakes, volcanoes and oceanic rifts. But the density of the atmosphere, being postulated as 2/3's water, is too high. A more reasonable accounting for larger tails is that dinosaurs resided in large, shallow, inland seas or swamps where this type of propulsion was helpful. These large inland seas or lakes were fed by constant tropical rains thought to exist during those times. The large back legs made it possible to be more mobile in both shallow water and on land. The longer necks and longer front legs of dinosaurs, such as the Brachiosaurus, made it possible to feed on both shoreline and submerged vegetation. Still, the question remains as to how their bones could support the immense weight of their muscles, considered to be comparable to today's muscle density. This question can only be answered by the planet having less gravity. The answers for varying gravity on planets is given by the hypothesis of gravity electrons that can be added or removed from the planet by gigantic electrical discharges, caused by a close encounter of another planet that is trying to achieve equilibrium of charge. Also, the entrance of a brown dwarf star into the inner solar system could over-activate the Sun's solar winds, which then can remove more than the normal amount of excess, or gravity, electrons from the inner planets. The overly active solar winds would have more positive ions, which would pull away excess electrons from the inner planets via their Van Allen belts and magnetosheaths.

Pterosaurs, the largest flying animals on Earth, have too much weight to fly in today's atmosphere. Naturally, Esker's invention of a much thicker atmosphere conveniently solves this problem of the pterosaur enigma. But again, the reduction in gravity force is considered, but then thrown away by Esker as being insignificant. But, a sufficient reduction in gravity can address why the pterosaur can fly. Let's review Esker's analysis of the possible gravity effect. He reduces the overall determining parameters to "g", the acceleration due to gravity; "ρ", the density of the biological material; and "L" the size of the height of fauna or flora. According to Esker's scaling properties, both stress and pressure can be equivalent to the above parameters. Hence, the maximum stress variables for the Mesozoic and present eras are set equal to each other assuming that bones and muscles today are equivalent to the dinosaurs.

$$S_M = g_M \times \rho_M \times L_M$$

and

$$S_P = g_P \times \rho_P \times L_P$$

with the "M" subscripts representing Mesozoic and the "P" representing present day. Thus, setting these sets of stress variables equal to each other produces:

$$g_M \times \rho_M \times L_M = g_P \times \rho_P \times L_P$$

The biologicals materials such as bone, blood, muscle and overall body density are similar for both eras; henceforth, the density parameters are set equal to each other:

$\rho_M = \rho_P$, and then:

$$g_M \times L_M = g_P \times L_P$$

$$g_M = g_P (L_P / L_M)$$

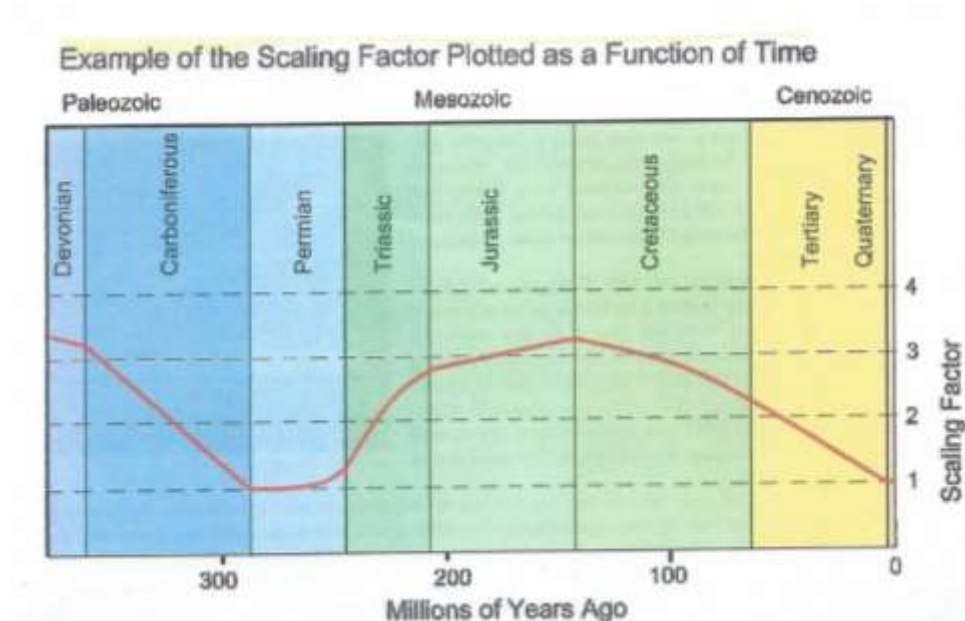
$$g_M = 9.807 \text{ m/s}^2 \times (1/3.2) = 3.1 \text{ m/s}^2$$

After setting Esker's scaling factor of 3.2 equal to the reciprocal of (L_P / L_M) , the value for Mesozoic gravity, using today's surface gravity acceleration of 9.807 m/s^2 becomes 3.1 m/s^2 . Of course, Esker could not imagine such a reduction in the force of gravity, and steered his analysis toward a super-dense atmosphere concept. His analysis has some credibility, since certain dinosaurs are pictured as being partially aquatic in nature.

Some measured densities of comets are 67P at 0.4 gm/cm^3 , Wild-2 at 0.6, Halley at 0.6, Hartley 2 at 0.22 and Borelly at 0.3, which are based solely on gravity being dependent on mass and not gravity electrons. The density of rock, which apparently is the primary composition of comets, is between 2.2 and 2.7 gm/cm^3 . So, Esker's idea of the effect of gravity being reduced by a factor 3.2 on Earth is not far off from the findings of comets having lost most of their excess, or gravity, electrons. A scaling factor for the gravity effect on comets with reduced excess electrons is roughly $(2.2 / 0.6) = 3.6$. The conclusion is that the Earth, due to at least four close encounters and/or excessive solar wind events, lost the majority of its gravity electrons before the Devonian era and at the beginning of the Triassic era, allowing for less

gravity and much larger megafauna. At the beginning of the Carboniferous and Cretaceous eras, the Earth regained its gravity electrons, thus increasing surface gravity and allowing the smaller fauna to dominate. See Esker's Figure for his Scaling Factor Plotted as a Function of Time.

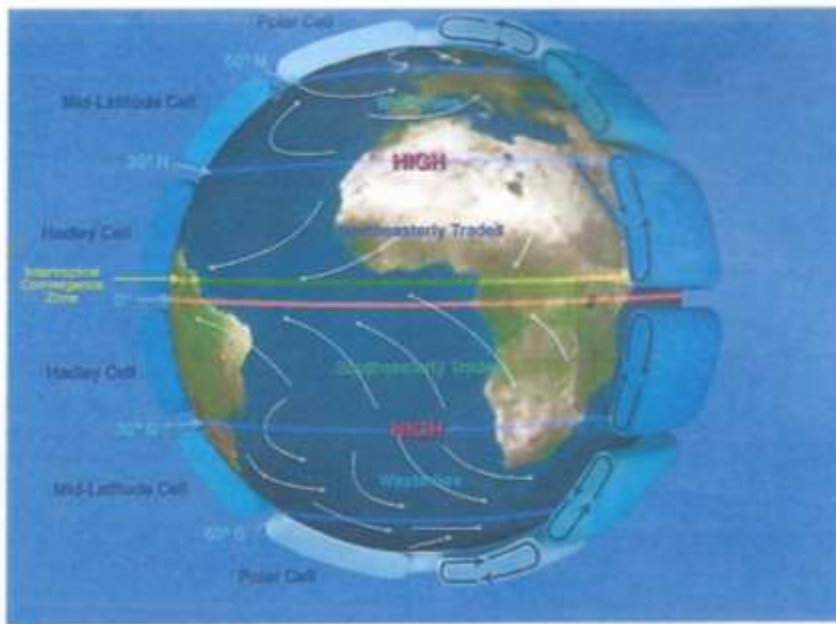
I give David Esker much credit for questioning the dinosaur paradigm that allowed me to possibly further support the concept of "electron asymmetry" and gravity electrons being the correct parameter for understanding and measuring the effect of gravity.



