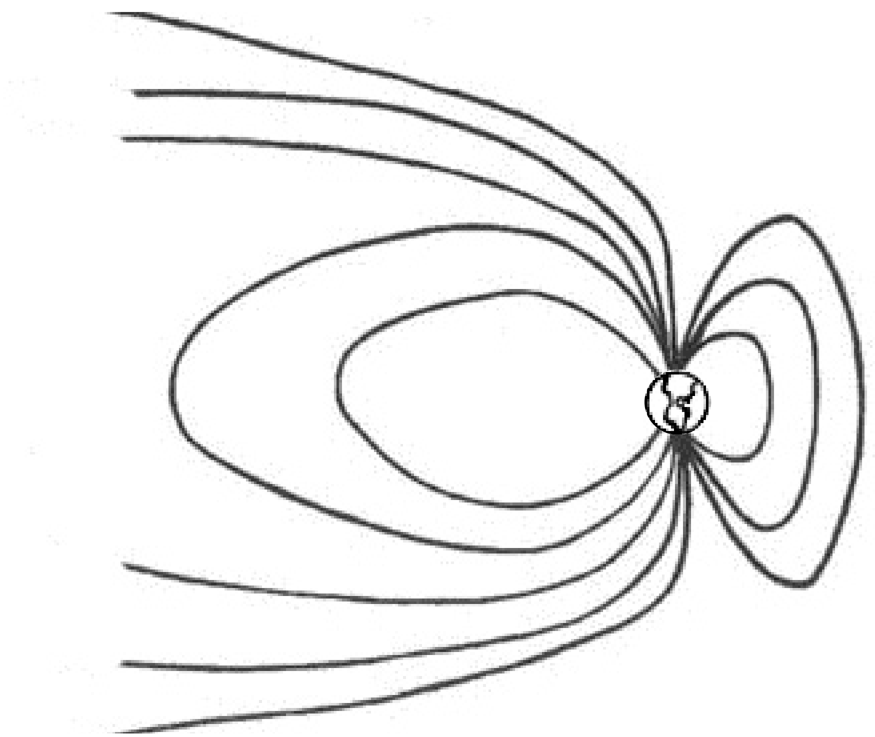
The Ultra-Space Field Theory

A Field Theory Model for Inventors and Alternative Thinkers

By Keith D. Foote



Dear Reader,

This is a *field theory model*. It is a functional, holistic model designed for hands-on inventors and alternative thinkers. It provides streamlined thinkers with a common sense view of quantum physics and cosmology that can be visualized without the necessity of mathematics. **As a new model, the Ultra-Space Field Theory has removed historical flaws traditionally ignored by the supporters of the Standard Model**.

Descriptions of 'light as transverse waves' and 'magnetic field lines as an illusion' are examples. The Standard Model has evolved into a disjointed puzzle which is functional only when reduced to mathematical equations. In this book, **forensic arguments are made against assumptions not officially challenged for over a hundred years.** This model allows for faster than light travel and formally examines magnetic field lines as a reality.

Physics took a wrong turn in 1814. This was when Augustin Fresnel, experimenting with light passing through crystals, decided light was made up of transverse waves. Transverse waves involve up and down movements and typically form when compression waves pass through solid matter. Waves carried along a cracking whip, or a string, with the up-down undulations passing through an up-down slit, are commonly used in describing Fresnel's experiments. Fresnel concluded the aether (the medium believed to transport light waves) must be an elastic 'solid'.

The error made was in projecting the characteristics of transverse waves onto polarized light. In this new model, polarized light waves are not described as transverse, but as electromagnetically aligned. The medium within Fresnel's crystals is electromagnetically aligned and only EM wavelets/quanta from sources with similar alignments can pass through. After leaving the crystal, this 'filtered' light transports the alignments and patterns until interference distorts them.

In 1905, to escape the mounting problems caused by treating light as transverse waves, Albert Einstein promoted a model of light as being made up of massless, chargeless particles traveling through empty space.

By translating Maxwell Planck's concept of quanta into particles (later called photons), Einstein claimed the aether was no longer necessary. What is never mentioned is that **Einstein, in his relativity equations, replaced the concept of 'aether' with the concept of 'space-time'**. Space-time differs from the aether in that it has no electric or magnetic properties, but is based solely on gravity. Gravity becomes the only source of resistance to movement in Einstein's model, and light loses all electromagnetic characteristics. (As an aside, Planck was furious with Einstein for his translation of Planck's experiments.)

Between approximately 1920 and the year 2000, magnetic field lines were traditionally described as an illusion by physicists. This was a political effort, in part to eliminate the electromagnetic field from contemporary physics and, in part to hide the fact magnetic fields could not be explained using a particle theory model. (Magnetic field lines have recently become important to astrophysicists and electronics engineers. There has been no official debate on the issue of their reality, simply a shift in the consensus opinion.)

After over one hundred years of use, there are no photon-based technologies. All of our modern electronics are based on electromagnetic wave technology. A schism has developed in our understanding of physics, resulting in significant confusion and a movement away from physics by students and the general population. **The Standard Model rests on a disconnected hodge podge of archaic conclusions, with mathematics as the only shared common language**.

I once overheard a physics professor state, "A person who isn't good at math doesn't deserve to be in a physics class."

The vast majority of modern ‘academic’ physicists are natural mathematicians. Mathematics reduces reality to measurements, quantities, and equations, using numbers and symbols. **Mathematics, by its very nature, is reductionistic to the extreme, meaning it is not an associative process (and generally, mathematicians are not inventors of new technologies).**

The USFT model translates the observations of historical experiments, and more modern ones, into a coherent paradigm and field theory language. Using one model (one language) to explain a variety of observations and experiments has a streamlining effect on the thinking process.

The Ultra-Space Field Theory is holistic in nature. It was developed by dismantling the current Standard Model of quantum physics and cosmology, and dropping assumptions lacking good supporting evidence. An overview perspective was used in reassembling the puzzle, with the behaviors of electric, magnetic, and gravity fields as guidelines. **Gravity, as the electrically-based contraction of space, is treated as an energy field**.

Quoting Louis de Broglie, “*History clearly shows that the advances of science have always been frustrated by the tyrannical influences of certain preconceived notions which were turned into unassailable dogmas. For that reason alone, every serious scientist should periodically make a profound reexamination of his basic principles*.”

Mathematics is great for fine tuning, but is terrible for creativity.

This new model is great for creativity (and understanding), but is not a tool for fine tuning.

Math does have its uses. It just shouldn’t be taken to an extreme. Keith

p.s. This model also lays a very functional foundation for understanding chemistry.

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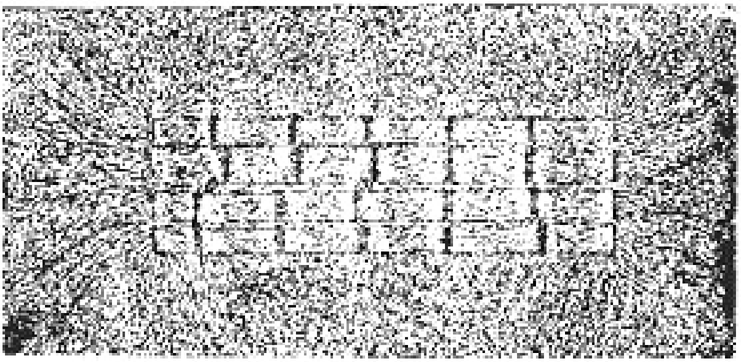
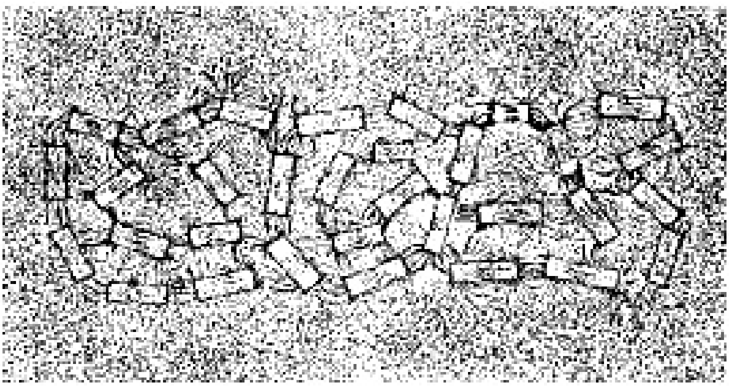
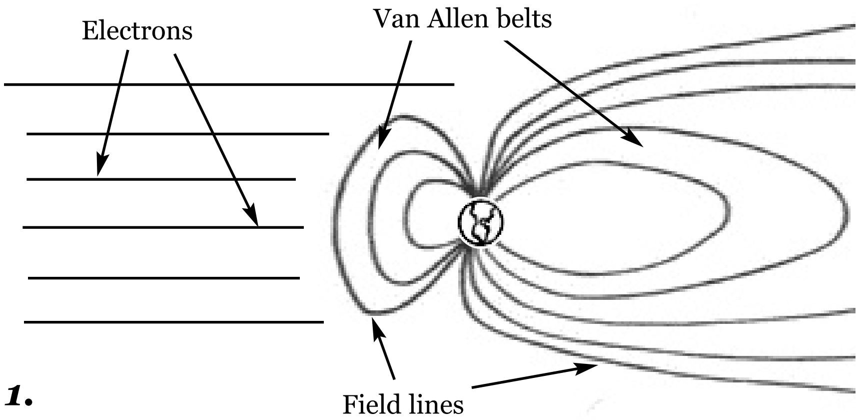
Changing Paradigms

A Quick Visual Lesson
(Got your thinking cap on?)



In the above picture, several magnetic bars have been aligned to form an overall, larger, coherent magnetic field. In the lower picture, the bars are in disarray, neutralizing one another, and blocking the formation of an overall, larger field. There is a zero reading from the overall magnetic field in the lower picture, but this does not mean the magnetic fields have 'annihilated' one another.





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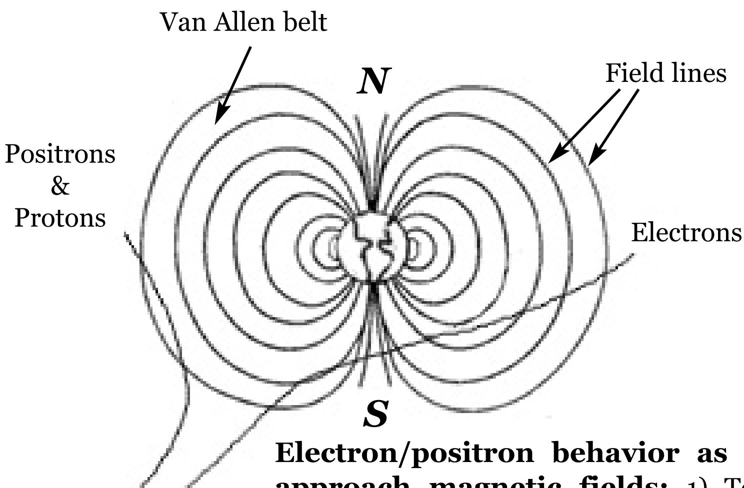

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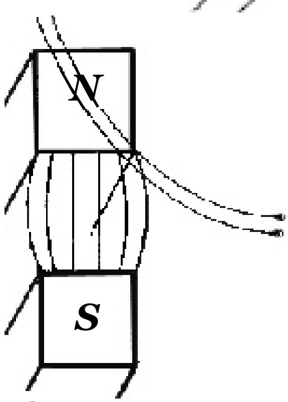

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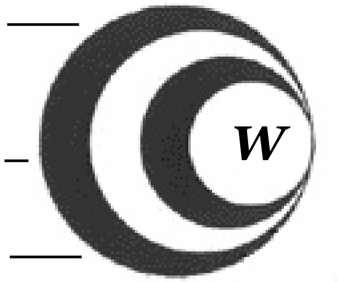
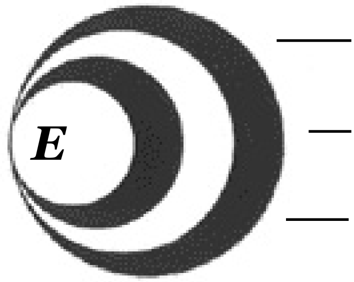
Electron/positron behavior as they approach magnetic fields: 1) Terra's magnetic field is compressed by electrons ejected from Sol. This magnetic field also protects us from beta radiation (electrons). Terra has a bipole magnetic field, sourced from a common center. 2) Electrons veer to the east as they approach a magnetic field, while positrons and protons veer to the west. These field energies can also become trapped in the Van Allen belts that exist between the magnetic field lines. 3) Electrons veer to the east of manmade 'dipole' magnetic fields, as well. The poles to the left are from two separate magnets.



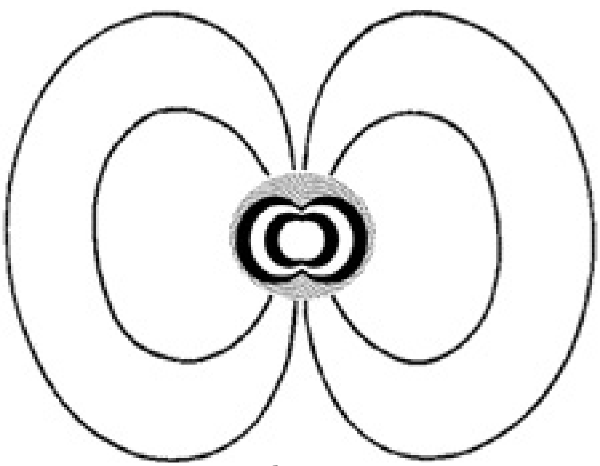
Positron



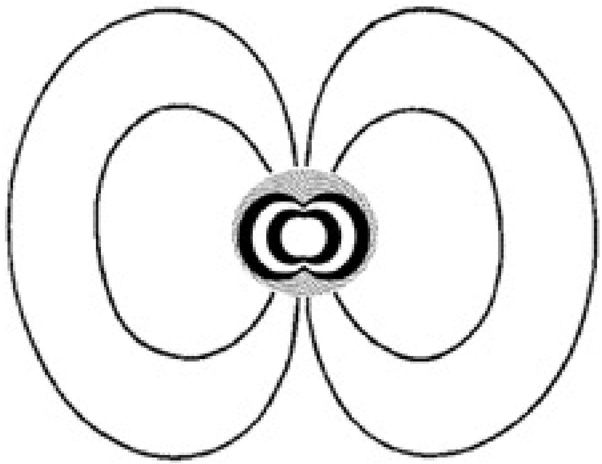
Electron

Unlike the Standard Model, the USF theory predicts electrons and positrons do not destroy one another, but join to form an ultra-subatomic electric black hole, called a thermon. Thermons transport light, and can be detected en masse in the form of dark matter.

Pair Joining

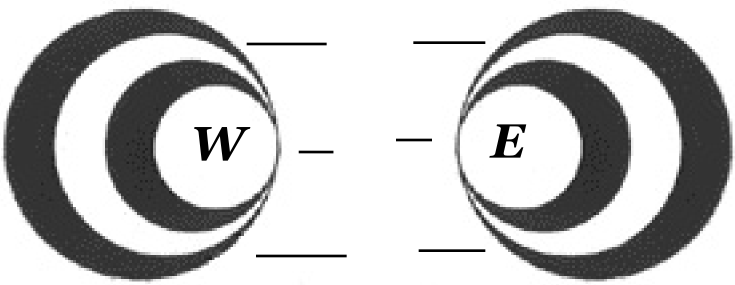


Thermon

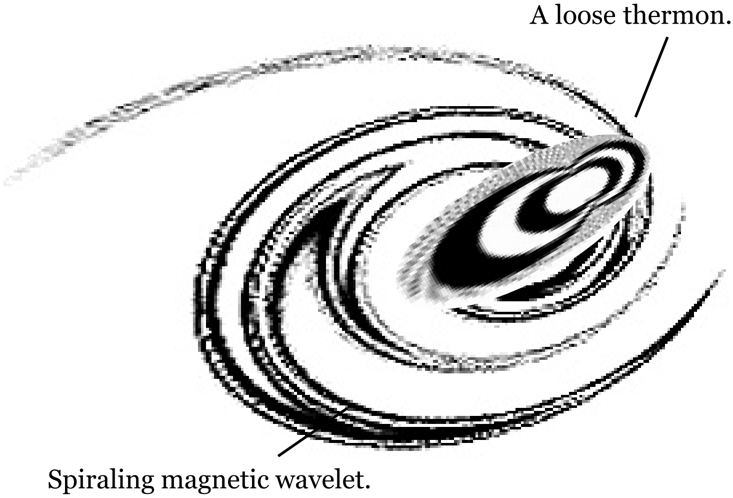


Thermon

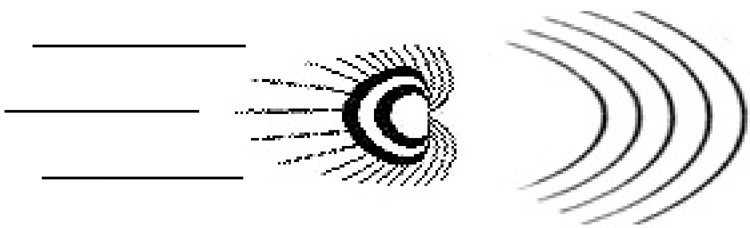
Pair Separation



Positron Electron

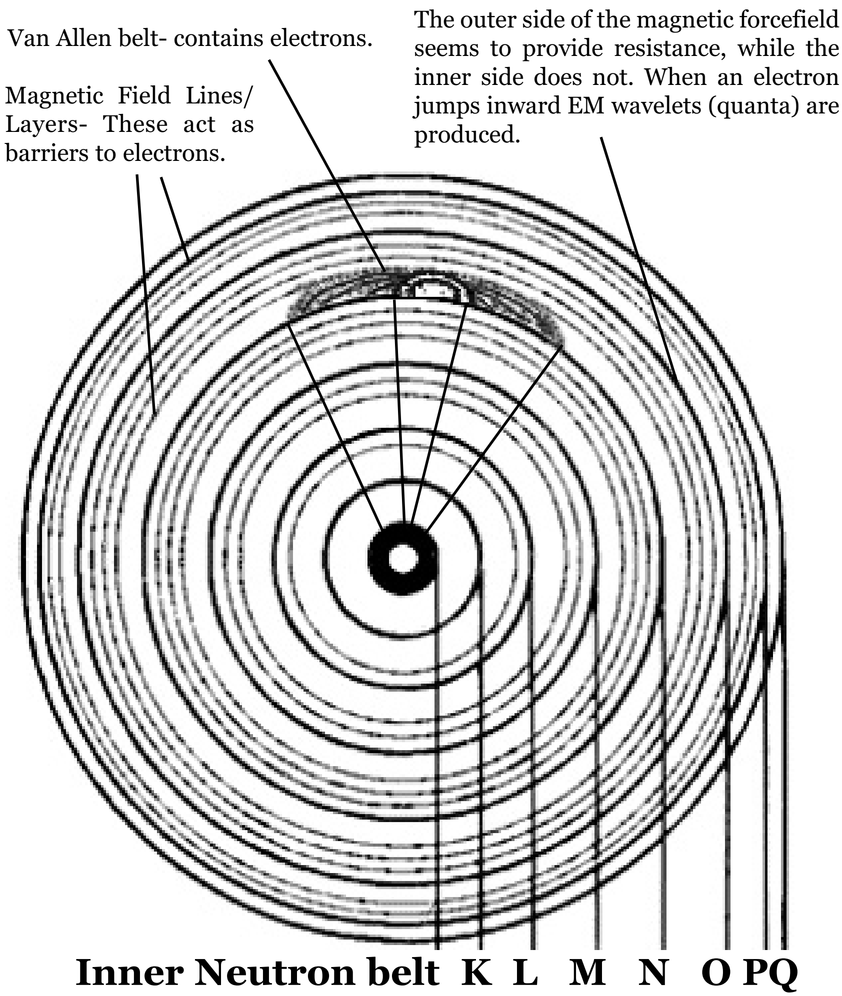


The thermon is rotated and unevenly compressed by the spiraling EM wavelet. This results in the light becoming elliptical.

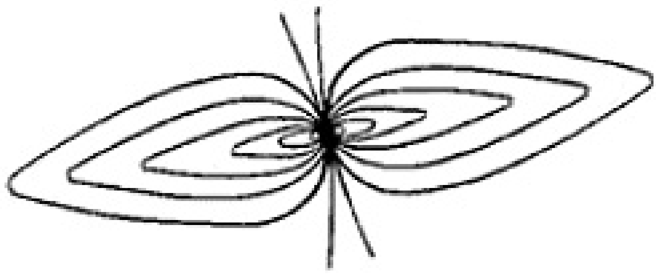


An electron accelerated to near the speed of light, meeting resistance from the EM field and generating synchrotron radiation. At faster than light speeds it creates Cerenkov radiation, with the EM waves being created to the side and rear of the electron.

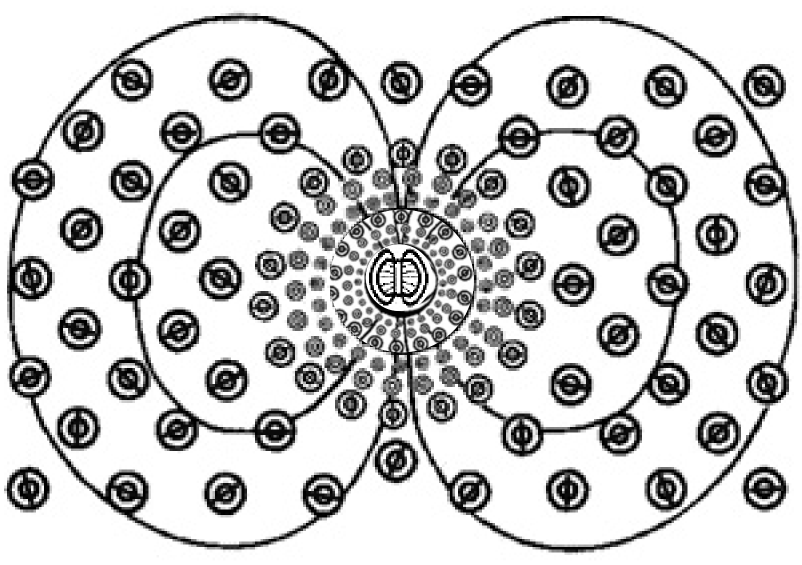
Polarized light passes through a leaded glass rod. A flow of electric current provides a persistant pressure which realigns the thermons, gradually changing the orientation of the polarized thermons and adding a spin to the EM wavelets .



A perspective of the proton from above its north pole. The proton has been assigned seven electron shells, or Van Allen belts, labeled K through Q. (This model of seven Van Allen belts/electron shells has been projected onto 'all' atoms with moderate success.) The individual proton has an eighth, very close inner belt which allows it to become a neutron. There are a number of subbelts that exist between the traditional belts. In more complex atoms, there may be more complex Van Allen belt systems.



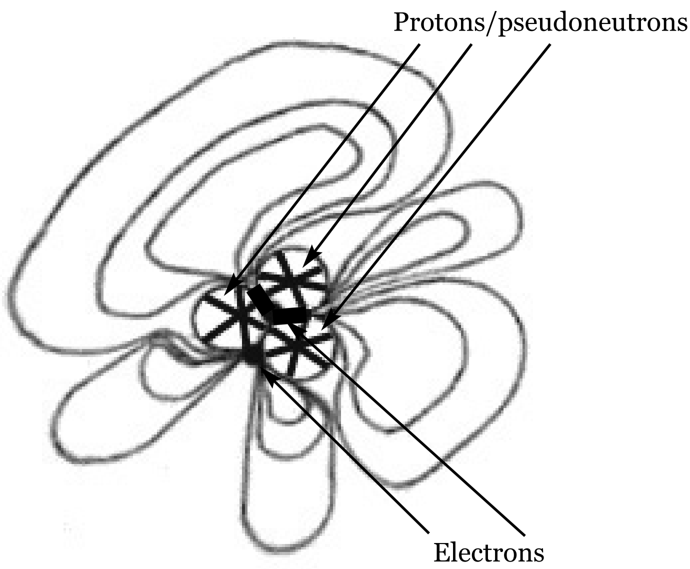
Field energies (gravity, electric, magnetic) can be altered by spin, and other environmental factors. The above picture is Jupiter's magnetic field. Its gravity field is also weakest at its equator, due to the planet's spin.



In this model, the proton is described as having two positrons joined to a single electron at its core. This results in a field entity with stronger gravity and magnetic fields than the thermons. This stronger gravity field, in turn, condenses the surrounding thermons. The nearer thermons surrounding the core form a stable lattice structure. This model of thermons condensing around gravity wells also applies to planets, stars, and black holes. Additionally, it provides an explanation for the missing positrons (Electrons and positrons are created in equal numbers, yet electrons are abundant, while positrons are quite rare.) It also provides a model for gravity and the gravitational lensing of light.

Within the atomic core, the neutron is treated as a proton sharing neutralizing electrons with other protons. With the exception of 'simple' hydrogen, all protons and neutrons within an atomic core are referred to as pseudo-neutrons.

In this model, a true neutron exists only temporarily, after it has been expelled from an atomic core and before it separates into an electron and a proton. The concept of neutrinos is discarded and treated as a mathematical misinterpretation. Neutrons are not treated as fundamental, or elementary particles.



Above: A tritium atom, a form of hydrogen, with multiple magnetic poles (called consequent poles). The three pseudo-neutrons share two electrons. Tritium is mildly unstable and will break down, releasing an electron to become Helium-3. Helium-3 has an atomic core with three pseudo-neutrons sharing one electron. (Guess which electron gets ejected and figure out why helium-3 is so stable.)

Some Basic Concepts
(Differences beween the Standard Model and the USFT Model)

Electrons and positrons do not annihilate one another in this model. The concept of a -1 added to a +1 to produce 0 is treated as an overly simplified mathematical illusion. Instead, this new model predicts they join, neutralizing one another, and creating an ultra-subatomic electric black hole surrounded by a weak magnetic field.

En masse, thermons are also called ‘dark matter’.

Light is made up of electromagnetic waves, not photons. These EM waves are transported by thermons, and are treated as compression waves, very similar to sound waves. They are visualized as longitudinal waves moving through ‘fluid’ energy fields, not as transverse waves moving through an elastic solid.

Inertia and gravity are not the same thing.

Both models agree gravity provides resistance to movement. In this model, gravity is not the one and only source of resistance to movement.

In the USFT model, gravity is described as the electrically based contraction of space. The curvature, or warpage of space described by the General Theory of Relativity broadly predicts the effects of gravity, but not the process.

Electrons and positrons are not assigned a gravity field. Their resistance to movement is based, not on gravity, but on interactions with electric and magnetic fields, and ultra-subatomic thermons. (Electrons-positrons are not assigned a gravity field, but as joined entities called thermons, they are.)

The electromagnetic field (or space-time, or the aether) is not considered 'homogonous'. (The aether *was* considered a homogeneous, elastic solid and The Special Theory of Relativity treated space-time as homogeneous, though the General Theory did not.) **Gravity wells create warpages in the in the electromagnetic field**. (This seems obvious, but I've never read, nor heard of it, stated this way.) (This paragraph prompted a line of thought described on pg 264.)

There are two basic types of energy in the USFT model. 1)Kinetic energy, the energy of movement, and 2)field energies, which include gravity, magnetic, and electric fields.

Time is treated as the process of change. It is not considered a fourth dimension. Clocks and calenders are tools for recording and measuring predictable changes in our environment. Gravity may slow down some electromagnetic events, but the process of 'physical' change does not slow.

The concept of electron spin has been dropped and replaced with an electron's preferential eastern orientation. (Electron spin was originally used to project a magnetic field onto the electron, but it displays no magnetic poles and there is no evidence of permanent spin. Currently, though the 'concept' of electron spin has been disproven, it continues to be used as a mathematical reference in the Standard Model. (The equations still work, making a visual model 'unnecessary and archaic'.)

The concept of a gravmagnetic field is introduced (but is not terribly well developed and awaits more research).

The speed of light is a variable, dependent on the medium transporting the EM waves. Light travels more slowly through matter (air, glass) and much more quickly in the depths of space between galaxies.

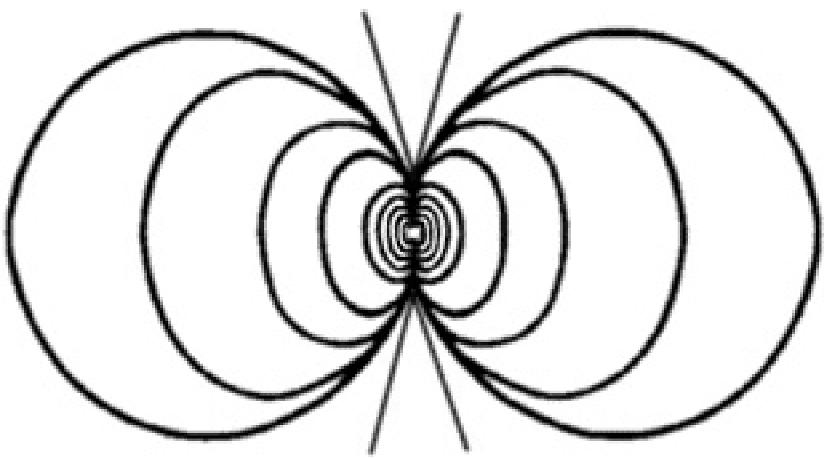
Protons are described as containing at their core two positrons joined to one electron.

Neutrons are described as a proton with an electron in its innermost Van Allen belt. No neutrinos required.

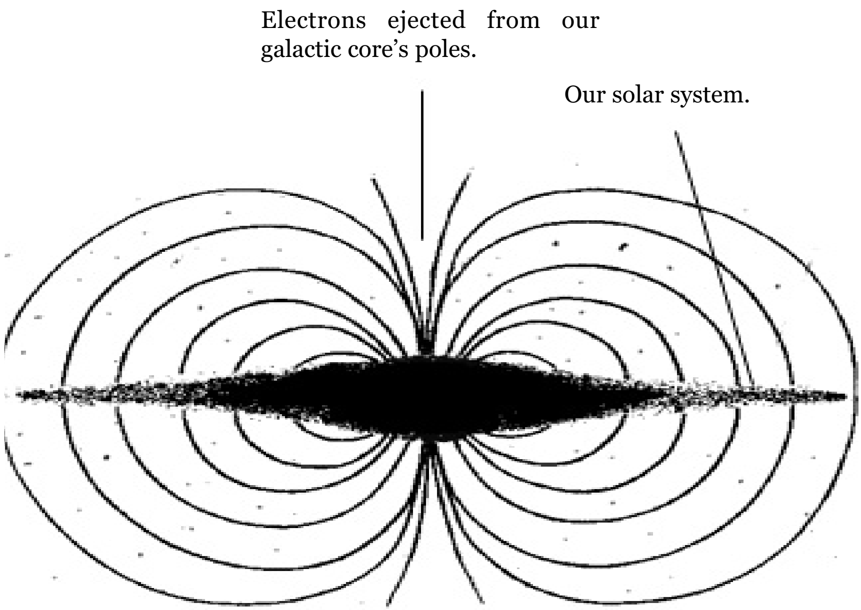
Protons and neutrons, as part of an atomic core are called pseudo-neutrons because they are bound to shared electrons.

Supporting evidence for these concepts is provided in the following chapters. (Except for time. It is 'assumed' the nature of time as a symbolic representation of change becomes self-evident with a reasonable amount of thought.)

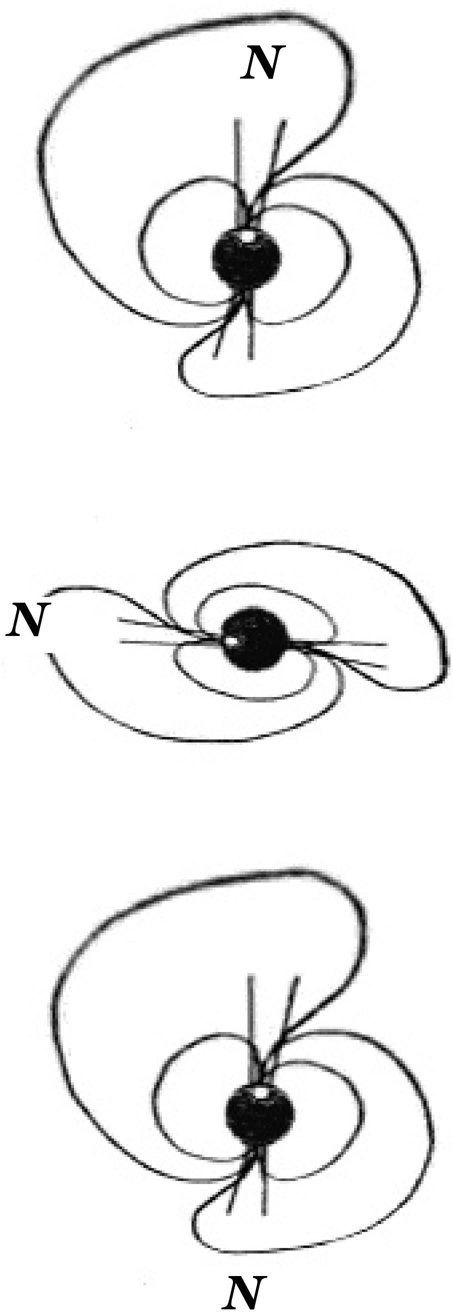
More Visuals



Sol's magnetosphere and Van Allen belts. The magnetic forcefield layers are distended outward by the same high speed electrons which compress the Earth's magnetosphere. In the USF theory, electrons ejected by Sol help to keep the planets in stable orbits, rather than spiralling into the sun.



Our galaxy and its magnetic field. Note how most of the matter, solar systems, gas clouds, etc. are located in the galaxy's equator. Due to spin, the galaxy's gravity field is weakest at its equator. As with our solar system, electromagnetic and gravitational influences gradually pressure matter into equatorial orbits. (This model predicts our galaxy's magnetic field will also be distended at the equator.)



A puslar rotates at a very high speed. One of the unique characteristics of a pulsar is its polar rotation. The pulsar does not rotate around its magnetic poles. Instead its magnetic poles rotate around a common center. The field strength of its moving magnetic poles causes disruptions in the local EM field, typically producing radio waves in a "lighthouse" effect. The radio waves of detectable pulsars sweep past the Earth, appearing and disappearing every few seconds or less. (It should be noted that a true pulsar must have poles rotating around a common center to produce the lighthouse effect.)

Flaws in the Special and General Theories of Relativity
(Ignoring the Obvious)

In 1905, Professor Albert Einstein declared the aether unnecessary (for mathematical equations). This was one of the early steps in establishing a model of physics which was purely mathematical. Describing light as mathematical units called photons was also a part of this paradigm shift. **Einstein's declaration established a philosophy of mathematical reductionism**.

Einstein's Special and General Theories of Relativity are based, in part, on observations of light as it passes through various types of moving matter (such as water), theoretical predictions called the Lorentz Transformations (which are based on the aether-as-an-homogeneous-elastic-solid model, and have numerous errors), and on the assumption nothing can move faster than the speed of light. The Special Theory came first and parts of it were used in developing the more broadly scoped General Theory.

Because Professor Einstein included actual observations in developing the Theories of Relativity, some predictions are accurate, while others not.

The gravitational lensing of light was an accurate prediction, and observed on May 29, 1919. It is used as supporting evidence for the General Theory of Relativity. The USFT model completely agrees with the General Theory on gravitational lensing. Both theories use an aether model format, but the Relativity Theories disguise it as space-time.

Curiously, gravitational lensing is also used as supporting evidence for the Special Theory. The Special Theory does not predict gravitational lensing, but because parts of it were used in the General Theory, it is assumed to be true by way of association.

In his Special Theory, Einstein predicted the speed of light adjusts itself to the speed of the observer, a subjective constant. According to Einstein, light everywhere adjusts itself to to match the speed of all observers, simultaneously, regardless of the observers speed and direction. A person traveling at the speed of light would see the light from distant stars in the same way a person on Terra would see them. This would be true regardless of whether the light was coming from behind, or from in front of, the traveling observer.

In his Special Theory of Relativity, Einstein starts by imagining that if a person is traveling at the speed of light, and looking in a mirror, the reflection would suffer no distortion. Reflected light from the mirror would travel, from the person's perspective, at its normal speed.

The Ultra-Space Field Theory agrees with this conclusion **'only if'** the person is traveling inside a spaceship, or within a strong gravity field. If the person is flying superman style at the speed of light, outside of a contained environment, the light would never reach the mirror to become reflected light.

This field theory model predicts the medium transporting light influences the speed of the light, and its direction. This conclusion is supported by the spreading of light passing through a prism to create a rainbow, and by the gravitational lensing of light by stars and galaxies. In both cases the medium obviously alters the direction of light, and less obviously, its speed.

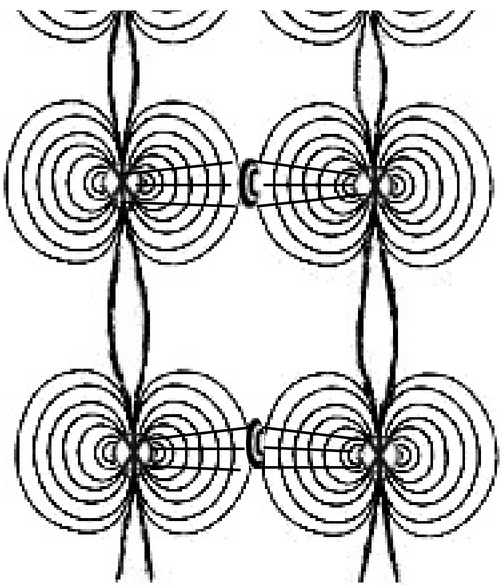
In the Ultra-Space Field Theory, the results of the Michlson-Morley experiment are explained as the electromagnetic field condensing with Terra's gravity well. As the EM field condenses, electromagnetic waves traveling through it slow. The speed of light is altered by gravity, and differing gravity fields would produce different speeds of light. For example, the speed of light would be different on Jupiter than it is on Terra, regardless of whether or not the experiment is performed in a vacuum.

One of Einstein's errors was in assuming resistance to movement, or acceleration, was the same thing as gravitational attraction. This assumption forced him to assign electrons a gravity field with no evidence of gravitational attraction, only resistance to movement.

Additionally, electrons traveling faster than light (see Cerenkov radiation) show the assumption of light as a speed limit to be in error. **Einstein's Special Theories neither predicted, nor included, Cerenkov radiation**. Nor can the Theories of Relativity be used to explain this phenomenon.

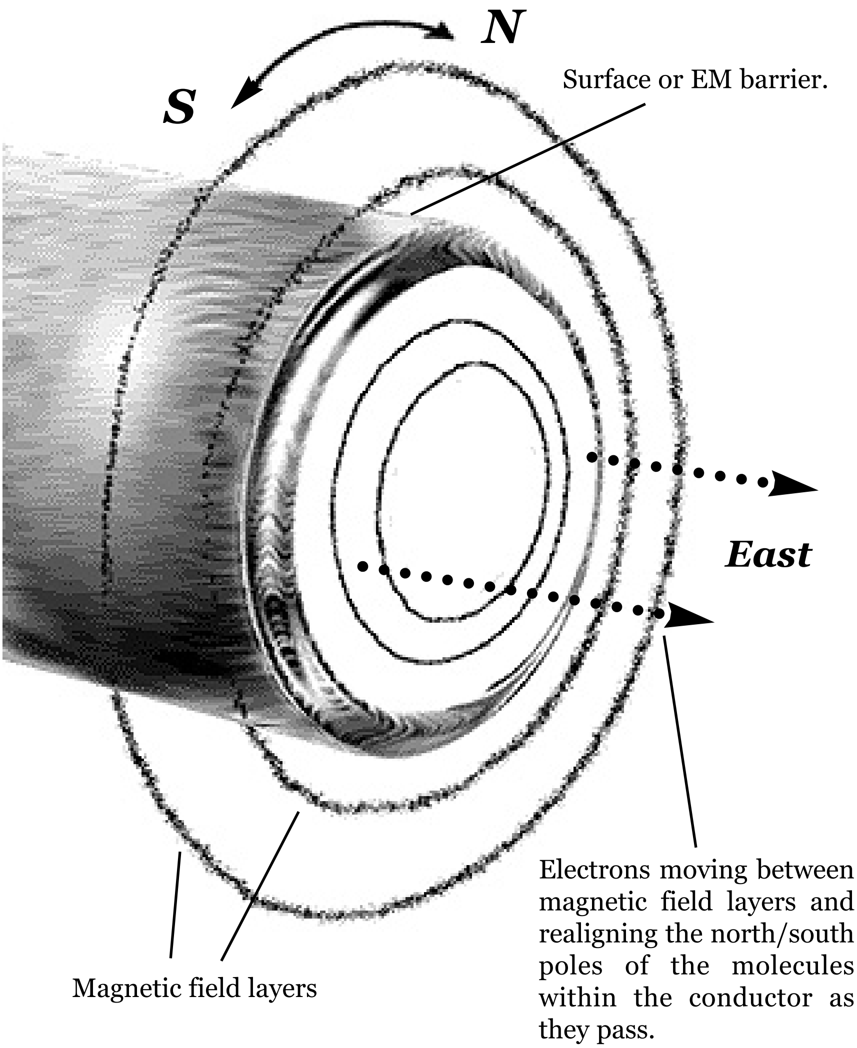
The physics community's philosophy of extreme reductionsim, and their faith in Einstein's assumptions, carries with it the dangers of significant misinterpretation and self-generated illusions. This, in turn, has stunted the development of new technologies.

More Visuals, 2

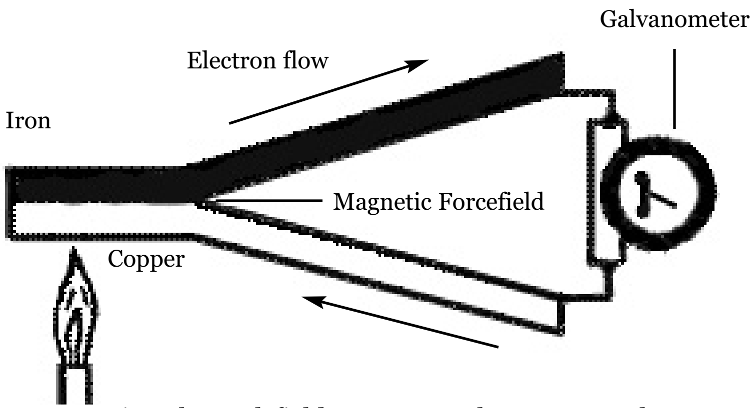


Lattice structure of a crystal showing the electric and magnetic bonding of molecules .

A simplified model of electricity shows the enlarged cross section of a wire carrying electric current. If the electron flow changes direction, the magnetic poles reverse to comply with the eastern movement and pressure of the electrons.



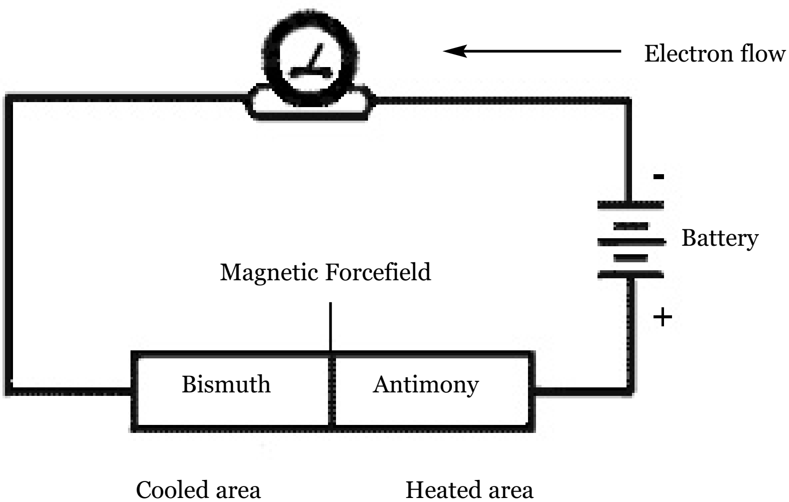
A thermocouple uses the Seebeck effect.



Just as a moving thermal field can move electrons, so electrons can move free and loose thermons. The Seebeck and Peltier effects provide examples of this process. The heat generated by electric resistance provides another example.

The joined EM barriers create a one-way magnetic forcefield, which prevents heat/loose thermons from returning. In the Seebeck effect moving thermons transport electrons. In the Peltier effect, moving electrons transport thermons.

The Peltier Effect



Chapter Two-
Energy Fields

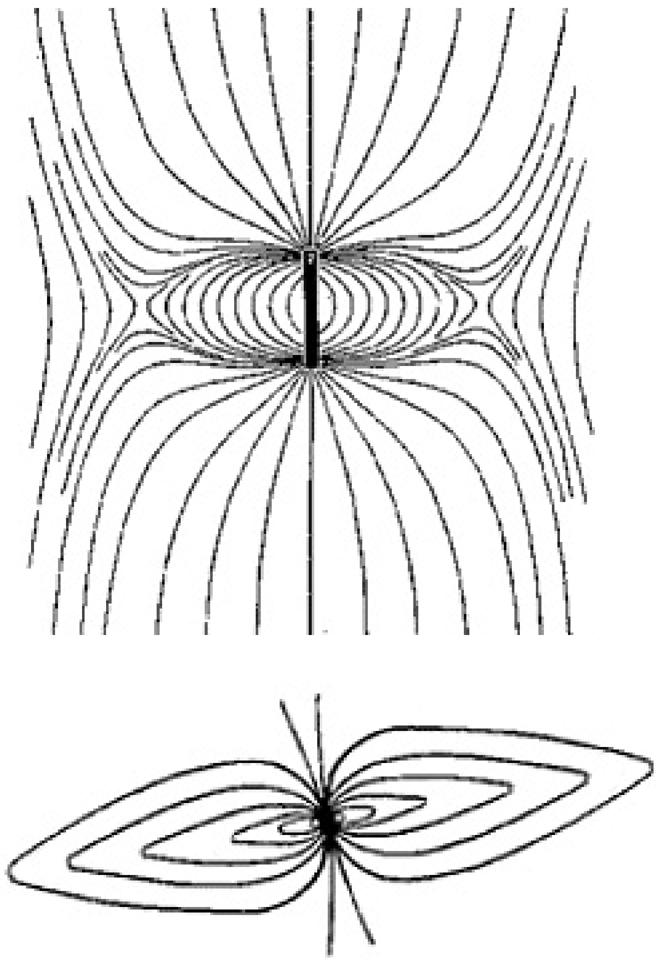
Energy Field Characteristics
(Endless Influences)

Energy fields are amorphous, occupy space, and some differing fields can coexist simultaneously in the same space, while others cannot. Two common examples of energy fields are gravity and magnetism. Gravity is a contracting energy field which attracts other gravity fields. Magnetism has north and south poles, with opposite poles attracting, while like poles are repelled. Gravity fields and permanent magnetic fields can occupy the same space, radiating from the same general area. Additional fields can interact with the first two.

Differing fields occupying the same space can have different strengths, and environmental factors can alter the influence of a field. The influence of a field gradually weakens with distance and grows stronger near its center. A field radiates from, or contracts toward, a central core.

A field cannot be viewed as an isolated entity in the way a particle is. More accurately, it is an energy pattern with a concentrated center, within larger fields. The pattern interacts with other fields, and they influence one another.

Inertia is a characteristic of energy fields. While they are not considered matter, gravity, magnetic, and electric fields each display forms of inertia. The inertia displayed by matter is the influence of energy fields, at subatomic scales and larger, resisting movement from still larger fields. The greater the speed, the stronger the resistance. Positrons and electrons moving at near speed-of-light velocities meet



A magnetized iron bar at the top, and Jupiter's intense magnetic field at the bottom. Both express gravity and magnetic fields simultaneously. Both fields seem to occupy the same space simultaneously. Jupiter's magnetic and gravity fields are distorted by the planet's rotation.

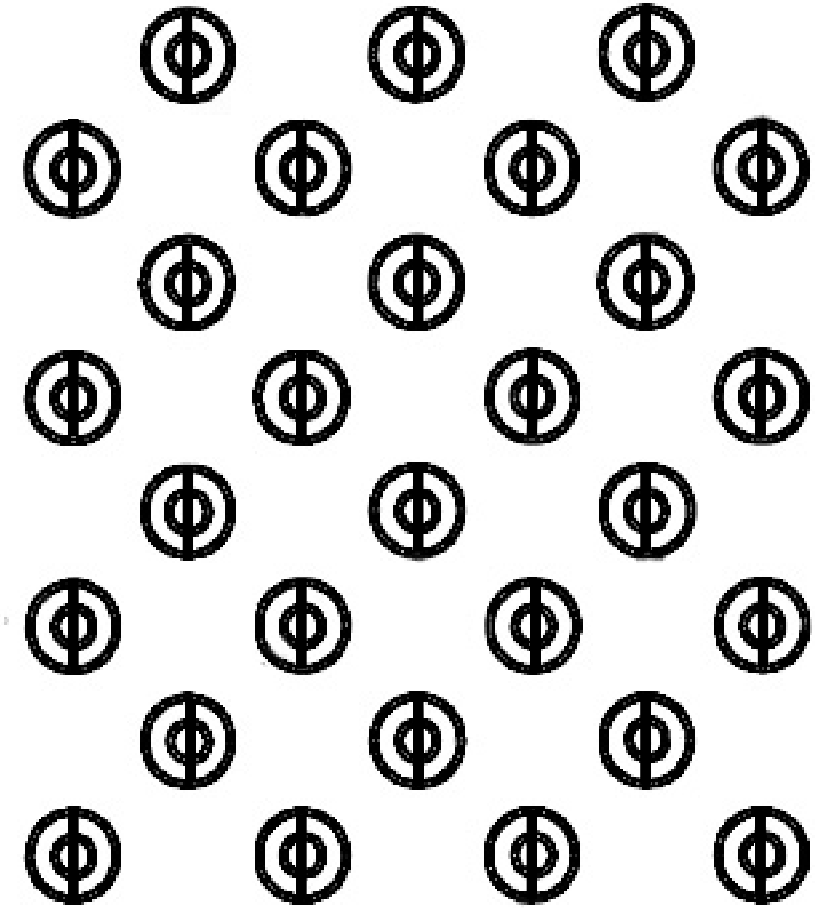
significant resistance because of a larger electromagnetic (EM) field. Protons, having a magnetic field, an electric field, and a gravity field, meet resistance from surrounding EM and gravity fields. **Were there no resistance, a field entity, or an object, would arrive at its destination instantly**.

Energy fields are amorphous, altering their shape and density to fit environmental relationships. At the macroscopic level (large enough to be easily seen by the human eye), fields centered in matter are altered by the shape of that matter. Fields, such as electrons, existing independently and without significant velocity, *seem* to radiate evenly from a central point, though with no apparent surface area. While interacting with a proton, or traveling at a high speed, an electron's field shape can be altered dramatically.

Within the framework of the Ultra-Space Field Theory, electrons, positrons, protons, and other subatomic entities are classified as energy fields. The phrase "subatomic energy field" may be abbreviated to "subfield."

The Electromagnetic Field
(Three Fields In One)

The most obvious property of the electromagnetic field is its ability to transport light. Compression waves move outward through the EM field from their point of origin. The electromagnetic field can be visualized as a magnetic field, heavily peppered with ultra-subatomic, electric black holes. The contracting, electric black holes each generate a gravity field, and a magnetic field which merges to form a universal electromagnetic field. These electric black holes are a neutralized combination of joined electrons and positrons, called thermons. Within matter, the EM field is called the thermal field. (In the Standard Model, the illusion of positive and negative charges promotes a model of electrons and positrons annihilating upon contact.)



The joined positron-electrons (thermons) are represented symbolically by a circle within a circle, and a line separating the two combined fields (crude, but effective for chalkboards). A magnetic field occupies the space between these subfields, creating a layering effect.The joined positron-electrons are nearly neutral electrically and, en masse, make up dark matter. They represent a more evolved version of Dirac's 'Sea of Electrons'. Though nearly neutral electrically, and ultra-subatomic, they are still influenced by electric and magnetic fields, as well as by gravity.

After a disturbance in the EM field has been initiated, a magnetic field layer transports the kinetic energy to the electric layer, which in turn transports it to the next magnetic layer, and so on. As the wave spreads outward from its source, thermon compression gradually diminishes, but the waves continue to travel at the same relative speed.

In a vacuum, these EM waves are described as traveling at 299,792 km/sec. In various forms of matter (glass, water) they travel more slowly, as the EM field within different forms of matter (the thermal field) is denser. Viewing an EM wave while traveling beside it at the same speed would show a rhythmically pulsing process, very similar to an underwater compression wave, or sound waves.

Magnetic and electric fields (and field lines/layers) cannot exist in the same space simultaneously, and interact repulsively. The standard magnetic field radiates outward from two poles fused to a common center. Thermons contract inward from two poles, the electron and the positron, which are capable of separation and an independent existence.

The thermon's gravity field is the result of an electrical contraction of space. It is a much weaker and less detectable gravity field then the one expressed by protons. The magnetic and gravity fields dissipate when the thermon splits.

Pair Separation
(Formerly Known as Pair Production)

This model recognizes the pair separation of an electron and a positron as the result of a thermon caught between the collision of EM waves and a stabilizing energy field (typically an electric or magnetic field), which is nearly stationary, or moving toward the oncoming EM wave. **High frequency EM waves (typically gamma rays) produce vibrational patterns within the thermons, causing separation in the same way glass shatters from high pitched sounds**.

The thermon is continuously compressed and released by the high-frequency rhythm of the gamma rays. The compression process continues, with the connecting electric field lines stretching and weakening the bonds of the electron and positron. Upon separation, each takes opposing trajectories, often traveling with similar velocities. Interfering magnetic and electric fields can alter their direction and speed.

