

# The Singularity Principle

by William Gray

## Abstract

From the dust arises thought; from thought curiosity and reason. What within the dust seeks to understand?

Teilard de Chardin, a French philosopher and paleontologist, observed that if attraction did not exist at the rudimentary level of the molecule it would not be possible for love to exist higher up. Physical reality derives from natural laws and Einstein described the search for them as “like trying to read God’s mind.”

“We ought then to regard the present state of the Universe as the effect of its anterior state and as the cause of the one which is to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situations of the beings who compose it – an intelligence sufficiently vast to submit these data to analysis – it would embrace in the same formula the movements of the greatest bodies ... and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes.” – (Laplace, “Essai philosophique sur la probabilit e”)

If “the world” is a “totality of existent atomic facts” (Wittgenstein) and mathematical logic correlates to physical reality then it should be possible to derive a complete description of physical reality as a purely mathematical exercise. It appears bounded by nuclear and electromagnetic interactions on its fundamental level, by seemingly infinite gravity on its astronomical level, and reason and emotion on its cognitive level, and somehow all these apparently unrelated domains intersect to form a unified universe.

Math derives from reason. Hannah Arendt described it as “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.” And Lord Brouncker said its “usefulness ... is in its ability to expand the boundaries of science and technology; ... a language of thought whose syntax prevents illogic and error.”

By mathematically deriving nuclear and electromagnetic phenomena and their interactions from a ground state of free space as a logic exercise, a correlation is established that extends to the phenomena and interactions of the other domains. This is accomplished by use of Singularity transforms.

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## I) The Quark-Gravity Connection

If  $F = G (m_1 \cdot m_2) / r^2$ , then  $G = F \cdot r^2 / (m_1 \cdot m_2)$ .

And if the Sun's gravitational force on the earth is in equilibrium with its  $m_e v^2 / r_e$  orbital centripetal force, so  $F_g = m_e v^2 / r_e$ , then  $G = F_g \cdot r_e^2 / (m_s \cdot m_e) = (m_e v_e^2 / r_e) r_e^2 / (m_s \cdot m_e) = v_e^2 r_e / m_s$ .

Thus the Gravitational Constant correlates to the earth's  $v_e^2 r_e$  angular acceleration factored by the Sun's mass  $m_s$ , the source of the gravitational field.

Furthermore, if Einstein's General Relativity Minkowski space-time model is correct then the source of the Sun's mass at the quark mass-generation level in particles should correlate to Einstein's  $x = ct$  spatial distance to time flow correlation and the light speed propagation of gravitational field energy.

And if the natural laws are in fact the same in all inertial frames of reference, so  $E = F \cdot d$ , then the quark's interactive radius and its light speed Strong force energy propagation distance should also correlate to the light speed propagation of gravitational force energy.

Thus, the earth's 1 year orbit period, an effect of light speed gravitational force propagation, and the distance of a light year must correlate to the quark's interactive radius and its Strong force interaction time because Einstein's  $x = ct$  space-time equivalence relation must apply in all inertial frames of reference.

Assuming  $1/n$  to  $n/1$  reciprocal mathematical, energy density and singularity symmetries between the quark and gravity domains, by the natural law  $E = F \cdot d$  field-energy relation, quark and gravity level distance interactions should reciprocally relate and the quark's  $1/r_{qi}$  reciprocal interactive radius should equate to gravity's interaction distance or its light year space-time equivalent.

In fact, the reciprocal of the  $9.454 \times 10^{15}$  m light year,  $1.057 \times 10^{-16}$  m, factored by  $\sqrt{3}$  equals 0.061 fm, within 6% of the quark's 0.0646 fm interactive radius, and

$$G = v_e^2 r_{es} / [1.1903459 \times 10^{57} \times (\frac{1}{2}eh/2\pi) \times \sqrt{2} \cdot \sqrt{3} \times 3(\mu_0 \epsilon_0)^{-3/2}] = 6.665 \times 10^{-11}, \text{ within } 0.12\% \text{ of the } G = 6.67259 \times 10^{-11} \text{ N} \cdot \text{m}^2 / \text{kg}^2 \text{ Gravitational constant (i.e. earth's } v_e = 2.97834 \times 10^4 \text{ m/s and } r_{es} = 1.496 \times 10^{11} \text{ m mean, not elliptical, velocity and radius were used), where}$$

- $1.1903459 \times 10^{57}$  is the Sun's proton mass equivalence;
- $m_p = [(\frac{1}{2}eh/2\pi) \cdot \sqrt{2} \cdot \sqrt{3} \cdot 3(\mu_0 \epsilon_0)^{-3/2}] = 938 \text{ MeV}$  is the quark generated proton mass
- $\frac{1}{2}eh/2\pi = 8.448061479 \times 10^{-54}$  is the fundamental magnetic field of a rotating charge;
- $\sqrt{2}$  and  $\sqrt{3}$  are the normalized resultants of planar 2-D and spherical 3-D energy distributions;
- $\mu_0 \epsilon_0$  is free space's permeability-permittivity;
- and  $G$  is the  $F_g = G m_1 m_2 / r^2$  Gravitational Constant correlated to the  $F_e = k_e e_1 e_2 / r^2$  charge force and  $\mu_0 \epsilon_0$  permeability-permittivity of free space at the quark level.

The quark's interactive radius is not its measured Quantum Optic or resultant proton radius. It is contextual, like Yukawa's nuclear force and molecules' electric dipole interaction distances, and it results from the Heisenberg Uncertainty's  $E = F \cdot d$  wavelength energy interaction distance. Since the Quark-Gravity Connection relates  $E = F \cdot d$  gravity interaction with quark generated proton mass-energy their interactive radii were used. This example shows a definitive relation between the Universe's strongest and weakest energy domains but explanations of Natural Law Behaviors and the Lorentz, Heisenberg, Minkowski and Sommerfeld Transforms are needed before the Singularity Principle can be applied to Physical Reality.

## II) Natural Law Behaviors

The underlying premise of Relativity is that the natural laws are the same in all inertial reference frames, based on Einstein's correlation of mechanical and electrodynamic motions to the speed of light as their upper boundary of velocity. He showed that both energy domains correlate by  $E = mc^2$  mass-energy equivalence of light speed gamma ray emissions from a stationary mass and the  $\gamma = [1 - (v/c)^2]^{1/2}$  Lorentz Transformation of space, time and mass by the mass' inertial velocity.

It was a clever Numerical Analysis deduction based on a premise that all effects have root causes. He determined the  $\gamma$  space-time-mass effects of velocity by  $a^2 + b^2 = c^2$  Pythagorean reasoning and normalizing the  $v/c$  relative velocity to its  $(c/c) = 1$  maximum velocity. From a closed system mathematical perspective it cannot be construed to yield a paradoxical  $\infty$ -mass condition any more than  $a^2 + b^2 = c^2$  can result in an  $\infty$  root length because his relation was normalized to a speed of light maximum velocity, just as a  $\lambda_C = h/mc$  Compton wavelength electron does not have  $\infty$ -mass in its frame of reference.

Einstein used velocity as the root cause of a  $KE = \frac{1}{2}mv^2$  inertial energy effect but didn't address  $PE = F \cdot d$  field energy, where  $KE = PE$  in non-accelerating inertial reference frame equilibriums, so the boundary of Lorentz transformation conversion of inertial energy to mass is  $\frac{1}{2}mc^2$  at light speed in the mass' reference frame. Total energy within a reference frame includes PE field energy, and if applied from a different frame of reference it must be adjusted for the relative energy density difference between domains.

Now Schrodinger's quantized  $e^{-ix}$  wave function energy is based on de Broglie's  $\lambda = h/mv$  matter wave. De Broglie had theorized that although periodicity had no readily explainable mechanism relating it to continuous inertial momentum, it could be assigned based on the wavelength-momentum correlation for photons, and Schrodinger realized that such an assignment would result in the observed statistical energy distributions, as in Einstein's recognition of light as energy quanta by distinguishing between instantaneous and Planck's average energy distributions in Black Bodies. Both are momentum based, one correlating to  $KE = \frac{1}{2}mv^2$  energy and the other to quantized  $1/n^2 PE = KE$  charge-momentum equilibrium energy states.

Earth's gravitational orbit radius also varies in distance and location in such a way as to statistically distribute the gravitational energy over time, even to the degree that it can undergo orbital decay and capture as occurs in Electron Capture. While earth's gravity behavior is explained in terms of Classical physics its statistical energy distribution over time correlates to Boltzmann's  $e^{-E_i/E_a}$  statistical distribution factor for gas molecule velocities, the basis of Einstein's and Schrodinger's distributions, but large mass large distance behaviors appear Classical because of the relative time and energy density differences between the domains.

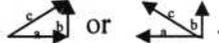
The quark-gravity connection and a similar Strong-Weak force decay time connection are shown to derive from relative energy density differences between domains and quantum statistical space-time energy distributions in classical equilibrium contexts occurs because energy stabilizes in  $e^{-ix} = \cos x - i \sin x$   $PE = KE$  wave function equilibriums. The field energy of a classical orbit should thus correlate to quantized nuclear force messenger wave field energy, as shown by Yukawa's prediction of pions.

Physical reality discontinuously divides into quark, particle, nuclear, atomic and astronomical energy domains in terms of Strong, Weak, EM and Gravitational forces that exhibit quantized discontinuous and continuously variable behaviors, depending on their contexts. In other words, energy's natural laws are the same in all inertial reference frames but behaviors differ because energy distribution circumstances differ.