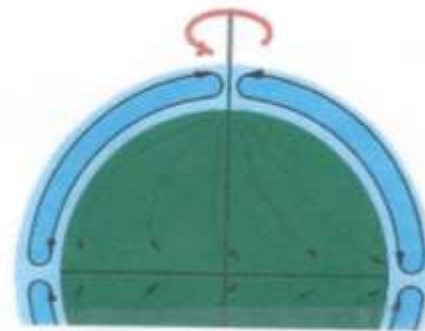
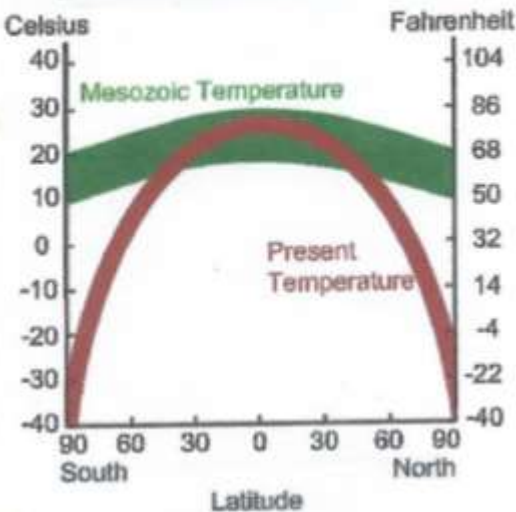
Credit: www.dinosaurtheory.com Image

4. The Mesozoic Climate Paradox

One more Esker issue must be addressed. He claims that the Mesozoic atmosphere supports his claim that the dinosaur environment between 250 and 60 million years BP was very dense, producing on the order of 370 atmospheres at sea level, thus giving megafauna enough buoyancy to support their tremendous weight. The global temperatures ranged from tropical to temperate with no frozen polar ice caps and no large deserts during the Paleozoic and Mesozoic eras. His reasoning is that the atmosphere was required to be thick and dense for global convection currents to disperse the higher heat energy at the equatorial regions toward the colder polar regions. Today's thin atmosphere is not able to use a continuous convective conveyor belt; thus, the warm water vapor condenses at about 30° latitude and re-circulates back to the equator, causing dry deserts. These re-circulations are called Hadley cells, which disperse the heat less efficiently toward the poles than did the weather cells of the Mesozoic which were continuous from the equator to the poles. Today's next set of weather cells, called the mid-latitude cells, are drier and do not carry enough heat toward the poles. Hence, drier polar ice caps and colder temperate climates occur. It seems that this concept is corroborated by the very dense CO₂ atmosphere of planet Venus, that has a very even and hot global temperature with no polar ice caps. Supposedly, Venus's thicker atmosphere allows rising hot gases to ascend at the equator and remain high enough to reach the polar regions, through convection, without being re-circulated.



Temperature as a Function of Latitude



Credit: www.dinosaurtheory.com Images

But, the chemistry of such atmospheric gases as water vapor and CO₂ needs to be evaluated at the Mesozoic temperature range of 10 ° to 30 ° Celsius and at 370 atmospheres which is 37.4 MPa or 5437 psi. Water becomes a liquid beyond 611 Pa at these temperatures.⁸⁷ Also, CO₂ is in the liquid phase at its critical point of 31 °C and 7.36 MPa. Beyond this critical pressure, CO₂ is either a liquid or a supercritical fluid.⁸⁸ For Esker's idea to work, animals of this period would need some special adaptation, such as fish

gills, which is not confirmed by the fossil record. Also, in such a thick atmosphere, the pterosaur would need fins more than wings to be mobile.

Figure: Water Pressure-Temperature Phase Diagram

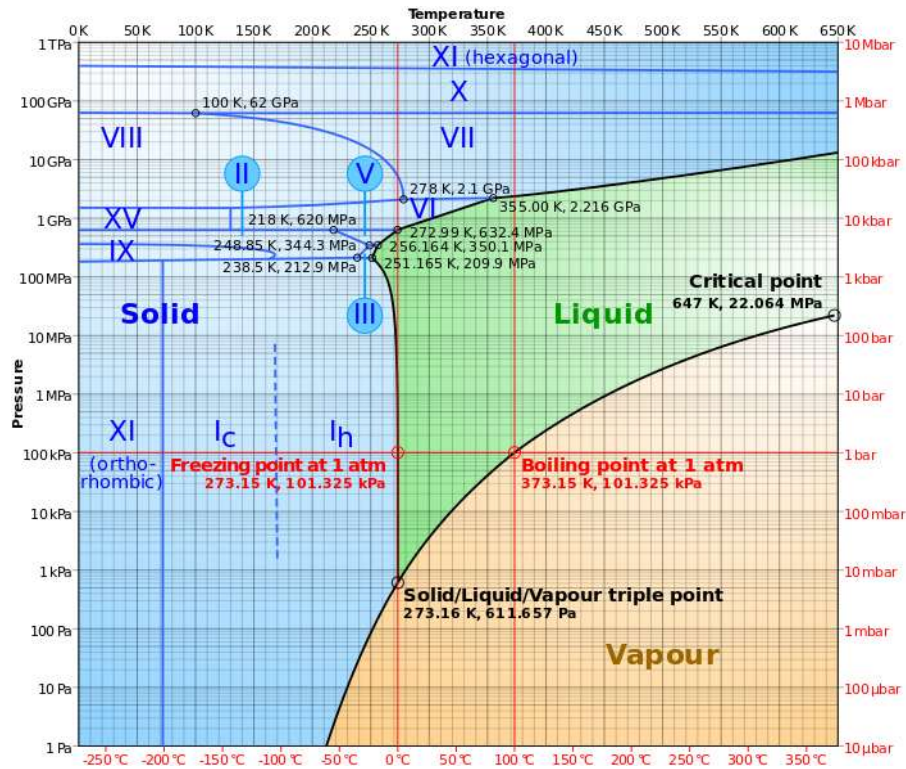
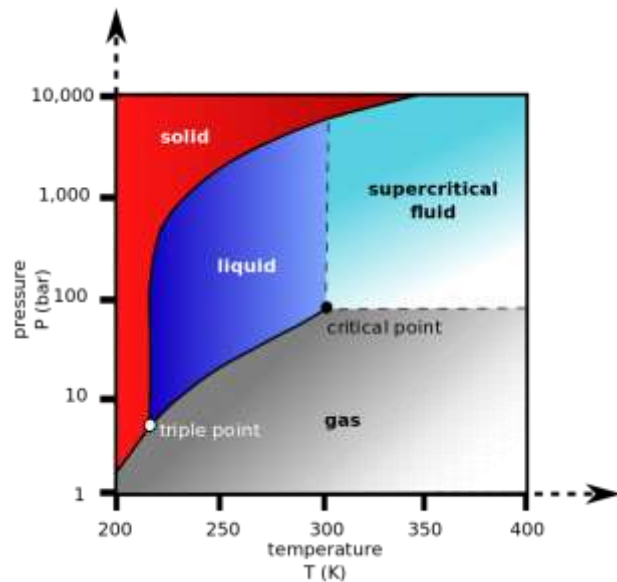


Figure: Carbon Dioxide Pressure-Temperature Phase Diagram



Credits: Images by Wikipedia and <https://www.google.com/search?q=water+phase+diagram>; and [https://commons.wikimedia.org/wiki/File:Carbon dioxide pressure-temperature phase diagram.svg](https://commons.wikimedia.org/wiki/File:Carbon_dioxide_pressure-temperature_phase_diagram.svg)

So, Esker's idea of a thick Mesozoic atmosphere is refuted. However, the Mesozoic climate paradox needs some answers. I am now prepared to suggest three things that Esker did not consider.

1. Indeed, the atmosphere had more CO₂ that was never completely depleted, due to constant intervals of CO₂ expulsions from volcanic activity, earthquakes and oceanic rift releases. Major CO₂ expulsions surely occurred during the major extinction events that included geological calamity, which roughly aligned themselves during the warmer global climate of the Paleozoic and Mesozoic eras. The approximate times of these occurrences are: the Ordovician-Silurian extinction events of 439 million years ago; the Late Devonian extinction of 364 million years ago; the Permian-Triassic extinction event of 251 million years ago; the Triassic-Jurassic extinction event of 199 to 214 million years ago; the Cretaceous-Paleogene extinction event of 65 million years ago⁸⁹ that finally ended the dinosaur era; and the Holocene extinction of 11,500 years BP based on the Younger Dryas geological period timeline.⁹⁰ CO₂ was constantly being removed by carbonated rocks, but never sufficiently reduced to allow enough of this greenhouse gas to heat-up the entire Earth surface, such as is predicted by modern global warming. The current gases for greenhouse effects are composed of 36% to 70% H₂O, 9% to 26% CO₂, 4% to 9% CH₄, and 3% to 7% O₃.⁹¹ The Paleozoic and Mesozoic atmosphere could have easily held an excess of these amounts, due to eruptions of Earth's internal volatiles. Even O₃ could have increased, due to more oxygen production by increased vegetation and ocean algae blooms. The fear today is that even a small additional release of industrial CO₂ into the atmosphere will cause a complete meltdown of the polar ice sheets. A much thicker atmosphere as is proposed by Esker for Mesozoic climate is not required.
2. Since the entire surface of Earth was in either a tropical or temperate climate with no deserts, much more vegetation existed, which produced more oxygen than what now exists. As the ocean waters became warmer they could not hold as much oxygen, thereby releasing more O₂ to the atmosphere. As the air became warmer, it held more water vapor, thereby improving the growth rate of vegetation that kept raising the oxygen levels in the air. Perhaps, more oxygen in the air allowed the animals of that period to use more energy and increase their metabolic rate; more available energy made the circulatory and respiratory systems more efficient, which in turn made their bone and muscular structure stronger.
3. Finally, I arrive at my special postulation, expounded in this paper, that the Earth's gravity field strength was lower, which directly led to many larger species than can exist today. David Esker showed his scaling factor of animal size, plotted as a function of time, going back about 400 million years. Megafauna, with a scaling factor of 3.0 or more, existed 500 to 400 million years BP and 200 to 60 million years BP. But, the scaling factor fell off to comparable factors of today in the Permian period, about 350 to 250 million years BP. Why did the scaling factor vary this much? Could the density of atmosphere also have changed proportionately? I do not have a good explanation for this variation due to atmospheric density changes, and neither does Esker have any explanation. However, the gravity field changes can be explained by this anomaly. Mass extinction events near 251 and 65 million years BP foretell global catastrophes that were likely caused by celestial intruders. These electrically charged intruders either discharged electrons to reduce Earth's gravity, or excess, electrons or to increase them. During the Permian period and the Cretaceous/Tertiary boundary, excess electrons were obviously gained by Earth through the discharge exchange. The gaining of more electrons by the Earth increased its gravity field strength, thereby restricting and limiting the continued evolution and survival of dinosaurs.