Electrons and positrons are defined as two different types of subatomic electric fields.* This model does not project a magnetic field and 'spin' onto these two subfields. **The USF theory associates electrons with an eastern trajectory and positrons with a western trajectory, per numerous experiments**.**

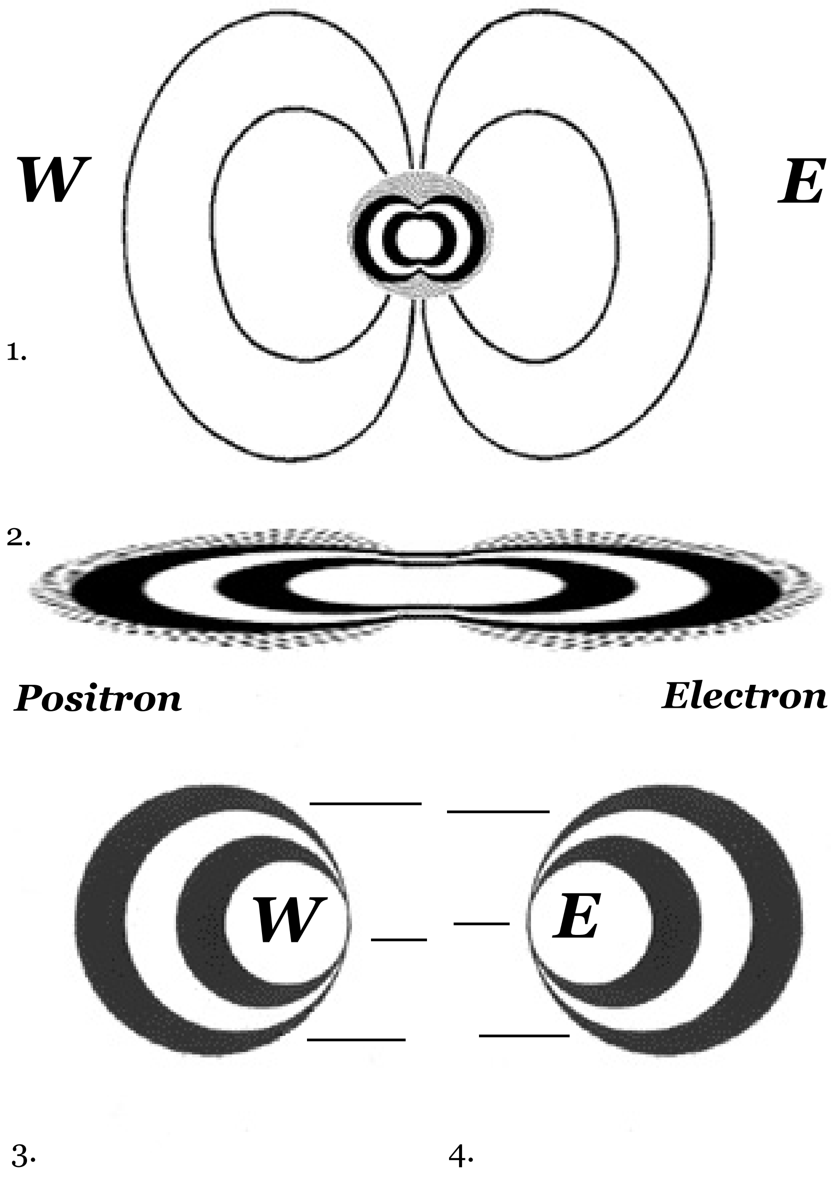
This phenomenon is known as the East-West Geomagnetic effect. Electrons and positrons are repelled by the magnetic north and south poles of a planet, and if moving toward its equator, will scatter horizontally, with electrons moving "preferentially" to the east and positrons preferentially to the west. This effect interested the AMS (Alpha Magnetic Spectrometer) group, led by M. Honda, M. A. Huang, and K. Kasahara,*** using computer models.

The East-West Geomagnetic effect is also expressed using dipole magnets, though the directions east and west are often referred to as up and down. (A dipolar magnet uses two separate magnets with north and south poles interacting, while a bipole magnet has its poles sourced from a common center.) The north pole of the magnet is positioned to the left of center and the south pole is positioned to the right of center. The positron moves down (or west) and the

*(Particle physics defines the positron as an electron with a reversed spin.)

**(Reference: Trend Report, #3 http//www.magnet.oma.be/trend4/public/trend3/test06.gif, 'On the Magnetic Reflection of Cosmic Rays' by B. Rossi, Physical Review, #36, p606, 1930, and 'A Positively charged component of Cosmic Rays' by A.H. Compton, Physical Review, #43, p835, 1937.)

***(Presented at the 27th International Cosmic Ray Conference, Hamburg, 2001. http//ikfia.ysn.ru/icrc27/papers/ici6506 p.pdf.)



A joined positron-electron is split by compression between two energy fields, typically magnetic fields and/or an electric field are involved. Picture 1 shows a symbolic representation of the thermon. Picture 2 shows the splitting process. Pictures 3 and 4 show the symbolic representations of the positron and electron as west and east monopoles.

electron moves up (or east, in reference to north).*

Electrons and positrons express polar characteristics, as evidenced by their attraction for each other. But, unlike a standard magnetic field, the two poles are not locked to a common center. They can exist as independent monopoles. In their relations to a magnetic field, the electron may be described as an east pole and the positron as a west pole. Both monopoles have a similar impact on the surrounding EM field, and display similar patterns while traveling.

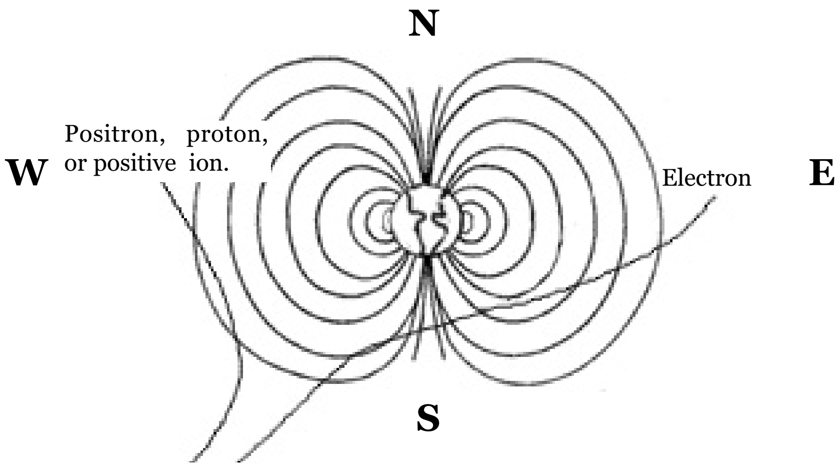
In 1785, Charles Augustin de Coulomb developed the inverse-square law, which predicts the weakening of field strength with distance and the attraction of "opposite" electrical charges. Protons provided the positive charge in his experiments. At that time, the positron had not yet been discovered, nor was there enough information to suggest the electron was an "east" monopole. In 1787, he noticed the similarities of magnetic and electric fields and expanded the inverse-square law to include the north/south poles of magnets.

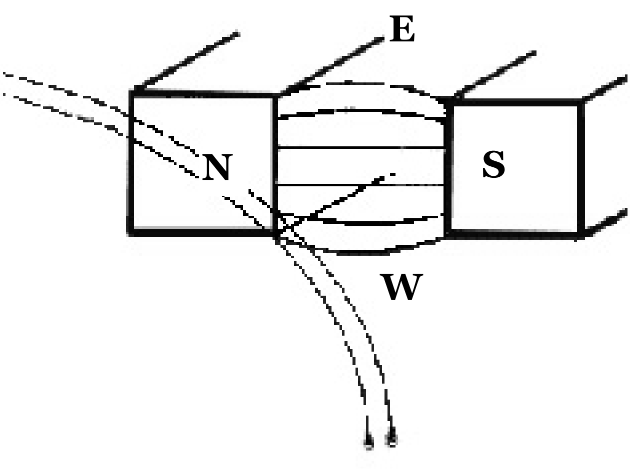
After separating from each other, electrons and positrons expand significantly, becoming subatomic entities with far more noticeable impact on their environment than in their joined, neutralized form. During the separation process, a predictable portion of an EM wave's quantum frequency energy is spent on the separation of the electron and positron, with the remaining energy converted into their velocity. The positron's and electron's velocities are a variable, dependent on the frequency of the EM wave's pulses and environmental factors, such as the density of the surrounding EM field.

Electrons and positrons express inertia, but there is no evidence of weight (gravitational attraction).**

* (Reference 'Physics For Scientists and Engineers, With Modern Physics,' Second Edition, page 633, by Douglas C. Giancoli, published by Prentice Hall.)

**(Currently, the inertia of electrons and positrons has been translated to mean they have weight and gravity. The USF theory offers an alternative explanation. See 'Inertia, Mass & Drag', this chapter.)


N
W
Positron, proton,
or positive ion.
Electron
E
S


E
N
S
W
Positrons

The electron exhibits a dual nature, repelling other electrons and simultaneously attracting positrons. Positrons display the same attraction, and a repulsion of other positrons.

Of recently documented experiments, one of the most important was performed at the Stanford Linear Accelerator Center and reported in the Sept. 1, 1997 issue of Physical Review Letters. Electrons were accelerated to near the speed of light and aimed at a laser beam with a 527 nm wavelength (a frequency falling in the green range of visible light).

The addition of considerable velocity flattened and condensed the forward regions of the electrons' field, compressing and increasing their field strength as they reached the laser beam. The interaction of high-speed electrons with EM waves resulted in the splitting of thermons, producing positrons and electrons. **The experiment is significant because it shows the pair separation process can take place using EM wave frequencies much lower than gamma rays**. In this new model, the oncoming EM waves are 'relatively' blue-shifted by the high-speed electrons. (These experimental observations also seem to completely invalidate Albert Einstein's 'Special Theory of Relativity'.)

Pair Joining

(Also Known as Pair Annihilation)

From fairly stationary positions, and when in range, an electron and a positron will accelerate towards one another. The two energy fields join, creating a disturbance in the EM field equal to two or more quanta, with EM waves (often gamma rays) moving away from their point of origin.

An orbital version of the process results in a field event called positronium. This phenomenon exists when the positron and the electron orbit each other, similar to two stars orbiting one another, or the way a large planet will shift a star's center of gravity, causing it to oscillate noticeably as the planet orbits. The distance between the electron and the positron as they orbit one another influences the length of time before they join, and the amount of quantum energy released. A greater distance results in a longer amount of time and can produce three, or more, quanta. Kinetic energy is a key factor in the EM frequencies produced.

Environmental conditions are also a factor in the creation of light from a positron and an electron. **The introduction of a magnetic field can speed up the merging process of positronium, resulting in more energy being released**. Should an electron and positron join while in a solid or a liquid, the local electric and magnetic fields can alter the strength and direction of the EM waves. (See *Thermal Fields;Thermons -Formerly Known as Phonons*, this chapter.)

A Different Paradigm
(And Different Conclusions)

The concept of electrons and positrons as east/west electric monopoles is a definite shift from traditional views, but is not without justification. When a beam of electrons approach a bipole* north/south magnetic field at the magnetic equator, the electrons preferentially move in an eastern direction. (Superficially, electrons and positrons appear to simply be repelled by north or south poles.) Defining electrons and positrons as east/west monopoles, and designating negative as east and positive as west, provides a functional foundation for what takes place in both electric current and light (EM waves).

As stated earlier, subatomic energy fields are not matter.

*(Bipole magnets have poles sharing a common center. Dipole magnets are two separate magnets, with one's north pole attracting the other's south pole.)

The USF theory predicts pair separation at frequencies commonly associated with the Compton effect and the photoelectric effect, and also allows for pair separation at even lower frequencies when moving fields and/or varying field densities are involved.

Currently, per the “traditional” interpretation of the equation $E=mc^2$, EM waves with the high frequencies of gamma rays are required to create positrons and electrons, although their appearance has been observed at lower EM frequencies. The traditional interpretation assumes pair production to be the creation of matter, not the the separation of an electron and a positron.

Pair separation using x-rays or gamma rays (both high frequency EM waves) results in electrons and positrons with high velocities, making them easy to detect. The positrons and electrons separated by EM waves of lower frequencies are rarer, have less velocity, and are less obvious.

The quanta/kinetic energy of EM waves does not always cause the separation of electrons and positrons. The kinetic energy of EM waves can be reflected, or transferred to shifting and moving thermons, producing heat. Any number of variables can interfere with pair separation. This is particularly true of frequencies in the low ranges, such as infrared. Faster pulsing frequencies, such as x-rays and higher, can pass through the surface of matter (the EM barrier), and its interior using the thermal (EM) field between atoms as a medium. (See *Thermal Field*, this chapter.)

Matter takes form at the atomic level. It is based on the accumulation of protons and their surrounding thermons, combined with electric and magnetic bonding mechanisms, and gravity. This model defines matter as including a gravity field. Electrons and positrons show no evidence of attracting gravity fields (only resistance to movement). **The proton has a stable magnetic field, electric field, and gravity field. This model adds a surrounding thermal field. (Temperature.)**

Positrons/Protons
(Gravity, Magnetism, & West Poles)

The Missing Positrons

The universe has an abundance of electrons and, curiously, only a few short-lived, loose positrons. Electrons and positrons are created simultaneously and should exist in equal numbers. When a positron is produced, its normal attraction to surrounding excess electrons results in an almost immediate joining, and produces EM waves.

The deficit of positrons 'can' be explained by an abundance of protons. Protons and electrons are the most 'obvious' elementary subatomic energy fields in the universe. Protons, a basic component of an atom's core (or nucleus, in the Standard Model), and positrons share the same 'positive' charge, or western pole, and both attract electrons.

Binding Energy Fields

By USF theory standards, the key differences between a positron and a proton are a gravity field, a thermal field, and a magnetic field with north/south poles. A proton has these extra fields, while a positron does not. The combined fields effectively block the electron's and proton's joining process. This combination of energy fields makes the proton a stable entity with a seemingly unlimited average life span (over a trillion years). The electron, which would otherwise join with the proton, is not only blocked, but is also repelled by the proton's thermal and magnetic fields, with the magnetic poles forcing it to take an equatorial orbit. (Terra's magnetic field also repels and traps electrons.)

The proton's combination of energy fields forms a stable central core. The phrase 'proton *g*' is used to describe the single gravity field unit assigned to a proton (see *Gravity*, this chapter), that has developed in combination with a magnetic field and the surrounding contraction of space (gravity). At present, it seems only the high velocity impact of another subfield can cause the breakdown of a proton's electric, magnetic, and gravity field combination.

The proton can be described as a dense, self-contained energy field, surrounded by magnetic forcefield like layers. As combined energy fields, it is responsible for the permanent magnetic fields observed at the macroscopic level, and for gravity. An individual proton will attract an electron at a distance, due to the positron/electron relationship. The proton will repel the electron at close proximity, due to a combination of magnetic field layers and short range thermal field density. (See *Proton* and *Thermal Field*, this chapter.)

Positive and Negative Charges
(Seeking Union)

Positives and Negatives

It has been a long held belief the negative charge is attracted to its opposite, a positive charge. This belief is based on our earliest assumptions about electricity, with a positive fluid filling a negative void, and long before it had any associations with magnetism. Our understanding of electricity evolved gradually, with protons, and later positrons, being assigned a positive charge, and electrons a negative charge. (Initially, electricity was considered the positive fluid filling the negative void.) From a mathematical perspective, charges with equal but opposite strength would result in a sum of zero energy, or balanced pressure, supporting early theories about electricity.

The joining of positrons and electrons does not result in a zero and their annihilation. Instead, EM waves are produced as the electron and positron join. The speed of their joining (their kinetic energy) influences the frequency and intensity of the resulting EM waves. Their kinetic energy is transformed into the electromagnetic waves frequency.

The USF theory describes a positron, not as the exact opposite of a negative charge, but as a force of equal strength which attracts electrons, and moves to the west of magnetic fields. Positive and negative charges are described as the mutual attraction electrons and positrons have for each other. The relationship of an electron orbiting a proton is the electron's unsuccessful attempt to join with a positron.

The Symmetrical Universe

In 1928, a theory of pair separation was developed by Paul Dirac. He used an 'aether theory' model that explained the existence of electrons as charged particles emerging from a sea of electrons (the sea was a common analogy for the aether model). Dirac developed this model further by incorporating a symmetry philosophy developed by Kant. **The creation of an electron, Dirac reasoned, should leave a hole in a sea of virtual electrons. This hole would express the characteristics of an anti-electron**.

Dirac expanded James Maxwell's equations on electromagnetic wave propagation (electric current and light), showing quanta could be described as an electromagnetic process. He then proposed light energy collides with a negative energy electron in a sea of background electrons, knocking it into a positive energy state.* This process, according to Dirac's equations, left a hole in the negative energy sea, expressing itself in the form of an anti-electron, later called a positron.

In 1932, the existence of positrons was discovered during cosmic ray experiments performed by Charles Anderson. He found a particle producing the typical ionization trail of an electron, but with exactly the opposite magnetic deflection. It was quickly concluded Dirac's anti-electron had been discovered. The discovery of the anti-electron was also considered conclusive evidence of universal symmetry (or

*(At this time there were disagreements on whether the electron was negative or positive. The void or the filler.)

'parity'). Since that discovery, pair separation has been both observed and accomplished on numerous occasions.

When Dirac worked out his prediction, the positron was undiscovered. He initially tried to interpret the hole as being a proton, but observations and mathematics made this concept unsupportable. When Anderson discovered the positron, Dirac immediately designated it an anti-electron. The concept of east and west monopoles was not considered.

The phenomenon of positrons was largely ignored until the 1950s, primarily because it was difficult to produce and study isolated positrons. Dirac's reasoning has also been applied to electronics, resulting in the concept of an electron hole. The electron hole represents an atom which has lost an electron, causing a positive charge (an ionized atom). This positive charge is often described as behaving like a physical entity, moving from one atom to another.

As electrons move in one direction, shifting from atom to atom, the imbalance, or electron hole, moves in the opposite direction. Unlike the positron, the electron hole is not currently considered a true subatomic entity, but the attraction an atom has for an electron after losing one.

Dirac expanded this concept of symmetry stating, "*for every particle there is a corresponding antiparticle*." This led to an unsupported theory of antimatter existing in amounts equal to normal matter.

A Dynamically Balanced Universe

In 1956, **the National Bureau of Standards concluded the parity conservation law was no longer supportable, weakening a myth (though not significantly) universally accepted since 1932** (and still supported by many in the scientific community).*

Parity conservation is essentially the belief nature is symmetrical. In quantum mechanics it means whenever

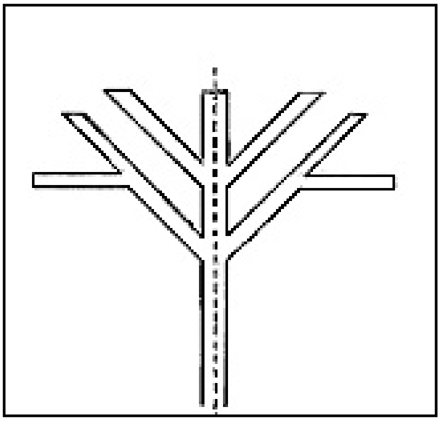
*(Reference-http://physics.nist.gov/Genint/Parity/expt.html)

particle is created, an equal and opposite particle is also created. This belief, though mathematically ideal, cannot explain a variety of phenomena discovered during high energy physics experiments. The most basic discovery is a complete lack of supporting evidence for the parity conservation law.

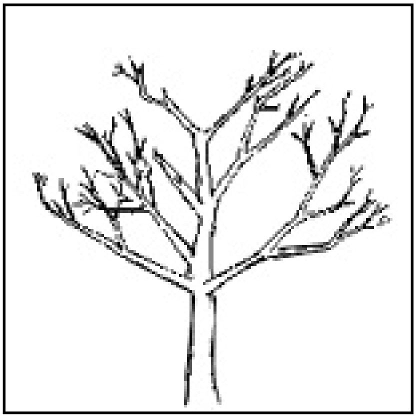
In 1998, the space shuttle Discovery used the Alpha Magnetic Spectrometer (AMS) to gather information 400 km above Terra. The goal of the mission was a search for cosmic antimatter. A symmetrical universe produced from the Big Bang would have created matter and antimatter in equal amounts, and there should be signs of this primordial antimatter, complete with antiprotons and antineutrons.

However, no experiments or research have ever detected primordial antimatter. The AMS scanned for antimatter above the atmosphere, sampling almost three million cosmic helium nuclei arriving from outer space. Not a single helium antinucleus was found, nor any evidence of antiprotons.

The USF theory discards the parity conservation law, and



The concept of parity requires an expectation that any electrical change initiates an equal and opposite change, simultaneously



A dynamically balanced universe seeks balance out of chaos in a time constrained process, and is constantly evolving and changing.

replaces it with the concept of a dynamically balanced universe.

A basic example of the universe's asymmetry is the proton. The formation of protons disrupts the symmetry of electrons and positrons. The combination of gravity, magnetic, and thermal fields blocks the normal positron/electron interactions, and makes the material world possible. While claims of man-made antiprotons exist, these entities are short-lived and may not be 'true' antiprotons.

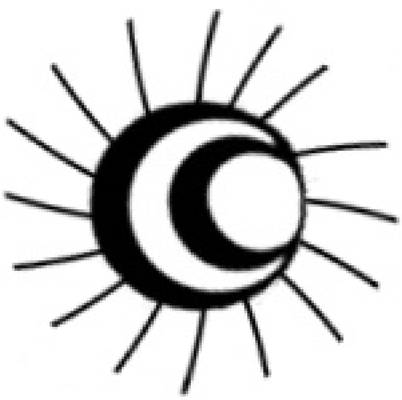
Magnetism as an Independent Field

This new paradigm describes magnetism, not as the byproduct of moving or spinning electrons, but as a property intrinsic to protons and thermons. Thermons and protons produce magnetic fields due to the *electrical contraction of space* at their centers. Within this model, the magnetic fields of the thermon and proton are treated as stable, separate fields. The magnetic fields of these entities may be electrically manipulated and aligned to produce ever larger magnetic fields.

It has been the general consensus of the scientific community magnetism is the unstable byproduct of moving electrons, and incapable of a separate existence. This assumption was based on an observation made by Andre Marie Ampere in the 1820s, describing the similarities between a permanent magnet and an object wound by wire with an electric current moving through it. Both expressed north and south poles.

From this observation, atomic scientists concluded the magnetic field surrounding an atom was created by orbiting, 'moving' electrons. 'Spinning' electrons, as moving charged particles, were also theorized to generate a magnetic field in an effort to explain two energy levels exhibited by orbiting electrons during Zeeman effect experiments. Still later, protons were assigned a spin to explain the magnetic fields they generated while lacking *magnetizing* electrons in orbits.

There are minor problems with these assumptions, which are generally ignored and have been viewed as curiosities. For example, the proton's magnetic field strength has been shown to be 2.79 times stronger than originally predicted under the current model.* Additionally, experiments have shown electrons exhibit no evidence of 'spinning' around a north/south pole axis, nor radiating north/south magnetic poles, presenting another glitch in the current model. While the magnetic moments of electrons have been mathematically predicted, this concept remains



Two dimensional rendering of an electron and its 'field lines'. Note, there is no representation of magnetic or gravity fields.

*(Originally measured by Otto Stern and based on experiments using the "Otto Stern Apparatus." The proton's magnetic field strength can be found at http: www.tshankha.com/magnetic_moment.htm. When viewing this webpage note that 5.585, the proton's "measured" value, is 2.79 times larger than the electron's "theorized" magnetic value of 2.002. It was assumed the positron component of the proton would be equal to that of the electron's and generate the theorized magnetic field..)

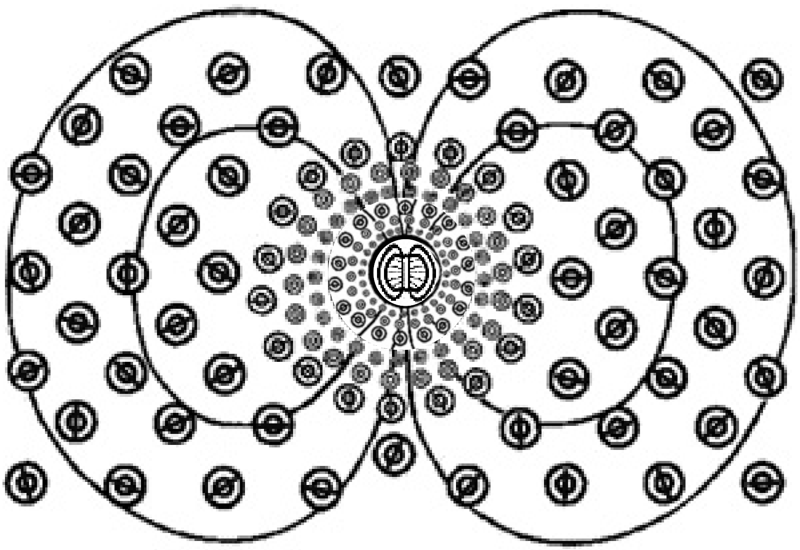
unproven using the most basic testing methods. The description of moving, or orbiting, electrons originally used to explain the magnetic fields of protons and atoms are no longer considered to be particles orbiting at the speed of light, but are now described as electron clouds.

The 'original' concept of electron spin has been thoroughly disproven,* and is replaced in the USF theory by the concept of an electron's eastern orientation. The assumption electrons and positrons have magnetic fields with north/south poles has led to increasingly confusing and problematic models. Currently, experiments with 'polarized' electrons accelerated in bunches, and interacting with both light and matter, are straining the north/south pole model. (See *Chapter 3-Electric & Magnetic Fields; Monopoles*.)

The USF theory differentiates between permanent magnets and the temporary reorientation and alignment of the atoms' magnetic fields by moving electrons (electric current). The magnetic fields surrounding protons are examples of fused magnetic/gravity fields, or permanent magnets.

In more recent times, a new technology called 'magnetic resonance imaging' (MRI) has caused a subtle shift in the perception of proton generated magnetic fields. MRI scans are based on the concept protons (not electrons, atoms, or molecules) will align their north/south magnetic poles with those of nearby, powerful magnets. This shift in perception focuses on protons as permanent magnetic fields and ignores the assumption they are a temporary byproduct of moving electrons.

*(Although thoroughly discredited as a physical model, introductory physics texts and encyclopedias continue to describe the two different energy levels as spin up and spin down, using simplistic or vague descriptions. Reference 'Physics For Scientists and Engineers, With Modern Physics,' Second Edition and later editions, by Douglas C. Giancoli, and 'Electron Spin', pages 3&4: 'Electron Spin Magnetic Moment' and 'Electron Intrinsic Angular Momentum'-http://hyperphysics.phy-astr.gsu.edu/ hbase/spin.html.)



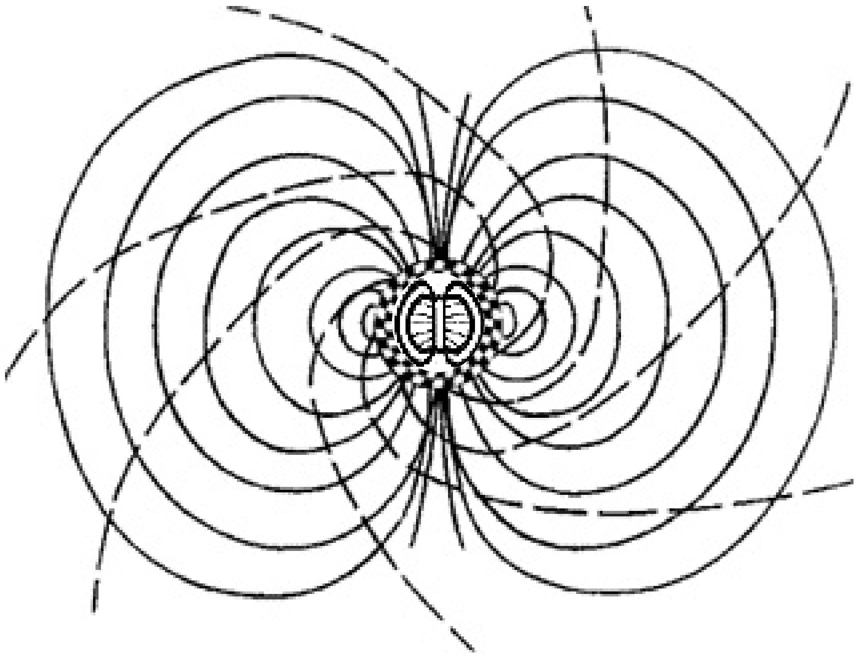
Artist's rendering of an unknown number of structured thermons making up the core of a proton. The attraction of the combined thermons add to the warpage of surrounding space, creating a gravity field which is founded on the electrical attraction of positrons and electrons. The center of the proton is predicted to be made up of two positrons bound to a single electron.

Protons
(The Core of the Matter)

Characteristics

This model predicts the proton's core to be made up of two positrons joined to a single electron. As the core of atoms, they are a combination of a magnetic field, a gravity field, and a surplus west monopole, protons are ultimately the foundation of our matter-based universe. They lack only a surrounding field of counter-balancing electrons, which also act to bind molecules together, to become true matter. As concentrated field energies, protons display characteristics very similar to those shown by matter at the physical level. They have weight, temperature, size, and shape.

Each proton incorporates a minimum of four energy fields. The thermal field surrounding the proton is the fourth energy field. It is a condensed version of the larger universal EM field and becomes denser nearer the center of the proton (also true of black holes, or any object with a gravity field).



Artist's rendering of the proton with internal dynamics shown. The broken lines represent the proton's gravity field. The thermal field is represented by the pattern of black and white checks.The magnetic field is shown as curved lines to either side, and the 2 positron- 1 electron core is at the center. (For a close up of the proton core, see the top of page 50.)

Two protons have never been observed merging and occupying the same space. **Excess positron energy in each proton has a repelling effect**. If not for shared, counter-balancing electrons, protons would not be able to bind and form more complicated atoms and molecules. The proton's thermal and magnetic fields combine to block electrons from merging with the core of a proton. In this model, shared electrons in the core of the atom allow protons to become a collective of pseudo-neutrons.

Protons generate a variety of field characteristics. Long-range repulsion and short-range attraction of other protons are two unusual properties exhibited by protons. It is a little known fact long-range repulsion and short-range attraction are also properties displayed by magnetic fields.*

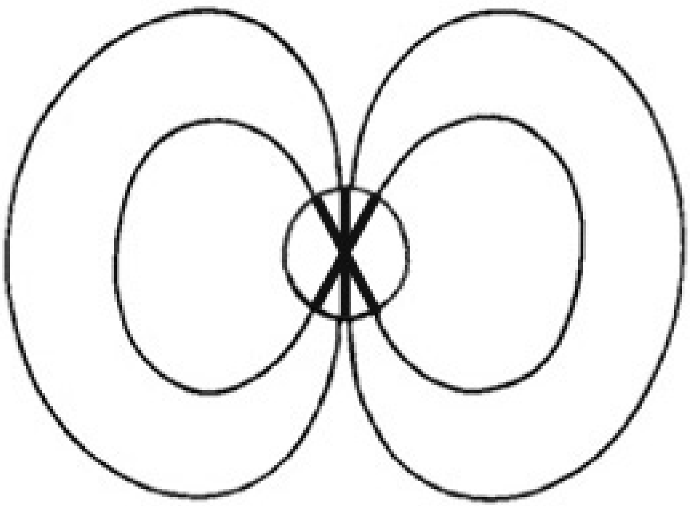
Traditionally, long-range proton-proton repulsion has been explained as a version of basic positron-positron electric repulsion, but explaining the short-range attraction between protons has been a difficulty. The concept of 'nuclear force' (defined as a strong attraction between nucleons in the atomic nucleus) has never explained short-range attraction, simply labeled it for mathematical purposes.

The USF theory explains these behaviors as an expression of the proton's four energy fields, with gravity complementing the magnetic short-range attraction. The positron-positron repulsion between protons takes place in the same range of distance as electron-proton attraction occurs. If, due to high velocity or unusual pressures, two protons overcome long-range magnetic repulsion, medium range positron repulsion takes effect. Medium range positron repulsion can be countered by the two protons sharing an electron, essentially creating two pseudo-neutrons as they combine to form the core of an atom.

Though the repelling 'western' charge of two protons can easily be overcome by the combination of their gravity, magnetic fields, and the sharing of an electron, it should not be ignored. The positive, western charge is also responsible for attracting *orbiting* electrons.

A hydrogen atom (a proton with an electron in orbit) has its 'positive' electrical field partially neutralized. Electrons continue to be attracted to the opposite side of the proton's

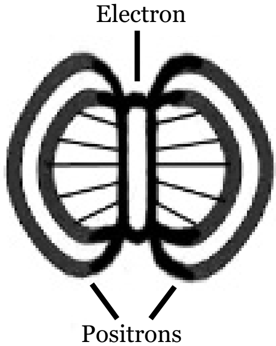
*(Reference- 'Teaching About Magnetism: an AAPT/PTRA-PLUS workshop manual' by Robert J Reiland; College Park, MD: American Association of Physics Teachers (AAPT), c1996 and 'Repulsive $1/r^3$ interaction' by Bo Gao, of the Dept of Physics and Astronomy, Univ of Toledo, in the Physical Review A, Vol. 59, #4, April 1999.)



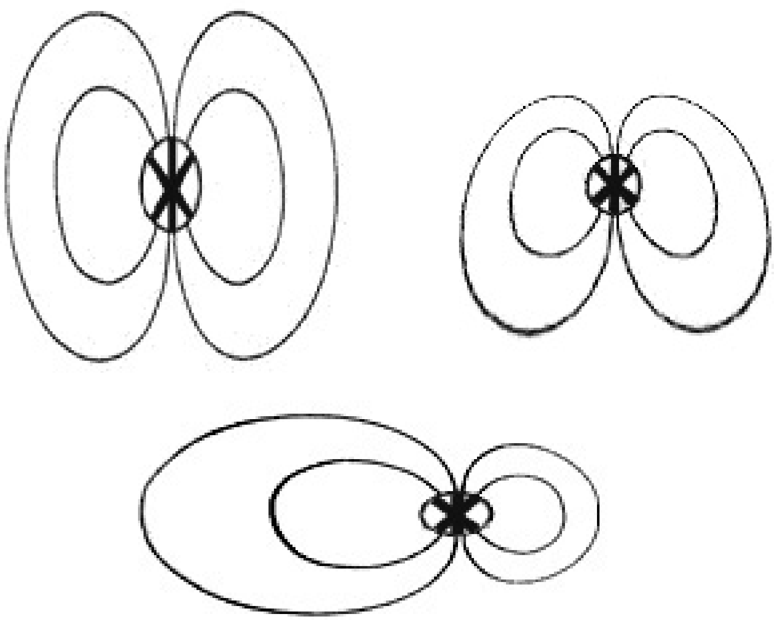
A simplified symbolic representation of the proton.

orbiting electron, and two electrons orbiting a single proton is not unusual. The hydrogen atom, as a whole, may be considered electrically neutral, though the electron and proton continue to express individual, polar characteristics. The magnetic field continues to radiate outward and interact with other fields, though sections are compressed by orbiting electrons. The orbiting electron continues to repel other electrons which have moved into nearby orbits.

The shape of protons has recently come into question. Protons have been assumed to have a spherical shape, but Gerald Miller of the University of Washington has thrown doubts on this assumption. Miller has suggested the possibility protons can assume shapes roughly equivalent to ovals and peanuts. This paradigm does not disagree with Miller's findings, but includes environmental factors in the shaping of a proton's field energies, while Miller's model is based solely on the proton's internal dynamics.



Above: The proton core, two positron joined to a single electron.
Below: Environmental factors can alter the shape of the proton and its surrounding energy fields



Van Allen Belts

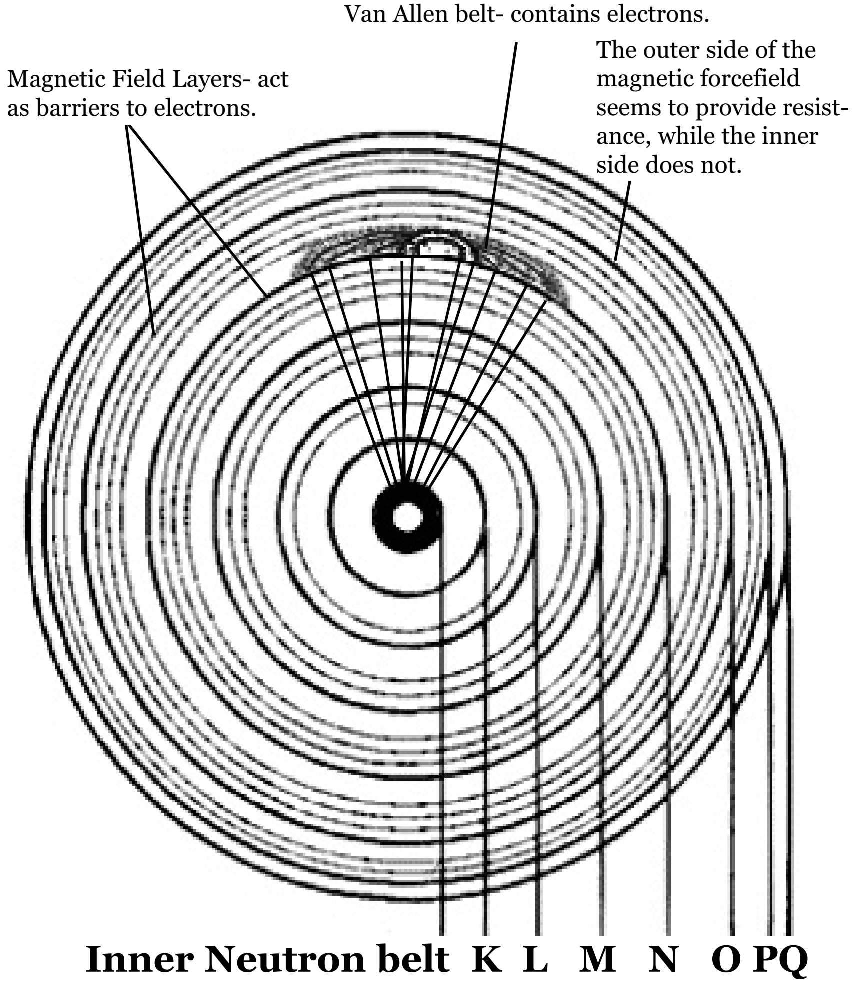
The traditional model of the atom describes seven electron shells, also known as quantum paths. **Seven Van Allen belts (similar those in Terra's magnetosphere) provide an excellent model for electrons orbiting a proton**. Using a forcefield analogy, the Van Allen (VA) belts are separated by magnetic field layers (also known as lines of force) which are not impenetrable, but are resistant to electric fields (electrons). They are strongest near the atomic core and the proton's magnetic poles, and weaken with distance. (See *Chapter 6- Matter & Electricity; The Photoelectric Effects, Photovoltaics, the pn junction*.)

In the case of a single proton, the USF theory adds an eighth inner field belt for the temporary creation of a neutron. (See *Neutrons*- this chapter.)

Each VA belt exists in the space between the magnetic layers. The forcefield layers are magnetic field lines, or flux lines. As EM waves '*have not been detected'* when an electron is pushed outward through the magnetic field layers of an atom, resistance is assumed to be one way, on the outer side of the field layer. (Theoretically, due to support from the condensing thermal field.) Orbiting electrons occupy the space between layers, the VA belts. Electrons will press against these forcefield layers, losing their spherical radiance, spreading out, and taking on the characteristics of the 'electron cloud.' The interaction between the protons' VA belts and electron clouds results in the seven traditional electron shells (and subshells).

Electrons pressed against an atom's outer magnetic field layer can repel nearby electrons, or attract other atoms needing electrons to create more complex molecules.

The orbiting electrons act to compress the proton's magnetic field. Repelled by the magnetic poles, most compression takes place at the magnetic equator. Compression by the electrons distort the shape of the atom's magnetic field.



A perspective of the proton from above its north pole. The proton has been assigned seven electron shells, or Van Allen belts, labeled K through Q. (This model of seven Van Allen belts/electron shells has been projected onto all atoms with general success.) The individual proton has an eighth close inner belt which allows it to become a neutron. There are a number of subbelts that exist between the traditional belts. In more complex atoms, there may be more complex van Allen belt systems.

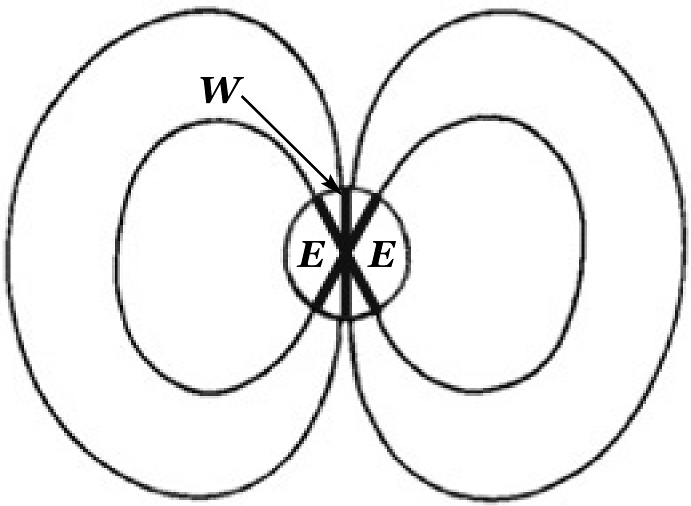
Electrons in the outer Van Allen belts '*of a solid*' are an average distance of a few tens of thousands of nanometers (one nanometer is a billionth of a meter) in 'all' atoms. In 'heavy,' complex atoms, inner orbit electrons are pressured closer to the core by outer orbit electrons.

The more protons in the core of an atom, the greater the number of electrons that atom will attract. An atom with one proton will attract one or two orbiting electrons, creating hydrogen. An atom with twelve pseudo-neutrons (by standard definition, six protons, six neutrons) attracts six orbiting electrons. Only a certain number of electrons can fit in a single Van Allen belt, owing to the electron's repelling nature of other electrons, the positron attraction of the atomic core with surrounding electrons, and the distance of the electrons from the atomic core. In complex atoms, two electrons in the first inner VA belt, and eight in the third, are a standardized occurrence.

It should be noted 'positrons' can become trapped in Terra's Van Allen belts. Within the USF theory paradigm, this behavior is also possible with atoms (this event may take place during a pair separation process). The positron repulsion between a proton and a positron make this event unlikely, but not impossible. Orbiting electrons, or newly acquired electrons, would normally make this a short-term relationship, ending in pair joining.

Antiprotons
(Electric Field/Gravity Field)

Claims of antiproton creation by accelerating an electron and smashing it into a proton have been made. The resulting antiproton can be described as a gravity field which has had an electron added to the compressed thermon structure. The addition of an electron makes the structure unstable, and the antiproton typically survives for less than a second before breaking down.



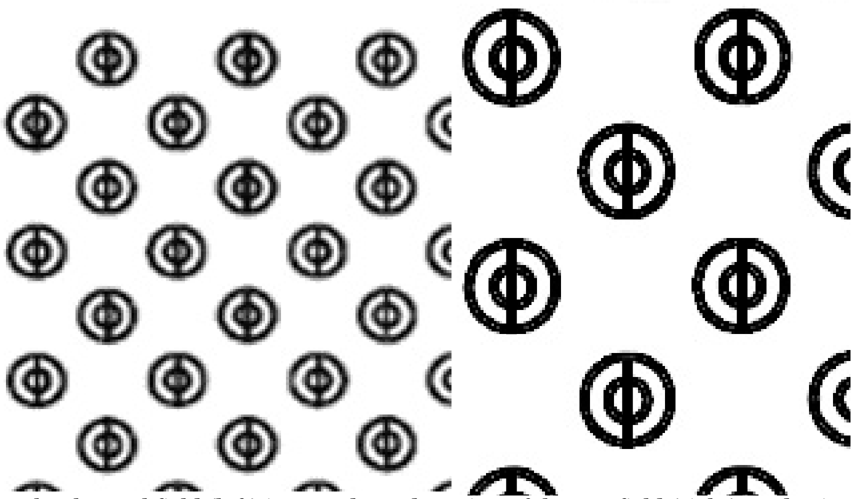
The 'theoretical' short-lived antiproton.

Antiprotons seem to have no long range repulsion and may not radiate a magnetic field. For a brief period of time the proton's structure survives the entry of an electron, before breaking down into smaller sections of varying size. The lack of antiprotons in nature supports the existence of a nonsymmetrical universe. These altered protons may not be *true* antiprotons.

Thermal Fields
(Warmth, Dark Matter, & EM Waves)

Characteristics

The thermal field is a radical concept. It is made up of thermons condensing around protons and atoms. Thermons closer to the core condense more tightly. The traditional model of heat describes it as the vibrations of molecules, and more recently, the vibrations of subatomic entities such as neutrons and electrons, but provides no means of transport for these vibrations. The USF theory describes heat as movement of, and within, the thermal field.



The thermal field (left) is a condensed version of the EM field (right), and exists in the space surrounding individual protons and atoms.

Temperature is an expression of activity within the thermal field, and **changes in temperature 'seem' to have two basic sources**. Thermon expansion or contraction, and differences in thermal pressure. Individual thermons may expand or contract, based on spin (a form of contained kinetic energy). The expansion of individual thermons forces the outward movement of surrounding and loose thermons.

Also, when one area of matter is cooler than another, and the two are thermally connected, thermal pressures force loose thermons into the cooler area, producing an even distribution of thermal pressures.

Internal pressures cause a continual striving for equilibrium and balance which is at odds with the perpetual turmoil caused by environmental disturbances. In a process called heat conduction, a thermal field of greater strength will transfer excess loose thermons to a thermal field under less thermal pressure when the two fields are close enough to connect. **The thermal field behaves very much like the model of heat as a fluid used prior to the 1920s**. The thermal field of an object sitting in the sun is in constant flux as it absorbs and releases thermons.

The thermal field is sensitive to electromagnetic influences and resonates at frequencies specific to the material containing it. These frequencies impact, and are expressed by, an electric field at the surface of a solid substance (the best examples being metals). **The study of this electric field is called 'plasmonics' in the particle theory model, and the 'EM barrier' in this model**. The thermal field's oscillations match the frequencies of EM waves and supports waves in the EM barrier . (See *Chapter 3-Mag & Elec Fields; Elec Fields; EM barriers/Plasmonics*.)

The thermal field interacts with light in a variety of ways. At the edge of the thermal field, the resonance/frequency of the EM barrier is a determining factor in the *direction* EM waves are reflected, or accepted and transmitted. During absorption of an EM wave's kinetic energy, thermal pressures will cause shifts in the thermal field, pressing thermons into the substance, and causing it to warm at the surface. Forms of light which are transmitted can meet with other forms of interference within this dense version of the EM field. Individual, low frequency quantum energies may be absorbed by denser areas of the thermal field surrounding atoms.

The absorption process for matter in a 'gaseous state,' can produce a sharply defined dark line (an EM frequency 'not' being radiated) during a spectral analysis, representing the frequency of the quantum energies absorbed. (See *Chapter 4-Electromagnetic Waves; The Spectrum*.)

When EM waves of a certain frequency (usually higher frequencies) pass through the thermal field, a thermon (a joined electron-positron subfield) can be split. The thermon is compressed between quantum energies and an atom's magnetic or electric fields, and pair separation takes place.

The thermal field is capable of transporting quantum energy. EM waves passing through a material behave as they would within a vacuum (?), but the intensity of their pulsations are reduced and slowed by the density of the thermal field.

As a dense form of the EM field, the thermal field can act as an electric buffer/insulator. It helps to keep the western charge of an atom's core, and the surrounding electrons, separated. Materials with a rigid thermal structure and few loose thermons can act as insulators for electric current.

The thermal field is a consequence of the proton's fused magnetic and gravity (gravmagnetic) fields interacting with the local EM field. Einstein's General Relativity theory regarding the warpage of space around gravitational mass is an expression of this process. (In this model, gravity is described as a contraction of space, rather than a warpage.)

Consequently, **the thermal field can be visualized as a dense version of the universal EM field**. The density of the thermal field controls the speed of the light moving through it. It has a limited range, and is most dense near the atom's core, thinning and spreading with distance. The grav-magnetic/thermal field fills the space between atoms and acts as a weak bonding mechanism (because it provides electromagnetic resistance to movement.)

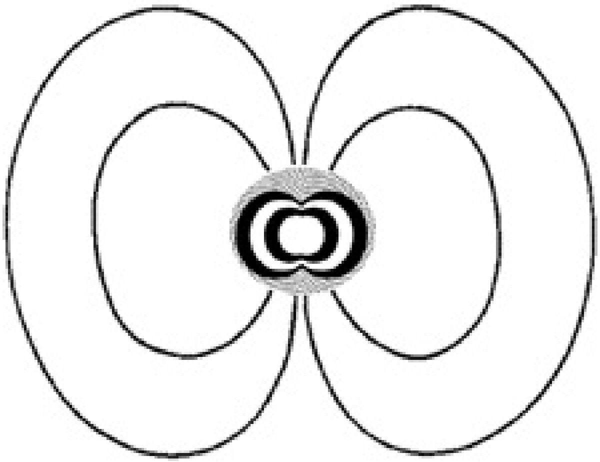
Insight into the differences in thermal field densities, and their impact on the speed of light traveling through them, can be gained with the use of a simple analogy. A person moving their hand through the air will encounter a weak resistance, while moving their hand through water at the same speed meets with a stronger resistance. With this analogy in mind, imagine an atom's thermal field becoming denser closer its core, and thinner with distance.

Thermons (Formerly Known As Phonons)

The theory of phonons was originally developed as a quantum model for sound waves, and was later adapted for use in predicting the transfer of heat. The word phonon (as in phonograph), was chosen because of its similarity to the word photon. **The Standard Model describes both sound and heat as vibrations within matter**. Peter Debye developed a formula (the Debye Law or Debye's Law), based on

Planck's constant, predicting the heat needed to raise the temperature of solids at low temperatures by one degree.

Currently, the word phonon has taken on a variety of interpretations. Some researchers limit the phonon's existence to a unit of vibration within the lattice structures of solids, while others treat it as capable of an independent existence. The description of the phonon as both a unit of sound and a unit of heat adds to the confusion.



Artistic rendering of a thermon. It has an east-west polarization with the electron and positron compressing in towards one another and creating the electric equivalent of a black hole. A magnetic field and a gravity field result from the warpage of space and energy fields.

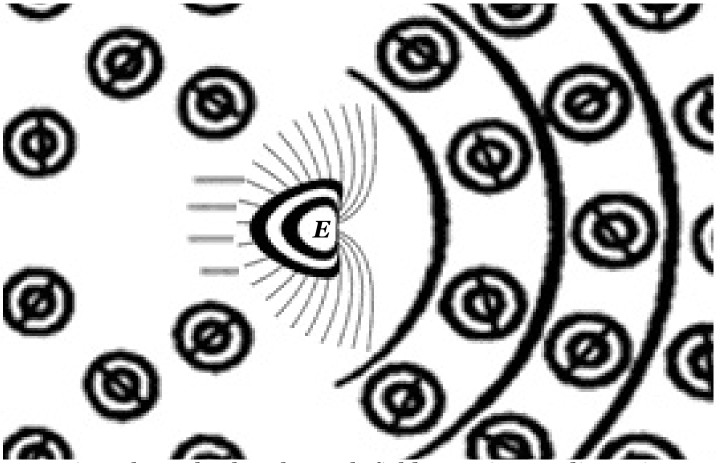
In an effort to promote clarity, the word thermon replaces the word phonon, and will be used in the USF theory to designate a unit of the thermal field. The thermon, as a complete energy field, is the result of a joined electron and positron. It is ultra-subatomic and nearly neutral electrically.

Thermons are the smallest unit which heat can be broken down to, and still maintain the characteristics of heat. The joined electrons and positrons are *intensely* attracted toward one another. Other gravity and magnetic fields can add to the compression, with stronger gravmagnetic fields causing greater compression.

Loose thermons can transfer from one location to another within a substance and, when direct contact is made, loose thermons can transfer from one substance to another. When a loose thermon is released into the vacuum of space, it expands and spreads, becoming a free thermon, and part of the universal EM field, with an average background temperature of 2.7 K*. This temperature is referred to as "cosmic microwave background radiation," and was discovered by Arno Penzias and Robert Wilson in 1964.

Thermal fields are in a constant process of shifting, expanding, and contracting. A moving electron, for example, traveling within matter, will disrupt the thermal field, creating thermal waves. Heat differs from EM waves in that loose thermons are actually moving under pressure, rather than simply pulsing as quantum energy passes through to a magnetic field layer. The essential difference is heat does not travel at the speed of light, but much more slowly.

Thermons are are predicted to have spin, with a greater spin acting to counteract the contraction of space and their own equatorial gravity field. The thermon, as an individual field, may contract or expand based the speed of its rotation. Just as Jupiter's magnetic field spreads outward due to the speed of its rotation, so too would the thermon's.



An electron moving through the thermal field, causing a disruption and transferring heat via both infrared waves and moving thermons .

*(Kelvins are units of a system that starts at absolute zero (no heat) while measuring temperature. The units of measurement are exactly the same as the Celsius system, but start 273.15 degrees lower. In the Kelvin system, water would freeze at 273.15 degrees.)

Expanding and contracting EM pressures from the rotating thermon increases thermal field movement, adding another component to the process of heating and cooling. Thermon spin would be expressed most obviously in heated gases.

In the EM field of outer space, as a weakly compressed field, the individual thermon is currently detectable only through the transport of light, dark matter in the depths of space, and the process of pair separation.

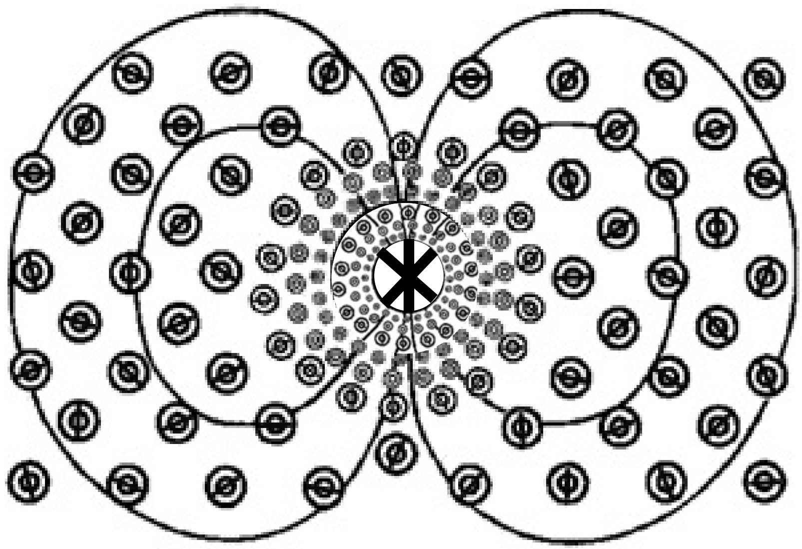
Density, Resonance, and Absorption

Within matter at low temperatures, the electrons orbiting molecules are easily influenced by environmental changes, shifting from an inner VA belt to an outer one and back again. EM waves repeatedly push electrons to outer VA belts, with the electron immediately shifting back to an inner orbit, due to electrical attraction. Normally, infrared and lower EM frequencies are produced, though higher frequencies can be emitted with larger quantum jumps.

In the thermal field, resonance is an expression of electromagnetic vibrational energies. These energies become increasingly influenced by gravity as they move nearer the atom's core. The process of absorbing a quantum of light contracts a portion of the EM wave, funneling it through increasingly condensed thermons as it moves into the curved, condensing space surrounding the atom.

The pressure of several quanta (units of kinetic energy within the EM wave) nearly simultaneously, can cause the complete ejection of outer valence electrons. (**Consider what happens when a piece of metal is placed inside a microwave oven**.) Otherwise, the electron's attraction for protons draws them back to their original position, compressing and shifting the atom's thermal field as the electrons make a quantum jump to an inner Van Allen belt.

