A Nuclear-Gravitational Electrodynamic Framework

by William Gray

Abstract

A single theoretical framework seems unlikely: There are the logical gaps created by Heisenberg's Uncertainty, Schrödinger's cat, and Wave-Particle Duality; the five distinct mass, charge, magneton, spin, and density energies of particles, and equally unique Strong and Weak nuclear, Electromagnetic atomic, and Gravity forces they exhibit; and finally the irreconcilable discontinuous and continuous universes of Quantum Theory and Relativity.

However, a unique Entropic Calculus mathematical approach reconciles these differences in terms of the firmly established Boltzmann probability principle, Maxwell EM Theory, and the Quantum and Relativity theories, to the point of a definitive solution.

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A Solution

I) The Logic Barrier

The problem with our inherent logic is that it only reaches as far as we can see, and not to the limits of the problems we try to solve.

However, as Hannah Arendt stated, "Mathematics, the non-empirical science par excellence … the science of sciences, delivering the key to those laws of nature and the universe which are concealed by appearances," provides us with logic where we have none.

We face three enigmas:

1) Heisenberg's particle position and momentum $\Delta x \cdot \Delta p_x \geq \hbar/2$ photon half-wavelength, or conversely, particle radius in field energy, measurement Uncertainty;

2) The unpredictable future of Schrödinger's cat since we cannot know if or when the particle decays and exposes his cat to the poison; and

3) Wave-Particle Duality where particles behave as particles if so examined, or as waves if so examined, one form a point with finite properties and the other existing as field energy extending through space at light speed.

"The solution to any problem is in the proper statement of the problem," in this case, the statement of the three limits to our logic:

1) Measurement resolution uncertainty;

2) Unpredictability of future events from randomly independent causes; and

3) Mutually exclusive paradigm behaviors.

II) Covariant Entropic Calculus

a) Covariant energy paradigms

In nature for every tick there is a tock, a covariant.

The relevance of a resolution uncertainty is its effect upon a system. A single miniscule event may initially be relevant as a conservation discrepancy, but conservation is based upon symmetry and energy acts to achieve symmetry. Relevance therefore has two states: instantaneous existence and average non-existence.

In **Electrodynamics of Moving Bodies**, Einstein partitioned EM energy into separate lines of reasoning:

1) "if the magnet is in motion and the conductor at rest, an electric field energy with a definite energy value results;" and

2) "if the magnet is at rest while the conductor is moving, no electric field results…, but rather an electromotive force in the conductor."

One was based upon the energy source's motion, and the other upon an object's motion in the source's field. Einstein used this distinction to unify mechanical and Electromagnetic energies into a "principle of relativity," without "space at absolute rest," with his $\gamma = (1 - v^2/c^2)^{½}$ Lorentz transformation of space, time and mass, and **Inertia of a Body Energy Content** $m = E/c^2$ decay of stationary mass into covariant EM field and motion energies.

However, EM energy relies upon space's $\mu_o\varepsilon_o$ permeability-permittivity and 4-D for field energy, electromotive force, and motion, so eliminating the impedance and dimensional entropic degrees of freedom of space, which provide light its means and limits, provided a Relative symmetry solution between inertial frames of reference, but overlooked a potential symmetry transform solution between mutually distinct energy paradigms: wave field and state energies.

b) Covariant mathematical paradigms

In his General Theory of Relativity, Einstein developed a co-variant solution to gravity with his $ds^2 = g_{ik}dx_i dx_k$ … "Riemann condition," where "g_{ik} must satisfy certain general covariant equations of condition," coordinate functions "determined by … transformation," over all "11, 12,… up to 44" indices imposed upon a "field free" $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ Minkowski 4-D space-time metric. This solution resolved gravitational force and inertial motion energies by a fixed 0-dimentional mathematical point space-time metric and potential and kinetic space-time-mass energy mathematical "condition" effects, but again overlooked a symmetry between the wave field and particle state energy paradigms operating upon and within space.

The "key to those laws of nature … concealed by appearances," in both cases however, was a $\gamma = \sqrt{(1 - v^2/c^2)}$ Lorentz transformation covariance resolution between 0-value 4-D space and space which resolves to zero as velocity approaches light speed, the field free and Riemann condition metrics which resolve to distinct g_{ik} coordinate indices function values by the covariant dx_i and dx_k roots of his $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ zero dimension points.

These solutions were successful because they were 0-value differentiations of continuous variable functions, without Heisenberg, Wave-Particle or Schrödinger resolution discontinuities which differentiate Quantum Theory and Relativity. Quantum Theory, however, has 0-value continuous variable function differentiations from Calculus and Statistical Analysis perspectives.

As Bohr pointed out with his Correspondence principle, quantum distinctions between $E_n = E_o/n^2$ states vanish for $n \geq 10^4$ in physical reality because energy distinctions are too miniscule to affect the statistical behaviors of system components. But this is a relative perspective which becomes apparent by a Cauchy-Riemann analysis of e^{-ix} wave functions in a Boltzmann $P = e^{S/k_B}$ (or $S = k_B \ln P$) probability principle system, the de Broglie – Schrodinger $\lambda = h/mv$ matter wave basis of Quantum Theory.

c) Covariance between the mathematical and energy paradigms

Quantum statistical systems are bounded by non-statistical limits. These E_o ground and E_c light speed minimum and maximum energy state systems all have a $k_B = E_o$ minimum resolution limit of their Boltzmann $P = e^{S/k_B}$ based $E_n = E_o/n^2$ excited quantum e^{ix} wave function states, the system's 0-residue value e^{ix} quantum harmonics of its e^{-ix} negative energy well E_o ground state.

Expressing wave functions in a $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ continuously analytic 1st order Cauchy-Riemann partial derivative root form clarifies this because $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = 0 = \partial^2 v/\partial x^2 + \partial^2 v/\partial y^2$ Laplacian 2nd order partial derivative harmonics are covariant functions with covariant variable roots which converge to zero as $e^{ix} = \cos x + i \sin x$ excited E_n quantum state wave functions in a $e^{-ix} = \cos x - i \sin x$ negative energy well E_o ground state $\lambda = h/mv$ matter wave based system governed by $E_n = E_o/n^2$ energy state Quantum Theory. In other words, the quantum states themselves have continuously analytic covariant roots.

In this perspective, quantum states are resolved as f(x) Calculus functions differentiated by x variables which approach zero, basic Limits and Continuity, as in $\int 1/f(x)\, dx$ singularities when $f(x) \rightarrow 0$, instead of Boltzmann's $k_B = E_o$ constant. Einstein applied force, size and velocity dx_i and dx_k Riemann condition energy roots to apply physical reality to his 0-dimension field free $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ points, since force, size and velocity are continuously analytic 1st order derivative covariants of quantized 0-energy 2nd order energy states. This theory extends this concept to include covariant wave-particle $P = e^{S/k_B}$ probability function energies operating upon space's $\mu_o\varepsilon_o$ impedance and within its 4-D space-time entropic degrees of freedom roots.

d) Mathematical covariance in physical reality's energy paradigms

In physical reality the continuous and analytic force, size and velocity 1st order derivative covariants are correlated by Sommerfeld's $\alpha = e^2/2\varepsilon_o hc$ fine structure ground state field force to light speed velocity correlation in terms of charge operating upon space's impedance. It defines the E_o and E_c non-statistical boundaries of $E_n = E_o/n^2$ quantum systems by $\alpha^2 = E_o/E_c$, and applies at quantum state force, size and velocity energy root levels because the $c = 1 / \sqrt{(\mu_o\varepsilon_o)}$ impedance root of space is a $dx \rightarrow 0$ differentiation root for force, size and velocity based energy functions in terms of α, whether mechanical, EM wave, particle mass, charge, magneton, spin, and density energies and the exhibited Strong and Weak nuclear, Electromagnetic atomic and Gravity forces.

For instance, in Yukawa's pion nuclear force messenger analysis he set bond length equal to a $\Delta x \cdot \Delta p = \hbar/2$ light speed momentum pion matter ½-wave Heisenberg Uncertainty to solve for its $E = mc^2$ mass-energy. He assumed constant light speed velocity momentum without any such knowledge by applying Occum's Razor logic, the simplest energy form in a constant straight line minimum energy velocity. This cannot be observed and so it cannot be known, but this minimum deviation, 0 resolution discrepancy, predicted the correct pion energy value by a continuous and analytic 1st order size and velocity analysis of a 2nd order matter wave function.

This is Entropic Calculus, where space's $\mu_o\varepsilon_o$ impedance and light speed c velocity limits are the force, size and velocity covariant entropic degree of freedom energy state root resolution coefficients, because quantum distinctions vanish at space's $\mu_o\varepsilon_o$ impedance and c velocity non-statistical limits. As $dx \rightarrow 0$, the force, size and velocity quantum energy state covariant root functions continuously vary. Although no way exists to know if this is correct with absolute certainty, the method's results prove with certainty that at least one continuous solution exists for discontinuous quantum states. Entropic Calculus therefore assumes Occum's Razor minimum common denominator constructs and then solves for an e^{-ix} Laplacian harmonic solutions.

III) A Physical Thread

a) A historical neutron quantum – continuous energy connection

In nature, Beta Decay and Electron Capture parallel Einstein's EM energy analysis. In 1911 Haskins theorized the EM force between protons was too great for nuclei to form unless the force was mitigated by a neutral particle comprised of a proton and electron. This notion was rejected by Rutherford, but when Chadwick discovered neutrons which decay into protons and electrons, Haskins stepped up to claim credit for predicting them, which Heisenberg rejected by saying the neutron was a different particle which simply decays into a proton and electron.

Then, in 1941, Borghi theorized neutrons were proton-electron composites which could be synthesized. In 1949 he was physically removed from a conference in Italy and lost funding for claiming this because it disagreed with Quantum Theory. However, in 1955 Borghi actually synthesized neutrons in a microwave tube filled with hydrogen, and verified them by mitigating isotope decays. Missfeldt also synthesized neutrons by exciting hydrogen with magnetic and rf energy in 1978 in Germany, indicating a continuous energy and quantum particle state nexus, but proposed no symmetry transform between mutually distinct field and quantum state paradigms.

b) A verification

A simple, but dangerous, experiment provides insight into the neutron structure. Borghi and Missfeldt excited hydrogen orbital electrons with EM energy to statistically form Electron Capture neutrons, indicating a hydrogen neutron quantum state. Neutrons can also be formed predictably with a Cyclotron and Electron gun, and fused into deuterium, tritium and helium.

Neutron decay releases a proton, electron, electron anti-neutrino, and $E_n = 0.78233$ MeV. The E_n energy is assumed to be a quantum statistical orbital wave function in a 3-D distribution, represents a $E_n + m_e / m_e = 2.531$ electron relativistic mass-energy increase and 2.754×10^8 m/s $= 0.91$ c Lorentz $\gamma = (1 - v^2/c^2)^{½}$ transformation velocity, and $a_n = a_o (E_o / E_n/3) = 2.76 \times 10^{-15}$ m neutron state radius which contracts to the $a_n / 2.531 = 1.091 \times 10^{-15}$ m (fm) observed radius.

Accelerating electrons to 0.91c and interacting them with stationary protons is difficult. But accelerating electrons and protons to identical velocities utilizes their opposite charges to promote interaction. Thus, the protons are accelerated in a Cyclotron to an $E_n = 0.782$ MeV = 1.2534×10^{-13} J energy, and $v_p = 1.2242 \times 10^7$ m/s velocity by simple K.E. = $½m_pv_p^2$. Relativistic effects are negligible for such low energy protons. Corresponding $E_e = ½m_ev_p^2 = 6.8253 \times 10^{-17}$ J = 426 eV electrons are achieved by electrostatic acceleration and beamed into a 1 m long interaction chamber with the 0.782 MeV protons. Deflector plates bend the beams into each other at 54° for a ½-spin insertion. Particle charges will do this on their own but require a longer chamber. A 5,000 turn calibration coil at the chamber's far end differentiates particle energies.

First, a pulsed 426 eV electron beam is verified by the coil, resulting in negative voltage pulses corresponding to the beam current and pulse rate. The same is then done for the protons, tuning the beams for equal and opposite pulses. Then both beams are turned on, resulting in zero voltage output from neutron formation. Some neutrons interact to produce deuterium, tritium, helium-3 and helium-4, and associated beta particles, as some neutrons decay to protons and a statistical beta particle distribution from 2.22 MeV for deuterium to 28 MeV for helium-4.

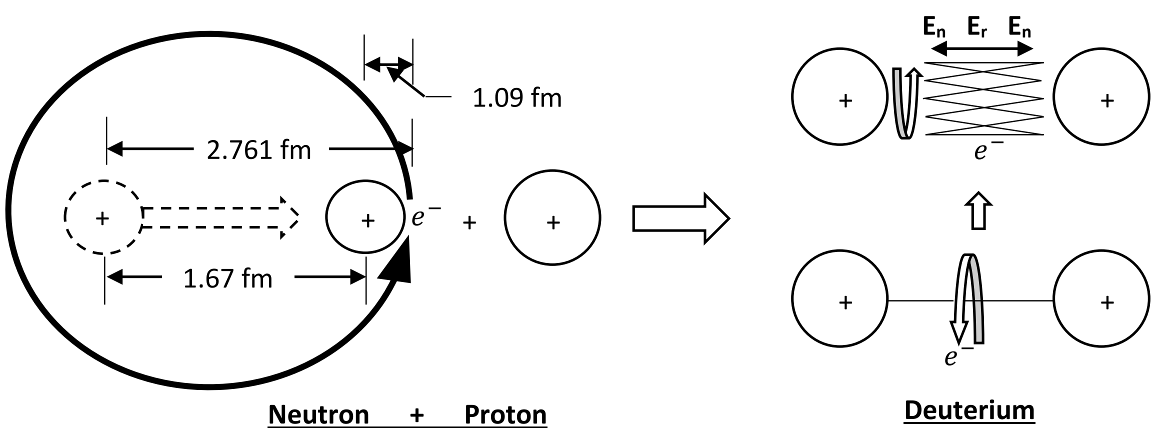
The danger arises when neutrons interact because they energize other neutrons and emit gamma rays, both of which are lethal. Neutrons are absorbed by carbon, and so graphite will absorb them, and gamma rays can be shielded by bricks. The problem is that up to 28 MeV gamma rays can occur from helium-4 formation beta decays. This risk can be minimized with low proton counts and gating their releases from the cyclotron to 1 μs pulses at 1 ms intervals.

In the interest of full disclosure, a Neutron Fusion patent was applied for in 2002 based upon this synthesis method, but was denied because:

1) it was regarded as unverified conjecture;
2) it violated Pauli's Exclusion principle;
3) Velochine received a Canadian patent in the early 60's for proposing that neutrons generated by bombarding beryllium with particles could be used to fuse with nuclei; and
4) Missfeldt received a German patent for his EM energy hydrogen excitation method; although this Cyclotron method is much more efficient at producing and fusing neutrons.

c) A classical mathematical neutron construct and bonding model

This method was derived from Bohr's Correspondence principle that quantum behavior becomes classical when quantum distinctions vanish, for $E_n = E_o/n^2$ when $n \geq 10^4$, and the fact that Boltzmann $P = e^{S/k_B}$ probability systems are 100% predictable at their E_o ground and E_c saturation state boundary conditions, which leads to a classical model:

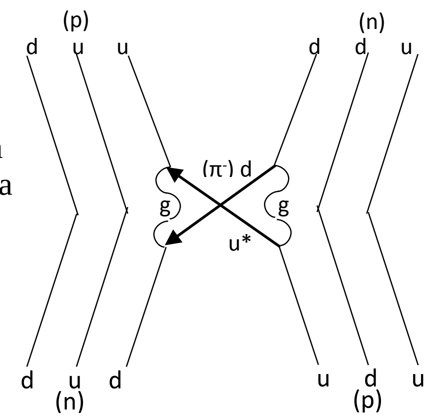


An E_n = 0.782 MeV electron's 0.91c orbital velocity relativistically contracts its 2.761 fm radius by $E_n + m_e / m_e$ = 2.531 to 1.091 fm, but Relativity acts upon space, and thus objects acted upon by its effect, so the proton is contracted towards the orbital electron, offsetting the neutron state construct's mass center by 2.761 fm – 1.091 fm = 1.67 fm, resulting in an arc cos (1.67 fm / 2.761 fm) = arc cos 0.605 = 53° ½-spin angular moment.