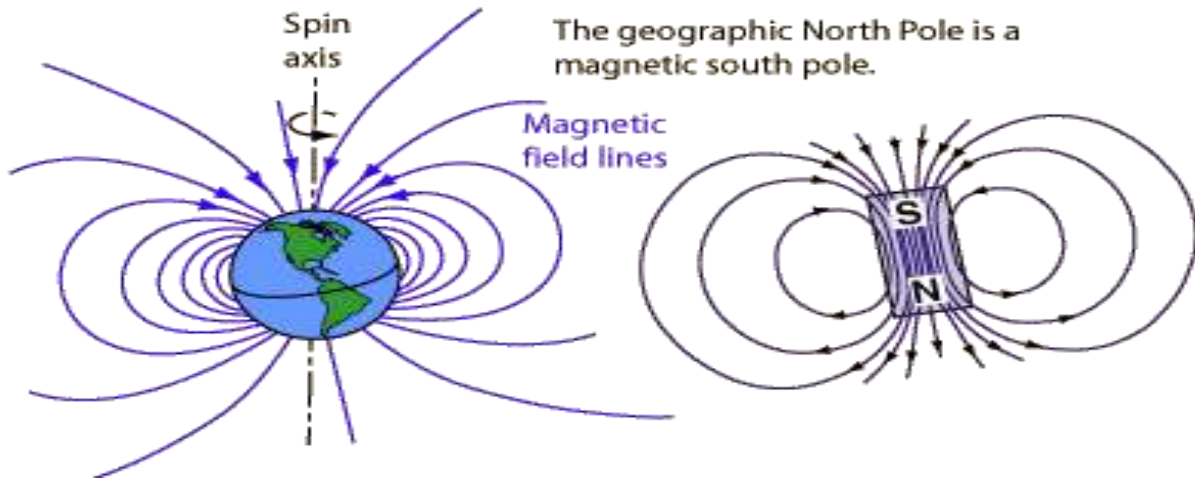
Their extinction, of course, was also aided by global calamities that occurred during these horrific events; however, any megafauna survivors were prevented from continuing their species due to the increase in gravity forces that besieged the Earth's surface. Now the conditions are right for the smaller fauna and flora species to dominate.

XV. Frisbees, Bicycles and Dust Devils

When the gravity force field is considered as purely electromagnetic and all conglomerations of mass have excess electrons, then new magnetic circuits can not only be imagined, but visualized, as affecting some known mysterious phenomenon. Certain observational phenomena can be better explained. The mass of the Earth produces two types of magnetic fields. One that is already known is caused by the spinning iron cores of an outer liquid layer and an inner solid core, reinforced by incoming solar wind particles. The field direction, or lines, appear as do iron filings that are oriented around a typical bar magnet. The density of the field increases when approaching the higher latitudes and the Earth's poles, just as happens with a bar magnet. This field density then continues to weaken as one approaches the equator. However, the second type of magnetic field, produced by the excess electrons held in place by Earth's matter, is roughly equivalent over Earth's entire surface. This second type of magnetic field has different strength and vector properties.

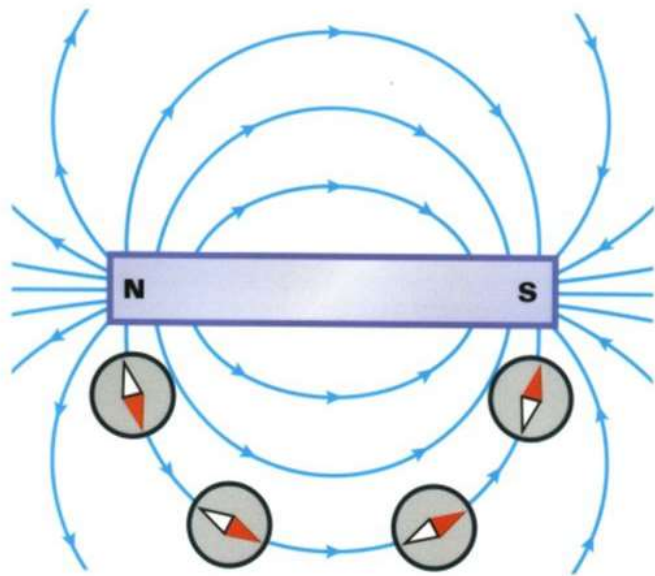
The electrical field direction developed by excess electrons is mostly perpendicular to the Earth's surface and is highly directional. To further clarify, the Earth's excess electrons create both the downward force of gravity that is caused by the electrical field direction, with which everyone is very familiar, and a faint magnetic field that is parallel to the surface, very close to the surface, globally well distributed and fairly equivalent over the entire surface, except for the highest latitudes. These excess electrons are trapped inside the Earth's crust and mantle, which are spinning slowly with the rotation of the Earth. The affect is similar to electricity being forced through a coil of wire of an electrical solenoid. The energized solenoid creates a magnetic field density around the solenoid, except now the solenoid is the spinning Earth itself. These excess spinning electrons in the crust also increase the density of Earth's magnetic field at higher latitudes, where the field lines enter the surface perpendicularly.

When the magnetic field is measured by scientists on the Earth's surface, they are not cognizant of the smaller baseline field generated by the excess electrons. The scientists only envision Earth's spinning iron core that attracts the solar wind particles at the poles, which is considered the entire field strength. This other magnetic field is everywhere equal, and, therefore, does not affect a compass reading or the migratory habits of animals. However, this weaker, encompassing field has an effect on other magnetic fields that are created by small, independent spinning masses above or on the Earth's surface.



MAGNETISM

- **magnetic field:** region of magnetic force
 - detect using a compass (needle points in field direction)
 - **field runs N to S outside magnet, S to N inside magnet**



Any spinning mass separated from the Earth's rotating mass produces its own distinct magnetic field, since it has its own small number of excess electrons. The greater amount of mass, the larger the diameter, the larger the moment of inertia or amount of mass concentrated on the perimeter and the faster the spin all create a larger, separate, magnetic field. Now, it is time to introduce some of the very familiar spinning masses such as Frisbees, bicycles, propellers, jet engines and dust devils, and analyze how they are affected by these new, postulated electric and magnetic fields.

A. Horizontal Spinning Masses

Such toys as Frisbees and disks used in the sport of disk golf are good examples of horizontal spinning masses. The aficionados of disk golf clearly realize that the maximum distance and lift time are dependent on two important parameters: the naturally expected translational force of the throw and the amount of spin imparted to the disk perimeter. Most scientists believe that the amazing amount of lift-time is due to the aerodynamics of the disk and the preservation of gyroscopic motion produced by the spin. It is difficult to separate or even imagine that the exceptional lift-time is due to the interaction of two magnetic fields or circuits. The faster the Frisbee is spun, the longer it stays in the air because the two magnetic circuits interact and are maintained longer.

While the Frisbee is spinning, its unknown magnetic field aids the disk in keeping level flight and preventing its dive toward Earth too early. The two magnetic fields resist wanting to change the horizontal orientation of the disk. This position of the two magnetic fields being 90° , with respect to each other, causes the maximum equilibrium for the two circuits. An analogy is a rolling ball seeking the bottom of a rounded bowl. Most disk designers believe the ways to achieve the best effects of disk lift are to:

1. adjust the shape of the disk to maximize its aerodynamic qualities
2. adjust its moment of inertia to increase its angular momentum.⁹²

These designers have no idea that magnetic field circuits play a major role in providing the forces that keep the disk level, thus preventing diving until the spin is slowed sufficiently. Any experienced disk golf player knows how important the imparted rotational force is to the sport.

Other important horizontal spinning devices are motor and engine-driven helicopter propellers that range from small toys to commercial helicopters. The rotating propellers constantly produce a magnetic circuit with Earth that stabilizes its horizontal motion. However, helicopter designers attribute both the lift and its horizontal translation to the aerodynamics of the propeller blades. There is great difficulty in separating the forces provided by the much smaller forces developed by the magnetic field circuits. A “propeller” toy that you spin in your hand tells the story better because the developed magnetic field forces and the lift component due to air are similar in amount. If one spins this “propeller” toy almost horizontal to the Earth’s surface, it achieves flight for a longer time than if the propeller is spun at an angle to the Earth’s surface. The magnetic circuits remain stronger and more stable if they counter each other within their respective, almost parallel or perpendicular, magnetic field directions.