The more active the thermons condensing around an atom, the more the electrons are pressured outward. This situation may result from an increase in thermal pressure,

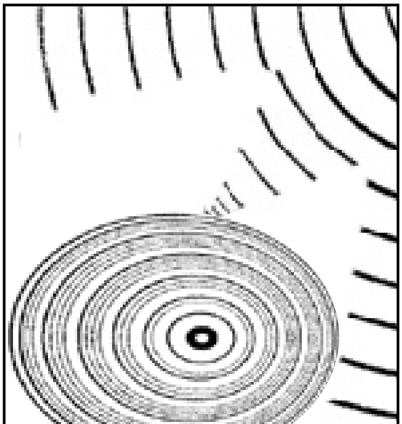


The warping of space caused by a proton's grav-magnetic field causes thermons to become more compressed. This causes a slow down in the passage of EM waves and helps to block electrons seeking the proton's core. The model of a compressed thermal field can also be applied to black holes and galactic cores.

such as an increase in heat, and/or individual thermons may have absorbed kinetic energy from EM waves, and expanded due an increase in spin. A combination of both scenarios is most probable.

If the electron's west pole attraction is not strong enough to overcome an atom's thermal pressures, such as with a superheated gas, the electron can only interact weakly with the atom's outer Van Allen belts. If the thermal field is too active, there will be no interaction with the atom's VA belts.

It should be emphasized electrons meet resistance from both the atom's condensing thermal field and from the outer side of the Van Allen belts (magnetic field layers). Without the vibrations of these magnetic layers, caused as an electron passes through the layer, there would be no such thing as a quantum jump.



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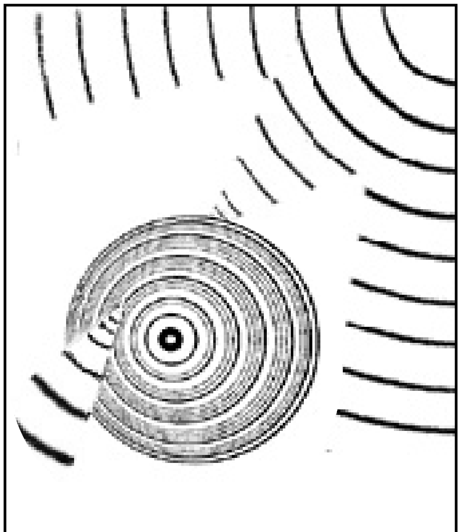

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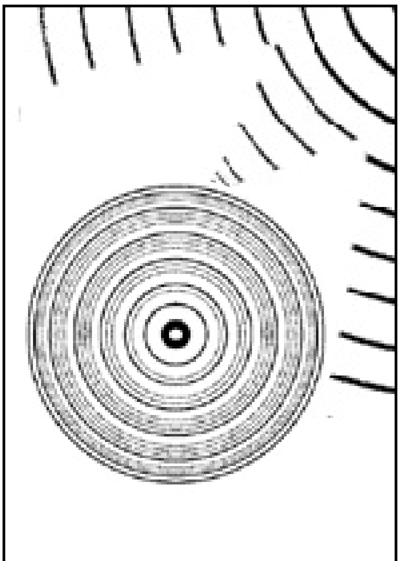


3.

In Picture 1, the thermal field around an atom has shifted and spread during absorbtion of a quantum from infrared light. As the thermons surrounding the atomic core become denser and more compact, so too does the wave being transported by them. Electrons are forced outward during this process.

In Picture 2, the spread out thermons and magnetic layers are compressed by orbiting electrons, causing a recoil phenomenon. The electron's passage through a magnetic layer initiates another EM wave. The new EM wave may, or may not, have the same quantum energy level as the one which entered.

In Picture 3, the thermal field around the atom has returned to a temporary state of balance before absorbing more quantum energy. (This is a simplified model based on the absorption and release of infrared light, and differs from visible light passing between the atoms of transparent materials, such as air or glass.)

The Generation of Quanta

The thermal field, combined with kinetic energy, an atom's electrons, and its magnetic field, create a variable energy source for Max Planck's quanta. Thermons provide the constant represented by 'h'.

In the rarefied space between EM compression waves, an atom's orbiting electrons will move inward toward the atomic core. The pressure exerted by electrons on the atom's magnetic layers and the thermal field is continuous and consistent. As the electrons pass through a magnetic layer to the next VA belt (or jumps inward from one quantum path to the next), quanta are generated. Quantum jumps produce a sharply defined white line (a spike of EM energy) during spectral analysis.

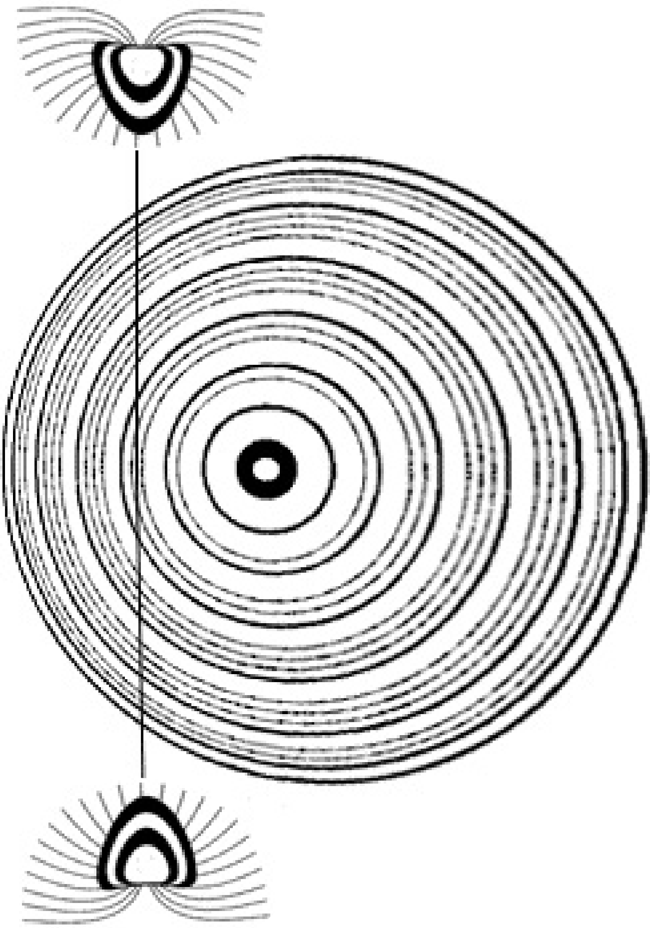
The amount of inward movement by the electron determines the frequency of the released quantum energy. A small amount of movement, from one subbelt (subshell) to the next will result in low frequency EM waves, such as radio waves, microwaves, and infrared, are common emission frequencies. The movement of electrons through one, *or more*, full Van Allen belts can result in EM waves in the visual, the ultraviolet, or higher frequencies.

Heated solids and liquids release quantum energy with a broad range of EM frequencies, but heated gases produce a few specific established frequencies, called spectral lines. This is because the orbiting electrons of gases have been pushed so far out by the density of the thermal field, their range of interaction and quantum energy production become extremely limited.

The Generation of Electrons & Positrons

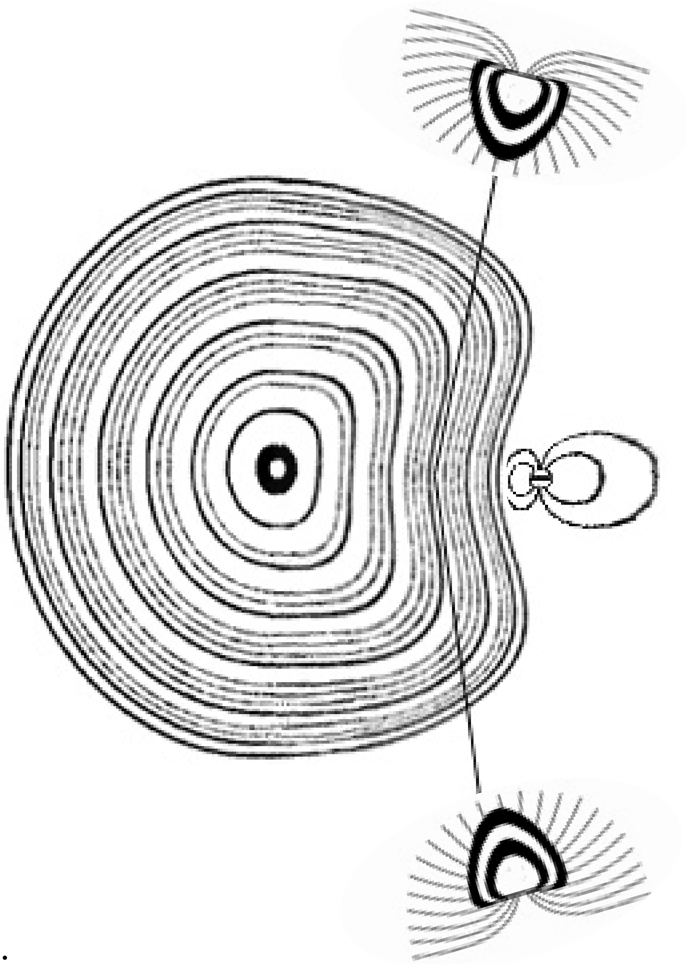
In a process called 'internal pair production' (or internal pair separation) a positron and electron can be ejected during a quantum jump.* In this situation, internal pressures cause

*(Reference: McGraw-Hill Encyclopedia of Science & Technology; Ninth Edition, Vol. 6, Electron-positron pair production.)



1.

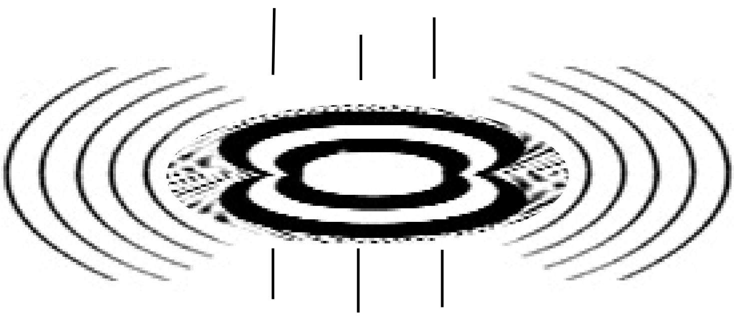
In picture 1, instead of simply causing a shift throughout the surrounding thermons, quantum energy causes a thermon to become compressed and split into an electron and positron. In picture 2, on the opposite page, a neutron collides with the Van Allen belts of an atom, causing internal pair separation. In both cases the positron quickly joins with another electron.



2.

a thermon to become trapped between field layers, and compressed to the point of separating into an electron and positron. It has also been established internal pair separation can happen when an atom and a subatomic entity (neutrons, protons, etc) , which this paradigm attributes to thermal and magnetic field compression by a moving subfield.

Another form of internal pair separation has been attributed to large, 'neutral' subatomic entities (such as a neutral ***Z*** boson or a *J*/psi meson) 'decaying' into a positron and electron. (In the USFT model, these entities are the result of broken proton structures, or clumps of interlinked thermons. Quarks are also considered to be clumps o' thermons which breakdown after the protons destruction .)

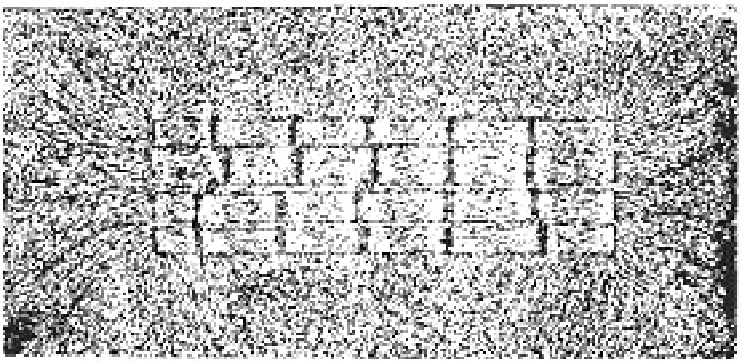


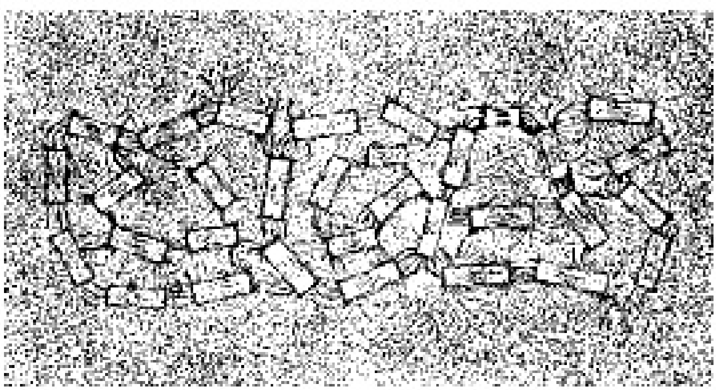
Pair joining with gamma rays being produced.

Supporting Evidence

This radical thermal field model refines the Bohr/de Broglie model of atomic EM wave creation and utilizes Schrodinger's wave equations. **The concept of thermal fields is supported by an endless number of observations**. Three examples will be described.

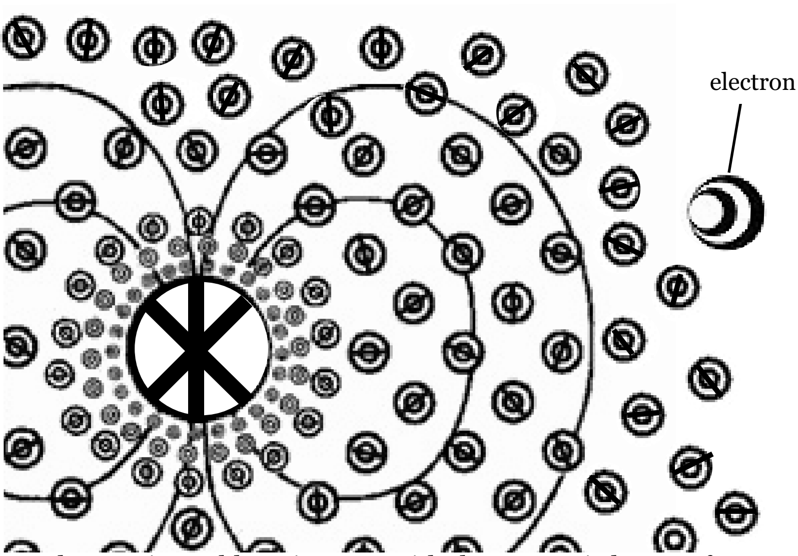
The first observation is called 'critical temperature.' This is when a permanent magnet becomes heated to a certain temperature and suddenly loses its magnetic qualities. Using an iron magnet as an example, it has been shown that, when heated gradually to a temperature of 710 degrees centigrade, the magnet will abruptly lose its magnetic field. This process is described (in this model) as the atoms' thermal fields expanding and pushing against the thermal/electron fields of nearby atoms. (The iron physically expands as it is heated.) Eventually the magnetic fields of the atoms move out of range, losing their tenuous north/south pole connections. No longer interconnected, the overall larger magnetic field breaks down.





The upper picture shows a group of magnetized bars magnetically aligned to form one large overall magnetic field. The lower picture shows a group of magnetized bars in disarray, with no overall magnetic field, and analogous to the atoms which have reached and passed critical temperature. (Credit: 'Magnetism and Electricity for Students' by H.E. Hadley, ©1905.)

The second supporting observation is superheated hydrogen plasma, which will become invisible, even within the infrared range.* This is explained by the thermal field pushing the orbiting electron well outside the proton's eighth VA belt, eliminating any interaction or significant compression, and blocking the production of EM waves. In



An electron is unable to interact with the magnetic layers of a proton to form hydrogen, or create EM waves.

this model, the process is called a 'thermal extreme'.

The third observation is a reinterpretation of the various states of matter, based on their temperature. When the thermal field loses more thermons than it absorbs, electrons can press further inward toward the atoms' core. During cooling, the atoms/molecules of matter contract towards one another. Gases become liquid and liquids become solid. Solids condense, contracting and become more brittle. As a solid cools, loose thermons are released, and shared electrons draw atoms together.

*(Reference: McGraw-Hill Encyclopedia of Science & Technology; Ninth Edition, Vol. 14, Plasma. Confirmed by Bob Heeter of National Academies Board on Physics and Astronomy.)

As the solid is heated, the atomic thermal fields gain thermons and expand, pushing the orbiting electrons outward, as well as the atoms sharing outer electrons. This expansion process turns the solid into a liquid. As the expansion continues, atoms are pushed further out of range, and the liquid becomes a gas. As electrons are pushed to the outer VA belts, the gas becomes a plasma, and as it becomes superheated, it moves into a thermal extreme.

Cold

As any good air conditioning tech knows, **cooling is the process of removing heat**. As a thermal field releases loose thermons without replacing them, its temperature/thermal pressure lowers. The thermal field pressures, acting to separate atoms and molecules, also lower and the remaining thermons are condensed and stabilized by the surrounding magnetic field and orbiting electrons. At present, it is unknown whether a temperature of absolute zero (a complete elimination of loose thermons within the thermal field) can be achieved by matter, or what the consequences to the proton might be.

When helium is lowered to a temperature of 2.2K (just slightly above absolute zero), it becomes a superconductor. The thermal field is extremely rarefied and provides no significant resistance to moving electrons. Extreme cooling also causes mercury and a number of other materials to become superconductors.

Pressure

Gravity effects the thermal field indirectly by causing pressure. Under gravitational pressure, a proton (or atom/molecule) is pulled toward another, typically larger, center of gravity. The thermal field surrounding the proton is compressed against other thermal fields below it during this ‘attractive’ process. In turn, atoms and their thermal fields press against it from above. The thermal field becomes compressed by the surrounding pressures and displays all the characteristics of a smaller, less active thermal field. The compression also allows electrons to press inward, generating infrared light, and releasing loose thermons.

As an example, **water in high altitudes will boil at lower temperatures than it does at sea level**. The atmospheric pressure at high altitudes is not as intense as at lower levels because less matter from above is being pulled toward the center of Terra. On Jupiter, a very large planet with intense atmospheric pressures, the thermal fields become so compressed, matter, which on Terra would be a gas, exists as a solid, even though Jupiter is much hotter.

Pressure is generally the result of gravity, but can also be created by using a closed container and increasing the amount of the gas or liquid held within, or increasing the temperature so the thermal fields expand. The pressure inside a closed container will increase as the temperature increases. The thermal fields are absorbing thermons and kinetic energy, but are unable to expand because of the restricted space available. The pressure on the walls of the container will increase as the temperature increases, until the weakest atomic or molecular linkages separate, releasing the pressure in an explosion. Prior to the containers breakdown, however, the thermal fields continue to display characteristics normally associated with matter at lower temperatures (except they will conduct more intense heat to the surrounding environment).

Likewise, the internal pressure of the thermal fields can be reduced by lowering the temperature. If the container's walls have some flexibility they can actually be sucked inward in response to the shrinking thermal fields. Prior to any changes in the containers walls, the thermal fields are forced to behave as though they still had the same density level. For example, a gas would be unable to condense into a liquid.

When cooling, the shift from a gas to a liquid dramatically lowers the materials temperature. This change in the thermal field's expression of heat is based on altered field pressures stabilizing the thermal field. This change can also dramatically effect EM waves given off by a substance. As mentioned earlier, when in gaseous form, only spectral emission lines are emitted, while liquids and solids emit a broad range of EM frequencies.

The Gravity Field
(A Purely Attractive Force)

Characteristics

All matter expresses a gravity field, with protons (and thermons) as the source. Gravity provides one source of inertia. The USF theory incorporates the gravity field of a proton as a bonding force with nearby protons. As gravity is additive, it becomes stronger with the number of pseudo-neutrons within an atom, and more noticeable in the physical world when an object is larger and/or denser. At the physical level, the only known way to increase an object's gravity field is by adding more matter (increasing its pseudo-neutron count). This theory describes gravity as a contracting energy field which attracts other gravity fields and weakens in strength with distance. It does not necessarily have a finite range. As a field energy, it interacts with other gravity fields and indirectly influences electric and magnetic fields.

Gravity fields attract each other and show no repelling qualities. There are no obvious field lines, belts, or waves, nor any direct or indirect evidence supporting these behaviors. The size and density of a physical object (its mass) dictate the strength of its gravity field. Attraction to other gravity fields is the single, obvious characteristic of a gravity field (and this is also what makes it so difficult to study).

Unlike the Standard Model, **this model supports the concept of gravity as an instantaneous process**. There is 'no' evidence contradicting this observation.

In the late 1500s, Galileo Galilei observed two objects with different weights, dropped from the same height (and without significant air resistance, such as that created by a feather, for example) would strike the ground at the same time. By experimenting with various heights, Galileo determined the objects were accelerating at the same speed. This was an accurate observation, but there are variations on the theme worth noting. As two objects drop side by side, both accelerate at the same rate, but **the rate of acceleration varies with altitude, and with latitudinal location**.

Variations in gravitational acceleration, based on latitude, have been shown through identical experiments at sea level. Gravitational acceleration (given the symbol 'g') at the North Pole is 9.832 m/s^2. In New York City, g equals 9.803 m/s^2, and at the equator it equals 9.780 m/s^2. The differences in acceleration according to latitude have been explained by the rotation of Terra. Rotation partially counteracts gravitational attraction by causing an outward thrust, which is at a maximum at the (rotational) equator and a minimum at the poles. (Consider the rotation of Jupiter's magnetosphere, shown at the beginning of this chapter.)

Altitude is a measure of distance above sea level. Using examples within two hundred miles of the same latitude, variations in acceleration based on altitude can be shown. In San Francisco, at an altitude of 100 meters, g equals 9.800 m/s^2. In Denver, Colorado, at 1650 meters above sea level, gravitational acceleration is 9.796 m/s^2, and at Pikes Peak (also in Colorado) at 4300 meters, it is 9.789 m/s^2. This shows the gravity field weakens as it extends outward.

General Theory of Relativity & Gravity

The Ultra-Space Field Theory model describes gravity as an energy field phenomenon, resulting in the contraction of space. Einstein's General Theory of Relativity describes gravity as a warping of space and time. Observations of gravitational influence at subatomic levels, and larger, support both models. The strength of a gravity field increases with nearness to the center of gravity. This paradigm agrees with the General Theory in essence, but describes the process of gravity as a contraction of electrical field energies, directly and indirectly condensing nearby energy fields around its core.

In spite of numerous attempts, the Standard Model has been unsuccessful in applying Einstein's General Theory equations to atomic and subatomic levels. Gravity, set in a field theory paradigm, may provide a more functional model. The proton can be seen as a lattice-like structure of interconnected thermons surrounding the proton's core, collectively warping the surrounding EM field.

The Contraction of Space

The radical concept of the thermon allows for the description of gravity as an electric phenomenon. The proton, as a uniform structure of self-contracting thermons, warps the surrounding electromagnetic space and creates a gravity field equal to one proton '*g*'. The proton's internal thermon structure generates a uniform gravity field. The contraction of space *behaves* as a distinct energy field, attracting other gravity fields. (See *Chapter 3- Magnetic and Electric Fields; Protons as Electric Fields*.)

This model implies **the contraction process of a single thermon, as a joined positron-electron, generates an extremely weak gravity field**. In turn, a functional model for 'dark matter' (or more appropriately 'thermon gravity') can be developed.

The Expansion of Space

Another radical concept is the USF theory prediction of **the expansion of space as a form of anti-gravity**. This concept can be supported using two fairly simple examples, as well as the equations in Einstein's General Theories of Relativity. Heated gases provide example of the expansion of space as a form of anti-gravity. As a gas is heated it both expands and weighs less on a per volume basis.

Centrifugal force (spin) used on the inside of a space station, imitates gravity. This, however, is not true gravity. The pressure is outward, not inward. The outward compression of matter can imitate a contraction of space, but the two should not be confused.

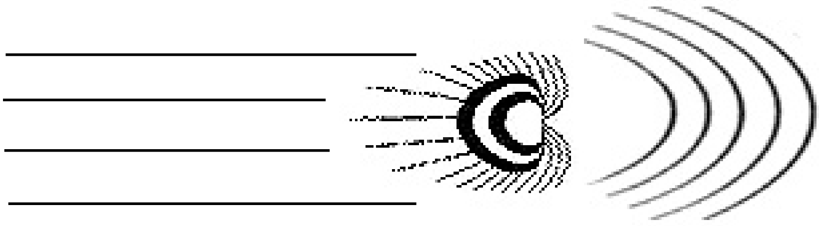
Inertia, Mass, & Drag
(Meeting Resistance)

Mass

Inertia is resistance to movement, or resistance to change in an already established direction. Gravity is most often associated with inertia per the Standard Model, but fluids and field energies can also produce drag, a form of inertia. The Standard Model traditionally describes gravity as the only source of inertia at the atomic and subatomic levels. At the atomic level, gravitational attraction is described as weaker than electric or magnetic fields. This is primarily due to the lack of influence gravity has on electrons, and the behavior of different field energies interacting with protons and neutrons.

Mass is closely associated with gravity. In regards to gravity, it can be described as the total number of pseudo-neutrons and/or protons within a give area. As the number of pseudo-neutrons in an atomic core increase, so increases the strength of the gravity field.

Drag, as a form of inertia, can be the result of gravity. For purposes of clarity, this book will distinguish between gravitational drag and electromagnetic drag. Gravitational drag is the result attracting gravity fields opposing movement away from each other. EM drag is the result of energy fields (minus gravity) meeting with resistance as they move through elec-



An electron accelerated to near the speed of light, meeting resistance from the EM field and generating sychrotron radiation.

tromagnetic and thermal fields. Synchrotron radiation provides an excellent example of EM drag.

Protons and neutrons meet resistance from both the gravity field and the EM field. **Electrons and positrons meet resistance *only from electric, magnetic, and thermal fields*.** Gravitational drag is strongest when moving away from a gravity core. Electromagnetic drag is similar, but increases when moving toward a source, or with acceleration.

At the subatomic level, mass is measured, not by weight, but by resistance to movement. The Standard Model describes the inertia of electrons and positrons as gravitational in nature. When Einstein developed the Theories of Relativity, it was known electrons resisted acceleration. Einstein interpreted this to mean their mass/gravity increased and incorporated the ratios of velocity and resistance into his theories. He stated that if electrons have inertia, then they must have weight, and assigned a gravity field to electrons.

The concept of electrons having no gravity field can be supported by the observation of electrons being ejected from the poles of galactic cores (black holes).

The Ultra-Space Field Theory assigns the proton the 'dual inertia' of one proton *g* of gravitational attraction, 'and' electromagnetic drag due to its magnetic field. (The core positron energy may also may also meet resistance from the EM field.)

The magnetic field resistance of moving protons and neutrons does not seem to have been previously considered, nor incorporated into inertia equations, and may require more advanced mathematical formulas.

Electron Drag

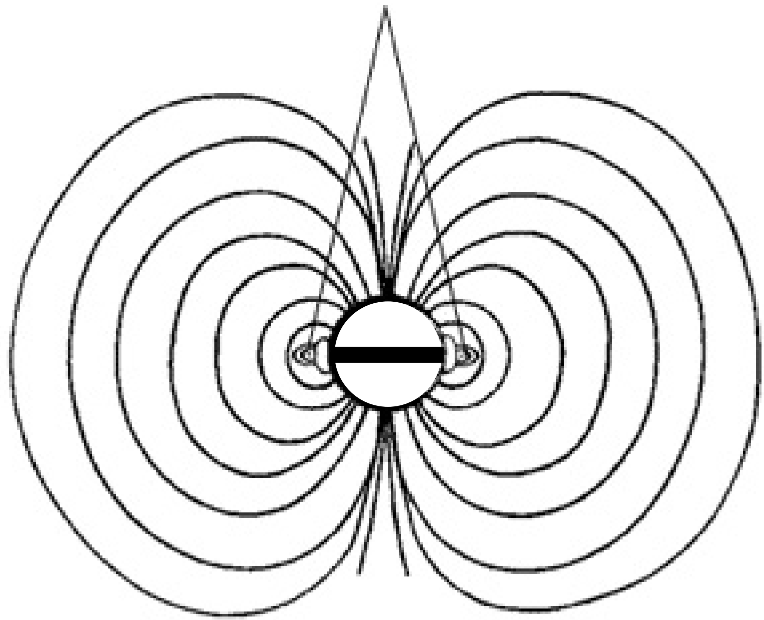
As an electron accelerates, it meets with resistance from the EM or thermal field. Both electric and magnetic field lines, and thermons, interact with passing electrons, resulting in drag. The faster the electron moves through the EM field, the more the leading area of the electron, as a field, flattens and spreads, further increasing resistance. At higher speeds, the electron generates higher frequency EM wave patterns, which radiate forward from the front of the electron. At faster-than-light speeds the waves radiate from the sides, or even from the rear.

In particle accelerators, called synchrotrons, charged subfields produce a phenomenon called synchrotron radiation. **As an electron is accelerated to near the speed of light, it produces a continuously 'narrowing' beam of light with increasingly higher frequencies**. This narrowing beam of light is caused the electron's field flattening on its leading side, and the space between each wave/pulse.

This process is also found in nature as electrons and protons are ejected from the Sun. Both are ejected at high speeds and propelled outward as part of a phenomenon called solar wind. Protons typically move more slowly in the solar wind because of the combined gravitational/EM drag, or dual inertia.

Though particle accelerators can generate synchrotron radiation using protons, the process requires much more energy because of the combined EM and gravitational drag. Overcoming the dual inertia of the proton to generate synchrotron radiation requires much larger amounts of energy (and consequently, much more money) generally making it cost prohibitive, but not impossible.

A single electron encircling the proton at its equator forms a neutron.



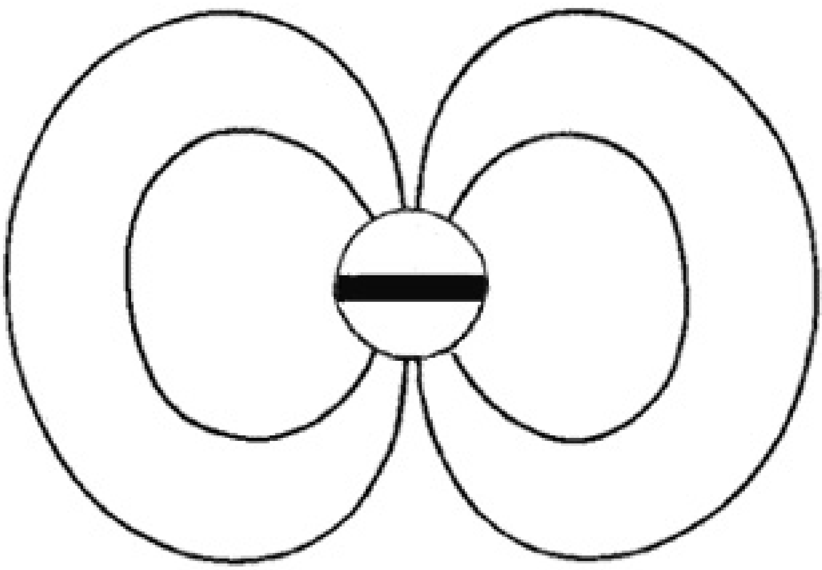
Neutrons
(Magnetized, Chargeless Gravity Fields?)

Characteristics and Myths

The USF theory distinguishes between a single, short-lived independent neutron and pseudo-neutrons existing as part of an atomic core. A true neutron is a proton with an electron located in the innermost Van Allen belt,* and which has recently separated from an atomic core. Within the core of an atom, core electrons are shared, partially neutralizing *all* surrounding protons and turning them into pseudo-neutrons.

*(This is not a new concept. Several scientists have created a neutron model with an electron in a tight orbit. On October 20, 2001, at a High Temp. Nuclear Synthesis II Mini-symposium, Michael Famiano and Richard Boyd, of Ohio State University, and Toshitaka Kajino, of the University of Tokyo, proposed a similar neutron model.)

An isolated neutron is not a stable entity. **Within ten to twenty minutes of its separation from an atom, a neutron will typically break down in a process called 'beta decay.'** It separates into a proton and an ejected electron. (Beta decay is also a form of electron-based radioactivity found in elements such as radium.)



A simplified representation of the neutron. The horizontal band symbolizes an encircling electron at the proton's equator.

The electron of an isolated, independent neutron encompasses the proton at its equator. The neutron generates a gravity field, a thermal field, and a magnetic field, and is considered electrically neutral. It is very sensitive to other magnetic fields and readily adjusts its polar orientation to the surrounding environment. (This supports the theory orbiting electrons influence a proton's/molecule's magnetic orientation.) The magnetic sensitivity of the neutron has made it an excellent tool for studying the magnetic domains in solids.

Prior to separation from an atom's core, the neutron's inner orbit electron is shared by two (or more) core protons, making both pseudo-neutrons. This provides for additional bonding, and counters proton-proton repulsion at close range. When two pseudo-neutrons are forced to separate, one often takes the core electron and leaves as a full neutron.

Neutrons, as part of an atomic nucleus, are pseudo-neutrons, which remain stable and are essential to the formation of the elements. The pseudo-neutron's electric, magnetic, and gravity fields can link with those of other pseudo-neutrons to create a complex atom. Currently, it is generally believed neutrons form an external layer, or shell, around complex atoms. The USF theory disagrees with this model and suggests *all* protons and neutrons within an atom's core are pseudo-neutrons.

In a process called electron capture, it is believed heavier atoms can absorb an electron into their core, changing a proton into a neutron, or, in this model, adding an electron to the electrical balance of pseudo-neutrons, and changing the atom from one element to another. The process is inferred by emitted x-rays, theoretically produced as outer electrons shift inward to replace the absorbed inner orbit electron.

The weight of a neutron is just slightly more than that of a proton. This model predicts the additional weight is not caused by a gravity field from the electron, but from the coulombic warpage of space as an electron and proton are attracted to one another at such close range. Within the atom's core this additional warpage of space increases the atom's overall gravity field.

Precise measurements show the neutron's inertia slightly exceeds the combined inertia of a proton and an electron by 0.01 percent (this 0.01 percent is 260 times more inertia than of a single, lone electron). Inertia should not be confused with weight, as the electron is spread out like a sail while moving with the proton, and promotes increased resistance as it moves through an EM or thermal field.

Because the neutron is electrically neutral when approaching an atom, it doesn't meet with the same repulsion a proton would encounter. It does continue to meet with long-range magnetic repulsion, short-range magnetic and gravitational attraction, and thermal field resistance, but the lack of proton/proton repulsion normally shifts the balance of repulsive and attractive forces, allowing the neutron easier access to an atom's core in many materials. This in turn allows for fission, or nuclear energy.

This model predicts the electron orbiting a cold neutron is more tightly bound than the electron of a warmer neutron.

The temperature, or thermal field, of a neutron effects its interactions with matter and atoms. This is shown in experiments using 'cold' neutrons. Neutrons are able to pass through certain materials, such as graphite and beryllium, having atomic cores surrounded by densely organized electric fields. When slow moving neutrons are introduced into these substances, they act as a filter, allowing only cold neutrons (neutrons with reduced thermal fields) to pass through, while warmer ones are deflected back after interacting with an atom.

Cold neutrons, unlike warm neutrons, can reflect off a polished surface, and can become polarized (their north/south poles uniformly aligned) by the reflection process. (See *Chapter 3; EM barriers/Plasmonics.)* A sheet of magnetized material can also polarize neutrons, by allowing those neutrons magnetically aligned with the sheet to pass through, and reflecting those which are not.

Additionally, a beam of cold neutrons passing through a magnetized iron block will become polarized, though in this case the emerging neutrons are magnetically aligned in the opposite direction of the iron block, while those with the same alignment are deflected away in different directions. This inverse alignment process is predicted to be both magnetic and electric in nature. As the neutron passes the polarized atoms in the iron magnet, the orbiting electric fields interact. As the gears in a clock move in opposite directions, so the neutron's electron shifts to an opposite orientation. The electron is an east monopole, and its preferred orientation is east. The neutron's magnetic field adjusts as well, with its unanchored north/south poles being attracted to their more stabilized opposites to become 'inversely polarized.'

The current 'Standard Model' of the neutron describes it as a proton with its surface completely surrounded by a meson. The meson carries a charge equivalent to one electron volt. Quark theorists believe the meson is a quark/antiquark pair, though there is no direct evidence supporting this concept and the circumstantial evidence is very weak.

The Fallacy of Proton Decay

While there are numerous observations of neutrons ejecting an electron and becoming a proton, proton decay has never been observed. The Standard Model of a proton transforming into a neutron by ejecting a positron and an antineutrino has never been confirmed and has no direct supporting evidence. Circumstantial evidence is '*extremely*' weak.

Historical Info

James Chadwick discovered the neutron in 1932. Since then, it has caused considerable confusion. Initially, the neutron was considered a fundamental particle, capable of an indefinite, independent existence. Early experiments failed to observe the neutron's separation into a proton and an electron after the passage of ten to twenty minutes.

One of the earliest neutron theories was symmetry-based and described the neutron as the result of a proton and antiproton passing one another, exchanging charges, and producing two neutrons (a collision would annihilate the proton and antiproton). Though this theory was never confirmed, and current observations do not support it, it continues to be used (perhaps unknowingly) as the unspoken foundation for neutron theory.

Within a few years of its development, this early model was modified to explain the emission of positrons from elements such as aluminum and potassium. After being bombarded by alpha particles (described by the standard model as helium ions- two protons, two neutrons, no electrons), these elements emitted positrons and electrons.

In developing a symmetry-based model for the neutron, it was theorized a proton would become unstable and eject a positron (proton decay), transforming it into a neutron. This model was further supported by positron emissions from unbalanced radioactive elements which simultaneously transformed protons into neutrons. (The USF theory does not support this model and explains these processes as pair creation and electron capture.)

After the discovery of the neutron, beta (electron) radiation was confirmed to be the result of a neutron breaking down into a proton and electron (the radioactive element gradually changed from one element to another as the number of electrons in each atom changed). This observation was used to expand the model, and used a symmetry philosophy to declare, "Neutrons can become protons by emitting an electron, and protons can become neutrons by emitting positrons." (A proton has *never* been observed emitting a positron to become a neutron.)

The varying directions and speeds of the electrons during neutron decay became a significant problem for mathematical theorists because it conflicted with the 'law of conservation of energy.' The concept of neutrinos (massless, chargeless particles) was developed as an explanation. Early on, neutrinos were a questionable mathematical requirement with no evidence supporting their physical existence.

Though completely unobserved, and with no supporting evidence, the symmetry-based model of proton decay (the theory a proton becomes a neutron by ejecting a positron) was extended to include an ‘antineutrino’ as part of the decay process.

In the mid to late 1930s, this modified model was also used to explain the heating of Sol. In a process called the proton-proton reaction, fusion was described as two protons colliding and remaining attached, and then converting to deuterium, a heavy form of hydrogen with a proton and a neutron. According to this early model, one of the protons in the pair becomes a neutron by ejecting a positron and an antineutrino. (The USF theory includes a core electron in the fusion of deuterium, and does not support the ejection of a positron and an antineutrino.)

In 1935, Hideki Yukawa proposed the protons in the cores of atoms were held together by a force overpowering proton/proton repulsion. Yukawa calculated the force was continuously absorbed and emitted from the proton in 1/100,000,000 of a second. The force came to be called a meson. He also predicted the meson had 200-300 times more mass than the electron. A single electron was considered too small to explain the stronger inertia of the neutron. Yet, when the neutron separates into a proton and an electron, the excess mass disappears (and, per the Standard Model, becomes a neutrino).

Neutrinos

Described as massless and chargeless, the neutrino’s impact on matter is considered to be essentially nonexistent. While being extremely difficult to detect, it does provide a solution for the dilemma faced by particle theorists because of the law of conservation of energy. Gradually the concept of a neutrino became accepted out of mathematical necessity, but observational proof of its existence remained a challenge.

In 1956, Clyde Cowan and Frederick Reines set up an experiment at the Los Alamos Scientific Laboratories designed to detect gamma rays. A tank of water was placed in front of a plutonium breeder reactor and observed. Gamma rays were detected, and this was interpreted to mean positrons and electrons had combined to create them.

Following the (never observed) proton decay model, this meant protons in the water had transformed into neutrons by releasing positrons and antineutrinos. It was further theorized the protons made this transformation after receiving neutrinos from the reactor, which in turn had been created by earlier neutron decay. Based on these observations the antineutrino, and the neutrino, came to be accepted as physical realities.

Neither the creation of gamma rays, nor the presence of positrons in matter, prove the existence of an antineutrino, nor its symmetrical counterpart, a neutrino. To date, this rationale is still used as evidence of neutrinos, though the wording has become so overly-simplified it is now a fictional description. There has never been direct evidence supporting the concept of neutrinos, and all circumstantial evidence can be explained using other interpretations.

Over time, other types of neutrino detectors have been designed and built, primarily with the intention of researching neutrinos from Sol and from supernovas. Many are water-based detectors that infer the existence of neutrinos by gamma rays or electron-sourced Cerenkov radiation. The SAGE neutrino detector infers neutrino emissions by the number of atoms converting from gallium to germanium each month. (A gallium atom converts to germanium by transforming a neutron into a proton and electron.) At present, neutrino research has produced minimal and unpredictable results.

The USF theory explains the varying speeds of electrons ejected from neutrons as the result of environmental magnetic, electric, and thermal variations, combined with varying polar orientations within the atom itself.

There is no doubt neutrino detectors are measuring something, but hard supporting evidence of ‘actual’ neutrinos does not exist.

Neutron Inertia

The inertia of a neutron has been measured and found to be slightly higher than the inertia of a proton. The standard model eliminates the electron as the source of inertia because a individual electron is not considered gravitationally strong enough. A different model of how an electron orbits a neutron provides a different conclusion.

In the USF theory paradigm, the electron is contained in the innermost Van Allen belt and encircles the neutron at its equator. The single electron field is spread out significantly and, as with a feather, it meets with greater resistance than it would in its more concentrated, free electron form.

According to the USF theory model, core electrons within an atom are shared by pseudo-neutrons and are trapped by the shared attraction of other protons. Within the atom's core, the attraction of electron to proton produces a contraction of space and a minute amount of additional gravity. When a pseudo-neutron is separated from an atom, with only the innermost VA belt holding the electron in position, the free neutron cannot contain the electron for an extended period of time. During decay, magnetic and thermal repulsion forces the ejection of the electron.

Neutron Acceleration

For several decades, consensus opinion has ruled out the possibility of accelerating neutrons to high velocities because of its electrical neutrality. In 1993, J. Anandan, of the Univ. of South Carolina, and C.R. Hagen, of the Univ. of Rochester devised a gedankin experiment (a thought experiment) describing the process of accelerating a neutron using magnetic and electric fields. The USF theory predicts a moving electric field could be used to repel/accelerate a neutron via its magnetic field. (Stabilizing the neutron's encircling electron is a separate problem.)

Chapter Three- Magnetic & Electric Fields

The Magnetic Field
(Permanent Magnets)

Characteristics

This paradigm describes protons as magnets, and as the source of magnetic fields in the physical world. Neutrons, as a form of the proton, are magnets as well. Magnetic forcefields are expressed by protons, neutrons, planets, the stars, and an infinite number of galaxies. The field lines expressed by a magnet can be more accurately described as three dimensional layers, or 'layered forcefields.'

Some regularly spaced magnetic layers are especially strong, and the spaces between them are called Van Allen belts. Smaller 'charged' fields (electrons, positrons, protons) can become captured within of the Van Allen belts. (See *Chapter 6- Matter & Electricity; Fusion; Titius Bode Law & Fusion*.)

North and south poles are the most obvious features of the magnetic field. Magnetic poles come in pairs, and are sourced from thermons and protons. Poles attract or repel the poles of other nearby magnetic fields at short range. A small field is influenced by larger magnetic fields surrounding it, as well as nearby, smaller fields.

Magnetic fields express themselves along the path of least resistance. A good example of this characteristic is circular magnetism.

Resistance comes from electric fields, and from the same pole of another magnetic field. Strong electric fields can repel weak magnetic fields. This can be shown by the combined strength of high speed electrons from the Sol compressing Terra's magnetosphere.

At greater distances, magnetic fields will weakly repel one another (long range repulsion). At the physical level this property is not generally noticeable, being overwhelmed by gravity. At closer distances, magnetic fields display the more obvious property of polar attraction.

The arrangement and orientation of joined magnetic fields influences the strength of the resulting larger field. Groups of interconnected magnetic fields with different polar orientations can partially cancel each other out, weakening the overall field. Areas of the fields become distorted and weaker, with some regions becoming completely neutral. These regions are called neutral points. Within atomic cores, this pattern creates diamagnetic substances.

Interconnected magnetic fields with the same general polar orientation combine to form a larger, stronger magnetic field. The pseudo-neutrons of an atom can combine in aligned patterns to produce atoms with strong magnetic fields, such as iron, or weak fields, as with oxygen. In the case of iron, the atoms form a domain, or crystalline structure. The domains typically arrange themselves in patterns that cancel each other out. The introduction of a strong magnetic field from an outside source can realign the atom's poles, turning the iron's small domains into one large magnetic field. This piece of iron can now be described as a permanent magnet and falls in the category of ferromagnetism.

The Standard Model

As mentioned earlier, the scientific community presently supports a model of magnetism describing electrons, not protons, as responsible for magnetic fields. Current theory describes the magnetic fields of atoms as the result of both orbiting electrons and their spin. Magnetic field lines are often described as an illusion.

Old Illusions

Michael Faraday first introduced the concept of magnetic field lines, or lines of flux, in the 1830s. He created a functional model of field lines extending from both the north and the south poles, with most curving around to connect with the lines emanating from its opposite pole. Faraday's model has been instrumental in helping to understand electric current and cosmological relationships.

Until recently, perhaps the last thirty years, Faraday's model of the magnetic field, along with the concept of field lines, was described as an illusion by most university instructors. Iron filings aligning themselves into patterns in a magnetic field were described as "little compass needles." The pattern of the iron filings was considered a complex system of lines which 'simply imitated' the behavior of a compass near the magnetic field. The field was considered a mirage, useful in describing magnetic forces at a distance.

There are a large number of older science textbooks, and books on magnetism, also describing the magnetic field as an illusion. Some newer textbooks, relying primarily on information from older books, continue to describe it in this way. The consensus opinion is changing very gradually to an acceptance of magnetic field lines as a reality.

Additionally, it is difficult to take useful measurements from the permanent magnets we see at the physical level. Permanent magnets are not really permanent. Jarring a magnet, or simply the passage of time, can cause the atoms within to shift orientations. This makes it difficult to predict the field strength of permanent magnets. Magnetic fields organized by electrical current are very predictable and easy to control. An understandable preference developed in using 'electrically generated' magnetic fields for experiments. It also had the psychological effect of reenforcing the belief magnetic fields were dependent on the movement of electrons for their existence.

Prejudice against the aether theory model and an incompatibility with particle theory were also factors in describing field lines as an illusion. Magnetic fields cannot be explained using a particle theory model. As a consequence, research in the area of magnetics has been severely retarded.

We now understand Terra, solar systems, and even galaxies radiate, and are influenced by, magnetic fields. The discovery of the Van Allen belts surrounding Terra, and an evolving understanding of their behavior, offer clear proof of the existence of field lines, or layered forcefields. Our increased understanding of magnetic fields, and their importance, has sparked a subtle, seemingly subconscious shift to a field theory paradigm. Also, the special effects of movies and television shows (such as Star Trek) have provided us with images useful in visualizing energy fields as encompassing forcefields.

A second illusion, also having been unnecessarily promoted, is the arbitrary assumption magnetic field lines flow from north to south. (The same assumption has historically been made regarding the field line between east and west monopoles, with the field lines 'flowing' from the west (positive) pole to the east (negative) pole.) All observable evidence suggests field energies flow in 'both' directions simultaneously.

Hysteresis

Placing an iron bar (a ferromagnetic material) within the range of a strong magnetic field causes the iron bar's atoms to realign. An electric current sent through a wire coiled around the bar can have a similar alignment effect. This process is called hysteresis. When the electric field is removed, the atoms within the ferromagnet can retain the alignment, with the magnetic fields of the atoms interconnecting from one pole to the next. The ferromagnetic material becomes a magnet.

Magnetism and the Thermal Field

When a ferromagnetic material is heated past a certain temperature (specific to each material), the thermal field of each atom expands to such a degree, the atoms are pushed out of each others magnetic range. This specific temperature is referred to as the Curie point, or the Curie temperature. In this state, the material is generally considered paramagnetic (weakly magnetic).

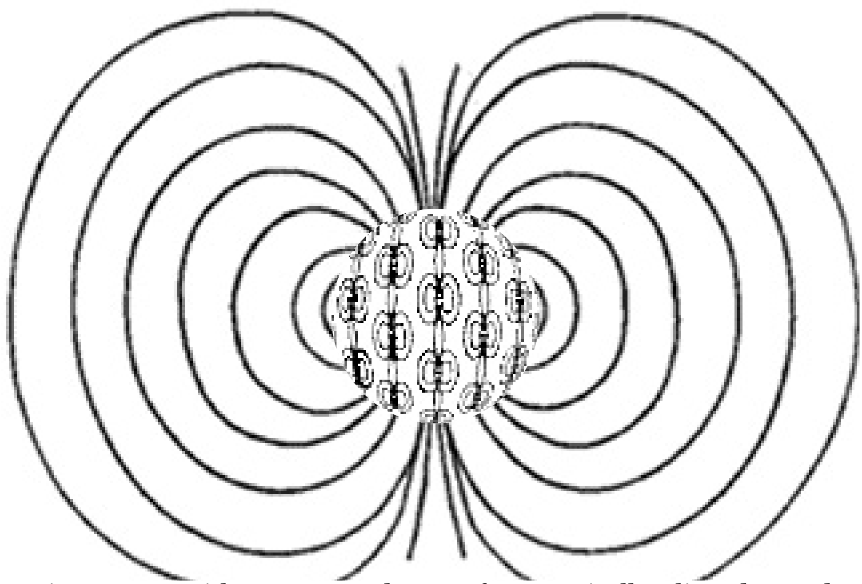
When the substance cools to just past the Curie point, the thermal fields contract enough for the atoms to potentially reconnect magnetically. Hysteresis will almost certainly be necessary to realign the atoms and produce a large scale magnetic field.

Protons, Neutrons, and Atoms

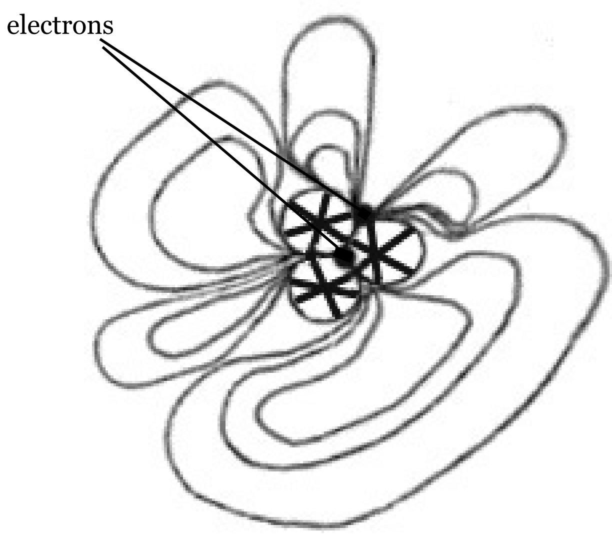
The proton is a true permanent magnet and expresses the characteristics of a magnetic field. When orbited by an electron, its magnetic field is partially distorted and compressed. From this point, magnetism is integrated into all matter as a fundamental component. The permanent magnetic fields we see at the physical level are the result of complex atoms within matter having magnetically extended and joined their poles, assuming a uniform north/south polar alignment.

Magnetic field lines/layers normally exist both inside and outside the body of a magnet. This is true at the atomic level as well, with layers existing within the atoms of the magnet. The Ultra-Space Field Theory carries this process one step further and predicts the pseudo-neutrons within the atoms of magnets can also be (slightly) realigned.

Pseudo-neutrons, as energy fields within the atomic core, are ‘assumed’ to be spherical shapes, though their shapes may adjust to some extent. The number of pseudo-neutrons determine specific magnetic patterns within the core. These patterns include magnetic alignments and neutral points.



An iron atom with a core made up of magnetically aligned pseudo-neutrons.



Above: A tritium atom, a form of hydrogen, with multiple magnetic poles (called consequent poles). The three pseudo-neutrons share a two electrons. Tritium is mildly unstable and will break down, releasing an electron to become Helium-3.

In aluminum, the atoms, as a whole, can become polarized, but this is not their natural state and they return to their original alignment easily. (The existence of diamagnetic and paramagnetic materials suggests the individual pseudo-neutrons *within* an atom's core will resist realignment by a strong magnetic field. This may be due to the arrangement of core electrons.) The molecules making up plastic display no significant north/south poles and do not polarize easily.

Other magnetic poles, in addition to the two primary poles, can be formed within the magnetic field. Such additional poles are called 'consequent poles', and develop in the atom's core when one, or a small group, of pseudo-neutrons maintain an alignment different from the atom as a whole. A large scale, energetic example of consequent poles are sun spots, also known as solar flares. Consequent poles can also be found in everyday refrigerator magnets.

Weakly magnetic, complex atoms have multiple consequent poles, with individual pseudo-neutrons as the source. Several distortions and neutral areas exist in the magnetic fields of these atoms. The distortions promote irregular patterns in orbiting electrons and may help to provide 'safe haven' for stray positrons.

Magnetic Forcefields

The layers of a magnetic field can be shown to exist through the use of permanent magnets and metal filings. By spreading metal filings on a sheet of paper placed over a magnet, its field can be observed. The field lines shown are actually three dimensional layers emanating from the magnet's center.

Magnetic flux lines, or in this paradigm, layers of magnetic forcefields, emanate from both poles and exhibit a variety of characteristics. Unless there is another nearby, strong magnetic field, most of the outer layers from one pole will curve around to meet layers emanating from the opposite pole. A few layers emanating from the center of each pole will merge with layers from a larger, weaker magnetic field surrounding it. Due to their organization, magnetic forcefields that are peripheral at the poles become interior layers at the magnetic equator.

Magnetic layers from like poles have never been observed crossing one another, suggesting a mutually repulsive characteristic. Magnetic layers from opposite poles will interconnect to form a larger magnetic field. At the planetary level, protons, electrons, and positrons are observed in Terra's Van Allen belts. At the level of the solar system, this paradigm predicts these charged subatomic entities push Sol's Van Allen belts outward. This paradigm also predicts Sol's Van Allen belts have acted to contain the matter necessary to form planets. At the level of galaxies, stars and solar systems form.

Field Strength

Measuring the strength of a magnetic field can be surprisingly difficult. Until 1780, the only way to measure the strength of a magnetic field was by its lifting power. Coulomb developed a more accurate method using the combination of a compass and a torsion balance device, allowing him to measure the magnetic field as it weakened with distance from its center.

The strength of a magnetic field is often measured at the poles where the magnetic field is the strongest (reminiscent of measuring lifting power). Long thin magnets tend to be weaker than short stubby magnets because there are fewer magnetic field layers emanating from the poles. In terms of strength, spherical shapes seem to be optimum for matter expressing a magnetic field. A magnet is weakest at its equator.