## III) The Lorentz Transform:

Einstein derived his  $\gamma = \sqrt{c^2 / c^2 - v^2 / c^2}$  Lorentz transformation by showing that space contracts by  $d = \gamma d_0$ , mass increases by  $m = m_0 / \gamma$ , and time flow slows by  $t = t_0 / \gamma$ , as velocity approaches the speed of light  $c$ . His presentations were simplified by relying on Riemann and Minkowski but he meticulously assigned them credit. He kept things simple because he believed that cause and effect and the Universe's natural laws could be presented in simplified terms.

His Lorentz transformation was a  $a^2 + b^2 = c^2$  Pythagorean transposed into a  $b = \sqrt{c^2 - a^2}$  velocity effect to unify EM and mechanical energies by referencing them to the speed of light and subtracting velocity as a ratio of it, all normalized to 1. Numerical Analysis finds roots of physical effects by math logic. First "normalize" a situation to a boundary, so  $b = \sqrt{c^2 - a^2}$  is really  $b = \sqrt{c^2/c^2 - v^2/c^2} = \sqrt{1 - v^2/c^2}$ .

The  $a^2 + b^2 = c^2$  Pythagorean works because a and b are the resultant vector roots, . Roots are squared to allow for all possible a/c and b/c root ratios, including a=0 or b=0 boundary conditions. The independent variable v velocity is a ratio of its maximum and the dependant variable b is the effect of varying v from 0 to its maximum value of c.

Einstein allowed any  $\frac{1}{2}mv^2$  kinetic energy ratio of the  $E = mc^2$  maximum subtracted from  $mc^2/mc^2 = 1$  to obtain the potential remaining effect. Thus if  $v=0$  then  $b = \sqrt{1 - v^2/c^2} = 1$  and maximum energy may be added, but if  $v=c$  then  $b=0$  and no more can be added. And since it adds as  $\frac{1}{2}mv^2$  KE only  $\frac{1}{2}mc^2$  can add as mass, the rest adding as  $E = F \cdot d$  field energy which causes different behaviors in different density reference frames so added energy must be adjusted to the domain. Thus the electron  $\lambda = h/m_e c$  Compton wavelength energy could be related to the quark and proton mass-energies by Sommerfeld's energy density ratio.

In Relativity he related unrelated mechanical inertial and EM wave energies by Conservation of Energy and got an  $E/m = c^2$  ratio of EM to inertial velocity mass energies. It's a closed system mass that can not go to  $m = m_0/\gamma = \infty$  within the system by applying the Lorentz transformation.

Einstein's math was correct but can be mis-applied by including external energy into a closed system solution to get the  $\infty$ -mass paradox. When he derived  $E = mc^2$  he did so by analyzing the natural decay of a radioactive mass, starting from a rest mass  $m_0$  that emits EM wave gamma rays. The mass was reduced by the emitted EM energy, a closed system losing mass by transform into EM energy.

He used a 0 inertial velocity closed system with light velocity EM emissions to derive a  $c^2 = E/m$  EM to inertial mass energy ratio to correlate physical reality to the speed of light velocity limit. Mass =  $E/c^2$  is the EM to speed of light ratio and  $v^2/c^2$  is a ratio of KE =  $\frac{1}{2}mv^2$  inertial to  $\frac{1}{2}mc^2$  maximum mass-energy, excluding  $E = F \cdot d$  field energy from his Lorentz transformation.

Up to that time everyone had tried referencing EM and inertial energies to  $\infty$ -inertia 0-velocity space but no one could. Einstein wrote two papers, one defining the effect of increasing inertial velocity to c and one defining conversion of 0-velocity mass into EM energy, bounding the 2 energy forms by  $v=0$  and  $v=c$  velocity limits and thereby unifying Newtonian mechanics and Maxwell's EM theory.

He simplified his derivations with standard Numerical Analysis, but adding external energy changes his closed system solution into an undefined open-closed one. He dealt in ratios bounded by  $v=0$  to  $v=c$  so using his  $\gamma = \sqrt{1 - v^2/c^2}$  transformation to obtain  $m = m_0/\gamma = \infty$  is like using computer LOGIC and NOT LOGIC without differentiating between the results. One yields a cause and effect result and the other subtracts cause from its limit to get a NOT effect, like subtracting v from c. They yield reciprocal ratios.

Einstein used a NOT LOGIC speed of light limit to relate EM and mechanical motion because relating them to  $\infty$ -inertia 0-velocity space by LOGIC didn't work. Using his equation without his logic to get infinite mass undoes his achievement. It's like trying to put Dextrorotatory molecules into Levorotatory sites and getting Thalidomide babies in DNA and aberrant behavior in neurons. Einstein said figuring out natural laws is like trying to read God's mind. It requires a transcendence of thought, but the Universe's constructs are simple. Its logic is bounded and simplified by the information of those boundaries.

Infinite inertia 0-velocity space and  $\infty$ -mass are mathematical PE and KE degree of freedom limits, but the actual force is an  $e^{-ix} = \cos x - i \sin x$  dynamic equilibrium between LOGIC and NOT LOGIC resultants, they are the energy's substance and potential information limits.

Space is a perceptual limit on one side of physical reality and seeming  $\infty$ -mass Black Holes are the other, a beginning and conclusion of our perception of space-time. If they factor these limits from physical reality they are factoring infinities from finite tangible phenomena and get undefined answers. Stable matter

is an  $e^{-ix}$  dynamic equilibrium between the substance and information components of energy, so  $F(x) = \int f(x)/e^{-ix}$  yields specific resultants whereas  $\int f(x)/0$  or  $\int f(x)/\infty$  do not.

Space is what occurs when energy has no apparent information and  $\infty$ -mass occurs when its degrees of energy freedom are filled so no more energy increase is possible in NOT LOGIC, total velocity degree of freedom information transfer to substance. But this limit is perceptual. Energy is dynamic, it does not stop in time, it continuously changes in a  $PE = Fd \equiv KE = \frac{1}{2}mv^2$  dynamic  $e^{-ix}$  equilibrium so factoring a boundary limit just negates this equilibrium component from the equation to yielding 0 and  $\infty$  solutions.

The  $e^{-ix}$  change function can't be dropped because that would eliminate symmetry from Einstein's time flow.  $E^{-ix}$  wave functions exist as reciprocally symmetrical PE – KE transforms in past-future time flow degrees of freedom. When one time-flow interval degree of freedom limit is reached it constitutes a PE that transforms into the next time-flow interval's KE. The change function carries through the interval boundary.

$E^{-ix}$  is the continuously stable wave function equilibrium part of the "change" function and its  $e^x$ ,  $e^{-x}$ ,  $e^{1/x}$  and  $e^{-1/x}$  quadrant components are its transform parts. The function exists so it can't be dropped from the equation without being accounted for. Math describes physical reality, and if a function exists in a domain it is based on a natural law and must be accounted for even if it appears to drop out, or the natural laws could not be the same in all inertial reference frames.

It's a  $\int f(x)/e^{-ix}$  Laplace Transform singularity. The  $e^{-ix}$  function is a natural energy behavior if  $PE = F \cdot d$  and  $KE = \frac{1}{2}mv^2$  orthogonal force form degrees of freedom are available, at imaginary orthogonal angles with  $90^\circ$  out of phase peaks so they only interfere at the  $e^{-ix} = \cos x - i \sin x$  sine - cosine interaction point. When Einstein equated time flow to  $x = \sqrt{-1}ct$  Minkowski space-time (m-space)distance it was incomplete because  $i = \sqrt{-1}$  represents an orthogonal imaginary degree of freedom and  $ct$  is static, without dynamic equilibrium between it and other degrees of freedom, so  $e^{-ix}$  must be included to allow PE-KE changes.

The  $PE = F \cdot d \equiv KE = \frac{1}{2}mv^2$  forms equate in a stable  $e^{-ix}$  equilibrium but  $d = d_0\gamma$  and  $t = t_0/\gamma$  Lorentz transformations contract space and dilate time so they appear different because they change spatial  $\mu_0\epsilon_0$  permeability-permittivity impedance and speed of light, since  $c = 1 / \sqrt{\mu_0\epsilon_0}$ . The PE-KE forms are parts of the  $e^{-ix}$  function but Einstein represented time as an  $x_t = ct$  distance orthogonal to real distances and time flow rate and distance are different behavior forms, just like KE and PE energy forms.

This leads to explanation of how both energy forms transform and unify quantum and continuous behavior in m-space because EM field energy is oriented and distinctly discontinuous but g-field energy is not. EM field energies have oriented  $e^{-ix}$  reciprocally symmetrically instantaneous energy components in dynamic equilibrium so it's the cause and g-field the effect, and factoring out saturated space-time degrees of freedom yields a quark energy density size to g-field energy density size Quark-Gravity Connection.

In a Lorentz Transform if a degree of freedom's energy velocity reaches light speed all potential velocity information is transformed into energy form in that degree of freedom so to be complete a Lorentz transformation must include an  $e^{-ix}$  dynamic equilibrium component, since  $c = 1 / \sqrt{\mu_0\epsilon_0}$  and  $\mu_0\epsilon_0 = (\partial^2 E / \partial x^2) / (\partial^2 E / \partial t^2) = (\partial^2 B / \partial x^2) / (\partial^2 B / \partial t^2)$  when unsaturated space-time degrees of freedom are available.

When this is incorporated into 4-D m-space it results in a ground state of the next energy density domain, subject to the same natural laws and  $v=0$  to  $c$  limits. The previous domain's differentiated forces are unified into an un-differentiated "gravitational" form with its own m-space degrees of freedom, since all its 4-D m-space energies have synchronized  $v=c$  angular and spherical momentums that transfer the degrees of freedom information into the energy, leaving no remaining differentiated field energy information.