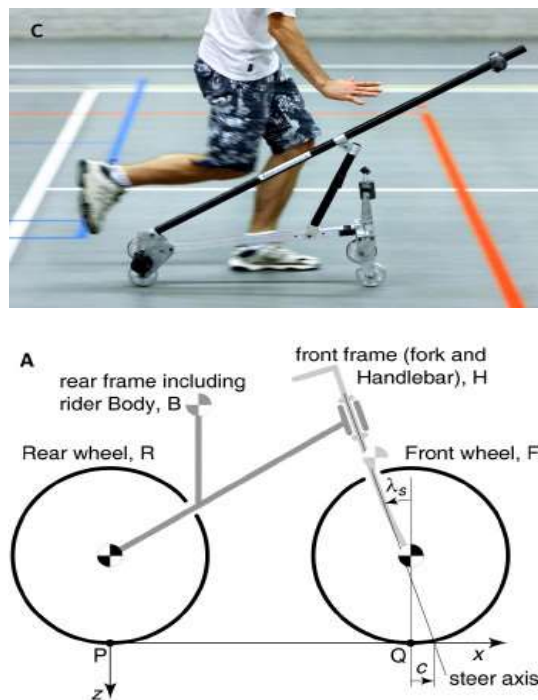
Do your own experiments with Frisbees launching them at different rotational velocities and at different angles to a level ground’s surface. More distance and longer stable lift should always be achieved with more spin and a more level launch to make the imposed magnetic properties of the spinning disk work better for you.

Another horizontal spinning mass of great interest is the dust devils that frequently occur on Earth’s and Martian deserts, which will be covered in a following chapter

B. Vertical Spinning Masses

The focus is now shifted to spinning masses that are vertical with the Earth's surface. The resulting magnetic field is now parallel with the Earth's magnetic field direction developed by both the spinning excess electrons inside the Earth's crust and the dipole magnetic effect of the spinning iron core. A well-known vertical spinning device is the common bicycle. Again, this device, like the Frisbee, is an excellent example to analyze, since the forces due to the interaction of the subject magnetic circuits become a major component of the overall forces that give the bicycle lateral stability. It is well known to any bicyclist that the faster the bicycle is pedaled the more dynamic lateral stability is achieved. An unexplainable effect of the bicycle not wanting to tip over occurs. This so-called lateral stability cannot be fully explained by Newtonian physics; the gyroscopic action of the spinning bicycle's wheels cannot account for the amazing ability to remain upright.

Cornell University's Quarterly Magazine, *EZRA*, (Vol. III, No.4, Summer 2011) reported some research about how bicycles balance themselves.⁹³ The accepted view is that the gyroscopic effect of the spinning front wheel and the front wheel "trail" behind the steering axis cause lateral stability. However, an experimental bicycle designed to eliminate the gyroscopic effect of spinning wheels and the "trail" of the front wheel shown in the picture below was still stable on its own. Hence, the conventional theory is disproven. Also, a mathematical analysis was performed to determine that self-stability did not require the accepted parameters. The researchers' conclusion is that "bicycle designs might not yet have explored potentially useful regions in design space." The mystery still persists: what does cause bicycle lateral stability, which all young children understand very quickly when learning bicycling for the first time? The reason is that vertically spinning devices are inherently directionally stable due to the interaction of imposed natural magnetic circuitry.



Credit: *EZRA*, Cornell's Quarterly Magazine Images

Other examples of vertical spinning masses are large rotating rings and tires rolling down a hill. These examples can easily ride over bumps and even become airborne. Yet, their inherent lateral stability keeps them upright and rolling to the bottom of the hill.

The same phenomenon that occurs with Frisbees is occurring with the bicycle. The wheels of the bicycle generate their own magnetic field because of the excess electrons inside the wheels' mass. This time the two faint but very effective magnetic fields interact to maintain the yet-unexplainable vertical stability, or as it is called in bicycle science, lateral stability. Equilibrium of the magnetic circuit is maximized when each is almost perfectly parallel with respect to each other. As the bicycle begins to tip, the interaction in the two circuits resists either circuit from becoming misaligned to each other, similar to taking two bar magnets and sliding them toward each other on a flat surface. The magnets will either align themselves parallel to each other or be perpendicular to each other.

Some familiar larger objects that spin vertically with the Earth's surface are the helicopter's tail propeller that gives the lateral stability to the craft. And also, there are the blades of jet engines used in modern flying craft. The same problem occurs for scientists and engineers in that they cannot distinguish between the fainter magnetic forces and the overwhelming aerodynamic forces developed by a jet airliner moving through the atmosphere or the fluid forces of gases moving through the jet engine. The developing magnetic forces may have a measurable affect, but scientists cannot yet conceive that such forces really exist.

I hope these discussions about simple spinning objects opens your mind to other ways of thinking about how this universe works. All possible forces that can be generated in the world of physics must be considered. Too often, forces generated by the electromagnetic regime are neglected, especially from the larger, macroscopic viewpoint. Currently, any thoughts about gravity being derived from electromagnetic phenomena is completely dismissed by mainline science.

C. Dust Devils and Their Big Brothers

Dust devils are another type of spinning horizontal mass that occurs naturally and usually in more arid regions of the Earth. These phenomena, considered still mysterious, produce vertical electric currents at their central vortices. This electric current is postulated to be excess electrons that have been gathered on the surface of dry deserts where conduction of electrical currents through moist soil and atmosphere is not available. Excess electrons, in trying to tenaciously gain parity or more equal distribution, search for any means to disperse themselves. When dry breezes bring dust over the surface, these excess electrons begin traveling upward toward these generally neutral atoms trying to find some positive charges. Like a current in a wire, a magnetic field is created horizontally around the current which in turn rotates the dust. The process is similar to a homopolar motor with electric current being supplied by the escaping excess electrons.

The Wikipedia definition of a homopolar motor is a direct current electric motor with two magnetic poles, the conductors of which always cut unidirectional lines of magnetic flux by rotating a conductor around a fixed axis so that the conductor is at right angles to a static magnetic field.⁹⁴ Of course, there is no actual conductor in a dust devil – only the free-traveling excess electrons that are accelerated to high

velocities and enormous voltage potentials. As these electrons rotate within the dust cloud, the neutral particles gather these loose spinning electrons and begin to spin themselves within a magnetic field that surrounds and is perpendicular to the spinning electron vortices. The proto-magnetic field becomes larger and larger as more free electrons start to rotate and expand outward with the dust. As the magnetic field becomes larger it accelerates the remaining electrons inside the vortices to higher and higher velocities which can achieve great heights.

This same phenomenon occurs on the Sun's photosphere and is identified as spicules, which are dynamic jets of about 500 km diameter. These spicules are well photographed and look like dark tubes.⁹⁵ Excess electrons collecting on the Sun's surface are trying to escape into the corona to meet with ions or positive charges that are being eventually expelled into the solar wind.

The dust devils are especially prevalent on Mars for good reasons. Excess electrons from the solar wind collect on the almost non-conductive, dry and very dusty Martian surface. During certain Martian seasons, when the planet is closer to the Sun, excess electrons build up more readily and cause numerous dust devils to combine into larger funnels that create global dust storms in the central latitudes.⁹⁶ Excess electrons that reach and constantly recharge planetary surfaces via the solar wind are the main triggers of weather for both Earth and Mars. Since Mars has a very thin atmosphere, only dust storms and dust devils are the main components of Martian weather.

On Earth, the higher density and conductive moist atmosphere, along with periodic infusions of excess electrons, create the global weather patterns. As excess electrons become too abundant in the circulating clouds of water vapor over Earth's surface, vertical currents of free electrons (currently thought to be elusive dust particles by mainstream science) begin to move upward toward positive charges recently received by solar winds as they enter the polar regions and spread toward the equator in the ionosphere. Much larger magnetic fields are formed horizontally around these currents to form rotating thunderstorms and sometimes tornadoes and hurricanes. Tornadoes create fierce funnels that cause excess electrons to reach the Earth's surface from the overly-charged funnel clouds. These large storms are created in a similar fashion to dust devils, but on a much larger scale due to the huge conductive masses of moisture found in Earth's water cycle between the atmosphere and the oceans.



Credit: Dust devils on Mars by NASA

The Laboratory for Atmosphere and Space Physics at the University of Colorado, in conjunction with NASA, has reported interesting analysis of data collected by the Mars Atmosphere and Volatile Evolution mission called MAVEN.⁹⁷ MAVEN collected data in November 2013 from the Martian upper atmosphere, its ionosphere and the dynamics of solar wind interactions. Onboard instruments measured ionospheric

electrons, magnetosheath ion density, ultraviolet input from the Sun and Martian remnant magnetic field. The mission was designed to know how the loss of CO₂ and nitrogen oxide and water vapor has evolved over the eons.

Mars has no internal dynamo to create a global magnetic field, but does possess so-called concentrated bands of crustal magnetism in its lower latitudes. Astrophysicists are mystified by this crustal magnetism and aurora events near the poles.⁹⁸ The postulation of this paper is that Martian global dust devils and the combining of these vortices into large traveling funnels create the strips of magnetic field that are measured by MAVEN.

The Martian auroras, unlike Earth's, are not caused by the ionization of atmospheric atoms in the ionosphere being ionized by incoming solar wind particles. On Mars, the ionosphere has little density of atoms. The trapped excess electrons try to escape the Martian surface near the edges of the dust storms at the higher latitudes that surround the polar regions. These escaping excess electrons combine with incoming solar wind's positive ion particles to create a Martian aurora.

