THE SUPERPOSITION STATES OF PLANCK'S CONSTANT

by

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Synopsis

This paper utilizes Einstein's construct of space-time to proceed from a static gravitational field to an inertial bipolar gradient, and then to a 4-dimensional field oscillation as the most stable form of Planck's energy. It then demonstrates that a superposition occurs by a time dilation in which force and energy act upon each other within the same Riemannian point if the cause and effect of events are included in the dx_4^2 time projection as Euler's e^{ix} Identity, resulting in a quantum oscillation event.

The paper then proceeds to demonstrate that spatial contraction along the axis of propagation at the speed of light masks the orthogonal oscillation along that axis for an independent observer, but that if that oscillation is considered an oriented permutated bipolar effect occurs which is observed as electromagnetic force.

It is then demonstrated that such a 4-dimensional oscillation will manifest as a photon with inert fields if accelerated by a gravity field or manifests as a particle with mass, charge, and magnetic moment if inducted by an electromagnetic field. The paper then proves the validity of the theory by calculation of the proton and neutron magnetons, and demonstrates that the strong nuclear binding force results from the quantum superpositioning of particle's electromagnetic fields, and that such interference of fields can result in Yukawa's unstable particle generation.

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We see a Universe of objects and distinctions, and think a Universe of causes and continuity For instance, if we see a lake or a person we discretely quantify them, and then realizing that it doesn't fully explain them, we observe that they also have behaviors which are dependent on the presence of other objects

This realization has resulted in a bi-directional scientific effort, one yielding Einstein's continuous physics and the other resulting in a discontinuous quantum physics. Evolution of the two theories has proceeded towards one another only to be halted at a seemingly insurmountable boundary condition known as Planck's constant, 6.626×10^{-34} Joule-seconds, which says that energy exists as discrete quanta. Our description of matter agrees with this interpretation down to the magnetic properties of particles, and even energy content of light is accurately presented in de Broglie's, E = equation, but beyond that no common denominator has arisen to join these quantum and continuous views.

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1) The concept of Superposition States, of two diametrically opposed states of an object coexisting at the same time, was made famous by Schrodinger's Cat paradox in which a cat is forced to exist forever both dead and alive because a radioactive half-life decay proceeded to the last particle and stopped, causing a time dilation. Actual examples of superposition states exist, including wave particle duality, complex-valued waves functions of quantum physics, Yukawa's exchange photon in particle interactions, and literally all objects from the 4th-dimensional perspective since every object's beginning and ending co-exists in that dimension. Fundamental to all superposition states is time dilation.

Light photons are continuous in that they have a wave nature and their energy is a function of frequency, but they are also discontinuous in that they are dependent on h. By showing that the original interpretation of h was incomplete because relativity was unknown at the time of its discovery, it is possible to give a "description of physical reality in terms of fields which satisfy partial differential equations without singularities"[2] and harmonizes this superpositioning of physics

A clue into the unraveling of the mystery lies in the anomaly of wave-particle duality, a superposition state of both wave and particle natures. The form is determined by external influences, indicating a continuity with the rest of the Universe, but the ability to manifest both forms must derive from some fundamental characteristic within the particle, along with its mass, charge, and magnetism. Since Planck's constant is the denominator common to both forms, there must be a wave characteristic to its nature in addition to its quantum nature. And, since waves have an inert electromagnetic nature while particles exhibit external electric and magnetic natures, the root causes for these behaviors must similarly derive from the constant.

If an interpretation of Planck's constant can be found which provides a partial differential solution between energy and fields

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2) "CLERK MAXWELL'S INFLUENCE ON THE EVOLUTION OF THE IDEA OF PHYSICAL REALITY," Albert Einstein, Essays In Science, Philosophical Library Inc., 1934, p. 45. Einstein felt the Maxwellian concept of describing phenomena in terms of "partial differential equations without singularities" applied to the Universe as a whole and provided the path to a complete description of reality.

in space-time (i.e a wave nature), and which also maintains its quantum integrity, solutions to wave-particle duality, violation of energy conservation in charged particle interaction exchange photons[3], the phenomena of charge and magnetism, and a relation between gravitational and electromagnetic forces results

Conceptually such a solution is possible by redefining energy in terms of force and distance ($E = F \cdot d$). Whether compressing a spring, moving into an acceleration field, or as Einstein showed, creating an acceleration field by its presence (i.e. gravity), the relation is the same, energy equates to force times distance. This allows Planck's constant to be conceptually redefined so that $h = 6.626 \times 10^{-34}$ Joule seconds = 6.626×10^{-34} Newton meter seconds, where a Newton represents a force that accelerates a kilogram mass a meter/second^2 This definition allows h to be viewed as a field strength in space and time, or field density, such that a dynamic state may exist in which the field strength oscillates in three orthogonal spatial dimensions while maintaining quantum integrity.

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3) Yukawals theory of charged particle interaction by photon exchange uses violation of energy conservation during Planck's constant's energy-time window to create a virtual photon from the field of one charged particle to transfer energy and momentum to another and then reabsorb it, a superposition state. It uses Heisenberg's uncertainty (using a photon to measure particle position and momentum results in an uncertainty of photon momentum transfer and wavelength position error, the products of which equal or exceed h, making simultaneous measurement of a particle's exact position and momentum impossible). While this analysis correctly predicted existence and energies of pions and muons, it is conceptually unsatisfying because it violates a fundamental principle of real phenomena, energy conservation, to create a real phenomena. A more plausible explanation might be that the charged particle's fields oppose each other, that is their gradients act to accelerate each particle away. This gradient, dilated at the particles and contracted in the center between them, constitutes a wave length whose frequency increases, and thus energy by $E = hf$, as the distance between them decreases. By wave-particle duality, this standing wave would form a particle that would decay and return its energy as an opposing momentum.

A 3 orthogonal dimension field oscillation is a 4-dimensional energy distribution containing the "a priori"[4] quantum and wave structural information of matter, a binary superposition state of information The form, physical or wave, must depend on external influences, which was the concept Einstein developed in Riemannian space[5] for his general relativity theory In physical form the particles must exhibit uniformity and external forces so pieces can fit together into integral forms, atoms, "at whose boundaries electrical density disappears,"[6] in wave form all forces and mass must be internalized so as to be inert to external forces and the orthogonal field oscillations must form naturally

By Lorentz transformation inertial energy results in spatial contraction, $1 = 1_0 (1 - v^2/c^2)^{½}$ If the energy is distributed between three dimensions the contraction in each dimension becomes $1 = 1_0 [1 (1/3\ v/c)^2]^{½} = 1_0 (1 - v^2/9c^2)^{½}$, so less space stores more energy if arranged in orthogonal fields, and if stored in the temporal dimension, via oscillation then $1 = 1_0 (1 - V^2/16c^2)^{½}$, resulting in less spatial distortion. This configuration provides

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4) Einstein's concept of the "a priori" was a continuum of cause and effect in which effect derives from cause and investigation of effect resolves cause.

5) His Riemannian space is the perspective of an observer from a point with three linear Euclidean dimensions existing in a linear time flow, surrounded by neighboring points which may be nonlinear in space and time flow, depending on physical influences, so the observer from the point will see linear space and time and an independent relative observer will see distorted space-time.