Similarly, the magneton for this construct is conceptually identical with the $\mu_B = ½e\hbar/m_e$ Bohr magneton, attenuated by proton mass magnetic field absorption, mitigated by the proton's $(r_p/r_e)^3/(m_p/m_e) = 4.837$ lower density, and attenuated by 2.531 relativistic contraction, to yield an electron generated $\mu_n = (½e\hbar/m_p)\ (r_p/r_e)^3 / (m_p/m_e) = 4.837 / 2.531 = -1.9111\mu_N$ magneton.

Thus a classical continuous geometric construct, as a saturated hydrogen quantum state, yields the neutron's $e^- + p^+ = 0$ neutral charge, 1+ fm size, 53° ½-spin, $m_n = m_p + m_e + E_n$ mass, -1.9111 μ_n Bohr based magneton, by relying upon Bohr's quantum-continuous Correspondence principle and the 100% $P = e^{S/k_B}$ Boltzmann probability at its boundary conditions.

d) A quantum – classical neutron behavior nexus



The classical continuous geometric neutron construct also supports the Feynman Diagram pion Down quark exchange, since a pion decays to an electron, and a Deuterium bond based upon such a neutron state resonance would have two neutron state E_n energies, and an $E_r = 2.531\ (E_n/3) = 0.66$ MeV, to yield a $2E_n + E_r = 2.224$ MeV mass defect bond by opposing momentum resonance. This quantum-classical ground state construct also yields the tritium, helium-3 and helium-4 bond energies by geometric extrapolation: Binding Energy $= 3^{1/d}\ (p \times 2.22\ \text{MeV})^n = -8.5$ MeV for tritium, -7.67 MeV for helium-3 and -28.3 MeV for helium-4, where d = 2 for 2-D planar tritium and helium-3 triton structures and d = 3 for 3-D tetrahedral helium-4 structures, p is proton #: 1 in tritium and 2 in helium-3 or -4, and n is neutron #: 1 in helium-3 and 2 in tritium or helium-4.

e) Neutron fusion versus laboratory and H-bomb deuterium fusion

The quantum – classical nexus is further illustrated by the fact that fusion works in an H-bomb, with over 600% more energy release than in an atomic fission bomb, but fails sustainment in a lab, and always with less than 100% efficiency. Conventional wisdom misinterprets the laboratory process, maintaining the "Fusion is only 20 years away, and always will be" standard.

This is because fusion is not an extreme temperature thermonuclear process, it is a Relativity phenomenon which occurs because nuclear pion bonding occurs at a fixed distance whereas electrostatic Coulomb repulsion is a classical continuous $F_e = k_e\ e^2/r^2$ phenomenon in which the repulsion energy at 1 fm is $E_r = k_e\ e^2/r = 2.31 \times 10^{-13}$ J = 1.442 MeV, which when added to the neutron states $E_n = 0.78233$ MeV energy equals the 2.224 MeV deuterium bond energy, so no net energy gain can occur by statistical laboratory thermonuclear reactions.

However, in an H-bomb, lithium deuteride is located within one or between two fission bombs, which upon detonation accelerate the deuterium nuclei toward each other at light speed, contracting the distance between particles to near zero relative to each other, while still at greater local perspective distances. This means the pion exchange nuclear bond formation occurs in the contracted space, while the local perspective $1/r^2$ distance mitigates charge repulsion. Neutron fusion overcomes this by masking the proton charges with neutron state orbital electrons.

So as conventional wisdom stays its 50 year laboratory deuterium fusion course, this analysis shows a mathematical continuous - discontinuous nexus, explains why deuterium fusion only works in H-bombs, and explains why the proton magneton is 2.7928 times greater than the Bohr based $\mu_N = ½e\hbar/m_p$ nuclear magneton, because of magneton field absorption mitigation by its $(r_p/r_e)^3/(m_p/m_e) = 4.837$ times lower density, factored by $\sqrt{3}$ to 2.7928 because measurements are taken in the excitation field axis instead of the ½-spin magneton vector axis.

However, while these calculations yield empirical values quantum theory cannot explain, they are incomplete time average macrostate values, such as the Pressure, Volume, Component count, and Temperature variables in Boltzmann's $k_B = pV/NT$ constant. The calculations fail to show a microstate level quantum-continuous connection because of the Heisenberg Uncertainty logical blind spot. But Quantum Theory tells us what we do not know, a consistent covariance between quantized and continuous energies, so there must still be a definitive mathematical logic remaining in those blind spots.

IV) Predictable Covariant States

a) A quantized – continuous behavior connection in Boltzmann systems

There are two points in any Boltzmann $P = e^{S/k_B}$ probability principle system with 100% predictability, when entropic degrees of freedom are empty and full: At the E_o ground state when a component has a 100% predictable Schrödinger $\int |\psi|^2\, dx = 1$ wave-particle duality periodicity probability because no other energy interferes with it; And at its light speed E_c saturation state, also 100% predictable because it cannot absorb any additional energy by which to accelerate and change direction or velocity so its behavior is continuous; With quantized behaviors in between.

Since both quantized and continuous behaviors occur within the same Boltzmann system mathematical framework, they must be connected or the system could not exist with a $P = e^{S/k_B}$ distribution from E_o to E_c without some k_B correlation between its quantized and its continuous behaviors, such as the Pressure and Volume macrostate covariants from continuously divisible quantized component energy roots, so the E_o ground, E_c saturation and E_n statistical states must correlate within and between systems on some covariant root level.

Such a root level correlation within and between systems can only occur if system energy densities correlate, like the Sommerfeld α^2 hydrogen E_o ground state potential and E_c light speed saturation state energies, which Relativity states applies to all inertial reference frames, including the Nuclear and Gravity domains. Sommerfeld correlated the ground state force and light speed velocity potential and kinetic energy roots by $\alpha = e^2/2\varepsilon_o hc$, an $\alpha^2 = E_o/E_c$ energy density ratio, thus defining system entropic degree of freedom boundaries and an empty to saturated state ratio, and correlating $P = e^{S/k_B}$ statistical behaviors within and between domains.

b) A mathematical basis for continuously analytic quantum states

In mathematics, quantum states themselves are continuously analytic if they are 2nd order partial derivative $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0$ and $\partial^2v/\partial x^2 + \partial^2v/\partial y^2 = 0$ Laplacian harmonics of 1st order continuously analytic $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ Cauchy-Riemann partial derivatives without residues, when all e^{ix} = cos x + i sin x excited quantum states exist harmonically within their e^{-ix} = cos x - i sin x fundamental negative energy well ground state without residues.

In all statistical systems this quantum-continuous condition exists for P = e^{S/k_B} = 100% probability situations, such as E_o when no energy beyond the ground state exists so $S/k_B = e^{-ix}$, at E_c when all entropic degrees of freedom are saturated so S = k_B, when n is so large probability is no longer an entropy function so $k_B << S = nk_B$, for $n \geq 10^4$ in $E_n = E_o/n^2$ systems, and for single component e^{nix} states when there is no Heisenberg Uncertainty interference with their energy.

c) A physical basis for continuously analytic quantum states

Physically these E_o ground no shared energy, single component, excess energy, or light speed zero $t = t_o/\gamma$ time flow saturated energy, where $\gamma = \sqrt{(1 - v^2/c^2)}$, state non-statistical system conditions show that e^{ix} quantum states are continuously analytic at their root levels, and for sub- and super-state harmonics of E_o and E_c because in a saturated system with continuously analytic boundaries and no residues, only the continuously analytic sub- and super-states exist.

Continuously analytic sub- and super-states follows for $E_o = \alpha^2 E_c$ ground and saturation state boundary systems since $\alpha = e^2/2\varepsilon_o hc$ is continuously analytic and a $E_c - E_o = \sum_{n=0}^{n=\infty} E_o/n^2$ Laplacian harmonic summation of resonant e^{ix} wave function energies without residues, where E_o is an e^{-ix} negative energy well and all $E_n = E_o/n^2$ quantum states are excited e^{ix} harmonic wave functions within the e^{-ix} negative energy well ground state, a basic hydrogen quantum system.

In this system, the $\alpha = e^2/2\varepsilon_o hc$ fine structure constant coefficient correlates the E_o ground state electric charge force potential energy root to a light speed maximum velocity kinetic energy root E_c saturation state, and since light is a $\frac{\partial E}{\partial x} = -\frac{\partial B}{\partial t}$ *and* $\frac{\partial B}{\partial x} = -\mu_o \varepsilon_o \frac{\partial E}{\partial t}$ Cauchy-Riemann continuously analytic 1st order partial derivative Faraday and Ampere-Maxwell law statement, and $\frac{\partial^2 E}{\partial x^2} = \mu_o \varepsilon_o \frac{\partial^2 E}{\partial t^2}$ *and* $\frac{\partial^2 B}{\partial x^2} = \mu_o \varepsilon_o \frac{\partial^2 B}{\partial t^2}$ 2nd order Laplacian harmonic electric and magnetic field wave equations statement, where $c = 1 / \sqrt{(\mu_o \varepsilon_o)}$, we know the correlation between EM field energy and light speed velocity are continuously analytic, so $E_c - E_o = E_c - \alpha^2 E_c = (1 - \alpha^2)E_c$ and $E_c - E_o = \sum_{n=0}^{n=\infty} \frac{E_o}{n^2}$ is therefore a summation of continuously analytic harmonic energy states.

The α correlation and summation of continuously analytic harmonic energy states defines the E_o to E_c available entropic degrees of freedom range as a summation of continuously analytic available $1/n^2$quantum harmonic states at n sub-state covariant root levels. Thus any combination of occupied entropic degrees of freedom states from E_o to E_c are continuously analytic quantum states since occupied and available entropic degree of freedom states are covariant continuously analytic functions, differentiated only by the fact that one contains energy and the other does not.

Alternatively, in terms of Relativity, the $\gamma = \sqrt{(1 - v^2/c^2)}$ Lorentz transformation goes to zero at light speed and $t = t_o/\gamma$ time flow goes to infinite duration between events so no change can occur. Thus for a $(1 - \alpha^2)E_c = \sum_{n=0}^{n=\infty} E_o/n^2$ harmonic series, if $\alpha^2 = E_o/E_c$ and E_o and E_c are continuously analytic for $\alpha = e^2/2\varepsilon_o hc$, then all E_n composite states are continuously analytic because all $E_n = E_c\alpha^2/n^2$ states are simple integer functions of a continuously analytic state.

V) Predictable Covariant Statistical Systems

a) Root level continuously analytic covariance

The foregoing analysis pertains to all real $E_n = E_c\alpha^2/n^2 = E_o/n^2$ quantum systems. All have covariant E_o and E_c continuously analytic predictable $E_o/E_c = \alpha^2$ boundaries and reference to each other by a continuously analytic $\gamma = \sqrt{(1 - v^2/c^2)} = \sqrt{(1 - \alpha^2)}$ Lorentz transformation so all inertial reference frame interactions are predictable because all reference to space's $\mu_o\varepsilon_o$ impedance and light speed. They are covariants in any interaction by virtue of these ground and saturation state fundamental frames of reference and they share each other's Laplacian harmonic entropic degree of freedom states within their individual $E_n = E_c\alpha^2/n^2 = E_o/n^2$ quantum systems. It appears then that Schrödinger's cat in the box paradox only exists as a contemplation in non-physical logic.

The key to correlating discontinuous 2nd order quantum statistical macrostate energies is that they are continuously analytical states at their covariant 1st order root levels in a framework bounded by non-statistical E_o and E_c states which correlate by the $\alpha^2 = E_o/E_c$ energy density ratio. As such they also correlate to Einstein's 4-D "field free" $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ Minkowski space-time metric, and his continuously analytical and covariant $ds^2 = g_{ik}dx_idx_k$ … Riemann condition dx roots. Since 2nd order statistical wave functions and ds^2 field free points of dimensional space equate to zero, and $P = e^{S/k_B}$ statistical states are functions of entropic limits, their energy may only exist as proportionate wave and dimensional forms.

Continuously analytic 1st order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ partial derivatives predict the future by continuously defining it in terms of the past's continuity, and since their covariant 2nd order $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ Laplacian harmonics average to zero as system entropy functions with periodicity, they predict each other as covariant "filled" and "available" entropic energy states, like EM field and node energy of matter wave and particle states, where $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0 = \partial^2u/\partial x^2 + \partial^2u/\partial y^2 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ define the 2nd order continuously analytic periodic space and energy state functions of each other.

b) One-step quantum state encryptions and decryptions

Continuously analytic covariance between E_o ground and E_c saturation states is not just a simple electron orbital wave - particle state covariance, but also a microstate covariance between entropic degrees of freedom. In statistical systems microstates manifest as observed macrostates, but macrostates are difficult to decrypt into original microstates. They are one-way asymmetric functions, like difficult to decrypt RSA semi-prime number encryptions. In Quantum Physics the $E_n = E_o/n^2$ energy states naturally encrypt into multiple $n^2 = n_i^2 + n_j^2 + \dots$ harmonics which sum to n^2, and vice-versa, because n^2 statistical wave states are system sub-boundaries, continuously analytic 1st order covariants interacting with space's $\mu_o\varepsilon_o$ impedance and 4-D entropic degrees of freedom. One-step light speed wave-particle duality system encryptions imply a random multi-energy state "electron cloud" Heisenberg Uncertainty distribution because its logic says path continuity cannot be known, but known entropies and one-step encryptions say the opposite.

First order covariance is an $\int 1/f(x)\,dx$ singularity function mathematical nexus in which the precedent f(x) function converges to zero, $f(x) \rightarrow 0$, a one-step $T = e^{-2KL}$ Quantum Tunneling "vanishing," where $K = (2m(U – E))^{1/2}/\hbar$, E is object energy, U is barrier potential energy height, L is the barrier impedance or width, by a $\int |\psi|^2 dx = 100\%$ Schrödinger wave-particle duality probability density function, since the continuously analytic 1st order roots of f(x) are covariant with system $\mu_o\varepsilon_o$ and 4-D entropic degrees of freedom in their sub-boundary quantum states.

Such ordering is the logic of two prime numbers forming an RSA semi-prime encryption, a one-step Cause and Effect logic function, with difficult n-step iterative decryption to determine original causative prime numbers. It is less difficult however if decryption is bounded from the bottom up and top down, if only odd numbers are used, and if unknowns are restricted to an e^x functional constraint with $x = S/k_B$ entropies factored by macrostate form, like user information providing password clues, and -ix and ix energy well and harmonic (2n + 1) resonance states. On this level all information states correlate to continuously analytic E_c, E_o and E_n sub-boundary roots, within an $e^x = x^0/0! + x^1/1! + x^2/2! + x^3/3! + x^4/4! = 99.6\%$ probability after five iterations, and an easy one-step 100% process if the causative primes are known.

An E_c light speed transition is a Heisenberg Uncertainty from our E_o ground state wave function perspective with an E_o/n^2 ½-wave differentiation capability, like iterative differentiation of a semi-prime from the number spectrum's top and bottom, except the semi-prime formation was a continuously analytic predictable one-step process which makes the reverse multistep iterative decryption possible. In the quantum process this is reflected in the fact that resultants are always wave functions and therefore the result of a E_o/n^2 wave function logic based upon $E_o = \alpha^2 E_c$, in which $c = 1 / \sqrt{(\mu_o\varepsilon_o)}$ depends upon the EM impedance of space.