The MAVEN mission report goes on to explain that a "non-thermal radiation" is emanating from the Martian surface. This process is correctly attributed to lightning-type discharges. However, these discharges are well organized into vertical electrical currents that directly cause the Martian dust devils and eventually the middle latitude giant dust storms.

NASA has made further studies of dust devils in the Arizona desert to better understand what is seen on Mars. Electric fields of up to 10,000 volts per meter of length are measured in these dust devils. The normal fair weather electric field at the Earth's surface measures 100 volts per meter. The conclusions by the Colorado University laboratory are quoted. "Dust devils on both Earth and Mars are atmospheric electric discharge phenomena similar to the electric breezes produced by 'ionic wind' air purifiers."⁹⁹ NASA assumes that the "non-thermal radiation" is caused by static electric charges building-up in the dust particles that then are discharged as lightning, but this is only a portion of the entire case. Excess electrons must be added to the equation to explain that charge separation also occurs and causes the greater amounts of voltage potential and magnetic flux, causing extreme rotational velocities.

The claim by Stephen Smith of the Electric Universe group is that "hundreds of kilometers per hour of rotating dust create intense magnetic fields that confine the charged particles and accelerates them around a vortex that couples with high voltages. These high voltages in the dust cause an ultraviolet glow that was measured by the MAVEN mission."¹⁰⁰ But, static electricity created in the rotating dust cannot fully explain the high values. Only the added excess electrons, or the so-called non-existent charge separation, can do this.

Charge separation due to excess electrons already exists in the atmosphere and on the ground. Storm clouds on Earth send lightning between themselves and to the ground, but electric discharges on Mars form dust devils combining into global dust storms. These storms help to complete the electrical circuitry between planetary surfaces and their ionospheres and magnetosheaths of these planets. This electrical power stored on the Earth's surface and in its atmosphere could possibly be harnessed, as Nicolas Tesla envisioned, by connecting the utility electrical grid to "ground poles" that can concentrate

and receive these natural excess electrons. Also, by mankind consuming and converting these electrons to other forms of energy, extreme weather conditions could be possibly deprived of these free excess electrons and be greatly subdued.

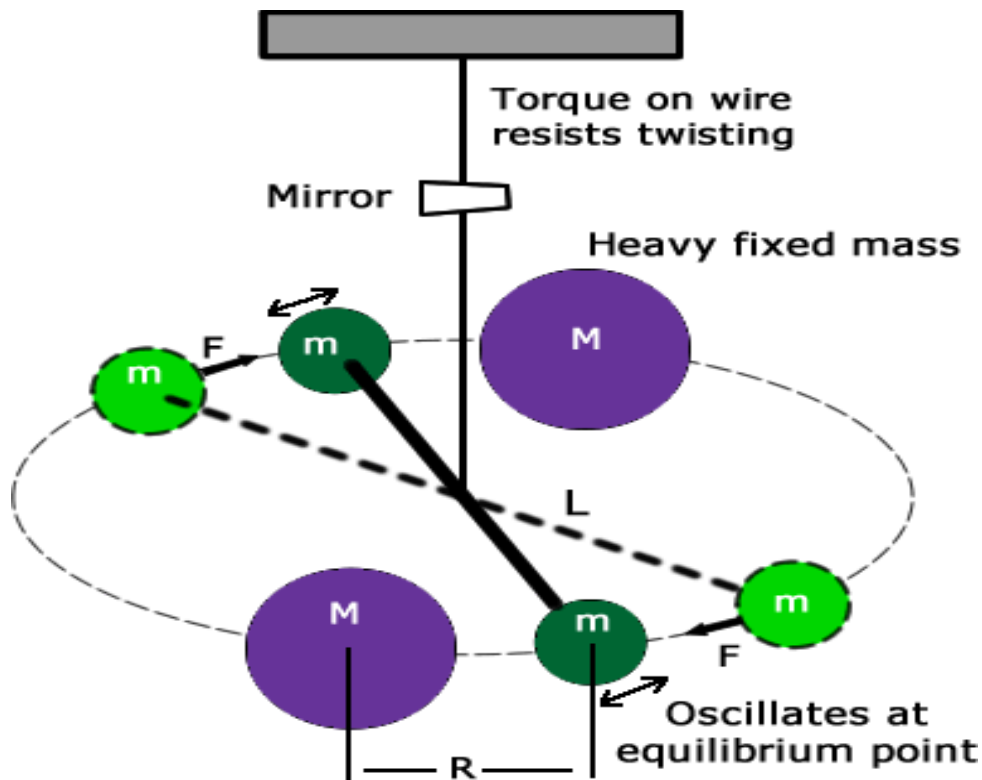
XVI. Physics Experiments to Prove gravity electrons Do Exist

What simple, inexpensive and practical experiments can be conducted to prove the existence of excess or gravity electrons inside a conglomeration of matter? The very first experiment that immediately comes to mind is the one of the first experiments to measure gravity by the determination of G , the universal constant of gravitation, which is used in Newton's equation for the force of gravity between two bodies or masses. John Cavendish, in 1798, 100 years after Newton proposed his equation, determined the value of G to be within 1% of its known value today. He proved that two small metal balls could be attracted horizontally to two much larger lead balls, thus confirming the mass of an object was an essential parameter to determining the force of gravity.¹⁰¹ During the time of Cavendish, the English government promised an award for whomever could measure the weight of the Earth. Cavendish was intent on performing this task by first calculating G , and then determining the mass of the Earth = $(g \times R_{\text{earth}}^2)/G$, and finally the density of the Earth = $3g/(4\pi \times R_{\text{earth}} \times G)$. The value of G was just a passing curiosity and the meaning of its units ($\text{m}^3 \text{kg}^{-1} \text{s}^{-2}$) was not questioned. In his paper of the experiment, no mention was made for the value of G , only the density of the Earth, which was considered "weighing the world".

A. The Modified Cavendish Experiment

This Cavendish experiment is very sensitive since the forces between the balls are extremely faint. An underground room is almost necessary to minimize temperature variations, air currents and vibration, which might perturb the balance arm. The experimental device must be assembled in the middle of the room to mask the gravitational field of the surrounding walls in the room. Any gravitational gradients from other equipment in the room and electromagnetic influences must be avoided. This experiment is a favorite one for many physics college courses and smaller simulations of this experimental device can be easily purchased from various suppliers.

The modification suggested is to perform two equivalent sets of experiments. The first set is performed normally, after choosing a proper location. The first set requires achieving a certain repeatability and tolerance range. Then the second set of trials is performed by the same equipment at the same location, with everything being equal, except now the larger balls are covered thoroughly in a dielectric material such as household paraffin wax. The idea is to shield or reduce any virtual electric field that may be emanating from the excess, or gravity, electrons of the masses of the larger balls. A positive result will be that the measurement of the value for G , the universal gravitational constant, is consistently less than the value for G in the first set of trials. This result is proof that the masses of attracting objects is not the only cause for the force of gravity. Other factors such as electromagnetic forces are necessary.



In the modified Cavendish experiment, the heavy fixed masses, M , are evenly coated with a dielectric material to shield some or most of any possible electromagnetic influence that may be part of the attraction of the smaller masses, m . If the G value has not been noticeably reduced, then perhaps a thicker or better dielectric may be required before abandoning this modified version.

B. Determining an Absolute Ratio of gravity to Regular Electrons

If an experimenter could separate most of the gravity, or excess, electrons from a mass and measure them, then the ratio of gravity electrons to regular electrons can be determined for most typical masses in the universe. Perhaps there is a way to achieve this goal by using a Van de Graaff machine.

A Van de Graaff machine is an electrostatic generator which uses a moving belt to accumulate electric charge on a hollow metal globe on the top of an insulated column, which can create very high electric potentials. It produces very high-voltage direct current, as much as 5 megavolts at low current levels. The device was invented in 1929 by an American physicist, Robert J. Van de Graaff.¹⁰²

The moving belt separates electrons from a roller, which becomes positively charged. A needle or a comb with sharp points spews electrons toward the positively-charged roller only to be intercepted by the belt and moved to another roller situated inside a hollow metal sphere. Another comb with sharp points removes the negative charge from the belt at the upper roller location, which then transfers the collected negative charge to the inside of the sphere. The negative charge on the inside induces an equal positive charge on the outside of the sphere which keeps increasing. Michael Faraday was the first to prove that no electric charge can be stored within a hollow conductor. All charges reside on the outside

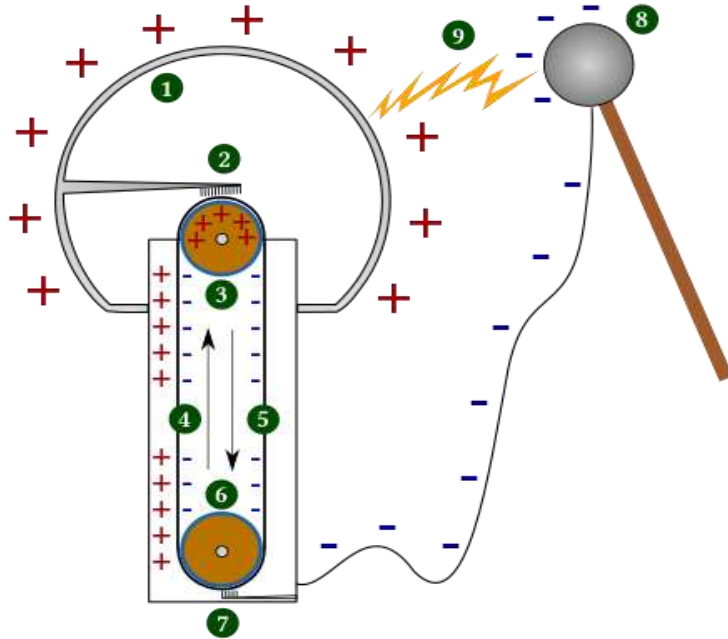
of the conducting surface, as was revealed in his famous ice pail experiment;¹⁰³ this occurrence is what exactly happens with the collected and stored charge on the Van de Graaff hollow metal sphere.