6) Einstein's solution to the "quantum-riddle" was an atom without localized particles, described in terms of partial differentials without singularities, and in which electrical field equations describe "A portion of space at whose boundaries electrical density disappears everywhere, always contains a total electrical charge whose size is represented by a whole number." The "atomic characteristics would be satisfactorily expressed by integral laws without localization of the formation entity which constitutes the atomic structure."

maximum energy storage in minimum spatial distortion, equalization of field oscillations between dimensions, and a fundamental stable energy state in space. It would constitute an "energy well" in that it would require additional energy to alter its form

This explanation is incomplete however. Even though the most stable configuration is orthogonal oscillating fields, it does not explain how energy "knows" to take that form or what its frequency should be. By the general theory a region of energy in space would create an acceleration field which would concentrate it, and all energy in the Universe eventually, to a point in space and time would stop. Since this does not occur there must be a density function at work which opposes the concentration of energy. This converse to relativity is contained in its initial premise that, based on empirical law, the velocity of light is constant

The fact that light velocity is only $c = 2.99792458 \times 10^8$ m/s means that space has a property which opposes inertial energy, at least to, the degree of how fast it can move. The derived Lorentz transformations also confirm an opposition to space contraction, time dilation, and mass increase, in that the effects are limited to the function defined by the equations

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7) Four empirical constants relate energy, space, and time: Pi relates space and time dimensions, e^x relates energy transfer in the dimensions, and Planck's constant relates energy to field density, a gradient in the dimensions. Speed of light, c, defines an energy density relation in space-time. The effect of mass static) and inertial (dynamic) energy on the dimensions of space-time are both defined and limited the Lorentz transformations, $1 = 1_0 (1 - v^2/c^2)^{½}$, $t = t_0 (1 - v^2/c^2)^{-½}$, $m = m_0 (1 - v^2/c^2)^{-½}$, where 1_0, t_0, and m_0 are the rest length, time, and mass perceived by an observer in an inertial system, and 1, t, and m are the parameters seen by an observer of the inertial system.

Density (mass/volume) is a measure of the space required to contain a specific mass of energy. But we are seeking an inverse density, a force of space opposing concentration of energy by its own acceleration field, similar to buoyancy where the displacement weight of a liquid creates a force to support a mass. In this case the buoyancy force manifests as a limitation to the contraction of space We know that energy causes space to contract in relation to its quantity and form[8], but not what limits it. However, since acceleration creates a force, for a system to be in equilibrium we must have an equal and opposite force to oppose this acceleration.

From the vantage of an independent observer energy creates a contraction gradient in surrounding space, but not from the local observer's perspective. A superposition state (space contracted and not contracted) is occurring, depending on the observer. Both are correct in that contracted space is compensated for by dilated time at local level so the velocity of light, c, is constant from both perspectives. In effect, the phenomena of time dilation dilates contracted space for the local observer. An independent observer does experience dilated time and sees light traverse the distance in less time, thus a contracted space.

However a paradox occurs as the independent observer realizes that he is the local observer of a region of space with energy in it If he takes a perspective with a field of view, where a mass moves through its center, he realizes that the contracted space

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8) Inertial energy contracts space in the vector of its motion

around the mass has the effect of creating space within the field. If he holds a ruler in front of him so its ends line up with the edges of the field, the region of space aligned with the inch in the ruler's center will contract to 1/8" as the mass passes thru the center, and so forth But the edges are still a foot apart so the contraction must have created space corresponding to the 7/8", gap created. Obviously contraction of space must either draw space from other regions or space must have a density coefficient such that it can be expanded by influences from neighboring regions

If, as Einstein theorized, "structure [of space] depends on physical influences"[9], with energy contracting space and energy removal returning it to its previous state, then energy presence in a region could cause an expansion of neighboring space outside the energy's acceleration field. Such reasoning imparts an elastic quality to space, with "memory," and a basis for energy to "know" what form to take. This requires a re-examination of Reimannian space[10] with inclusion of secondary relativistic effects and the concept that events in time also constitute "physical influences," since past events are the cause of present effects

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9) "The Problem of Space, Ether, and the Field in Physics," Albert Einstein, Essays in Science, The Philosophical Library Inc., 1934, p. 73.

10) Einstein started with the empirical law of "constant velocity of light" and determined that $d\sigma^2 = c^2dt^2$, where do is the length between two infinitely close points, P and P', c is the velocity of light, and dt is the transit time. By incorporating dx_1, dx_2, and dx_3 as orthogonal projections of $d\sigma$, and the imaginary time coordinate" $x_4 = (ict)^{½}$, he generalized the propagation of light as "$ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$." "Since this formula expresses a real situation we may attribute real meaning to ds." This is the Pythagorean theorem applied to differentials representing space and time and gives linear Euclidean qualities to a point's local observer while ds may be non-zero for neighboring points so as to incorporate relativistic effects for independent observers. His time, t, was the relative rate of flow of time, not a point in time.

In order to incorporate the law of inertia, with velocity and direction, Einstein represented a point in 4-dimensional space as a straight line, ds, approaching zero length. By the Pythagorean theorem, $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2$, he incorporated 3 orthogonal spatial dimensions and an imaginary time coordinate, representing time flow rate as a distance in terms of velocity of light, where x_4 $(ict)^{½}$ and $dx_4^2 = i \cdot c \cdot dt$. This gave each point its own time flow rate (incorporating the law of motion) so that if it was a "material point" (i.e. containing energy) it could have the inertial properties of velocity and direction. He did not incorporate secondary relativistic effects, directional time flow rates, or the effect of events in the time flow rate of a point.

By giving each point an individual time flow rate he was able to show that while 2 events are simultaneous in a reference frame (i.e. two points with identical direction and velocity), they are not simultaneous for a second frame moving relative to the first (i.e. two points with different directions or velocities), so that simultaneity depends on the state of motion of the observer And if adjacent points have different inertial vectors, with different time flow rates, as may occur with a 3-dimensional oscillation or the center and circumference of a rotating disc, then the points may be combined into one point as the distance between them goes to zero. This allows a point to possess two time flow rates, thus a time dilation, within its time flow rate, and a superposition state may result by two simultaneous events occurring at different absolute times in the time dilation of the point's time flow rate.

For example, consider two particles with different velocities and flow rates. Even with different local times they can collide with each other because both exist in the observer's time. However, if it possible to initiate subparticle collisions on each, a different result would occur If both particles were given identical velocities and local times, and identical subparticle collisions were simultaneously initiated, their collisions would occur at the same time and it could be set up so the particle and subparticle collisions all occurred at the same point in space and time. However, if particle velocities and time flows differ, and identical subparticle collisions are simultaneously initiated the collisions occur at different times to an observer.