When measuring a magnetic field, location in reference to the poles is an important factor. The spacing, or density, of magnetic forcefields (field lines) influences the strength of the overall magnetic field. As distance from the two poles increases, the forcefield layers are spread farther apart and the strength of the magnetic field weakens.

Compression is also a factor in field strength. Environmental factors can compress or rarify a magnetic field. When the north poles of two permanent magnets are pressed together, their field lines are compressed, making the north poles of each magnet more concentrated and stronger. As the poles are pressed closer together the field strength continues to grow. Moving electrons can compress or rarify a magnetic field as shown by Terra's magnetic field. (See *MacroMagnetic Fields*, this chapter.)

The size of a field may reflect its range, but not necessarily its strength. A large, weak field can be compressed into a small strong one, and vice versa.

The units of magnetic field strength used in this paradigm are called the tesla (T) and the gauss (G). One tesla is equal to 10,000 gauss. A refrigerator magnet is equal to about 50 gauss, and the 'average' strength of Terra's magnetic field at its surface is about 0.5 gauss.

Circular Magnetism

If a bar magnet is placed across the ends of a horseshoe magnet, a circular magnet is created. A ring of iron can also be magnetized to create circular magnetism. Under these circumstances, the magnetic field has no need to cross space in reaching for an opposite pole.

A circular magnet contains the magnetic field *within* the material. It is important to understand the magnetic field can flow in a loop within a material, without the magnetic poles extending beyond the surface of the material.

This is an example of magnetic fields taking the path of least resistance in forming a north/south pole relationship. The magnetic alignment of the atoms/protons follow a curve, (not a straight line) and there is no separation of poles at the physical level. Each individual atom follows and expresses the pattern of the overall magnetic field.

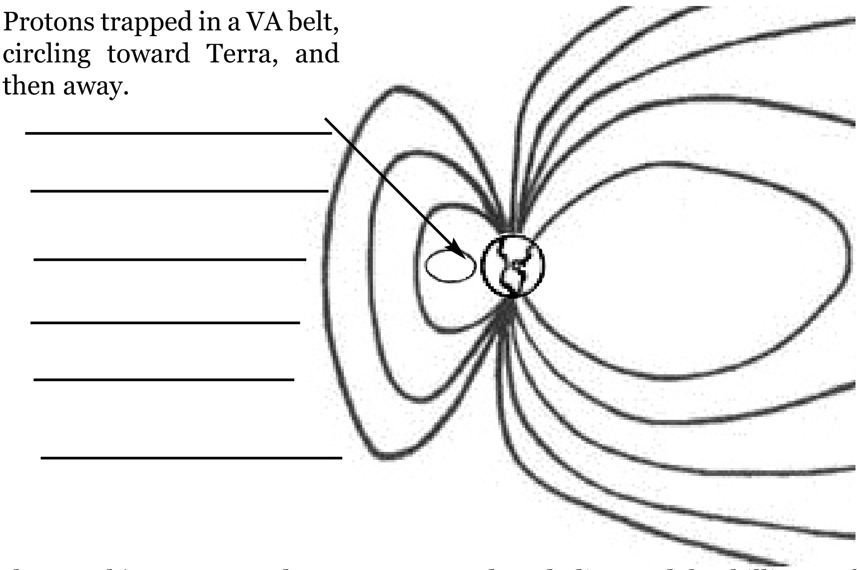
Currently, the technological evolution of circular magnetism has been limited to testing metal devices for defects in their structure.

MacroMagnetic Fields
(Larger and Weaker)

Terra's Magnetosphere

The term magnetosphere was first used to describe Terra's magnetic field, and was later applied to the other planets, and to Sol. Terra's magnetosphere has traditionally been described as a byproduct of moving electrons, part of a spinning molten iron core found at the center of Terra. While this theory may have some validity regarding the strength of Terra's magnetic field, by itself it is no longer a valid explanation. Both Mars and our own moon have weak magnetospheres, while lacking molten cores.

Terra's magnetosphere acts as a layered forcefield, surrounding and protecting us from solar winds generated by the sun. Solar winds are believed to be made up primarily of electrons and some protons (positrons and positive ions may be included in the mix). Just as the magnetic field of proton cores act to repel and inhibit electrons, so Terra's magnetosphere shields us from high speed electrons, positrons, and the more slow moving protons. Textbooks describe our magnetosphere as starting a few hundred kilometers above Terra and extends outward from the magnetic equator an estimated average of 60,000 kilometers. (Though standard compasses suggests it exists at ground level, and the typical model of a magnetic field predicts its existence within Terra.) By comparison, Terra's magnetosphere is a small field existing within the larger, weaker 'Interplanetary Magnetic Field' encompassing our solar system.



The Earth's magnetosphere, compressed and distorted by billions of high speed electrons.

Solar winds pass Terra at approximately 400 km/second. Charged entities moving on an intercept course alter the shape of the magnetosphere, separating some outer field layers and compressing the remaining ones on the sunward side, while distending the rest of the magnetic field away from Sol. The flattened area of the field is called the 'bow shock' and this term can applied to all energy fields interacting with other moving fields, or moving through a field providing resistance. The compression of Terra's magnetic forcefield results in a smaller, but stronger, magnetic field. (See *Author's Notes, # 12*.)

In 1958, the American satellite 'Explorer I', containing a geiger counter, was launched into orbit around Terra. During its elliptical orbit, it would periodically record intense radiation. James A. van Allen interpreted these readings to mean the magnetosphere had two strong layers or belts of radiation. Later satellites showed these belts to contain large numbers of protons within an inner layer and electrons in an outer layer. Since that time, the model has evolved to include a number of subbelts. The solar wind and cosmic rays provide a steady flow of protons and electrons. Electrons were originally thought to enter and collect through the tail of the magnetosphere, while protons and ions were thought to enter through the poles. (When an atom loses one or more electrons, it becomes an ion with a positive charge equal to the number of orbiting electrons lost.)

In early experiments, electrons and protons were observed traveling back and forth from one pole or the other, moving in a tightening spiral as the belts come together at the poles. Typically these charged entities are repelled by the increasing magnetic density at the poles and change direction, moving back towards the opposite pole in an expanding spiral until passing the magnetic equator. The process is repeated at the other pole. The discovery of the East-West Geomagnetic Effect noted electrons veer to the east and protons to the west.

Outer space is filled with the subatomic entities and ions sourced from the solar wind and cosmic rays. Observing their interactions with the magnetosphere from our planet's surface is difficult, because of distance and the atmosphere. The planet's outermost atmosphere extends to 450-600 km above Terra's surface. Helium is the most abundant gas at this height, and the temperature averages 600 degrees C, but can reach 1700. The atmosphere is so thin in this region, atoms and ions readily escape into space after colliding.

NASA's Space shuttle, Discovery, in its June, 1998 mission, used the Alpha Magnetic Spectrometer (AMS) to gather information 400 km (250 miles) above Terra. The data provided a more accurate model of how subfields and ions interact with Terra's magnetic field. The AMS gave the first view of cosmic rays in the upper atmosphere.

The AMS also showed how different subfields respond to Terra's magnetosphere. It scanned cosmic rays arriving at different latitudes as Terra moved. It was expected Terra's magnetic field would repel low velocity protons arriving at the equator more strongly than at higher latitudes.

To their surprise, the data showed a large number of low velocity protons at almost all latitudes, 'especially' near the equator. More surprising were the *patterns* of movement the protons displayed. At the equator, low velocity protons formed an arc extending from 400 km to over 4000 km above the surface of Terra. Protons were moving away from Terra, then curving back toward it, following the donut shape (or toroid) of Terra's distorted magnetosphere. (See illustration, page 96.)

A similar effect was seen with electrons and positrons, except these were traveling at approximately half the speed of the protons. It was expected the number of positrons and electrons would be equal. However, in the equatorial band, there were almost four times as many positrons as electrons. This imbalance is not understood. Another puzzle is that within the equatorial toroid, AMS also found large amounts of the rare isotope helium-3, rather than the more common, and heavier, helium-4.

The USF theory paradigm explains the increased number of charged entities at the equator as a result of polar repulsion pressing the charged entities in to an equatorial orbit. The equator is where Terra's magnetic field is at its weakest. Repulsion at the north and south poles is considerably stronger. Magnetic field strength typically increases closer to the magnetic core. Incoming charged entities are repelled outward by magnetic field layer repulsion.

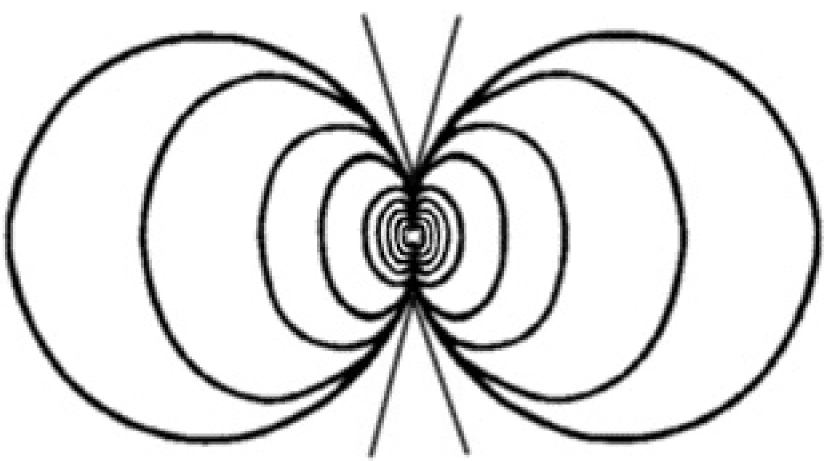
This new paradigm also predicts the solar winds pressing against Terra's magnetic field play a role in stabilizing its orbit and preventing it from spiraling into Sol due to gravitational attraction. This differs from the more traditional explanation of Terra's stable orbit, which uses *only Terra's momentum* to offset Sol's gravitational pull. Electrons ejected from Terra also provide an explanation for the moon's gradually enlarging orbit as it slowly pulls away from Terra.

The Interplanetary Magnetic Field

The Ultra-Space Field Theory describes the Van Allen belts surrounding protons and atoms as a space between magnetic field lines where charged entities take up orbits. It also applies this concept of Van Allen belts to Sol.

Sol has nine planets orbiting it. The USF theory predicts, as Sol formed, so too did nine primary Van Allen belts. Within these belts electrons and protons from our Sun, and ions and gases from quasars, became trapped. Over time they have consolidated at Sol's equator and condensed into the planets. (Pluto is not included as a planet, but as a comet. See *Chapter 6- Matter and Electricity; Fusion; Titius Bode law and Fusion.*)

For several years Sol's magnetic field has been described as weaker than Terra's, or nearly the same strength, yet it is large enough to encompass our solar system and beyond. When related to orbiting planets, it is referred to as the interplanetary magnetic field, though its center is, in fact Sol.



Sol's magnetosphere and Van Allen belts. The magnetic forcefield layers are distended outward by the same high speed electrons which compress the Earth's magnetosphere.

More recently, it has been determined when Sol has minimal sunspot activity (consequent poles), its magnetic field is 100 times stronger than Terra's.

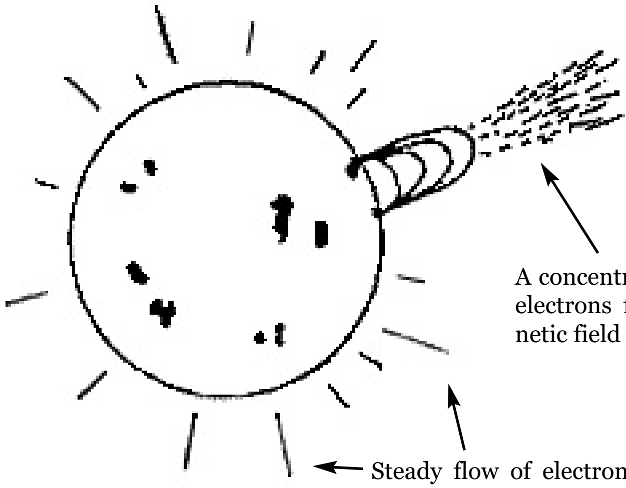
Sol's magnetic field appears to be weak because of solar winds (ejected electrons, positrons, and protons, from the sun) pressing its field layers outward and spreading them. Just as a compressed magnetic field will register as stronger in the areas measured, an expanded, stretched-out magnetic field will register as weak where measured. This concept is supported by recent research and experiments performed by NASA.*

The magnetic field of the sun is not static. Sol goes through a full rotation every 27 days, causing a spiraling effect in its magnetic field. (A spiraling effect has not yet been incorporated into our model of Terra's rotating magnetosphere.) Every 11 years Sol's magnetic north and south poles reverse themselves. This pole reversal is followed by a cycle of sunspot activity, which is magnetic in nature. Sunspots are where intense, compressed magnetic loops, hundreds of times stronger than the surrounding magnetic field, press out through Sol's photosphere. During this process, the remaining magnetic field is weakened.

Sunspots are relatively cool, dark areas on the surface of Sol. The center of a sunspot is coolest, at about 4250 K, as compared to the surrounding photosphere that is approximately 5800 K. Sunspots exist for an average of two weeks, but may last for two months. Their relative darkness is generally described as convection currents (rising hot ionized gas/protons) being inhibited by intense, temporary magnetic fields. (The coolness may be the result of the Peltier effect. See *Chapter 6- Matter and Electricity; Peltier Effect.)*

Because Sol's poles reverse themselves every eleven years, its south pole is able to link with Terra's north pole, creating a tunnel effect for the solar winds at the poles. With this magnetic linkage, solar wind gusts or coronal ejections can

*(Reference www.spaceweather.com/glossary/imf.html.)



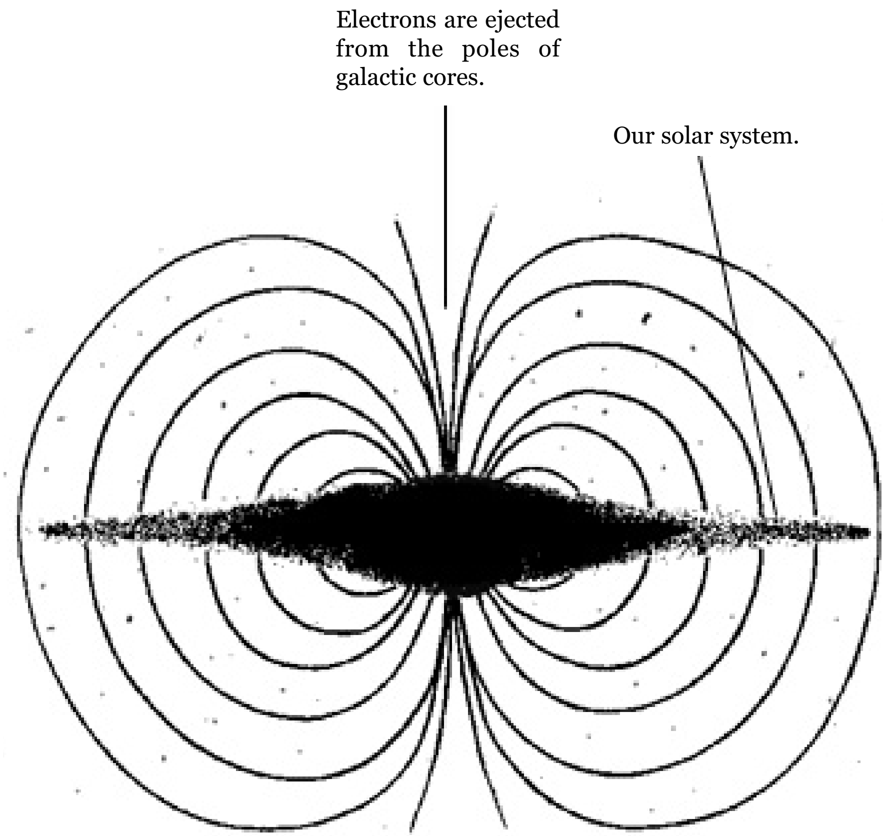
Sunspots come in pairs with one acting as a magnetic north pole and the other as a south pole. The magnetic fields formed in these cool areas eject concentrated streams of electrons and protons (and possibly positrons).

produce exceptionally strong northern lights.

According to this model, the solar system's field lines are stretched outward by a steady flow of beta radiation. It has been observed the space outside our solar system is warmer than the space within it. This model predicts this to be the result of the Peltier effect.

In the Peltier effect, electrons push thermons ahead of them, and as they pass though a magnetic field layer created by two metal surfaces pressed together. Thermons (heat) accumulate on the far side of the magnetic field. This leaves a shortage of thermons on the near side of the magnetic field, effectively cooling one piece of metal and heating the other. (See *Chapter 6- Matter and Electricity; Peltier Effect.)*

As the peripheral layers of Sol's magnetic field are pressed outward, they also receive pressures from outside our solar system, pressing the outer layers together. Electrons and thermons pass through these field layers, but cannot return.



Our galaxy and its magnetic field.

The Galactic Magnetic Field

The galactic magnetic field is considered to be quite weak, with estimates of its average strength being approximately 0.5 nano-teslas. Although this is 1/50,000 of Terra's magnetic field strength at its surface, the galactic magnetic field still influences the motion of protons, electrons, and positrons. The magnetic field existing between galaxies is estimated to have a strength of .1 to 2 nano-teslas.

Variations on the Magnetic Field
(Core Alignments)

Variations

Permanent magnets are classified as ferromagnets (ferro=iron), and express the magnetic characteristics we are most familiar with. In addition to ferromagnetism, other types of magnetism were discovered after the mid-1800s. In 1845, Michael Faraday discovered bismuth and glass are repelled from magnetic fields. This property was classified as 'diamagnetism.' Faraday's research also found some substances which were obviously not permanent magnets, but were none-the-less attracted by magnetic fields, a property he called paramagnetism. Two other forms of magnetism were discovered in the 1930s- ferrimagnetism and antiferromagnetism. (See *Chapter 6- Matter & Electricity; Ferrimagnetism and Antiferromagnetism*.)

Diamagnetism

A substance is diamagnetic if it is repulsed by a magnetic field. The current model of diamagnetism uses a field theory paradigm. A magnetic field brought into range of a diamagnetic substance interacts only weakly with the magnetic fields of the atoms, but very strongly with their electric fields. The interaction produces repulsion.

When a magnetic field penetrates the diamagnetic substance, the electric fields (electrons) surrounding the atoms become realigned. The atoms have an extremely weak overall magnetic field and multiple poles, due to the internal arrangement of pseudo-neutrons. Interacting primarily with the electric fields, the large magnetic field is repelled. This is supported by Lenz's law.

The realignment of electron orbits, and the repulsive effect, lasts only as long as the external magnetic field is present. Diamagnetism is a very weak effect compared to ferromagnetism. (It should be noted diamagnetic atoms, having weak, multiple magnetic poles and equators, will produce a number of unusual electron orbits.)

Water is diamagnetic, and so are most organic compounds, as well as many nonmetals. Some metals, such as silver, lead, gold, copper, and bismuth, are diamagnetic, with bismuth expressing the strongest repelling qualities. All substances are weakly diamagnetic (due to their electric fields) and this susceptibility must be included when predicting the effects of introducing a magnetic field to a substance.

Superconductors have been called perfect diamagnets. When a magnetic field is applied to a superconductor during the cooling process, the magnetic field is repelled from the sample after it is lowered to the superconducting transition temperature. This is called the Meissner effect after its co-discoverer, Walther Meissner.

Paramagnetism

A paramagnetic substance is weakly magnetic. The atoms/molecules within can become polarized by the influence of an external magnetic field, but the atoms themselves have such weak magnetic fields the alignment disappears when the external field is removed. This paradigm predicts the pseudo-neutrons within the atomic core are in a state of moderate magnetic disarray, creating an overall weak magnetic field.

The current model of paramagnetism was developed by Langevin, and also follows a field theory paradigm. His model explains the paramagnet as consisting of a large number of weakly magnetic, noninteracting atoms. Without the influence of a strong external magnetic field, the magnetization of the system is zero, because the poles are randomly oriented and out of each others range. A strong external magnetic field forces the poles to partially align along the field direction. The amount of alignment (and the amount of magnetization) is directly related to the strength of the external magnetic field.

Magnetic substances becoming paramagnetic after being heated past the Curie point have atoms that have moved out of range (due to thermal field expansion). Substances which are paramagnetic below the Curie point simply have atoms with weak magnetic fields.

Monopoles
(The behavior of)

Characteristics

As east/west monopoles, electrons and positrons are attracted to each other and repelled by the north/south poles of the common magnetic field. When held in stationary positions near one another, these opposing poles radiate field lines connecting the two and express their mutual attraction (this is called an electric dipole). This can be demonstrated at the macroscopic level using standard classroom experiments with the positive and negative poles, a glass plate, and finely powdered gypsum crystals. A subatomic pole, whether east, west, north, or south is attracted to its opposite pole and repels all other poles.

A stationary monopole, and not interacting with another pole, is currently treated as though it will radiate unconnected field lines evenly in all directions. This may not be true. When traveling, the internal dynamics of a monopole can develop a wobble from electric or magnetic interactions. Once this wobble is initiated, it is maintained until distorted by new circumstances. The greater the wobble, the more impact, or influence, the monopole will have when interacting with other fields. This internal wobble can also be transferred to other nearby monopoles.

The wobble is currently associated with electron polarization. This paradigm describes electrons and positrons with wobbles as 'off-center', and ones lacking a wobble as 'centered'. A moving monopole is far more likely to be off-center, than perfectly centered.

Monopoles moving through a magnetic field will become off-center. This wobble is displayed in the spiral trajectory of high velocity electrons being pushed by a magnetic field.

Impact

An off-center monopole will have more impact on other fields than its streamlined, centered counterpart. The greater the internal wobble, the more pronounced the impact a monopole will have on fields it interacts with. This is because its internal dynamics is concentrated more in one area than in others. This continually moving, 'strong' area causes greater interference when impacting another field.

Similarities and Differences

Electrons and positrons are described as having equal, but opposite charges and have been assigned very exact values. All evidence continues to suggest this is true, though it is possible there are some minute variations from one monopole to the next. Certainly this would be true due to environmental influences.

A basic difference between positrons and electrons is the preference given to positron energy when protons are formed. Short-lived antiprotons, created by smashing an electron into a proton, have been produced, but antiprotons have not been found in nature.

Electrons
(Isolated Generators)

Internal Dynamics (ID)

The Standard Model describes the electron as a charged particle with a gravity field and a magnetic field. Its magnetic field is caused by the particle's spin around its own axis. The spin aspect of the Standard Model, disproven by both mathematics and observations, is understood to be an antiquated fiction by more experienced members of the particle physics community. Less experienced members assume the concept of electron spin to be a reality.

Additionally, there is no supporting evidence electrons generate an attracting gravity field, or contract the space surrounding them.

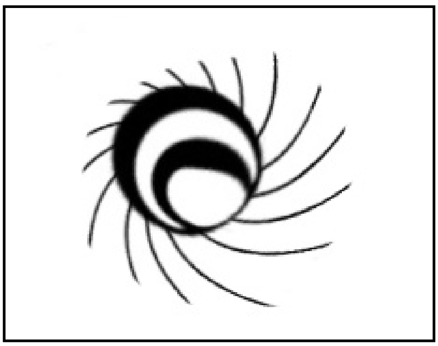
The USF theory model describes electrons as subatomic east monopoles with an internal dynamic (ID) more complicated than a simple spin. The ID of an electron can become unbalanced or off-center during interactions with magnetic or electric fields and develop a wobble. This wobble is closely associated with the polarization of electrons. The eastern orientation of the electron provides a foundation for the concept of 'polarized electrons'.

Polarization plays a role in the terms spin-up and spin-down and can be translated into this paradigm. When an electron orbits an atom, it adjusts its orientation in reference to the atom's magnetic field. If the atom is organized with multiple magnetic poles, the electron will adjust its orientation to reflect the strength of nearby magnetic poles. The difference between the orientation of the electron in reference to its host atom is demonstrated by the anomalous Zeeman effect. The introduction of a magnetic field causes a shifting in the spectrum lines of an object radiating light. (See *Magnetic Fields & Electrons; The Zeeman Effect,* this chapter.)

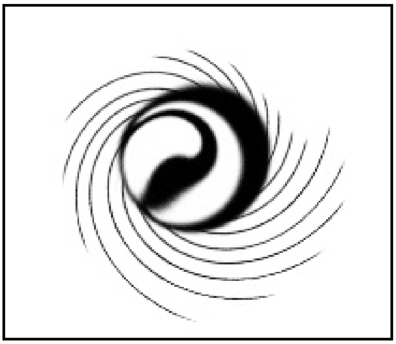
Moving & Orbiting Electrons

'Free' electrons are not bound to atoms, but move about in space, or within matter. Moving electrons meet resistance from the thermal field/EM field and any nearby magnetic or electric fields. Loose electrons are generally in outer orbits, and often weakly anchored while shared by two or more atoms. Realignment of an atoms' poles, or thermal field expansion, can free loose electrons.

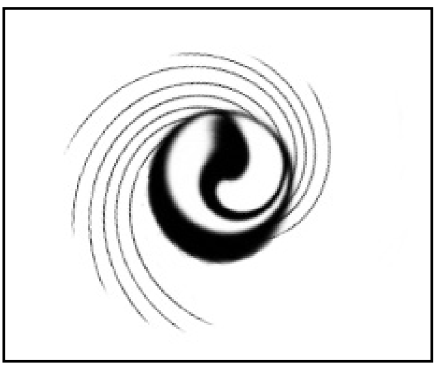
Inner orbit electrons may move around an atom, but are not required to. Nor are they required to orbit an atom at the speed of light. The spread-out electric field formed by an inner orbit electron is not static, but capable of ripples and would communicate oscillations to and from the underlying magnetic and thermal fields. The *spread out* electron passes



An electron with a mild wobble.



An electron with a medium wobble.



An electron with a extreme wobble.

Electrons with varying degrees of internal wobble. The field energies of the electron are distorted by environmental factors. This distortion can be transferred through the thermal/EM field to influence other nearby electrons.

on collective patterns of ripples and waves (EM waves). The science of plasmonics/EM barriers offers a good example of these ripples and waves. (See *EM barriers/Plasmonics*, this chapter.)

Electrons move into orbits around protons because of their attraction to the proton's positron charge. An atom will attract half as many electrons as its core has pseudo-neutrons (give or take a few depending on circumstances). The orbits of outer electrons *can become strongly anchored* when two or more atoms share it. This is is called covalent bonding, and forms molecules when different atoms share the electrons.

As field energies, an individual orbiting electron will thin and spread, partially covering and offsetting the positron energy of the proton. When there are sixteen or more pseudo-neutrons in an atom's core, there is a distinct preference for two electrons in an inner orbit and eight in the next outer VA belt.

There is no requirement electrons 'must' maintain equatorial orbits. This is simply a preferred orbital pattern for atoms with clearly defined magnetic poles. As with Terra's Van Allen belts, electrons may move back and forth between the magnetic poles, though at this scale only a small amount of north/south movement takes place. The pressures of an atom with strong magnetic poles may press the electron into a stable equatorial orbit in the inner Van Allen belts, but in outer belts the balance is sensitive and easily disturbed. This would be especially true for diamagnetic atoms.

Characteristics of the Electron

Electrons are readily available and easy to manipulate with electric and magnetic fields. Electron-based fields and magnetic fields will repel electrons. Magnetic fields can trap them in what are called 'magnetic bottles.' *

*(Magnetic bottles can be man-made, but the classic example in nature is Terra's Van Allen belts.)

This theory associates electrons with electric fields and the eastern pole of a thermon. Electrons, as east monopoles, are assigned an eastern charge and attract their west monopole counterparts, positrons. Just as the north pole of a magnetic field repels other north poles, so electrons repel other electrons.

As an energy field, the electron lacks a clearly defined surface and is generally considered to be a point electric charge with no specific size. While lacking a surface, the electron does have density, which increases near its center and decreases with distance. At near speed-of-light velocities the leading field area of the electron flattens and spreads.

The electron, as an individual unit, was first discovered in 1887 by Sir Joseph John Thomson, during 'cathode ray' experiments. Cathode rays (presently called electron beams) form during the discharge of electrical current through gases. By deflecting the rays with electric and magnetic fields, Thomson discovered they were made up of individual, charged entities and each had exactly the same charge. He also made the shocking discovery electrons seemed to be thousands of times smaller than atoms.

Cathode Rays

The cathode ray is an archaic term for a stream of electrons, or an electron beam, emitted by an electrode in a vacuum tube. Cathode ray tubes are the primary component in old style television sets and computer monitors. Other uses of cathode rays include electron beam welding, x-ray production, and laser excitation.

In a cathode ray tube, the cathode is a terminal, or electrode, emitting a stream of electrons. There are several types of cathodes, but the most popular are thermionic cathodes, or hot cathodes, which emit free electrons when heated. They can be heated directly with an electrical current, or indirectly by passing current through a filament near the cathode. A coated cathode is covered by a film of material which releases electrons easily during heating. Indirectly heated cathodes are often coated to increase the emission of electrons. A cold cathode is an electrode which emits electrons without being heated, and is used in some gas-filled tubes and in very-high-voltage electron tubes.

The cathode ray tube's glass envelope is shaped like a funnel. During normal operation, a thermionic cathode at the tube's narrow end releases a stream of electrons. The stream passes through one or more cylindrical electrodes radiating an electric field, which compresses the electrons into a pencil-shaped beam. The electron beam passes through a deflection zone where it is shifted horizontally or vertically. After the beam direction has been adjusted, it strikes a light-emitting layer of phosphor on the inside wall of the tube's face (the TV screen or ‘detector’). The electrons cause the phosphor to fluoresce, lighting a point of color on the face of the screen. Combinations of phosphors can be used to produce all the colors of the visible spectrum, creating a color picture.

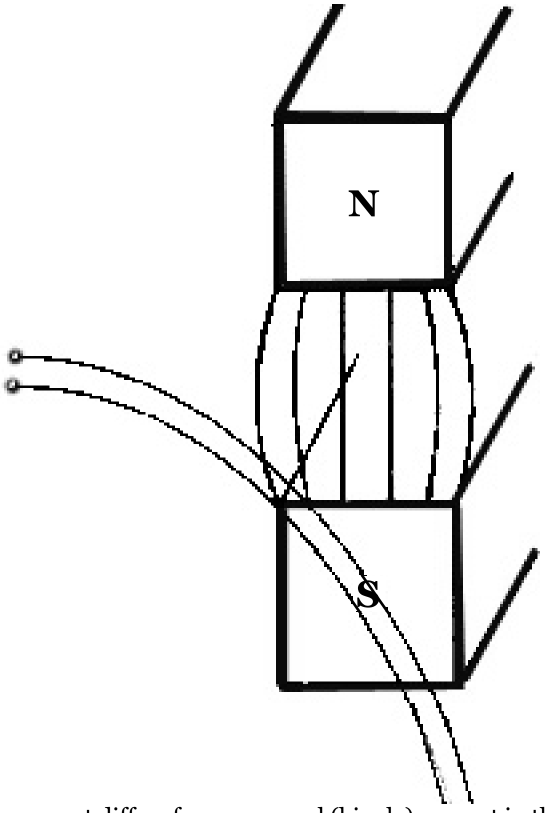
Accelerators
(Near the Speed-of-Light)

Particle Accelerators

Particle accelerators use more complex equipment and techniques than those used by televisions, but the basics are the same. A charged energy field can be moved and accelerated by introducing electric or magnetic fields. Beams of charged subfields can be focused by magnets. Early accelerators used static, or direct, electric fields, but most modern equipment uses alternating fields to propel electrons.

There are two basic designs used for particle accelerators, linear (linac) and circular (synchrotron). The longer a linac accelerator is, the greater the speed a subfield can be accelerated to. A synchrotron accelerates subfields by circulating them several times before they hit their targets, and requires significantly less space. Charged subfields, traveling at a steady speed in a curved trajectory, express properties very similar to those shown by subfields accelerating in a straight line. This phenomenon is used in some experiments performed in synchrotron accelerators.

Accelerators are used primarily for collision experiments, but some research focuses on synchrotron and Cerenkov radiation. Increasing the velocity of charged subfields is generally used for studying nuclear and particle physics. By shooting charged subfields at atoms, protons, electrons, etc. ,



A dipole magnet differs from a normal (bipole) magnet in that two opposite poles are separated by a distance and do not radiate from a common center. Dipole magnets can also be used to manipulate moving electrons and positrons.

researchers can study the resulting products with detectors. Moving at near the speed-of-light, charged subfields can smash through the magnetic field, and break up the core of an atom.

Accelerating Electrons

The Stanford Linear Accelerator Center uses a straight accelerator and produces electrons in much the same way they are produced by old-style televisions. After being accelerated by an electric field, due to potential differences between the negative cathode and the positive anode, they enter the accelerator, a long copper tunnel, or pipe. Gases are removed from the accelerator pipe, minimizing resistance and eliminating potential collisions and deflections as the electrons travel down the accelerator.

The electron beam is actually a series of electron 'bunches' timed to pass through microwave emitters located throughout the system. The accelerator pipe contains microwave emitters spaced every 3.6 centimeters. The bunches o' electrons travel through a small hole in the center of each emitter. The emitters produce concentrated, laser-like microwaves which propel the bunches o' electrons forward. The microwave also initiates a magnetic field on the inner surface of the copper pipe. (It is electrically aligning the copper atom's magnetic fields.)

The microwave emitters are part of a klystron system. Klystrons are microwave generators using the passage of electron bunches to time the emission of microwaves for the next emitter. They were invented by William Hansen and the brothers Russell and Sigurd Varian.

The magnetic field counteracts the normal repulsion electrons have for each other and compresses them toward the center of the accelerator pipe. The microwave accelerates the electrons, moving them forward. The combination of field pressures keeps the electrons bunched.

The bunches ride briefly ahead of the of the microwave until they pass through the next emitter. Any electron falling behind the bunch is propelled forward by the intense wave, keeping it in the bunch. Also, electrons moving ahead of the bunch receive less microwave repulsion and, consequently slow due to EM field resistance.

At the end of the accelerator, large magnets are used to create a magnetic field perpendicular to the direction of the electron beam. Electrons are deflected by the magnetic field and steered toward different experimental areas. For some experiments, electrons and positrons are fed into storage rings, where they continue to circulate.

The storage rings use magnets, with the north/south pole tips arranged above and below the beams (dipole magnets). These are spaced periodically around the storage ring, providing the circular acceleration needed to guide the electrons along a curved path. More complicated combinations of magnets, such as quadrupoles and sextupoles, are used for magnetic lensing and keep the bunches well focused and traveling in the center of the storage ring.

Accelerators often use polarized electrons.

Accelerating Positrons

The positron bunches follow the same patterns as the electron bunches, being accelerated by the concentrated microwaves and compressed toward the center of the accelerator pipe by magnetic fields. The directional effect of magnetic poles are reversed for positrons.

The positrons are produced by using accelerated electrons and colliding them with a target. The incoming electrons compress thermons surrounding the target atoms and initiate a pair separation process, separating thermons into an electrons and positrons. The positrons are collected using magnetic and electric fields to guide and transport them back to the beginning of the accelerator.

Polarized Electrons

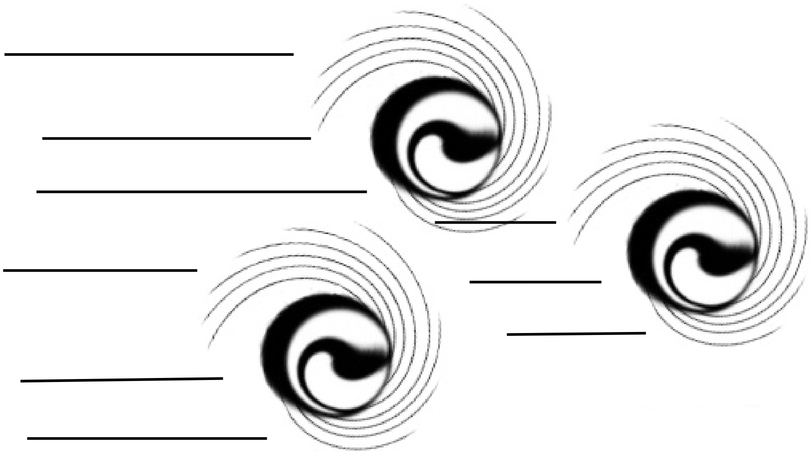
Within this model, electrons do not have magnetic north and south poles, though their east poles can be realigned and the electron can be polarized per its east pole. Electrons can become polarized by interacting with a magnetic field or with other polarized electrons. It is generally assumed polarized electrons orbit ferromagnetic atoms. These atoms have strong magnetic fields and electrons would share similar equatorial orbits.

One method of producing polarized electrons is through the use of polarized light. When polarized light from a laser is focused on a gallium arsenide surface, electrons are emitted from the surface and collected by accelerating them across a small potential difference. (See *Chapter 4- Electromagnetic Waves; Polarized Light*.)

Depending on ones purposes, the most efficient means of gathering a collection of polarized electrons would seem to be gathering the electrons and then polarizing them. This is not to suggest there is no value in developing new polarization techniques. However, the polarization of these electrons will dissipate fairly quickly, if not maintained. Additionally, the polarization process must be maintained during the experiment. Without constant manipulation, the electrons' alignment will disintegrate.

the USFT model has retained many of the terms associated with electron manipulation. Polarized electrons (free electrons with their eastern orientations aligned in the same direction) have recently become a subject of interest to members of the particle physics community.

A moving electron normally develops a wobble, as though its spin is off center. The wobble can be in any orientation relative to its direction, or trajectory. Beams of polarized electrons can be produced, with their wobbles turning uniformly and their field lines displaying similar off-center patterns.



Three "polarized" electrons sharing the same eastern orientation with similar internal dynamics, or "wobbles."

Transverse Polarized Electrons

When the wobble of a moving electron is perpendicular to the trajectory it is called transverse polarization. An electron accelerated to speeds producing high frequency synchrotron radiation (high frequency EM waves) will become transversely polarized (due to EM field resistance). A combination of the magnetic or electric field accelerating the electron, and resistance from the EM field, causes the ID's of most electrons to adopt similar patterns.

Longitudinal Polarized Electrons

Transversely polarized electrons are altered to produce longitudinally polarized electrons, which are often used in collision experiments. When a transversely polarized electron passes through a series of magnets called a 'siberian snake,' the orientation and the concentrated field lines of the electron are flipped around, with the overall trajectory remaining essentially the same. The wobble is manipulated to move parallel with the trajectory.

Electron Interactions
(Collective Behaviors)

Electron Diffraction & Matter Waves

The process of electron diffraction has been used in quantum physics as evidence of 'matter waves'. Electron diffraction was first observed by Clinton Davisson and Lester Germer in 1927, when they scattered electrons off the surface of a metal crystal and found interference patterns resembling the ones produced by light waves. More recently, Young's double slit experiment has used electrons (instead of light), producing comparable interference patterns.

Electron diffraction, or matter waves, is a process of electron repulsion, not a curving wave front which is expanding outward. Concepts like constructive and destructive interference cannot be applied accurately to the process of electron repulsion. They are different processes.

An astroid striking Terra would create a crator. A powerful bomb would also create a crator. The results are quite similar, but stem from two entirely different events.

The similarities of wave diffraction and the repulsive behavior of subfields, like electrons (and protons and neutrons) have been exaggerated (much like 'entanglement'). The concept of matter waves short-circuits the brain and stimulates curiosity. The National Enquirer does very much the same thing.

In diffraction experiments, the slit represents a starting point. Passing through the slit causes a number of electrons near the slit wall to change direction. The narrower the slit, the greater the directional change. The type of material used for the slit experiment will also effect the results, per the materials electronegative charge. (Electronegative is an archaic term meaning their atoms strongly attract electrons.)

The speed of the electrons also effects the spread of the beam. The greater the speed, the more interference patterns. These rerouted electrons interact with other electrons within the beam. Although the overall direction of the rerouted electrons remains the same as they pass through the slit, a greater velocity causes them to approach and repel other electrons more quickly. This, in turn, results in more interactions over the same distance, and an increased number of interference patterns. The field strength of individual electrons is stronger at their front, due to field compression, adding repulsive strength to the interactions taking place.

After the electrons have passed through the slit, general electron/electron repulsion causes the beam to spread. The electrons traveling at the center of the beam receive equal repulsion from the surrounding electrons and are the least effected by the repulsion process.

Entangled Electrons

Entanglement is a mathematical prediction that subatomic entities (or 'systems') can be produced as twins, and these twins can influence one another instantaneously, from any distance. If accepted as true, it rebuts Einstein's assumption nothing, including info or communications, can travel faster than the speed of light. Polarized photons and electrons are often used during entanglement experiments.

The general idea is that an electron (or photon) forced to flip its poles, will cause its twin to instantly flip its poles.

Some entanglement enthusiasts hope to use the phenomenon for communications improvements. Popular themes include using entanglement for instant long-distance communications and/or for encryption techniques.

The USFT model does not support the speed of light as a speed limit, nor is it opposed to the concept of instant communication, as it 'assumes' gravity is instantaneous (lacking any evidence to the contrary). This, however, does not imply support of the entanglement concept. In this model, photons don't exist, and electrons don't have magnetic poles. If entanglement does exist, the USFT model predicts it would be a function of gravity, not an electromagnetic process.

There are numerous claims of successful entanglement experiments. Most, if not all, focus on hopes of creating new encryption techniques. The true success of these experiments remains a question mark, as they are typically unverified by impartial physicists, and there are no entanglement encryption technologies on the market.

It should be noted that interference increases with distance. The lack of research on “instant communications at great distances” suggests there are problems making instant long-range communications difficult, if not impossible

Supporting evidence for entanglement is extremely weak and based primarily on short-range experiments with statistical results. Some theoretical physicists find fault with the concept of entanglement. Howard Wiseman of Griffith University in Australia suggests the mathematics for quantum entanglement may look fine on paper, but does not relate to anything practical.

Wiseman, and others who agree with him, believe the theoretical calculations refer to a kind of ‘phantom’ entanglement which cannot actually be measured. Entanglement can be described as a mathematical illusion based on premises which are not accurate.

Another problem for entanglement researchers is the embarrassing possibility their experiments are seriously flawed. There are critics who point out the results of every single experiment done so far can be explained by faults in the experimental setup, the procedure, or the equipment being used. These experimental flaws are called “loopholes”.

The most obvious loophole is the detection process. Twin particles are not always detected in both wings of the experiment, making it possible to subconsciously engineer ‘quantum correlations’ based on expectations. The term ‘quantum correlation’ has even evolved to include the researcher’s expectations during entanglement experiments.

Electrons and the Thermal Field

High temperature plasmas contain free, unbound electrons and protons. At cooler temperatures, these plasmas would be hydrogen gas. The concentration and activity of a proton's thermal field dictate the distance between protons and electrons. Because of the large number of loose and free electrons, plasma can conduct electricity extremely well. Resistance occurs, not from thermon density, but from thermon activity. Extremely hot plasmas can produce a very high resistance because the expanded thermal fields provide a great deal of redirected energy. The dense space immediately around protons and ions is difficult for electrons to move through, but eddying currents of thermons also provide resistance.

It is worth noting the protons in a plasma are not bound by a strong gravitational field. Their magnetic/positron influence allows protons to form a more slow moving 'positive' electric current. 'Positrons' would, of course, immediately attempt to join with nearby electrons.

Moving electrons create waves in the electromagnetic and thermal fields they travel through. Thermons are also being relocated as electrons move through the EM/thermal field. (*See Chapter 6; Matter & Electricity; The Peltier Effect*.)

At extremely cold temperatures, superconductivity theories predict two electrons within a material transport (and are linked by) a single thermon (phonon) as they move in the same direction. This prediction is primarily mathematical with little or no direct supporting evidence.

Magnetic Fields & Electrons
(Disturbing Behaviors)

The Zeeman Effect

The introduction of a magnetic field impacts the orbits of electrons around an atom's core. This disturbance is most noticeable in heated gases where orbiting electrons have been pushed into outer Van Allen belts and can only emit a few established frequencies, called spectral line emissions (unlike heated solids and liquids, that emit a broad range of EM frequencies). The presence of a strong magnetic field alters the Van Allen belt arrangement, with some magnetic layers and sub-layers linking to the larger magnetic field, while others are compressed by it.

Electrons caught in the compression are effected differently depending on their location. Electrons in an outer orbit have much more freedom for north/south movement than those in an inner orbits. Outer valence electrons will *shift their eastern orientation*, and change shape and position more easily as they interact with a strong magnetic field. Thermal field pressures are overcome, and the electrons are pressed through the atom's distorted magnetic layers. The end result is the release of EM waves pulsing at three or more frequencies instead of the normal single frequency emission. This process of creating three or more spectral line emissions is called the Zeeman effect.

The Zeeman effect was first discovered by Pieter Zeeman in 1896. He used sodium in his original experiments, producing a single spectral emission line to either side of the original, totaling three lines. Later experiments with stronger magnetic fields and different materials caused additional lines to appear on either side of the original, suggesting additional electrons had shifted positions.

There is also the appearance of an 'anomalous Zeeman effect', particularly for atoms with odd numbers of electrons in their outer orbits. In such cases, it is found the number of Zeeman emission lines is actually 'even' rather than 'odd.'

The Stark Effect

The Stark effect also splits spectral lines, but is caused by a strong electric field. Electric fields are mutually repulsive and a strong electric field will also influence the an atom's magnetic field by repelling the electrons in orbit around an atom's core.

Electric Fields
(A Group Entity)

Characteristics

An electrostatic electric field (static electricity) is made up of individual electrons behaving as a collective. While maintaining a distance from one another, electrons collectively radiate a larger electric field. The enlarged field expresses characteristics similar to those shown by the single electron. It is attracted to positively charged fields, and repels other negative fields, including free electrons.

A static electric field typically forms as the result of atoms losing electrons from their outer orbits. In clothes dryers electrons are lost due to friction and thermal field expansion, with electrons collecting on the surface of fabric fibers.

Electrons, while individually repelling one another at short range, can accumulate on the surface of an insulator, such as a glass screen, which is made up of electrically neutral molecules. Each electron becomes more compressed and focused outward with every additional electron. Collectively, they form a static electric field.

An electrostatic field is roughly stationary until it interacts with matter lacking electrons at the atomic level (and having a positive charge from its protons), or a conductor capable of transferring the electrical field to matter lacking in electrons. The strength of an electrostatic field is partially dependent on the number of accumulated electrons and partially dependent on the strength of the positive charge contained in the interacting matter. The larger the number of excess electrons, the stronger the field.

When strong enough, an electrostatic field can move through the air, or an insulator, to reach positively charged matter and achieve neutrality. Static electric shocks and lightning are both examples of this process. As with a single electron, an electric field on the macroscopic level is not restricted to a specific shape, but is elastic and malleable.

Terra's Electric Field

Terra is full of loose and free electrons, causing a weak field to radiate from it. Repulsion causes a continuous flow of electrons to flow outward and away from the surface of Terra. This is an expression of Coulomb's Law, which predicts the attraction an electron has towards a positron or a proton, and the repulsion it has toward other electrons. The electric field radiating from from Terra and into the atmosphere can be called a Coulomb field. Its strength is described as 120 N/C at sea level and 66 N/C at 2 kilometers above sea level. (N stands for newton, a unit of force, and C stands for coulomb a unit of electricity.)

Terra (atmosphere included) continuously gains and loses electrons. Electrons move outward from Terra, through the lower atmosphere, and on to the ionosphere, located from 50 kilometers (30 miles) to 400 kilometers (250 miles) above Terra's surface. This is a region of Terra's atmosphere where incoming solar radiation causes extensive ionization (a loss of electrons) of the local atoms.

Free electrons, while being attracted to ions in the ionosphere, are also repelled by the their 600 degree temperatures. The combination of solar ionization, the solar wind, thermal field activity, and rising electrons from the Earth, saturates the ionosphere with electrons. Thunderstorms add one more factor to the growing number of electrons in the atmosphere. Raindrops will often carry positive ions to the Earth as they fall, creating an even more extreme difference in coulombic potential (electrical attraction).

During thunderstorms, these extreme differences cause lightning, which returns excess electrons to the Earth.

Roughly 80% of the lightning strikes reaching the Earth carry electrons. The Earth normally carries a negative charge compared to the atmosphere, but when a thunderstorm moves in, the atmosphere has the greater negative charge.*

Some physicists have estimated Terra would lose almost all of its electrical charge in less than an hour, if its reserve of excess electrons were not perpetually replaced. The traditional model suggests expelled electrons are replaced by electrons from Sol. It is believed these electrons are funneled into the center of Terra between the field layers of the magnetic pole closest to Sol. Experiments using the FAST (Fast Auroral Snapshot) satellite show this model to be inaccurate.

The FAST satellite** disputes the notion electrons are being funneled into Terra's core by showing electrons are being repelled at the poles. The USF theory suggests gravitational compression at Terra's core (a weaker version of the gravitational fusion process at the sun's core) is responsible for the continuous flow of expelled electrons, as well as the heat generated there.

EM barriers / Plasmonics

EM barrier pulses, more commonly referred to as plasmonics, are waves moving within an electric field. The waves are the collective effect of moving or shifting electrons supporting the field and include the rippling movements of underlying magnetic and thermal fields extending from the atoms' core. The atoms and electrons of matter develop a unified rhythm. Metals provide the most obvious examples of EM barriers, due to the numerous electrons at their surface.

The term plasmonics, and plasmon, originates from research on the movement of electrical currents in a plasma

*(There are a number of good books and articles on the subject of lightning and it is worth a little research, if the reader has an interest.)

**('Lights Out' by Jonathon Knight, New Scientist Magazine; Dec 25, 1999.)

cloud. It was, unfortunately, borrowed to describe waves moving through electric fields in, and surrounding, solid matter. The rationalization for using the word plasmonics in this way was based on the concept of 'quantum plasma', describing electron density. The word plasmon, with its 'o-n' ending, suggests a subatomic particle capable of an independent existence, but this has never been confirmed. The terms plasmon and plasmonics are confusing because of their association with plasma and the suggestion of a stable subatomic particle. Plasmons are remarkably similar to neutrinos in that the concept of a new particle was developed to explain the loss of velocity moving electrons experienced after interacting with the EM barrier waves.

The frequency of the pulses flowing through the EM barriers on the surfaces of 'most' metals matches ultraviolet EM waves. Metals reflect most EM frequencies lower than x-ray and gamma ray, or 'frequencies higher than ultraviolet pass through most metals,' just as visible light passes through glass. For alkali metals, gold, silver, and a few other materials, EM barriers operate at frequencies matching the wavelengths of visible or near-ultraviolet light. The frequencies of the EM barriers represent the resonance of the atoms' electromagnetic/thermal fields.

Currently, most plasmonics literature describe the layer of electrons as independent of atoms and simply resting on the surface of a metal. This paradigm describes them as exposed orbital electrons, and part of the atomic structure.

Thomas Ebbesen, Peter Wolff of the NEC Research Institute have experimented with the effect of light on EM barriers. They have studied the effect EM barrier frequencies have on visible light passing through holes in a gold foil. 100 million identical holes were made in the foil, each hole 300 nanometers wide, or 200 times smaller than the diameter of a human hair.

Ebbesen and Wolff began their research because of a peculiar phenomenon. A gold foil, made 14 years prior for another experiment, was discovered to be transmitting visible light through holes theoretically too small to allow its passage. Light with large ‘transverse’ wavelengths should have been blocked according to the traditional transverse wave model. According to basic optical theory, only 0.01 % of the visible light should have passed through, yet their experiments showed 100%, or more.* (The USF theory describes the transverse model of light as an illusion.)

Using the USF theory model, it is predicted the surface matter surrounding each hole (called a ‘waveguide’) radiates EM barrier waves, which cause constructive interference patterns, and help to channel and concentrate the light.

Recently, Ebbesen showed a series of concentric circles surrounding a waveguide could concentrate a large beam into a small, intense beam, providing a new type of laser. This phenomenon is still open to theoretical interpretation. From a field theory perspective the beam of light seems to be funneled to a tighter beam. Why concentric circles would create a ‘field’ funnel, similar to the effect described above, remains a mystery.

Protons As Electric Fields
(A Structure of Thermons)

A Stable Collective

A theoretical model of the proton can be developed using a lattice structure of thermons, with an electron, joined to two positrons, at its core. Though the number of surrounding thermons is currently unknown, the generated magnetic and gravity fields appear to be relatively stable and uniform. The pattern of the proton’s thermon lattice structure may be a single standardized model, or there may be variations on the

*(Reference Nature- Vol 391, p 667; New Scientist- 26 Apr 2003, p31; Nature Materials- vol 2, p 229; and www.neci.nec.com/posters/ all/thio-posters.pdf. If you’re interested in potential technologies, these articles are a good read.)

theme, similar to that of snow flakes. At present, it appears the gravity and magnetic fields are consistently uniform.

The possibility time (movement or change) may be almost nonexistent at the center of the proton should be considered as a stabilizing factor.

Electrical Spin
(And Magnetic Fields)

Creating a Magnetic Field

This model describes magnetic fields as resulting from the electrical contraction of space at the center of a thermon or a proton. It does not describe 'spinning electric fields' as a source of magnetic fields.

Spinning an object with an excess of electrons causes the magnetic fields of the atoms and thermons within to align north-to-south. The direction of the spin is east, due to the nature of electrons. The north/south poles of the aligned magnetic fields will reflect eastern movement. Spin the electric field in the opposite direction, and the poles will flip. Spin can be a tool for manipulating the magnetic fields of atoms and thermons.

As individual electrons and positrons do not create an inward warpage of space, and since they show no evidence of magnetic or gravity fields, electrons and positrons are not assigned magnetic fields or gravity fields.

This does not mean subatomic fields cannot spin. Electrons and positrons can be manipulated to express a 'wobble', a concentration of its field lines combined with a spin. Individual protons and neutrons can spin, and not necessarily in an east or west direction. Light polarization experiments suggest thermons can shift their polar alignments, and are completely capable of spin.

Chapter Four- Electromagnetic Pulses

EM Waves
(Pulses of Energy)

The Wave Model & Transverse Illusions

Christian Huygens developed the first *'wave-theory'* of light in 1678, based on experiments with crystals. In his 'Dissertation on Light', he wrote: '*I call the spherically shaped surfaces 'waves', because of their similarity with those which one can observe forming in water after throwing a stone into it.*' Until roughly 1820, light waves were considered to be very similar to sound waves.

In 1814, Augustin Jean Fresnel performed experiments using two tourmaline crystals, which suggested light waves are transverse (up/down) in nature. The image of a wave traveling along the length of a string, and through a slit parallel to the hump of the wave, is a common analogy. When the axes of the crystals are in parallel (properly aligned), light will pass through both. When the second crystal is rotated to a 90 degree angle, the light becomes blocked. The analogy of transverse waves passing through slits was used as an explanation. If the 'slits' of both crystals were aligned, the wave passed through both. If the 'slits' of the second crystal were placed at a right angle, the up-down wave was blocked.