The comb or needle at the bottom roller is, for many types of these machines, connected directly to ground or the Earth. The electrons, either normal or excess, come from the Earth and are attracted through the needle by the positive charge on the roller that is rotating the belt. However, a very possible modification is to connect the ground wire to a large metallic block that is thoroughly insulated from the Earth and surrounding environment. Now, the Van de Graaff machine can only "suck away" the excess electrons and perhaps a very small percentage of valence electrons before it is halted, as will be indicated by the elimination of a corona discharge at the tip of the needle or the tips of the comb that spew electrons toward the positively-charged roller.

Supposedly, all the excess electrons should have been removed and collected on the hollow sphere. The remaining part of the experiment is to measure the number of electrons on the sphere by knowing the total charge transferred from the metallic sphere. Can this experiment be performed? This very precise process would require a very talented physicist. I am proposing that the following calculations can be used. Measure the mass of the metal block, (m), that is connected to the ground wire and somehow measure the current and time to transfer this current from the sphere.

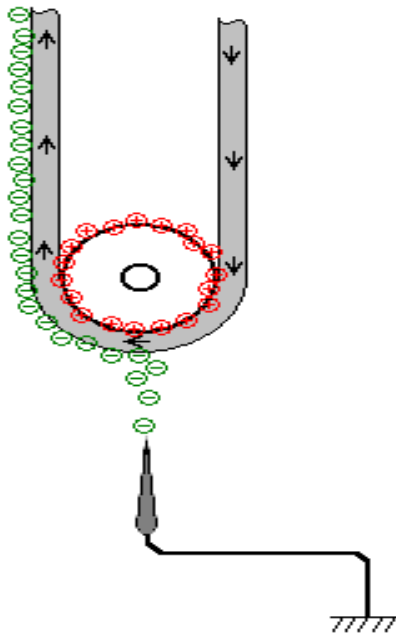
1. Total number of normal electrons (e_n) contained in metal block of mass (m) = $m(\text{kg}) / (1.67 \times 10^{-27} \text{ kg})$ which is mass per electron)
2. Total number of gravity electrons (e_g) removed from metal block = charge transferred (q) / $(1.602 \times 10^{-11} \text{ coulombs})$ which is charge per electron)
3. Charge transferred from sphere (q) coulombs = time for transfer (t) x current (I) which is coulombs per time, or
4. Charge transferred from sphere (q) coulombs = (t) x (voltage / resistance)
5. Final result = ratio of gravity electrons to normal electrons = $e_g / (e_g + e_n)$

Van de Graaff Generator



- | | |
|---|---|
| 1. hollow metal sphere | 6. lower roller (metal) |
| 2. upper electrode | 7. lower electrode (ground) |
| 3. upper roller (for example an acrylic glass) | 8. spherical device with negative charges |
| 4. side of the belt with positive charges | 9. spark produced by the difference of potentials |
| 5. opposite side of belt, with negative charges | |

Credit: Wikipedia image



Credit: www.amasci.com image

The above figure shows the bottom roller and belt configuration of a typical Van de Graaff machine. Electrons from a ground connection are spewed from a needle onto the moving belt, due to the attraction of the positively charged roller. The roller becomes almost immediately charged oppositely from the negative charge on the belt because of the effect of electrostatic induction.¹⁰⁴ The ground connection shown in the diagram would become a limited supply of electrons in the experiment because the ground is now a metallic block that is totally insulated from its surrounding environment. Special care is required to ground the metal block after completion of the experiment in case it builds-up a positive charge.

C. Dropping Magnets to Verify the Electric Field of Mass

If, indeed, the gravity electrons on Earth create the gravity field, then in reality, this force field is an all-encompassing electric field that should be detected. Theoretically, if a magnet is dropped from a certain height, an induced magnetic field is created to oppose the force of the falling magnet and slow its velocity. This type of experiment is similar to a very popular physics experiment where a magnet is dropped through an aluminum tube. The induced magnetic field in the tube noticeably slows the fall of the magnet.

The experiment must be very precise, with high tolerance and repeatability. The masses of the magnetic and the non-magnetic materials must be identical. The masses need to be dropped inside an evacuated tube to eliminate any aerodynamic concerns. The length of fall needs to be adequate to overcome all the inaccuracies of the measured data. The time of each fall is measured precisely to note any differences in their rate of falling. The results should reveal that the non-magnetic mass has a faster fall time. In other words, the magnetic mass is held back by an opposing induced magnetic field created by the falling magnet moving through an electric field, which is that of gravity. Hence, the conclusion is that the gravity force field is actually a weak electric field that is created and emanated vertically by a fairly constant excess of electrons trapped within the Earth's mass.

XVI. How Does Gravity Communicate in this Universe?

This paper is dealing with a new concept for gravity. That concept requires the use of electromagnetic forces and circuits that need a force carrier particle. The fictitious graviton is eliminated and replaced with the already known and accepted photon to produce the long sought Unified Force Theory. Of course, the photon is the force carrier, or boson, for all EM forces. Its maximum velocity for communication between entities in the universe's macro-world is the famous constant, c , the maximum velocity of light. Of course, higher velocities can occur throughout the universe by objects that are accelerating long enough to achieve more than c , or 299,790 km/s. However, communication between that object and another can only occur at something less than this velocity, depending on the refractive index of materials that this force carrier passes through.

This conclusion definitely creates an issue with how gravity appears to communicate almost instantaneously in order to hold planets in their orbits around stars and stars in their orbits around the central core of a galaxy. For instance, the force carrier, or photon, takes 8.3 minutes to travel between the Sun and Earth. The travel time for a photon from the Sun to the farthest planet, Neptune, is 4.15

hours or a rate of $30 \text{ AU} / 4.15 \text{ hr.} = 7.23 \text{ AU/hr}$. The Sun is orbiting the galaxy at approximately $250 \text{ km/s} = 0.06 \text{ AU/hr}$. It seems perfectly reasonable that the Sun should eventually shed Neptune and other planets from its embrace because theoretically the communication time keeps getting larger. However, the evidence shows that Neptune and other planets have stable orbits that obviously must not only orbit eccentrically, but also spiral, following the Sun, to stay with its translating motion. So how does Neptune faithfully receive communication through gravity's photons to maintain its solar orbit? How does the Sun receive communication from a much farther distance, the galaxy core, to maintain its orbit?

The evidence of stable orbits necessitates another theory. If the maximum velocity of light (c) is to remain, then another already known phenomenon must be invoked. The universe, on a macro basis, requires memory. Once a remote body detects a larger body in space, a connection is maintained with the smaller body following and being controlled by the more massive body. This connection is more tenuous at larger distances, as is exemplified by the application of either the universal gravitation law or Coulomb's law. The developed forces are proportional to the number of gravity electrons of each body multiplied together and divided by the square of their separation distance.

The connection is generally indicated by an orbit of the smaller body around the larger body. Kepler's Laws define this connection by involving the acceleration and deceleration of orbital velocity and the spiraling path of the smaller object. This communication, or connection, is maintained as the larger body translates through space.

Hence, the communication should be almost instantaneous for the star and its planets. But, the velocity of light (c) is the communication speed for photons, neutrinos and some relativistic electrons. The communication for stars with their galaxies is also supposedly made by the same velocity constant and particles, or is it?. What is needed are galactic and stellar Birkeland currents, or filaments of current, developed between the stars by magnetic circuitry similar to the interconnection of paper clips being held in a long string by a strong magnet. These universal communications by electric current and magnetic fields have a continuous flow or memory, much like the internet or a computer or your own brain. If the loss of current occurs, such as happens with the collision of two galaxies, then extensive memory loss occurs and massive destruction or chaos ensues. If your computer loses power or current, its RAM memory can be lost. If your brain loses the current of your blood flow from a stroke, the loss of memory ensues. The macro scale is no different. If severed, and the circuitry or filaments of current can be re-established soon enough, then much memory can be saved.

Memory via electromagnetic circuitry maintains connectivity even though current density and voltage potentials vary. Memory is the web-like network or EM circuitry not only for computers and your brains but also for stellar and galactic objects. Once these webs or filaments are established the speed of light or " c " is irrelevant for communication between macro-entities.