#### IV) The Heisenberg Transform

Heisenberg's Uncertainty says energy is quantized so it is impossible to simultaneously measure a particle's position and momentum with infinite accuracy. If a photon wave is used to resolve position and momentum the interaction point is unpredictable and total energy transfer can only be known if it occurs at a node so there will always be at least a  $dx \cdot dmv = h/2\pi \frac{1}{2}$ -wavelength resolution uncertainty.

No one could refute this logic so it became accepted, but incomplete, just as Einstein's m-space. All logic is bounded, valid only within its boundaries, and the Uncertainty is only one boundary. Physical reality is expressed as quantized integers at one extreme and as transcendentals like  $e$  or  $\pi$  at the other, and yet both co-exist in a stable equilibrium by transformation into one another.

This is real, so any logic that limits physical reality's interpretation to only quantized or continuous behavior is incomplete. Quantum  $e^{-ix}$  wave functions have orthogonal sine and cosine root-transcendentals of the  $e^x$  transcendental, and since  $\int e^x$  and  $de^x/dx$  integrate and differentiate into  $e^x$  functions they constitute quantized energy states in Schrodinger's  $\int |\psi(e^x)|^2 dt$  probability distribution. This however raises an apparent discrepancy because although the electron's energy is a statistically predictable wave function within a time interval, and waves are continuously predictable  $\partial^2 w / \partial x^2 = 0$  Cauchy-Riemann harmonic functions over time, the Schrodinger wave functions are not, so there is an orthogonal PE  $\equiv$  KE continuity part missing.

The solution is 2 part. One shows that Heisenberg's Uncertainty is a PE = F·d  $\equiv$  KE =  $\frac{1}{2}mv^2$  energy transform by Yukawa's  $\lambda = h/mv$  quantized matter wave nuclear force messenger and the other shows 100% and 0% predictable  $S = k \ln W$  probability solutions for 1 and  $\infty$  part Boltzmann's  $e^{-E_i/E_a}$  systems. If  $e^{-E_i/E_a} = e^{-E_a/E_a} = e^{-1}$  or  $e^{-E_i/E_a} = e^{-1/\infty} = e^0 = 1$  it's a predictable  $e^{-ix} = e^{-1} \leftrightarrow e^0$  quantized energy continuous change equilibrium ground state boundary condition with no energies to interfere with it, and when  $e^{-ix} = e^{-\infty/1} = 0$  it drops out and becomes a non-equilibrium boundary node, but  $e^{-ix}$  still exists in both of the boundary states.

Yukawa realized that if a particle emits a nuclear force messenger that travels at near light speed it would have a  $\lambda = h/mc$  matter wavelength and if it occurs within Heisenberg's Uncertainty it won't violate Energy Conservation since it would travel and return within this period if no other particle is present, so he set the  $\frac{1}{2}$ -wavelength equal to 1.4 fm.

From this he calculated the 140 MeV pion. However it wasn't within the Uncertainty wavelength, it was exactly the wavelength, and equivalence between the pion's wave field and momentum energies means the Uncertainty is actually a wave and particle inertial energy transform function.

His 1.4 fm  $\frac{1}{2}$ -wavelength distance is  $\sqrt{2}$  x the proton's 1 fm interactive radius, a Pythagorean angular momentum resultant of orthogonal inertial energy roots, with  $\frac{1}{2}$  a wavelength inside the proton and the other  $\frac{1}{2}$  outside. This correlates to Einstein's Minkowski space if point radius equals  $x = ct$  distance to a neighbor, a quantized boundary for his Riemann construct.

In Production and Transformation of Light Einstein showed that thermal Black Body EM emissions were quantized by atoms' electrons, continuous thermal energy transduced to statistically quantized energies by particles. But he also stated that Optical Theory explained diffusion, diffraction, refraction, reflection, etc., so completely that he doubted if it could ever be replaced. (Continuity/Discontinuity = Uncertainty)

Waves are continuous PE = F·d field energy forms expressed in terms of  $\pi$  and  $e^{-ix}$  transcendentals but their energies and periodic wave functions are quantized in terms of  $c$  and Planck's constant  $h$ . Their field energies continuously constructively superimpose because the  $e^{-ix}$  wave function's sine and cosine roots are unified and polarized orthogonal Maxwell Electric and Magnetic field energy transcendentals.

They also have 1-dimensional  $\lambda = hc/f$  and  $E = h\lambda$  wavelength and energy "particle nature" periodicity, with symmetrical wavelengths in free space, but become refracted and lose energy (red shift) in Einstein's gravity field so their symmetry is a function of the medium they interact with.

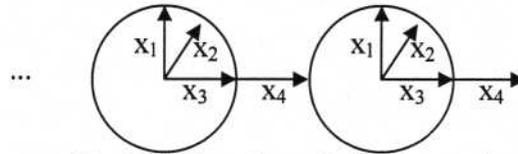
In free space it is simply  $\mu_0\epsilon_0$  permeability-permittivity, but in a g-field the relative medium density on one side of the wave is greater than on its other side, so it occupies degrees of freedom orthogonal to its motion that modulate its symmetry, bending it and changing its  $e^{-ix}$  frequency by energy loss.

In conjunction with the Yukawa messenger particle Heisenberg Uncertainty  $\lambda = h/mv$  wave length symmetry boundary at matter's fundamental level, the asymmetry modulation to wave field energy at the astronomical (gravity) level leads to a conclusion that the wave field energy in the Uncertainty is actually a conservative particle-wave energy Transform. (Continuity/Continuity = Certainty)

Since it derives from a fundamental nucleon in Yukawa's nuclear bond and effects energy transfer under asymmetric medium condition (red shift at the astronomical level) it means it constitutes a mechanism to transform  $E = mc^2$  particle mass directly into field energy by medium modulation.

### V) The Minkowski Transform

Einstein's Minkowski space is a simple  $a^2 + b^2 = c^2$  Pythagorean extended to 4 dimensions as  $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 - dx_4^2 = 0$ , with time flow is represented as  $x = \sqrt{-1}ct$  distance so it correlates to space's 3 dimensions with  $ds^2$  set to 0 because it is a mathematical point with no  $E = F \cdot d$  size in "field free" space.



However if energy is present  $E = F \cdot d$  gives them finite size, and  $x_4$  time flow distance between them depends on the medium density between them. Einstein's model has  $\mu_0 \epsilon_0$  permeability-permittivity inside and out because it represents a "field free" space metric for a Riemann construct gravitational field metric reference that assigns  $E = F \cdot d$  field energy by assigning orthogonal  $g_{ik}$  distance roots to each  $dx^2$  element.

In the particle domain however the density is the particle's mass factored by its 3-D volume, and the density between the particles is the 1-D distance between them factored by the energy of the pion nuclear force messenger and the PE inside must equate to the pion messenger KE between the particles in a tangible way or their behavior could not exhibit uniform stability.

Assuming Einstein, Yukawa, De Broglie, Heisenberg and Schrodinger were correct within the boundaries of their analyses, and the Strong, EM and Gravitational forces are non-interactive for good cause, except the Weak force Strong-EM connection, if a pion messenger emits and returns with an energy and distance corresponding to a bond energy and length equal to Heisenberg's  $\lambda = h/mv$  Uncertainty wavelength, then the  $KE = \frac{1}{2}mc^2$  pion KE must equate to the  $PE = F \cdot d$  particle potential energy by an  $e^{-ix}$  equilibrium incorporated into Einstein's m-space.

Einstein's m-space was correlated to gravity by the principle of equivalence by orthogonal  $g_{ik}$  distance roots that were "not constants, but functions of the coordinates," "summed up over the indices for all combinations 11, 12, ... up to 44" for each " $ds^2 = g_{ik}dx_i dx_k$  ..." coordinate element of his  $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 - dx_4^2$  Pythagorean, and were "continuous" and "covariant" to accommodate  $PE_g = G \cdot m_1 m_2 / r$  gravitational and  $mv^2/r$  centripetal energies.

By the Cauchy-Riemann equations, if an analytic and continuous region has  $\partial^2 i / \partial x^2 + \partial^2 i / \partial y^2 = 0$  and  $\partial^2 k / \partial x^2 + \partial^2 k / \partial y^2 = 0$  2<sup>nd</sup> derivatives of variables with respect to coordinates that are equal to 0, then the real and imaginary parts satisfy Laplace's Equations in two dimensions as an  $e^{-ix}$  harmonic function.

In other words they satisfy both gravitational orbit and quantized orbital wave function requirements. The primary distinction between an orbit and quantized orbital is that in an orbit the  $E_i$  instantaneous and  $E_a$  average energies are equal and in a quantized orbital the  $E_i$  instantaneous values yield a quantized energy state  $e^{-E_i/E_a}$  Boltzmann distribution with a Schrodinger  $\int |\psi(e^t)|^2 dt$  wave function probability distribution. Einstein made a similar distinction between his quantized and Planck's equally probable instantaneous energies in Production and Transformation of Light.

Planck used Boltzmann's  $S = k \ln W$  principle, with  $S$  being a system's macrostate entropies and  $W$  being it's probability proportional to the number of microstate configurations that comprise it because each microstate energy is just total system energy divided by the possible microstates, so all are equally possible, like a 5 coin system having  $2^5 = 32$  possible microstates with 3.125% probability each. A 3H-2T macrostate with 10 possible microstate "complexions" thus has a 31.25% probability but a 5H macrostate with only one possible microstate only has a 3.125% probability.