In effect, simultaneous events are shifted in time in systems with secondary relativistic effects Independent events may also be made simultaneous by mathematically determining velocities and timing of the initial events so as to adjust the variables in the particle and subparticle processes and make them simultaneously collide, at least to the degree of certainty of Planck's constant in Heisenberg's Uncertainty, and if h is resolved as a partial differential without singularities, the only uncertainties are the truncation errors introduced by ϵ^x and pi[11]

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11) The constant pi = 3.14159.., an empirical transcendental non-truncating number, relates the 3 spatial dimensions and time by the orthogonal velocity of energy to propagation velocity of a wave. For a sphere $V = 4/3 \cdot pi \cdot r^3$, or $pi = 3/4\ V/r^3$. Since Volume and radius are finite, their ratio is finite and cannot equal a transcendental unless the radii are individually considered such that $r^3 = r_x r_y r_z$. If pi is empirical then the radii product must be an inverse of pi according to Heisenberg's Uncertainty, $1/pi \leq 4 \cdot dr \cdot dp/h \leq 4 \cdot dE \cdot dt/h$, a wave function. Conversely, since space always contains an energy field influence pi may never truncate.

If simultaneous events become shifted in time by secondary relativistic effects, the occurrence order of the events remains fixed in absolute time, and no superpositioning results However order of events affects process outcome. If events A and B occur simultaneously they are neighboring physical influences but if A occurs first it affects B as a temporal influence. If A and B initiate on passing each other (physical influences) and subsystem B is moving faster (slower time) then A will occur first If the occurrence of A has an effect of absorbing energy from subsystem B, slowing it down (faster time) subsystem A will speed up, pass subsystem B, and B will occur sooner The process will repeat, oscillating from the alternating physical and temporal influences

The superpositioning of A and B are a steady state resulting from the system's internal physical and temporal influences but an external physical influence could interfere with the process, such as absorbing energy and causing process termination leaving A or B as the final state. The continuity of the process is described by Euler's Identity, $e^{\cdot} = \cos x + i \sin x$,[12] where cos x represents the physical influences in the oscillating superposition state and i sin x represents the temporal influences in the imaginary time domain. Sine and cosine are phase shifted by 90° so that as one effect peaks, orthogonal imaginary effects act to counter them

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12) The constant e = 2.71828…, an empirical transcendental non-truncating number, defines energy transfer in the dimensions. Because e doesn't truncate, represented as $e^x = 1 + x + x^2/2! + x^3/3! + \cdots + x^{\tilde{}}/\infty!$, it means that energy transfers never reach a static steady state. If it did all processes eventually would reach a termination state and stop and the Universe's fluid nature would become static. By equating to real oscillating phenomena, with an imaginary phase shifted counter influence, dynamic systems attain equilibrium.

The effect is exemplified by a simple pendulum The strongest physical influence (maximum gravity) occurs at the bottom of the arc the pendulum's motion reverses at the arc's end (minimum gravity) out of phase. Gravity, a static physical influence, varies in strength as a cosine as the pendulum oscillates in the vertical dimension However, it is the horizontal force (a dynamic influence in time) that moves the pendulum orthogonal to gravity and causes its vertical oscillation. The velocity at the bottom of the arc is relatively constant so its acceleration ($a = dv/dt$) is zero and thus its horizontal force ($F = ma$) is zero, but at the end of the arc, where the pendulum stops and reverses, the change in velocity, and thus its acceleration and force, is maximum.

This superposition state (cosine oscillation of a mass in a static gravitational field and sine oscillation of the mass in a dynamic field in time) is an extension of Einstein's equivalence of gravitational and accelerated reference frames in that inertial energy (bottom of arc) transforms to gravitational energy (end of arc), and vice versa. It's significant because each depends on the other by e^x $x + i \sin x$,[13] and while energy transformation in a pendulum depends on the hinging of a mass, in superposition states the forms hinge to each other in the dimension of time.

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13) Normally e^x is thought of in terms of its ex curve of energy transfer between states, like half-life curves. The curve results from its expansion elements, $1 + x + x^2/2! + x^3/3! + \cdots + x^\infty/\infty!$, numerators representing degrees of energy freedom and denominators representing dimensional energy flow windows between degrees of freedom. In other words, energy doesn't transform directly from 4 degrees into 1, it transforms continuously through 3 and 2 first. The e^x curve only asymptotically approaches a finite state and Euler's Identity shows that in two state equilibrium systems the energy transforms between the states by a sine-cosine function in the "imaginary" orthogonal dimension of time.

In a pendulum energy "knows" how to transform between static gravitational and dynamic inertial forms by the constraints of the hinge and mass, and in space energy "knows" by the constraint of constant velocity of light (Lorentz Transformations) as a physical influence of surrounding space and by being hinged in time by the constraints on energy transfer described in Euler's Identity. It's a relative temporal influence because the effect at any point in space-time depends on its prior state. In a pendulum the period of oscillation is given by $T = 2 \cdot pi(L/g)^{½}$, where g is the force of gravitational attraction and L is the distance between the hinge and the mass. In a pendulum the period is independent of the mass quantity, but is dependent on gravity acting on it

However, in space relativistic effects are the physical hinge and the force is the field created by the energy ($E = F \cdot d$). A mass, gravitational, is relativistically static and distorts space-time equally in all directions, but in inertial motion it is vectored, contracting space in the direction of motion and dilating it back to a relative norm in its wake. This oriented contraction-dilation is the basis for a mass in motion staying in motion

A mass' relative velocity, ds/dt, is negative with respect to the acceleration field, d^2s/dt^2, created by its inertial energy so theoretically its motion should slow. However, the oriented time dilation, d^2s/dt^2, opposes and differentiates the acceleration field so velocity remains constant. Since orthogonal energies are static and equal it remains vectored in its direction of motion.

In addition to the contraction gradient in the direction of motion there must be an equivalent dilation gradient in its wake Otherwise, either instantaneous dilation and infinite acceleration would result or space would remain contracted and inertial motion would collapse the Universe If presence of energy contracts space (by Einstein's Riemannian space), energy removal dilates it (by converse of light velocity constancy and Lorentz Transformations), and inertial and gravitational frames of reference are equivalent, then a standing longitudinal compression wave of space exists with a $2 \cdot pi$ wavelength and period which depends on its velocity.

The faster its velocity, the greater its energy ($E = \frac{1}{2}mv^2$), and the shorter the period for the compression wave to traverse a point in space. This comports with de Broglie's "matter wave" for particles ($E = hf$) If energy creates a contraction gradient, and is released on dilation as the object passes through the region influenced by the energy, then energy is being dynamically stored and released from the contraction-dilation field of the wave as the object passes through it to create new contraction-dilation field This is a continuous process, a traveling wave, and if the inertial energy becomes great with respect to the energy contained in the mass then a particle would exhibit wave properties.[14]

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14) Wave-particle duality (Doubleslit experiment) is a phenomena of electrons being detected as particles, localized in space-time, but distributed according to a probability of interference patterns of matter waves. Waves constructively and destructively interfere because inertial energy manifests as waves in space and by Riemannian space, energy of one point influences its neighboring points. Since particles move according to field gradients they create by their inertial energy, particles must distribute according to an interference pattern. Wave particle interference patterns are a measure of the ratio of inertial energy to mass, and particles with different energies alter the pattern accordingly.