The genetic shapes and configurations of star systems and galaxies are a natural consequence of building memory and defeating entropy, chaos or death. The memory for our solar system is aided by Birkeland currents that use the Sun's heliosheath, combined with the magnetic fields of the various planets. Every galactic system and every star system and every planetary system has its own unique

nervous system and space genetics that determine the success of its memory and, yes, its eventual consciousness and longevity.

XVII. Important Manifestations of Electron Asymmetry

If indeed electron asymmetry does exist and is proven, the triggering of other ideas quickly flows. Obviously, machines can easily be envisioned that defy the force of gravity since the mass of objects is not its cause. Since excess electrons can migrate to different celestial bodies, similar to static charges being added or subtracted from puff balls in static electricity experiments, answers may be forthcoming about the dinosaur enigma and how a possibly more advanced, but very ancient civilization, built the mysterious megaliths throughout the world.

New theories may now become approachable by the consensus narrative of current scientific and academic institutions about “charge separation”. If 10% or more electrons than protons exist, then “charge separation” is a very real possibility. This “charge separation” can easily address the mysteries that cause bolts of lightning, balls of lightning, arc blasts between celestial bodies that cause enigmatic scarring on planetary and satellite surfaces and galactic Birkland currents feeding the Sun’s and other stars’ energy supply.

Most importantly, an unlimited and non-polluting energy supply is very possible. If the Sun is constantly emitting electrons in its solar winds that is collected on the planets in vast amounts, then the ground and atmosphere of Earth is a direct source of unlimited electrical power. Drawing this excess electron energy from special ground connections to feed mankind’s electrical utility grid becomes very real. And, perhaps extreme weather conditions on Earth related to solar wind storms can be avoided by absorbing and converting these excess electrons into other forms of energy useful to man, such as supplying the world’s deserts with water through massive desalination technology.

XVIII. End Notes

¹ www.jhu.edu. *Johns Hopkins University*. Archived from [the original](#) on March 4, 2016. Retrieved August 18, 2016. .gif

² Matt Strassler, “The Strengths of the Known Forces”; May 31; 2013

³ Kenneth S. Krane (1988). *Introductory Nuclear Physics*. Wiley & Sons. [ISBN 0-471-80553-X](#).

⁴ “Electroweak”. *The Particle Adventure*. [Particle Data Group](#). Retrieved 3 March 2011.

⁵ <https://en.wikipedia.org/wiki/Nucleosynthesis>

⁶ Donald D. Clayton, *Handbook of isotopes in the cosmos*, Cambridge University Press (Cambridge 2003).

⁷ https://en.wikipedia.org/wiki/Van_der_Waals_force.

⁸ Genet, C.; Intravaia, F.; Lambrecht, A.; Reynaud, S. (2004). “[Electromagnetic vacuum fluctuations, Casimir and Van der Waals forces](#)” (PDF). *Annales de la Fondation Louis de Broglie*. **29** (1-2): 311–328. [arXiv:quant-/0302072](#).

-
- ⁹ Jaffe, R. (2005). "Casimir effect and the quantum vacuum". *Physical Review D*. **72** (2): 021301. [arXiv:hep-th/0503158](https://arxiv.org/abs/hep-th/0503158). Bibcode:2005PhRvD..72b1301J. doi:10.1103/PhysRevD.72.021301.
- ¹⁰ A. Lambrecht, [The Casimir effect: a force from nothing](#), *Physics World*, September 2002.
- ¹¹ [American Institute of Physics News Note 1996](#)
- ¹² Nemiroff, R.; Bonnell, J., eds. (17 December 2006). "[Photo of ball attracted to a plate by Casimir effect](#)". *Astronomy Picture of the Day*. NASA.
- ¹³ "[The Casimir effect: a force from nothing](#)". *Physics World*. 1 September 2002. Retrieved 17 July 2009
- ¹⁴ www.physlink.com/education/askexperts/ae281.cfm
- ¹⁵ <https://en.wikipedia.org/wiki/Proton>
- ¹⁶ https://en.wikipedia.org/wiki/Atomic_radius
- ¹⁷ https://en.wikipedia.org/wiki/Nuclear_force
- ¹⁸ https://en.wikipedia.org/wiki/Weak_interaction.
- ¹⁹ http://catalog.flatworldknowledge.com/bookhub/4309?e=averill_1.0-ch07_s02
- ²⁰ Bondi, A. (1964). "Van der Waals Volumes and Radii". *J. Phys. Chem.* **68** (3): 441–51. doi:10.1021/j100785a001
- ²¹ P. Pyykkö (2012). "Refitted tetrahedral covalent radii for solids". *Physical Review B*. **85** (2): 024115, 7 p. Bibcode:2012PhRvB..85b4115P. doi:10.1103/PhysRevB.85.024115.
- ²² https://chem.libretexts.org/...Forces/...Interactions/Van_Der_Waals_Interactions
- ²³ Isaac Asimov (1976). *Asimov on Physics*. Avon Books, New York, New York
- ²⁴ <https://en.wikipedia.org/wiki/Electron>
- ²⁵ Stewart, Joseph (2001). *Intermediate Electromagnetic Theory*. World Scientific. p.50. ISBN [981-02-4471-1](#)
- ²⁶ https://www.google.com/?gws_rd=ssl#q=electrostatic+unit+to+coulomb*&spf=1
- ²⁷ https://en.wikipedia.org/wiki/Coulomb's_law
- ²⁸ <http://hyperphysics.phy-astr.gsu.edu/hbase/Tables/diel.html>
- ²⁹ https://en.wikipedia.org/wiki/Relative_permittivity
- ³⁰ https://en.wikipedia.org/wiki/Gravitational_constant
- ³¹ J. B. Fixler¹, G. T. Foster², J. M. McGuirk³, M. A. Kasevich^{1,*} "Atom Interferometer Measurement of the Newtonian Constant of Gravity"; *Science* 05 Jan 2007: Vol. 315, Issue 5808, pp. 74-77; DOI: 10.1126/science.1135459; * To whom correspondence should be addressed. E-mail: kasevich@stanford.edu
- ³² Wallace Thornhill, Wallace Talbott, (2002, 2008); *The Electric Universe*; Mikamar Publishing
- ³³ https://en.wikipedia.org/wiki/Solar_wind/Ulysses_observations.
- ³⁴ McComas, D. J.; Elliott, H. A.; Schwadron, N. A.; Gosling, J. T.; Skoug, R. M.; Goldstein, B. E. (2003-05-15). "[The three-dimensional solar wind around solar maximum](#)". *Geophysical Research Letters*. **30** (10): 1517. doi:10.1029/2003GL017136. ISSN 1944-8007

-
- ³⁵ https://en.wikipedia.org/wiki/Solar_wind/solar wind properties and structure
- ³⁶ <https://helios.gsfc.nasa.gov/heliosph.html>
- ³⁷ <https://en.wikipedia.org/wiki/Heliosphere>
- ³⁸ Donald E. Scott, Ph.D. (2006), *The Electric Sky*, Mikamar Publishing, Portland, Oregon; Double Layers, page 74.
- ³⁹ <http://www.ElectricUniverse.com>
- ⁴⁰ J E Allen¹, "The plasma–sheath boundary: its history and Langmuir's definition of the sheath edge"; Published 14 November 2008 • 2009 IOP Publishing Ltd; Plasma Sources Science and Technology, Volume 18, Number 1
- ⁴¹ Wallace Thornhill, Wallace Talbott, (2002, 2008); *The Electric Universe*; Mikamar Publishing; page 48.
- ⁴² Anthony Peratt, *Physics of Plasma*, p. 194
- ⁴³ Wallace Thornhill and David Talbott (2002, 2008); *The Electric Universe*; Chapter 2; Plasma & Electricity in Space; pages 41 and 42; Mikamar Publishing.
- ⁴⁴ https://en.wikipedia.org/wiki/Moon/Impact_Craters
- ⁴⁵ Melosh, H. J. (1989). *Impact cratering: A geologic process*. Oxford University Press. ISBN [978-0-19-504284-9](https://doi.org/10.1017/9780195042849)
- ⁴⁶ "[Moon Facts](#)". SMART-1. [European Space Agency](#). 2010. Retrieved 12 May 2010.
- ⁴⁷ Schneider, N. M.; Bagenal, F. (2007). "Io's neutral clouds, plasma torus, and magnetospheric interactions". In Lopes, R. M. C.; Spencer, J. R. *Io after Galileo*. Springer-Praxis. pp.265–286. ISBN [3-540-34681-3](https://doi.org/10.1007/978-3-540-34681-3).
- ⁴⁸ Io: Overview; Solar System Exploration. NASA. Retrieved 29 October 2014
- ⁴⁹ <http://www.crtsite.com/Heinrich%20Geissler.html>; The Cathode Ray Tube site / Geissler Biography
- ⁵⁰ Egeland, Alv, Burke, William J.,(2005), *Kristian Birkeland, The First Space Scientist*, Springer pp.221, ISBN [1-4020-3293-5](https://doi.org/10.1007/978-1-4020-3293-5)
- ⁵¹ Peratt, Anthony (1992), *Physics of the Plasma Universe, Birkeland Currents in Cosmic Plasma* (p.43-92), Springer-Verlag, ISBN [0-387-97575-6](https://doi.org/10.1007/978-0-387-97575-6) and ISBN [3-540-97575-6](https://doi.org/10.1007/978-3-540-97575-6) [1]
- ⁵² Meyer-Vernet, Nicole (2007). *Basics of the Solar Wind*. Cambridge University Press. ISBN [0-521-81420-0](https://doi.org/10.1017/9780521814200).
- ⁵³ *Geiss, J.; Gloeckler, G.; Steiger, R. Von. "Origin of the solar wind from composition data". Space Science Reviews. 72 (1-2): 49–60. doi:10.1007/BF00768753. ISSN 0038-6308*
- ⁵⁴ Zhu, L.; Schunk, R. W.; Sojka, J. J. (1997). "Polar cap arcs: A review". *Journal of Atmospheric and Solar-Terrestrial Physics*. 59 (10): 1087. Bibcode:[1997JASTP..59.1087Z](https://doi.org/10.1016/S1364-6826(96)00113-7). doi:[10.1016/S1364-6826\(96\)00113-7](https://doi.org/10.1016/S1364-6826(96)00113-7).
- ⁵⁵ A, Brekke; A, Egeland (1994). *The Northern Lights*. Grøndahl and Dreyer, Oslo. p.137. ISBN [82-504-2105-1](https://doi.org/10.1017/9788250421051);"[Windows to the Universe – Auroral colors and spectra](#)"
- ⁵⁶ https://en.wikipedia.org/wiki/Birkeland_current
- ⁵⁷ Le, G.; J. A. Slavin; R. J. Strangeway (2010). "Space Technology 5 observations of the imbalance of regions 1 and 2 field-aligned currents and its implication to the cross-polar cap Pedersen currents". *J. Geophys. Res.* 115 (A07202). Bibcode:[2010JGRA..11507202L](https://doi.org/10.1029/2010JGRA..11507202L). doi:[10.1029/2009JA014979](https://doi.org/10.1029/2009JA014979).