Einstein on the other hand realized that if a system's  $E = hf$  harmonic oscillator energies are restricted to quantized multiples of their ground state energy their microstates are not equally probable. Thus Planck's

Black Body harmonic oscillator atoms were all in thermal equilibrium with equal energies but Einstein's quantized electron energy state atoms were not.

A Boltzmann equal energy state distribution has a different distribution than one in which all parts have distinct instantaneous energies that are roots of each others energy states, which is why Schrodinger's wave function probability distribution is an integral of the square of the wave functions. They are like an angular momentum's orthogonal velocities that integrate to a  $\frac{1}{2}v^2$  resultant, which is why hydrogen's actual statistical orbital radius is  $\sqrt{2} r_0$  instead of Bohr's  $r_0$  radius.

Atoms' individual energies statistically interfere, which Einstein realized explained increased Black Body uv radiation. At higher temperatures however energies equipartition between atoms because they're all in "excited" states and  $\Delta E_n = E_0/\Delta n^2$  energy differences decrease as  $n \rightarrow \infty$  so  $(1/n^2) \rightarrow 0$  (i.e. Bohr's Correspondence principle that quantum behavior becomes classical as  $1/n^2$  quantum distinctions vanish).

Schrodinger used distinct  $E_i$ 's in his probabilities and Einstein used them in his paper, but it was also the reason he felt Quantum Theory to be incorrect. Schrodinger believed that all energy exists as quantized wave functions and Einstein believed that photons are "energy quanta" and that continuous optical wave behavior theory was also correct.

The divergence in understanding results from a failure to distinguish between LOGIC and NOT LOGIC. In Pauling's General Chemistry Thermodynamics chapters he presents Bose-Einstein distributions of fermionic and bosonic molecules and shows how they converge at higher energies, as they approach their structures' upper quantized energy limits. Fermions and bosons are reactive  $\frac{1}{2}$ -spin and un-reactive integer spin structures with different distributions, respectively, but both converge to continuous behavior as the quantized energy distinctions vanish as the energy states saturate their  $1/n^2$  available degree of freedom.

Half spins are resultants of equal orthogonal Pythagorean roots but they are only equal in their ground states, as in a rigid Bohr orbit. As soon as a system's parts accumulate energy the  $a^2 + b^2 = c^2$  Pythagorean allows the a and b roots to vary from 0 to maximum, which in the case of particles is  $v_0$  to c, a Sommerfeld number ratio of the potential to kinetic energies. However at  $v=c$  no more potential energy can be added, and for  $v_i = v_k = c$  a  $\frac{1}{2}c^2$  energy integration results, as when Compton wavelength energy becomes  $E = mc^2$  when the orthogonal  $\frac{1}{2}v_i^2$  and  $\frac{1}{2}v_k^2$  root energies combine and converge into bosonic behavior.

Einstein, thinking in speed of light limit NOT LOGIC, didn't realize their derivations were LOGIC, and vice versa. Ironically, he called his theory cause and effect because as energy adds the relativistic effects increase but in reality he solved it by NOT LOGIC subtraction of  $(v/c)^2$  cause from the  $(c/c)^2$  limit. However Schrodinger explained hydrogen's observed spectra as an energy probability distribution starting from an  $E_0$  ground state energy and increased it in  $E_0/n^2$  states, LOGIC effects based on fermionic root energy causes.

Ground state protons and electrons are fermionic  $\frac{1}{2}$ -spin parts with energies that are always root component resultants with their own distinct  $\frac{1}{2}$ -spin magnetic and angular moment quantum numbers, one Electromagnetic PE and the other  $\frac{1}{2}mv^2$  KE, which is why hydrogen ground state orbital electrons must exist as diatomic molecular magnetic spin pairs. As system energy increases the  $1/n^2$  quantum energy distinctions interfere, causing a probability distribution, but as the  $1/n^2$  entropy degree of freedom becomes less available and the quantum distinctions, the system's NOT state entropies, vanish and it becomes mono-atomic.

Quantum entropy disappears when there is no energy to interfere, as in a single atom gas where  $E_i = E_a$  in Boltzmann's  $e^{-E_i/E_a}$  factor, in a Bose-Einstein low energy condensation, and when the  $1/n^2$  energy states saturate at their upper limit, as in a  $\frac{1}{2}mc^2$  Compton wavelength KE = PE state, when  $E_i = E_a$  so  $e^{-E_i/E_a} = e^{-1}$  because energy degree of freedom distinctions vanish. In this state the proton's  $\frac{1}{2}$ -spin cannot interfere with the electron because it has no remaining quantum degree of freedom state's available to interfere with.

In hydrogen there are two ways quantum entropy saturation occurs, at ionization when  $\lambda = h/mv$  1-D matter waves become symmetric and when the centripetal orthogonal velocities saturate. In this case the entropy limits differ from ionization's because they are physically limited by the proton size, its  $\frac{1}{2}$ -spin, and relativistic contractions of space. They don't affect the electron's inertial reference frame, they affect the proton's interaction with the electron's energies as it approaches its  $v_i = v_k = c$  limits.

In a centripetal angular momentum orbit the  $e^{-ix}$  function  $v_i$  and  $v_k$  orthogonal velocities statistically interact with  $1/n^2$  entropy states available for each so it becomes a statistical orbital, but at saturation Lorentz effects become phased so the proton mass experiences a rotating 1.67 fm contraction of the 2.76 fm electron orbit to 1.09 fm by orthogonal "neutron state"  $E_n = 0.783/3$  MeV energies, bringing the electron to 1.09 fm in the proton frame of reference we observe, with an arc  $\cos 1.67/2.76 = 53^\circ$   $\frac{1}{2}$ -spin mass center offset.

These are  $E = F \cdot d$  particle field energy dimensions at a proton-electron saturated degree of freedom equilibrium node where both combine to a composite particle energy state, like the quark energy states that yield proton mass,  $\frac{1}{2}$ -spin and size, but these concepts must first be incorporated into m-space to converge quantum and continuous  $E = F \cdot d$  field energies into a  $e^{-E_i/E_a}$  Boltzmann distribution with  $E_i = E_a$  ground and  $\Delta E_i = 1/n^2 = 1/\infty$  saturation states normalized to  $e^{-ix} = e^{-1}$  and  $e^0$   $S = 1$  and  $S = 0$  entropy boundary conditions.

In other words, if system energies are  $E_i = E_a$  no energy is available to distribute into quantized states so  $S = 1$ , but if  $\Delta E_i = 0$  the quantum states saturate and an  $S = 0$  entropy condition constitutes a singularity boundary transition state for a structure's energy as it transforms into the next domain's  $E_i = E_a$  ground state.

Thus the  $E_C = \frac{1}{2}mc^2$  one degree of freedom maximum KE at PE = 0 saturation in  $\sqrt{2}\sqrt{3}$  2-D angular and 3-D spherical momentums of all available entropic degrees of freedom in the lower density domain and Sommerfeld's  $1/\alpha^2 = c^2/v_o^2$  ratio yields a Up quark  $m_{Uq} = 2\pi(\frac{1}{2}m_e c^2)\sqrt{2}\sqrt{3} = 4$  MeV mass energy. Only 3-D space was needed to determine the ground state structure because time flow is a constant at saturation.

However, the time degree of freedom must be included to accommodate dynamic behaviors like  $e^{-ix}$  pion messenger bonding between the internal quark structure and another particle and  $e^x$  Weak force decay to apply the wave-particle equivalence of the Heisenberg Transform. A ground state occurs when a lower density domain's available entropies are all  $S = 0$ , like a perfect crystal, because all degrees of freedom are saturated, so no PE is available to them, but the next higher density domain's entropies are all  $S = 1$  because at ground state all PE is available (i.e.  $1/n^2 = 1$  can go to  $1/n^2 = 0$  as  $v = v_o$  goes to  $v = c$  again).

This juncture of diametrically opposing 0 and 1 entropy conditions creates a very strong PE = F·d because the Sommerfeld Transform size changes by  $1/\alpha = 137$  but energy density sees a  $1/\alpha^2$  available PE increase in conjunction with the fact that at saturation all lower density domain degrees of freedom are filled but it appears static because it is an  $e^{-ix}$  equilibrium node between one domain's PE and the next one's KE. At ground state all KE states are possible but at saturation none are so it is all PE. This is 2<sup>nd</sup> Law of Thermodynamics entropy increase, but only until a domain's available degrees of freedom saturate, then it can only increase entropy by increasing energy density to make new entropic degrees of freedom available, and the  $e^{-ix}$  function doesn't just stop at its node because its inertias still exist and can only be resolved by entering the newly available entropies and thereby increase their energy density.

Conversely, the  $e^{-ix}$  entropy function works in reverse when nature super-saturates into radioactive isotopes or if man puts a piston in gas vessels to provide an entropic degree of freedom into a lower density domain. It is however dangerous to poke a hole in a  $1/\alpha^2$  high density domain's structure unless prepared to channel a  $10^{-20}$  s total destabilization chain reaction energy discharge, but Einstein's  $x_4 = \sqrt{-1}ct$  energy time flow degree of freedom in his m-space does provide an energy transform solution.

Mathematical transition, absent medium or substance, is instantaneous, but in an  $\mu_o \epsilon_o$  permeability-permittivity medium it is limited to the  $c = 1/\sqrt{\mu_o \epsilon_o}$  speed of light, and because lower density saturated entropies and available higher density entropies are reciprocal but equivalent energy density singularity states, a  $\partial^2 S/\partial x^2 = \partial^2 \rho/\partial x^2$  entropy and density  $e^{-ix}$  equilibrium occurs, observed as Electron Capture neutron state formation and Weak force decay, and results in  $1/n^2$  quantum states because it correlates energy density increases to  $e^{-ix}$  wave function wavelength decreases in stable structures (i.e. particle to hydrogen size and energy density by decay of quantized  $\alpha$  particle size and  $1/\alpha^2$  energy density states).