VI) A Covariant Quantum Continuous Construct of Space

a) A reversible one-step quantum impedance – inertia transform construct

This nexus exists at its most fundamental level for EM waves operating upon space-time $\mu_o\varepsilon_o$ permeability-permittivity impedance as field energy and in its 4-D as inertial momentum, as Maxwell's EM wave equations show when $1/c^2$ is substituted for $\mu_o\varepsilon_o$ (for x-dimension only):

1) Maxwell's Faraday's Law of Induction and Ampère-Maxwell law (in free space):

$$\oint \boldsymbol{E}\cdot d\boldsymbol{s} = -\frac{d\phi_B}{dt} \;\Rightarrow\; \frac{\partial E}{\partial x} = -\frac{\partial B}{\partial t} \quad and \quad \oint \boldsymbol{B}\cdot d\boldsymbol{s} = \mu_o\epsilon_o\frac{d\phi_E}{dt} \;\Rightarrow\; \frac{\partial B}{\partial x} = -\mu_o\epsilon_o\frac{\partial E}{\partial t}$$

2) Taking the 2nd partials to obtain the Electric field wave equation:

$$\frac{\partial^2 E}{\partial x^2} = -\frac{\partial}{\partial x}\left(\frac{\partial B}{\partial t}\right) = -\frac{\partial}{\partial t}\left(\frac{\partial B}{\partial x}\right) = -\frac{\partial}{\partial t}\left(\mu_o\epsilon_o\frac{\partial E}{\partial t}\right) \;\Rightarrow\; \frac{\partial^2 E}{\partial x^2} = \mu_o\epsilon_o\frac{\partial^2 E}{\partial t^2}$$

3) And Magnetic field wave equation:

$$\frac{\partial^2 B}{\partial x^2} = -\frac{\partial}{\partial x}\left(\frac{\partial E}{\partial t}\right) = -\frac{\partial}{\partial t}\left(\frac{\partial E}{\partial x}\right) = -\frac{\partial}{\partial t}\left(\mu_o\epsilon_o\frac{\partial B}{\partial t}\right) \;\Rightarrow\; \frac{\partial^2 B}{\partial x^2} = \mu_o\epsilon_o\frac{\partial^2 B}{\partial t^2}$$

These equations are 1st order continuous and analytic Cauchy-Riemann $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ partials and 2nd order $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = \partial^2 v/\partial x^2 + \partial^2 v/\partial y^2$ Laplacian harmonics operating upon space's $\mu_o\varepsilon_o$ impedance and within its 4-D space-time so they directly equate:

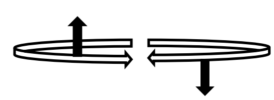
$$\nabla(uv) = \frac{\partial uv}{\partial x}\boldsymbol{a}_x + \frac{\partial uv}{\partial y}\boldsymbol{a}_y + \frac{\partial uv}{\partial z}\boldsymbol{a}_z \iff \nabla^2(uv) = \frac{\partial^2 uv}{\partial x^2} + \frac{\partial^2 uv}{\partial y^2} + \frac{\partial^2 uv}{\partial z^2} = 0$$

Additionally, if $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0 = \partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = \partial^2 v/\partial x^2 + \partial^2 v/\partial y^2$, so Einstein's 4-D space-time metric is a covariant Laplacian harmonic construct, and $ds^2 = g_{ik}dx_idx_k$ … "Riemann condition" by extension, where the g_{ik} "covariant equations of condition" functions continuously transform between Riemann field condition and 4-D space-time metric forms, then a 4-D Lorentz gravity equivalent transformation occurs when g_{ik} satisfies the Riemann condition, and $g_{ik} = \mu_o\varepsilon_o$ for EM wave equations at the E_o field free space point level. To attain this, space's $\mu_o\varepsilon_o$ construct must consist of stationary EM light energy points which reciprocally integrate to support any E_c velocity EM wave field energy, since $c = 1/\sqrt{(\mu_o\varepsilon_o)}$.

b) A quantized stationary EM light impedance construct of space

A stationary light construct empirically agrees with light conservatively transecting space uniformly in any direction with $E = h/f = hc/\lambda$ periodicity, as a $P = e^{S/k_B} = 100\%$ conservative Boltzmann entropic degree of freedom probability function. To be continuously analytic, space's $\mu_o\varepsilon_o$ points must integrate over 4-D space-time to reciprocally equate with EM wave field energy in an $\int 1/f(x)\,dx$ singularity function so energy can quantum tunnel between space's field and 4-D forms as a Schrödinger $\int |\psi|^2\,dx = 100\%$ EM wave – particle duality probability density function.

Such $\mu_o\varepsilon_o$ impedance points would have neutral ground states which excite into polarized vectors upon polarized EM field energy interaction, which Einstein's $ds^2 = g_{ik}dx_idx_k$ … Riemann condition analysis with $dx_n^2 = dx_idx_k$ differentiated Pythagorean roots accommodate. Thus these points would configure as ↑↓ neutral, ↑↑positively, and ↓↓negatively polarized $\sqrt{(\mu_o\varepsilon_o)}$ point-pairs by which to accommodate wave field and node energies:



This same impedance construct accommodates particles as both external mater waves and internal permutated geometric e^{-ix} wave function energy constructs with Boltzmann's $P = e^{S/k_B}$ entropic degree of freedom dependent probabilities and an α density root coefficient. Specifically this means the points of space are the fundamental matter wave constructs of a permutated progression of all matter constructs: $\mu_o\varepsilon_o$ point-pairs → electrons → quarks → protons → Higgs mass boson → Hydrogen atom → gravitational bodies → orbiting planets ….

c) Energy form as an entropic function

This interpretation requires Wave-Particle Duality to be $P = e^{S/k_B}$ probabilities of $S = \mu_o\varepsilon_o$ and 4-D fundamental space entropic degrees of freedom factored by k_B particle mass, magneton, charge, spin and size characteristics, which proportionately exhibit to the entropic degrees of freedom of their circumstances. Thus, each characteristic energy form has equal probability of appearing, but the circumstances presented by a specific situation determines which manifests as a Cause and Effect determinant of the entropic degrees of freedom presented.

Except for charge, which has orientation polarity and is constant except as energy in terms of distance, mass-energy correlates to particle magneton, ½-spin and size characteristics. By recognizing that characteristics are system entropy probability effects, if the magneton, spin and size are entropic degree of freedom permutations of space's fundamental $\mu_o\varepsilon_o$ impedance and 4-D, then mass-energy must also be a permutation of space's 4-D and $\mu_o\varepsilon_o$ impedance.

A concept of characteristics being system entropy probability effects translates to energy operating upon space's $\mu_o\varepsilon_o$ impedance with respect to its 4-D: Stationary, velocity, 2-D angular momentum acceleration, stable, converging or diverging 3-D acceleration, and progressions thereof, meaning that space changes size with respect to its fundamental 4-D field free metric according to the energy functions operating upon its coordinates, a Riemann condition. It also translates to stable quantum states as covariant Laplacian harmonic transform resonance energies between orthogonal entropic forms such as field and 3-D constructs, and potential and kinetic or deuteron, triton and helion resonances, etc.

d) Mass-energy and gravity as an entropic functions

Increasing EM wave energy contracts wavelength, inertial mass contracts space, and wave-particle duality is a covariant result of energy operating upon space's $\mu_o\varepsilon_o$ impedance and 4-D entropies. It thus follows that mass-energy involves a contraction of space's $\mu_o\varepsilon_o$ impedance construct, increasing their frequency in symmetry with light's effect as energy density increases, and if mass is a $\mu_B = ½e\hbar/m$ Bohr magneton attenuation factor, then conversely mass must be an $m = ½e\hbar/\mu_B$ charge with angular momentum operating upon space magnetic energy product.

Since the magneton, and covariant $m = ½e\hbar/\mu_B$ mass-energy generation, involve light speed rotation, they constitute a $\int 1/f(x)\,dx$ singularity which cannot be differentiated, but which exhibits as a bosonic contraction of space relative $\mu_r\varepsilon_r$ impedance increase which requires energy to accelerate as inertial mass. In **Electrodynamics of Moving Bodies** Einstein unified EM and mechanical mass energies by applying his Lorentz transformation equally to them, a contraction constituting a General theory Riemann condition, which means gravity does not arise from mass, but instead mass generation and gravity are covariant effects of light speed EM charge rotation energy operating upon space's $\mu_o\varepsilon_o$ and 4-D entropic degrees of freedom.

e) A conceptual matter construct summary

Hence, with this conceptual framework:

1) Boltzmann $P = e^{S/k_B}$ = 100% entropic probabilities at domain E_o ground and E_c saturation state boundary conditions;
2) $\alpha^2 = E_o/E_c$ energy density ratios, where $\alpha = e^2/2\varepsilon_o hc$;
3) $\int 1/f(x)\,dx$ singularity $f(x) \rightarrow 0$ transition state events partitioning domains;
4) Schrödinger $\int |\psi|^2\,dx$ = 100% EM wave node-field duality probability density function transitions between domains; and
5) $\mu = e\hbar/2m$ and $m = e\hbar/2\mu$ rotating charge EM energy mass, magneton and gravity generation operating upon Einstein's Riemann condition metric by his Lorentz transformation of space's $\mu_o\varepsilon_o$ and 4-D entropic degrees of freedom;

it is possible to use an Occum's razor logic framework to define common $e^{x = S/k_B = -ix = ix}$ particle, atomic, and orbital matter constructs which yields all current empirical results.

Occum's razor applies since $e^{+/-ix}$ are 2nd order $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ Laplacian harmonics of continuous and analytic 1st order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ Cauchy-Riemann partials, with e^{ix} constituting the fundamental ground state and e^{-ix} constituting all higher excited state harmonics, as e^{S/k_B} quantum statistical wave functions within domains and $e^{x = S/k_B = -ix = ix}$ transition state $\int 1/f(x)\,dx$ singularity functions, as $f(x) \rightarrow 0$, between domains.

VII) A Covariant Quantum Continuous Basis of Matter and Gravity

a) Entropic Calculus matter construct progression

Entropic Calculus simply differentiates the progression of matter constructs to obtain a fundamental common denominator root level construct:

1) differentiating observed e^{ix} excited state harmonics to isolate e^{-ix} ground state 2nd order $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0$ and $\partial^2v/\partial x^2 + \partial^2v/\partial y^2 = 0$ fundamental energy constructs; and
2) differentiating 2nd order partials to obtain the Cauchy-Riemann continuous and analytic 1st order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ partial derivative energy construct roots.

Thus, starting with the $\mu = e\hbar/2$ fundamental magneton, so $m = e\hbar/2\mu$ and μ is the relative $\mu_r\varepsilon_r$ construct impedance effect on space's $\mu_o\varepsilon_o$ and 4-D entropic degrees of freedoms, the mass energies and density sizes become:

1) Impedance energy of space:

$$hc = h / \sqrt{(\mu_o\varepsilon_o)} = \sqrt{(e\hbar/2)} / 2\alpha = 1.9864473 \times 10^{-25}\ \text{J·m},$$

where $\sqrt{(e\hbar/2)}$ is particles' $(e\hbar/2)$ magneton mass generation root. The $\sqrt{(e\hbar/2)}/2\alpha = 1.99151199 \times 10^{-25}$ J·m result is 0.255% greater than $hc = 1.986447 \times 10^{-25}$ J·m because the $\sqrt{(e\hbar/2)}$ generated root does not account for $(1 - \alpha/\pi)(1 - \sqrt{2}\sqrt{3}\alpha^2)$ momentum cancellation losses which reduces the calculation to 1.986886×10^{-25} J·m, within 0.009%.

2) Electron quantum optical and interactive radii and mass energy:

$r_{eo} = (hc/\alpha^2)\sqrt{3}\,\pi = 2.03 \times 10^{-20}$ m $\qquad r_{ei} = (r_{eo}/\alpha)\,3(\sqrt{2}\sqrt{3})^2 = 5.01 \times 10^{-17}$ m

$m_e = (½e\hbar)(\alpha/hc)\,3^{2/3}\sqrt{2} = 9.129378 \times 10^{-31}$ kg, corrected to within 0.0003% of $m_e = 9.10938291 \times 10^{-31}$ kg by incorporating the $(1 - \alpha/\pi)(1 + \sqrt{2}\sqrt{3}\alpha^2)$ momentum effects.

Note: Matter constructs have two radii, representing the particle and wave field phases.

3) Quark quantum optical and interactive radii and mass energies:

$r_{qo} = (hc/\alpha^3)\pi/2 = 0.803 \times 10^{-18}$ m $\qquad r_{qi} = (r_{qo}/\alpha)\sqrt{3} = 6.353 \times 10^{-17}$ m

$m_{Up} = (E_c - E_o)\sqrt{2}\sqrt{3}\,2\pi = (½m_ec^2 - ½m_ev_o^2)\sqrt{2}\sqrt{3}\,2\pi = 3.9322$ MeV

$m_{Down} = \sqrt{3}\, m_{Up} = 6.81075$ MeV = excited Up quark state

4) Proton radii and mass energy:

$r_{po} = r_{qi}\, 3^{2/3}\, 2\pi = 0.83$ fm $\qquad r_{pi} = (hc/\alpha^4)\, \pi^2\, 3^{2/3} / \sqrt{2} = 1.017$ fm

$m_p = (½e\hbar)\, \sqrt{2}\, \sqrt{3}\, 3c^3 = \sqrt{3}\, [(m_{Up}/\alpha) + (m_{Down} - m_{Up})] = 1.6727 \times 10^{-27}$ kg = 938.306 MeV

5) Higgs Boson Mass Energy:

$m_H = [m_p - \sqrt{3}\, (2m_{Up} + m_{Down})] / \alpha = 125.1$ GeV

6) Hydrogen ground state:

$E_o = (½e\hbar)\, 3^{2/3}\, (\alpha^3/hc) / \sqrt{2} = 2.43 \times 10^{-35}$ kg = 13.63555 MeV by $E = mc^2$ conversion, corrected to 0.0004% of E_o by $(1 - \alpha/\pi)(1 + \sqrt{2}\, \sqrt{3}\, \alpha^2)$ momentum effects.

7) Gravitational energy and nuclear-gravity light speed distance symmetry:

a) $E_g = \sqrt{3} / (½e\hbar)2\pi = 3.263 \times 10^{52}$ eV, where $(½e\hbar)$ is the proton and electron EM mass-energy basis, $(½e\hbar) = 8.4480615 \times 10^{-54}$ is within 0. 5% of $(2\alpha hc)^2 = 8.405 \times 10^{-54}$, and within 1.5% of the G $m_e m_s / r_{es} = 5.3 \times 10^{33}$ J $= 3.312 \times 10^{52}$ eV value

b) Light Year = $3^{4/3}\sqrt{2}\pi/2r_{pi} = 9.451 \times 10^{15}$ m, within 0.1% of the actual 9.46×10^{15} m value (Note: The $3^{4/3}$ factor is $(3^{2/3})^2$, indicating a composite proton-earth orbit structure resonance)

b) Table of relative quantum-continuous planetary ground states

Planets:	**Mercury**	**Venus**	**Earth**	**Mars**	**Jupiter**	**Saturn**	**Uranus**	**Neptune**
Earth masses (Earth=5.972 x 10^{24} kg)	**0.055275**	**0.8150**	**1**	**0.1075**	**317.84**	**95.164**	**14.536**	**17.148**
mean distance to Sun (AU=1.49598 x 10^{11} m)	**0.3871**	**0.723**	**1**	**1.524**	**5.203**	**9.537**	**19.189**	**30.07**
m/r (Earth units mass to mean distance ratio)	**0.14279**	**1.127**	**1**	**0.0705**	**61.088**	**9.9784**	**0.7575**	**0.57027**
orbital velocity (Earth units = 2.9783x10^4 m/s)	**1.590**	**1.176**	**1**	**0.808**	**0.438**	**0.324**	**0.228**	**0.182**
orbital period (Earth year = 365.26 days)	**0.241**	**0.615**	**1**	**1.881**	**11.863**	**29.447**	**84.017**	**164.791**
F = mv^2/r (Earth units = 3.5410 x 10^{22} kg·m/s^2)	**0.361**	**1.5586**	**1**	**0.0463**	**11.72**	**1.0475**	**0.0394**	**0.0189**

$F = G M m / r^2$ (Earth units = 3.5424x10^{22} N)	**0.3689**	**1.559**	**1**	**0.0463**	**11.741**	**1.046**	**0.0395**	**0.0189**
$E_g = G M m / r$ (Earth units = 5.2994 x 10^{33} J = 3.30762 x 10^{52} eV)	**0.14279**	**1.127**	**1**	**0.0705**	**61.088**	**9.9784**	**0.7575**	**0.5703**
$E_v = mv^2$ (Earth units = 5.2973 x 10^{33} J	**0.13974**	**1.1269**	**1**	**0.0701**	**60.98**	**9.99**	**0.7556**	**0.568**

(Data for calculations obtained from NASA solarsystem.nasa.gov/planets web site)

Gravitational constant: G = 6.67384 x 10^{-11} m^3 / kg s^2 Sun's Mass: M = **1.9891 x 10^{30} kg**
Standard Gravitational Parameter: μ = GM = 1.327126 x 10^{20} m^3/s^2 = 3.32979 x 10^5 Gm_e

c) Comparative quantum nuclear - continuous gravitational energy analysis

As can be seen from the table, the Planets' orbital energies, whether gravitational force or angular momentum based, correlate to Earth's orbital energy by their m/r mass / distance energy density ratio, a continuously analytic 1st order correlation because their mass is so large quantum distinctions vanish, which means all planets' orbital energies correlate to the $E_g = \sqrt{3} / (½eħ)2\pi$ = 3.263 x 10^{52} eV = 5.3 x 10^{33} J electrodynamic (½eħ) proton and electron EM mass-energy basis.