Pure inertial energy (without mass to possess velocity, by temporal differentiation of the acceleration field) constitutes an acceleration field, an unbalanced force over distance. By its own effect on space it will direct itself into an uncontracted region, and as energy flows from the contracted region it will dilate and the space it flows into will contract. This gradient will in turn cause the energy to flow back to the depleted region, and continue to oscillate as a longitudinal wave between opposing acceleration fields. While this is balanced in the oscillation dimension, it is not balanced in the other two and subject to destabilization and energy loss by interference from field gradients of other sources

If the energy is distributed in a 3-dimensional orthogonal oscillation, however, it will be stable to extraneous fields in any dimension because its own acceleration fields will counteract any interference. And as previously mentioned this configuration is naturally more stable because it results in significantly less spatial distortion. However, this configuration is subject to external influences which will transform it into a light photon with inert electromagnetic fields and zero rest mass or a particle with uniform quantum external electromagnetic fields and mass

Energy, existing as a 3-dimensional field oscillation, has no mass because fields have no mass. However, fields are affected by other fields in that they can be interfered with according to the rules of constructive and destructive wave interference. Fields are also influenced according to the Riemannian structure of space in that if a neighboring point in space is contracted or dilated it will affect the

position of the point under consideration and in changing its position will impart a local acceleration to it. Since the 3-dimensional oscillating field has no mass it will be accelerated to c, the speed of light, and manifest as a photon.

In the direction of motion length will be contracted to zero, by Lorentz Transformation, for an independent observer and there be no oscillation along that axis. However, from a perspective of a local observer the oscillation still occurs. This does not create a paradox of zero and finite length of space, it means that the dimensions of space are relative to an observer and that space does have an inverse coefficient of force which opposes its contraction when it contains energy. This agrees with Einstein in that if it takes infinite energy to accelerate a mass to c, no energy is left in the Universe to require space. An infinite mass would collapse space, while the mass and field still occupy space.

If the 3-dimensional field oscillation is moving at c, then the oscillations in its orthogonal dimensions will traverse sine trajectories, just as a spring-mass oscillating vertically will traverse a sine trajectory if given a horizontal velocity. And at the 0^0 point on a sine wave the slope is one ($d \sin x/dt = \cos x$) so the orthogonal velocity must also be c, creating a secondary relativistic effect to the oscillating fields, since the photon moves at c for an independent observer, the fields oscillate, and the velocity of the field is c for the local observer at 0^0

The secondary relativistic effect contracts space to zero and dilates time flow to ∞ at 0^0 and creates an acceleration field to the local observer but not to an independent observer because time differentiation negates the secondary effect on independent points in space,[15] so independent points don't experience the effect of the secondary field but the local point does. Since forces of the primary and secondary fields are equal and opposite but shifted in time, by Euler's Identity, $e^{ix} = \cos x + i \sin x$, where cos x is the primary field and i sin x is the secondary and opposing field, they balance each other in a stable wave state This renders the fields inert to external static fields (i.e. gravity) although its trajectory follow spatial distortions (i.e bending of light).

In effect the secondary temporal effect renders the field invisible to external static fields. However, this does not occur to external secondary dynamic fields since dynamic fields possess similar temporal effects and if they exist in the same region of space time they will interfere, which electromagnetic fields do with light, either generating light photons by the energy in two opposing dilation fields or absorbing light in two opposing attraction fields, as exhibited in charged particle interactions, or by refraction (shifting of frequency) in strong fields.

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15) This is the opposite effect described on page 6 for a local observer in a static field without secondary effects. Since the state of a point is the sum total of all forces acting on it in space and time, the sequence, magnitude, proximity, and orientation of events will determine the local and independent observations. A Riemannian point in a static field experiences Euclidian space but if a local observer becomes an independent observer of a phenomena within his point he will observe relativistic effects, and if the phenomena occurs between the local observer and an independent observer from another point, the effects are equal, opposite, and negated for the independent observer.

At an orthogonal oscillation peak, field velocity is 0, space is dilated, and secondary field energy has transferred into the primary field as an inverse acceleration. Since time is undilated at the peak, energy in the primary field is "visible" to external static fields and is affected by them.[16] Because electromagnetic fields have sine varying time dilations from ∞ at 0^0 to zero at 90^0, energy in the primary field is in temporal phase with and visible to external electromagnetic fields over the entire cycle and such fields will completely interfere over the full cycle

Although Maxwell's equations characterize the fields of an electromagnetic wave they don't explain the phenomena of electric and magnetic fields. From the perspective of a local observer at the node of orthogonal oscillating fields no orientation occurs because the fields oscillate symmetrically between the +++ and --- coordinates. However an independent observer sees an orientation polarity with respect to

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16) Energy will transfer from a primary field which intersects an external static field during normal time at the oscillation peak, resulting in red shift and bending of light. The effect depends on the time spent in the region of the peak, thus lower frequency photons are affected more than higher frequency ones which have less relative time at the peak. If photons merely followed the curve of space from a gravitational field they would circle it endlessly. However, light has its own inertial energy component and the effect must be a vector sum of the gravitational and primary fields in the time domain.

17) Electromagnetic fields constructively and destructively modulate and demodulate because even though frequencies differ they are in temporal phase over the entire cycle. Energy transfers from one point in space to another, one field to another, depending on the field vectors and energy content. In other words, if they are out of phase, opposing fields, energy transfers from them electromagnetically to another region, and if they are attracting, in phase, energy transfers from a low energy field to a high energy field because the gradient in the high energy field is stronger, lower frequencies modulate higher ones. Momentum of charged particles is an energy source so constructive interference from opposing fields creates photons. Conversely, the destructive interference from oppositely charged particles absorbs photons.

propagation and the observer's relative position.[18] Since charge and magnetism coexist mutually dependent on one another they must be considered an effect.[19] The parameters available as causes are oscillating fields, their orientation with respect to each other, the velocity of those fields relative to an independent observer, the fact that the oscillation on the axis of propagation is visible to a local observer but not to independent observers, and the relativistic effects on space and time.

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18) By convention electromagnetic waves are viewed from a forward upper left position (xy-z quadrant) so the E^+ field is on the y axis and the B^+ field is on the -z axis. From a forward lower left position (x-y-z quadrant) the fields appear rotated so that B^+ is now E^+ on a y axis and E^+ is now B^- on a z axis. In polarization, light waves pass through aligned long-chain hydrocarbons doped with iodine for conductivity. Iodine valence electrons absorb light waves whose E field vector parallels their ability to move along the hydrocarbon chains so only waves whose E fields are perpendicular to the chain alignments are passed. While polarization only requires E field alignment, coherence has E and B field phase alignments and complete superpositioning. These two extremes of alignment show total polarity involves both field orientation and phase relation to other fields (i.e. same orthogonal field orientations and phase yield same polarity.)