Mathematically the internal wavelength size and energy density quantized energy states and the  $\partial^2 S/\partial x^2 = \partial^2 \rho/\partial x^2$  entropy to density transition, when lower density domain entropies saturate at  $S = 0$  and higher density domain energy is constrained to a  $E_i = E_a = 1$  ground state and  $E = F \cdot d$  wave field-energy

equilibrium, as shown by Yukawa's Heisenberg Transform, can thus be represented as a  $\partial^2 u / \partial x^2 = 0$  and  $\partial^2 v / \partial x^2 = 0$  Cauchy-Riemann  $e^{-ix}$  harmonic Laplace equation solution of a  $\int 1/f(x)$  singularity transform.

Because  $E = F \cdot d$  continuously correlates energy to field and distance as Einstein correlated time flow to an  $x = \sqrt{-1}ct$  distance of energy moving at light speed, and Maxwell's  $\partial^2 E / \partial x^2 = \mu_0 \epsilon_0 \partial^2 E / \partial t^2$ ,  $\partial^2 B / \partial x^2 = \mu_0 \epsilon_0 \partial^2 B / \partial t^2$ ,  $\partial E / \partial x = -\partial B / \partial t$  and  $\partial B / \partial x = -\mu_0 \epsilon_0 \partial E / \partial t$  EM wave relations are Cauchy-Riemann harmonic Laplace functions, the only criteria for an  $e^{-ix}$  equilibrium is that energies occupy orthogonal i degrees of freedom as phase shifted sine and cosine field energy forms.

It makes no difference whether they are represented as PE-KE forms in orthogonal dimensions of space like a pendulum, as orthogonal E electric and B magnetic fields in a Maxwell EM wave photon, or as orthogonal space-time degrees of freedom in Einstein's m-space, as long as energy can flow continuously between correlated orthogonal degrees of freedom.

However the uniqueness of Einstein's m-space model is that it relates a point's  $E = F \cdot d$  structural size to the minimum quantized distance to its neighboring point by the same  $E = F \cdot d$  relation, structural and interactive radii like in nucleons, as Yukawa showed by using Heisenberg's Uncertainty wavelength to predict the pion nuclear force messenger.

Because Einstein used field-free m-space as a reference for his " $g_{ik} dx_i dx_k$ " Riemann gravity field construct, where  $g_{ik}$  is a continuous function of  $dx_i dx_k$  roots of  $dx_n^2$  space-time coordinates, it means a quark size and mass-energy relates to gravity's field as a  $\int 1/f(x)$  reciprocal singularity function, shown by equating gravitationally determined light year to quark size since quarks generate the Sun and Earth proton masses.

Since they are m-space based structures they correlate to point size distances by the same energy time-flow equivalence. Thus quark size and mass-energy correlate to the Compton  $E_C = \frac{1}{2} m_e c^2$  wavelength energy at the atomic domain's  $S = 0$  entropy saturation, if charge and magnetic field energies are represented as oriented structural  $E = F \cdot d$  field energy polarities, then mass-energy presents as a  $(\frac{1}{2} e h / 2\pi)$  magneton at an m-space  $2\pi$  wavelength point with an oriented orbital charge that manifests as a  $m_p = \sqrt{2} \sqrt{3} (\frac{1}{2} e h / 2\pi) 3c^3$  mass-energy when light speed angular and spherical momentums are incorporated.

It manifests as an unstable quark energy state and stable electron symmetry because the Up quark is an electron excited energy density state at its  $S = 0$  saturated entropy state limit and the quark is an  $S = 1$  available entropy ground state, an  $S = 0$  and  $S = 1$  boundary discontinuity, where  $m_{Uq} = \sqrt{3} \sqrt{2} c^3 \frac{1}{2} m_e c^2$  is the electron upper and Up quark lower boundary. The quarks comprise a stable triton configuration proton structure equilibrium when the  $m_{Dq} = \sqrt{3} m_{Uq}$  Down quark mass-energy is the Up quark's excited state in the UDU proton and all energies are in Cauchy-Riemann harmonic  $e^{-ix}$  Laplace function equilibriums.

The proton's mass-energy and  $\frac{1}{2}$ -spin then result from a  $\sqrt{2} \sqrt{3}$  angular and spherical energy resultant distribution of the UDU structure as an orbital around its generated  $\mu m = \frac{1}{2} e^2 h / 2\pi$  mass-energy, providing the same  $\frac{1}{2}$ -spin mass offset as for hydrogen's neutron state. As an m-space point the internal triton orbital with  $\frac{1}{2}$ -spin offset generates Yukawa's Heisenberg Uncertainty wavelength pion in which his 1.4 fm  $\frac{1}{2}$ -wavelength is a  $\sqrt{2}$  resultant of the quarks structure 1 fm radius  $\frac{1}{2}$ -spin angular momentum.

Observed resultant and interactive radii reduce to simple geometries. The pion is a  $\frac{1}{2}$ -wavelength resultant of the excited Down quark state  $\sqrt{2} \sqrt{3}$  momentums constrained to the 3 Up quark triton structure. They are a quantized fundamental configuration because the excited state statistically occupies Einstein's m-space  $x_1, x_2, x_3$  and  $x_4$  degrees equally and can only do so by fully depleting a degree of freedom as it fills the next. Any back flow would be an excited higher frequency state so all  $x_n$  degrees are sequentially occupied (i.e. phased) in a ground state that exists at the  $S = 0$  and  $S = 1$  boundary discontinuity condition.

Any other states are  $1/n^2$  quantized excited states up to the  $S = 0$  limit that relates by Sommerfeld's  $\alpha = \frac{1}{2} e^2 / \epsilon_0 h c$  number. Equations equating Strong and Weak force decay times by  $x_4$  time flow energy transition between domains are presented in Quark Electrodynamics. This mathematical model uses Einstein's m-space points as structural constructs with quantized internal and external force-distance energies at a matter wave node boundary, and results in a Heisenberg resolution Uncertainty, shown in Quark Electrodynamics

as a electron-proton radii ratio, that can't be resolved on one hand but does allow continuous field energy extension into the gravity domain by his Riemann construct, thus unifying quantized and continuous field energies by the Heisenberg Transform.

## VI) The Sommerfeld Transform

The point of The Singularity Principle is that if the natural laws are the same in all inertial reference frames then behaviors like velocity have degree of freedom boundaries (i.e. speed of light). If Sommerfeld's number relates hydrogen's ground state velocity and energy to their limits by  $v_0 = \alpha c$  and  $E_0 = \alpha^2 E_C$ , where  $E_C = \frac{1}{2}mc^2$  is the maximum possible Compton wavelength energy increase, then it applies in all domains.

Sommerfeld's  $\alpha = e^2/2\epsilon_0hc$  number relates actual KE to possible PE when expressed as  $\alpha = (e^2/2\epsilon_0h)/c$  because  $v_0 = (e^2/2\epsilon_0h) = 2.187692 \times 10^6$  m/s, hydrogen's ground state electron velocity. It equates ground state PE = F·d charge field and KE =  $\frac{1}{2}mv^2$  kinetic energies, orbital charge attraction and centripetal force equilibrium. He was trying to show equivalence between Bohr's rigid orbit and Quantum Theory's orbital predicated on de Broglie's  $\lambda = h/mv$  wavelength and Schrodinger's  $e^{-ix}$  wave functions by Relativity.

Had he recognized that by Relativity the natural laws are the same in all inertial frames of reference he could have correlated the mv momentum in de Broglie's matter wave and momentum in Classical orbits because both are stable ground state conditions in distinctly different energy domains, where  $\alpha = v_0/c = mv_0/mc$  is the possible momentum increase ratio and  $\alpha = (h/mc)/(h/mv_0) = \lambda_c/\lambda_0$  wavelength ratio of the potential and actual  $e^{-ix}$  wave function energy states, constituting a domain size ratio that relates the Quantum domain electron orbital wavelength to the Classical EM wavelength.

It further relates the electron's  $\lambda = h/m_e c$  orbital and Compton light speed wavelengths used to relate the quark, particle and atomic domains because light speed is its momentum upper boundary condition limit. The actual and potential kinetic energies are  $\frac{1}{2}mv^2$  and  $\frac{1}{2}mc^2$  and if  $\alpha = v_0/c$  then  $\alpha^2 = (v_0/c)^2 = \frac{1}{2}mv^2 / \frac{1}{2}mc^2$  must be the ratio of energies between all of its domains.

Thus, by providing size and energy ratios, this Sommerfeld Transform provides an energy density ratio between domains that can be dimensionally adjusted geometrically to relate domains' behaviors, like the quark and gravity domains reciprocally related by the quark's size and light year's distance determined by the quark generated masses that determine the light year's period and its distance determined by the speed of light in Einstein's  $x = ct$  Minkowski space relation.

## VII) The Singularity Principle

### A) Singularities

By the concept of a mathematical Singularity all energy domains may be related.

A Singularity occurs when a domain's  $f(x)$  functional description reaches a boundary and becomes undefined, unbounded by the domain's context. This occurs when  $f(x) \Rightarrow 0$  and is factored from the  $F(e^{-ix}) = 1$  functional unity of a domain's equilibrium, when  $F(x) = 1 / f(x) = 1/0 = \infty$ , while integrated over the domain's limits, or  $\int_{-\infty}^{\infty} \frac{1}{f(x)} dx$  as  $f(x) \Rightarrow 0$ .