Earth's C = 9.4 x 10^{11} m orbital path correlates to the LY = 9.46 x 10^{15} m light year by a C/LY = 9.936 x 10^{-5} Circumference / Light year ratio, and the mass / distance ratio since earth's mass determines its circumference and period. Earth's C/LY ratio times the speed of light yields its (C/LY)c = 2.98 x 10^4 m/s orbital velocity, so its energy references to light speed by Einstein's $E = E_o/(1-v^2/c^2)^{½}$ Lorentz transformation and $r_{pi} = 3^{4/3}\sqrt{2\pi}$ / 2 LY = 1.017 x 10^{-15} m proton radius.

This energy correlation derives from the $\alpha = e^2/2\varepsilon_o hc$ ground state charge potential to light speed kinetic energy root ratio of the nuclear and atomic domain $\alpha^2 = E_o/E_c$ ground to saturation energy state dynamic ranges. Gravity is continuous because $E_n = E_o/n^2$ quantum distinctions vanish for n $\geq 10^4$ (Bohr's Correspondence principle), and the C/LY = 9.936 x 10^{-5} Circumference / Light Year distance or velocity ratio yields an n = 1 / C/LY $\geq 10^4$ energy root in the $E_n = E_o/n^2$ quantum energy relation so its quantum distinctions vanish and it is continuous.

This subtle Bohr's Correspondence principle variation occurs in the gravity domain's distance energy root because electrons behaviors in atoms are matter wave functions with light speed periodic field and node energies which equate as Heisenberg Uncertainties, so $E_n = E_o/n^2$ quantum energy state n roots can only be equal integer harmonic values, but gravitational force in orbits propagates at light speed while orbital mv^2/r centripetal force generates at a v velocity, and distinctions between 2nd order Cauchy-Riemann Laplacian harmonic quantum states for v^2 mechanical and c^2 gravitational energies vanish for $v^2/c^2 \leq 10^{-8}$ energy and v $\leq 10^{-4}$ c root ratios.

d) A quantum-continuous gravitational energy nexus

Gravity is continuously analytic field energy with respect to the speed of light, distance, velocity and mass accumulation, with no $E_n = E_o/n^2$ quantum distinctions, so it is unlikely that it derives directly from mass, but instead is a covariant mass generation effect. This premise rests upon the concept of Wave-Particle Duality as a statistical effect of energy operating upon space's $\mu_o\varepsilon_o$ and 4-D entropic degrees of freedom, since Gravity only corresponds to Quantum Theory in regards to Wave-Particle Duality field energy, most likely as it applies in mass generation.

The wave field aspect of particle mass generation, operating upon and within space's $\mu_o\varepsilon_o$ impedance at light speed, conceptually correlates to earth's 29.79 km/s mv^2/r centripetal force generation, and corresponding $v = 1.006 \times 10^4$ and $c = 3 \times 10^8$ m/s root velocity ratio, $\lambda_v = h/mv$ and $\lambda_c = h/mc$ quantum matter waves, and $E_v = E_g/v^2$ and $E_c = E_g/c^2$ energy ratios, since $v^2/c^2 \leq 10^{-8}$ so it has no quantum distinctions by which to form harmonic resonance states.

This Quantum discontinuity nexus with Relativity's continuity was likely overlooked because Einstein based Relativity on a $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ "field free" Minkowski space-time energy metric and $ds^2 = g_{ik}dx_idx_k$ … Riemann condition with dx_i and dx_k roots of dx^2 field energy elements, where the g_{ik} "11, 12,… up to 44" coordinate indices functions "satisfy certain general covariant equations of condition" "determined by … [Lorentz] transformation," with 0 minimum and light speed maximum velocities. Differentiating gravitational distance and inertial velocity energies with 0-D points continuously resolves gravity as a Riemann condition energy root covariant, but physical reality never goes to zero, it has E_o energy ground states.

Quantum Theory correctly references hydrogen's $v_o = 2.187 \times 10^6$ m/s minimum velocity E_o ground state governed by $E_n = E_o/n^2$ quantum energy $\lambda_v = h/mv$ matter wave state harmonics, but does not properly address $n \geq 10^4$ or light speed as a Boltzmann $P = e^{S/k_B}$ probability system boundary condition. It addresses the 2nd order Laplacian harmonics part but not the continuously analytic 1st order Cauchy-Riemann derivative basis and Relativity requirements.

Bohr and Sommerfeld almost made the connection in their attempt to connect Relativity and Quantum Theory but did not realize that equal n integer harmonic energy roots in $E_n = E_o/n^2$ quantum behaviors is an assigned limitation which does not address energy form interactions whose matter waves differ by at least 10^4, and energy states by at least 10^8, too great for a stable resonance, even though Bohr was correct for n integers $\geq 10^4$ in his Correspondence principle.

Bohr's rigid orbit mechanistic model is regarded as incorrect because it failed to address statistical variations, but was the best model up until de Broglie introduced particle matter waves, providing Schrödinger with statistical orbital variations and Heisenberg with a continuous wave field energy interaction Uncertainty. This logical Uncertainty resolution defied analysis because factoring quantum integer states with continuous energies yields undefined results.

The $\Delta x \cdot \Delta p \geq \hbar/2$ Uncertainty barrier was breached by Yukawa's pion messenger particle momentum and distance energy analysis, but only in terms of quantized light speed velocity and nuclear bond distance. It failed to fully resolve the ½-wave resolution uncertainty by recognizing that $E_n = E_o/n^2$ quantum energy states have continuously analytic 1st order covariant dx_idx_k roots without quantum distinctions within each quantum energy state's boundaries which provide for continuous quantum field energy root interactions, since ½-wave Heisenberg Uncertainty states are $P = e^{S/k_B}$ system statistical behaviors, but with continuous energy root entropic interactions.

e) A quantum-continuous matter construct progression

The distinction becomes apparent in the following stable matter construct analysis and comparison of the proton particle model and planetary orbits:

Matter Constructs:	**Mass-Energy**	**Quantum Optical Radius**	**Interactive Radius**
Impedance of Space	$\mathbf{hc = h / (\mu_o\varepsilon_o)^{½} = (½e\hbar)^{1/2} / 2\alpha}$ $\mathbf{= 1.986445684 \times 10^{-25}\ J{\cdot}m}$		
Electron	$\mathbf{m_e = (½e\hbar)(\alpha/hc)\, 3^{2/3} \sqrt{2} =}$ $\mathbf{9.129378 \times 10^{-31}\ kg}$	$\mathbf{r_{eo} = (hc/\alpha^2) \sqrt{3}\, \pi =}$ $\mathbf{2.03 \times 10^{-20}\ m}$	$\mathbf{r_{ei} =}$ $\mathbf{(r_{eo}/\alpha)\, 3(\sqrt{2}\sqrt{3})^2}$ $\mathbf{= 5.01 \times 10^{-17}\ m}$
Quarks	$\mathbf{m_{Up} = (E_c - E_o) \sqrt{2}\sqrt{3}\, 2\pi =}$ $\mathbf{½m_ec^2 \sqrt{2}\sqrt{3}\, 2\pi = 3.9322\ MeV}$	$\mathbf{r_{qo} = (hc/\alpha^3)\pi/2 =}$ $\mathbf{0.803 \times 10^{-18}\ m}$	$\mathbf{r_{qi} = (r_{qo}/\alpha) \sqrt{3}}$ $\mathbf{= 6.353x10^{-17}\ m}$
Proton	$\mathbf{m_p = (½e\hbar) \sqrt{2}\sqrt{3}\, 3c^3 =}$ $\mathbf{\sqrt{3}\, [(m_{Up}/\alpha) + (m_{Down} - m_{Up})] =}$ $\mathbf{1.673 \times 10^{-27}\ kg = 938.3\ MeV}$	$\mathbf{r_{po} = r_{qi}\, 3^{2/3}\, 2\pi =}$ $\mathbf{0.83\ fm}$	$\mathbf{r_{pi} =}$ $\mathbf{(hc/\alpha^4)\pi^2 3^{2/3}/\sqrt{2}}$ $\mathbf{= 1.017\ fm}$
Higgs Boson	$\mathbf{m_{HB} = [m_p - \sqrt{3}(2m_{Up} + m_{Down})] /}$ $\mathbf{\alpha = 125.1\ GeV}$		
Hydrogen Atom	$\mathbf{E_o = (½e\hbar)\, 3^{2/3} (\alpha^3/hc) / \sqrt{2} =}$ $\mathbf{2.43 \times 10^{-35}\ kg = 13.63555\ MeV}$		
Orbital Gravitational Energy and Size	$\mathbf{E_g = \sqrt{3} / (½e\hbar)2\pi = 3.263x10^{52}}$ **eV** $\mathbf{GMm_e/r_{es} = 5.3x10^{33}\ J = 3.312x}$ $\mathbf{10^{52}\ eV}$	**Light Year =** $\mathbf{3^{4/3} \sqrt{2}\pi / 2r_{pi} =}$ $\mathbf{9.451 \times 10^{15}\ m}$	

From the table it can be seen that masses and densities (sizes) follow a geometric orbital energy wave function progression which derives from space's 1st order continuously analytic 4-D and impedance roots. Furthermore, unless dealing with boundary conditions like speed of light or velocity and distance energy roots, there is no point to addressing more than 4 places since it is a quantum-continuous nexus which occurs for $n \geq 10^4$ in $E_n = E_o/n^2$ quantum systems. The nexus is a $\int 1/f(x)\, dx$ singularity transform in which f(x) quantum system wave function resolution goes to zero, $f(x) \rightarrow 0$, and $P = e^{S/k_B}$ statistical behaviors are replaced by continuously predictable logic.

This four digit limit is not mathematical conjecture, it is natural behavior. Sommerfeld's $\alpha = v_o/c = e^2/2\varepsilon_o hc = 0.007297353$ fine structure constant correlates light speed to hydrogen's ground state potential energy root $\sqrt{E_o}$ based upon absolute boundary condition limits, so $E_c = E_o/\alpha^2$ in the $E_n = E_o/n^2$ form, a non-integer correlation between domain boundaries, and the quark mass-energies to E_o ground state orbital electron by $m_{Up} = E_o/\alpha^2 \sqrt{2}\sqrt{3}\ 2\pi = 3.9323$ MeV, for E_o = 13.60569253 eV = 1 Ry ≡ hcR_∞, but because these are transition states only 4 digits are accurate.

f) The hc = $h/(\mu_o\varepsilon_o)^{½}$ quantum-continuous matter construct behavior root

Space's impedance vector is the construct basis, equating energy, size and time to light speed momentum with a 1.98644731 x 10^{-25} J·m resolution. This hc root is the $\mu_o\varepsilon_o$ ↑↓ point-pairs' permeability-permittivity impedance vector and ground state ds lower limit root of Einstein's $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ "field free" Minkowski space-time points; the fundamental ½-wave ground state basis for all matter construct ground states; the reciprocal $c = 1/(\mu_o\varepsilon_o)^{½}$ light speed saturation state limit; $E_n = E_o/n^2$ quantum states reduced to ↑↓ → ↑↑ and ↓↓ point-pair excited state roots; and the f(x) → 0 singularity function Entropic Calculus limit.

The $h/(\mu_o\varepsilon_o)^{½}$ impedance vector manifests as an $(½e\hbar)^{½}/2\alpha$ orbital charge magneton root, the fundamental basis of motion and the mass generation function. It is not unipolar and does not exist by itself because it is the basis of stable angular momentum equilibrium resonances in its (½eħ) point pair form, and conversely the root of instability and decay functions.

This conclusion is premised upon the fact that $h/(\mu_o\varepsilon_o)^{½}$ is within 0.255% of $(½e\hbar)^{½} / 2\alpha$, which corrects to 0.035% by incorporating the $(1 - \alpha/\pi)\ (1 + \sqrt{2}\sqrt{3}\alpha^2)$ angular momentum effects of a $-\alpha/\pi$ negative energy well α density coefficient over a π ½-wave length ground state wave function orbital in an $\sqrt{2}\sqrt{3}\alpha^2$ excited α^2 energy density state with √2 angular and √3 spherical momentum vector distributions in all available spatial entropic degrees of freedom over time.

The $h/\sqrt{(\mu_o\varepsilon_o)} = \sqrt{(½e\hbar)} / 2\alpha$ impedance and orbital charge wave-particle duality functions are thus the covariant continuously analytical common denominator Entropic Calculus roots for Boltzmann $P = e^{S/k_B}$ probability principle based logic systems for k_B macrostate energy equally interacting in all S available entropic degrees of freedom, and in Relativity's $dx^2 = dx_i dx_k$ local perspective √2 angular momentum energy vector operating upon and with respect to itself and its observed √3 spherical momentum 3-D entropic distribution. Both logics are correct because both initiate from these fundamental covariant continuously analytic common denominator roots.

Mathematically it corresponds to the Cauchy-Riemann $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ 1st order continuously analytic partial derivative, and $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = 0 = \partial^2 v/\partial x^2 + \partial^2 v/\partial y^2$ Laplacian 2nd order quantum harmonics, according to Cause and Effect since the 1st order logic is continuously analytic, which allows stable 2nd order quantized equilibrium resonances to exist as quantum states with continuously interactive covariant energy roots within their boundaries.

However, existence of the covariant energy root entropic degree of freedom permits an interactive resonance with the $-\partial v/\partial x$ 1st order root, forming an equilibrium between the $-\partial v/\partial x$ element and the entropic degree of freedom as a positive $\partial v/\partial x$ element. This can destabilize the 2nd order $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = 0 = \partial^2 v/\partial x^2 + \partial^2 v/\partial y^2$ resonance and transform it into an interactive transition condition between stability and its interactive circumstances. This would have been the initial state of infinite 4-D space-time entropy prior to a $\int 1/f(x)\,dx$ Big Bang event if its f(x) → 0 stability function went to zero and space transitioned into a stable space - matter equilibrium.

VIII) A Covariant Quantum Continuous Basis of Stability

a) Prime number stability distributions in nuclei

Before addressing matter constructs it is useful to examine prime numbers. “Mathematics … deliver[s] the key to those laws of nature … concealed by appearances.” This is true because its logic derives from nature, and conversely nature’s logic can be extrapolated mathematically. The uniqueness of prime numbers has intrigued and challenged mathematicians for centuries and their lack of physical significance indicates an uncorrelated mathematical logic. A correlation exists however in the stable particle configurations of nuclei.