19) Charge and magnetism independence are circumstances of structure. Magnets result from electron spin alignments but are electrically neutral because atoms equalize charges. Charge buildup results from accumulation of electrons but is magnetically neutral because of the random electron spin alignments. Particles have a quantum unipolar charge independent of velocity and a bipolar magnetic component dependent on the particle's energy specified by the Bohr magnetron $u_B = e \cdot h/4 \cdot pi \cdot m_e = 9.27x10^{-24}J/T$, or energy to magnetic flux ratio. Since E and B fields result when 2 orthogonal field oscillations move at a velocity it means particles have a 3-dimensional orthogonal oscillating field with E field phases radially oriented so that particle exteriors exhibit one polarity and interiors possess the other. This field polarity requires that the E field oscillation be local on a spherical plane within the particle, that the orthogonal propagation oscillation occur on the same plane, and that an orthogonal B field oscillation occur external and radial to the sphere so magnetic field poles occur axially through the spherical surface. This limits charge to a quantum value dependent on rest mass since field strength depends on the energy content and oscillation frequency (E = hf) and the only energy available for a spherical oscillation is the rest mass energy by $E = mc^2$. Since the magnetic field is bipolar and radial increasing particle energy will contract space in its motion direction so the magnetic field oscillation frequency increases as wavelength decreases or its orthogonal field gradient increases, while the local spherical electric field oscillation remains constant. Using de Broglie's E = hf relation $u_B = 9.27 \times 10^{-24}h \cdot f/T$. For a rest mass of $m_e = 9.109x10^{-31}$ kg, by $E = mc^2$ m_e translates to $8.186x10^{-14}J$. Dividing by 3h, for 3 oscillations, the fundamental electron frequency is $f_e = 4.118x10^{19}Hz$. This configuration explains quantum charge and a magnetic component dependent on energy, such an oscillation configuration requires a Riemannian geometric to make the spherical oscillation possible.

The vector sum resultant of the three oscillating fields is represented by Einsteins's Riemannian constancy of light formula, $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$, if ds^2 is the resultant and the dx^2's represent the orthogonal field oscillations and time in terms of Euler's Identity. This incorporates the influence of prior events into his Riemannian concept and allows us to analyze the formation of physical matter as a dynamic pattern of energy creating its own forces to maintain the pattern in a stable state. It is Archimedes' "place to stand" that moves the Universe between energy and form, a pivotal hinge between continuous and quantum.[20]

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20) Strictly speaking this was not Einstein's intended application since his ds^2 represented "constancy of the propagation of light" as an infinitely short line and this applies to accelerating field wavefronts within light and their resultant effect on neighboring points in space. However $F = ma$ and $m = E/c^2$, where F is constant and linear for constant acceleration and by the Pythagorean Theorem summation of forces equals 0 in equilibrium states, so ds^2 represents the resultant acceleration fields constituting the forces. Equilibrium further applies to forces undergoing variations in time, and separated by propagation delays in time, as in wave oscillations described by $e^{ix} = \cos x + i \sin x$. If ds^2 is substituted for x then e^{ix} becomes $\cos ds^2 + i \sin ds^2$, where $\cos ds^2$ represents the motive energy of the field gradient and $i \sin ds^2$ represents the forces controlling the motion. In a pendulum the orthogonal force is the sine variation in gravitational force on the mass resulting from a hinge and chord. In a wave the hinge is the resultant of the orthogonal oscillating fields and the chord is the force, based on spatial contraction proportionate to relative energy. As the wavefront velocity of the E and B fields reduces from c to 0 the motive energy transforms into an orthogonal resultant which creates an opposing gradient. This resultant appears 45 between the E and B fields for independent observers, because the propagation axis oscillation is masked due to spatial contraction in direction of motion, and it appears 45 from each axis to a local observer at the node, but it is 90 to the observers on each wavefront, being the hypotenuse of equal oscillating fields. The energy transformed from oscillating fields to the resultant becomes an opposing acceleration field that opposes energy's motion. This is apparent in the proof of Euler's Identity, where $e^{ix} = (1 - x^2/2! + x^4/4! - \cdots) + i(x - x^3/3! + x^5/5! + \cdots)$, if we let $ds^2 = x$, its "orthogonal projections" represent cosine wave oscillations, and its sine term represent the opposing resultant (positive terms representing energy into a function and negative terms representing energy from it). The resultant oscillates between the xy-z and -x-yz quadrants and velocity transforms it to a 45 slanted sine wave whose wavefront traverses a spiral path about the axis of propagation according to the Right Hand Rule, and which conforms to $\bar{F} = q\bar{v} \times \bar{B}$ if $\bar{F}$ is the i sine force on energy into the resultant as the E and B fields build and out of the resultant as they decay, a chord to the resultant's hinge.

Summarizing, if:

1) inertial energy creates an acceleration field (gravitational to local observer) differentiated by time dilation in motion direction, and a deceleration field (anti-gravitational) integrated by time contraction in its wake, it will appear as a constant velocity to an independent observer;[21] and if

2) Planck's constant is represented as force, distance, and time, instead of energy and time; and if

3) pure energy without form is inertial, forming only an acceleration-deceleration field which opposes energy flow so as to cause local oscillation (while still having constant velocity to an independent observer); and if

4 a 3-dimensional oscillating field is more stable (equalized distribution with less spatial distortion); and if

5) pi is empirically transcendental such that at least one dimension contains a field gradient to accelerate such a zero rest mass structure to the velocity of light; and if

6) the orthogonal field oscillations moving along a propagation axis traverse sine trajectories; and if

7) the propagation axis oscillation, although contracted for independent observers, exists for local observers; and if

8) cause and effect influences of temporal events are included in Einstein's Riemannian space, with forces from equalized by temporal propagation delays, as in wave equations; and if

9) translational motion of such a structure results in polarity of fields conforming to the Right Hand Rule for independent observers, then there is

a) equivalence between gravitational and electromagnetic fields, where g is a function of static energy quantity ($m = E/c^2$), E depends on oscillation energy ($E = hf$) and orientation in a 3-dimensional field structure, **B** depends on orientation and velocity of **E** (see note 19), and both are inert to g because of masking by secondary relativistic effects; and

b) the formation of physical matter as a dynamic pattern of energy creating its own forces to maintain the pattern in a stable state is established.

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21) By "equality of inert and heavy masses." Its the relativistic equivalent of Heisenberg's Uncertainty. Just as a particle's velocity and momentum cannot be simultaneously known (because of the wave nature of particles and light) to an independent observer, similarly the acceleration-deceleration fields of an inertial system cannot be known by an independent observer because of the time dilation and contraction.

In light, electric and magnetic fields are inert because of the properties of space specified by the empirical coefficients, permitivity, e_o, and permiability, u_o [22] Since light moves at c, the fields move at c, and their respective + and - field strengths match, their effects equalize within their region of space unless similar strength field influences from other sources affect space so as to cause field superpositioning Particles however travel at less than c while their fields radiate at c so their fields don't equalize and are apparent to other sources in similar dynamic frames of reference i.e electric or magnetic fields)

For this reason particles are unstable and either decay or stabilize into atomic configurations according to an e^x relative time curve dependent on the quantity of particles present Both radioactive decay and stabilization into atomic configurations are