The model of light as transverse waves relies on polarized light as its only supporting evidence. In the USF theory model, polarization is treated as the electromagnetic alignment of thermons, the underlying support system of EM waves. The 'waves of quanta' passing through the thermons become '*electromagnetically*' polarized and transport these properties after leaving the crystal. (See *Polarization of Light; Crystal polarization*, this chapter.)

The behavior of light imitates the three-dimensional behavior of sound waves passing through a fluid much more closely than the two-dimensional transverse waves passing through a solid or along a string.

As the frequency of sound waves increases, they spread less and become more beam like, after passing through an opening. The same is true for light. Unlike transverse waves traveling along a string, sound waves and EM waves dissipate because they are spreading out into three-dimensional space. The Doppler effect applies to both sound waves and light waves, but with light, it's called redshifting and blueshifting. The analogy of a sonic boom is often used when describing Cerenkov radiation. The sonic boom created by a plane traveling faster than the speed of sound is emitted in a cone shape. A charged subatomic entity traveling faster-than-light creates the same effect using EM waves. These are just some of the similarities shared by light waves and sound waves. The model of light as transverse waves is based on limited observations and a misinterpretation of the evidence.

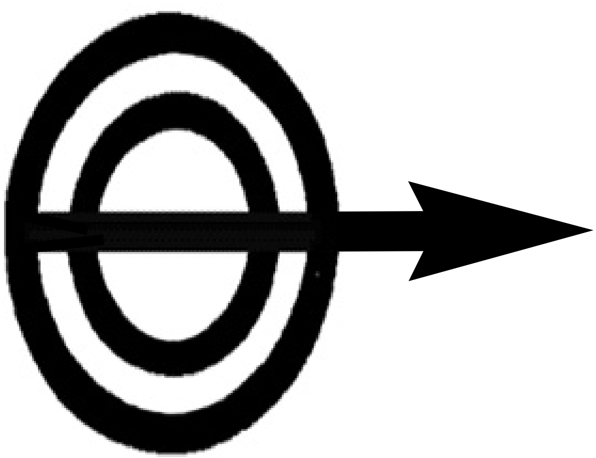
The electromagnetic field can be described by combining Faraday's concept of light as shifting electric field lines, Maxwell's addition of a magnetic field, and a neutralized thermon version of Dirac's 'Sea of Electrons'. An ocean of thermons, ebbing and flowing (similar to ocean and atmospheric currents), while concentrating in and around gravmagnetic fields, provides a highly functional model.

There are two basic ways of measuring the energy levels of light: The amount of thermon compression (intensity), and the number of compressions per second (frequency).

Quanta

Quanta are an expression of kinetic energy passing through thermons, which in turn supports the EM/thermal field. The concept of quanta was first developed by Max Planck. In 1900, he devised an experiment using a black box to measure the amount of infrared light emitted by the interior of a black box. The black box absorbed and reemitted the infrared light. He then created a mathematical formula predicting the average number of quanta radiated by an object based only on its temperature. Planck theorized light was emitted by many 'oscillators'. Planck's experiments showed the oscillators used a statistically constant value (h).

From an overview perspective, the USFT agrees with Planck's model. Thermons become Planck's oscillators, which are effected by gravmagnetic pressures. The pressures existing on Terra's surface are not the same as the gravmagnetic pressures on Saturn or in the space between galaxies.



The arrow attached the the symbol of a thermon represents a quantum (a parcel of energy), and the direction of its movement. It should be noted that individual thermons do not travel from Sol to the Earth at the speed of light. EM field compression waves move through thermons at the speed of light. The quantum represents a unit of that wave. A group of quanta carrying the same polar orientation would be considered "polarized."

Within a Terra-like gravmagnetic field, the amount of energy within a specific quantum is calculated by its frequency using Planck's equation $E = nhf$. n is an integer (a whole number such as 1,2,3) representing the number of wavelets, a single wavelet being 1. h is a constant of 6.626 x 10^{34} joule/seconds (this is a kinetic energy-work/frequency ratio). f is a variable representing the pulse frequency. E is the product, or the amount of energy in a quantum, or quanta. (We should not assume 'h' remains a constant in different gravmagnetic environments.)

Quanta, as a form of kinetic energy, is passed from one thermon to the next. Thermons can transport multiple waves in multiple directions. While traveling as part of a compression wave, quantum energy follows a relatively straight course as it moves outward. A 'single' quantum of energy, on the other hand, will meander as it moves outward, following a path of least resistance. The vibrations of individual thermons provide the resistance. The process can be visualized as a single-bolt lightning strike.

Polarized light experiments suggest quanta, as a form of kinetic energy, can transmit magnetic and electric alignments. Quantum energy can realign loose and free thermons uniformly as it passes through them, once the polarization pattern is established. Interference can break down polarization patterns fairly quickly. These repetitive patterns of energy act to form the overall wave.

An EM wave, or pulse, can be seen as a spherical disturbance, expanding outward from a single central point, and transported by thermons. This expanding wave front can be treated as a unified whole until portions of it interact with other energy fields, such as the ones making up matter. During interaction, quantum energy can be separated, absorbed, and reemitted as various forms of kinetic energy.

In 1905, Einstein translated Planck's observation to mean these parcels of energy were particles, physical objects (later called photons), moving through empty space.

The quantum can be seen as a unit of repeating field patterns. The 'compression wave', made up of quantum energy, is traveling at the speed of light. The speed of light varies with the density of the EM, or thermal, field.

These are the most well-known features of a quantum's behavior patterns. The EM waves traveling through space dissipate, not in terms of frequency, only intensity Dissipation is due to spread of the wave as it expands outward, gradually lowering intensity. An individual quantum (parcel of energy), transporting patterns out of synch with the rest of the EM wave, is called incoherent.

Incoherent Light

Most natural and man-made light is incoherent. Incoherent light is the result of multiple disturbances (of similar temperatures) creating EM waves at irregular intervals. Internal wave-interference patterns also promote the creation of incoherent waves. The source of the light, whether it be Sol or a lamp, produces a series of discontinuous pulses (quanta). The pulses are random, unsynchronized, and 'out of phase' with one another. The thermons transporting an incoherent EM wave front do not pulse simultaneously, nor are they polarized. Each quantum of incoherent light, within the same frequency, pulses with the same repetitive pattern, but at different times. Certain types of flames, lasers, and masers provide sources of coherent light, with most of the quanta being roughly in phase.

Because the pulses are out of phase, incoherent light does not produce the 'controlled' interference patterns coherent light can produce. Two beams of light, passing through one another, will not interact 'noticeably' because the pulsing quanta are out of phase with each other. Each individual thermon compresses as the wave passes through, regardless of timing. (A thermon with two waves passing through simultaneously merges them, causing interference.)

Pulselengths and Measurements

The Ultra-Space Field Theory uses a different model than the classic wave model shown in standard textbooks. Both models, however, operate using the same background framework of reality and have a number of similarities. Some of the differences are subtle.

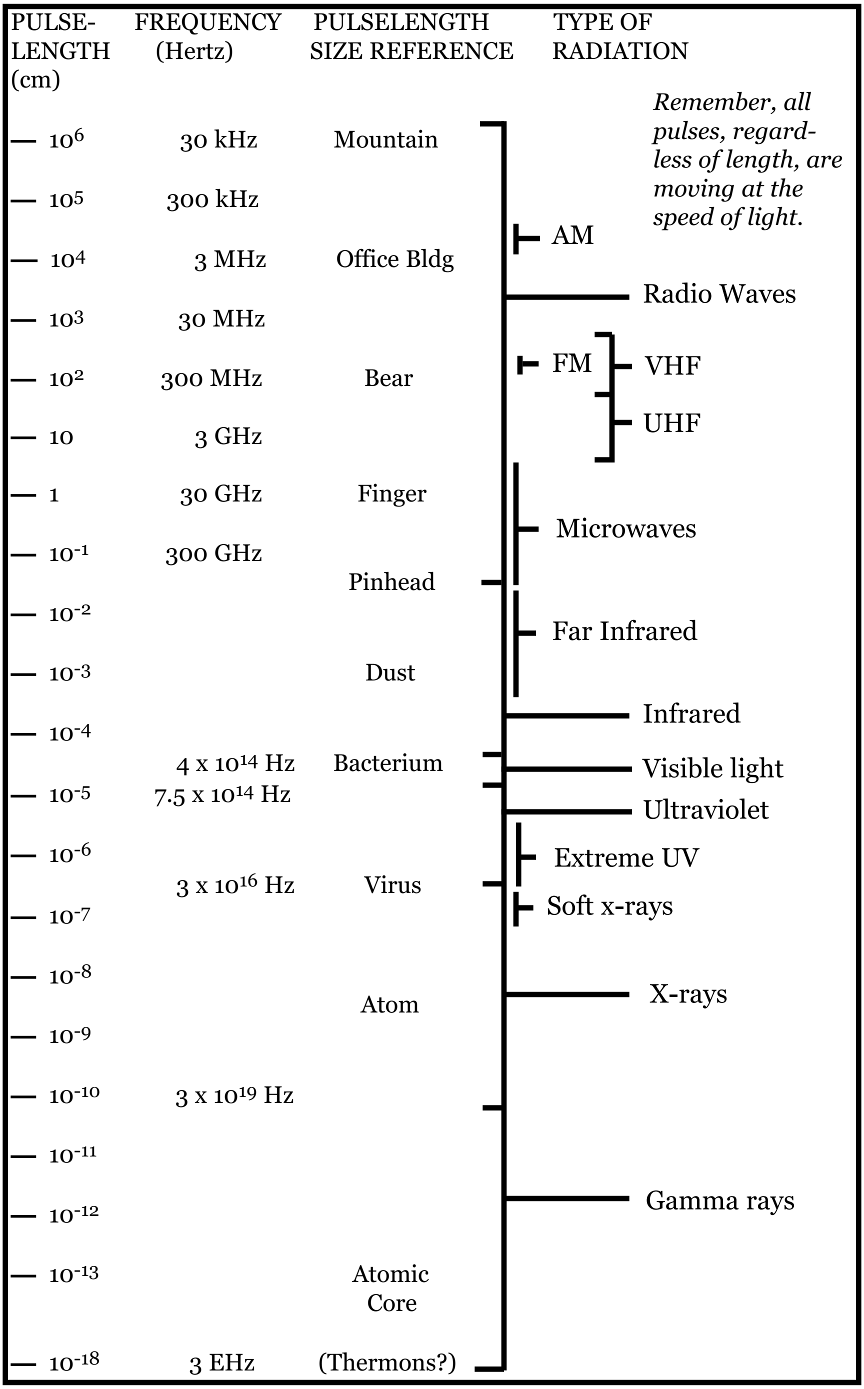
In this model, the term pulselength provides an alternative for the word wavelength, and will be used intermittently in this chapter. The root word 'wave' has strong associations with undulating transverse waves. The word pulse suggests a rhythmic pattern. While the two words are basically the same, pulselength can present a fresher, more accurate image.

A pulselength/wavelength is the distance from the peak intensity of one wave to the next wave's peak intensity. Pulselengths and frequency are measures of the energy expressed by quanta. The length of a pulse is a variable, dependent EM/thermal field, they are traveling through.

The pulselengths of light traveling through air are slightly shorter than those traveling through a vacuum. These same pulselengths are shorter still, when traveling through glass. Light traveling through a vacuum is the standard used to define wavelengths (pulselengths). Frequency describes the energy carried by EM waves over a specific distance for a specific amount of time, and are expressed in 'Hertz.'

Frequencies

High frequency EM waves will pulse more times per second over the same distance than will low frequency waves. Thermons effected by EM pulses compress at regular intervals and this can range from a slow process, as with microwaves, to a fast process, as with gamma rays. Thermons can transmit multiple frequencies nearly simultaneously, and in varying directions. Higher frequencies spread less and maintain more intensity over greater distances.


PULSE-LENGTH (cm)
FREQUENCY (Hertz)
PULSELENGTH SIZE REFERENCE
TYPE OF RADIATION
Remember, all pulses, regard-less of length, are moving at the speed of light.
10^{6}
30 kHz
Mountain
10^{5}
300 kHz
10^{4}
3 MHz
Office Bldg
AM
Radio Waves
10^{3}
30 MHz
10^{2}
300 MHz
Bear
FM
VHF
10
3 GHz
UHF
1
30 GHz
Finger
Microwaves
10^{-1}
300 GHz
Pinhead
10^{-2}
Far Infrared
10^{-3}
Dust
Infrared
10^{-4}
4×10^{14} Hz
Bacterium
Visible light
10^{-5}
7.5×10^{14} Hz
Ultraviolet
10^{-6}
Extreme UV
3×10^{16} Hz
Virus
Soft x-rays
10^{-7}
10^{-8}
Atom
X-rays
10^{-9}
10^{-10}
3×10^{19} Hz
10^{-11}
Gamma rays
10^{-12}
10^{-13}
Atomic Core
10^{-18}
3 EHz
(Thermons?)

When light changes from one thermal field to another, its pulselength changes, but its frequency does not. For example, when light passes from air to glass, its pulselength shrinks, but the number of pulses per second remains the same. Because the speed of light also changes with the medium it is passing through, the equation 'pulselength x frequency = speed of light' remains consistent. Individual thermons are more compressed in the area surrounding the atoms and the space between them, slowing the quanta's compression process.

The pattern of EM compression waves is also altered by changing mediums. Upon moving from air to glass, the quanta, as patterns of moving energy, are concentrated by the density of the thermal field, decreasing their range of influence and impact with other fields. Leaving the glass, and returning to a medium of air, the thermons are less compressed, and the pulselength returns to its previous span.

The frequencies of EM pulses known to interact with matter range from low frequency AM radio waves to high frequency gamma rays. The highest frequency detectable by man-made instruments is approximately 3 EHz. EM pulses interact more consistently and more intensely with matter in the mid-range better known as infrared and visible light. Pulse frequencies below the range of 30 kHz and beyond 3 EHz may extend to infinity, but are undetectable by current 'matter' based technology. There is no reason to assume frequencies do not exist beyond the known ranges simply because we are unable to detect them.

A Hertz is equal to one pulse per second. Gamma rays contain high energy quanta (rapidly compressed and recompressed thermons) and pulse at an average of 3 EHz (3 exaHertz/sec or 3 times 10^{18} pulses per second), while AM radio waves contain low energy quanta and pulse at an average of 30 kHz (30 kiloHertz/sec or 30 times 1000 (10^3) per second).

High Frequency Light

As EM frequencies become higher, the behavior of light becomes more beam-like. This behavior is also shown by sound waves. Lower frequencies have more spread. This model incorporates the concept of 'wavelets' being released by individual thermons. The wavelets of gamma ray frequencies are flatter than the more rounded wavelets of infra-red, due to a lack of time for full decompression for the thermons. (This process should not be confused with the internal rhythms of thermons and the constructive interference leading to pair separation.)

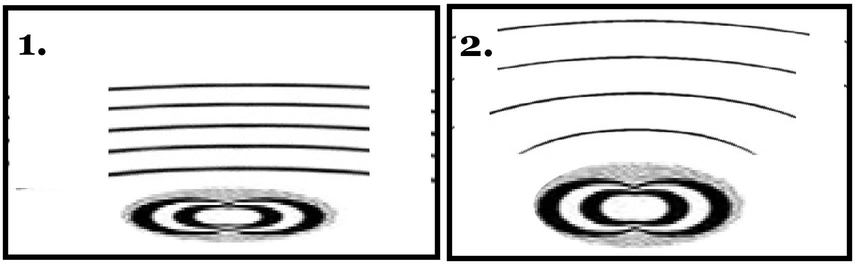
The flatter wavelets of high frequency light produce beams which maintain a greater intensity, a tighter beam, for longer distances. Lower frequencies, with more rounded wavelet emissions, produce EM waves with a greater spread.

Low Frequency Light

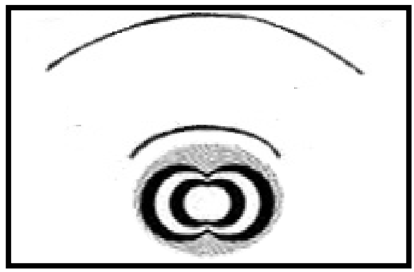
EM waves pulsing at lower frequencies, visible and infrared, generally do not separate thermons into positrons and electrons when interacting with the field energy of atoms. As they are slowed by the increasing density of the thermal field surrounding an atom, they are usually absorbed and their energy spread out among the shifting thermons, which in turn translates into heat. As electrons return to their previous positions around the atom, and pass through the atom's VA belts, new infrared waves are emitted.

Radio waves and microwaves have such low frequency ranges they normally have a minimal impact on matter (unless highly focused and concentrated), causing electrons to oscillate as the waves are absorbed into the thermal field. As with gamma rays, they are on the outer range of frequencies interacting with matter.

A curious phenomenon is how low frequency EM pulses will travel more quickly than high frequency EM pulses through a dense thermal field. This variation of speeds based on pulselength allows light to spread out in a prism, creating a light spectrum and is called 'dispersion.' (See *Speed of Light; Quantum Inertia/Dispersion,* this chapter.)



Symbolic images of differing frequencies. Picture 1 shows x-rays and gamma rays. Visible light and infrared are shown in Picture 2. In Picture 3, radio waves, micro-waves and lower frequencies are represented.



The Spectrum

The rainbow is the most familiar example of a spectrum. Visible or white light from Sol is spread out by water acting as a prism, dispersing the light. The full spectrum includes a spread of EM pulse frequencies extending beyond either end of the visible range. Strongly heated solids, liquids, and '*compressed*' gas can also radiate light, and, sent through a prism, produces a rainbow, or a 'continuous spectra'.

A close look at light received from Sol shows its spectrum is not a continuous even spread, but contains a system of sharp black lines. These are properly called Fraunhofer lines (after their discoverer) and are absorption lines. The lines identify an atom/element in the form of an extremely hot gas under pressure. Only an extremely hot gas under pressure can remove certain frequencies of light. The dark absorption lines represent frequencies that have been absorbed from the sun's spectrum and identify the gases 'surrounding' Sol.

Fraunhofer lines have a direct relationship to another phenomenon called 'line spectra.'

Heated gases, '*under low pressure,*' can produce only a limited range of EM frequencies, called line spectra or emission lines. Under the USF theory paradigm, this is explained by the distance of the orbiting electrons. Heated gases under low pressure have spread-out, active thermal fields pressing the orbiting electrons outward. As a result, the electrons have minimal interaction with the atom's magnetic field. The atom's magnetic field is necessary for the quantum jumps and, under these circumstances, only quanta of a select few frequencies can be emitted.

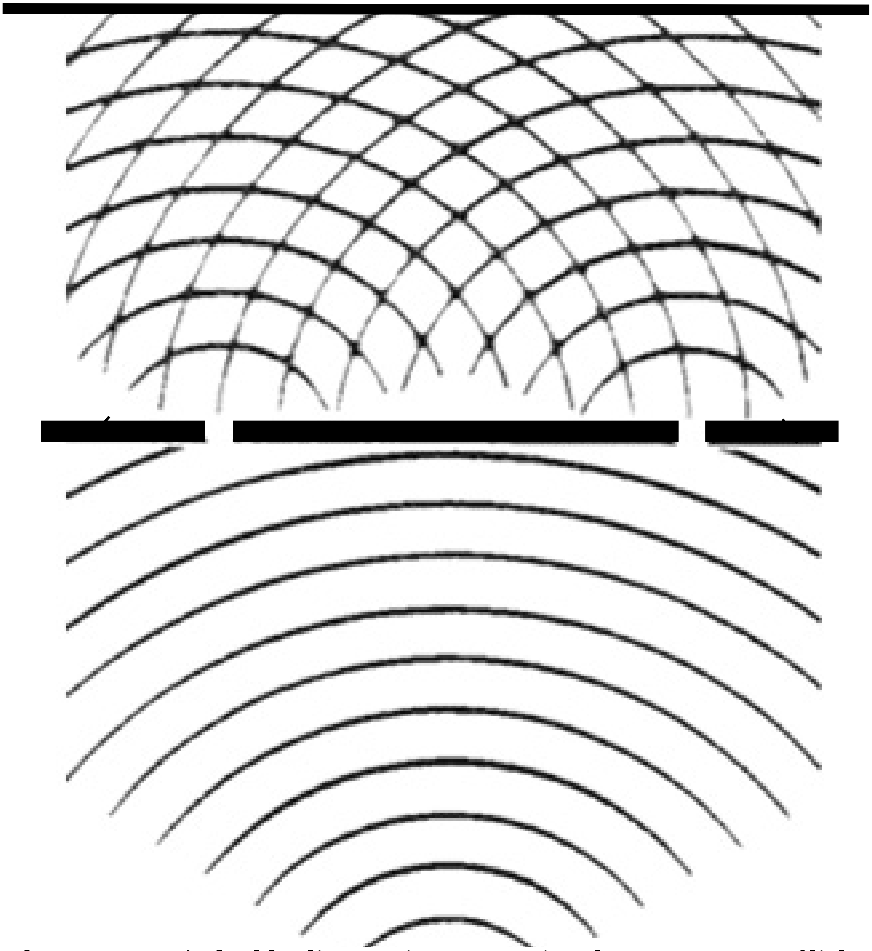
Each element (iron, etc.) is capable of being heated to a gaseous form, and in this state, under low pressure, can be identified by its line spectra patterns. If 'continuous spectra' light is passing through a cooled gas, or a heated gas under intense pressure as takes place with the sun, the absorption lines take on exactly the same patterns as displayed when it is radiating emission lines.

Interference

The macroscopic wave nature of light is undeniable. When 'coherent' EM pulses are sent through an opening in matter, the quantum energy to either side is absorbed or reflected, while a portion of the pulses passes through. The narrower the opening, the more pronounced the curvature and change of direction shown by the light pulses exiting the opening. As the light pulses continue to expand outward the curvature spreads and becomes less obvious. This process is known as diffraction.

When two openings are used, as in Young's classic double slit experiment, these curvatures interact to produce interference patterns. Two separate wave patterns are formed after the light has passed through each opening, and then merge. In this experiment, typically the two openings are opposite a photographic plate recording the interference patterns. Some EM waves are pulsing in phase with one another while others are not. This causes some thermons to compress less (due to simultaneous compression waves from opposing directions) and greater intensity in other thermons. Coherent light of the same frequency produces the best results in this experiment.

Some areas of the wave front can double in intensity,



Thomas Young's double slit experiment, proving the wave nature of light by showing interference patterns. It was originally performed in 1801. These eperiments allowed Young to first measure wavelengths. In the upper half of the illustration, each intersection can be considered a thermon compressed simultaneously by two waves.

concentrating quantum energy in a process called constructive interference, creating bright areas on the photographic plate. Some areas on the plate register as gray, showing the brightness of the original EM pulse. Dark areas show 'no light' has been received, due to destructive interference. This is the most basic example of light's wave nature.

We know from direct observation two beams of light crossing one another will not show any obvious signs of interference. Dim light can pass through intense beams without being influenced in any obvious way.* This is because the pulses must be in phase, or compress the same thermons simultaneously, to influence one another. Young's double slit experiment greatly increases the probability of simultaneous, or near simultaneous interactions, in part through the use of coherent light. If EM pulses are in phase, or reach the same thermon simultaneously, the intensity (or amplitude) of the two is added. If the EM waves arrive half a pulselength apart, the weaker wave is subtracted from the larger.

Another example of EM wave phenomenon takes place when light is blocked by a single object. As an EM wave front passes an object, some of the light is absorbed, creating a shadow. The pressures of the pulses expand into shadowed areas. EM field pressures alter the shape of the wave in the same way the slit experiments do. The compression of individual thermons spread the wave into the shadowed area.

Interference patterns created by two interacting EM pulses display concentrated and rarefied features. This is true regardless of the model being used. The equations used in the classic model apply equally well to the USF theory model. As wave models the only significant difference between the two is the feature of amplitude. Amplitude in the classic transverse wave model is based on size, while the USF theory paradigm is based on the amount of compression thermons receive and the thermal field density.

*(Research 'The Principle of Superposition' separately. This principle underlies the whole subject of light interference and is always true for light in a vacuum.)

Holography
(Form Without Substance)

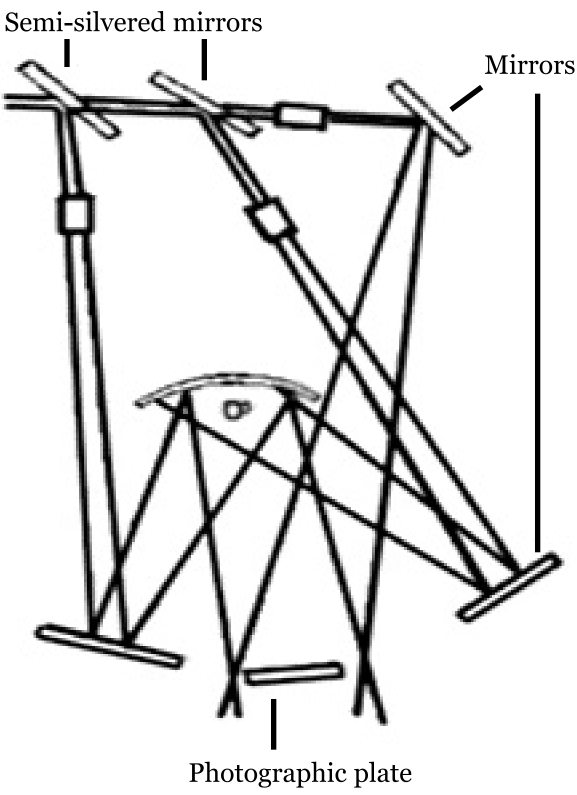
The Basics

A hologram is a three-dimensional image created by the concentrated EM pulses of a laser. The laser light passes through a photographic plate acting as a complex diffraction grating (Young's double slit experiments). The interference patterns are recorded. Laser light passing through the photographed interference patterns can form a three-dimensional image, which can be viewed from all angles (in front of the plate).

The developed holographic plate, without a laser light source passing through, superficially appears to be an image of meaningless spots, blobs, and circles. It is only after the laser light passes through, that the images become recognizable. A particularly curious phenomenon is how, if the holographic plate is cut into 4 sections (or 8, or 16), each section will recreate a smaller version of the hologram as a whole, and 'not' a portion of the original hologram. This property has initiated an interest 'holographic memories' for computers.

The image on the photographic plate is created using a laser beam that has been split into one or more 'object beams' and a single 'reference' beam. The object beams are reflected from mirrors to provide multiple angle reflections from the object being holographed. The reference beam is reflected to pass through one of the object beams before reaching the photographic plate. The interference patterns created on the plate diffract the laser light passing through and create an image.

Holographic imaging is generally considered a novelty at this time. Its potential for communication and recording purposes has received minimal attention.



The process of creating a holographic image is complex, involving mirrors, semi-silvered mirrors, beam spreaders etc., to induce the necessary interference patterns. A cup under the curved mirror is holographically photographed onto the plate at the bottom of the picture.

Light/Matter Interactions
(Transformations)

Intro

The EM barrier (plasmonic field) at the surface of a substance acts as a screen and dictates how differing EM pulses interact with the substance. Some frequencies of light are reflected, while others are transmitted into, or through, the matter. The thermal field surrounding atoms transports the EM pulses, or absorbs their kinetic energy.

Each atom has its own resonance, or vibrational pattern, which supports the resonance at the EM barrier. The resonance patterns become more complicated as the number of pseudo-neutrons at an atoms core, and orbiting electrons, increase. High pseudo-neutron counts take place in heavy elements, such as iron (56 pseudo-neutrons, with 30 internally shared electrons and 26 orbiting electrons) or zinc (65 pseudo-neutrons, sharing 35 electrons, with 30 electrons in orbit), or in complex molecules, such as the crystal calcite ($CaCO_3$, 100 pseudo-neutrons sharing 50 electrons).

Metals reflect most EM frequencies, but not x-rays or gamma rays. These high frequencies will pass quanta through thin sheets of metal, though thicker sheets will absorb them. Quanta moving through thick sheets of metal can be absorbed by the dense thermal field surrounding atoms (becoming heat), or cause a thermon to split.

Reflection

Reflected light has become a very useful tool for life forms with eyes. Visible light reflects off objects at a wide range of frequencies, sending the eye vast amounts of information about our immediate surroundings.*

*(Reflection and refraction are studied by the science of optics which uses a wave theory paradigm and has been researched and refined for 300 years. There are many excellent texts on the subject and a good introduction to optics, written by Jenny Reinhard, can be found at http://www.machinevisiononline.org/public/articles/ MSPhysics_OpticsRevAa.pdf.)

Light can be reflected in a variety of ways. When reflected off a smooth surface, the EM pulses are being repulsed by the EM barrier. EM barrier repulsion can also take place using an irregular, bumpy surface, but this results in 'diffused reflection,' with the light scattering in different directions. Another form of diffused reflection is when quanta are reflected off molecules. The blue sky is a result of this kind of reflection. (See *Polarization* and *The Raman Effect*, this chapter.)

Mirrors provide the most focused example of reflected light. Modern mirrors are made of a reflective metal coating on the back of a glass pane. Visible light is transmitted through the thermal field of the glass, repelled by the EM barriers of the metal, and again transmitted through the glass' thermal field and into the thermal field of the air before being received by our eyes.

There is some displacement of light waves as they transfer from the air, and through the surface of the glass, but this effect is reversed as the electromagnetic pulses are repelled back through the glass. The metal foil on the back of the glass is generally aluminum, which has an EM barrier resonance repelling visible light. The individual atoms are not arranged closely enough to be responsible for reflection. It is the foil's electromagnetic barrier that provides the smooth, reflective surface.

The glass pane is made primarily of melted silica, cooled so quickly crystals were not allowed to form. Crystal formations would alter the transparency of glass, creating blurred and distorted images. Each small crystal would have its own individual EM barrier resonance. (See *Chapter 6-Matter and Electricity; Crystals*.)

The EM barrier resonates at a certain frequency, repelling similar frequencies, while allowing lower and higher frequencies through. Lower EM frequencies are often absorbed after passing the initial EM barrier, while higher frequencies may pass through unaffected.

Absorption

Matter which is not pure white or transparent is absorbing visible light (and its quantum energy). The quantum energy shifts the thermons, creating heat. If an object is green (approx. 527 nm pulselength), then that frequency is being reflected while all other visible frequencies are being absorbed.

The color black is an absence of visible light. A black object is not reflecting visible light (though it will be radiating invisible infrared light). A black object is typically absorbing visible light and redirecting the kinetic energy into heat. Whether the object is made of a black material or simply coated with a black paint makes no difference. The pigment of the paint acts to absorb the light and transform it into heat.

Absorption takes place after light has entered the thermal field. The light is initially transmitted through the EM barrier and is altered by internal interference. Absorption is not a thermon splitting (or pair separation) process. Instead, the kinetic energy is absorbed in totality by the thermal field, most often as it approaches an atom or molecule, shifting and rearranging the condensed thermons. As an EM pulse approaches an atom, the thermal field becomes denser. This, in turn, causes the expanding pulse front to become funneled, or concentrated.

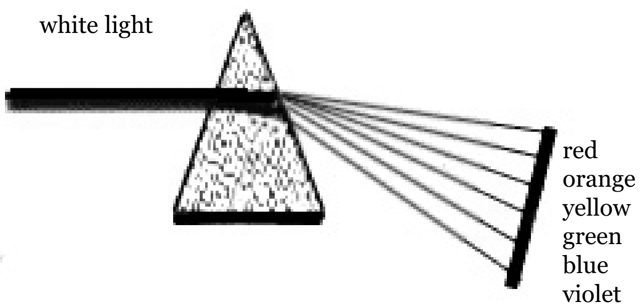
When quanta (an expression of kinetic energy) are absorbed, the total energy is a combination of frequency and intensity. In the case of infrared light, the pulse can push the electrons outward, transferring some of the kinetic energy. The electrons again shift inward, per their electron-positron attraction, and create infrared light in the process. Higher frequencies, or more concentrated pulses (intensity), can cause the loss of outer valence electrons.

When an outer orbit electron is lost, the remaining electrons produce different EM frequencies during quantum jumps. The atom's magnetic field and the position of the remaining electrons change.

Transmission

Transparent matter has EM barriers which allow certain light frequencies (specifically, visible light) to pass through. While visible light is not reflected, each frequency is deflected slightly as it passes through the EM barrier .

The denser the thermal field of the material (per grav-magnetic influence from the atomic cores), the more slowly the EM pulses pass through. EM frequency is also a factor, with higher frequencies traveling slower than lower, less energetic frequencies (see *Speed of Light*, this chapter). This variation in speed, based on frequency, results in dispersion and refraction (the rainbow effect displayed by prisms).



The differing angles of the prism's plasmonic fields, combined with the different speeds per frequency, causes white light to spread out into its varying pulselengths. Blue and violet travel more slowly than red and orange.

Refraction

Accept for total reflection (an ideal), some quantum energy will pass through the surface of a material, though it may only penetrate to a short distance before being transformed into heat. For transparent materials, most of the visible light passes through. Visible light contains a range of pulselengths, and the *direction* of differing pulselengths passing through the the EM barrier is altered.

Using glass as an example, if light enters through a flat surface (EM barrier), each frequency follows a slightly different path. If the exit surface is parallel to the entry surface, the second EM barrier returns the varying frequencies to their original direction. If the surfaces are not parallel, as with a prism or a lens, the light takes a different direction as it passes through the second EM barrier.

The thickness of a material can have an effect as well. After passing through the first EM barrier of a piece of glass, higher frequencies move more slowly through the denser thermal field. Though all the frequencies may have entered at approximately the same location in a very thick piece glass they may exit at slightly different times. Normally, this is not noticeable on a small scale, but a prism will imitate and exaggerate the effect.

Polarization
(Altered Pulse States)

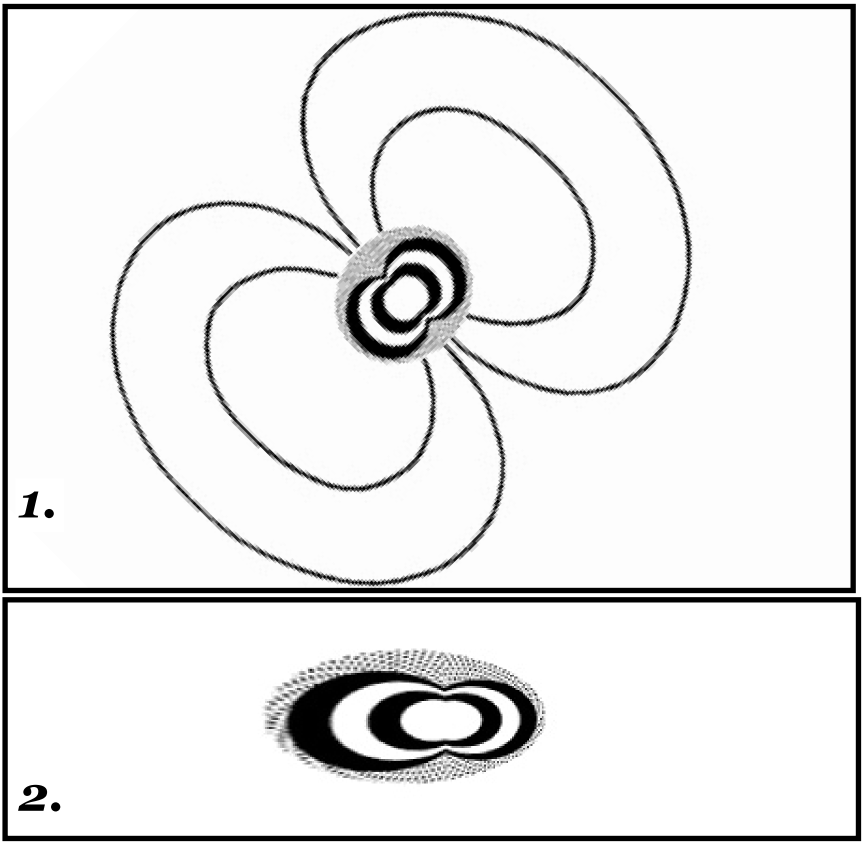
Unpolarized Light

The traditional model of an EM pulse shows electric pulses traveling with a transverse up-down motion (similar to waves on the surface of water), and a magnetic pulses oscillating in synch from side to side. This image is based in part on a model of electric current, with the north/south magnetic alignment being at right angles to the flow of electricity, and in part on 'highly' polarized light.

Unpolarized light is made up of chaotic pulses. It is also an ideal. Most sources of light produce EM pulses that are at least weakly polarized, though very weakly polarized light can be treated as unpolarized. Additionally, light can be polarized quite easily by environmental factors.

Polarized Light

The polarization of light is generally described as the separation of light waves, based on their 'electrical' polar



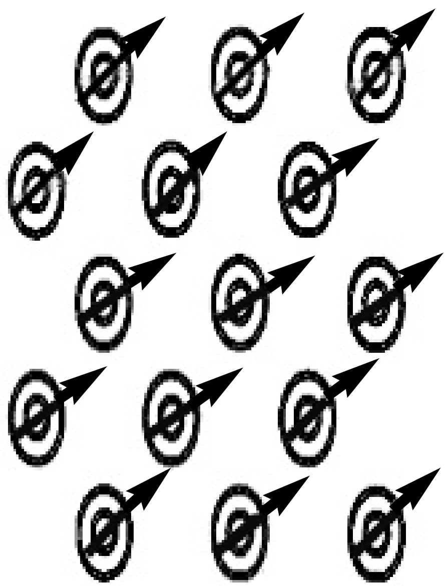
In picture 1, the ideal unpolarized thermon compressed by a quantum of kinetic energy. Though having east-west poles, the compression is so evenly distributed the poles are not pronounced. Picture 2 shows a polarized version, with uneven compression and the east-west poles quite pronounced.

orientations. The USF theory describes the process as changing the EM pulse's compression dynamics. A polarized wavefront distorts the compression of a thermon, altering its magnetic and electric alignment. The more uniform these deformities are, the more the light is polarized. The electron-positron components of the compressed thermon express the distortion most clearly. More extreme forms of polarization produce some interesting results when interacting with matter.

Polarized light is generally considered to be EM pulses with uniform distortions. This type of uniformity can be caused in a variety of ways.

Reflection

The reflection of light can result in polarization. This process can happen when light strikes a nonmetallic surface at any angle other than 90 degrees. The amount of light polarized can vary from 100% to none at all. An angle



Polarized quanta, with all the east-west poles of the thermons aligned in the same direction, typically the result of an environmental influence.

producing 100% polarization is called the 'polarizing angle.' Light striking at certain angles is separated into two beams.

The polarizing angle for reflection varies with the type of material being used and its EM barrier. For glass, the polarizing angle is approximately 57 degrees. (This should not be confused with a 'reflected image.')

Each EM pulse contains some rhythmic distortions, with roughly 50% oriented to one side and the remaining 50% to the other side. At 57 degrees, the glass' EM barrier reflects half of the light with similar distortions off its surface, with the remaining half reflected into its thermal field where it passes through or is absorbed.

Polarization can also take place through molecular reflection. Molecular reflection produces scattered light (as one might expect from a spherical reflector). An example of this is the blue sky we see on a sunny day. Blue frequencies of light from Sol are reflected and scattered by atmospheric molecules more readily than any other visible color because of their short pulselengths. Much of this light is polarized in the process (though scattered).

Crystal Polarization

Christian Huygens first worked with the phenomenon of polarized light in 1690, while experimenting with crystals, specifically Iceland spar (also known as calcite). Iceland spar grows into very large crystals and is easy to experiment with. He found aiming a beam of light through one of these crystals separated it into two beams of equal intensity (unless the light was aimed directly through its crystallographic axis*).

Further experiments by Huygens showed if one of these beams were aimed through a second crystal, it, also, would divide into two beams of equal or unequal intensity, or not separate at all, depending on the orientation of the second crystal. From these experiments he first determined the polarization abilities of light.

The molecules in crystals are arranged in uniform, regular patterns. Iceland spar, and many other forms of transparent or translucent crystals, have an internal pattern of layers, or walls of molecules. These molecular layers act as EM barriers and provide corridors for certain frequencies of light.

*(A crystalographic axis is the corridor system between the internal EM barriers of a crystal. This corridor system can channel light in specific directions.)

Light enters the thermal field of Iceland spar, but upon entry is separated into two beams. One beam of light is the result of 'internal reflection' and is channeled through the molecular corridors. This reflected beam is polarized. The remaining, unchanneled beam is not repelled by internal EM barriers and continues along its original path through the Iceland spar.

Some crystals, such as tourmaline, are called 'dichroic' and gradually absorb the unpolarized light, while the remaining polarized light passes through.*

The channeled beam always follows the path of the molecular corridors, as demonstrated by a simple rotation experiment. As the crystal is rotated, the channeled beam moves with the crystal and continues to exit from the same location on the surface of the crystal. The unchanneled beam continues in a straight line path, unaffected by the rotation of the crystal.

Crystal polarization is a form of reflective polarization, but the reflection takes place inside the crystal instead of on its surface. Crystal polarization also shows the rhythmic patterns of EM pulses are involved in the reflection process and that uniform patterns can be introduced into light waves. There is a high probability *the thermons within the channels* have a uniform north/south polarization.

The Faraday Effect

Named after its discoverer, Michael Faraday, the Faraday effect (no longer mentioned in text books) is fast becoming a forgotten phenomenon, primarily because it is unexplainable using a particle theory paradigm. Magnetic polarization was originally used to explain this phenomenon, but moving electric fields provide a better explanation.

The Faraday effect is normally described as the rotation of a polarized light beam by an intense magnetic field as light passes through a medium. The USF theory, however, distin-

*(Polaroid sheets and sunglasses are dichroic.)

guishes between the strongly interlinked magnetic fields of permanent magnets and the temporary magnetic alignments formed by electric current. The ‘magnetic polarization’ described in Faraday’s experiment uses electric current.

Electric polarization is produced using a transparent, isotropic medium,* such as leaded glass, surrounded by an electric coil. This model predicts the turning of polarized EM pulses as the result, not of a magnetic field, but of a moving electric field. As electrons move through the coiled conductor, their collective field radiation repels the eastern half of the thermons transporting the EM pulse, while attracting the western half. Loose thermons, and hence a portion of the EM pulse’s quantum energies, are rotated in the direction of the moving current.

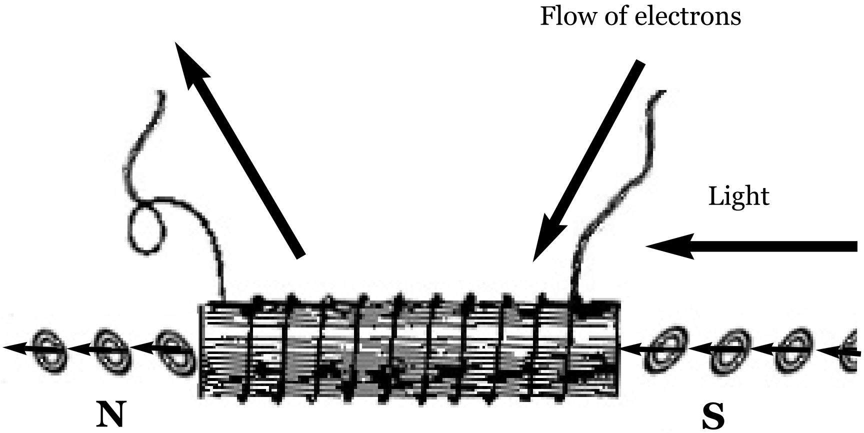
R. M. Kiehn reached the same conclusion, separately and at an earlier date. In 1997, he presented a mathematical argument describing the implausibility of the Faraday effect being the result of magnetism. He carried his argument further by mathematically describing the Faraday effect as the result of moving electric fields.

The strength of the current and the length of the transparent medium both influence the amount of rotation. A stronger field, or a longer medium, (or both) will cause the amount of rotation to increase. The electric field generated by the coil creates a constant spiralling pressure on the already polarized light. As the light passes through the medium, the quantum energy and thermons rotate under the constant pressure of the moving electric field. The quanta being transported pass this kinetic pattern onto the thermons after leaving the glass.

Inverse Faraday Effect

There have been some unsuccessful efforts to assign a magnetic orientation to polarized light. This is, in part, based on the expectation of an Inverse Faraday effect, with

*(A medium with no crystalographic axis.)



Polarized light passes through a leaded glass rod. A flow of electric current provides a persistant pressure which realigns the thermons, gradually changing the orientation of the polarized thermons and adding a spin to the EM pulses .

circularly polarized light producing a magnetic field. Experiments using lasers have shown circularly polarized lasers can cause a Faraday effect in test beams interacting with the laser. There have been, however, no direct measurements, nor any evidence, of an increased magnetic field to show an *Inverse* Faraday effect.

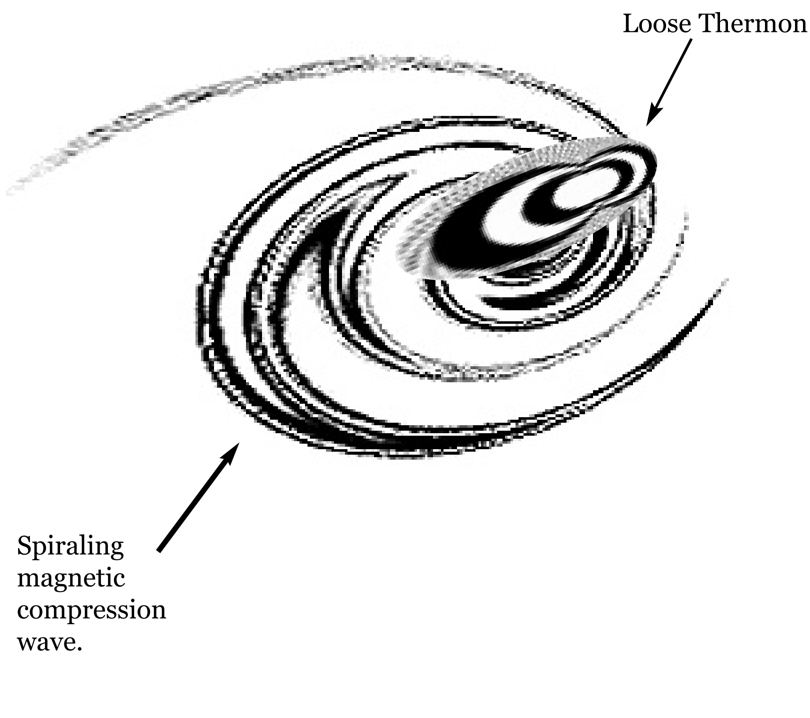
Circular & Elliptical EM Pulses

Unpolarized or weakly polarized light is difficult to study because it is chaotic. Electromagnetic pulses with inner turmoil are exceptionally difficult to study because of their weak impact. Polarized light, as waves of uniform electromagnetic pulses, allows for the study of a phenomenon which would otherwise be difficult to detect or research.

Polarized light impacted by the Faraday effect is described as having Faraday Ellipticity. Both elliptical and circular pulses are imbalanced, but elliptical pulses are a more extreme example. This model is quite similar to the one used in many text books which describe a modified transverse wave model. The pulsing energy moving through the thermons becomes imbalanced and spiraling.

Using the pulselength as a measure, when pressures against magnetic portion of the EM pulse is unevenly distributed by one quarter of a pulselength, the light beam becomes circularly polarized. Any drag causing less than, or more than, a quarter (or 3/4) pulselength results in elliptical rhythms.

Light also becomes elliptical (and possibly circular) when it enters a crystal at an angle to the crystallographic axis. This is considered the result of an uneven reflection of the electro-magnetic compression wave.



The thermon is rotated and unevenly compressed by the spiraling magnetic pulse. This results in the quantum energy becoming elliptical.

Wave Packets
(Synergistic Patterns)

Wave packets are a combination of interacting EM pulses that do not expand or spread out. The size of a wave packet is determined by the number of quanta it contains with differing frequencies. The creation of a wave packet requires a selection of frequencies interacting in such a way they cancel out (destructive interference) everywhere outside the wave packet and reinforce (constructive interference) the pulses carried within. There is no photon model capable of explaining this phenomenon.

Curiously, the smaller a wave packet, the more variation in pulselengths. A few waves of similar pulselengths produces a large, spread-out wave packet.

EM Waves or Photons?
(Either, Or?)

The Corpuscular Model

From the mid 1600s to the 1800s, light was normally described as corpuscular, per Sir Issac Newton. His model described light as streams of very minute particles, or corpuscles. Newton was worshiped by members of the science community and his narrow-minded followers stunted the wave model's evolution for nearly 122 years.

The Classical Aether Model

Christian Huygens developed his wave-theory in 1678. Huygens' model immediately met with two serious difficulties. The first had to do a medium for transporting the waves. Light was treated as compression waves, similar in nature to sound waves, but light could pass through a vacuum, whereas sounds would not. An undetectable medium must exist in both a vacuum and within matter. To explain the passage of light waves through transparent matter, this medium had to exist not only in interstellar space, but also in the space between molecules. Additionally, this medium did not *'seem'* to restrict the motions of stars and planets. Huygens assumed the medium existed, and called it the aether.

The second difficulty with wave theory was its initial inability to account for the straight-line (rectilinear) propagation of light. The sharp-edged shadow of an object in direct sunlight did not support the analogy of an expanding, curved compression wave. Huygens explained straight-line propagation by suggesting light waves are made up of wavelets which pass through and are transferred by points (think of Planck's oscillators). This problem was not fully resolved until after Thomas Young's experiments with light wave interference in the early 1800s. Shortly after Young's experiments, Fresnel expanded on on light wave interference, using destructive interference to further explain straight-line propagation.

The cultural transition of the scientific community from light corpuscles to light waves was completed in 1850 due to the experiments of Jean Foucault, which showed the speed of light in water was slower than in the air. The wave model predicted the slow down, the corpuscular model did not. It should be noted the aether-based classical model utilized only two fundamental forces, gravity and electricity. Unlike the EM and thermal fields of the USFT model, a gravity field was not projected onto the aether.

The aether model evolved to include the projected characteristics of an elastic solid (based on the illusion of transverse waves) made up of extremely minute particles, far smaller than atoms. The elastic solid model of aether, with matter capable of moving through it without resistance, weakened the credibility of the aether model significantly.

The Electromagnetic Field Model

Michael Faraday developed the first field theory model with a focus on electric field lines and introduced this concept during a lecture in 1846. Faraday believed light was the result vibrations in lines of force within a universal gridwork of electric field lines. Generally speaking, his model was ignored by the scientific community, but not by James Maxwell.

Maxwell and Faraday communicated by mail, with Maxwell deveoping mathematical formulas based on Faraday's experiments. The equations developed by this team were presented by Maxwell in 1860, and worked remarkably well in predicting and understanding the behavior of light. Maxwell's model of an electromagnetic field dovetailed with the aether model and the two supported one another. H. A. Lorentz expanded on Faraday's and Maxwell's work even further, explaining how electrons orbiting an atom produced light. **Maxwell's equations are so successful that they cannot be discarded, in spite of the photon model, which is currently in fashion**.

The Quantum Model

As described earlier (See *EM waves: The Wave Model & Transverse Illusions*, this chapter), Planck developed a model of light waves passing through, and being emitted by, 'oscillators'. The energy/wavelets emitted by the oscillators are quanta, and the oscillators themselves are represented as the 'minute particles' of the aether model and 'thermons' in the Ultra-Space Field theory model.

The Photon Model

Einstein's Special Theory of Relativity was used as an an explanation for the Michelson-Morley experiments, and as an argument against the aether, catapulting him into a position of prominance and fame. Planck's model of oscillators transporting quanta, supported an aether theory model. This was at a time when the scientific community was accepting the results of the Michelson-Morley experiments as evidence the aether didn't exist.

The willingness to accept an argument based on a lack of evidence (a lack of evidence cannot be used to prove or disprove an argument), shows the frustration and doubts of physicists with the elastic solid model of aether. Yet, at the time, no one could dispute light as transverse waves and there was no other explanation available for this behavior.

Einstein provided a simple solution. Discard the mathematically complicated aether model altogether and treat Planck's quanta as corpuscles (photons). It worked well mathematically, and Einstein believed he had supporting evidence for a photon model. Einstein carried this process to the extreme of discarding the electromagnetic field, as well. This, in turn, resulted in projecting a gravity field onto electrons as a method of explaining their inertia, since the electromagnetic field was no longer available to provide resistance.

Einstein's model of light as high-velocity particles worked well for a time, but has failed to evolve into a model explaining phenomena such as polarized light, redshifting, radio waves, wave interference patterns, Cerenkov radiation, and faster-then-light experiments. Additionally, no photon-based technology has been developed since the initiation of this model, over a hundred years ago.

Comparing Photons and EM Waves

When developing the theory of photons as particles, Einstein used observations of the photoelectric effect as supporting evidence. The photoelectric effect is described as the ionization of atoms, with electrons being knocked from their outer orbits by light. He pointed out photon theory and wave theory predicted very different results in explaining how certain metals, such as zinc, converted light into electricity. His primary argument for a particle theory model was the of speed of electrons transported during the process.

In his argument, Einstein used two important characteristics of light- frequency and intensity. Light of the same frequency (or same color) is called monochromatic. A laser, for example, concentrates light of the same frequency into a tight, intense beam. When the intensities and monochromatic frequencies are varied in a controlled way, classical aether wave theory, according to Einstein, made the following predictions regarding the photoelectric effect:

1. When the intensity is increased, the electric component of the EM waves, as part of a negative electric field, should become stronger, and should increase the number of ejected electrons from zinc atoms. This more intense light should also increase the speed of the ejected electrons.

2. Varying the frequency of light waves should not effect the speed of the ejected electrons, because the speed of light was believed to remain constant.

Photon theory, using the billiard ball analogy to describe the same situation, makes the following predictions:

1. When the intensity is increased (but not the frequency), the number of photons increases, with a corresponding increase in the number of ejected electrons; but since the energy of each individual photon has not changed, the speed of each ejected electron should not change.

2. Photons with higher frequencies carry more energy. Increasing or decreasing the frequency of the light should cause corresponding variations in the speed of the electrons.

(This is a major flaw in Einstein's arguments and experiments. His experiments measured the varying speed of electrons moving through a conductor. It is now known electric current, and its electrons, move at consistant speeds.)

Though light displayed wave characteristics during double slit experiments, the classical 'aether as an elastic solid' model could not explain the (illusionary) increased speed of the electrons as the frequency of the light increased. The photon theory, as massless particles striking electrons, provided a model explaining the variations in the number and speed of electrons. In the years since this model was adopted, it has gradually been modified to such a degree it no longer resembles the original billiard ball model. It is now 'generally described' as outer valence electrons absorbing the kinetic energy of the photon and escaping their orbits. *Laser experiments have ultimately found Einstein's photoelectric model to be in error.*

Photon Theory Collapses
(Intense Observations)

Microwave ovens

Einstein's model of light predicts low frequency photons, regardless of intensity, lack the power to knock electrons from their orbits. Place a metal cup in a microwave oven and turn it on. Do your observations match Einstein's predictions?