Prime numbers identify stable particle pattern distributions which are unobserved outside that domain because, as in mathematics, they are one-way prime functions which easily result in semi-prime RSA like encryption patterns, a very difficult to decipher Quantum Riddle in the reverse direction. The Stable Nuclides Table in the Appendix presents a prime number stability pattern in the Brookhaven National Laboratory Chart of Nuclides at www.nndc.bnl.gov/chart/. (Use Decay Mode, Tool Tips On, NDS, Wide Screen and Level 4 Zoom to best see the patterns.)

As the Table shows, prime numbers constitute particle configuration stability nodes so all stable elements have prime number stability points in their proton, neutron or mass numbers. Prime numbers are indivisible, non-factorable, and stable because with no $S = k_B \ln P$ entropic degree of freedom factors available to partition their energy, they are P = 100% stable. Stable, and then less stable distributions generally occur around them, so a proton prime number indicates a vertical element distribution, a neutron prime number indicates a horizontal isotope distribution, and a mass prime number indicates an element and isotope cluster distribution.

The term generally is used because the combinations may be constructive or destructive, stabilizing or destabilizing configurations. For instance, a mass prime of 2 is a stability point for a mass increase to He-3 or a mass decrease to H-1, as shown in Brookhaven’s Chart of Nuclides, and a proton prime of 2 can distribute between He-3 and He-4 or H-2 and H-1. This changes as particle count increases as shown for Argon, P = 18, stable if viewed as a dual Fluorine nucleus combination of prime 19 masses. Deviations increase as nuclei become larger until P = 43, 61 and above 83, because geometry cancels prime number stability effects by interfering with the light speed synchronicity of shared Yukawa’s distance dependent proton-neutron pion bonding.

b) Prime number stability function

All prime numbers, except 2, are odd, indicating a 2n +1 equilibrium resonance between equal n states and a non-factorable odd pendulum or teeter-totter type energy fulcrum state. The prime number 2 is thus a stable resonance condition between equivalent 1 and 0 quantum states, where n = ½ for (2n + 1) = 2, a $P = e^{S/k_B}$ = 50% Wave-Particle probability function from space’s $\mu_o\varepsilon_o$ impedance and 3-D entropic degrees of freedom. Prime number energy resonances are thus between 1 and 0 quantum states, include an inherent wave-field instability factor, and constitute equivalent entropic degree of freedom sets bound by an unstable entropic degree of freedom resonance state, paralleling the natural sequence of (2) deuteron and (3) triton stable sub-states.

The significance of prime numbers then is that they constitute 2n + 1 indivisible number combinations representing stable particle combinations. Number Theory parallels physical reality if prime numbers represent stable resonances, but physical reality's significance is that this logic has entropic degree of freedom boundaries which interfere with and limit the mathematical logic. This occurs at half the k_B root value, for 2 = 2n + 1, when n = ½, and k_B equally occupies two entropic degrees of freedom at light speed as a 2-D √2 Pythagorean superposition resultant of equal orthogonal wave-particle duality field and state energy forms, and then again for a 3-D √3 Pythagorean superposition resonance resultant when the field and state energies become a 3-D mass energy. This provides stable matter configurations, and so on until size interferes.

c) Electron wave-particle mass-energy resonance construct

Space's $\mu_o\varepsilon_o$ impedance point-pairs with ↑↓ neutral and ↑↑ or ↓↓ excited $E_n = E_o/n^2$ states has a $c = 1/\sqrt{(\mu_o\varepsilon_o)}$ 1-D root which forms a (½eħ) ↔ (α/hc) stable magneton generation ↔ wave field energy ∫ 1/f(x) dx resonance singularity matter construct. For the $m_e = (½e\hbar)(\alpha/hc)\sqrt{2}\,3^{2/3} = 9.129376 \times 10^{-31}$ kg electron mass, α indicates transformation of space $hc = h/\sqrt{(\mu_o\varepsilon_o)}$ impedance point energy density into a higher density magneton-wave electron construct, the $\sqrt{2}3^{2/3}$ indicates a √2 orbital angular momentum distribution of two 3-D orbital elements with a $s = [s(s + 1)]^{½}\,\hbar = ½$ spin angular and $m_s = \pm½$ magneton leakage energy combined $3^{2/3}$ resultant moment.

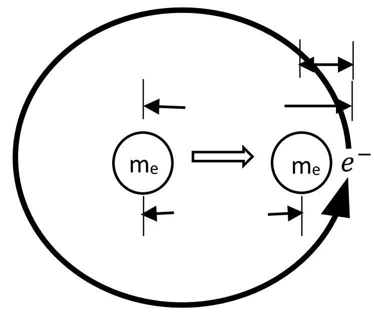
A light speed superposition state singularity resonance cannot be differentiated because there is nothing faster than light speed, no x → 0 to differentiate f(x) as f(x) → 0, and is regarded as an irreducible Heisenberg Uncertainty. The 3^2 element represents equivalent $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ 3-D energies in a $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ field - particle state (½eħ) (α/hc) resonance operating upon and within space's impedance and 3-D. This light speed resonance in one domain yields the saturated state mass, charge, magneton, spin and size forces which manifest as the next domain's observed electron ground state $3^{1/3}$ resultant.

d) Electron mass-energy generation field leakage magneton

These requirements are satisfied by a light speed orbital EM energy construct with a √2 angular moment "charge" polarity orientation and ½eħ generated $B = d\phi_E/dt$ magnetic field mass in a 3-D spherical rotation distribution with a $3^{1/3}$ resultant, captive by its charge force passing through it. The magneton is ½eħ field leakage energy from the attenuation by the increased $\mu_o\varepsilon_o$ impedance mass-energy density, from relativistic orbital motion contraction to its observed size. The ½-spin moment is mass-magneton offset by the orbital contraction and g-factor is the v/c m_e distinction. This configuration's contracted EM field mass-energy presents impedance to inertial motion because motion transforms space's $\mu_o\varepsilon_o$ impedance into $\mu_r\varepsilon_r$ relative high density energy.

This orbital EM energy construct constitutes a light speed √2 EM energy orbital wave function whose orientation generates a specific m = ½eħ/μ mass = inertial impedance magnetic field energy by passing its charge force through the field energy's increased $\mu = \mu_r\varepsilon_r$ impedance to attract its opposing motion and field orientation on its opposite side, since the increased energy density constitutes an entropic degree of freedom for this field energy. The wave length through the mass-energy equates to the contracted space orbital period for a stable equilibrium.

e) Covariant relativistic mass and g-factor



As equal field and construct forms in equilibrium, each component must resonate in all 3-D in a $\sqrt{2}$ angular momentum orbital from their perspective, resulting in a 3^2 compounded $\sqrt{2}$ orbital. From our perspective we observe a $3^{1/3}$ undifferentiated resultant, since the 3^2 and $\sqrt{2}$ construct is a light speed function, and since one component has inertial mass and the other is EM energy, the mass component undergoes Lorentz transformation.

This means the mass follows the oriented field energy, and vice versa, mass resonating with itself at light speed. We cannot differentiate its position since it is always offset from center by relativistic orbital contraction, with a covariant Lorentz mass increase equal to the generated $B = d\phi_E/dt$ inertial mass field resulting in an equal and opposite momentum negative energy well cancelation which stabilizes the electron. This causes a $½g = 1.001159652\ \mu_B$ electron magnetic moment increase $g = 2.002319304$ factor effect, since $2\sqrt{2} / (½g – 1)$ = [$r_{ei} = (r_{eo}/\alpha)\ 3(\sqrt{2}\sqrt{3})^2 = 5.01 \times 10^{-17}$ m] / [$r_{eo} = (hc/\alpha^2)\ \sqrt{3}\ \pi = 2.03 \times 10^{-20}$ m], within 98.88%, is the density ratio effect of the r_{eo} particle mass-energy forming its r_{ei} interactive construct, within 0.03% of ½g with the 3-D spherical momentum effect, since $[2\sqrt{2} / (½g – 1)] / (r_{ei} / r_{eo}) / (1 - \sqrt{3}\alpha) = 1.001458435$.

Discounting relativistic effects for the moment, a hydrogen atom orbital electron with an $E_o = 13.60569253$ eV $= 2.1798721722 \times 10^{-18}$ J energy has a $v_o = \sqrt{(2E_o/m_e)} = 2.18769 \times 10^6$ m/s velocity and $\lambda_o = h/m_e v_o = 3.32492 \times 10^{-10}$ m matter wavelength, corresponding to the $a_o = \lambda_o/2\pi = 0.5291776 \times 10^{-10}$ m Bohr radius. Accelerating this electron to light speed yields an $E_c = E_o/\alpha^2 = ½m_e$ KE, where $\alpha = v_o/c$ is Sommerfeld's fine structure constant, and $\lambda_c = h/m_e c = hc\alpha^2/2E_o = \alpha\lambda_o = \alpha a_o 2\pi = 2.4263102389 \times 10^{-12}$ m Compton wavelength, by simple size-density change.

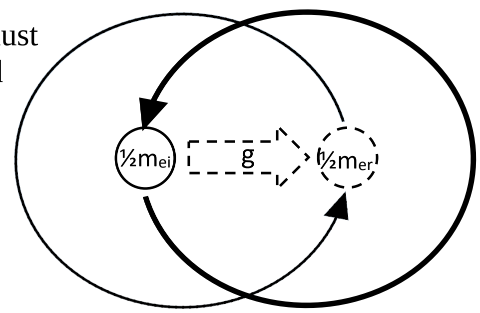
Einstein's development of the $\gamma = \sqrt{(1 – v^2/c^2)}$ Lorentz transformation in Electrodynamics of Moving Bodies was a theoretical treatment, with $\gamma \rightarrow 0$ as $v \rightarrow c$ mathematical limits in which mass $m = m_o/\gamma \rightarrow \infty$ and size $s = \gamma s \rightarrow 0$, but in physical reality with limited entropic degrees of freedom the variables can only achieve real limits. Since the lower limit in any system is the E_o ground state energy of the components of that system, the actual velocity, size and mass-energy has $v_o \leq v \leq c$, $s_o \leq s \leq s_c$, and $m_o \leq m \leq m_c$ ranges, and thus g-factor effect, since $1 + \alpha/2\pi = ½g$, within 0.0002%.

f) An electron covariant mass-energy resonance construct

At fundamental particle construct levels, energy resonates between $\mu_o\varepsilon_o$ impedance and 3-D particle forms at light speed because energy operating upon $\mu_o\varepsilon_o$ is limited to $c = 1/\sqrt{(\mu_o\varepsilon_o)}$, a physical energy entropic degree of freedom time flow constraint. This is energy's physical boundary condition differentiating it from its pure EM form into particle construct inertial and field behaviors, as defined by the $\alpha = e^2/2\varepsilon_o hc$ fine structure constant $P = e^{S/k_B} = 1 = c\ \sqrt{(\mu_o\varepsilon_o)}$ 100% entropy dependent probability, $\int |\psi|^2\, dx$ = 100% Schrödinger probability density function, $\int 1/f(x)\, dx$ singularity function inversion transform, and Lorentz $\gamma = \sqrt{(1 – \alpha^2)}$ space-time-mass $\alpha^2 = E_o/E_c$ energy density transformation between physical reality's E_o and E_c constraints.

The significance of this is more apparent if the α fine structure constant is viewed as an entropic differentiation coefficient partitioning EM energy into $e^2/2\varepsilon_o h$ field force and c motion behaviors in terms of available $\mu_o\varepsilon_o$ impedance and 3-D entropic degrees of freedom. EM energy resonates between opposing $e^2/2\varepsilon_o h$ forces differentiated by motion operating upon space's $\mu_o\varepsilon_o$ impedance and 3-D. This in turn differentiates the momentum and charge force entropic degrees of freedom those functions created, since $S = k_B \ln P$, giving rise to continuously analytic 1st and 2nd order Cauchy-Riemann inertial mass-energy wave field and momentum covariant energies, each continuously differentiating the other's energy, and space's impedance and 3-D.

The basis of inertial mass-energy is $B = d\phi_E/dt$ EM field energy with momentum, with α saturating it as $m_e = (½\alpha e/2\pi c)\ 3^{2/3}\sqrt{2} = 9.12938 \times 10^{-31}$ kg = 0.51099893 MeV/c^2 mass-energy at light speed motion and 3-D α size compression boundary condition limits. Its $r_{eo} = (hc/\alpha^2)\sqrt{3}\pi = 2.03 \times 10^{-20}$ m quantum optical and $r_{ei} = (r_{eo}/\alpha)\ 3(\sqrt{2}\sqrt{3})^2 = 5.01 \times 10^{-17}$ m interactive angular momentum radii constructs coincide exactly with its 1-D local perspective quantized $E_c = ½m_ec^2 = 0.255499$ MeV/c^2 Compton matter wavelength mass-energy gain limit of going from v_o to c.



To stabilize, the $½m_{ei}$ EM inertial mass-energy generator must resonate by symmetry with equal energy, specifically the generated $½m_{er}$ light speed relativistic effect of $½m_{ei}$ operating upon space's 3-D and impedance entropic degrees of freedom. These $½m_{ei}$ EM generator and generated $½m_{er}$ 3-D functions are thus bound by a 1-D g = 2.0023193 relativistic resonance resultant of the masses' √2 angular and √3 spherical momentums. The two $½m_e$ masses are differentiated by g, as a 2/g = 0.998841691 compound effect, to yield an $m_e = 0.510998928$ MeV/c^2 electron mass, with a $(1 - 2/g)\ m_e$ = 0.000591894 MeV relativistic negative energy well binding the $½m_e$ EM inertial and relativistic masses. This yields in a ½g magneton mitigation and ½-spin, since the $\alpha = 2\pi(1 - 2/g)/(2/g)^2$ ground to saturation state force, velocity, size and √(PE/KE) negative energy well momentum and the $\alpha = 3(\sqrt{2}\sqrt{3})^2\ (r_{eo}/r_{ei})$ covariant $½m_{ei}$ and $½m_{er}$ orbital effects match to within 0.036%.

g) Alternative covariant mass-energy resonance construct description

Free space's lower $\mu_o\varepsilon_o$ impedance density expands the electron light speed $3(\sqrt{2}\sqrt{3})^2$ orbital and interaction field construct by 1/α, where $\alpha = e^2/2\varepsilon_o hc$ is the fine structure E_o ground to E_c light speed saturation state energy density root coefficient. In the electron's case, it is the r_{eo} quantum optical $½m_{ei}$ and $½m_{er}$ covariant pair light speed electrodynamic orbital wave field energy with respect to its r_{ei} interactive radius in one light speed electrodynamic cycle.

To picture the electrodynamic construct, factor r_{ei} by α to obtain $[r_{ei} = (r_{eo}/\alpha)\ 3(\sqrt{2}\sqrt{3})^2 = 5.01 \times 10^{-17}\ \text{m}]\alpha = [r_{eo} = (hc/\alpha^2)\ \sqrt{3}\ \pi = 2.03 \times 10^{-20}\ \text{m}]\ 3(\sqrt{2}\sqrt{3})^2$, where $hc = h/\sqrt{(\mu_o\varepsilon_o)}$ indicates the lowest common denominator point of a $\mu_o\varepsilon_o$ impedance point-pair, α^2 is the E_o to E_c light speed correlation of particle node energy density increase to wave field size in a wave-particle duality resonance, √3 is its 3-D distribution vector resultant, giving it an arc cos $1/\sqrt{3} = 54.74^o$ = ½-spin relativistic mass-magneton offset, and π indicates a ½-wave E_o electron ground state.

Then $3(\sqrt{2}\sqrt{3})^2$ indicates a dual mass dipole, $½m_{ei}$ B = $d\phi_E/dt$ inertial mass generator and generated $½m_{er}$ relativistic effect, √2 angular and √3 spherical momentum resultants statistically occupying 3-D at light speed, equal spherical energy distributions in orbitals about each other. This is the g factor effect of a $½m_{ei}$ B = $d\phi_E/dt$ inertial mass generator in light speed √2 angular and √3 spherical momentum orbital with the equal E_o to E_c $½m_{er}$ Lorentz mass it generates, covariant semi-stable states in a negative energy well resonance to yield a super-stable electron.