However,  $f(x) \Rightarrow 0$  doesn't mean it ceases to exist. The function has causes, the natural laws are the same in all reference frames, present states are effects of prior ones and causes of nexts, and  $e^{-ix} \lambda = h/mv$  wavelength-momentum equilibriums arise from PE = F·d  $\equiv$  KE =  $\frac{1}{2}mv^2$  energy degrees of freedom, so  $f(x) = 0$  is only a wave node, when the prior domain's available entropic degrees of freedom saturate at  $S = 0$  and the next one's are unfilled at  $S = 1$ . Then the prior domain is PE for the next one's KE, the  $e^{-ix}$  inertias carry the saturated domain's PE's into the next one, and Schrodinger's  $\int |\psi(t)|^2 dt$  probability function becomes the distribution mechanism for the Universe's energy between its domains.

This means the Universe must expand faster as it gets larger because gravity and energy interference decrease as their PE entropic degrees of freedom deplete and transform into KE inertias. All Strong, Weak, EM and Gravity PE forms occupy 4-D space-time degrees of freedom and constitute a combined PE density and  $e^{-ix}$  inertia to distribute the Universe's matter into un-occupied regions. This interpretation only requires 4-D m-space and  $PE = F \cdot d \equiv KE = \frac{1}{2}mv^2$  energies to explain observed  $1/n^2$  quantum wave functions,  $v = 0$  to  $c$  inertias, and the observed resultant Strong, EM, Weak and Gravitational force behaviors.

Mathematical  $\infty$  singularity limits differ from tangible physical ones, and observed behaviors, structures and degrees of freedom differ from domain to domain because microstate behaviors are functions of each domain's system entropies  $S$ , microstate entropies  $s$  (i.e. domain's with their own entropies), their interactions with each other and their boundaries, and system macrostate behaviors depend on the microstate "complexions" that comprise their configurations, like a 5 coin system where macrostate probabilities are proportionate to the number of microstates comprising them:

| <u>Macrostate</u> | <u>Microstate "Complexions"</u>   | <u>Number of Microstates</u> | <u>Probability</u> |
|-------------------|---|------------------------------|--------------------|
| 5H-0T             | hhhhh   | 1                            | 3.125%             |
| 4H-1T             | hhhht, hhhth, hhthh, hthhh, thhhh                                       | 5                            | 15.625%            |
| 3H-2T             | hhhtt, hhtth, htthh, tthhh, hthtt,<br>hthth, ththh, hthht, thhth, thhht | 10                           | 31.25%             |
| 2H-3T             | same as 3H-2T macrostate, interchanging h and t                         | 10                           | 31.25%             |
| 1H-4T             | " " 4H-1T " " "   | 5                            | 15.625%            |
| 0H-5T             | ttttt   | 1                            | 3.125%             |

Coins however have fixed 50/50 heads/tails probabilities and in Production and Transformation of Light Einstein showed that light is "energy quanta" and explained Black Body uv spectra by distinguishing Planck's  $E_a$  average energy atoms from electrons'  $E_i$  instantaneous energies, so atoms are sub-systems with their own entropies within the systems they occupy, like coins with heads and tails probability distributions while at rest, functions with both internal sub-system and external system LOGICS and NOT LOGICS.

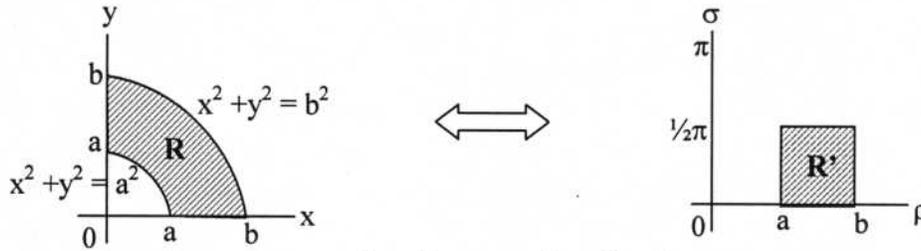
This means electrons  $e^{-ix}$  wave functions become predictable when there are no other hydrogens to interfere with externally and their proton's angular momentum and pion messenger functions are accounted for, when the electron's  $E_i = E_a$  so  $e^{-E_i/E_a} = e^{-1}$ , a simple wave function between the proton and electron at a new higher density  $E_o$  ground velocity at its  $S = 0$  and  $S = 1$  domain boundary.

Heads/Tails microstates are saturated sub-system degree of freedom fixed 50/50 probability coin flipping system roots. They are incomplete metaphors because they presume only saturated states. Physical internal states have instantaneous energy informations that statistically distribute, systems on their own level with their own set of  $s$  entropies that change with internal and external circumstances, and their probability distributions are affected accordingly.

Transformatal Mapping relates domains' limits, behaviors, etc., because energy's natural laws are the same in all reference frames even though circumstances, behaviors and appearances differ. All have energy state structures, interaction mediums, distances and sizes,  $1/n^2$  quantized  $PE \equiv KE e^{-ix}$  wave function excited states,  $e^{-E_i/E_a}$  Boltzmann factor statistical interactions and Schrodinger  $\int |\psi(t)|^2 dt$  wave function probabilities,  $v_o$  to  $c$  velocity limits, and entropic degrees of freedom, but statistical behavior becomes predictable when  $E_i$  instantaneous energies saturate at their  $v = c$  and  $1/n^2 = 1/\infty = 0$  limits or  $E_i = E_a$  single component ground state, where  $v = v_o$  and  $1/n^2 = 1/1 = 1$  when  $E_o$  energy proceeds through its m-space point 4-D degrees of space-time freedom sequentially because no other available energy to accumulate into excited states.

A region  $R$  bounded by  $x^2 + y^2 = a^2$ ,  $x^2 + y^2 = b^2$ ,  $x = 0$  and  $y = 0$ , where  $0 < a < b$ , maps into an  $x = \rho \cos \sigma$  and  $y = \rho \sin \sigma$  transformation, where  $\rho > 0$  and  $0 \leq \sigma \leq \frac{1}{2}\pi$ . Under the transformation  $x^2 + y^2 = a^2$  and  $x^2 + y^2 = b^2$  become  $\rho^2 = a^2$  and  $\rho^2 = b^2$  or  $\rho = a$  and  $\rho = b$ , and  $x = 0$  and  $a \leq y \leq b$  become  $\sigma = \pi/2$  and  $0 \leq$

$\rho \leq b$ , and  $y = 0$  and  $a \leq x \leq b$  become  $\sigma = 0$  and  $a \leq \rho \leq b$ , a  $e^{ix} = \cos x + i \sin x$  sine-cosine curvilinear continuity transforming into a quantized discontinuity.



The  $0 \leq a \leq b$  region R bounded by  $x^2 + y^2 = 0$  and  $x^2 + y^2 = b^2$ , a radius b quarter circle limited by  $x = 0$  and  $y = 0$  to  $x^2 + y^2 = b^2$ , becomes rectangle R' bounded by  $0 \leq \rho \leq b$ , since  $\rho = 0$  at  $x = 0$  and  $y = 0$ , while  $\sigma$  still remains an indeterminate variable bounded by 0 and  $\frac{1}{2}\pi$ . Thus indeterminate variables transform into a determinate ones, waves transform into quantized energy states, and vice versa, and can be extended from a 2-D wave energy, into a 3-D volume and energy density, and 4-D m-space-time behavior.

Replacing  $\infty$  mathematical limits with free space's  $\mu_0 \epsilon_0$  and permeability-permittivity  $c = 1/\sqrt{\mu_0 \epsilon_0}$  velocity limits yields  $\mu_0 \epsilon_0 = (\partial^2 E / \partial x^2) / (\partial^2 E / \partial t^2) = (\partial^2 B / \partial x^2) / (\partial^2 B / \partial t^2)$  PE = F·d field and KE =  $mv^2/r$  centripetal inertia limits of an  $e^{-ix}$  equilibrium when Sommerfeld's  $\alpha = v_0/c = \frac{1}{2}e^2 / \epsilon_0 hc$  relation defines the structure's minimum  $E_0$  ground state that conforms with space's  $\mu_0 \epsilon_0$  permeability-permittivity constraints and defines the  $\alpha$  size and  $\alpha^2$  energy density between domains that each have a speed of light velocity limit.

Physically quantum behavior vanishes when an electron is captured and forms a "neutron" state with a proton or ionizes into free-space, where the quantized  $E_n/n^2$  atomic domain PE becomes classical KE. The electron still has a  $\lambda = h/mv$  de Broglie matter wave but in free space it is symmetrical and cancels because without a proton to interact with there's no proton PE = F·d field energy for a quantized  $e^{-ix}$  equilibrium state to form. Quantized states require orthogonal  $e^{-ix}$  KE momentum and PE field energies for a wave function. In a neutron state the particles' interaction radii and  $E_n = +0.782$  MeV energy at near light speed precludes the electron's quantum function within the  $E_0 = -13.6$  eV energy well needed for the  $e^{-ix}$  equilibrium.

When Schrodinger applied Boltzmann's  $e^{-E_i/E_a}$  distribution he obtained a  $\int_0^\infty |\psi(x)|^2 dx$  probability distribution because the atom's  $\psi(x)$  wave function is a PE  $\equiv$  KE  $e^{-ix}$  wave relation that becomes a squared  $|\psi(x)|^2$  probability function because the quantized  $\lambda = h/mv$  matter wave energy states statistically distribute atoms  $E_i$  instantaneous energies with respect to the overall  $E_a$  average energy so the probability function is a square of two  $e^{-ix}$  functions, one describing distribution of instantaneous energies between atoms and one describing individual electron's instantaneous energies, resulting in a square of  $\psi(x)$  wave functions.