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22) Permittivity, $e_o = 8.8542 \times 10^{-12}\ C^2/N{\cdot}m^2$, and permiability, $u_o = 4{\cdot}pi \times 10^{-7}\ T{\cdot}m/A$, define the behavior of electric and magnetic fields on free space. Since $1\ T = N{\cdot}s/C{\cdot}m$ and $1\ A = C/s$, $u_o = 4{\cdot}pi \times 10^{-7}\ N{\cdot}s^2/C^2$ so e_o and u_o define two aspects of the same effect, a force's space-time attraction and repulsion gradients for <u>two</u> charges. Since $c = (u_o e_o)^{-½}$ it means that the product of both space-time dilation-contractions are c^2, and being coincident, if generation of a field's components are limited by c then its propogation must also be limited by c. They were defined in terms of charge because it was believed to be more fundamental, quantum and capable of being accumulated, while magnetism appeared continuous and bipolar with strength dependent on charge quantity and velocity. In actuality both are mutually dependent effects of 3-dimensional orthogonal field oscillations. Neither exists without the other although one pole of what we call charge is masked by existing within 3-dimensional particles, orthogonal to its magnetic axis, and so particles appear unipolar in charge and bipolar in magnetism. Bipolar charge, existing radially, is a binding force of the energy in particles and is quantum because the field oscillation frequency depends on the quantum rest mass. Since the electron is the lighter particle in a hydrogen atom, an electron-proton stable state, and charges must equalize so "electrical density disappears everywhere" at its boundaries, it is the defining charge to mass ratio. Magnetism, orthogonal and axial, is dependent on particle kinetic energy according to $dB/dt = -dE/dx$ and $dB/dx = u_o c_o{\cdot}dE/dt$ because motion, dx/dt, will affect its apparent field oscillation frequency to an independent observer. By $E = mc^2$, $m = E/c^2 = Eu_o e_o = E{\cdot}B^2/E^2$, the bipolar binding forces.

decays from a particle's relative perspective. Similar particle proximity will result in field interference which destabilizes its electromagnetic binding forces causing radioactive decay into more stable forms (electromagnetic radiation, protons and electrons), and proximity of dissimilar particles (i.e. opposite charges and masses) destabilizes them as individual particles and decays them into atomic configurations. The binding forces on the energy are given by $E = mc^2 = m/u_oe_o$ so $m = Eu_oe_o$ and since $u_oe_o = B^2/E^2$, the mass of a particle is the quantum energy bound by the ratio of the magnetic and electric fields Since the fields are bipolar, and B and E only represent one pole's field strength, they are squared, and since B changes with kinetic energy so does particle mass.[23]

Protons and electrons stabilize into hydrogen configurations, with electrical density disappearing at boundaries, and the atoms stabilize into molecules, with magnetic density disappearing at boundaries, however singular electrons and protons are not stable states since their charge and magnetic fields are not equalized. And there is a secondary relativistic effect to proton and neutron magnetic fields since they have static "heavy" energy and dynamic energy. For this reason, if the Bohr magnetron of the electron is taken as the fundamental reference, a proton's or neutron's magnetron can not be proportionate since the static quantity of their energy is relativistically different from an electron's

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23) This analysis explains wave-particle duality since spatial contraction masks the particle nature for an independent observer as velocity increases and field oscillation frequency increases with energy according to $E = hf$. Since the unequalized field energy increases with velocity, field interference from neighboring particle fields occurs with constructive-destructive distributions.

Just as ferrous metals affect the magnetic field of a current loop by providing a medium to increase flux density the additional mass in a proton will similarly increase its flux density. From a Classical perspective, inductance, L, is the ratio of magnetic flux linkage to current producing the flux and is a product of spatial geometry and permeability. Inductance is magnetism's equivalent of mass, since $E_m = \frac{1}{2}mv^2$ and $E_B = \frac{1}{2}LI^2$. The difference, between gravity and electromagnetic forces is that one is a static radial space-time contraction-dilation dependent on energy quantity and the other is a permutated dynamic force dependent on the quantity and oriented energy motions,[24] and since energy relativistically affects space-time according to quantity, motion, and orientation, the relativistic effects of L, magnetic mass, must be included

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24) Gravity is weak, static, dependent on energy quantity, and dimensionally radial as a point source. Inertia is equivalent to gravity reduced to a single dimension and its effect is relative in that a local observer experiences no change, a propagation axis observer experiences an acceleration field as the inertial object approaches and repulsion as it departs, with no time dilation or contraction since time is the reference point on which an objects motion and acceleration fields are based and the fundamental premise of Relativity is that an observer cannot observe change in his own reference point, and an orthogonal independent observer sees the space contraction and dilation differentiated by time dilation and contraction (i.e. constant velocity). And while gravity is a weak force Inertia is strong, non-linear, continuous (dependent on mass and velocity $[m_i = m_0(1 - v^2/c^2)^{-\frac{1}{2}}]$), bi-polar, and its full effect reduced to one dimension. Electromagnetic forces are permutated effects of accelerated energy in a 4-dimensional orthogonal oscillation with respect to itself, with inertial momentum and secondary relativistic effects along a propagation axis, resulting in two strong orthogonal forces polarized with respect to propagation (Right Hand Rule), oscillated in time by secondary relativistic effects of oscillating energy wavefronts, masked to static gravitational fields but subject to similar fields oscillating in time, and held in a stable oscillating energy structure by Euler's relation ($e^{ix} = \cos x + i \sin x$) where the forces created by three orthogonal energy motions direct the energy motion and as energy orthogonally transfers to the forces they become the energy, stabilizing the process as a 3-dimensional wave structure. Each degree of energy freedom has a permutated effect and proof of existence of secondary relativistic effects is empirical in that both earth and magnets have co-existing gravitational and magnetic fields which do not interfere and the only dimension available to meet the criteria of non-interference at the same point in space and time is the time dimension.

The concept of magnetic mass adds a relativistic dimension to quantum physics when one considers that spin angular momentum for an electron is $3^{½}$ h/4 pi = $91.32x10^{-30}$ J s and the ds resultant in Einstein's Riemannian point is $3^{½}$ h if h a field oscillation.[25]