The $½m_e$ electrodynamic and covariant Lorentz effect interactive mass-energies resonate as $(\sqrt{2}\sqrt{3})(\sqrt{2}\sqrt{3})$ to yield an $r_{ei} / r_{eo} = 3(\sqrt{2}\sqrt{3})^2 / \alpha$ field force to velocity 3-D entropic degree of freedom resultant, generate the g = 2.002319304 factor, (½g = 1.001159652) μ_B magneton, and the $(1 – 2/g)\ m_e$ = 0.00059189 MeV relativistic momentum cancellation negative energy well. It should be noted that $(g – 2) / m_e(1 – 2/g)(1 – \alpha/2)$ = 3.9292 MeV is within 0.08% of the Up quark $m_{Up} = (½m_ec^2)\ \sqrt{2}\sqrt{3}\ 2\pi$ = 3.9323 MeV mass-energy, the electron's symmetry covariant.

h) Entropic Calculus construct

The reasoning behind this end result backwards electron analysis was derived forward as an e^x Entropic Calculus progression from space's hc impedance by $E_c = E_o / \alpha^2$ relativistic energy density increase of a √3 ground state π ½-wave 1s type spherical orbital, a stable 2-d two degree of freedom local perspective resonance with √2 and √3 resultants in the observer's 3-D domain. It is a $3(\sqrt{2}\sqrt{3})^2$ generator and Lorentz $½m_e$ mass-energy electrodynamic and relativistic mass-energy resonance singularity, $\int_{D=1}^{3}\int_{d=1}^{6}\frac{1}{f(x_{Dd})}\ dx_d dx_D$, integrated over the 6-d local and 3-D observer entropic degrees of freedom, where f(x) → 0 in 3-D space because light speed wave-particle duality resonance wavelength cannot be differentiated by sub-light speed wavelengths.

It is Einstein's $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ Minkowski 4-D field free space-time metric in covariant resonance with his $ds^2 = g_{ik}dx_idx_k$ … "Riemann condition," where the g_{ik} 11, 12,… up to 44 coordinate functions are "covariant equations of condition" in terms of $\alpha^2 = E_o/E_c$ energy ranges, $\alpha = e^2/2\varepsilon_o hc$ energy roots, and $c = 1/\sqrt{(\mu_o\varepsilon_o)}$ KE motion and PE impedance energy boundaries, as continuously analytic 1st order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ Cauchy Riemann and 2nd order $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2 = 0$ Laplacian harmonic behaviors. These form a stable covariant $e^{-ix} = \cos x – i \sin x$ negative energy well with semi-stable Boltzmann $P = e^{S/k_B} = e^{ix}$ interactive states, where $k_B = ½m_{ei}$ and S is space's$\mu_o\varepsilon_o$ impedance and 3-D entropies.

In this model, an e^x function ∫ 1/f(x) dx singularity transition occurs at the Strong nuclear, EM atomic and gravitational domain boundaries, as E_o ground and E_c saturation state boundary condition α size and α^2 energy density ratio transforms. This uniform mathematical framework permits particle into massive body and vice-versa reversible processes, depending upon entropic conditions, as in atomic level chemical thermodynamics. Basically, if Einstein's theory correctly depicts gravity, this Entropic Calculus framework depicts matter formation at one boundary of physical reality and gravitational effects at the other boundary.

The model references space's hc impedance in terms of α size and α^2 energy density, so the progression firmly anchors in physical reality. It provides a relativistic quantum statistical behavior basis with its interactive $½m_e$ EM and Lorentz masses occupying each dimension's 2-d degrees of freedom so they may independently interact with surrounding 3-D, like a coin's head or tail independently interacting with the ground and space sides of its 2-d entropic degrees of freedom. There are no heads or tails, no statistical behaviors, only continuous √2 angular and √3 spherical momentums until entropic interaction, like gravity and ground interacting with coins. No statistical outcome occurs without entropic interaction, since $P = e^{S/k_B}$ is entropy dependent.

This α based matter construct and statistical behavior progression defines a covariance between Standard Model $½m_e$ electron based leptons and $½m_e$ based quarks, and constructively protons, because a quantum-continuous behavior nexus occurs when quantum distinctions vanish at $\alpha^2 = E_o / E_c$ boundaries and $E_n = E_o/n^2$ Bohr's Correspondence principle states, for $n \geq 10^4$, with 2-d degree of freedom quantum orbital wave function energies, because $\alpha = e^2/2\varepsilon_o hc$ is a 1-d degree of freedom energy root correlation which defines the $\alpha^2 = E_o/E_c$ statistical behavior range, with E_o and E_c mass-energies transforming system entropies by $\sqrt{(1 - v_o^2/c^2)}$. The E_o/n^2 states are statistical sub-boundaries with continuously analytic covariant 2-d degree of freedom behaviors, so if mass-energies transform system entropies then quantum distinctions must vanish. Thus in physical reality the 100% stable mass-energy construct probability point occurs at α size and α^2 energy density ratios. The constructs form because they are entropic degrees of freedom limits.

IX) Extrapolation into covariant quark, proton and pion constructs

a) Quarks

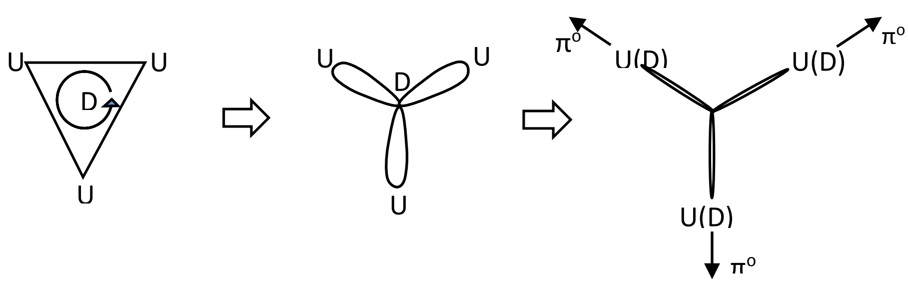
The Up and Down quarks are semi-stable limit points of a ground state electron achieving a $½m_e$ light speed mass-energy, a $1/\alpha^2$ energy factor equivalent of an electron going from v_o to c:

$m_{Up} = (E_o/\alpha^2)\ \sqrt{2}\sqrt{3}\ 2\pi = (½m_e c^2)\ \sqrt{2}\sqrt{3}\ 2\pi = 3.9323$ MeV and

$m_{Down} = \sqrt{3}\ m_{Up} = 6.8109$ MeV, where $m_e = (½e\hbar)\ (\alpha/hc)\ 3^{2/3}\ \sqrt{2}$

$r_{qo} = (hc/\alpha^3)\ \pi/2 = 0.803 \times 10^{-18}$ m   and $r_{qi} = r_{qo} / \sqrt{3}\ \alpha = 6.353 \times 10^{-17}$ m

b) Quark triton

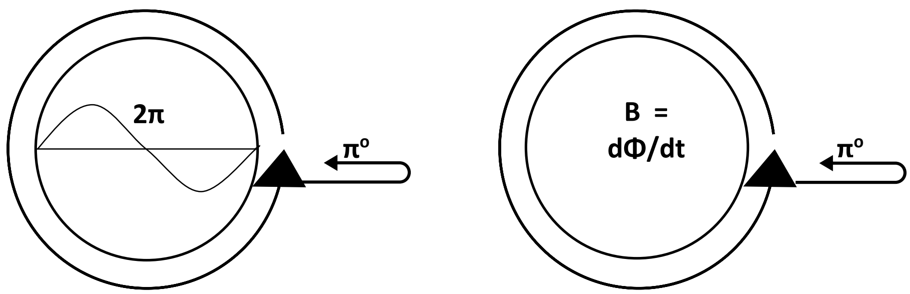


Quarks are statistically probable semi-stable energy states, occurring by virtue of their α size and α^2 density ratios to hc and the electron's E_o ground state energy in its √2 angular and √3 spherical 1-s orbital distribution. Their unstable π/2 (¼-wave) energy states achieve semi-stable π ½-wave states by resonance with each other, and become fully stable 2π wave resonance states with the Higgs boson mass-energy they generate within the proton:

In this construct a Down quark is a excited √3 Up quark state in orbital resonance with three ground state Up quark wave functions, generating 135 MeV π° neutral pion emissions by light speed interaction with relatively stationary Up quarks, while binding them as a m_{Down} - m_{Up} = 2.88 MeV gluon. This construct results in +2/3 Up and -1/3 Down quark average charge values by virtue of the light speed resonance, if charge is regarded as a light speed resonance orientation polarity resultant and therefore an unresolvable uniform constant particle property to observers.

If a Down quark orientation is -1 and Up quark orientation is +1, according to symmetry, its -1 orientation state and $(\sqrt{3} - 1)m_{Up}$ = 2.88 MeV light speed momentum energy would flip the Up quark +1 state to -1 upon interaction, resulting in a -1 Down quark state and two +1 Up quark state triton, a light speed rotational resonance by the gluon Down quark state's momentum which presents as two +2/3 Up and one -1/3 Down quark charges to relatively stationary observers who cannot differentiate light speed ½-wave Heisenberg Uncertainty transitions, like Yukawa's pion.

c) Higgs mass generation



Such a triton structure is semi-stable by virtue of the opposing but unbalance charges and which as a $2m_{Up} + m_{Down}$ = 14.6755 MeV energy state must distribute equally in 3-D space. The light speed motion of the 2(+2/3) + (-1) = +1 triton charge construct operates upon space's $\mu_o\varepsilon_o$ impedance to produce a definite value $B = d\phi_E/dt$ magnetic field energy which bends the triton's trajectory by reciprocally operating upon its charge. For a stable resonance the triton's charge through the boson must synchronize with its orbital matter wave, confining its size so $2\pi r_{po} = C_p$.

In this ground state orbital about the Higgs boson field mass-energy it electrodynamically generates, the triton is a 2-D planar three Up quark energy state distribution and a $m_{Down} - m_{Up}$ = $(\sqrt{3} - 1)m_{Up}$ = 2.88 MeV gluon force bond, where $m_{Up} = ½m_ec^2\ \sqrt{2}\sqrt{3}\ 2\pi$ = 3.9322 MeV is a light speed $\sqrt{2}\sqrt{3}2\pi$ planar and spherical orbital electron energy and $m_{Down} = \sqrt{3}m_{Up}$ is its excited state.

The gluon propagation traverses a clover-leaf wave function, with wave shape field intensity and wavelength correlating to two interactive $r_{qi} = r_{qo}/\alpha\sqrt{3} = 6.353 \times 10^{-17}$m quark wave field radii, defined by the $r_{qo} = (hc/\alpha^3)\pi/2 = 0.803 \times 10^{-18}$m non-interactive quark size based upon space's impedance, so the triton's size corresponds to gluon force messenger propagation rate.

Light speed propagation of the triton charge through the Higgs boson coincides with its orbital generation of the boson mass, so a light speed $\sqrt{3}$ spherical angular momentum e^+ charge generates a covariant $B = d\phi_E/dt$ field energy equilibrium, a standing wave space-triton resonance as it rotates to the boson's opposite side, interacting with itself through the boson, a mediation of the triton's interaction with itself over a quantized resonant period, distance, and energy, with the boson presenting a reciprocal covariant energy to the triton's orbital charge and gravity effect.

This model is based upon a $\mu = ½e\hbar/m$ Bohr magneton relation, as an $m = ½e\hbar/\mu$ mass in an $E_o = e^{-ix}$ quantum continuous ground state. If the Up Up Down quark triton light speed orbital +1 charge generates the Higgs boson mass center then the orbital must result in the proton radius because the triton's ↑e+ charge motion force must transmit through the boson to attract its ↓e+ opposng side motion. Thus $\lambda = hc / \sqrt{3}(2m_U + m_D)\ \sqrt{2}\sqrt{3}\ 2\pi = r_{pi} = 1.01$ fm, where $hc = 2 \times 10^{-25}$ J•m is space's EM energy impedance, $\sqrt{3}(2m_U + m_D) = 25.4$ MeV $= 4.07 \times 10^{-12}$ J is the quark triton's spherical momentum mass energy, π is the light speed ½ sphere ½ wave length it travels, $\sqrt{2}\sqrt{3}$ is the E_o ground state quantum continuous angular and spherical momentum orbital energy, and 2π is the e+ charge diametric motion wavelength through the boson.

d) Proton 2.7928 μ_n magneton and $\pi°$ and π^- pion generation

Furthermore, factoring the $\mu = e\hbar/2m_p$ proton magneton by its $(r_{pi}/r_{ei})^3/\sqrt{3}(m_p/m_e) = 2.793$ density ratio yields its correct value, and the gluon interaction with the triton's quarks triggers a generated $(m_D - m_U/\pi) = 5.56$ MeV and $\sqrt{(3/2)[3(½m_ec^2)/\alpha + \sqrt{2}m_e]} = 129.53$ MeV mass-energy decay 135.1 MeV $\pi°$ pion emission, as would occur from $B = d\phi_E/dt$ mass generation interruption as the gluon carries the -1 Down quark charge state to the next Up quark in its orbital.

Triton orbital path charge and $B = d\phi_E/dt$ Higgs mass generation disruption co-varies with light speed pion emission duration: For a $r_{po} = r_{qi}\ 3^{2/3}\ 2\pi = 0.83$ fm Higgs mass radius, $C_H = 2\pi r_{po} = 5.215$ fm circumference, and $129.53\ \text{MeV}/m_p = 13.805$ % proton mass decay, the $C_H \times 0.13805 = 0.72$ fm orbital distance traveled matches Yukawa’s 135 MeV $= 2.163 \times 10^{-11}$ J neutral π^o pion $\lambda = hc/\pi^o = 1.44$ fm matter wavelength over its 0.72 fm ½-wave cycle. The 1 fm nuclear bond contracts to 1 fm $(m_e / (m_e + E_n)) = 0.4$ fm upon interaction with a neutron state orbital electron, coinciding with the pion ½-wave length as a (1 fm + 0.4 fm) / 2 = 0.72 fm median bond length.

The neutron state electron interaction adds $3(m_e + E_n) + \sqrt{2}m_e = 4.6$ MeV, from a neutron state $\sqrt{3}(m_e + E_n)$ orbital energy with each proton and $\sqrt{2}m_e$ resonance orbital between them, to yield the 129.53 + 5.56 + 4.6 = 139.7 MeV π^- negative pion which decays upon bond cleavage, indicating an electron mass-energy extraction upon interaction with the proton's $\pi° = 135$ MeV pion. This does actually occur in nature during upper atmospheric lightning discharge 140 MeV gamma ray emissions, a characteristic lightning discharge bond cleavage pion decay signature.

e) Proton wave field generation size, mass and ½-spin

The proton’s radii, mass-energy and ½-spin effects thus result as:

$r_{po} = r_{qi}\ 3^{2/3}\ 2\pi = 0.83$ fm $\qquad r_{pi} = (hc/\alpha^4)\ \pi^2\ 3^{2/3} / \sqrt{2} = 1.017$ fm

$m_p = (½e\hbar)\ \sqrt{2}\ \sqrt{3}\ 3c^3 = \sqrt{3}\ [(m_{Up}/\alpha) + (m_{Down} - m_{Up})] = 1.6727 \times 10^{-27}$ kg = 938.306 MeV

arc sin $r_{po}/r_{pi} = 54.7^o$ ½-spin, the quantum optical to interactive radii wave-particle ratio

The proton mass is similarly (½eħ) fundamental magneton based, generated by the quark triton orbital charge, but differs from $m_e = (½e\hbar)\ (\alpha/hc)\ \sqrt{2}\ 3^{2/3}$ electron mass generation because electron mass results from its ½eħ magneton relativistic interaction with space’s α/hc impedance and subsequent $\sqrt{2}\ 3^{2/3}$ resonance with it as an $\sqrt{2}$ orbital wave function resonance between equal $(3^{1/3})^2$ covariant 3-D objects, the universe taking a particle mass-energy generation path.