-
- ⁵⁸ K. Rawer. *Wave Propagation in the Ionosphere*. Kluwer Acad. Publ., Dordrecht 1993. [ISBN 0-7923-0775-5](#)
- ⁵⁹ <https://en.wikipedia.org/wiki/Ionosphere>
- ⁶⁰ https://en.wikipedia.org/wiki/Hannes_Alfv%C3%A9n
- ⁶¹ Bostick, W. H. (1986). "[What laboratory-produced plasma structures can contribute to the understanding of cosmic structures both large and small](#)". *IEEE Transactions on Plasma Science*. PS-14: 703–717. Bibcode:[1986ITPS...14..703B](#). doi:[10.1109/TPS.1986.4316621](#).
- ⁶² AL Peratt, J Green and D Nielson (20 June 1980). "Evolution of Colliding Plasmas". *Physical Review Letters*. 44: 1767–1770. Bibcode:[1980PhRvL..44.1767P](#). doi:[10.1103/PhysRevLett.44.1767](#)
- ⁶³ [https://en.wikipedia.org/wiki/Double_layer_\(plasma_physics\)](https://en.wikipedia.org/wiki/Double_layer_(plasma_physics))
- ⁶⁴ <https://www.nasa.gov/content/goddard/van-allen-probes-spot-impenetrable-barrier-in-space> (Nov. 26, 2014)
- ⁶⁵ "[The Van Allen Belts](#)". NASA/GSFC. Retrieved 2011-05-25
- ⁶⁶ https://www.plasma-universe.com/Debye_length and https://en.wikipedia.org/wiki/Debye_sheath
- ⁶⁷ <http://farside.ph.utexas.edu/teaching/plasma/Plasmahtml/node41.html/> Langmuir Sheaths
- ⁶⁸ <https://cass.usu.edu/htm/research-overview/ionospheric-dynamics-morphology>
- ⁶⁹ <http://space.fmi.fi/~noora/Kamaa/Part3.pdf/> Ionosphere - Currents & Conductivities
- ⁷⁰ <http://space.fmi.fi/~noora/Kamaa/Part3.pdf/> Ionosphere - Currents & Conductivities
- ⁷¹ https://en.wikipedia.org/wiki/Birkeland_current
- ⁷² www.swpc.noaa.gov/phenomena/earths-magnetosphere
- ⁷³ Tohru Araki, Kristian Schlegel, H. Lühr; "Geomagnetic effects of the Hall and Pedersen current flowing in the auroral ionosphere"; Dec 1989; *Journal of Geophysical Research – Space Physics*; Volume 94, Issue A12; pages 17185-17199.
- ⁷⁴ https://en.wikipedia.org/wiki/Hall_effect
- ⁷⁵ [NWS Lightning Safety: Understanding Lightning: Thunderstorm Electrification](#). [National Oceanic and Atmospheric Administration](#). Retrieved 25 November 2016. This article incorporates text from this source, which is in the [public domain](#).
- ⁷⁶ Oliver, John E. (2005). [Encyclopedia of World Climatology](#). [National Oceanic and Atmospheric Administration](#). ISBN [978-1-4020-3264-6](#). Retrieved February 8, 2009.
- ⁷⁷ Harrison, R. G. (2011-01-01). "[Fair weather atmospheric electricity](#)". *Journal of Physics: Conference Series*. 301 (1): 012001. doi:[10.1088/1742-6596/301/1/012001](#). ISSN [1742-6596](#).; And, Stephen Smith (May 8, 2015 article); "Spacequakes"; www.thunderbolts.info.
- ⁷⁸ Saunders, C. P. R. (1993). "A Review of Thunderstorm Electrification Processes". *Journal of Applied Meteorology*. 32 (4): 642. Bibcode:[1993JApMe..32..642S](#). doi:[10.1175/1520-0450\(1993\)032<0642:AROTEP>2.0.CO;2](#)
- ⁷⁹ Earle R. Williams (November 2001) "Sprites, elves, and glow discharge tubes," *Physics Today*, 54 (11): 41–47. Available online at: [Physics Today](#)
- ⁸⁰ https://en.wikipedia.org/wiki/Upper-atmospheric_lightning

-
- ⁸¹ news.nationalgeographic.com/.../100730-science-space-spacequakes-themis-nasa-auro/
"Spacequakes" Discovered in Earth's Upper Atmosphere; By Ker Than, for National Geographic News;
August 1, 2010
- ⁸² <http://www.newscientist.com/article/dn17147-superterminal-raindrops-break-speed-limit.html>; May
15, 2009; by Phil McKenna; Magazine issue 2709.
- ⁸³ <http://www.waterjournal.org/volume-5/madl>; Evidence of Coherent Dynamics in Water Droplets of
Waterfalls; by Madl P.; doi: 10.14294/WATER.2013.7
- ⁸⁴ "Comet vital statistics"; European Space Agency. 22 January 2015. Retrieved 24 January 2015
- ⁸⁵ Baldwin, Emily (21 August 2014). "[Determining the mass of comet 67P/C-G](#)". European Space Agency.
Retrieved 21 August 2014.
- ⁸⁶ <https://en.wikipedia.org/wiki/Comet>
- ⁸⁷ http://www1.lsbu.ac.uk/water/water_phase_diagram.html
- ⁸⁸ https://en.wikipedia.org/wiki/Carbon_dioxide/physicalproperties
- ⁸⁹ http://www.bbc.co.uk/nature/extinction_events
- ⁹⁰ https://en.wikipedia.org/wiki/Younger_Dryas
- ⁹¹ "[Climate Change Indicators: Atmospheric Concentrations of Greenhouse Gases](#)". Climate Change
Indicators. United States Environmental Protection Agency. Retrieved 2017-01-20.
- ⁹² <https://en.wikipedia.org/wiki/Frisbee>
- ⁹³ Bill Steele; "How do bicycles balance themselves? New research picks up momentum"; *EZRA*, Cornell's
Quarterly Magazine; Vol. III, No. 4 Summer 2011;
<http://ezramagazine.cornell.edu/SUMMER11/ResearchSpotlight.html>
- ⁹⁴ https://en.wikipedia.org/wiki/Homopolar_motor
- ⁹⁵ <http://www.astronomy.com/news/2004/07/solar-spicules-explained>
- ⁹⁶ <https://www.nasa.gov/feature/goddard/the-fact-and-fiction-of-martian-dust-storms>
- ⁹⁷ <http://lasp.colorado.edu/home/maven/>
- ⁹⁸ <http://lasp.colorado.edu/home/maven/2016/10/17/maven-gives-unprecedented-ultraviolet-view-of-mars/>
- ⁹⁹ https://en.wikipedia.org/wiki/Dust_devil/electricalactivities.
- ¹⁰⁰ Stephen Smith (February 2017); "Ultraviolet Mars"; www.thunderbolts.info (credit: Laboratory for
Atmospheric and Space Physics/University of Colorado; NASA).
- ¹⁰¹ https://en.wikipedia.org/wiki/Cavendish_experiment
- ¹⁰² https://en.wikipedia.org/wiki/Van_de_Graaff_generator
- ¹⁰³ https://en.wikipedia.org/wiki/Faraday's_ice_pail_experiment
- ¹⁰⁴ <http://amasci.com/emotor/belt.html>