However Schrodinger's equations used 0 to  $\infty$  mathematical limits. The actual limits are two energy states, one at hydrogen's  $E_n/n^2$  quantized energy plus  $E_0 = -13.6$  eV equals zero,  $E_n/n^2 - E_0/1 = 0$ , ionization and one at the proton and electron physical size limit  $E_n = E_n/n^2 = +0.78233$  MeV neutron state. These omissions weren't known when Schrodinger derived his wave functions because neutrons were discovered in 1932 and the proton and electron sizes were undetermined. Also, Schrodinger's wave functions are not predictable over time because mathematical wave functions are ideal and physical ones depend on particle sizes, pion messenger occurrences, and interactions with other atoms and available degrees of freedom.

Wave-Particle Duality  $\lambda = h/mv$  matter wave behavior derives from two phenomena: the internally generated field messengers and particle interactions with their external circumstances. In free space no interference occurs but in multiple particle systems the interference between particles cause  $e^{-E_i/E_a}$  statistical distributions of instantaneous energies. Schrodinger did not solve for  $E_i = E_a = 1$  single system or  $E_i = E_a / \infty = 0$  infinite sub-system systems so he did not isolate these wave function energy state boundary conditions.

## B) Fundamental Matter States

Consider a physical matter system with only 3 fundamental 2<sup>nd</sup> order root particles, the EM wave, electron and proton, since all matter can be shown to be excited or composite states of their mass-energy,

charge, magneton magnetic field, spin and energy density size parameters. By themselves they represent a unique symmetry that correlates by the concept of a mathematical singularity with respect to each other.

The EM wave is neutral with orthogonal EM wave field energies that correlate completely by Maxwell's equations. They are integer spin bosonic mass-energy carriers with momentum that only exist at the constant speed of light upper velocity limit of physical reality with respect to  $\infty$ -inertia 0-velocity  $\mu_0\epsilon_0$  permeability-permeability free space, symmetrically reciprocal  $1/f(x)$  singularity functions by Maxwell's  $\mu_0\epsilon_0 = (\partial^2 E/\partial x^2) / (\partial^2 E/\partial t^2) = (\partial^2 B/\partial x^2) / (\partial^2 B/\partial t^2)$ ,  $\partial^2 E/\partial x^2 = \mu_0\epsilon_0 \partial^2 E/\partial t^2$  and  $\partial^2 B/\partial x^2 = \mu_0\epsilon_0 \partial^2 B/\partial t^2$  Cauchy-Riemann 2<sup>nd</sup> order derivative Laplace wave equations when the actual  $\mu_0\epsilon_0$  physical limits of space are substituted for 0 mathematical limits in  $\partial^2 f(x)/\partial x^2 + \partial^2 f(y)/\partial y^2 + \partial^2 f(z)/\partial z^2 + \partial^2 f(t)/\partial t^2 = 0$  equations.

The electron and proton have reciprocal unity charges, indicating that charge is an orientation effect of a structural Maxwell  $m \cdot \mu = \frac{1}{2}eh/2\pi$  mass-energy magnetic field energy phenomenon. This is supported by the fact that their magnetons reciprocally equate when their masses and sizes are used to incorporate their densities as relative  $\mu\epsilon$  permeability-permittivity impedances with respect to free space's  $\mu_0\epsilon_0$ .

Their fermionic  $\frac{1}{2}$ -spins can also be shown to correlate to an oriented wave energy polarity with  $\sqrt{2}\sqrt{3}$  angular and spherical momentums rotating about the magnetic field energy their rotations generate by Maxwell's Theory. Thus all their measurable parameters are reciprocally symmetrical with respect to each other and free space's  $\mu_0\epsilon_0$ , and in composite states they equate to maximally excited "neutron" and depleted energy "hydrogen" ground states that result in EM wave energy carriers in the nuclear and atomic domains of matter, so all three mass-energy forms correlate.

Quark sub-particles are considered to be symmetrical with leptons but are never stable by themselves while the electron, proton and EM wave are each completely stable matter ground states. Quarks correlate as energy states that constitute fundamental particles' composite component and excited interaction states.

Equations calculating relationships between quarks and other phenomena are presented in Quark Electrodynamics. Since they symmetrically correlate to leptons, they constitute constructive electron and proton components of matter and emit or absorb quantized EM waves when changing energy states.

### C) Singularity Rules of Equivalence

If the natural laws are the same in all inertial frames of reference then the energy domains equate.

This follows from the speed of light being the upper velocity limit, the ground state of stable systems being  $e^{-ix} = \cos x - i \sin x$   $PE = F \cdot d \equiv KE = \frac{1}{2}mv^2$  equilibriums, since  $\mu_0\epsilon_0$  4-D m-space degrees of freedom are equally available in all domains, and Sommerfeld's  $\alpha = \frac{1}{2}e^2/\epsilon_0hc$  number relating hydrogen's  $v_0 = \frac{1}{2}e^2/\epsilon_0h$   $= 2.187691562 \times 10^6$  m/s ground state velocity to the speed of light extended to  $1/\alpha$  size and  $1/\alpha^2$  energy density ratios between domains by the Sommerfeld Transform.

Thus even though behaviors based on circumstances in each domain appear different the energies of each follow the same fundamental rules from the weakest force Gravity in the astronomical domain to the upper speed of light maximum energy density boundary Strong force condition within particles.

It also means that since energy behavior follows the same fundamental rules the energy density of domains constitutes continuously analytic regions with  $f(x) = u(x,y) + i v(x,y)$  functions in which  $u$  and  $v$  satisfy Cauchy-Riemann  $\partial u/\partial x = \partial v/\partial y$  and  $\partial u/\partial y = -\partial v/\partial x$  equations, since ground states are  $PE \equiv KE$  real and imaginary energy  $e^{-if(x)}$  wave function equilibriums with Laplace 2<sup>nd</sup> derivative  $\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 = 0$  and  $\partial^2 v/\partial x^2 + \partial^2 v/\partial y^2 = 0$  quantized harmonic solutions that can be extrapolated to 4-D m-space like Einstein did in his  $a^2 + b^2 = c^2$  Pythagorean correlation.

M-space points, because of  $x = ct$  space-time equivalence, have conservative internal  $x_1, x_2$  and  $x_3$  radii and external  $x_4$  point to point interactive distance for uniform  $\mu_0\epsilon_0$  energy resonance and transmission medium impedance. This means Einstein's  $ds^2 = dx_1^2 + dx_2^2 + dx_3^2 + dx_4^2 = 0$  point, where  $x_4 = \sqrt{-1}ct$ , ranges from 0-size mathematical points to  $E = F \cdot d$  internal and interactive external physical size points.

In a uniform  $\mu_0\epsilon_0$  medium the point and interactive sizes will be uniform  $x_{1 \rightarrow 4} = \frac{1}{2}\lambda = \frac{1}{2}hc/E$  distances because each degree of freedom represents an excited PE state with respect to the orthogonal degree of freedom it transfers into by  $x = ct$  PE = F·d  $\equiv$  KE =  $\frac{1}{2}mc^2$  space-time transform.

Because the energy must equally distribute, and  $e^{-E_i/E_a} = e^{-E_a/E_a} = e^{-1}$ , it constitutes a  $1/e^{-f(x)}$  wave function integrated over the 4 available degrees of freedom, a Laplace Transform singularity function which factors the  $e^{-ix}$  equilibrium factor from the system's unity, so  $F(s) = \int 1/e^{sx} dx$ . This simply means that for stable 4-D energy points in internal and external  $F(x) = 1$  equilibriums the system's  $e^{-ix}$  equilibrium function can be factored out as a common denominator since its wave nodes are the point and interaction boundaries.

Energy equally distributes in 4-D m-space so the ground state energy that must sequentially transfer between its 4 degrees of freedom, depleting one without energy backflow or it constitutes a higher frequency  $1/n^2$  excited state. Excited states do this at a higher frequency and appear more random, and multiple excited states introduce statistical un-predictabilities. A point moving through space is an excited state by reciprocal space-time Lorentz transform, where its energy continuously interacts with depleted  $\mu_0\epsilon_0$  space as wave field PE in  $e^{-ix}$  equilibrium with the point's other 2 internal degrees according to a  $\frac{1}{2}\lambda$  Heisenberg Transform. The interaction with space equates by  $x_4 = ct$  with the  $a^2 + b^2 = c^2$  resultant of  $x_1$ 's orthogonal  $x_2$  and  $x_3$  degrees of freedom to yield a constant velocity excited state inertia. It moves in a straight line by interaction with the uniform  $\mu_0\epsilon_0$  impedance of space's degrees of freedom opposing the interactive  $E = F \cdot d$  wave field energy.

If other points exist their interactions statistically distribute their energies according to Boltzmann's  $e^{-E_i/E_a}$  factor, yielding quantized discontinuities between point energies; If the  $\mu_0\epsilon_0$  impedance changes the  $c = 1/\sqrt{\mu_0\epsilon_0}$  speed of light changes according to the relative EM permeability-permittivity difference between points' internal and external mediums. Uniform medium constitutes uniform EM energy  $\mu\epsilon$  impedance and creates a  $T = e^{-2KL}$  Quantum Tunneling transmission coefficient, where  $K = \sqrt{2m(PE - KE)}/h/2\pi$ ,  $L$  is the impedance's  $x = ct$  time or distance to an energy interaction, and  $R = 1 - T$  is its reflection coefficient.