Laser Experiments

In the late 1970s and early 80s, laser experiments resulted in phenomena disproving Einstein's light-as-particles theory. In these experiments the laser intensity was increased while maintaining the same frequency. This process is known as multiphoton ionization. The results of these experiments were surprising and did not support a billiard ball analogy of interacting photons and electrons.

Using high intensity, 'low frequency' lasers, such as microwaves, physicists found electrons were being transported (consider how microwaves are used in particle accelerators). This should not happen in a light-as-particles paradigm. The individual photons in low frequency light would lack the energy to knock electrons from their orbit.

Another newly discovered phenomenon has been observed while using very intense lasers. Increasing the intensity of a laser beam should increase the number of electrons being transported from the target area. This has been shown to be true- up to a point. EM frequencies traditionally associated with the photoelectric effect show that, past a certain critical intensity, the transport of electrons diminishes and stops. Computer simulations show the electron being shaken back and forth with wavelike oscillations. Photon theory cannot explain this phenomenon, as increased intensity should only represent an increased number of photons, with a subsequent increase in photon/electron collisions.

A third example of the photon theory collapse is the speed of electrons after the ionization process. Experiments using high intensity lasers have shown electrons from this process are traveling much faster than Einstein's theory predicts.*

Particle/Wave Resolution
(Light as Quanta)

Light as Quanta

The USF theory describes the photoelectric effect as electron ejection in its photoconductive and photovoltaic forms. The thermal field is incorporated into the model, with

*(Reference 'Ejection energy of photoelectrons in strong field ionization' by D. Bauer in the Physical Review A, Vol. 55, March 1997.)

its fluctuations and shifts causing the ejection of electrons. This model supports the following observations and predictions regarding photoelectric effects:

1. **As light intensity increases, more electrons are ejected**. With greater intensity, thermon compression increases. With greater intensity, more energy is transported through a given space. This causes outer valence electrons with a weak attraction to the atom's core to be ejected easily.

2. **As EM pulse frequency increases, more electrons are ejected**. As the pulses per second in a given area increase, each individual thermon receives more kinetic energy per second. Thermons may absorb some of this kinetic energy as spin, expanding in the process, and/or they may pass it along in the form of concentrated EM pulses. Both processes cause the ejection of electrons.

3. **If frequency and/or intensity is decreased past a certain point, fewer electrons are ejected**. The energy within low frequency, low intensity light is not sufficient to support the ejection of electrons. The quantum energy is absorbed by the thermal field and transformed into heat (no photoelectric effect).

4. Only a certain number of loose, outer valence electrons are available at any given time. As the temperature increases, they are pushed outward and released. Remaining electrons are more tightly bound by coulombic attraction, restricting the number of electrons easily released. **Past a certain intensity, electron transport diminishes and stops, unless the electrons are replaced**. (See *Chapter 6- Matter & Electricity; Photoelectric Effects*.)

The Compton and Raman Effects
(Frequency Changes)

The Compton Effect

Einstein's concept of photons received support from Arthur H. Compton in the early 1920s. The Compton effect describes aiming x-rays at materials with large numbers of electrons (such as graphite), causing the release of electrons, and x-rays with longer pulselengths. This observation was explained with the analogy of photons striking electrons as a cue ball would strike a glancing blow to a billiard ball. The photon is described as losing frequency energy in the process, but not speed.

The Ultra-Space Field Theory explains the Compton effect, not as a massless, chargeless particle striking an electron, but as a variation of the pair separation process. X-ray frequencies initiate a process of constructive interference, while compressing a thermon against an atom's magnetic field. Pair separation is initiated, but with so little velocity, the positron immediately recombines with an orbital electron. Kinetic energy (velocity) accompanies the newly released electron and an x-ray operating at a lower frequency is also produced. This explains the change in frequency with the simultaneous emission of an electron.*

The Raman Effect

The Raman Effect was also initially heralded as proof of photons as particles, but was later explained with an equally valid argument describing it as the result of electromagnetic waves. It was first discovered in 1928 by Sir C. V. Raman, who was working with liquids, and separately a few months later by Landsberg and Mandelstamm experimenting with

*(Reference 'The Quantum Theory of Scattering X-Rays by Light Elements' by Arthur H. Compton, Physical Review, Vol 21, 483-502, May 1923 or http://prola.aps.org/abstract/PR/v21/i5/p483_1 .)

quartz crystals. Raman observed 'focused' light of a single frequency, aimed into a glass flask containing a specific liquid, would scatter the light and alter its frequency. After light was scattered by the liquid, it expressed frequencies which were either lower or higher than before. In the majority of cases the new frequencies were lower, but with some liquids, the quanta had gained energy and were higher. In liquids promoting a boost in frequency, it has been noted raising the temperature increased the boost.

This paradigm explains quantum/kinetic energy is absorbed by a molecule's thermal field. The resulting increase in thermal field activity causes the orbiting electrons of the atoms making up the molecule to be pressed outward. These electrons are now poised to recompress the thermal field of each atom they belong to, and pass through complex magnetic layers. As these are complex molecules, made up of different kinds of atoms, there are variations in thermal field density and the Van Allen belts. The EM waves are released from different regions of these complex field patterns, causing variations in frequency.

The attracting energy fields act as a spring mechanism, being stretched out, and then snapping back into place. During this process, electrons pass through complicated Van Allen belts and produce EM pulses.

The shifting electrons of some materials will have 'boosted' frequencies due to more intense field pressures. Heated materials, with stronger thermal fields, can increase the boost. The electrons bonding atoms together to form molecules can provide particularly intense pressures, as they are less flexible in their orbital positions. The magnetic layers movement and vibrational characteristics are restricted.

The laser has turned out to be an ideal tool for experimenting with the Raman effect. The modern laser beam is intense, focused, and typically monochromatic. With modern day equipment, the Raman effect is used primarily to study molecules and crystals.

'Virtual' Subfields
(Alias- Virtual Particles)

It has been discovered electrons and positrons will pop in and out of existence in a total vacuum. The phenomenon, more commonly known as virtual particles, has been described as the source of the theoretical 'dark energy' (similar to dark matter in that its existence is suggested, but unproven). Dark energy is, in turn, used to explain the theoretical expansion of the universe.

The USF theory describes virtual subfields as thermons separating briefly into an electron and positron before once again joining. This separation would take place during an EM wave compression process. As the compression wave passes, the electron and positron rejoin.

Two colliding waves of high frequency polarized light, particularly elliptical polarized light, would be particularly well suited for the partial separation of a thermon's electron and positron. Environmental factors and frequencies would dictate the distance between the two monopoles.

Theories of Relativity
(In the Eye of the Beholder)

The Michelson-Morley Experiment

In 1887, two scientists (Albert Michelson and Edward Morley) made a discovery which threw the scientific community into very subtle chaos. In an effort to prove the existence of aether (a medium conducting light waves), they accidentally discovered regardless of how fast, or what direction, an object was traveling in relationship to a light source, for example the Sun, the light registered as traveling at the same speed. They performed their experiment under a variety of circumstances, as did other scientists, always with the same inconceivable conclusion. They, and many other scientists, were expecting the speed of light to register as slower if moving away from them, and faster if moving towards them.

For a better understanding of the expected results, consider the following scenarios. If the driver of a red car is traveling at 40 mph, and a blue car is moving at 40 mph towards the red car from the opposite direction, then the first driver will perceive, from her position, the blue car as traveling at 80 mph. If the blue car is moving at 80 mph, in the same direction as the red car, and passes it, the first driver will perceive the blue car as moving at 40 mph.

The question raised by the Michelson-Morley experiment is, 'Why would light (EM pulses) always register at the same speed, regardless of the speed and direction of the moving measuring device?'

The Michelson-Morley experiment is uses a convoluted testing process. It involves matching interference patterns with reflected images. The more complicated an experiment, the more likely its conclusions will be misinterpreted. Wikipedia provides a good description of this experiment.*

There are at least three flaws with the conclusion assigned to the Michelson-Morley experiment. An absence of evidence/information was used as proof something did not exist. The Doppler effect wasn't applied to light waves until 1929. Had it been used in 1887, another conclusion would have been reached. The lensing effect of gravity, predicted and proven by Einstein, provides a third flaw by establishing that light is effected by gravity fields. (See *General Theory of Relativity , page 168.*)

The Special Theory of Relativity

In 1916, Albert Einstein's 'Special Theory of Relativity' provided a possible answer to the question, 'Why would light (EM pulses) always register at the same speed, regardless of the speed and direction of the moving measuring device?'

His Special Theory states the speed of light, in the vacuum of space, is a constant of 299,792 km/sec. Einstein declares 299,792 km/sec is a speed limit, the maximum speed light and matter can achieve. This statement provides him with an absolute, or a foundation for the rest of his theory. Using this speed as a constant, he explains matter in motion adapts by increasing its mass and adjusting its rate of time flow. Regardless of direction or speed, an object will interpret the speed light to be 299,792 km/sec because its own frame of reference is altered. The speed of light doesn't change, the observer, and the measuring device, are physically altered as they move. This is referred to as time dilation.

The USFT does not support Einstein's assumption of the speed of light as a speed limit, nor the assumption the speed of light is relative to the observer. There are simply too many examples of faster-than-light events. (See *Faster-Than-Light*, page 171.)

Einstein's predictions of time dilation are based on his assumption of light as a speed limit. If his first assumption is wrong, his entire line of mathematical reasoning falls apart. Evidence countering the the position of the speed of light as a speed limit includes Cerenkov radiation.

Supporting evidence for the Special Theory is based on time dilation. It consists of an airplane transporting four cesium beam atomic clocks around the world, first east, and then west. The experiments took place in October of 1971.

The clocks slowed slightly when going east, and sped up slightly when going west. The rotation of Terra was included in the 'relative' speed of the airplanes. From the perspective of people within the plane, and, theoretically, from the perspective of the atomic clocks, the plane was traveling more slowly to the east, as Terra rotated to the east. The plane seemed to travel more quickly to the west, for the same rotational reason.

*http://en.wikipedia.org/wiki/Michelson-Morley_experiment

The 'loophole' in this experiment is Terra's magnetic field and its effect on atomic and subatomic particles. A simple change in altitude would effect magnetic field pressures. As the planet rotates, so rotates its magnetic field. Traveling to the west would increase magnetic field pressures. Traveling to the east could decrease magnetic field pressures, depending on the speed of the plane.

In 1971, there was an assumption the magnetic field was an illusion and not worth considering. While many older physicists still make this assumption, times, they are a changin'.

The General Theory of Relativity

Einstein developed his General Theory of Relativity in 1916. This theory of relativity focused on gravity. One aspect of this theory predicted strong gravity fields would act as a lens and influence the direction and speed of EM pulses. Einstein's theory used time and space to describe the warping of light from its original path. Observations have shown his predictions to be true.

In 1919, during a total eclipse, measurements of starlight passing Sol were taken and it was shown our sun curved the starlight slightly inwards.

Another prediction supported by the General Theory describes space as curved. It has been said that if a person could look far enough into the distance, they would see the back of their head.

The Ultra-Space Field Theory does not support this extreme example. Space is curved around gravitational cores, meaning that for every star, planet, etc, there will be a curvature of space. There is no evidence of a uniform, universal curvature of space.

The USF Theory of Relativity

The USF theory describes the interaction of light and gravity in terms of increasing field density, with the EM field becoming denser as the center of a gravmagnetic field is approached, as does Einstein's. Anything with a gravmagnetic field, from a proton to a black hole, will slow and alter the path of EM pulses, though generally this is very subtle and difficult to detect. A large gravmagnetic field is needed to prove this theory, and our own star, Sol, was successfully used.

Any device, as a form of matter, being used to measure the speed of approaching light, will alter the speed of the EM pulses as they enter the device's gravmagnetic field. While this may not be detectable with small gravmagnetic fields, the denser EM field surrounding stars provide supporting evidence.

Consequences

A basic consequence of the Special Theory of Relativity is the assumption nothing can exceed the speed of light. A variety of mathematical equations use 299,792 km/sec as an absolute. They support an increase in speed with an increase in mass.

Practical experience with protons, electrons, and positrons in acceleration experiments show the difficulties in achieving even near speed-of-light velocities. As these subatomic entities are accelerated, greater and greater amounts of field energy are needed to overcome resistance and continue the acceleration process.

Having eliminated the aether (and consequently, the electromagnetic field) as a form of resistance, Einstein stated gravity was the source of all resistance.

On various occasions, Einstein stated he was unaware of the Michelson-Morley experiment when developing his Special Theory of Relativity. His theory was not originally designed as an explanation for the experiment's results, but was applied later. Originally, his Special Theory of Relativity was designed to predict what would happen if he were riding alongside a beam of light. Then the question became, "What would happen if I was holding a mirror in front of me, while traveling at the speed of light?" This may provide some insight as to why Einstein believed the speed of light was a constant, relative to the observer, regardless of how fast the observer was moving.

An integral part of Einstein's foundation for his Special Theory was the assumption every interaction takes time, inferring no interactions takes place instantaneously. He understood electrons and subatomic 'particles' seemed to have increased resistance as their velocity increased, and he believed explicitly the speed of light in empty space was an invariable constant. The Special Theory predicts a high speed object will increase in mass (resistance) as it accelerates, and time will slow down for that object. The end result being light is perceived as traveling at a constant 299,792 km/sec.

The speed of light, as a constant, created a set of mathematical limitations (or a framework) which allowed physicists of the time to make reasonably accurate predictions about the interactions of matter, light, and travel at high speeds. Aether was not necessary for these equations. That was over a hundred years ago.

In developing the USF theory as an energy field model for quantum physics, direct observations were considered more important than the needs of mathematical equations. A deliberate effort was made to avoid projecting mathematical limitations on the model. Mathematical 'theories' were ignored, while still allowing for basic equations that have been proven accurate and dependable.

The Ultra-Space Field Theory interprets the results of the Michelson-Morley experiment to mean light travels at a variety of speeds. The speed of light is dependent on the gravitational and magnetic constrictions existing in the EM or thermal field the light is passing through.

Having described the Standard Model's self-imposed speed limits, it should be acknowledged some experiments and discoveries dealing with faster-than-light speeds have been performed, producing remarkable results.

Faster-Than-Light
(What?)

Electric Wave Packets

Since the 1980s, scientists have been able to send EM 'signals' at faster-than-light speeds. In 2002, two physicists, Jeremy Munday and Bill Robertson at Middle Tennessee State University, succeeded in sending 'electric' signals through two different types of alternating coaxial cable at over four times the speed of light.*

By alternating the coaxial cable, they essentially sent an electrical pulse through different mediums, or thermal fields. The pulse itself was a combination of two signals, a weak and a strong, combining to form a wave packet (originally described as the pulse's peak). The differences in thermal field resistance as the wave packet passed from one cable to the next caused the compression waves moving to the rear of the pulse to reflect off one another, combining in strength to accelerate the wave packet forward.

Although the overall wave packet maintained a cohesive identity, the internal structure of the packet became severely distorted. Future experiments will be aimed at maintaining the 'structural integrity' of the wave packet, allowing for faster-than-light communications.

The field pressure manipulations in this experiment are similar to the way airplane wings redistribute air pressure during takeoff. Airplane wings displace the pressures from above by redirecting the air flow above the wing. The air flowing above the wing has been accelerated by the wings shape and directed to push against the downward pressure of the upper air. Because of the wing's shape, the air pressure

*(Reference Sept. 9, 2002 issue of Applied Physics Letters.)

below remains constant, while the pressure from above is diminished. The faster the plane travels, the greater the upward thrust of the moving air above the wing, and the more lift as the upper air pressure is diminished.

In the case of Munday and Robertson's wave packet, field pressures were reflected to the rear of the wave packet, increasing pressure from behind, while pressure at the front remained constant. The end result was a wave packet traveling at over four times the speed of light.

Cerenkov Radiation

The density of a thermal field controls the speed of light passing through it. When a 'charged' subfield enters a thermal field, and if it is traveling faster than EM pulses normally travel through that medium, the subfield radiates a cone of EM waves behind it. This type of light is known as Cerenkov radiation.

The analogy of a sonic boom is often used in describing Cerenkov radiation. The sonic boom created by a jet traveling faster than the speed of sound is emitted in a cone shape behind the jet. A charged subatomic entity traveling faster-than-light creates the same effect using EM waves.

The light is typically bluish-white in color, as shown by the bluish aura surrounding underwater radioactive objects. In this case the thermal field created by water molecules slows the subfields being ejected by the radioactive material.

The density of the water's thermal field immediately provides stronger resistance, slowing the subatomic entity. For as long as momentum continues to carry it at faster-than-light speeds within the thermal field, this cone of light radiates to the rear. The cone of EM waves is hollow, and, for a brief period, the subatomic entity moves faster than the light being radiated. As the charged entity slows, the cone of light tightens, becoming smaller. As speed drops to below the allowed speed of light, the radiated EM pulses become a tightening beam of synchrotron radiation which radiates forward. (See *Chapter 2- Subatomic Energy Fields; Inertia & Mass; Inertia*.)

Cosmic Rays

Protons and the atomic cores of various elements (typically helium) enter the Earth's atmosphere at high velocities and are called cosmic rays. Cosmic rays move at a variety speeds with some approaching the speed of light. The faster they move, the greater their impact as they enter the atmosphere. Cosmic rays come from all directions and are generally considered to be from outside our solar system.

Ultra-high energy cosmic rays with levels as high as 1020 eV have been detected. A proton registering an energy level of 1014 eV will have a velocity of four hundred and sixty one times the speed of light. As one might expect, these energy levels have raised some concerns within the scientific community because they have no explanation as to how particles can be moving faster than the speed of light.

Jorge J. H. Samra, an engineer at La Plata National University, Argentina, has written an excellent paper on this subject. (www.jjhsamra.com.ar) The mounting evidence of ultra-high velocity cosmic rays disputes the concept of 299,792 km/sec as a speed limit and provides hope for faster-than-light travel.

The Speed of Light
(A Variable or a Constant?)

Redshifting

Light from distant stars' displays evidence of redshifting (the Doppler effect). The spectra of this light shows the expected 'spectral absorption line patterns', but in the wrong location. They will have shifted down the spectrum. To eliminate confusion with sound waves, this aspect of the

Doppler effect is called a redshift. (If all EM frequencies coming from a distant star have shifted downward, we have no way of knowing how much of a shift has occurred. What started out as low ultraviolet now looks blue, and blue now looks green, etc. etc. 'except for the absorption lines.')

There are three known causes for the redshifting of light, though generally, only the Doppler effect is used.

The Doppler Effect

One mode of EM wave frequency shifting is called the Doppler Effect. The Doppler effect was initially discovered by Christian Doppler in 1842. It provided an explanation for changes in the pitch of sound waves as a noise emitting object approached or moved away from a listener.

The Doppler effect was adapted to include light by Edwin P. Hubble in 1929, and is the 'standard and preferred' explanation for the redshifting of light. The theory suggests stars are moving away from the Earth at ever increasing speeds, causing EM pulses to shift downward or 'spread'. Observations of stars orbiting each other have confirmed the Doppler effect by measuring the changes in their spectral absorption lines. During orbit, one star first moves away from the Earth, shifting the absorption lines toward the red, lower frequency waves. The star will then move toward the Earth, causing a blueshift, with the absorption lines moving up the spectrum to the higher frequencies.

The classic examples of redshifting describe the observer as stationary, with the stars or galaxies moving away in reference to the observer. A change in EM frequency occurs when the source and observer are in motion relative to each other, with the frequency increasing when the source approaches the observer and decreasing when it moves away. The Doppler effect, as the only means of redshifting light waves, has led to the belief of an expanding universe. The Doppler effect is based on a wave model (sound waves).

The Wolf Effect

The second proven source of redshifting light is the Wolf effect. Emil Wolf, an optical physicist at the University of Rochester, discovered this redshifting process in the mid-1980s.* Experiments performed in 1988 by Wayne Knox, of AT&T Bell Laboratories, confirmed Wolf's discovery. The Wolf effect describes how interference patterns within EM waves cause the redshifting (or a blueshifting) of light. Research has shown plasma-induced interference can closely mimic the Doppler effect, providing strong support for the theory hydrogen gas and plasma between stars and galaxies is responsible for the redshifting.

An analogy of Wolf's discovery uses a pair of tuning forks with nearly identical resonant frequencies. If the forks make contact with one another, the higher frequencies get dragged down to match the lower ones. The 'altered' frequencies, now with longer pulselengths, have been redshifted. The tuning forks in this case are the thermal fields of protons/atoms receiving and transmitting two frequencies simultaneously. This process has been verified with experiments using both light and sound waves. (There is a good, much more detailed explanation of the Wolf effect at http://public.lanl.gov/alp/plasma/redshifts.html)

Sound Waves & EM Waves

The Doppler effect and the Wolf effect can be shown as a phenomenon applicable to sound waves. Both treat light as EM compression waves. The existence of this characteristic as an expression of light provides further support for the concept of electromagnetic waves as compression waves.

Gravitational Redshifting

The first direct observation of gravitational redshifting by a supermassive black hole was announced by NASA, June 26,

*(Reference Physical Review Letters; 56, 1370-1372 (1986)-'Invariance of spectrum of light on propagation', by Emil Wolf.)

2002. T. Jane Turner of NASA Goddard Space Flight Center and the University of Maryland led the research. The recent data may also offer a new way to measure black hole spin, a goal for some astronomers.

The survey looked at NGC 3516, a galaxy with a supermassive black hole as its core. Gas surrounding the core glows in X-ray radiation as it is heated to temperatures in the millions of degrees by the black hole's extreme gravitational compression. A spectral phenomenon called a ‘broad iron K line’ is a part of this radiation.

Black holes typically emit the broad iron K line. Turner and her colleagues determined this spectral feature is a result of strong gravitational redshifting. ‘The observation rules out several competing theories attempting to explain the broad iron line,’ Turner has stated. ‘We find that Einstein's predictions ring true.’ Previous investigations of black holes have also provided indirect supporting evidence, but this was the first direct observation of gravitational redshifting.

This discovery contradicts earlier assumptions about gravitational redshifting. In 1964, mathematical predictions argued against the possibility of redshifts from the surface of quasars (quasars are currently considered to be black holes). It is worth noting the observed redshift did not take place on the surface of the black hole, but from distances of 35 and 175 times the distance of the black hole’s radius.

Einstein’s Theory of General Relativity predicts gravitational redshifting, describing it as the warping of space and time by intense gravity. The USF theory paradigm agrees with this prediction (using the thermal fields of protons and atoms as a model) with the surrounding EM field becoming denser due to increasing gravmagnetic influences. As the black hole’s EM field becomes denser, EM pulses condense and slow down. Light escaping from this area has a spread out, or broadened, spectrum, including spectral line emissions. The end result is a form of redshifting.

Quantum Inertia / Dispersion

In a vacuum, light of all frequencies is traditionally considered to travel at 299,792 km/sec. The frequencies are rhythmic pulses exhibiting a consistent mathematical relationship with pulselength, which equals the speed of light.

This relationship can be easily expressed with the equation: $f \cdot d = c$. This means the number of pulses per second, or its frequency (f) times the distance (d) it has traveled from one pulse cycle to the next, equals (c) the speed of light, in a vacuum. This speed is just slightly slower when light is traveling through the air, and slower still as light passes through water or glass. The equation $fd=c$ still applies as light travels through the thermal fields supported in these forms of matter, but the compressed pulselengths correlate to the slower speed of light while in these mediums. The USF theory describes this process as 'Quantum Inertia.'

While traveling through a thermal field, speed variations between different frequencies become noticeable. Prisms display this effect by dispersing visible light into spectral colors. The slower the frequency (the fewer pulses per second), the less resistance, and the faster the quanta/kinetic energy travel through the prism. Red light travels faster through a transparent medium than blue, because blue light pulses more often. A single high frequency quantum pulse meets more resistance than its low frequency counterpart. In the rarefied EM field of a vacuum, neither low nor high frequencies meet 'significant' resistance.

Quantum Inertia is the result of the pulsing process. In a thermal field the compression and expansion process itself is restricted. Thermons located in matter are much more concentrated energy fields than thermons in the depths of space. An EM pulse slows while passing through a condensed thermon.

Expanding on this phenomenon, light travels faster in more rarefied EM fields. Light would travel more quickly outside of our solar system, and even faster in the space between galaxies? Resistance to an electron's or a proton's (or a spacecraft's) movement would be minimal between galaxies. The speed of light can be interpreted as a variable, with the stretches of space between galaxies allowing minimal compression and maximum velocity.

Quantum Inertia & the Interstellar Medium

Until approximately the 1950s, outer space was considered to be completely empty and the ultimate vacuum. This is no longer considered true. It has become known space contains protons, electrons, hydrogen gas, helium, dust particles, and in smaller amounts, atoms of most, if not all, the elements. The matter existing between the stars is known as the interstellar medium, and consists primarily of protons, electrons, and hydrogen gas. The USF theory carries this one step further and adds thermons.

The concept of dispersion was ruled out as a form of redshifting for light traveling from other galaxies in the 1920s. This happened because, at the time, outer space was still considered a vacuum, (the concept of aether had been dropped) and was thought to provide no slowing to the higher frequencies of light. This has remained the general consensus of the scientific community, though researchers investigating quasars might disagree with the earlier assumption. (See *Chapter 5- Interstellar Influences; Quasars*. See *Author's Notes, #5*.)

The Ultra-Space Field Theory predicts, based on Quantum Inertia, light will travel more quickly in the space between galaxies, and there will be a weak dispersion process over vast distances. In the depths of space, with minimal resistance, spacecraft could achieve speeds far exceeding the standard speed limit of 299,792 km/sec.

Chapter Five-
Interstellar Influences

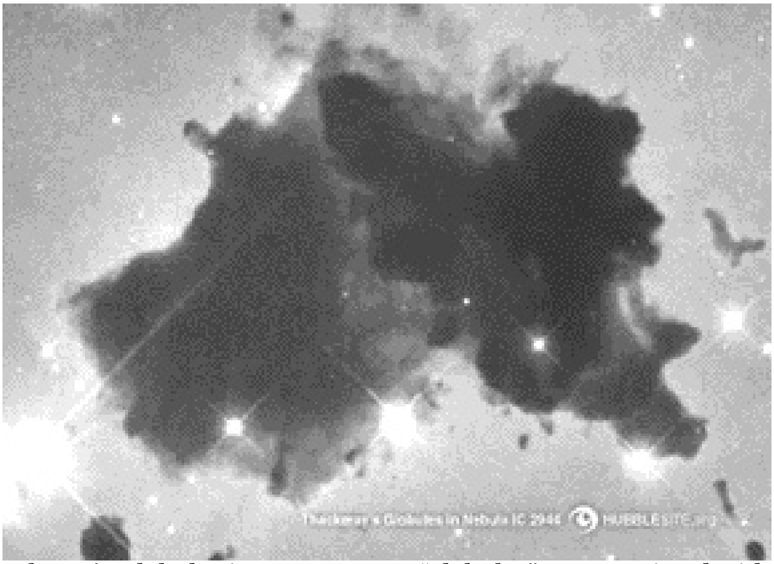
The Interstellar Medium
(The Missing Vacuum)

Characteristics

The interstellar medium exists in the space between the stars and galaxies. In terms of matter, it is made up of 99% gas, a variety of atoms and molecules, and dust. The Ultra-Space Field Theory includes thermons as the underlying foundation of the interstellar medium, and as a requirement for the transport of EM waves.

Hydrogen (both in its atomic form as a single atom, and in its molecular form as two loosely bound atoms) and deuterium (a heavy form of hydrogen with two pseudo-neutrons) make up about 74% of the interstellar medium, with helium at approximately 24%. The gases exist partly as charged particles, such as ions, and partly of neutral atoms and molecules. The interstellar medium is very thin and rarefied, with an 'average' density of about 1 atom per cubic centimeter. Though interstellar space is emptier than any artificially created vacuum on Earth, matter is dispersed throughout space and, because space is so vast, the interstellar medium adds up to a huge amount of matter.

The interstellar gases are typically found in two forms- cold clouds of neutral hydrogen and hot ionized hydrogen near hot young stars. The cold clouds can give birth to new stars as heat loss allows atoms to move closer and become gravitationally attracted, resulting in an inward collapse. The



Thackeray's Globules in IC 2924. Gas "globules" are associated with star formation. Credits: NASA and the Hubble Heritage Team (STScl/AURA) http://hubblesite.org/newscenter/archive/2002/01/

ionized hydrogen is produced when newly-formed stars give off large amounts of radiation in the form of electrons, protons, and EM waves. As the new star heats more distant hydrogen, the thermal field of each hydrogen atom shifts and expands, moving electrons out of their orbits.

Dust makes up a small percentage of the medium. Interstellar dust isn't made up of dead skin cells like the dust you might find in your home. These dust particles are composed of silicates, carbon, ice, and/or iron compounds. In general, they are only a fraction of a micron across, which is also the approximate pulselength of blue light. The size of the particles has been used as an argument to support the model of light as transverse waves. This is a weak argument, in that unblocked light travels through the space between the particles. It is the size of this space which would be important. Higher frequencies do not travel *through* the particles, though they may be reflected. Lower frequencies, such as infrared, would be transmitted through the particles.

Remember our blue sky. The USF theory suggests diffuse reflection and destructive interference patterns cause blue, and higher frequencies, to be reflected and redirected, while red light and lower frequency EM waves with a broader spread factor continue to pass through. This process is known as interstellar reddening. If the dust is thick enough, all light is blocked, leading to areas called 'dark nebulae.'

Light can also be reflected toward the viewer by clouds of dust. This is called a reflection nebula. A reflection nebula is a cloud of dusty gas, usually around a star, where the dust reflects starlight, making it visible to the Earth.

Currently, it is believed our solar system is moving through a cloud of interstellar gas that is approximately 60 light years across.* The cloud has a density of 0.1 particles per cubic centimeter and is contained within a larger region called 'the local bubble,' with an even lower density of approximately 0.001 particles per cubic centimeter. The local bubble is about 300 light years in diameter.

We now know the density and temperature of the interstellar medium varies greatly from one area to another. Data from orbiting observatories and information gained from radio waves emitted by pulsars have helped to form a general picture of how gases and plasmas are distributed.

Supernovas
(Bursts of Light in the Distance)

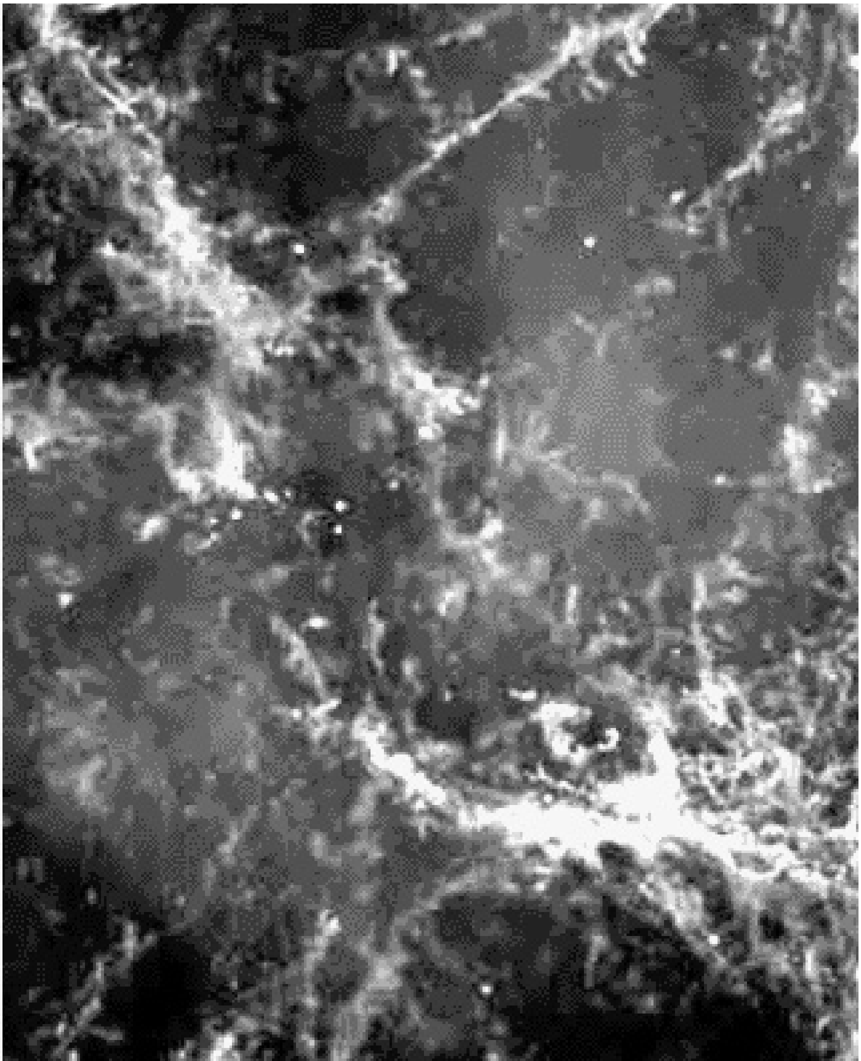
General Info

A supernova is an imploding star (not an exploding star. The implosion, as seen from Earth, begins with an increase in brightness. The star will radiate light billions of times brighter than normal, then fade out slowly in a few weeks.

Approximately 15 supernova implosions per year are

*(Light years are a measure of distance- the distance covered by light as it travels for one year. The speed of light as a variable makes this a sloppy system.)

detected using modern telescopes. The first recorded supernova was in 1054 A.D. and was visible to the naked eye. It was responsible for spreading matter throughout the Crab Nebula and left behind a pulsar. Supernova remnants can be found scattered all over the universe.



The Crab Nebula shows the gaseous remnants of a supervova which imploded in 1054 A.D. Credit: NASA and the Hubble Heitage Team (ST Scl/AURA)http://hubblesite.org/newscenter/archive/2000/15/image/a

On February 23, 1987, an astronomer at Chile's Las Campanas Observatory discovered the most recent supernova implosion visible to the naked eye. It emitted EM frequencies across the entire spectrum. The supernova was found in the nearby Large Magellanic Cloud and quickly became an object of intense study by astronomers.

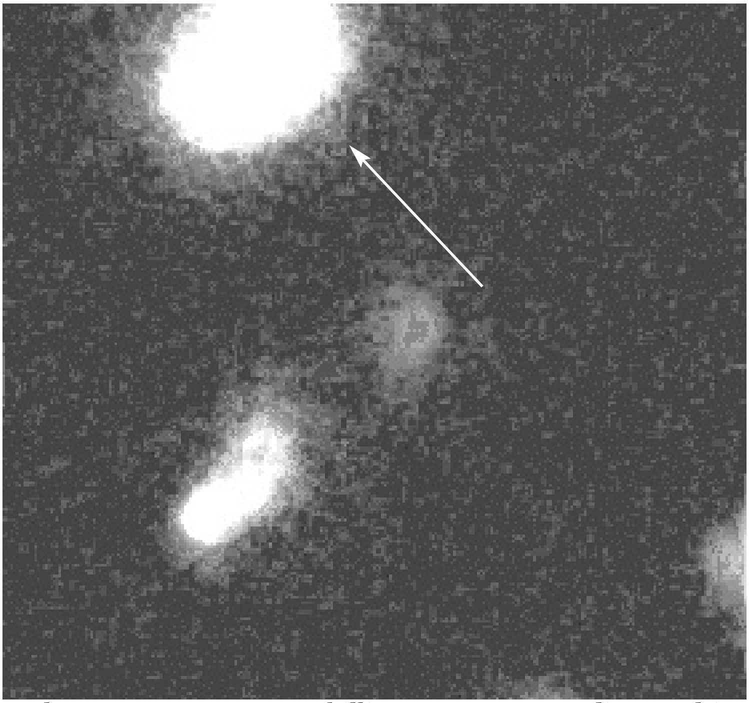
There are two 'basic' types of supernova, Type I and Type II. A Type I supernova results when old stars with a small amount of matter, such as white dwarfs, implode. Type I supernovas have been further broken down into Types Ia, Ib, and Ic. Type II occurs when young stars, with a very large amount of matter, implode.

One early theory on the creation of supernovas describes old white dwarfs, when part of a binary system, and nearly out of fuel, attract matter from their companion star. After stealing enough matter from its companion star, the white dwarf collapses into a neutron star, violently ejecting surface gases outward as part supernova implosion.

A Type Ia (formerly known as Type I) 'supernova spectrum' shows a deep absorption line in the red range, associated with silicon, and an absence of helium, the second most abundant element in the universe. The classification of Type Ib was created for supernovas lacking the silicon absorption line, and, as discovered by J. Craig Wheeler of the University of Texas, displayed helium in their spectra. In the late 1980s, Type Ic was added to represent small-mass supernovas lacking both helium and silicon absorption lines.

Stars with large masses burn very rapidly and produce Type II supernovas. Once a large-mass star has spent its energy, it cannot provide a continuous outpouring of energy and matter to support its structure against gravity. It then collapses in on itself, with the recoil creating an ejection of surface matter and closely orbiting gasses.

A Type II collapses much the same way a Type I does, and the recoil causes surrounding matter to be ejected. Most of the outer star is blown away, forming an outwardly



A star that went supernova 10 billion years ago was dicovered in 1997, and is called 1997ff. Credit: NASA and A. Reiss (STScl). http://hubblesite.org/newscenter/archive/2002/01/

expanding gaseous shell. Remaining in the center of the implosion is a compact remnant, which, depending on the amount of mass existing just prior to the supernova, may result in a pulsar or a black hole.

Type II supernovas are usually red super-giants, but the supernova of 1987 was not. It was a blue giant, named Sanduleak, with a gravity field of 20 solar masses (our sun is used as gravitational unit and one solar mass is assumed equal to its gravitational strength). This unusual event (involving a 'blue giant') allowed scientists to examine a rare supernova process (from a vast distance). It was determined Sanduleak's surrounding gasses contained very few heavy elements. Heavy elements absorb large amounts of radiation from the core of the star. Lacking these elements, Sanduleak became a hot blue giant instead of a red supergiant.

After going supernova, Sanduleak was obscured by debris from the ejected matter. It is unknown what type of core remnant remained. It is estimated a star must have a minimum of three solar masses to become a black hole, and Sanduleak, though unusual as a supernova, is theorized to have exceeded this amount of matter, becoming a black hole.

Neutron Stars (or Pseudo-neutron Stars)

In 1934, Fritz Zwicky and Walter Baade theorized a supernova implosion would leave a star-like remnant, consisting largely of neutrons. The supernova of 1054 has been used as evidence supporting their theory. A pulsar exists where the supernova implosion took place. (Please note- in 1934, free neutrons were still considered stable, fundamental entities. The model developed may be flawed.)

It is unknown whether or not neutron stars are actually made up solely of neutrons, though our current understanding of neutrons (or pseudo-neutrons) makes this a reasonable possibility. It is also possible the core has ejected most, or all, of its electrons.

Neutron stars are extremely small, with a radius of approximately 10 km (6 miles), and considered to be very dense. Pulsars are generally accepted to be young neutron stars, emitting short bursts of radio waves due to a high rotation speed. This rotation slows over time, reducing the number emissions and making the ‘neutron’ star difficult to detect.

A few neutron stars are partners in binary systems. The orbital interaction with another star makes it possible to identify them and estimate the strength of the neutron star’s gravity field. Most of these partnered neutron stars have a gravitational strength of 1.4 to 1.8 solar masses.

Pulsars

Pulsars were discovered accidentally by Jocelyn Bell in 1967. She was working on her Ph.D. at the time, under

Anthony Hewish. One night, she came across a signal repeating regularly with a very precise rhythm.*

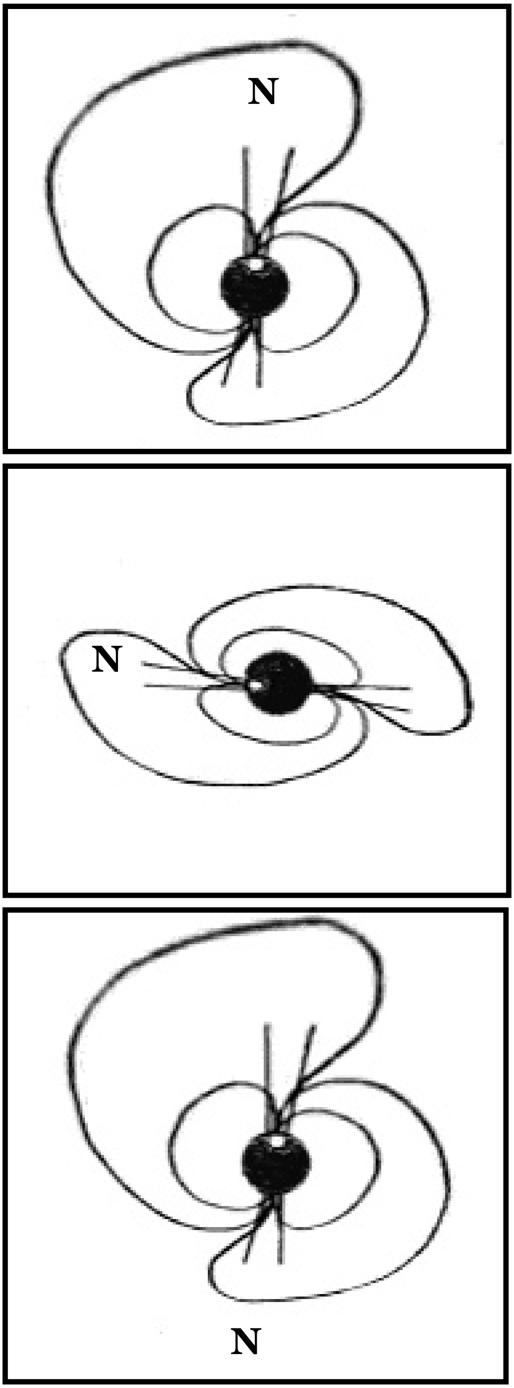
Pulsars appear to be located anywhere in our galaxy within a few hundred parsecs of the galactic equator. Most of the pulsars found are within 30,000 light years of Earth (primarily due to proximity). As of May 2001, 1300 pulsars had been discovered, and it has been estimated 100,000 pulsars exist in our own galaxy, the Milky Way. (Research on pulsars outside of our galaxy is a new field.)

Pulsars are low-mass, older stars that have recently gone supernova and been transformed into neutron stars. Their high speed rotation, combined with their magnetic field strength, causes a rotating pulse system of electromagnetic radiation, mainly as radio waves. The space between pulses typically lasts from 0.0015 seconds to 8.5 seconds, expressing the speed of the pulsars rotation. The pulses occur regularly with a uniform precision, but generally show a miniscule slowing with each pulse. (Under the USF theory paradigm, the primary reason for a slowing rotation is the pulsar's magnetic field meeting resistance from the surrounding EM field.)

Individual pulses, while accurate in their timing, can vary a great deal in intensity. Weak pulses may be followed by strong pulses. The individual pulses may contain subpulses, in turn, having varying intensities. At times, the Earth may stop receiving pulses, and then the pulses will resume.

Due to an 'anomalous dispersion,' discovered by Bell/Hewish et al during their research of the pulsar, predictions on their distances from Earth have been made. This anomalous dispersion is the result of an interference pattern caused by an interaction with hydrogen, which makes up most of the conventional interstellar medium. The anomalous dispersion causes a few radio frequencies to arrive at different times. The radio wave frequencies are pref-

*(Bell, Hewish, and their colleagues, published their research in the February 24, 1968 issue of Nature, Vol 217, pg 709).



A puslar rotates at a very high speed. One of the unique characteristics of a pulsar is its polar rotation. The pulsar does not rotate around its magnetic poles. Instead its magnetic poles rotate round a common center. The field strength of its moving magnetic poles causes disruptions in the local EM field, typically producing radio waves in a "lighthouse" effect. The radio waves of detectable pulsars sweep past the Earth, appearing and vanishing every few seconds, or less. (It should be noted that a true pulsar must have poles circling round a common center to produce the lighthouse effect.)

erentially absorbed and reemitted by the hydrogen atoms (and their orbiting electrons) takes more time than waves passing directly through through the EM field. A comparison of the difference in arrival times allows for the calculation of a pulsar's distance. The difference is sometimes referred to as a 'dispersion measure.'

The discovery of anomalous dispersion is important, not only as a tool for predicting the distance of pulsars, but as the first step in establishing the existence of an interstellar medium, and proving EM waves are, in fact, interacting with a denser area of the medium as they travel through space.

Black Holes
(Extreme Gravity)

Galactic Cores

Galactic cores are currently considered to be supermassive black holes, with a surface gravity so strong no light can escape from it. Light from the surrounding regions can escape, but may suffer from gravitational redshifting in the process. It is assumed any form of matter entering a black hole will never again emerge.

Galactic cores provide an excellent example of a large scale gravity field and the characteristics of gravity. In 1983, Alan Dressler accidentally discovered a massive black hole in the center of the Andromeda Galaxy. (A galactic core in USF theory lingo.) Our own galactic core (the black hole in the center of the Milky Way) is estimated to be 2000 light years wide. Prior to 1983, it was generally assumed every galaxy orbited around an empty center radiating infrared light.

Until very recently there had been doubts every galaxy had a supermassive black hole at its center. A curious assumption had suggested only galaxies with bulging cores could contain supermassive black holes. This assumption was proven wrong after Alex Filippenko, with the University

Credit: NASA, The Hubble Heritage Team and A. Reiss (STScl).
http://hubblesite.org/newscenter/archive/2003/24/

of California, and Luis Ho, with the Observatories of the Carnegie Institution of Washington, discovered a relatively small supermassive black hole at the center of galaxy NGC 4395.

The two scientists discovered galaxy NGC 4395, a flat 'pure-disk' galaxy with no central bulge, contains a black hole of approximately 66,000 solar masses. This creates a high probability other pure-disk galaxies, previously believed to lack a galactic core, do in fact have one.

"The supermassive black hole in NGC 4395 is the smallest one yet found in the center of a galaxy," Filippenko said. "This would be consistent with the galaxy having a small bulge. However, the bulge is not just small, it seems to be nonexistent."

It has been known for several years NGC 4395 emits visible light and X rays from its core region. This is normally a clue signaling the presence of a giant black hole actively drawing in matter to create an accretion disk. But, because of its small size and the assumption of a central bulge requirement, it was previously overlooked.

NGC 4395 may represent a unique step in the evolution of supermassive black holes. Currently, it is the general consensus opinion black holes formed shortly after the theoretical Big Bang. The concept of black holes evolving over time is only now beginning to receive serious consideration.

In 1917, Karl Schwarzschild calculated any star compressed past a certain critical radius would become so dense, and the gravitational force so great, the star would become a black hole. This theory is now being given some credit, and is called the 'Schwarzschild radius.' The rounded warped space above the black hole is called the 'event horizon.' The event horizon marks the region surrounding the black hole where nothing can escape. (Light would not escape because of the incredible density of the EM field below the event horizon, though electrons and positrons might escape because they lack a gravity field and are repelled by strong magnetic fields.)

Galactic cores display field characteristics. They have an intense gravity field. They are surrounded by an area radiating infrared light. They have north and south magnetic poles, as shown by the massive jets of electrons shooting out from each pole. (It is generally assumed positrons are not involved in this process.)

The stars and solar systems around galactic cores tend to move into orbits perpendicular to the poles. Equatorial orbits. The size of galactic cores and their surrounding galaxies are proportional. The larger the galactic core, the larger its surrounding galaxy. The orbital speed of a galaxy's outer stars is determined by the size of its galactic core.

The Ultra-Space Field Theory describes galactic cores as containing protons, which may (or may not) be combined with electrons to form a mass of pseudo-neutrons. Matter absorbed by a galactic core is compressed and broken down to its key components. These subfields are then absorbed and added to the black hole's mass, or expelled as shown by the electrons (and/or positrons?) exiting via the magnetic poles.

Stellar and Supermassive Black Holes

'Supermassive' black holes typically range from millions to billions of solar masses. The more common 'stellar' black holes, created by the gravitational collapse of massive stars, are much smaller, ranging from 3 to a 1000 solar masses. Supermassive black holes typically act as galactic cores, while the smaller black holes maintain an orbit around them.

Black holes come in a variety of sizes. It has been theorized some may be as small as a mountain while others may be over twice the size of our own galactic core. Small black holes are essentially undetectable, unless interacting with another star. It is theorized small, 'invisible' black holes are orbiting our own galactic core the same way solar systems do. (There is no reason to believe small black holes cannot 'grow' by collecting more and more matter over time.)

Quasars
(Bright Lights, Bright Lights!)

Quasars are the most luminous objects in the known universe. A few are thousands of times brighter than our entire galaxy. Some quasars vary the intensity of their light every few minutes and are believed to be rotating at incredible speeds.

Most quasars are estimated to be more distant than any known galaxy, and because of their brightness, cannot be considered stars. Quasars radiate radio waves, visible light, gamma rays, and X rays, with variations in the amounts of each form of radiation. For example, a small number of quasars give off most of their energy as gamma radiation.

Quasars also emit EM waves in pulses. The length of time between pulses varies with each quasar and with the type of EM wave. The time between pulsed radio wave emissions can span from months to years. The space between pulses for visible light is usually a matter of days. X-ray emissions are given off every few hours.

Quasars were first discovered by radio astronomers in the early 1950s. When the locations of the intense radio sources were found, they were able to match the sources with what appeared to be normal, ordinary stars. A closer inspection of their spectra, however, showed they were extremely unusual, and could not be classified.

The color of quasars is typically much more blue than the light given off by most stars. This phenomenon has been attributed to extreme Doppler redshifting and has been used to identify quasars radiating few, or no, radio emissions. (?To the best of my knowledge, the blue light has not been associated with Cerenkov radiation?)

In 1963, Maarten Schmidt at Hale Observatories experimented with redshifting the hydrogen Balmer lines and discovered the spectrum of 3C273 had shifted toward the red by 16% (a 'very' large shift). Under the expanding universe theory, this suggested the quasar was well over a billion light years in distance, and moving away fast. This also meant it was over 100 times brighter than any nearby spiral galaxy.

The spectra of quasars have shown both absorption and emission lines. These two types of lines should match, but instead display differing redshifts. This phenomenon of was eventually explained as the result of a quasar's light passing through gas clouds, which produced the absorption lines.

A number of quasars have been observed ejecting what appears to be gas from their poles. The ejected gas extends thousands of light years outward.

In March, 2003, George Chartas and a team of researchers discovered evidence of high speed winds blowing away enormous amounts of gas from the cores of two different quasar galaxies. **Their observations revealed these galactic winds, traveling at about 40% the speed of light, contain oxygen, carbon, and iron. It should be noted quasars are the only 'known' source of elements heavier than helium. The galactic winds from quasars provide a source of heavy elements, which earlier theories presumed could only be created by the internal fusion of stars (which were then suppose to explode, not implode). It is possible quasars are the primary source of heavy elements.**

This discovery weakens arguments supporting the current Standard Model of the interior of stars as the source of elements more complex than hydrogen and helium. The current standard model provides no means of releasing heavy elements from the star's core after it implodes. (See *Chapter 6- Matter & Electricity; Fusion; Star Formation*.)

Currently, quasars are considered to be small black holes, immature versions of the galactic cores at the center of each galaxy. In some cases, galaxies (called Seyfert galaxies) have a bright quasar-like core.

The concept of quasars as extremely evolved forms of black holes should be considered. The combined matter of hundreds of stellar, or supermassive, black holes, would develop incredibly intense magnetic fields. At the scale of quasars, magnetic fields may be strong enough to overcome gravity, causing the ejection of complex ions from its poles. It is understood that the time required for a black hole to evolve into a quasar would destroy current estimates of the universe's age.

Quasars, as evolved black holes, would change assumptions about the age of the universe and weaken arguments supporting an expanding universe. Advocates of an expanding universe are opposed to this concept.

The Expansion Theory
(Moving Further and Further Away)

Characteristics

The redshift of stars and galaxies has been explained using the Doppler effect. This, in turn, is based on the idea all stars are moving away from each other, or at least away from the planet Earth. The most recent explanation describes a force called dark energy as forcing the universe to expand, with all the galaxies in the universe moving away from each other. (See *Chapter 4- EM Waves; 'Virtual' Subfields*.)

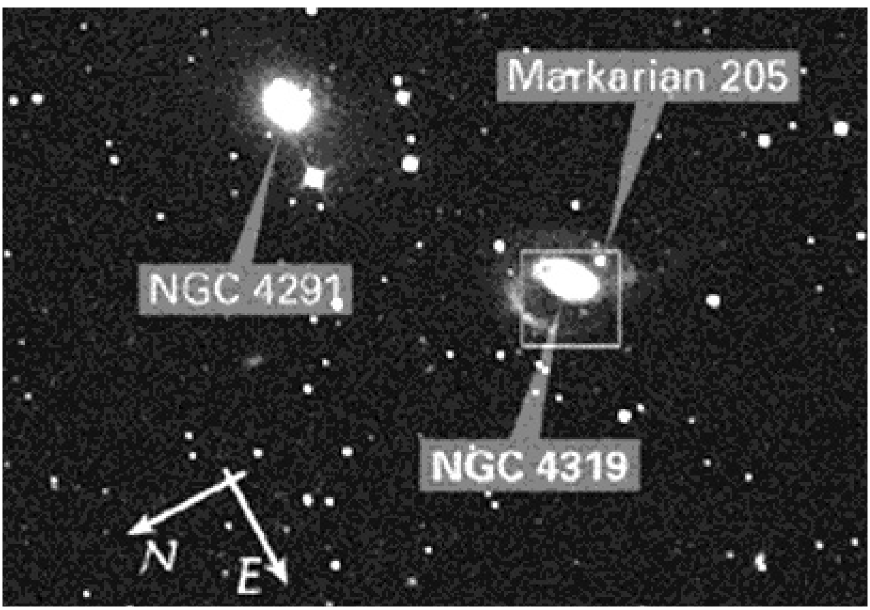
The expanding universe theory, formerly known as the Big Bang theory, has been popular with astronomers and cosmologists since 1929, when Edwin Hubble discovered the more distant a galaxy is, the greater its redshift. Adapting the Doppler effect to include light, this implied the farther away a galaxy is, the faster it is receding. This became known as the Hubble Law and is expressed mathematically as $V = H\,D$, with V being a velocity equal to H (Hubble's constant or 50 km/sec/Mpc) times D (the distance in megaparsecs- Mpc). Other studies have shown Hubble's constant to be as high as 100 km/sec/Mpc. The difference in values comes from a lack of evidence regarding the true distance of other galaxies. All distances are based on estimates, and different astronomers have used different equations and formats in computing distances.

The most recent observations supporting an expanding universe paradigm come from two teams working collaboratively. In 1998, Saul Perlmutter of the Lawrence Berkeley Lab and Brian Schmidt of the Mount Stromlo and Siding Spring Observatories began studying the brightness of Type Ia supernovas. Based on their observations, Schmidt and Perlmutter have concluded the expansion of the universe is accelerating. Using a basic, simplified assumption that all types of Ia supernovas start with the same amount of energy, they have observed the most distant supernovas are 20-40%

fainter than expected. Using the Doppler effect as the only source of redshifting, Schmidt and Perlmutter have theorized an 'accelerating,' expanding universe, with dark energy as the source of the expansion.