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25) By the Pythagorean Theorem, if $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2$, then ds = $3^{½}$ h + time, if the orthogonal projections of Einstein's Riemannian point are the h-field oscillation amplitudes. Ds is their resultant inertia oscillating between opposing quadrants and which forms a helical trajectory with an orbital angular momentum about the propagation axis (note 20), with h being the common denominator between Einstein's Riemannian point and the Bohr magneton. When the Bohr magneton is calculated it varies inversely with electron mass so one would expect a proportionate nucleon magneton. However proportionality only applies for free space in which u_o is the only factor. Velocity of light is limited by the e_o and u_o properties of space (i.e. $c^2 = 1/ u_o e_o$) because energy exists as a zero rest-mass 3-dimensional oscillating h-field state of Planck's constant. But mass has inert energy bound by **E** and **B** forces (h-mass = $\mathbf{E}\,\mathbf{B}^2/\mathbf{E}^2$) in a spherical oscillation with inertial resistance to acceleration limited by the Lorentz Transform properties of space. One is a dynamic state of energy, space and time and the other is a static state, so correlation requires integration of the dynamic variables over the volume. Since the magnetic mass, $L = 2\ E_B/I^2$, is the ratio of total flux to current linked, $L = \int vol\ \mathbf{B}\,\mathbf{H} / I^2\ dv$, wher H is the magnetic field strength and $\mathbf{B} = u_o u_r \mathbf{H}$ is the flux density, the relative coefficients u_r and e_r must be included to correctly determine a particle's magneton. An electron's diameter = $1x10^{-16}$m and a proton's is $2x10^{-15}$m. By $V = 4/3\ pi\ r^3$ their volumes are 5.2410^{-49} and $4.19x10^{-45}$ m^3, a ratio of 8000, but their mass ratio is 1836 so a proton's energy density is 4.36 times less. Less density would result in greater acceleration and magnetic field strength, and since this is the average energy density of a volume and **H** is 1-dimensional it must be divided by $3^{½}$ to yield an average relative coefficient Of $u_r = 2.52$, which is within 10% of the observed 2.7928 and attributable to resolution error in particle diameters of 3%. However the E-field oscillation is on a spherical plane with phases radially oriented so charges manifest radially with one pole on the surface and the other in its center, the propagation axis oscillation is in the plane of the surface, and the B-field oscillation occurs radially with poles axial to the sphere. (Polarities depend on **E** and **B** field orientations.) Since the volume available for energy in a radial oscillation varies with the cube of the distance from the center of a sphere, the density of the energy is also varying with the cube of the distance. So even though the average density is 4.36, such a cubic variation in density would affect the magneton and could account for the 10% discrepancy. Furthermore, the strength of E force binding a particle's energy by concentric opposite charges on its surface and center are given by $F_E = q^2/4pi\ e_o r^2$ and are $9x10^4$ N for an electron and 230 N for a proton, which are proportionate if one factors in the relative mass to density ratio of $m_r/\rho_r = 1836^2 / 8000 = 421$. This shows that the forces binding the energy into particles is tremendously strong and that particle stability is a relative function of the quantity of energy and the volume of space (i.e. as particles become bigger they will be less stable). This would suggest that the electron was the fundamental particle and its forces and mass determined the proton and hydrogen atom, the stable state of a proton and electron.

If h is a 4-dimensional field oscillation superposition state which becomes a 0 rest-mass electromagnetic h-field wave structure at light speed if attracted by a static gravitational field or an h-mass sub-light speed particle with **E** and **B** fields if inducted by an electromagnetic field, and if magnetic mass is $L = \int B \cdot H \, dv$, where $\mathbf{B} = u\mathbf{H}$ and u relativistic energy density permeability, and electron and proton diameters are 1×10^{-16} m and 2×10^{-15} m $\pm$ 3%, such that proton volume = 8880 electron volumes and 1/4.837 energy density, then the proton's magneton will be 2.7928 u_n.

However a complete description nucleon magnetons must include the 9135 u_n neutron magneton as well. A neutron is an unstable composite (920s half-life) of a proton, electron and antinuetrino each with its own spin, and a mass of 939.56563 MeV/c^2, which is 0.78233 MeV/c^2 greater than the composite energies (more than an electron's 0.511 MeV/c^2). Its magnetic phenomena is more complex than incorporation of a single permeability factor since multiple particles and an added relativistic energy are involved.[26]

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26) A magneton of -1.9135 u_n indicates a magnetic moment opposite the spin angular momentum (i.e. a (-) orbital particle of 4.837/2.53 u_n). A hydrogen atom is a proton-electron stable state with an electron orbital magnetic moment proportional to angular momentum, with velocity and orbit dependent on quantum energy and wavelength. If electrons may be excited to higher orbitals, a state constraining an electron to a proton's vicinity, in a neutron configuration, electrically neutral and with an unshared magnetic moment, is also attainable. Such an orbital would be 2×10^{-15}m in diameter and have a Bohr circumference wavelength of 1.25664×10^{-14}m, yielding a momentum of 5.273×10^{-20}kg-m/s. Added energy is 0.782 MeV/c^2, $m/m_o = 2.53 = 1/(1-v^2/c^2)^{½}$, so v = 2.75 x 10^8m/s. Its spin magneton is $h \cdot e \cdot 4\pi \times 10^{-7}/4\pi \cdot m = 4.61 \times 10^{-30}$Wb·m which is $u_B/2.53$, its increased energy density relativistic permeability factor. However its magnetic field will be affected by the proton's mass and volume so it must be factored by its relative density, 4.837, divided by its relative mass, 1836.68, to yield the neutron magneton, $u_N = 4.837/2.53 \times u_B/1836.68 = 1.9119\ u_n$. This value is within a 0.09% error (1.9135-1.9119 / 1.9135 = 0.0084%). An equal and opposite orbital electron magneton of $4.837/3^{½} m_p\ u_B$ cancels the proton's magneton.

That the correct proton and neutron magneton values can only be obtained by incorporating quantum mechanics, relativistic mass increase and the concept of electromagnetic forces from h-field oscillations strongly substantiates that the superposition state of h is the common denominator of quantum and relative physics.[27]

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27) A neutron, as a quantum state of hydrogen, is permitted by Schroedinger's probability density relation since an electron may exist at any location. The quantum level is the wavelength ratio of the neutron and hydrogen's rest state electrons $n = 3.33\ A\ /\ 1.25664 \times 10^{-14}m = 26500$, with a probability of $1/n^2\ 1.424 \times 10^{-9}$. This predicts a free neutron to hydrogen ratio of the Universe which will vary as the energy content and size of its composite particles are more accurately determined. The ratio only applies to free neutrons and atoms, not to those bound in nuclei or molecular form because balancing the unbalanced forces of the particles alters their e^x half-lives, as indicated by neutron stability in "magic number" combinations. This raises the issue of the nuclear forces. Examination of potential energy versus separation in neutron-neutron or proton-neutron systems indicates a binding energy which transforms from +35 MeV repulsion at 0.3 fm to -35 MeV attraction at 0.5 fm along a line thru 0.4 fm. The slope then decays at non-linearly to -45 MeV of attraction at 1.4 fm, and then non-linearly to 0 MeV at 3 fm. This path suggests a quantum binding state, a transition region, and an amplified coulomb force region as the transform process between a quantum nuclei and quantum particle states of matter. Yukawa proposed a "hook" messenger particle as responsible for the 1.4 fm internucleon binding force. Modification of this concept to a "coupling" phenomena, like traincouplings, with a Coulomb force "bu electromagnetic wave interference we will refer to it as nucleon interference. As mentioned, light waves are inert to electromagnetic influences because the fields produced are countered by equal and opposite fields exactly ½ wavelength later since propagation and orthogonal field generation both occur at c, whereas particle fields exhibit at c because counter fields are not produced until some sublight speed time later. However, if waves come in close proximity, within $1.414 = 2^{½}$ of ½ wavelength (i.e. the radius of curvature of the field and propagation velocity resultant) they will interfere according to the superposition principle since the field path to the adjacent wave is shorter than the path to its own ½ wavelength counter field. At that point the field forces of the two individual waves transform them into a single higher energy wave. The same phenomena will occur between particles at a distance of 1.414 times a particles radius, since that is the resultant of the electric and magnetic field vectors if particles have one electric pole on its surface and the other in its center with magnetic poles axially oriented. (It should be noted that since charge polarity is a function of magnetic field orientation, not individual field, the electric field will be a gradient from its center to its surface (i.e. a proton will vary from 0 to +e from its center to its surface and an electron will vary from 0 to -e from center to surface.)