The proton however takes a wave field mass-energy generation path because the triton's quarks are wave function energy states which depend upon light speed $\frac{1}{2}m_ec^2$ electron 2π matter wave energy in $\sqrt{2}$ angular and $\sqrt{3}$ spherical orbital resonance, and the triton in $\sqrt{2}$ angular and $\sqrt{3}$ spherical orbital resonance with its ($\frac{1}{2}e\hbar$) generated magneton mass-energy by a light speed 3-D matter wave construct. The universe takes two paths because of its $\mu_o\varepsilon_o$ and 3-D entropies.

The proton's wave function construct has a lower density than the electron's relativistic mass effect construct because the electron's light speed $\sqrt{2}$ angular and $\sqrt{3}$ spherical momentum resonance between $\frac{1}{2}m_{ei}$ $B = d\phi_E/dt$ inertial and $\frac{1}{2}m_{Er}$ relativistic mass elements contract space while the proton's matter wave length construct defines its 3-D space, the distribution of its quark triton wave function about the Higg's mass it generates.

Thus the density ratio of the proton's r_{pi} interactive size with respect to the electron's r_{ei} interactive size is $(r_{pi}/r_{ei})^3/m_p/m_e = 4.58$ times less (actually 4.837 times less because of physical size interferences). This lower density results in less magneton absorption by the generated mass-energy, or greater $\mu = \frac{1}{2}e\hbar/m_p$ leakage, by a factor of 4.837, which yields the $4.837/\sqrt{3} = 2.7928$ greater proton magneton in the measuring fields direction. The proton's ½-spin is the mass offset ratio of its $r_{po} = r_{qi}\ 3^{2/3}\ 2\pi = 0.83$ fm mass center in its $r_{pi} = (hc/\alpha^4)\ \pi^2\ 3^{2/3} / \sqrt{2} = 1.017$ fm interactive distribution, as arc sin $r_{po}/r_{pi} = 54.7^o$.

X) Hydrogen, the covariant particle construct basis of the Atomic Domain

Other than showing that hydrogen's $E_o = (\frac{1}{2}e\hbar)\ 3^{2/3}\ (\alpha^3/hc) / \sqrt{2} = 13.63555$ MeV $= 2.43 \times 10^{-35}$ kg ground state references to the hc impedance of space, as does its $\lambda_o = hc/E_o$ orbital matter wave, and that wave-particle duality is a $P = e^{S/k_B}$ probability function of space's $\mu_o\varepsilon_o$ impedance and 3-D of space entropic degrees of freedom, and the neutron is a $P = e^{S/k_B}$ statistical saturation state, so hydrogen provides a continuously analytic basis for all elements as $P = 2n + 1$ prime number stability resonances, this theory and Quantum Theory are in agreement. As shown in **III) A Physical Thread** (p. 8), all the energies for the neutron, deuteron, triton and helion easily derive by simple ground state analysis, and thus all atomic constructs.

Conclusion

The solutions presented herein are Occum's Razor simplest explanation to account for all parameters within a statistical framework bounded by $\alpha^2 = E_o/E_c$ density range E_o ground and E_c saturated states according to the following four principles:

(1) The **Entropic Energy Density Progression Principle**: Matter constructs coexist as energy domains in equilibrium, partitioned by Sommerfeld's $\alpha = e^2/2\varepsilon_o hc$ hydrogen ground state electron charge force to light speed saturation state velocity energy density root coefficients;

(2) The **Singularity Principle**: Energy domains operate according to Boltzmann $P = e^{S/k}$ principle f(x) functions between E_o ground and E_c saturation states, at which point E_c reversibly transforms as an $\int 1/f(x)\,dx$ singularity, as $f(x) \rightarrow 0$, into the next domain's E_o ground state;

(3) The **Wave-Particle Principle:** Matter constructs exist as e^{-ix} light speed resonances between the $hc = h / (\mu_o\varepsilon_o)^{½}$ electromagnetic impedance and 4-D space-time entropic degrees of freedom, operating upon as wave field energy and with 4-D as particle constructs, according to Boltzmann's principle that $P = e^{S/kB}$ is an entropy function; It appears as a duality because light speed resonances are Heisenberg Uncertainties which sub-light components cannot differentiate;

(4) The **Prime Number Stability Principle:** Prime numbers are 2n +1 stable resonance construct elements of nature which cannot be destabilized by simple factoring.

The Entropic Calculus concept relied upon applies standard Calculus concepts according to:

1) Boltzmann's $P = e^{S/kB}$ probability (or $S = k_B \ln W$ macrostate proportionality) principle;

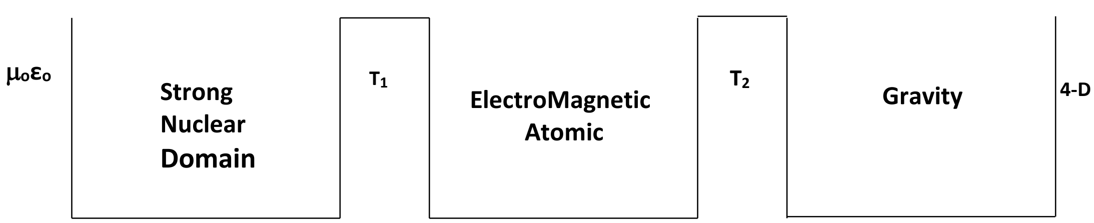
2) Wave-Particle Duality results from space's $\mu_o\varepsilon_o$ impedance and 4-D space-time entropic degrees of freedom, a light speed statistical resonance between field and construct states;

3) First order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ continuously analytic Cauchy-Riemann partials with convergent second order $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = 0$ and $\partial^2 v/\partial x^2 + \partial^2 v/\partial y^2 = 0$ Laplacian harmonic $e^{ix} = \cos x + i \sin x$ quantum statistical wave function energy states;

4) Schrödinger's $\int |\psi|^2\,dx = 100\%$ wave-particle duality probability density function;

5) Quantum Tunneling $T = e^{-2KL}$ transmission, where $K = (2m(U – E))^{1/2} /\hbar$, E is object energy, U is barrier potential energy height, L is the barrier impedance or width; and

6) The concept that $\int 1/f(x)\,dx$ singularity events between the Strong nuclear, EM atomic, and gravity energy domains are Schrödinger energy state wave functions.



The solutions correlate the mass, size, charge, magneton and spin particle parameters to each other and Strong, EM and Gravity physical reality domains. However since it depicts what occurs within ½-wave Heisenberg Uncertainty states there is no way to observe its correctness, although it provides the correct answers according to the same fundamental logic and exhibited external behaviors, as Yukawa's pion nuclear force messenger did. It does not conclusively prove what is, but it does prove: **There is a something continuously analytic behind all things.**

Appendix

I) Prime Number Based (2n + 1) Stable Matter Construct States

a) Prime numbers:

2	3	5	7	11	13	17	19	23	29
31	37	41	43	47	53	59	61	67	71
73	79	83	89	97	101	103	107	109	113
127	131	137	139	149	151	157	163	167	173
179	181	191	193	197	199	211	223	227	229
233	239	241	251	257	263	269	271	277	281

b) Stable Nuclides Table: The Prime Numbers column lists the protons, neutrons and mass prime numbers which stabilize the nuclei. Numbers in parentheses are the stable constituent nuclei of non-prime stable elements, like the 21st element's nucleus is a composite of elements 10 and 11 with 12 neutrons in each, so they are (2n + 1) composite level stable states. Composite states start at element 18 and instabilities start at 43, 61 and above 83 because of nuclei size.

Protons	Neutrons	Mass	Prime Numbers		
			P	N	M
P = 1	N = 0,1	M = 1,2			2
P = 2	N = 1,2	M = 3,4	2	2	3
P = 3	N = 3,4	M = 6,7	3	3	7
P = 4	N = 5	M = 9		5	
P = 5	N = 5,6	M = 10,11	5	5	11
P = 6	N = 6,7	M = 12,13		7	13
P = 7	N = 7,8	M = 14,15	7	7	
P = 8	N = 8,9 10	M = 16,17,18			17
P = 9	N = 10	M = 19			19
P = 10	N = 10,11,12	M = 20,21,22		11	
P = 11	N = 12	M = 23	11		23
P = 12	N = 12,13,14	M = 24,25,26		13	
P = 13	N = 14	M = 27	13		
P = 14	N = 14,15,16	M = 28,29,30			29
P = 15	N = 16	M = 31			31
P = 16	N = 16,17,18,20	M = 32,33,34,36		17	
P = 17	N = 18,20	M = 35,37	17		37
P = 18	N = 18,20,22	M = 36,38,40	(9+9)	(10+10)	19+19
P = 19	N = 20,22	M = 39,41	19		41
P = 20	N = 22,23,24	M = 42,43,44		23	43
P = 21	N = 24	M = 45	(10)+11	(12+12)	
P = 22	N = 24,25,26,27,28	M = 46,47,48,49,50			47
P = 23	N = 28	M = 51	23		
P = 24	N = 28,29,30	M = 52,53,54		29	53
P = 25	N = 30	M = 55	(12)+13	(14+14)+2	
P = 26	N = 28,30,31,32	M = 54,56,57,58		31	
P = 27	N = 32	M = 59	59		
P = 28	N = 30,32,33,34,36	M = 58,60,61,62,64	61		
P = 29	N = 34,36	M = 63,65	29		
P = 30	N = 36,37,38	M = 66,67,68	37,67		
P = 31	N = 38,40	M = 69,71	31		71

P = 32	N = 38,40,41,42,44	M = 70,72,73,74,76	41 73
P = 33	N = 42	M = 75	(16)+17 (20+20)+2
P = 34	N = 40,42,43,44,48	M = 74,76,77,78,82	17+17 (20+20)
P = 35	N = 44,46	M = 79,81	79
P = 36	N = 44,46,47,48,50	M = 80,82,83,84,86	47 83
P = 37	N = 48	M = 85	37
P = 38	N = 46,48,49,50	M = 84,86,87,88	19+19 (22+22)+2
P = 39	N = 50	M = 89	89
P = 40	N = 50,51,52,54	M = 90,91,92,94	(20+20) (24+24)+2
P = 41	N = 52	M = 93	41
P = 42	N=50,52,53,54,55,56	M=92,94,95,96,97,98	53 97
P =(43)	N=(54,55)(24+28=52)	M=(97,98)	43 (unstable)
P = 44	N=52,54,55,56,57,58,60	M=96,98,99,100,101,102,104	101
P = 45	N=58	M=103	103
P = 46	N=56,58,59,60,62,64	M=102,104,105,106,108,110	23+23
P = 47	N=60,62	M=107,109	47 107,109
P = 48	N=62,63,64	M=110,111,112	(24+24) (30+30)+2n
P = 49	N=64	M=113	113
P = 50	N=64,65,66,67,68,69,70,72	M=114,115,116,117,118,119,120,122	67
P = 51	N=70,72	M=121,123	(25+26) (30)+31+11n
P = 52	N=68,70,71,72,73,74,76,78	M=120,122,123,124,125,126,128,130	71,73
P = 53	N=74	M=127	53 127
P = 54	N=72,74,75,76,77,78	M=126,128,129,130,131,132	131
P = 55	N=78	M=133	(27+28) (32+33)+13n 59+61+13n
P = 56	N=78,79,80,81,82	M=134,135,136,137,138	79 137
P = 57	N=82	M=139	139
P = 58	N=82	M=140	29+29 (36+36) (65+65)+10n
P = 59	N=82	M=141	59
P = 60	N=82,83,85,86,88	M=142,143,145,146,148	83
P =(61)	N=(85,86)	M=146,147	61 (unstable)
P = 62	N=82,87,88,90,92	M=144,149,150,152,154	149
P = 63	N=90	M=153	31+(32) (40)+41+9n
P = 65	N=94	M=159	47+47+10n
P = 66	N=90,92,94,95,96,97,98	M=156,158,160,161,162,163,164	97
P = 67	N=98	M=165	67
P = 68	N=94,96,98,99,100,102	M=162,164,166,167,168,170	167
P = 69	N=100	M=169	(32)+37
P = 70	N=98,100,101,102,103,104,106	M=168,170,171,172,173,174,176	101, 103 173
P = 71	N=104	M=175	71
P = 72	N=104,105,106,107,180	M=176,177,178,179,108	107
P = 73	N=108	M=181	73 181
P = 74	N=108,110	M=182,184	37+37
P = 75	N=110	M=185	37+38
P = 76	N=111,112,113,114,116	M=187,188,189,190,192	113
P = 77	N=114,116	M=191,193	191
P = 78	N=114,116,117,118,120	M=192,194,195,196,198	37+41
P = 79	N=118	M=197	79 197
P = 80	N=116,118,119,120,121,122,124	M=196,198,199,200,201,202,204	(39)+41
P = 81	N=122,124	M=203,205	(40)+41
P = 82	N=124,125,126	M=206,207,208	41+41
P = 83	N=126	M=209	83

II) Wave-Particle Duality and Statistical Behavior

a) Is there a two-way logic between Macrostates and Microstates

Statistical behavior is like one-way semi-prime RSA encryptions, a simple one step prime to semi-prime product, and difficult multi-step decryption to obtain the original prime numbers.

Macrostates	Microstate Complexions	Complexion Multiplicity	Macrostate Probability
5h-0t	hhhhh	1	3.125%
4h-1t	hhhht, hhhth, hhthh, hthhh, thhhh	5	15.625%
3h-2t	hhhtt, hhtth, htthh, tthhh, hhtht, hthth, ththh, hthht, thhth, thhht	10	31.25%
2h-3t	(same as 3h-2t with h and t exchanged)	10	31.25%
1h-4t	(same as 4h-1t with h and t exchanged)	5	15.625%
0h-5t	ttttt	1	3.125%

It is seen from the chart that the Macrostate Probability is proportionate to the number of Microstate Complexions, or combinations resulting in a Macrostate. If macrostate proportionality is known however, is it possible to differentiate what causes a specific microstate complexion.

Mathematical logic derives by two avenues, observation of the logic of physical reality and extrapolation of the logic of mathematics, which is why it can deliver "the key to those laws of nature and the universe which are concealed by appearances." This consistency, and the continuity of the "laws of nature," lead us to intuitively conclude that there is an underlying logic responsible, "something continuously analytic behind all things."

It is true that there are counter-intuitive behaviors, but they are by nature reciprocal to intuitive behaviors, and therefore representative of entropic degree of freedom behaviors, in accordance with Boltzmann's principle that $P = e^{S/k_B}$ probabilities are entropy functions and conversely $S = k_B \ln W$ entropies are behavior proportionality functions.

In other words, there is a reversible logic at work, one which references to e, a continuous and analytic function, whether x is S/k_B statistical, ix harmonic, or x transcendental, but it is one-way time-flow dependent, easy to implement 20/20 hindsight in time's past direction but difficult to decrypt (predict) in the future direction. A coin combination will always manifest a macrostate in one step but a 3h-2t or 2h-3t macrostate may take 10 tries to obtain the original microstate.

b) Two-way symmetrically reversible logic

Einstein treated time flow as a reversible dimension, so energy time flow from future into past has a $x = \sqrt{i^2} \cdot ct = \sqrt{-1} \cdot ct$ distance root in his $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$ field free Minkowski space-time metric so continuously analytic energy functions were equally reversible.

One could predict future position from current momentum and a past position with equal ease. Heisenberg's Uncertainty changed that however because it says position and momentum can only be measured to a ½-wavelength certainty, thereby rendering continuity non-existent. The problem with this perspective is that it is existentialist logic, that one is responsible for acts of free will without certain knowledge of right or wrong, and by extension to the future from past behavior. It dismisses the diametrically opposed paradigm that one cannot be responsible without intent, and if one knows the future is uncertain then intent is discontinuous and without free will.

In the next Weak force decay section it is shown that certain root level conditions create entropic degrees of freedom which destabilize constructs to permit decay, a statistical function by virtue of physical interaction through space's impedance. Statistical behavior could not be consistent without a continuously analytic root level connection, which is what we observe, so we must modify mathematical logic to include the physical logic of entropic degrees of freedom.