Not all observations support their theory. Quasars are the most obvious example of possible flaws in using the Doppler effect as the sole explanation for the redshifting of light from other galaxies. The Doppler effect predicts both the distance and the speed of quasars moving away from the Earth. Some are estimated to be traveling away from the Earth at 93% the speed of light, or higher. Assuming Earth is not the center of the universe, and splitting the speed between our own solar system and the quasar, both would be traveling at 46.5% the speed of light away from each other, or each are traveling at 139,403 km/sec. (The gas cloud, or 'local bubble,' our solar system is interacting with, would also have to be moving at this speed, as would our galaxy.)

The issue of brightness and distance has created



Credit: NASA, Digitized Sky Survey, and Z. Levay (STScl).
http://hubblesite.org/newscenter/archive/2002/23/image/b

controversy as well. Many highly redshifted quasars seem to be associated with low redshift galaxies. The most prominent example is a quasar called Markarian 205, which seems to be interacting with a galaxy named NGC 4319.

The Hubble Heritage, an organization created to disseminate information collected by the Hubble Telescope, publicly supported the conservative view of many scientists, and stated NGC 4319 is 80 million light-years from Earth and Markarian 205 is more than 14 times farther away, at one billion light-years from Earth. They assert the apparent close alignment of Markarian 205 and NGC 4319 is simply a matter of chance. In making the assessment, they used the Doppler effect as their primary argument.*

A small number of scientists disagree with this conclusion. The first was H. C. Arp, of the Max Planck Institute fur Astrophysik. In 1972, he presented pictorial evidence showing Markarian 205 and NGC 4319 were connected. Arp took deep exposure photographs at Mount Palomar and Kitt Peak showing a luminous bridge of gas between the two objects. This caused some turmoil amongst professional astronomers. The connection was denied at first, but was later confirmed by CCD imaging. X-ray maps of the area also show apparent connections with three other nearby quasars of a much higher redshift.

More recently, Jack Sulentic, of the University of Alabama, has defended Arp's conclusions. Through image enhancement and analysis of Arp's telescopic images, Sulentic has confirmed Arp's findings.

Edwin Hubble, the discoverer of the redshift phenomenon stated 'The possibility that the redshift may be due to some other cause, connected with the long time or distance involved in the passage of light from the nebula to observer, should not be prematurely neglected.'

*(The sheer volume of articles unquestioningly repeating the Hubble Heritage's opinion would lead a researcher to believe their opinion was an undisputed fact.)

Chapter Six- Matter & Electricity

Matter *(Building A Physical World)*

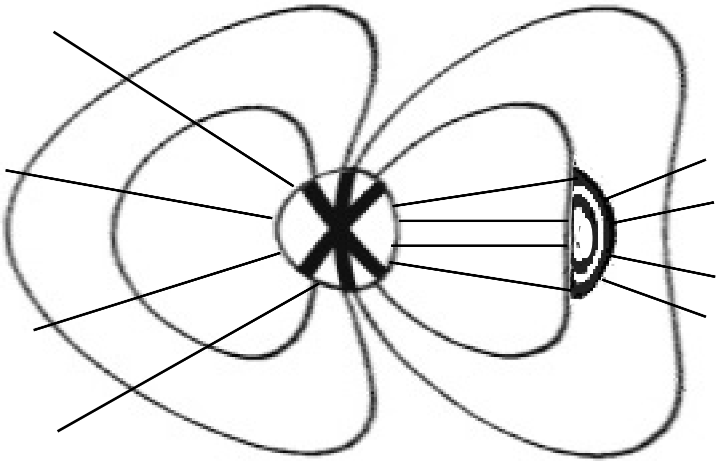
Hydrogen

The simplest form of matter is hydrogen (Element 1), with a single proton core orbited by an electric field consisting of one or two electrons. Hydrogen is classified as a gaseous element, but can become a liquid, either due to immense pressures, temperatures at a few degrees above absolute zero, or a combination of pressure and cooling. In its liquid state it takes on metallic qualities and is capable of conducting electricity.

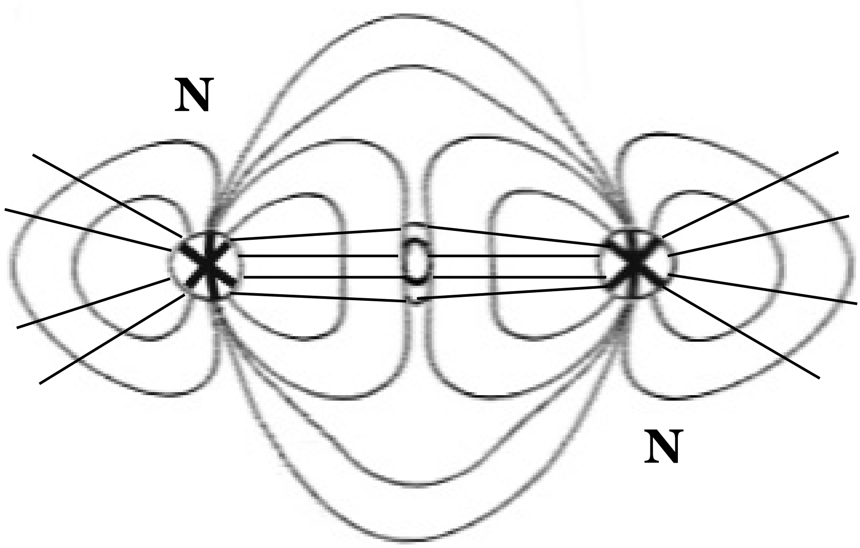
On Earth, hydrogen is rarely found as a gas. As the lightest element, hydrogen floats up to the edge of our atmosphere and escapes into space. It can be found in deep underground pockets, the result of oil and gases naturally breaking down and decaying. Hydrogen can also be manufactured with some difficulty by separating it from compounds, such as water.

Less commonly known are deuterium (heavy hydrogen) and tritium (an even heavier form of hydrogen which is mildly radioactive). Both have an orbiting electron, but deuterium includes two pseudo-neutrons in its core and tritium has three pseudo-neutrons. It is estimated hydrogen and deuterium make up 90% of the matter in the universe. (See *Chapter 2- Energy Field Interactions; Neutrons*.)

A single proton will often have two electrons in orbit. One electron cannot encompass a proton (except temporararily in

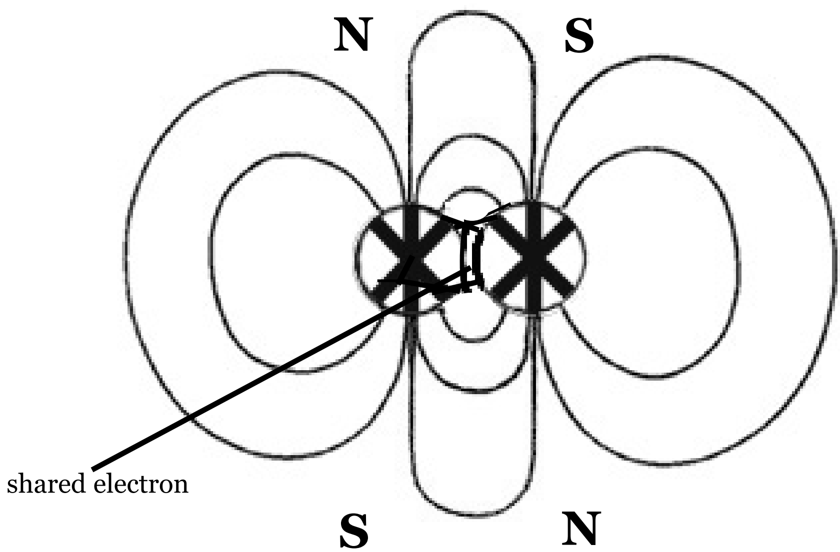


In the above illustration, the proton's "west pole" energy is partially neutralized by the single orbiting electron. The far side continues to radiate field lines. Likewise, the electron continues to radiate an east pole field lines away from the proton. In the lower picture, two protons share an electron, creating a hydrogen molecule (H_2). The same molecule can attract additional electrons, as might be provided by an oxygen atom to form water (H_2O).



the form of a true neutron). With an electron on one side, the opposite side of the proton still attracts electrons, though weakly. This 'open side' allows hydrogen atoms to attract additional electrons, including the electrons of other atoms, and assists in the movement necessary for atoms to 'bond' with other atoms, forming more complex molecules.

Hydrogen atoms often combine to form H_2 molecules. This combination of two hydrogen atoms joined by an electron is one of the weakest molecular bonds, and is used by RNA and DNA strands during the separation and reforming process of reproduction. H_2 and deuterium should not be confused, as H_2 consists of two *separate* atoms linked by a single electron's coulombic attraction.



A deuterium atom. Note the magnetic poles of the two protons, or pseudo-neutrons, are reversed. At this distance, the shared electron minimizes proton-proton repulsion, while assisting gravity and magnetism as bonding forces between the two.

The primary difference between a deuterium atom and an H_2 molecule is the distance separating the protons from their shared electron.. The deuterium atom is locked together by field energies, while the protons of the H_2 molecule are bound together weakly, and may not be influemced by gravity at this range.

Deuterium is a single molecule with two protons locked together by magnetism, gravity, and an electron.

A proton (or ionized hydrogen atom) moving through a gas or liquid, will abruptly slow down as it takes a loose electron from another atom. A true hydrogen atom (electron in orbit) will not experience the same abrupt slow down, though it will be decelerating due to a variety of field interactions as it passes. A moving atom, picking up a free electron in a vacuum, will experience a less abrupt slowdown.

Cold hydrogen gas, in space, will emit radio waves. This is normally attributed to hydrogen atoms bumping into one another. As multiple energy fields, the process of two atoms bumping one another will cause their electric and magnetic fields to compress and release. Another explanation is field compression caused by the absorption of EM waves. The compression is often enough to produce radio wave frequencies. Warmer hydrogen emits infrared light.

In space, molecular bonding (H_2) requires more than just a bump. One or both of the atoms must have enough acceleration or force to overcome each others long-range magnetic repulsion. Molecular bonding is the result of interconnected field lines, typically with the added attraction of a core electron. The core electron would be trapped between the two hydrogen atoms. This may be the only electron in the relationship, or orbital electrons may be bound to either, or both, hydrogen atoms.

<u>The Proton's Relationships</u>

This model describes protons, not in terms of proton-electron attraction, but as a complex mix of energy fields. If, due to high velocity or unusual pressures, a hydrogen atom is compressed into a tight space with a another proton, the two protons become pseudo-neutrons by sharing the electron.

It should be noted that, because of their gravity fields, protons are not as easily influenced by the EM field as electrons and positrons. Just as it requires more energy to accelerate a proton, it also takes more to decelerate one. The proton not only has greater momentum than positrons or electrons traveling at equal speed, but is also influenced by mutual gravitational and short-range magnetic attraction.

Four basic field characteristics come into play: thermal, electrical, magnetic, and gravitational.

Temperature would play a vital role in this process. The higher the temperature, the greater the need for velocity or strong pressures. If the environment and the protons are both extremely cold, thermal field resistance is minimal and can be more easily overcome by velocity, gravity, and magnetism. Cold atoms would have electrons in tighter orbits than their warmer counterparts. A proton approaching a cold hydrogen atom (the electron already in orbit) would require less kinetic energy to form deuterium.

Consider the magnetic orientation of the two protons. Ignoring proton-proton repulsion, without the electron, their attraction should be south pole to north, one above the other. With the electron influence, they shift, with both their equators being drawn to the electron and their magnetic poles taking opposite alignments. The attracting electron is then squeezed between the two partially neutralized protons.

During this process, the thermal field and the Van Allen belts are altered, resulting in the release of kinetic energy as both quanta and moving thermons. The thermal field of each proton is most strongly compressed at the center of this '*cold fusion*' process.

The strength of a deuterium atom's magnetic field is partially canceled. The gravity field is effectively doubled (there is a small additional increase due to the coulombic warpage of space created by the shared electron). Thermal field density is a variable, but will probably be more concentrated in some areas. The pseudo-neutron core has less 'surface' space than two separate protons, (and theoretically less EM field resistance, but a little over twice the gravity).

Tritium

As a form of hydrogen, tritium can be flammable and explosive. Unlike simple hydrogen it is mildly unstable, or radioactive. When a tritium atom decays, an electron is expelled. The electron's speed is a variable dependent on its direction as it passes through the gravmagnetic and thermal fields of the tritium atom, and is also influenced by surrounding field energies. The maximum distance this electron travels is about five millimeters (a little less than a quarter of an inch) in air, and can be stopped completely by a sheet of paper or by ordinary clothing. This is a very weak form of 'beta' radiation.

Since tritium is like hydrogen chemically (one orbiting electron), it is often found attached to molecules in place of hydrogen. A water molecule may exchange a hydrogen atom for a tritium atom, becoming 'tritiated water' (or HTO).

Tritium has a half-life of about 12.5 years. After expelling a core electron, it becomes Helium-3, a rare light isotope.

Three Pseudo-neutrons, & Some Electrons

Helium-3 is a stable, inert gas. As a form of helium, it is neither flammable nor explosive. On average, there is only about one Helium-3 atom for every million Helium-4 atoms, suggesting Helium-3 may convert readily into Helium-4.

Plasmas

If a large magnetic field interacts with a plasma cloud, the cloud's electron and proton drift is influenced by it, causing circular movements within the plasma. This is called cyclotron rotation. Other patterns of motion occur if the magnetic field is unbalanced, or if a gravity field is acting on the protons. The movement of protons and electrons are also influenced by the cloud's 'own' magnetic field.

Plasmas, as hot gases, are in a constant state of movement (similar to weather patterns in the Earth's atmosphere). Waves of moving gas cause electrons, protons, atoms, and molecules to continuously interact with one another. Some of the simplest plasma waves occur when magnetic field layers are disturbed. As protons and electrons can become trapped between field layers, both will experience compression and repulsion, with electrons moving away more quickly than protons. This also influences moving electrical currents within the plasma cloud.

Fusion
(Building Elements)

Star Formation

For millions of years a massive hydrogen cloud slowly orbits a galactic core, continuously collecting new protons and electrons. Mists of complex atoms, such as iron, drift into the cloud as well. As the cloud grows and ages, less light reaches its center. Gradually, the thermon field at the center of cloud stabilizes, losing more heat than is absorbed.

The cloud slowly contracts as it loses heat, radiating radio waves and simultaneously continuing to grow as it collects protons and electrons from the surrounding environment. The gravitational pressures continue to increase while the thermal kinetic energy at the center steadily diminishes. Eventually the hydrogen cloud collapses in on itself. This collapse may draw in protons from the outer edge so quickly, they begin to generate low frequency synchrotron radiation.

At this point, the center of the newly formed star is filled with protons, pseudo-neutrons, and electrons. The thermal fields surrounding the pseudo-neutrons and protons are now under intense pressure. The pressure is similar to that created by electrons orbiting an atom, but much more intense. Thermons and electrons are constantly being shifted and pressed outward from the new star's core.

As compression at the core increases, electrons and thermons are ejected from the star's core at very high speeds. EM waves and heat move outward during this process. Near the star's center, ejected electrons are constantly colliding with more stable ones, being repelled, and causing further turmoil in the thermal field. Protons well outside the core are carried away with electrons and thermons.

The star is now radiating protons, electrons, EM waves, and thermons. Outside the core, closer to the star's surface, protons collide and repel one another at high speeds. Temperatures are too high in this region to allow the formation of hydrogen atoms, and electrons are continually redirected by a variety field pressures.

Further out, in the star's photosphere, it is slightly hotter with temperatures ranging from 4000K to 6000K. There is also more room for proton, electron, and thermon movement. As a proton moves away from the star's core, thermal field pressures decrease. The protons' own thermal fields shift as high-speed electrons move through and around them. Most light radiated by the star comes from the photosphere, where large scale incoherent EM waves are formed.

The next layer up is called the chromosphere and can be treated as a Van Allen belt. Small scale fusion takes place in the chromosphere as atoms are continually bombarded by high numbers of expelled high speed protons. The fusion promotes increasing thermon activity and higher temperatures. Thermons are allowed greater expansion and movement at this level, with temperatures reaching 10,000K in the lower regions of the chromosphere, and above 20,000K in the upper regions. Outwardly moving EM waves, thermons, electrons, and protons support the structure of the star. When the core of the star has released the bulk of its electrons, it collapses in on itself.

The Standard Model disagrees with the above description. Both the USF theory model and the Standard Model use gravity as the source of the star's intense heat, but differ on the location and process of fusion. The Standard Model predicts fusion is the result of extremely high temperatures. It is believed high temperatures cause vibrations, which in turn cancels out proton-proton repulsion. In the Standard Model, protons and neutrons are then linked by shared gluons to form heavier elements, with some of their matter being transformed into energy. Efforts to imitate the Standard Model of fusion have never succeeded, though several attempts at laser induced fusion have been made.

The USF theory describes a star's heat, and its fusion process, as the result of gravitational pressure. Small scale fusion is a by-product taking place outside of the star's core. This process is similar to alternative, functioning, small scale fusion reactors that have been developed recently. Fusion at the core of a star produces a mass of pseudo-neutrons. After the star dies, it may evolve into being part of a black hole , and then a quasar.

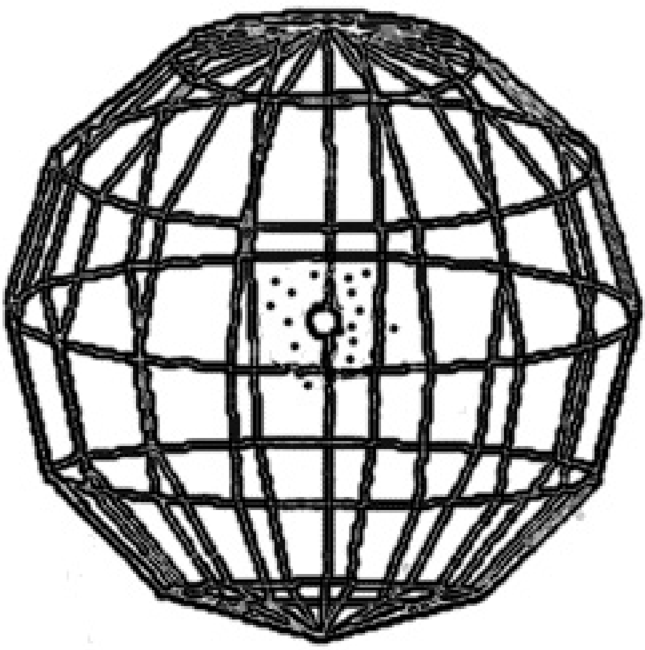
Quasars provide the only observable source of complex elements, which are being transported by galactic winds. This fact is incorporated into the USF theory paradigm, with collapsed stars evolving into black holes, and then eventually into quasars.

Inertial Electrostatic Confinement Fusion

The University of Wisconsin/Fusion Technology Institute has taken a leading role in developing IEC fusion. Unlike earlier, unsuccessful attempts to imitate the Standard Model of a star, IEC fusion uses spherical electrostatic containment fields to accelerate deuterium and helium-3 ions toward the center of the sphere where they collide. During these collisions, small scale fusion takes place.

Fusion was initiated using two separate experimental procedures. In the first, deuterium atoms were fused together resulting in helium-3 atoms and extra neutrons, or tritium and extra protons. In the second procedure, helium-3 and deuterium were mixed in equal parts with the fusion process producing helium-4 (normal helium). As with the first experiment, deuterium atoms also fused with one another, producing helium-3 and tritium.*

D + D = 3He + Neutron or D + D = Tritium + Proton
D + 3He = 4He (normal helium) + Proton



An IEC fusion grid and core. The outer wire mesh acts as an anode surrounding a core cathode. Some experimenters have built these in their homes using "moderately" inexpensive supplies.*

*(Two good websites for further investigation: 1-http://fti.neep.wisc.edu/FTI/pdf/fdm1119.pdf. 2-http://torsatron.tripod.com/fusor/fusor.html)

Titius-Bode Law and Fusion

While a solar system and an atomic system have distinct differences and characteristics, there are also remarkable similarities. Each system has a central core with smaller energetic systems orbiting it. Equatorial orbiting patterns provide the most stunning similarities.

Bode's Law, or more accurately the Titius-Bode Law, describes a pattern roughly approximating the distance of planetary orbits and the Van Allen belts of Sol.

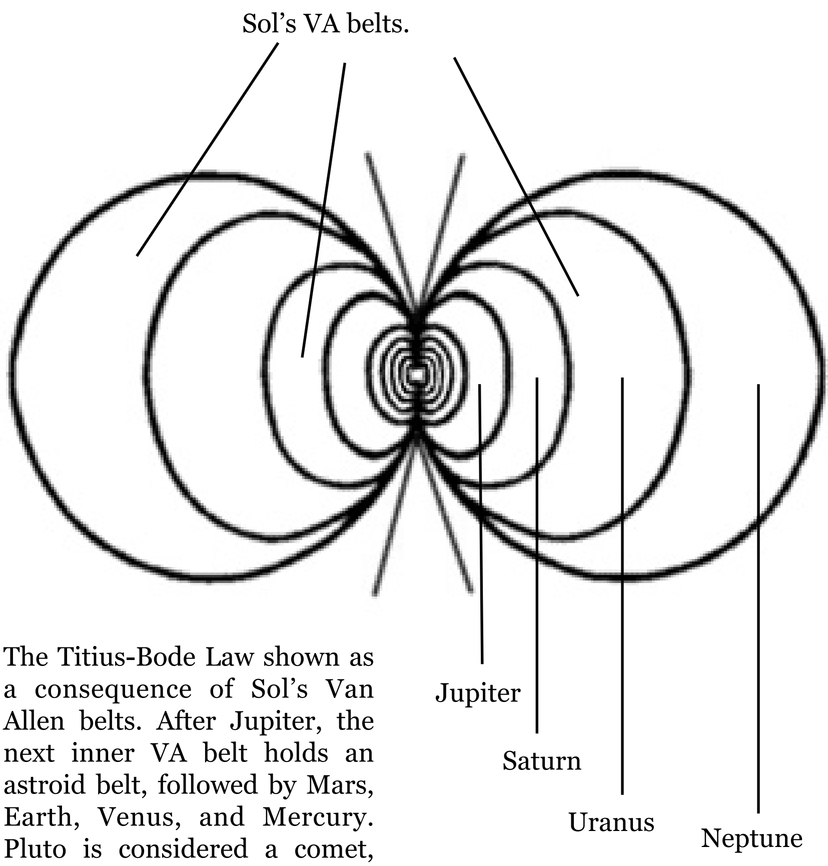
The Titius-Bode Law was first proposed in 1766 by Johann D. Titius, and made popular by Johann E. Bode in 1772. It is an equation describing the various distances of planets from the sun. This law has never been explained with a physical argument, but is expressed by the equation $(n+4)/10 = a$, with 'a' as the calculated distance of a planet from Sol, and 'n' as the progression of numbers 0, 3, 6, 12, 24, 48, 96, 192, and 384.

The Titius-Bode Law provides a rough approximation of the distances of the planets (Mercury through Saturn) known at the time it was proposed. Uranus, discovered in 1781, and an asteroid belt (between Mars and Jupiter), initially discovered in 1801, also fit the pattern. The distance of Neptune, however, is an anomaly and may have had its orbit altered by Pluto, which has a highly irregular orbit and has been theorized to have entered our solar system after its formation.

The USF theory applies Van Allen belts to the sun and other stars, as well as to galactic cores and quasars. Sol's Van Allen belts explain the positioning of the planets. Protons, electrons, and hydrogen, and helium ions became trapped between the forcefields forming these Van Allen belts. As with the VA belts encompassing the Earth, the electrons and protons contained within the belts are not at rest and stationary, but are extremely active, with many traveling at high velocities.

Subfields and the ions of heavier elements move through the universe at a variety of speeds. Some electrons and protons had just enough velocity to become trapped in the Sun's Van Allen belts. Others collided with ions and dust already trapped there. Gas clouds contribute to the buildup. Hydrogen and deuterium are easily formed, but the process does not stop there. The steady stream of protons and complex ions from outside our solar system caused a continuing build-up of matter within the Sun's VA belts.

Galactic cores also have VA belts and perform a similar



The Titius-Bode Law shown as a consequence of Sol's Van Allen belts. After Jupiter, the next inner VA belt holds an astroid belt, followed by Mars, Earth, Venus, and Mercury. Pluto is considered a comet, and is not listed.

role in forming stars. A galaxy's stars are formed in the equatorial region of its core. Protons and ions avoid the core's poles in the various stages of a galaxy's formation, taking on the shape of broken rings until gravity condenses them.

This paradigm suggests small scale fusion takes place within a star's Van Allen belts, with the heavier elements being provided by quasars. The standard model requires fusion to take place in the center of a star with extremely strong gravitational pressure and high temperatures. The USF theory version describes a star's Van Allen belts as a low pressure environment of contained electrons, protons, ions, etc. interacting with high speed protons and electrons, a model much closer to the IEC fusion process.

Over millions of years, what had started as layers of hydrogen and helium gas orbiting a star combines with streams of more complex elements to form a mixture of elements and compounds. Gravity and inertia slowly pull the various forms of matter trapped in the belts together, forming planets that orbit the star.

It may also be possible some elements preferentially build up in specific subbelts, explaining the varying geologies and atmospheres of different planets.

Cold Fusion

Research on cold fusion has continued, in spite of numerous claims room temperature fusion is impossible. Both a small number of private institutions and the U. S. Navy have been researching cold fusion. The U. S. Navy, although not working in secret, was discrete in research lasting from 1993 to 2003. The Navy researchers repeatedly demonstrated an otherwise unexplainable temperature increase in over one hundred trial runs.*

The discovery of cold fusion was first announced in 1989 by Martin Fleishmann and Stanley Pons, then at the

*(Reference: New Scientist/29 Mar 2003/ 'Reasonable Doubt' by Bennett Daviss.)

University of Utah. They stated they had created fusion in cells composed of a palladium electrode (a soft, white, conductive metal with an atomic number of 46) resting in 'heavy water' (oxygen is bound to 'deuterium,' rather than hydrogen; also called deuterium oxide). The original announcement of cold fusion was met with disbelief, and followed by unsuccessful attempts to imitate the cold fusion process. Within months, the Energy Research Advisory Board/U. S. Dept of Energy pronounced claims regarding cold fusion were "false and without merit." Leading journals, such as the *Journal of Physical Chemistry*, refused to publish the positive results of cold fusion experiments. Scott Chubb, a guest editor for the journal *Accountability in Research* describes the bias and handling of cold fusion as "a scientific debacle" and "a breakdown in the process of unbiased, objective reporting of scientific information."

The cold fusion process involves sending an electrical current through a heavy water solution to a cathode made of palladium, or coated with palladium. Under ideal circumstances, this process can produce a 30% to 40% gain of energy over the electric current being used. This increase in heat energy is explained as the fusing of deuterium ions.

A number of factors can influence cold fusion experiments. Something as simple as the thickness of the palladium electrode can determine the results, with a rod six millimeters thick producing results, while a one millimeter rod will not. Smooth rods will work, while rods with minute, nearly undetectable cracks will not. In 1994, Melvin Miles, working for the Navy at the time, discovered a palladium-boron alloy also produced the 30-40% energy gain.

Using a field theory paradigm, moving electrons pass through the thermal field of the heavy water, aligning and polarizing molecules as they pass. In the process, the weakly bonded deuterium atom (of an HDO molecule) captures a moving electron and breaks free of the shared electron linking it to the oxygen atom. These free deuterium atoms are carried with the currents of moving electrons and accumulate in, and at the surface of, the palladium.

As the deuterium builds up on the surface, new deuterium atoms slam into the buildup, fusing, and forming helium-4 atoms. Unlike IEC fusion, the cold fusion process inhibits the splitting deuterium atoms, resulting in helium-4.

A small number of protons in the heavy water promote the formation of tritium, which is also created during the fusion process. As fusion takes place to form helium or tritium, thermal activity increases to a higher degree than would take place by the passage of electric current alone. The fusion process expels thermons, generating heat and raising the temperature.

This model of cold fusion is supported by findings of large amounts of helium-4, smaller amounts of tritium, and no observations of helium-3.

The Elements

(Organized Subfields)

The Properties of Elements

The basic properties of an element are based on the *electrical balance of protons and electrons* in an atom's core. Its molecular bonding properties (chemistry) are based on the *number of electrons orbiting the core*. Tritium, a form of hydrogen with all of its properties, has three pseudo-neutrons (two core electrons), with one orbiting electron. Helium-3 has three pseudo-neutrons ('one' core electron), two orbiting electrons, and the basic properties of helium-4.

An atom having lost an orbiting electron, or gained an extra, is called an ion and exhibits the same basic properties of 'normal' atoms making up an element.

An atom having lost a pseudo-neutron (a proton and a core electron), or gained an extra, is called an isotope. *The internal electrical balance is similar*, and it exhibits the same basic properties as ‘normal’ atoms.

While the loss or gain of a single orbital electron doesn’t change the basic properties of an element, it can effect how an element will react to other kinds of atoms.

The Noble Gases, or inert gases, are helium, argon, neon, xenon, and radon. They have very stable electric and magnetic fields, and do not easily join with other elements to form molecules and compounds.

Their chemical stability is attributed to the existence of eight electrons (two for helium) in an outer Van Allen belt of each atom. The importance of this number of electrons in an outer Van Allen belt cannot be overstated.

Most other elements will bond with one another to achieve this stable octet (eight) electron configuration (called the ‘Octet Rule’), and in the process form larger, more complex molecules. This bonding process to achieve an eight electron EM balance requires sharing electrons with their reacting partners, or losing electrons to them. Because the noble gases already have this stable eight electron configuration, they remain inert and unreactive.

The properties of noble gases can be correlated with their atomic numbers. Their boiling points decrease sequentially. The higher the atomic number, the greater the amount of heat needed to achieve the boiling point. They range from radon (element 86), having the highest, -61.9 deg C, to helium (element 2) with the lowest, -269.0 deg C. The melting (or solidification) points similarly range from -71.0 deg C for radon to -248.7 deg C for neon. Helium will solidify below -272.1 deg C, at a pressure of 25 atmospheres.

Alkali metals’ atoms all have a single electron in their outer Van Allen belt, making them electropositive. This electron can easily be lost, turning the atom into a weakly positive ion. For some alkali metals, this gives them the stable eight electron configuration. The orbit of this single loosely bound electron does not follow the Octet Rule, and may be considered necessary only to counterbalance the number of protons in the atom's core. Because of this single electron, alkali metals are extremely reactive to other forms of matter. They will react violently with water, releasing heat and hydrogen as they combine with oxygen atoms.

Alkali metals will readily share their outer electron with 'halogen' atoms to form stable salts. Research has recently shown the atoms of alkali metals can also gain an electron to form highly reactive negative ions.

The alkali metals have a low melting point, a low density, and are extremely malleable. Six of the elements are classified as alkali metals: lithium, sodium, potassium, rubidium, cesium, and francium. Lithium is the least reactive, with 6 pseudo-neutrons, and (normally) 3 electrons.

Halogens are nonmetal and extremely electronegative, meaning their atoms strongly attract electrons to form a covalent bond. All halogens have strong unpleasant odors and will burn flesh. Bromine, chlorine, fluorine, and iodine are the four halogens. The word halogen means salt forming and fluorine salts are called fluorides. The salts created by halogens dissolve easily in water. Electronegativity, the need of atoms to have eight electrons in an outer Van Allen belt by bonding with other atoms, is strongly associated with a process called oxidation. The word oxygen (meaning 'acid former') is often associated with oxidation, but halogens cause oxidation as well.

Fluorine, a small atom with 9 orbiting electrons, and 18 pseudo-neutrons, is 'the most' electronegative element. The fluorine atom has two electrons in an inner shell, and seven electrons in its outer Van Allen belt, requiring an additional electron for maximum stability. This needed electron is strongly attracted by the atom's core because the outer seven electrons are such a short distance from the core, explaining the extreme electronegativity of the element. As a result, fluorine forms compounds with all elements, except the noble gases.

Halogens and alkali metals are rarely (some say never) found in a pure state because they bond so readily together, and with other elements. Obtaining halogens typically requires extracting them from compounds.

Alkali earth metals consist of six elements: beryllium, magnesium, calcium, strontium, barium, and radium. These elements are categorized separately from ‘alkali metals’ and ‘metals’ primarily for historical reasons. The oxides (oxygen-metal compounds) of barium, strontium, and calcium resembled alumina (aluminum oxide, from which aluminum is extracted) and were classified as a group. Beryllium, magnesium, and radium were later added to this group of elements and do share similar chemical properties. (Note, aluminum is categorized as a ‘metal.’) (See **Rare Earth Elements**.)

Metals account for 85 of the 110 known elements. Metals are malleable and ductile (can be drawn into a wire). They conduct electric current, and easily bond with other elements to form compounds. Iron (Element 26) is a metal, and generally considered to be the fourth most abundant element in the Earth’s crust. It typically has 26 orbiting electrons, and approximately 54 pseudo-neutrons.

Metals were once described as “those elements which, when in pure state and contained within a solution, carry a positive charge and seek the negative pole of an electric cell” (a battery scenario), and there are still texts using this description. The description was developed at a time when electric current was thought to be positive and flowing toward the negative pole. (See *Conventional Current Confusion*, this chapter.)

When the metal is dissolved by an acid and an electric current is run through the solution, free electrons move toward any positively charged material added to the solution.

The chemical properties of metals differ from non-metals, in that the atoms of metals typically have a few loose electrons in their outer Van Allen belts. These electrons can be shared or transferred to other atoms. For example, chlorine, a halogen, will easily enter a relationship with a metal atom by attracting one of the metal's electrons to its outer shell of seven. The electron may be shared or transferred to the chlorine atom. The sharing of a loose electron results in ionic compounds.

While a metal atom may have an outer electron stolen, turning it into an ion, it still has eight electrons in an outer Van Allen belt, and the Octet Rule is already met, making the metal atom/ion stable.

Metals are also distinguished by their weakly bound outermost electrons having relative freedom of motion, allowing electrical conductivity.

<u>Physical properties of metals</u>:

1. Are solids at room temperature and Terran pressures (except mercury).
2. Malleable and ductile in their solid state (though brittle at cold temperatures).
3. Show metallic luster.
4. Are opaque (not transparent).
5. Have a high density.
6. Are good conductors of heat and electricity.
7. Form crystal structures with each atom having eight to twelve nearby neighbors.

<u>Chemical properties of metals</u>:

1. One to four valence electrons. (Electrons in outer orbits.)
2. Low ionization potentials (they readily lose electrons).
3. They are electropositive.

Metalloids are elements which share the properties of both metals and non-metals. These elements display hybrid behaviors. Many are semiconductors. They include boron, silicon, germanium, arsenic, antimony, tellurium, and astatine.

Rare Earth Elements got their name from chemists who first isolated them in their oxide forms (such as alumina). These oxides resemble calcium, magnesium, and aluminum oxides to a degree, and are sometimes called common earths. A characteristic of rare earths is all have three valence electrons. Because of this, they all have similar chemical properties.

Transition metals are set apart by their variable oxidation states. This group of metals is distinguished from other metals, not by their physical properties, but by the behavior of their orbiting electrons. The transition metals have their outer electrons in more than one Van Allen belt. Normal metals have their outer, or valence, electrons in only one VA belt.

Because these electrons occupy more than one belt, transition metals have a variety of oxidation states, unlike normal metals having one or two oxidation states.

Oxygen is not classified as a member of the noble gases (it is not inert), though it is classified as a gaseous chemical element in Group VA of the periodic table. Its atomic symbol is O, and its atomic number is 8. It has six valence electron, with two additional electrons contained in an inner Van Allen belt. It bonds easily with other atoms to form the preferred octet pattern of electrons.

Oxygen is known mainly in its gaseous form as a diatomic molecule, with two oxygen atoms combining to share two electrons. It makes up 20.95% of the volume of dry air, is colorless, odorless, and tasteless. It is slightly soluble in water and is responsible for the oxidation (rust) of metals as it bonds to share the two needed electrons.

Radioactivity and Fission

Radioactivity is the release of energy. This energy can be expressed in a number of ways. Radioactivity can take the shape of EM waves, moving electrons and positrons, or protons, neutrons, and ions traveling at varying speeds. Visible light and lower frequencies, though forms of radiation, will not be covered in this section.

Nuclear fission is the splitting of an atom. Heavy atoms are broken into two, or more, smaller ones. There are approximately 50 known ways an atom can undergo fission, each producing different results.

The atoms of some forms of matter, such as uranium-235, will undergo fission when bombarded by low-speed neutrons. The low speeds of these neutrons make the process controllable within nuclear reactors. Each collision in the fission process causes additional neutrons, protons, or helium ions to be emitted, resulting in further collisions. A chain reaction takes place in the reactor that can be kept in check through the use of neutron absorbing rods.

During fission, an atom's outer fields are compressed by a neutron or proton, and electrons are pressured through magnetic layers, creating EM waves with gamma ray frequencies. In some cases, thermons are compressed and split, producing moving electrons and positrons. The positrons join with nearby electrons, also creating gamma rays. The striking neutron is either absorbed by one of the newly formed atoms, or is rerouted by recoil. Each new atom with an excess of core electrons will, in turn, eject electrons. Electrons continue to be ejected until a stable atom is achieved, creating a new element.

In the early days of radiation research (around 1900), three categories of radiation were created and named after the greek alphabet. The types of radiation were: 'alpha'-, 'beta'-, and 'gamma'-. The name gamma 'rays' comes from 'gamma' radiation. Alpha radiation is used to describe high speed helium ions, which normally move much more slowly than the high speed electrons and positrons. Beta radiation covers high speed electrons and positrons, and the term beta decay describes the ejection of an electron from an atom's core.

Neutron and proton radiation, as well as high speed ions other than helium, does exist, but currently does not fall into the three 'standard' categories. Under the USF theory paradigm, these 'particles fall under alpha radiation because they carry gravity fields, while beta and gamma radiation do not.

The stability of an atom's core is determined by the ratio of core electrons to protons, although it is currently unclear why some combinations of protons and core electrons are stable, and others are not. In atomic cores with a low pseudo-neutron count, there are obviously too many core electrons, In more complex atoms, the instability increases as the number of pseudo-neutrons increases. It appears there is a natural limit to the number of pseudo-neutrons an atomic core can contain before becoming radioactive. Some unstable cores will adjust their ratio of core electrons to protons by spontaneously ejecting one or more of its pseudo-neutrons.

Molecules
(Atoms; 1, 2, and More)

Molecules

A single atom is defined as a molecule, but the word molecule is generally used to describe two or more atoms that have become bonded, or interlinked. Same type atoms will bond to form the molecules of an element. Differing atoms will bond to form molecules, in turn forming compounds.

Water, with two hydrogen atoms and one oxygen atom has a molecular structure. Molecules are the smallest part a substance can be reduced to and still maintain the characteristics and identity of that substance. Just as atoms represent the smallest form an element can be reduced to, and still exhibit the characteristics of that element, so the more general term molecule represents the smallest form of any kind of matter.

Molecules can become extremely large and complex, with a variety of elements combining to create new forms of matter with very distinctive characteristics. Large molecules, made up of a variety of atoms, take on the shape of chains or strands. The gravity and magnetic fields of these molecules can be quite distorted and effect the surrounding thermal fields and orbiting electrons.

Molecular Bonding

Molecular bonding is the result of gravity, magnetic, electric, and thermal field interactions. Unlike fusion, atoms and molecules 'drift' toward one another because of attractive forces. Repulsive forces 'are not' overcome and the molecules bond at a distance from one another, becoming trapped between repulsive and attractive influences. In bonding, the gravity field has the least influence, with the thermal field coming in a close second. Molecular bonding, in all its forms, falls under the science of chemistry

Traditionally, bonding has only been associated with shared electrons in outer orbits around atoms. The electron-proton attraction is described as initiating the bonding process between electropositive and electronegative atoms. This new paradigm includes the other three fields, with the magnetic field having a strong attractive influence in solids, and a progressively weaker influence in liquids and gases.

The shared valence electron(s), while acting as a bonding energy, also acts as an electrical barrier. The thermal fields of each atom act to repel electrons (due to increasing density). The combined attractive and repelling forces from different field energies anchor the atoms together as they share an electron.

Ionic Bonding

Ionic bonding occurs chiefly between atoms which are very electropositive, for example sodium, and very electronegative, such as chlorine, to form sodium chloride (common table salt). The sodium atom has one electron in its outer Van Allen belt, or valence band. Sodium gives up this electron rather easily in its chemical reactions, forming a positively charged sodium ion.

Ionic bonding does not form new molecules. The transfer of electrons, instead, causes positive and negative ions to create separate lattice structures while forming crystals. The USF theory suggests the formation of crystals is heavily reliant on shared magnetic fields and polar alignments.

Covalent Bonding

Covalent bonding takes place when electrons are shared by two or more atoms. There are two types of covalent bonding, equal and nonequal (outside of this paradigm they are normally called polar and nonpolar). Electrons shared by the same type of atom, such as hydrogen (H_2) or oxygen (O_2), distribute their 'electron attraction' equally between the two atoms. This is the equal covalent sharing of an electron. Nonequal covalent bonding takes place between different types of atoms and the electrons are generally not shared equally. In nonequal covalent bonding, the electron will spend more time near the nucleus of the atom having the greater electron attracting power.

The electrons in covalent bonding, being shared by two or more atoms, are relatively stationary and unable move into a true orbit around the atom's core.

Hydrogen Bonding

Hydrogen bonding is a weak form (perhaps the weakest) of covalent bonding. Two protons, linked at a distance by a shared electron, and repelled by magnetic and thermal pressures, represent the simplest form of hydrogen bonding. Being the same element, they maintain the same basic characteristics of hydrogen, but are a two-atom hydrogen molecule (H_2). Two bonded hydrogen atoms are most stable when they are 0.74 angstroms apart (thermal and magnetic pressures restrict their moving closer). If these same two hydrogen atoms have a total of two (or three) orbiting electrons, they can each bond to a single oxygen atom, forming a water molecule with properties completely different from those expressed by hydrogen or oxygen.

When hydrogen (H) bonds with oxygen, nitrogen, or fluorine, the electron of each hydrogen atom moves to an equatorial position between the two bonding atoms. The atom bonding to the H atom radiates a broad west pole energy and attracts most of the electron's field lines. The shared electron is now only weakly attracted to the H proton, and the H proton is repelled by the other atom's stronger thermal field. This makes for a very weak bonding situation.

The hydrogen atom/ion will readily attract a second electron, either in the form of a free electron or in bonding with another atom to form a second 'hydrogen bond.' This process is stronger than van der Waals bonding, or magnetic bonding, but weaker than normal covalent bonding.

Hydrogen-bonding interactions between molecules are responsible for some very unusual and important properties of matter. In liquid water, for example, hydrogen atoms bonded to the oxygen atom of one molecule are also weakly bonded to the oxygen atoms of adjacent water molecules. This allows the molecules to separate and reconnect easily.

The core of an oxygen atom contains pseudo-neutrons in magnetic disarray. It is paramagnetic (water is considered diamagnetic), with a very weak magnetic field, and possibly multiple magnetic poles. This allows the oxygen atoms to be much more 'fluid' in the location of their shared electrons.

Multiple Electron Bonds

The atoms forming molecules are often connected by two, three, and even four bonds between adjacent atoms. A good example of two atoms joined by a double bond is the molecule dioxygen* (two oxygen atoms). Each oxygen atom has six electrons in its outer Van Allen belt, and by sharing two electrons, each oxygen atom is able to achieve the preferred eight electron shell. The dinitrogen molecule (two nitrogen atoms) uses a triple bond. Each nitrogen atom has five electrons in its outer Van Allen belt and, to reach the optimal eight, the two atoms share three electrons. In each atom, two of the five electrons have 'some' freedom of movement within the outer Van Allen belt. Some complex molecules have quadruple bonding. As the number of shared electrons increases, so too does the bonding strength.

The Van Allen belts of these atoms become extremely distorted during this process (as does the shape of the electron fields), and the magnetic poles of one or more atoms may take a magnetic alignment opposite its partners.

Multicenter Bonds

Some molecules are formed by sharing a single electron between three or more atoms. This is called multicenter bonding and it provides an additional, weak stability for a molecule.

Metallic Bonds

Metallic bonding is a new category and was originally classified as covalent bonding. It takes place between metal atoms forming a lattice structure. The metallic bond is

*(Bi- and di- both mean two, bi- is latin and di- is greek.)

similar to the multicenter bond except many atoms (often six to twelve) surround a 'central metal atom' in forming a lattice structure.

The loose electrons in metallic bonds are often spread out over a wide area, weakly sharing lines of force throughout the entire lattice structure. Typically, there aren't enough electrons within the structure for every atom to share a two electron bond. The existing electrons become spread out, distributed somewhat evenly throughout the thermal field. This has two effects: 1) The electrons are 'very' loosely bound to a specific location, and 2) the atoms become very weak positive ions. Electrical conductors are known to have both loosely bound electrons, and free electrons drifting through the thermal field at very slow speeds.

Metallic bonds provide the strongest evidence of grav-magnetic bonding. The loose and free electrons, and magnetic fields of the atoms, may be necessary for the initial creation of the lattice structure, but are not required for its short-term support. The loose and free electrons are the basis of electric current. Though the electrons have left their original positions, and reorganized the atom's magnetic fields, the conductor does not disintegrate.

Gravmagnetic Bonding

Gravmagnetic bonding is an expression of the thermal (EM) field existing within matter. This concept is a prediction of the USF theory model, and may be the strongest bonding mechanism in solids. Each type of atomic core is surrounded a gravmagnetic field, which warps and condenses thermons, influencing their density and movement. The bonded atoms exchange thermons while cooling, but each atom provides a specific gravmagnetic influence. The thermal fields meld and expand in the areas between the atoms.

This melding of differing gravmagnetic fields provides additional bonding strength, and results in molecules with new boiling and melting points. For example, the thermal fields of water molecules have a more limited range of boiling and melting points than oxygen.

An increase in thermal field activity (an increase in temperature) can cause bonded atoms to separate. As the thermal field of each atom expands and shifts, the electrons are pushed further out from the atom's core. If the shared electron acts as a common center, each atom pushes away from its bond partner.

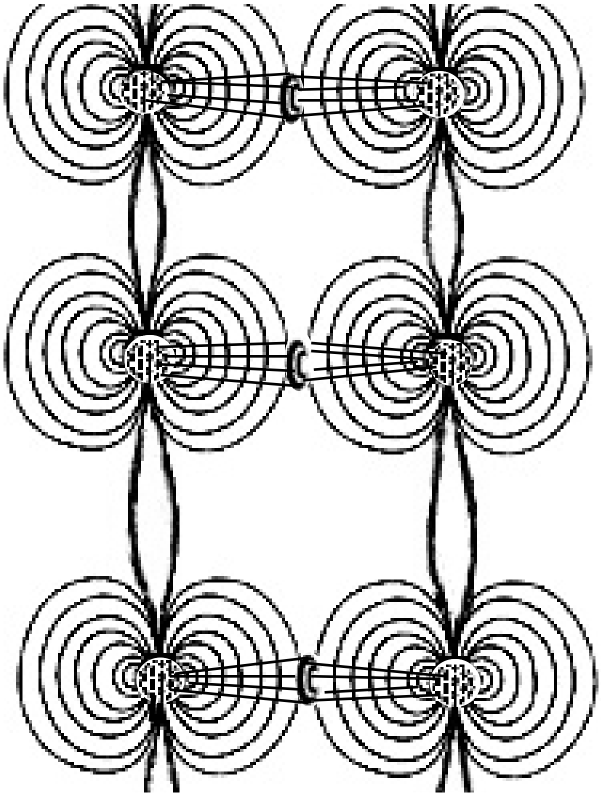
The electron will remain with the atom displaying the strongest attraction, or be ejected. The bond separation can causes fluctuations in the overall thermal field, initiating further separations. This process can be adapted to explain combustion.

Magnetic Bonding

Magnetic bonding is one of the van der Waals forces. Although it is typically described as 'dipole interactions' and associated with electron-proton attraction, the descriptions match those of magnetic field interactions. The shunning of a magnetic field model is attributed to the belief magnetic fields are a by-product of moving electrons and the archaic prejudice the magnetic field is an illusion.

Johannes van der Waals discovered these forces while researching gases at the molecular level in the late 1800s. Polar molecules, when properly oriented, will attract each other (north pole to south). Considered to be a weak influence between molecules, magnetic bonding becomes evident only in symmetrical, magnetically aligned molecules, or at very low temperatures. This is a weak attraction for the molecules of matter in a gaseous state, stronger for liquids, and strongest in solids. Magnetic bonding is often masked by other, stronger field interactions.

'Nonpolar' molecules can also produce magnetic bonding after being polarized. Though these molecules are not



The "lattice structure" of a crystal, showing electric and magnetic bonding forces.

considered 'permanently magnetized,' they can still be temporarily polarized. These temporary magnetic alignments lead to a net attraction between molecules, allowing nonpolar substances like carbon tetrachloride to form liquids. This is the same process shown by a paper clip becoming magnetized upon contact with a bar magnet, and then losing its magnetic field upon separation.

The USF theory includes magnetic bonding as part of the forces holding matter together, and incorporates it as a weak force in noncrystalline solids. Magnetic bonding is stronger in crystals and partly responsible for the formation of lattice structures.

Positrons Within Matter
(To Be, or Not To Be)

The Controversy

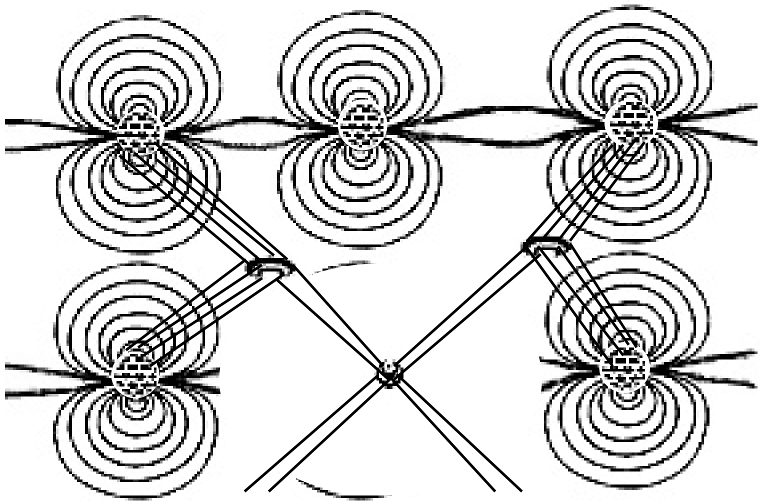
The binding of positrons to atoms has become a controversial issue in recent years. Historically, it has been the general consensus positrons would be repelled by protons or joined with orbiting electrons to create gamma rays. These earlier views did not allow for the insulating value of the thermal field, or the potential for balance as a positron is simultaneously attracted by multiple electrons, repelled by protons, and stabilized by an atom's magnetic field.

Observations

Early experiments with positrons were focused on electron structures. By the end of the 1960s, it was understood EM waves produced by electron-positron joinings could provide information about the lattice structures of crystals. Low velocity positrons can drift through a material, possibly encountering an electron, or they can become trapped in 'crystal defects,' also called vacancies. The positron is held at the defect site until encountering an electron.* Positron experiments were first performed on metals in 1967. In 1968, researchers began using positrons in experiments with ionic crystal structures. Semiconductors became the subject of positron experiments in 1969. In all of these experiments, it was shown positrons could exist within matter, though it is assumed only a brief existence is possible.

These experiments were performed, not to prove positrons could exist within matter, but to explore the internal structures of matter. A beam of positrons would

*(Reinhard Krause-Rehberg and Hartmut S. Leipner have written an excellent book on positron-electron joinings in semiconductors titled 'Positron Annihilation in Semi-Conductors'- ISBN # 3-540-64371-0. The Martin-Luther-University Halle, in Germany, has become a leader in researching this field.)



A defect, or missing atom, in the structure of a crystal lattice provides temporary safe haven, or a trap, for a positron.

enter the target material, resulting in the movement of positrons into electromagnetically balanced regions. Coulombic attraction would eventually draw a positron to the electron presenting the best combination of minimal surrounding resistance and closeness.

The amount of time for this process to produce EM waves, more specifically gamma rays, and the frequency of the gamma rays, provides information about the internal structure of the solid being investigated. The size of the trap is estimated by the amount of time passed before the generation of gamma rays. It has been suggested the frequency of the gamma rays indicates whether the positron has joined with an inner shell electron or an outer electron.

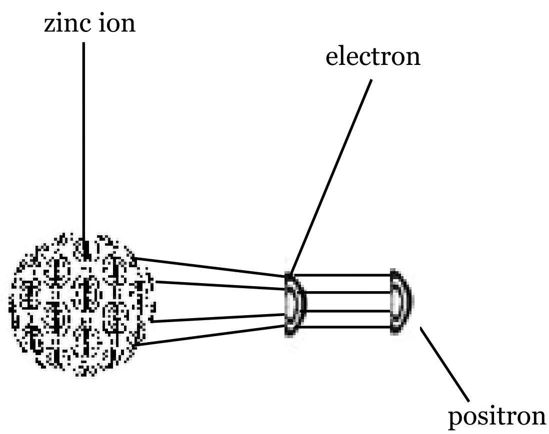
Existing Within

Unlike the standard model, the Ultra-Space Field Theory predicts the existence of positrons within matter as a normal state. Positrons are able to exist in structural defects within solids, and can be produced from the thermal field by internal pair separation.

Experiments using pair joining (pair annihilation) within lattice defects assume the defects are normally empty. This paradigm, however, assumes the occasional long term existence of positrons within matter, protected and isolated within a defect. Positrons, already within matter being experimented upon, are forced to relocate due to repulsion. There is also evidence positrons can bond to orbiting electrons.

J. Mitroy and G. Ryzhikh, working with the Australian National University, have presented very strong evidence supporting the binding of positrons to neutral zinc atoms.*

The outer electron, orbiting a zinc ion, carries a bonded positron along with it. The positron is simultaneously attracted to the electron and repelled by the positron energy of the atom, while also meeting resistance from a magnetic layer.



*(Reference the Journal of Physics B: Atomic, Molecular, and Optical Physics, Volume 32, Mar 14, 1999, #5.)

The results of their experiments indicate the potential for positron binding to take place in copper (Cu), silver (Ag), sodium (Na), and magnesium (Mg).

Pair separation provides another source of positrons. Recent experiments using low-velocity electron beams aimed at a sheet of tungsten, 2.5 mm in thickness, have yielded high numbers of positrons. The electrons within the beam indirectly compress the thermal field of the tungsten atoms by repelling (pressing inward) the atom's orbiting electrons. This compression results in the pair separation of positrons and electrons, and EM waves. The process also causes thermal field activity, releasing heat.