(Continued)

27 - continued) Once the field superpositioning occurs the particles will exist in a quantum bound state until a greater energy overcomes the binding energy. Superposition, or fusion, of particle electromagnetic fields constitutes an energy well, a nucleon quantum bound state, when magnetic fields superimpose because magnetism is the permutated effect increasing with particle energy (charge is "fixed" to electron rest mass by its oscillation orientation but the axial magnetic field oscillation frequency is affected by its relative inertia) so if added energy increases electron mass and orbital magnetic moment to that of proton spin magnetic moment, it binds to the proton. However, the electron's increased spin magnetic moment is an unbound field with a potential for forming a stable proton configuration (i.e. deuterium's magnetic moment is 0.8574, which is within 2.5% of the 0.8793 = 2.7928 + (-1.9135) up and u_N) or an unstable configuration with a neutron (i.e. bound neutrons without balancing protons are unstable). The 2.5% discrepancy in deuterium's magnetic moment is not a resolution error, it results from sharing of the quantum orbital electron between 2 protons in a resonant p-e-p state similar to resonant delocalization of orbital electrons in conjugated molecular structures. It results in a lower, more stable, electron energy state which results in a lower deuterium magneton. In neutron's however no resonant orbital electron sharing exists, in fact the neutron electrons have the same spin orientations (ds^2 resultants of the h-mass orthogonal fields are identical if the fields are superimposed) resulting in an antibonding spin configuration as in antibonding molecular bond dissociation. By Pauli's Exclusion Principle electrons may only share a molecular orbital if they have opposite spins so n-n configurations are unstable unless they have at least one proton per neutron in p-e-p configurations to balance the spins (i.e tritium, a p-n-p configuration, is unstable, but deuterium, p-n, and helium, p-n:n-p, are stable). A electron-proton potential energy versus separation plot was never done because it wasn't realized that a neutron is a hydrogen quantum state p-e-p system. The n = e-p system is unstable because its 0.782 MeV is not able to maintain the quantum state with the unbalanced electron spin and decays into a proton, electron, and antineutrino containing the orbital electron spin. To visualize this, picture two electromagnetic waves, one with the **B** field left of the rising **E** field and one to the right. Now picture a superposition so the **B** field phases align. In such a case the **E** fields cancel and the **B** fields add if they are opposite polarity particles (i.e. a neutron is neutral with nearly twice the magnetic moment) while both **E** fields and **B** fields add if they are the same polarity (i.e. 2 protons have 2x the charge and magnetic field but form an unstable structure because of identical spins). The field superposition coupled nucleon quantum state comports with the straight line behavior of the +35 to -35 MeV repulsion-attraction 0.4 fm region. And the continuous non-linear 1.4 fm transition region and decay to 3.0 fm comports with an amplified Coulomb force region which would occur as the neutralized internucleon Coulomb forces of a field superposition state transformed back into separate fields. The transition is continuous, amplified, and without singularities because of added relativistic energy, A 1 fm proton-electron separation has a Coulomb force $F_c = k_e e^2 / r^2 = 9.29 \times 10^2$ N.

(Continued)

27 - continued) However concentric oscillating sources cannot be treated as single dimension point sources and, as factoring of energy density yields a relative permeability in proton magnetons, concentric charged surfaces form a capacitor involving a relative permittivity. A capacitor's electric field energy, $E=\frac{1}{2}C\ dv^2$, raises an electric mass concept, and as the dipole moment of dielectric materials effectively reduces space and amplifies flux density, a neutron electron's relativistic energy would contract space and amplify its Coulomb force $2.53^2 = 6.4$ times. This permittivity and amplified field concept in charged particle interactions is substantiated by Yukawa's pion formation if $E = mc^2 = hf$, where $f = c/\lambda$, if induction of an h-mass (i.e. particle) from an h-field by electric and magnetic fields is considered.

CONCLUSION

It's difficult to conclude leaving unanswered questions but the validity of any proposal can only be measured by the ratio of its answers to the thought it provokes. Presented herein is evidence of a transform between the physical and information domains, the unseen communication between cause and effect.

By some means this Universe has gathered its dust into a form that observes, comprehends, and affects itself, and at the end of each such effort always returns to a starting point of "Why?" If physical is the cause and the information domain an effect, then solution to the question proceeds by differentiating the transform relation between them, the first step in characterizing a process.

The information domain has its origin in the fundamental relation between energy, space, and time. Without energy, space and time have no behavior but on its arrival they respond. As if jealous of its sovereignty the first response is to gather the intruder into a sphere within walls of a spatial gradient. Somehow all of the points of space know, as the first word of information is created, exactly how much energy has arrived, how far they are from it, and how much each of them must change to adapt to it.

And energy, not to be easily overcome, exhibits new behavior Unable to press outward in all directions, it finds that it can squeeze through the window of a single dimension to move within the confines of space and time at a velocity proportionate to its quantity. A second word, and the points of space know to contract before the energy and expand behind it.[28] And energy, its nature to go where it isn't, and balanced by the nature of space to limit its intrusion, finds a new movement to challenge its confines, a 4-dimensional oscillation, stable by minimal and equal intrusions in each dimension, and symbiotically gives birth to new a form.

By the conditions of space, static or dynamic, it transforms into something inert that distributes energy throughout space with the greatest of speeds or into something unbalanced that can only be stable by joining and manifesting in form and function. From static to inertial to dynamic to in-form-ational, each a part in a recursive pattern, each with permutated new behaviors, and each with lesser energy and greater information and function. By this pattern we see that our unanswered question is nothing but the nature of our energy to go where it is not.

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28) Empirical evidence of this is in comet's, with oblated fronts, as would result from and acceleration gradient, and extended posterior regions without loss of mass, as would result from a dilation gradient and in agreement with the behavior of their head facing gravitational bodies as they pass.

This paper shows that by using Einstein's construct of space and time and adding degrees of freedom of energy motion one may proceed from a static gravitational field to an inertial bipolar gradient differentiated by time to yield constant velocity for an independent observer, then proceeds to show that a 4-dimensional field oscillation is the most stable form for Planck's energy, that a superposition state may occur by a time dilation in which force and energy may act on each other within the same Riemannian point if the cause and effect of events are included in the dx_4^2 time projection as Euler's e^{ix} Identity, resulting in oscillation.

It shows that pi may never truncate, being an empirical value requiring r^3 to be incorporated as individual dimensions, at least one of which always containing a spatial gradient and non-finite, and will result in acceleration of the h-field to yield a light photon if the field is static. It also shows that each degree of energy freedom adds an observer with differing relativistic effect and that one observer sees no propagation axis oscillation while another does, and that incorporation of this oscillation results in an oriented permutated bipolar effect we call electromagnetic, and being dynamic in space-time is inert to gravity except at the peak of the oscillation cycles, allowing for red shift.

The paper then shows that if an h-field is subjected to these fields, h-mass results with unipolar charge and bipolar magnetism and that these forces, unbalanced and unstable, result in particle decay, by e^x, into either stable particle or atomic configuration. The paper then derives the empirical proton magneton value with these principles, and by showing a neutron as a quantum state with a relativistic electron, derives its and deuterium's magnetons. It also shows that the nuclear binding force is not a force, but a quantum particle field superpositioning and that such particle interference can result in Yukawa's unstable particle generation.

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