At its simplest level wave-particle duality is shown to exist as a light speed resonance of energy between the available $\mu_o\varepsilon_o$ impedance and 3-D space degrees of freedom, so this logic explains the physical outcome of a mathematical logic uncertainty which only exists because it fails to include real behavior. Boltzmann's $P = e^{S/k_B}$ principle says probability depends upon entropies, so of course if entropies are excluded statistical probability outcomes are eliminated.

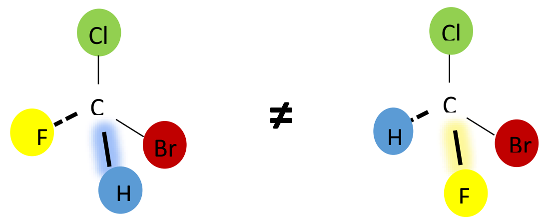
Boltzmann also said this principle is reversible so $S = k_B \ln W$ entropies are proportionate to behaviors. Thus our mathematical logic is discontinuous because of Heisenberg's Uncertainty, while physical reality's logic maintains continuity at its root levels, such that the $\Delta x \cdot \Delta p \geq \hbar/2$ Heisenberg Uncertainty is a continuous function of the x position and p momentum energy root elements of space's $\mu_o\varepsilon_o$ impedance and 4-D space-time entropic degrees of freedom.

In other words, a statistical coin system has two $P = e^{S/k_B} = 100\%$ certainty boundaries, at E_o ground state when no coins flip and at E_c saturation when coins fill the degree of freedom and cannot flip. Also, quantum states are continuously analytical non-statistical sub-boundaries in the time dimension during the flip. The end of a flip has a statistical outcome, but has a continuous potential energy height and kinetic energy angular momentum flip rate to achieve that outcome. Behaviors during that period are continuously predictable 1st and 2nd order Cauchy-Riemann Laplacian harmonic $\Delta x \cdot \Delta p$ height and momentum functions. They affect space's, and the other coins', $\mu_o\varepsilon_o$ and 4-D entropies, which symmetry conserves to zero, and thus predictable at their covariant $\Delta x \cdot \Delta p$ roots.

In the kinetic theory of gases Boltzmann showed how the cumulative behaviors of all the molecules (microstates) manifest as a continuously analytic pressure • Volume / N molecules • Temperature function (macrostate), where $k_B = pV/NT$, S is system entropies, P is probability, and W is proportionality, and thus changing these continuous behaviors affects the statistical distribution because they are entropic degrees of freedom, so the connections are really two-way with the behaviors occupying entropic degrees of freedom affecting their behavior of an element.

c) A Heisenberg logic lapse

A lapse in our mathematical logic in matching physical reality does not mean physical reality is uncertain. It continues without our understanding because its Δx and Δp are covariant root functions of space's entropies. Microstates are thus continuously predictable at that level so reducing entropic degrees of freedom with controlled energy eliminates discontinuous behaviors. This is done by utilizing this fundamental logic entropic degree of freedom to control the system f(x) function by convergence of Δx or Δp to zero. A ∫ 1/f(x) dx singularity occurs as f(x) → 0, but its inverse occurs as dx → 0 and 1 / f(x) → 0, as function increases with respect to entropies.



If the entropic degrees of freedom function goes to zero $f_e(x) \rightarrow 0$ then the system function increases to its maximum $f_s(x) \rightarrow \infty$ making it predictable. Physically this occurs with isomers. Specific solvents entropically direct isomer product outcome. In organic chemistry, carbon has 4 valence electrons 109.5° apart with respect to each other, forming a tetrahedron with a carbon center. This chiral center construct forms when each electron bonds to a different functional group, so no molecular symmetry exists in regard to any axis. In laboratory synthesis, products are 50/50 Levorotatory and Dextrorotatory, rotating linearly polarized monochromatic light left or right, respectively, by the functional groups' integrated electronegativity orientation vector. Polarized solvents however occupy and fill the entropic degrees of freedom so 50/50 outcomes becomes 100% predictable.

In regards to the 5 coins, each coin represents an energy entropic degree of freedom. As such, each coin accepts a portion of the total energy and displays it as potential energy height in earth's gravitational field and exhibit and kinetic angular momentum energy to the exact degree by which the input energy transfers to it, so there is no discontinuity to the process, each coin's outcome is determined by its initial state, the time it spends in the air, and its angular momentum.

Without understanding that wave-particle duality is a covariant space $\mu_o\varepsilon_o$ impedance and 4-D entropy function the Uncertainty is more complex than semi-prime one-way encryption and n-step decryption to us with our mathematical logic, since prime numbers have a (2n + 1) format. There is an underlying logic however which transforms individual $½mv^2$ molecular energies into continuous covariant pressure·Volume / Number·Temperature functions, or five coins into ten 3 heads and 2 tails combinations, or vice versa, because each flip's Δx and Δp energy disparities are covariant with the entropic degrees of freedom of space.

d) The correct mathematical logic

A solution is always in the proper statement of the problem if any aspect of an event is entropically controllable, like $P = e^{S/k_B}$ statistical systems, because the outcome is continuously analytic 1st order $\partial u/\partial x = \partial v/\partial y$ and $\partial u/\partial y = -\partial v/\partial x$ Cauchy-Riemann partial derivatives and (2n +1) 2nd order $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ Laplacian residue free quantum harmonics, where 1 defines the $\partial^2u/\partial x^2 + \partial^2u/\partial y^2 = 0 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ framework.

Otherwise e^x based Laplace Transforms could not circumvent Limits and Continuity analysis rigors, Fourier Analysis could not reduce square waves and pulses to harmonics, system e^x, e^{S/k_B}, e^{ix}, and e^{-ix} functions could not resolve to $e^{x = S/k_B = ix = -ix}$ ∫ 1/f(x) dx singularity functions with Schrödinger $\int |\psi|^2\, dx = 1$ wave function behavior transfers through system boundaries, and Einstein's Minkowski free space and Riemann condition gravity framework could not equate as

$ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0 = \partial^2u/\partial x^2 + \partial^2u/\partial y^2 = \partial^2v/\partial x^2 + \partial^2v/\partial y^2$ energies at dx root levels to quantum behavior, and no Entropic Calculus could analyze it.

As a comparison, the degree of difficulty is the distinction between Statistical Analysis (SA) and Machine Learning Routine (MLR) pattern recognition. SA functions determine data set outcome probabilities, while MLR functions determine the data pattern required for a specific probability outcome. There are literally 1000's of iterative algorithms linked to the CRAN Repository (Comprehensive R Archive Network) to do circumstance dependent MLR functions, impossible without an underlying continuously analytic fundamental logic. Integration and factoring of these functions (an MLR function) will yield their fundamental root logic.

This is ironic because Boltzmann said probability is a system entropy function, so choosing the algorithm with the highest probability of success is itself a $P = e^{S/k_B}$ function, which provides a means of logically decreasing decryption difficulty, since it is continuously analytic in terms of systems entropies and (2n + 1) prime numbers can be n = (2n + 1) subset functions.

The n = (2n + 1) subset functions are seen in terms of the (2n + 1) prime number stability states in the proton, neutron and mass parameters of nuclei in nature, and the behavior of Weak force Beta particle decays in terms of these internal prime number stability states and external circumstances like proximity (system entropies), where prime numbers are regarded as (2n +1) stable resonance states of n = ½ unstable 50% probability states, when n = (2n + 1) in $E_n = E_o/n^2$ quantum systems harmonic states.

If (2n + 1) prime number stability states did not coexist as $E_n = E_o/n^2$ resonant covariants between domains bounded by $\alpha^2 = E_o/E_c$ energy density limits in terms of $\alpha = e^2/2\varepsilon_o hc$ common denominator energy roots it would not be possible for Electron Capture and Beta Decay $\int |\psi|^2\, dx$ Schrödinger wave function and $e^{x = S/k_B = ix = -ix}$ behavior transfers through system boundaries.

III) Weak Force Decay

a) Weak Force decay asymmetries

Strong force decays obey symmetry, are faster than 10^{-20} s, and occur as unstable particle decays or EM gamma ray emissions to more stable states, both of which are in the Strong force domain. Weak force decays are asymmetrical, orders of magnitude slower, and involve varying kinetic energy Beta, Muon, Pion, or Tau particle emissions into the lower energy density atomic domain, thus undergoing α^2 energy density and α size and speed of light velocity decay.

According to charge symmetry, neutral kaons should decay equally as

$$K^\circ \rightarrow \pi^- + e^+ + \nu_e \quad \text{and} \quad \pi^+ + e^- + \nu_e^*$$

but e^+ positron emissions are more frequent. Similarly, according to decay path symmetry, negative pion and proton interaction should yield

$$\pi^- + p^+ \rightarrow K^\circ + \Lambda^\circ \quad \text{and} \quad K^\circ + n^\circ$$

but $K^\circ + n^\circ$ products never occur.

This is because of internal and external circumstances, or entropic conditions, indicating that Weak decays are affected by conditions they decay from and circumstances they decay to. In the first case, e^+ positrons decay into an infinite orbital electrons atomic domain and immediately annihilate so they always experience a 100% available entropic degree of freedom. In the second case, a π^- has U*D quarks and a p+ has UUD quarks while a K° has DS* quarks, a Λ° has UDS quarks, and a neutron has UDD quarks, so according to symmetry, if a K° with DS* Down and anti-Strange quarks is produced then a Λ° lambda with a S Strange quark must also produce.

b) Weak Force decay durations and α energy density root correlations

A similar logic explains Weak force Beta particle decay slowness, as the following decay relations demonstrate:

a) Neutral pion to two gamma rays: $\pi^\circ \rightarrow 2\gamma$ ($t_{\pi^\circ} = \sqrt{3}\, t_C / \alpha^2\pi = 0.838 \times 10^{-16}$ s)

b) Pion$^-$ to muon$^-$: $\pi^- \rightarrow \mu^-$ ($t_{\pi-} = \sqrt{2}\, t_{Wv}\, 3/\alpha = \sqrt{2}\, (0.44 \times 10^{-10}$ s) (411.1) $= 2.56 \times 10^{-8}$ s)

c) Muon$^-$ to orbital electron: $\mu^- \rightarrow e^-$ ($t_{\mu-} = t_{\pi-}\, \sqrt{3} / 2\alpha\sqrt{2} = 2.15 \times 10^{-6}$ s), where

$t_C = \lambda_C/c = 2.4263 \times 10^{-12}$ m / c $= 0.80933 \times 10^{-20}$ s, the light speed Compton wavelength transit time and also the $\lambda_{Eo} = \lambda_C/\alpha = 3.329 \times 10^{-10}$ m hydrogen ground state electron orbital wavelength,

$t_{Wv} = (t_{\pi^\circ}\, \pi / \sqrt{3}\alpha^2)\, \sqrt{2}\sqrt{3}\; 2\pi = (\sqrt{3}\, t_c / \alpha^2\, \pi)\, (\pi / \sqrt{3}\alpha^2)\, \sqrt{2}\sqrt{3}\; 2\pi = (t_c / \alpha^4)\, \sqrt{2}\sqrt{3}\; 2\pi = 0.44 \times 10^{-10}$ s, the Weak force light speed to $v_o = 2.1877 \times 10^6$ m/s speed and size domain density change.

These calculated π° (0.838×10^{-16} s), π^- (2.56×10^{-8} s), and μ^- (2.15×10^{-6} s) decay times, all within a 2.5% of actual π° (0.84×10^{-16} s), π^- (2.6×10^{-8} s), and μ^- (2.2×10^{-6} s) decay times, correlate the Strong and Weak forces by incorporating the effect of an atomic domain entropic degree of freedom, namely the result of adding electron inertial mass, sub-light speed velocity, and atoms' size density change entropic degrees of freedom to the Strong force energy.

They are all reference to the atomic domain's electron light speed Compton wavelength t_C transit time, and thus the t_{π° neutral pion decay time and E_o ground state electron wavelength, because it is a Strong force decay time reference the electron, quark and proton interactive radii and their transit times all correlate to:

$r_{ei} = (\frac{1}{2}\lambda_C\alpha^2)\, \sqrt{2}\sqrt{3} / \pi = (0.646 \times 10^{-16}\text{ m})\, \sqrt{2}\sqrt{3} / \pi = 0.05037$ fm $t_{ei} = r_{ei}/c = 1.68 \times 10^{-25}$ s

$r_{qi} = (\frac{1}{2}\lambda_C\alpha^2) = 0.0646$ fm $t_{qi} = r_{qi}/c = 2.155 \times 10^{-25}$ s

$r_{pi} = (\frac{1}{2}\lambda_C\alpha^2)\, 3^{2/3}\, \sqrt{2}\sqrt{3}\, \pi = 1.034$ fm $t_{pi} = r_{pi}/c = 3.45 \times 10^{-24}$ s

and also the quark triton's light speed gluon transit time of its side, a typical Strong force event,

$t_q = 2r_{qi}/c = 2((\frac{1}{2}\lambda_C\alpha^2) / c = 4.31 \times 10^{-25}$ s.

c) Proximity based (2n + 1) prime number ½-life decay function

Weak force decay is thus shown to be a simple process of adding an electron with atomic domain entropic degrees of freedom, such as a neutron saturated state hydrogen atom, or simply an orbital electron with close enough proximity for a matter wave interaction Electron Capture, to a Strong force based triton pion generation function, so a Strong force energy atomic entropy and a circumstance based energy transform occurs. The unanswered question is why is it a ½-life proximity based decay function, what in other identical nuclei triggers the decay instability?

Very simply, because of (2n + 1) Prime Numbers. Just as some stable elements like 18, with no proton, neutron or mass prime numbers of its own, can be a compound nuclei product of a stable prime number based element like 9, with a prime number mass of 19, so too can semi-stable elements undergo (2n + 1) division when they are not prime number stable.

For instance, prime number stable elements may have unstable excess neutron isotopes, since neutrons are inherently unstable $E_n = +0.782$ MeV positive energy saturated state hydrogen atoms which stabilize by forming 2.22 MeV mass defect bonds with protons. However with too many neutrons, as in H-3 tritium with two neutrons per proton, the mass defect is an excited state because proton pion bonding is time shared between two neutrons and the opposing light speed momentums cannot completely cancel, but instead have a 50% duty cycle ½-state cancellation.

This ½-state excitation occurs in H-3 tritium nuclei, where its two neutrons together form a 100% excited bond state, equivalent to two neutrons attempting Weak force decay by Beta emission to yield H-2 deuterium but cannot because proton charge captures their electrons. Thus tritium's (2n + 1) = 3 prime number, where n = 1, is unstable because the two neutrons result in an extra excited state which raises tritium to a (2n + 1) = 3 + 1 = 4 state, divisible by a deuteron (2n + 1) = 2 stable prime number state, with its n = ½ effect of opposing momentum cancellation by resonance of the 1 and 0 neutron and proton states between two entropic degrees of freedom.

In effect, the ½ reciprocal prime number is stable because it is an un-factorable entropic degree of freedom combination for excited energy states. However, in physical reality, when size and velocity duration attenuates excited state energy transfer, a divergence occurs between the mathematical indivisibility of pure prime numbers and the erosion of stability from a decreasing opposing momentum cancellation duty factor, in effect adding an entropic degree of freedom which alters the prime number degrees of freedom to a (2n + 1) + 1 = (2n +2) unstable factorable state. Excess neutron excited state isotopes proportionately form extra excited states which make (2n + 2) unstable resonances factorable by more stable nuclei (2n + 1) prime numbers.

Since all particle constructs have been shown to be continuously analytic wave-particle duality state functions, operating upon space's $\mu_o\varepsilon_o$ impedance as field energy and within its 4-D as a particle construct, any excited state condition is shared by similar proximate constructs with the same resonance characteristics, so proximity directly affects decay rate. Thus the ½-life Weak force decay function factors unstable isotopes whose excited state achieves 1, so (2n + 1) + 1 = (2n + 2), which factors by stable lower value (2n + 1) prime number element conditions, thus causing an entropic degree of freedom dependent decay to a more stable condition.