Trapping positrons in semiconductors is more complex than in metals. This is mainly because the number of point defects decreases. Early research of positrons within semiconductors led to a number of misinterpretations and confusing results when scientists attempted to transfer of the knowledge obtained from metals. The assumed constants, taken from metals, predicted higher vacancy concentrations than actually existed. Since that time, more reliable experiments have determined the trapping variables within semiconductors.

General lifetimes for positrons in semiconductors have been experimentally determined. A new development is the background-reduced measurement of positron joinings with inner orbit electrons. It is predicted chemical information around the 'joining' site can be obtained by comparing measured and theoretically calculated Doppler (redshift) spectra. The location of the defect can be found, and it is hoped the stabilizing causes of the defects can be determined sometime in the future.

The electric fields of protons and electrons surrounding vacancies in semiconductors have a strong influence on positrons occupying those vacancies. Positively charged vacancies (sourced from protons and similar to a nonmoving electron hole) will repel positrons. Negative vacancies attract positrons. At low temperatures, positrons can occupy these negative vacancies more readily, leading to a preference of temperature during positron trapping experiments.

Neutral and negative vacancy-type defects, and negative ions, are the dominant form of positron traps in semiconductors.

Crystals
(Field Magick)

Characteristics

A crystal is a solid, with the atoms or molecules arranged in three dimensional patterns. Each crystal repeats the basic pattern over and over.

Some crystals have fairly simple patterns, and only one type of atom (for example, copper). Others have complex molecular structures- such as proteins, or many kinds of atoms- such as tourmaline. Each kind of crystal has its own unique physical properties, which are expressions of its structure, and its chemical composition.

Crystals are extremely common. Every form of metal is made of tiny crystals. They are generally too small to see without a microscope (but can easily be seen on galvanized metal). Almost every kind of pottery and ceramic tile is made of crystals, though the external glaze may have been cooled too quickly to allow for the formation of crystals. Nearly every rock is made of crystallized minerals, meaning most of the solid Earth is crystalline. Sugar, salt, and baking soda are made of crystals. Even human teeth are made of crystals.

While the magnetic fields of atoms play a role in most atomic and molecular relationships, they are the primary force responsible for forming crystals as a material cools. The magnetic field is responsible for polar attraction and repulsion, as well as manipulating the electrons' orbital position.

Amorphous Solids

Molecules can form solid matter without taking on the shape of repetitive lattice structures. This type of material is called an amorphous solid. Examples include glass, rubber, and many plastics. Most amorphous solids are made up of intertwined, long, chainlike molecules. Lacking a rigid molecular order, these substances are sometimes referred to as ‘supercooled liquids’, though they are ‘seemingly’ rigid. (Old panes of glass are found to have sagged over time becoming thinner at the top, and thicker at the base.)

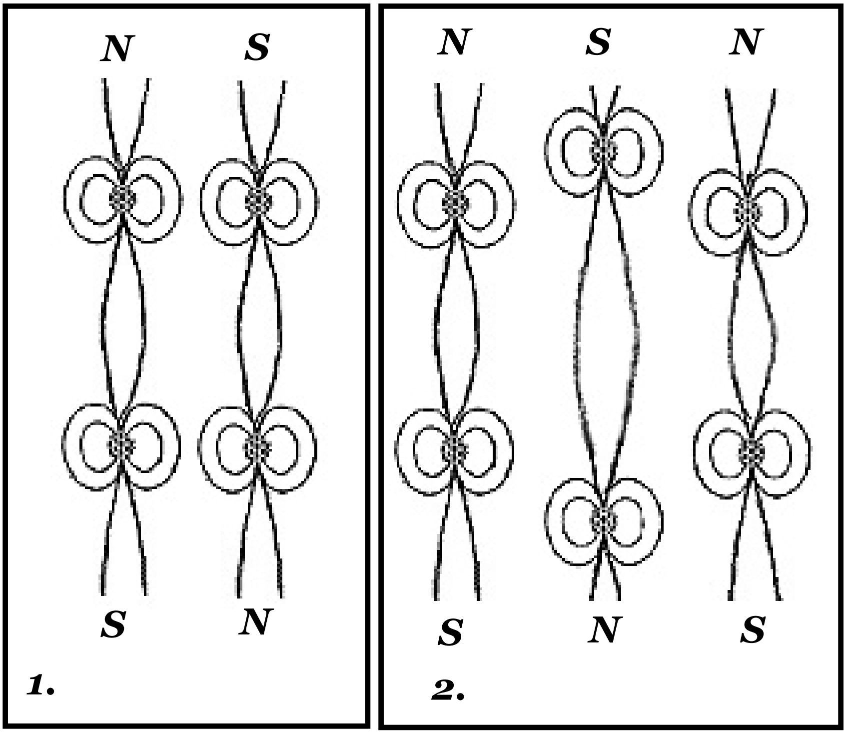
Amorphous solids can be created by oxidation (rusting), the evaporation of a solvent (leaving a glue or gel), a depositing process (such as vapor deposition or electrodeposition), or a quick cooling process that doesn’t allow time for crystal lattice structures to develop as the molecules contract toward one another.

Antiferromagnetism & Ferrimagnetism (Magnetic Misdirection)

Antiferromagnetism

Antiferromagnets have lattice structures containing magnetic alignments of equal strength, but in opposite directions. They counteract each other, neutralizing the overall magnetic field. Certain magnetic patterns are expressed below a critical temperature, called the Neel temperature, after Louis Néel. In 1930, Néel, proposed the existence of antiferromagnetic materials, with atoms of the material having magnetic alignments opposite those of neighboring structures.

The Neel temperature varies with different compounds. Below the Neel temperature, other variables are the particular pattern of ordering and whether the material is single or polycrystalline.



Picture 1 shows antiferromagnetism, the poles of the two lattices are of equal strength and reversed alternately. In picture 2, one possible variation of ferrimagnetism is shown. The center lattice is stretched out and weaker than the ones to either side. Also the poles are reversed.

The introduction of a strong magnetic field can cause a partial realignment of the atom's magnetic fields. The alignment depends on the direction of the field relative to the crystalline axes and the crystalline anisotropic* energy.

The antiferromagnetic patterns of a material can be determined by neutron diffraction experiments. Because individual neutrons carry both a magnetic field and an equatorial electric field, they interact with the polar alignments in the antiferromagnet. As the neutrons pass through the material, their own polar alignments become

*(Anisotropic: different values, depending on which crystalline axis is being measured in the same crystal.)

altered by the surrounding environment.

A large number of compounds are antiferromagnets. Many are insulators containing iron-groups, rare earths, and actinide (chemically similar and radioactive) metals.

Ferrimagnetism

Ferrimagnets contain reversed magnetic patterns similar to antiferromagnets, but the magnetic fields of the lattices have different strengths. These complex magnetic patterns can occur in ionic compounds, such as oxides. Ferrimagnetism consists of lines of atoms adjacent to one another within the crystal lattice, and having opposing polar alignments. They are often separated by oxygen atoms. Though the opposing fields counteract each other, generally, one of the magnetic fields is stronger than the other. An overall, weak magnetic field is produced, and has often been confused with ferromagnetism.

Magnetite is a good example of ferrimagnetism. Until the 1940s, magnetite was considered a ferromagnet. In 1948, Néel's theory provided a framework for understanding many of the properties of ferrites.

As temperatures increase, the thermal fields of atoms become more active and expand, separating the magnetic fields of linked atoms. The magnetic patterns become disordered. As the temperature is raised over a specific range, the magnetization may first decrease to zero and then increase again, representing the second magnetic field.

Ferrites are excellent electrical insulators. They are used in high-frequency devices requiring low electrical losses, such as electric transformers. The insulating qualities of ferrites are explained using their oppositely aligned magnetic fields. This magnetic arrangement makes it difficult for the electrons to move freely in ferrites. Careful research has made it possible to design ferrimagnetic systems with specific magnetic and thermal field relationships.

Conductors, Etc.
(To Conduct or Not To Conduct?)

Conductors

In metals, free electrons and valence electrons can be shifted to form a concentrated static electric field, then becoming electric current. Copper is one of the best, and most commonly used, metal conductors. Another popular metal conductor is aluminum. Some metals, such as nichrome (a chromium-nickel alloy) have thermal fields which shift and reorganize easily. These are used for heating and cooking purposes.

Atoms having one, two, or three electrons in their valence band allow the shifting of loose electrons to new positions quite easily. Elements with atoms like this are good electrical conductors. Metals such as gold, silver, and copper have a single loose electron in their valence band and are also excellent conductors.

Insulators

An insulator is a very poor conductor of electricity. A good conductor has loosely bound or free electrons (roughly one per atom), which can easily be repositioned, while in an insulator all the electrons are tightly bound to the atoms and molecules. Except at high temperatures, with the thermal field pressing the electrons into outer orbits, insulators have no loose electrons and cannot conduct electricity. When the electrons can be thermally pressured to outer VA belts, or if imperfections or impurities are present, insulators 'will' begin to conduct electricity.

The maximum number of electrons occupying the valence band is eight, and elements with atoms having eight valence electrons are, under normal conditions, excellent insulators. Because the valence band is filled, it can be considered electrically stable and will not easily share electrons with neighboring atoms. The inert gases (helium, neon, argon, krypton, xenon, and radon) are excellent electrical insulators. Elements with six or seven electrons in their outer orbits also make good insulators.

Semiconductors

Descriptions of semiconductor materials use the concept of 'electron holes,' as carrying positive charges. This nonphysical concept has been introduced as a convenient symbol for positive charges. Holes represent missing electrons, and the positive charge expressed by the atom in the electron's absence. In the standard model the actual charge carriers are considered to be electrons moving in the opposite direction of the holes. (See *Photoelectric Effects*, next section.)

Semiconductors fall between conductors and insulators and can display resistance on of the order 1 ohm/cm. Semiconductors include materials such as germanium and silicon. Impurities can strongly alter their conducting abilities. For example, pure silicon laced (or doped) with boron in the ratio of 1:100,000 can increase electrical conductivity a thousandfold at room temperature.

Semiconductors have a filled valence band, but the relationship with the thermal field is such that an electron in an outer orbit can easily be pushed out of range, and become free. At room temperature a significant number of electrons can be pushed outward, becoming free to conduct electricity.

A conductor, however, is understood to always have loosely bound or free electrons, even at temperatures near absolute zero.

The Photoelectric Effects
(Absorption, Emission, and Forcefields)

Variations On A Theme

There are three different types of photoelectric effects: 1. the photoemissive; 2. the photoconductive; and 3. the photovoltaic. In all three types, the current industry models describe outer valence electrons as absorbing the 'kinetic energy' of the photon (not being struck by the photon) and escaping their orbits due to their increased energy levels. Modern models of photoelectric effects used in the industry do not incorporate a billiard ball analogy, but describe field interactions by adapting the particle theory model. A field theory model describes the processes somewhat differently, but does not disagree with the basic conclusions.

Photoemission

In the photoemissive effect, the phototube (or photoemissive cell), was first developed in the 1920s. The electric eyes opening doors when a person interrupts the flow of light are examples of photoemissive cells.

A photoemissive cell is made up of a wire anode and a semicylindrical cathode. The 'emitting cathode' is contained within an empty or gas-filled bulb. The cathode's surface is normally made up of layers of cesium, potassium, or rubidium.

EM waves strike the cathode's surface and quanta (kinetic energy) are absorbed by the thermal fields of atoms near the surface of the material. Thermal field activity presses the surrounding electrons outward, resulting in one or two outer valence electrons being ejected with enough force to leave the material. The emitted electrons are attracted to the positive anode in the form of a very weak current. When a person or an object interrupts the flow of light, the weak electric current is stopped, triggering the door to open. More modern applications have replaced phototubes with semiconductor photodiodes.

Photoconduction

The photoconductive cell, also known as the photoresistor, is the oldest type of photoelectric device, and was first developed in the late 19th century. Photoconductive cells are often used to automatically turn street lights on and off. They are also used in backyard lighting/alarm systems (via infrared frequencies) and in scanning bar codes when making a purchase.

Photoconductive materials become better conductors of electricity when light shines on them. Though all insulators and semiconductors can be described as photoconductors, only a few show enough photosensitivity to provide useful applications.

Modern photoconductive cells use light to free electrons from semiconductors. Temperature has long been associated with the photoconductors ability to conduct electricity and this model includes thermal field expansion as part of the process. When the electrons are pressed outward by thermal field activity, they become loose, or free, and are available for electric current.

The resistance of a photoconductor may change from several hundred thousand ohms in darkness to a few hundred ohms in direct sunlight. Examples of photoconductive materials are: Lead sulfide (PbS), lead selenide (PbSe), and lead telluride (PbTe), which are sensitive to infrared radiation; and cadmium sulfide (CdS) which is sensitive to light in the visual range.

Photovoltaic Cells

Photovoltaic cells are used in a wide variety of electronic systems, one example being fiber optics communications arrays. They are also known as solar cells when Sol is their source of light/energy. As solar cells, they can provide a source of electric current for electronic equipment. Semiconductors, such as silicon and gallium arsenide, are used in the production of solar cells.

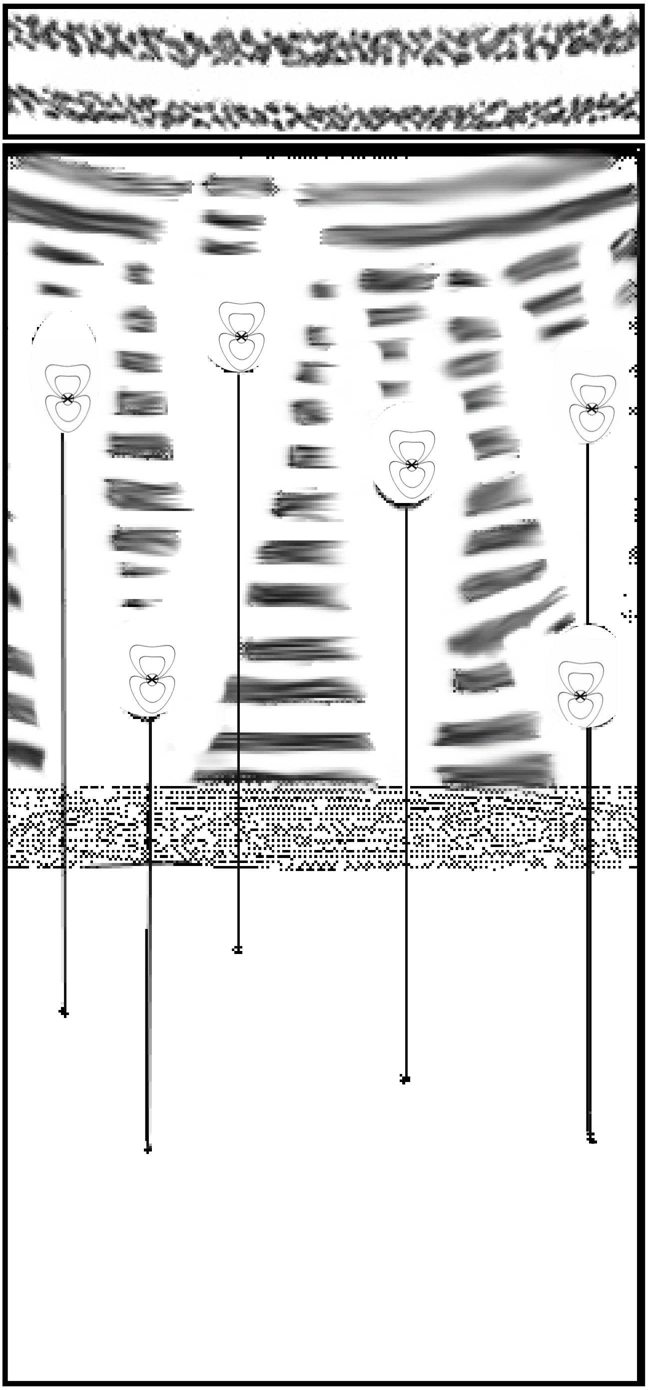
Using silicon solar cells as an example, the USF theory paradigm describes the typical photovoltaic process as follows:

Trace amounts of boron are added to pure silicon, forming the first layer of the solar cell, called a 'p-type' semiconductor. The surface layer of a photovoltaic cell is very thin and transparent, so light can be transported throughout the first layer. The junction region, called the 'pn junction' ('p' stands for positive and 'n' stands for negative) is where the first layer of silicon meets with the second layer of silicon. The second layer is called an 'n-type' semiconductor, and consists of pure silicon laced with phosphorus.

The boron atoms have loose electrons, and phosphorus atoms readily attract nearby loose or free electrons. All boron atoms close to the pn junction begin losing outer valence electrons to nearby phosphorus atoms after the two distinct EM barriers have been pressed, together. The process causes the p-barrier to become electropositive and the n-barrier to become electronegative.

It should be noted the pn junction behaves as a magnetic field layer, allowing electrons to pass in one direction with minimal resistance. (See *Thermoelectrics; Peltier effect*, this chapter.) This suggests the compression of two electric fields may generate a magnetic field. (A similar conclusion is reached regarding an electron and positron as they contract in on one another to form a thermon.)

The electrical imbalance creates field tensions at the pn junction. The pn junction can be treated as a single field layer, or forcefield, allowing electrons to pass through in only one direction. (This effect is also used in diodes to control the directional flow of electricity.)



EM waves in the air or in empty space.

Waves become condensed as they enter the thermal field of the solar cell.

Entering the grav-magnetic fields of atoms, EM waves are funneled becoming further condensed.

Boron atoms, laced throughout the 1st layer of silicone, eject loose electrons as their thermal fields shift and expand.

Electrons pass one way through the forcefield created by the joined plasmonic fields, also called the pn junction. The behavior of the forcefield comes from the differing vibrations of the silicone layers.

This creates an excess of eletrons in the second layer of silicon, which has been laced with phosphate atoms. This creates a battery effect.

When light of certain frequencies passes into the p-layer, quanta are absorbed, shifting and expanding the thermal field. The thermal fields around the boron and silicon atoms expand pressing the orbiting electrons outward. The silicon, by way of the photoconductive effect, becomes a better conductor. The weakly bound boron electrons, already oriented toward the pn junction by coulombic attraction, are ejected per the photoemissive effect and thermal field pressures, and travel through the pn junction to the n-layer.

Heat is transported through the pn junction with the electrons. Thermons, and the thermal fields of each silicon layer, meet no significant resistance from the pn junction, and thermons are continuously exchanged until an equilibrium is established. As the n-layer heats, it also becomes a better conductor.

With an excess of electrons on one side, and a lack of electrons on the other side (electron holes), the solar cell essentially becomes a battery, with light initiating the transfer of electrons from one side of the junction to the other. (See *Direct Current/Batteries*, this chapter.)

In terms of mathematics and moving charges, modern industry models and the USF theory agree quite well. The paradigms are different, but the processes described are essentially the same. Typical light to electricity conversion efficiencies for solar cells currently average from 10 to 15 percent. Efficiencies of 30 percent have been achieved using gallium arsenide cells, and researchers hope eventually to reach as high as a 40 percent conversion rate.

Adrianne Ryann Curtner, as a student of the Kenyon College Physics Department, wrote a particularly well researched (and readable) senior thesis paper describing the photovoltaic process in much more detail. Her paper, dated Mar 26, 1999, can be found at- http://www.powerlight.com/docuploads/PLCorpWPsunlighttoelectricity.pdf. The Powerlight Solar Electric Systems Corp sponsors this web page and uses it to explain the photovoltaic process.

Electric Current
(Coulombic Attractions, Magnetic Repulsions)

The Focus

The term electric current can include a variety of moving electric fields. In plasma clouds, salt water, fluorescent bulbs, and battery acid, protons, positive ions, and electrons can create flowing energy fields, providing genuine electric current. The focus of this section, however, is on electric fields flowing through solid conductors.

It has been the consensus opinion, since 1820, electric current generates a magnetic field. This field theory model reinterprets the evidence to mean moving electrons have realigned the magnetic fields of the conductor's atoms into uniform patterns, in turn forming a larger, coherent magnetic field.

The Basics

When electric current moves through a solid conductor, an obvious magnetic field forms in and around the conductor. A circular magnetic field radiates uniformly at a right angle to the moving current, and takes on traits normally associated with the directions of east and west.

Electric current follows the path of least resistance as it moves through the conductor. It moves as an overall field event, and not simply as individual electrons. The flow of 'alternating current' is described as moving along the surface of the conductor. (Remember 'the path of least resistance?')

Charge/Voltage/Coulombs

An atom, or an object, is electrically charged if it has an excess of electrons, or a shortage of electrons. The electron is assigned a negative charge and one proton, or two pseudoprotons are assigned a positive one. The terms negative and positive can be easily replaced by east and west without altering any electrical formulas (zero can also represent neutralized energies). In its most basic form, a charge is the attraction positrons (west monopoles) and electrons (east monopoles) have for one another. It is similar to the magnetic attraction of north and south poles.

Voltage is a measure of the attractive 'pressure', or strength, but not the movement of electric fields. Voltage is always measured between two stable points, or two opposite fields. Each electron, as an individual electric field, has a charge. The attraction, or voltage, between an electron and a positron (or a proton) is equal to one electron volt. The voltage of a static electric field (a group of electrons) is dependent on the number of electrons and the strength of an approaching positive field. Static electricity, as an example of an electric field, has a voltage, or 'electrical potential.'

A coulomb, named in honor of Charles Augustin de Coulomb for his research, is a unit of measurement describing the strength of a charge, based on the number of electrons (or excess electrons) in an electric field. A coulomb is equal to 6.25×10^{18} electrons, or in measuring a positive charge, 6.25×10^{18} protons or positrons.

The Electric Field

Electrons, as independent east monopoles, repel each other at close range, but this does not mean they cannot exist as a collective. A collective group of electrons will radiate a large scale electric field, just as a series of aligned protons, as north/south poles, will radiate a large scale magnetic field. Static electricity is one example of electrons existing as a collective entity.

As with other energy fields, an electric field existing inside matter will be influenced by the shape containing it. An electric field radiates lines of force in much the same way a single magnetic pole does. The strength of the electric field is greatest in areas where the lines of force are concentrated. Lines of force can become concentrated due to an objects shape, or from the introduction of another field energy. At the physical level, only a perfect sphere, unaffected by outside influences, will radiate an even, uniform distribution of electric field lines.

Electric Current

A field theory paradigm provides an especially useful model in explaining electricity. Electric current (measured in amperage) is the movement of an entire electric field, initiating movement of, and within, the immediate thermal field. Electric currents are not simply the flow of electrons through a conductor. The introduction of excess electrons at one end of a conductor results in the almost immediate release of electrons at the other 'grounded' or positive end. This is, in part, because electrons repel one another.

The addition of excess electrons to a conductor increases the strength of the larger overall electric field, which is also subject to constraints and field pressures from the surrounding medium. Unable to maintain a neutral balance with surrounding energy fields, the 'excess' portion of the electric field expresses voltage, released in the form of current, and immediately moves toward the nearest positive energy field at the first opportunity. In a sense, the entire field is under pressure, and will release the pressure at the first chance.

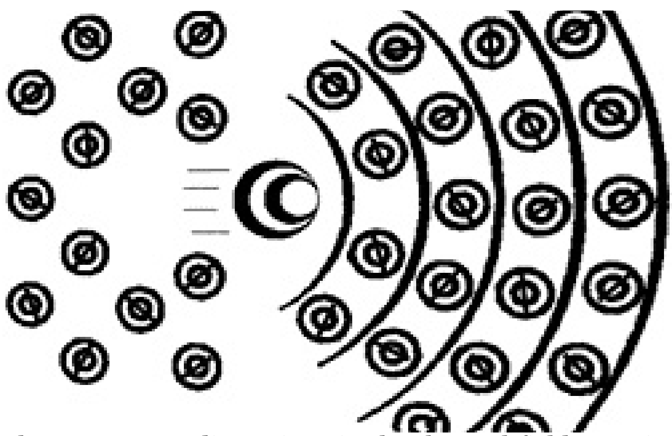
Electric fields located in matter interact with the substance's thermal field, *with compression waves* initially moving through the conductor's thermal (EM) field at the speed of light. These EM waves represent the flow of charge through a conductor. The EM waves and moving electrons are extremely fast and can appear to be a consistent flow, much like water flowing through a pipe.

Resistance

The electric field is also influenced by fields in the surrounding environment. The thermal field, influenced by the gravmagnetic fields emanating from the surrounding atoms, is the primary source of resistance to electric current. Electrons shift and move as the electric field moves. Each moving electron causes a disturbance in the thermal field, resulting in thermal oscillations and the release of heat. From a larger perspective, electrons can be visualized as pushing waves of loose thermons ahead of them, and to either side.

The density of the thermal field plays a role in the amount of resistance a specific material provides and the amount of heat released from electric current. The longer the conducting wire, the greater the number of electrons interacting with the thermal field, or the greater the resistance. However, the thicker the wire, the more loose valence electrons available in a given length, creating a greater coulombic attraction.

Realigning the magnetic fields of individual atoms within the conductor also provides resistance. When the electrons stop moving, and exerting pressure as they pass, the individual magnetic fields return to their original alignments.



A moving electron causes disruptions in the thermal field, creating low frequency EM waves and the redistribution of loose thermons (or, the generation of heat.)

V=IR

A mathematical relationship exists between resistance (R), electric current (I), and voltage (V). If the voltage, or coulombic attraction, increases (meaning an increase in excess electrons, or positive ions) then the electric current, or the resistance, or both, will increase (though generally resistance remains constant and electric current increases). When only a small electric current is produced from a large voltage, resistance is high.

This relationship was discovered in 1826 by G. S. Ohm and is called Ohm's law.

Direct Current / Batteries

Direct current (DC) flows in a continuous stream and, unlike alternating current, the charge flows in one direction only. Direct current is produced when electrons move through a conductor to neutralize attracting positive ions, protons, or positrons. Unlike alternating current, an excess of electrons is introduced into the conductor, causing an imbalance, or voltage.

Batteries are a traditional source of direct current. A nonrechargable battery, using a zinc electrode and a copper electrode, will provide direct current. Both metals are classified as electropositive, but zinc is known to contain a large number of free and loose electrons, making the copper, by comparison, electronegative and attracting the excess. (Remember, electronegative is an archaic term meaning their atoms strongly attract electrons.) Additionally, copper reacts much more slowly to acids than does zinc. The two electrodes are separated by a solution of hydrochloric acid (a combination of hydrogen and chlorine) and water.

Combining hydrochloric acid with a metal produces hydrogen gas in a process called *single-replacement action*. In this case, the zinc's surface atoms have a stronger attraction to the chlorine atoms in the acid's molecules than do the weakly bonded hydrogen atoms. The chlorine atom's release the H proton cores as they bond with the zinc atoms, but not the electrons. The chlorine atoms steal the hydrogen's electrons, transferring them to the zinc post. The zinc post builds an excess of loosely bound electrons and creates a negative electric field.

The protons, released by the single-replacement action, drift through the acid toward the copper post and steal electrons from it, becoming hydrogen gas and leaving positive copper ions. The protons within the stationary atoms of the copper post create a positive electric field. The stage is now set for electric current.

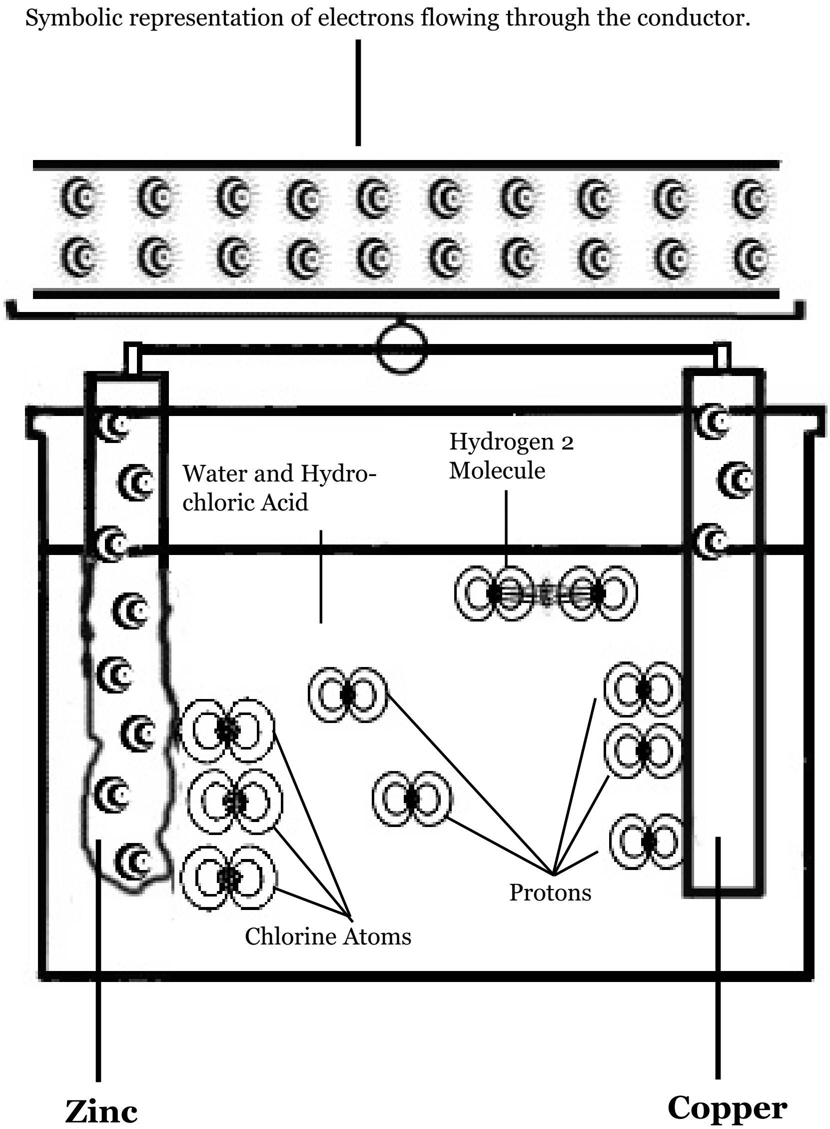
When a wire conductor is attached to the two posts, both electric fields react. The negative field expands into the conductor, initially as an electromagnetic compression wave moving at the speed of light. Once the EM wave passes, a flow of electrons follows, and remains continuous for as long as there are excess electrons.

The positive field remains stationary, but attracts any free electrons available in the wire. With both posts connected to the conductor, the entire collective of free and valence electrons moves toward the positive pole in a steady stream. As long as chemical reactions cause the zinc to gain electrons, and the copper to lose them, the current will continue. Typically, the zinc gradually dissolves into the electrolytic solution and the source of electrons disappears.

While electricity flows through the conductor it radiates a magnetic field with a circular north/south alignment.

Magnetic Alignment

The unusual shape of the magnetic field during the passage of electric current provides a clue to the processes taking place inside the conductor. The standard magnetic field expresses both a north and a south pole. A compass placed in various positions around the wire conducting



A simple model of a battery. The protons attach to the copper bar, drawing away electrons as quickly as the zinc bar can release them.

electricity finds no poles, but rather a circular magnetic field encompassing the wire, similar to the east and west directions running parallel to the Earth's equator. The compass will reverse itself when the direction of the current reverses.

During their movement, electrons seek out, or create, the path of least resistance. As part of this process, the magnetic orientation of the conductor's atoms are altered.

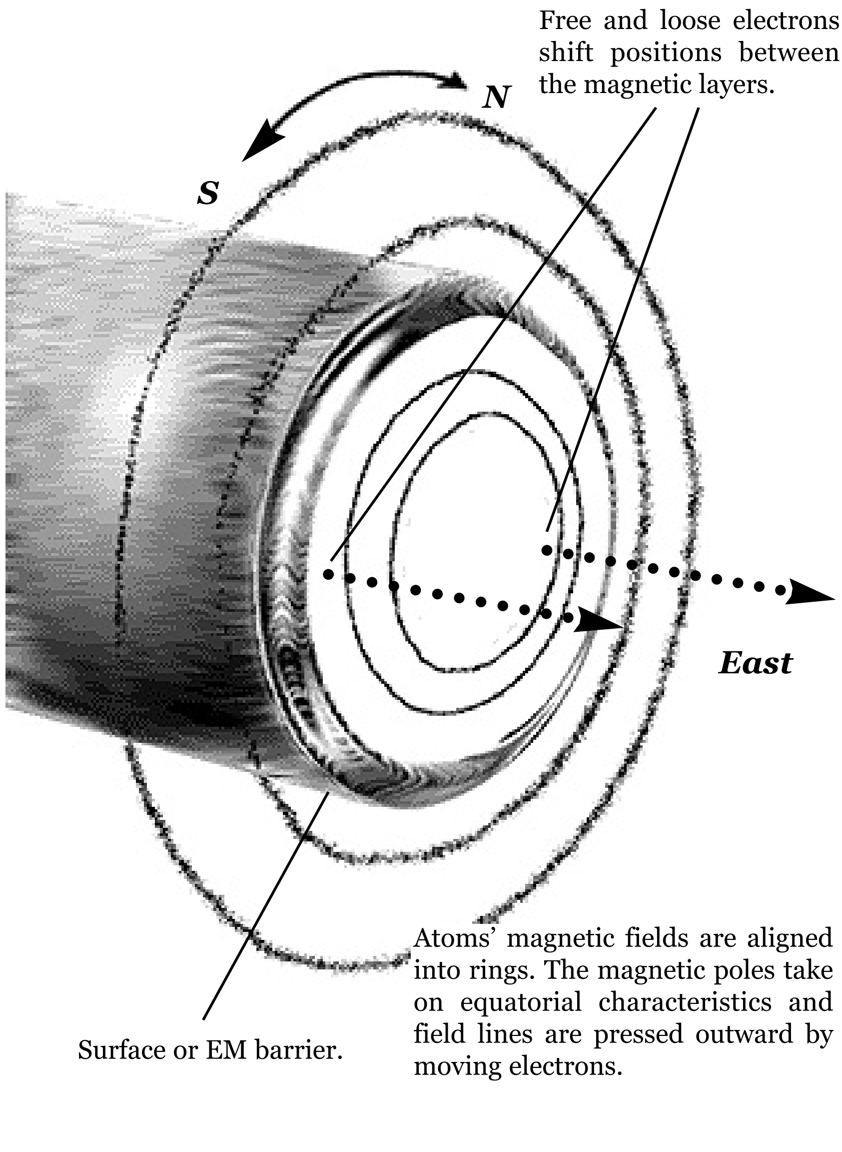
The path of least resistance is through the magnetic equators, so the atoms' magnetic fields align themselves, with neither the north nor south poles facing the oncoming electron flow. Their poles move to form a north/south relationship with the 'eastern' flow of electrons. As north and south poles attract one another, and like poles repel, the magnetic fields of atoms become aligned in rings and radiate circular magnetic fields. As the magnetic fields shift, free and loosely bound valence electrons move through the newly formed layers between the magnetic rings. It is between the magnetic rings the electrons preferentially flow. The moving electrons also press the magnetic field lines outward from the conductor.

Alternating Current

In the case of alternating current (AC), it is the compression waves moving through the conductor at the speed of light which are used as electric current. A magnetic field is introduced at one end of the conductor causing the electrons to shift with the EM compression wave. The atoms' magnetic fields realign in the process. During the realignment process, loose and free electrons shift, becoming a collective voltage. The compression wave is the same as the initial EM wave described in direct current.

If the magnetic field is not removed after being introduced, only the single compression wave moves through the conductor. The magnetic field must be removed and rein-

A simplified model of electric current shows the enlarged cross section of a wire carrying electric current. If the current changes direction, the magnetic poles reverse to comply with the eastern movement of the electrons.



troduced to initiate a second EM compression wave. If only a north pole is used, the compression waves consistently move in the same eastern direction (as referenced to the magnetic north). If the magnetic field of a south pole is introduced, the compression wave moves in the opposite direction, or "east in reference to the south pole." This change in direction of the eastern monopoles also acts to realign the poles of the magnetic rings, causing them to flip in response the oncoming electromagnetic compression wave.

In alternating current, the path of least resistance for the electrons becomes the surface of the conductor. The constant shifting back and forth of electrons and magnetic fields causes eddies and opposing ripples within the thermal, electric, and magnetic fields. Resistance is minimal at the surface (EM barrier), or 'skin' of the conductor.*

Conventional Current Confusion (CCC)

Standard convention teaches direct electric current flows from the positive to the negative. This 'conventional' model was developed early in electrical research and was based on the assumption a positive force was filling a negative void. It was later discovered negatively charged electrons, moving toward the positive pole, are responsible for electrical current.

Though a growing number of text books describe our present understanding of electron movement, a large percentage continue to use the 'conventional' current model. This is the result of a philosophy of convenience. Rather than changing several centuries of theory and contradicting older text books, this convention continues to be used in an effort to avoid paradigm confusion and lengthy discussions. Ease and conformity sometimes receive a higher priority than new information and its meanings. This process of avoiding updated information leads to unnecessary confusion.

*(There are references to a zero magnetic field at the center of the conductor in alternating current.)

Watching the Flow of Electricity

In April of 2003, a new 'magnetic' scanning microscope was developed at Brown University that can observe the flow of electricity. It can be used for both educational purposes and detecting defects in the smallest and most complex integrated circuits. It operates at a resolution 1,000 times greater than previous scanning microscopes. The scanner can locate previously undetectable defects. This sets the stage for developing smaller integrated circuits.

"This microscope will allow manufacturers to find defects in each embedded wire in ever-tinier circuits," Gang Xiao has stated. Gang Xiao and Ben Schrag, both of Brown University, developed the instrument's hardware and software.

Most magnetic sensing for the imaging of electric current flow is restricted to extremely low temperatures, requiring cryogenic aids such as liquid nitrogen. The Brown University scanner is revolutionary in that it works at room temperature. "This design opens the way to greater use of magnetic sensing technology," said Schrag. "We are just scratching the surface of potential applications. Until now, little or no technology existed for actually 'watching' electrical current flow." The researchers have observed current flow in the smallest commercially available components, half the size of conventional chips. These components can be as small as 50 nanometers.

This new technology can be used to pinpoint how electrical current can form pinholes in state-of-the-art devices called magnetic tunnel junctions. These tiny devices are strong candidates for memory storage cells and may replace the present cells used in computer memory chips.

Images produced by the microscope may be viewed at-http://www.micromagnetics.com/.

Thermoelectrics
(Thermal & Electric Field Interactions)

Intro

It has been well established heat and electrons influence each other. A conductor carrying electric current will 'heat up' and eject electrons, creating beta radiation. From the perspective of this paradigm, a moving electron will carry a thermal wave in front of it and electrons are ejected from their atomic orbits by shifts and expansions of the atom's thermal field. In 1820, Thomas J. Seebeck first observed heat could generate an electric current. Thermoelectricity is based on the interaction of electrons and the thermal field.

The three major thermoelectric phenomena are the Seebeck effect, the Peltier effect, and the Thomson effect. These effects receive little attention in modern text books because of the difficulties in explaining them using a particle theory paradigm.

Thomson Effect

In 1854, William Thomson used thermodynamic arguments to associate the Peltier and Seebeck effects and found mathematical relationships between the movement of heat and electric current. His arguments connected the two effects and predicted a third effect, the Thomson effect, and acts as an underlying principal for the first two. In essence, Thomson stated heat can be transported by electric current (or moving electrons), and when an electric current flows through a conductor having temperature variations, the current will cause an increase or reduction of heat in the conductor, effectively smoothing out the heat variations.

When a conductor is heated at one end, the expanding thermal field of each atom forces loose electrons out of orbital range. Atoms become ions and free electrons are carried by thermal pressures toward the cool end of the conductor, creating an increased negative electric field, or a voltage. The voltage is directly proportional to the difference in temperature between the two ends of the conductor. As the difference in temperature diminishes the voltage difference drops. When a second conductor is brought into contact, any excess charge in the first will be transferred and shared as a field energy. For a brief instant, a magnetic field will form as the electric field is redistributed and atoms realign their magnetic fields to minimize resistance.

Seebeck Effect

In his original experiments, Seebeck used two different types of conductors (metals) and mistakenly believed the heat itself was causing nearby magnetic compass needles to fluctuate. He claimed heat currents produced the same effect as electric currents.

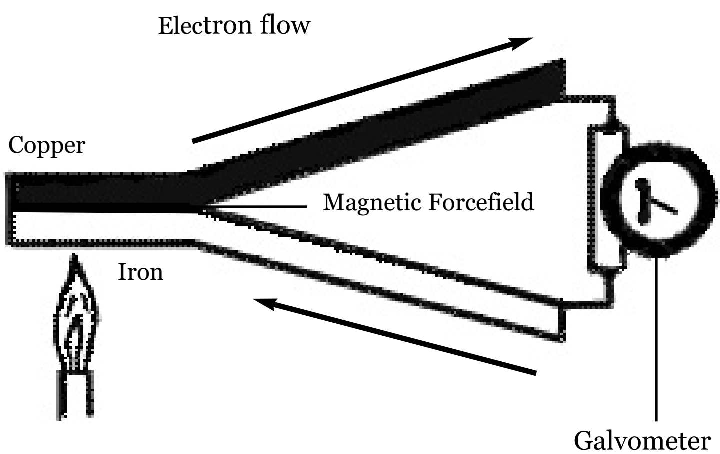
Though Seebeck's initial conclusion was wrong, his continuing research led to the discovery heat could generate a weak electric current when two different conductors, such as two metal wires, are connected to form a crude loop, or 'closed circuit.' As one junction, or connection, is heated, electrons are released due to thermal field activity and expansion. At the heated junction, thermal currents create a one way gate for electron flow, similar to the forcefield effect created by pn junctions in solar cells. Entry into the second conductor is blocked by the EM barriers combined with thermal currents, leaving the electrons to move through the length of the first conductor to again reach the second, similar to the process used with solar cells.

The continuing supply of electrons form an electric field (with voltage), resulting in electric current. Once the electric current has been initiated, the magnetic alignment of atoms within the conductors create the standard magnetic rings. Initially attracted to the second conductor because of its more positive charge, the electric current is now attracted to a still stronger positive charge at the heated junction (which has lost, and continues to lose, electrons. The electrons are continuously recycled by the combination of heat flow and the one-way forcefield at the junction of the metals.

The Seebeck effect has been developed for industrial uses in the form of thermocouples, with a heat source, such as a gas flame, generating a one-way flow of electrons. The thermocouple combined with a galvanometer can be used to measure the temperature of a heated junction.

More recently, it has been found semiconductors display much larger Seebeck effects, and are used to generate electric power. Because any source of the heat will work, kerosene lamps to nuclear decay and direct sunlight can be used to produce electricity. Use of semiconductors can generate electric power ranging from a few watts up to several hundred watts.

A thermocouple uses the Seebeck effect.



Peltier Effect

The Peltier effect is a very unusual phenomenon. Discovered by the French physicist Jean C. A. Peltier in 1834, the Peltier effect has recently been used for small scale cooling in computers. This effect occurs when an electric current is introduced to a circuit using two different types of conductors with one junction. One side of the junction heats while the other 'cools significantly.' In 1838, Heinrich Lenz showed the impressive nature of this effect when he used a bismuth-antimony junction and froze a drop of water by sending an electric current in one direction (cooling). He then melted the drop by reversing the current (heating).

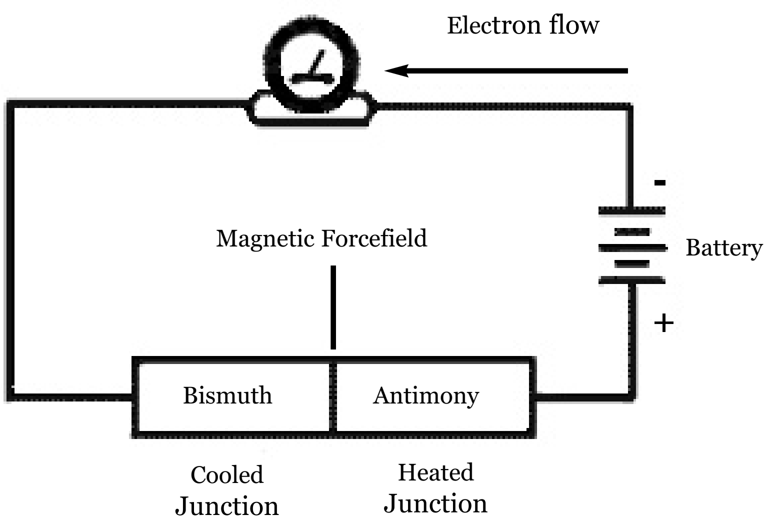
The Peltier effect is often described as a reverse of the Seebeck effect, but this description is not entirely accurate. There are no particle theory models for this effect (partially explaining why there are no references to it in modern textbooks).

Thermons (heat) are transported from one side of the junction to the other by the flow of electrons. As electrons move through the junction, a number of thermons are carried ahead of them. Heat is removed from the first side of the junction, cooling it, and deposited on the other side of the junction, heating it. The effect is reversed if the direction of the current is reversed.

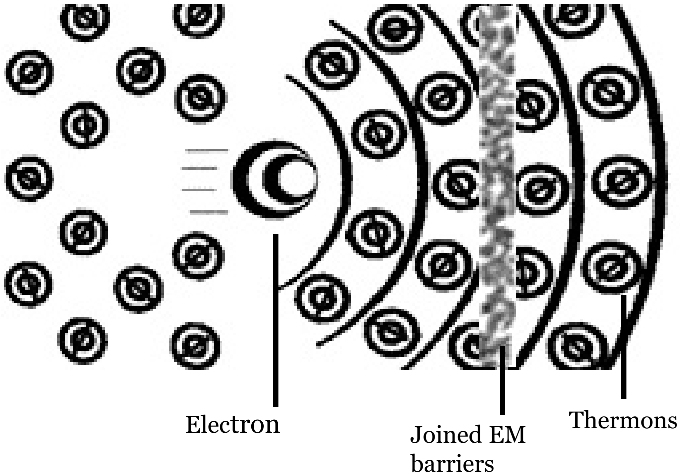
It is not unusual for electric current to transport and generate heat. What is unusual is having heat removed from one side of the junction and deposited on the other. The USF theory model predicts the joined EM barriers produce a weak forcefield. Electrons pass through the pn junction, carrying thermons ahead of them, but the thermons are not allowed to return as long as an electric current applies continuous one way pressure. The electric current, combined with the EM barriers, blocks the return flow of thermons, cooling the first side of the junction.

Modern 'Peltier coolers,' such as the ones used in computers, are devices operating like miniature refrigerators. The elements in these devices are made of different layers of composite, ceramic-type materials. When an electrical current passes through a Peltier cooler, one side of the element becomes very cold and the opposite side becomes very hot. The cold side is connected to the component needing to be cooled, and heat (thermons) is removed from the hot side by using a heatsink unit and a fan.

The Peltier Effect



The Peltier effect is also being used in refrigeration and heating devices. A modern single-stage Peltier cooler can lower temperatures to nearly 70 degrees centigrade below room temperature. Peltier coolers have a distinct advantage over conventional refrigerators due to the very localized heat transfer and because they have no moving parts. On the downside, they are less efficient than modern refrigerators and more expensive to operate.


Electron
Joined EM barriers
Thermons

Chapter Seven- Universal Fields

A Universal Gravity Field
(The UGF)

The Concept

Even Einstein was forced to use a field theory format in describing the possibility of gravity waves. In fact, he probably deserves more credit for the model of a universal gravity field than any other historical figure. He understood a connection between movement and resistance existed, and incorporated this into his General Theory of Relativity. (In his later years, Einstein attempted to develop a broad field theory model, but lacked sufficient information. Also, he had effectively shot in self in the foot by having already dismissed the aether/EM field as unnecessary.)

Characteristics

Unlike the universal EM field, the universal gravity field (UGF) does not seem to exhibit detectable waves at the physical level. This does not exclude the possibility, but none have been detected to date. It thins between the planets and the stars, and grows denser as matter is approached, with larger forms of matter causing greater densities, or more intense gravity wells. Measurable differences can be detected at close range.

Protons and neutrons express gravity fields, and, theoretically, thermons spread throughout the universe express a weak form of gravity. The weak gravity produced by thermons provides a model for dark matter. The USF theory associates gravitational resistance to movement, or gravitational inertia, with both the UGF and local condensed gravity fields, and includes thermons, protons, neutrons, atoms, and matter.

As gravmagnetic fields weaken with distance, the EM field becomes significantly more rarefied in the space between galaxies. This suggests the probability of decreasing resistance between galaxies, and a resulting increase in the speed of light. Traveling spaceships would also meet with less resistance, allowing for significantly increased velocities.

A Universal EM Field
(The Unspoken Premise)

The Concept

The universal electromagnetic field is not a new concept. In 1844, Michael Faraday (who invented the first electric generator) gave a lecture regarding his novel idea of field theory, and in 1846 gave another lecture describing light as vibrations in lines of force in an electrical field. He was largely ignored because his theories opposed the popular 'aether' (an elastic solid) theory, a model most scientists at the time considered a well established fact.

James Maxwell later expanded Faraday's work mathematically, showing electromagnetic waves are self-sustaining, but his work was incorporated into the aether theory paradigm, allowing it greater credibility for the time period. As the aether paradigm ran into problems, Maxwell's equations continued to be highly successful in predicting the behavior of light and electricity. Aether, as a medium of light, was eventually replaced by the simpler electromagnetic field.

The electric field was unfortunately missing. It is common knowledge among astronomers that a weak magnetic field exists in the space between stars and galaxies. The (nearly) empty stretches of space between galaxies display magnetic phenomena, and thermal energy is also expressed by the cosmic microwave background (CMB) spectrum. The CMB spectrum is a nearly perfect blackbody with a temperature of 2.725 +/- 0.002 degrees Kelvin in all directions. (One might ask how the vaccum of space maintains a temperature.)

As the concept of photons became popular, interest in EM waves declined, but the model could not be discarded because of its continued successes, particularly in explaining a variety of phenomena the more limited particle theory could not.

Enter the concept of the thermon, as a neutralized electric entity. While extremely rarefied, all evidence suggests a universal electromagnetic field does exist and individual thermons, while at present difficult to detect, provide a highly functional model as the electric component in the transport of light and heat.

Characteristics

The universal electromagnetic field exists throughout the universe. Between galaxies, it is made up of rarefied thermons surrounded and separated by a weak magnetic field. Around matter, such as an atom, a star, or a galactic core, it becomes denser. The thermal fields in matter are a dense form of the universal electromagnetic field.

The universal EM field can act as a medium to support electromagnetic waves, which in turn can be broken down into units of kinetic energy called quanta. Quanta are the driving force behind EM waves and can cause thermons to split into subatomic entities called electrons and positrons. As individual, charged entities, electrons and positrons cause additional disturbances within the universal EM field and meet with resistance, or electromagnetic inertia, when moving.

Predictions

The concept of a universal EM field lays a foundation for the science of electromagnetic waves, though it is rarely discussed or mentioned in modern academia. Expanding electromagnetic waves are the result of a disturbance within an electromagnetic field. Light originating from other galaxies strongly suggests an electromagnetic field permeates the known universe.

A consistent historical problem in cosmology is the idea of the Earth as the center of the universe. Predictions of our universe's size and age are based on what we are able to see. Currently, the most distant object within visible range is estimated to be roughly 15 billion light years. Unsurprisingly, the current reductionist paradigm also estimates 15 billion years as the approximate age of the universe.

The idea of the known universe orbiting around a universal energy field 'core' should be considered, as should an even larger EM field encompassing our universe, and other universes.

The USF theory predicts the universe will be found to have a significantly larger Earth-centered visual radius than 15 billion light years. As a field theory paradigm, it predicts the universal EM field encompasses the known universe, and beyond, allowing light to travel from one galaxy to others.

Author's Notes

It is my sincerest hope that I have laid a solid foundation for a field theory paradigm. I have no doubt there is room for it to evolve and change. I apologize for any errors I may have made and highly recommend 'all' theories be treated with suspicion.

1. -Ampere and Faraday communicated, and argued, about their research. Faraday eventually convinced Ampere experiments and observations should receive a higher priority in developing theories than assumptions made by previous generations of scientists. These debates are understood to have changed Ampere's mindset, allowing him to give up some of his earlier notions and freeing him to develop significant contributions to the understanding of magnetic and electric fields.

2. -Faraday and Maxwell communicated regularly through the mail, with Faraday providing answers to Maxwells' questions about experiments and results, and Maxwell developing mathematical equations which accurately predicted the behavior of electric current and light.

3. -Is the oval shape of our solar system's planetary orbits the result of field resistance as our solar system moves through space orbiting the galactic core?

4. -It would be worth cataloguing and comparing the electromagnetic barrier frequencies of different materials, at different temperatures.

5. -There may be a relationship with dispersion (within matter) and gravitational redshifting.

6. - The problem with relying too heavily on mathematics, rather than direct observation, is that it can lead to what could be described as paradigm errors (or incorrect assumptions). As Sgt. Mobley, a powerline training instructor for the U.S. Air Force was fond of saying, "To assume something makes an ass out of u and me."

7. - The word 'assume' is found on the following pages: 6, 16, 35, 101, 121, 166, 170, 208, 210, 211. It should probably be located on every page of this book.

8. -'If' one could decrease the gravity and EM field resistance at the front of a space ship, while increasing thermon density at the rear, a form of warp drive would be created.

9. -A spaceship, encased in a pn junction (with a reverse bias) could provide shielding against solar beta radiation (high speed electrons from Sol). How to block heat with field energy? A version of the Peltier effect?

10. - It seems odd the writers of textbooks hide, or at least ignore, phenomena which is unexplainable using the current paradigm. Wouldn't young, fresh minds be the ideal place for sowing the seeds of doubt?

11. -Particle theory currently supports a number of particles that are smaller than electrons. The USF theory allows for the existence of infinitely small and infinitely large energy fields, but they are beyond the scope of this book.

12. - It is said Venus, the same size as Earth, has a very weak magnetic field. This weakness may be due to its closeness to Sol and the impact of electrons 'stripping back' and distorting its magnetic field.

13. -Experiments in space, using magnetic spheres with the poles and magnetic equators clearly marked, could provide insights into the formation and patterns of atoms.

14. -A gravmagnetic field? The relationship between gravity and magnetism has never been seriously explored.

15. -Sunspots may be a version of the Peltier effect.

16. -What are the chances our galaxy is orbiting the nearest quasar?

17. -The pn junction behaves very much like like the Van Allen belts around an atom. This would be worth investigating.

18. -I wonder if there's a magnetic alignment process involved in cold fusion that doesn't take place in IEC fusion.

19. -A spinning, 'saucer shaped' magnetic field might be the optimum design for minimizing EM field resistance and allowing travel at faster-than-light speeds.

20. -I disagree with Einstein's predictions of time being relative, but ignoring that, what does he mean by 'space' and what do I mean by space. His meaning of space is purely mathematical and deals with length, width, and depth. The three dimensions. My meaning of space is the electromagnetic field, made up of thermons which contract or expand, depending on their location and relationship with gravity wells.

21. -The contracting thermal field around a planet acts as a lens

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