This is Schrodinger's quantum energy well in which PE constitutes the barrier's height (energy well depth),  $L$  is the energy barrier's width ( $\infty$  in free space and finite  $\frac{1}{2}\lambda$  time interval between energy domains), and KE is the  $\frac{1}{2}mc^2$  energy state that transfers. Sommerfeld's  $\alpha = \frac{1}{2}e^2/\epsilon_0hc$  number relates  $e^2$  charge field PE to light speed time flow and energy density ratio between domains depends on the  $c = 1/\sqrt{\mu\epsilon}$  impedance difference between domains' relative  $e^{-ix}$  ground state equilibriums and  $L$  space-time barrier width.

This simplification only applies to fixed interactions such as point with surrounding space or another point, like Einstein's m-space points or Yukawa's nuclear bond, but the concept extends to quark energy state interactions within particles. If distance between points is long, as for gravity, quantized energy density distance  $1/n^2 \Rightarrow 1/\infty = 0$  relative to point  $1/1^2$  ground states and vanishes (Bohr's Correspondence Principle). Quantum behavior transforms to continuous by  $x = ct$  distance interaction and quantized medium correlates by Einstein's  $dx^2 = g_{ik}dx_i dx_k$  Riemann construct to m-space  $\mu_0\epsilon_0$  medium points with PE = F·d field energy.

Statistical interactions between points constitute a relative impedance which means there will be 3 dominant forces, one at a  $e^{-E_i/E_a} = e^{-E_a/E_a} = e^{-1}$  boundary, one at a  $e^{-E_i/E_a} = e^{-E_i/\infty} = e^0$  boundary, and one at the  $e^{-E_i/E_a}$  Boltzmann statistical ground state median where the  $x = ct$  interaction distances provide quantum  $1/n^2$  impedance distinctions. Since the  $e^{-1}$  and  $e^0$  are fixed  $1/1$  and  $1/\infty$  quantum boundaries for  $e^{-ix}$  behavior the analyses are classically continuous even though the  $e^{-E_i/E_a}$  energy distribution is statistical with  $1/n^2$  energy states and  $\int |\psi(x)|^2 dx$  probabilities, corresponding to the Strong nuclear, EM atomic, and astronomical Gravity close, intermediate and long distances.

However there must also be an inter domain force that allows quantum tunneling between domains according to their relative interactive impedances, corresponding to Weak force decay between Strong and EM domains. It's statistical behavior is only apparent between these two domains because they are a transition between quantum fixed and quantized statistical domains but for larger distances the quantized distinctions quickly vanish. Thus analyses in the Strong and Gravitational domains become classical while the EM atomic domain is statistical if the components are in excited states, such as U-235 nuclei or Borghi's and Missfeldt's rf EM excitement of hydrogen to accelerate Electron Capture.

## D) Singularity Derivations

A significant advantage of the Singularity Principle, that when an energy domain's degrees of freedom saturate it transforms into the next domain, is that it makes classical analysis of  $1/n^2$  quantized statistical systems possible.

The answer to the question presented in the Abstract, "What within the dust seeks to understand?", is that it's not within the dust alone, its within the dust and its circumstances. The dust has the fundamental behaviors of energy but the manifestations, or microstate "complexions", depend on the available entropic degrees of freedom of its circumstances. The force of the question is the PE within the dust, its formulation is its circumstances.

At a system's upper speed of light boundary the available entropies are saturated so  $S = 0$ . In 4-D m-space this is summarized as  $\sqrt{2}\sqrt{3}$  angular and spherical momentum conditions with no remaining available time dilations in any of space's 3-D to allow statistical variations over time. All available degrees of freedom are at the same time flow rate and even though the domain has  $1/n^2$  quantized  $e^{-ix}$  wave function energy states the quantum distinctions vanish at  $S = 0$ .

As Schrodinger showed, the probability distribution is a  $P = \int_L^U |\psi(x)|^2 dx$  integration from lower to upper limits of a  $\psi(x) = e^{-ix}$  wave function squared, for all 4 space-time dimensions. This occurs because the components' internal degrees of freedom allow  $1/n^2$  quantize  $PE \equiv KE$   $e^{-ix}$  energy state equilibriums and its external circumstances allows similar system  $e^{-ix}$  states, microstate and macrostate energy "complexions," but at  $S = 0$  saturation all states are filled so behavior is classical because  $1/n^2 = 1/\infty = 0$ .

At the next domain minimum energy ground state all 4-D m-space degrees of freedom are available again to the previous domain's saturated degrees of freedom PE, but this consists of two compounded wave function energies, the component's (microstate) and the system's (macrostate). The system's  $e^{-ix}$  wave function is at a saturated node but still exists in its inertias so its function transfers through the singularity event's unbounded condition as PE for the next domain's KE in its newly available higher energy density degrees of freedom, subject to the relative  $\mu\varepsilon$  density change between domains.

Similarly the microstate's degrees of freedom are saturated so it also constitutes a PE for the next domain's high energy density available degrees of freedom. This  $S = 0$  saturated microstate condition is  $1/\alpha$  times smaller with  $1/\alpha^2$  times greater energy, where  $\alpha = v_0/c = \frac{1}{2}e^2/\varepsilon_0hc$ , so it constitutes an extreme excited state energy density condition at its own  $e^{-ix}$  wave function node boundary and can also be considered classical, since  $1/n^2 = 0$  at  $S = 0$ .

As energy domains become less dense there is less energy density disparity between its ground state components and their maximum  $S = 0$  saturated degree of freedom boundary as distances increase so the components become less dense. Thus the mass defect binding energies become less between components as the densities decrease, as demonstrated by deuterium's -2.224 MeV BE (binding energy), hydrogen's -13.6 eV BE, diatomic hydrogen's -4.6 eV BE, and so on down to the gravitational domain.

Because binding energies occur at equilibrium node boundaries, at  $S = 0$  for the lower energy density domain and  $S = 1$  at the higher density one, they are conservative classical  $PE \equiv KE$  reciprocal momentum ground states, like reciprocal pendulum PE states transforming into opposing KE states if  $e^{-ix}$  wave function degrees of freedom are available for an equilibrium. Equal and opposite momentums cancel energies so the combined component masses appear bound by a mass defect BE but the momentums still exist, which is why energy is released when bonds are broken even though it arises from a mass defect.

Thus quarks by themselves are unstable but stable in proton triton quark ground state configurations, protons and electrons are stable but unpaired entropic degree of freedom conditions that form hydrogen, hydrogens bond into molecules, and molecules bond ionically, covalently or interactively with other groups because  $e^{-Ei/Ea}$  statistical interactions cause equal and opposite momentums and mass defect conditions that cumulatively sum to low density mass defect conditions satisfying Einstein's  $ds^2 = g_{ik}dx_i dx_k + \dots$  Riemann construct gravity field, where  $g_{ik}$  is the cumulative summation effect applied to the  $dx_i dx_k$  points of space.

Thus gravity is a very weak force resulting from field-free m-space compression by occupation of matters' cumulative energy density plus summation of binding energy momentum Lorentz contractions extended to  $\infty$  m-space degrees of freedom. True summation is difficult because of the  $\infty$  particles and  $\infty$  BE momentums components involved, but since all matter and binding energies components are based on quark generated mass in  $1/\alpha$  size and  $1/\alpha^2$  energy density ratios the cumulative construct can be related simply by a size energy density  $1/f(x)$  Singularity inversion, so the length of the gravitational field determined by the mass effect that generates it, a light year distance determined by the gravitational mass orbit period, will be the reciprocal of the quark's interactive energy density size since it generates the mass that determines the gravitational effect. Hence quarks cause gravity and The Quark-Gravity Connection.

## E) Singularity Calculations

Our domain of observation is directly bounded by quantized atomic and classical astronomical behaviors while the nuclear domain components of atoms are only indirectly observable and their quark energy state components can only be observed as quantum optical shadow effects in particles. However if particles' parameters and interactions can be mathematically explained in terms of the quark energy states within particles by a model that also explains observable atomic behavior then the explanation has vertical integration between domains and horizontal integration within its own domain.

As shown, at its boundary when energy degrees of freedom are saturated at  $S = 0$  available entropy the analysis may proceed classically because statistical behavior is precluded at the system's  $e^{-ix}$  wave function node. Thus the electron's  $\lambda = h/mc$  Compton wavelength and  $KE = \frac{1}{2}mc^2$  energy provide a classical size and energy density point of reference by which to relate quarks' sizes and energies.

By symmetry the quark must equate to the electron if it is a fundamental proton component and the proton and electron equate to a hydrogen configuration. The electron's speed of light Compton energy is  $KE = \frac{1}{2}mc^2 = 4.093555584 \times 10^{-14} \text{ J} = 0.2554995323 \text{ MeV} = \frac{1}{2}m_e c^2$ , corresponding to a  $E_0/\alpha^2 = \frac{1}{2}m_e c^2$  orbital ground state energy density increase. This energy is a 1-D saturation energy and must be extrapolated to fill the other two spatial and time degrees of freedom of Einstein's m-space points as a  $2\pi e^{-ix}$  quark ground state wave function,  $2\pi\sqrt{2}\sqrt{3}$  angular and spherical  $\frac{1}{2}m_e c^2$  momentum and  $m_{Uq} = 2\pi\sqrt{2}\sqrt{3} \frac{1}{2}m_e c^2$  mass-energy.

Similarly, the Up quark's interactive radius must extrapolate as  $\frac{1}{2}$  the Compton wavelength factored by a  $1/\alpha^2$  Sommerfeld energy density increase inverted to  $\alpha^2$  to comply with the  $1/f(x)$  singularity function inversion size decrease. Thus the Up quark's interactive radius is  $r_{qi} = \pi\lambda_C\alpha^2 = \alpha^2 \times 1.213155208 \times 10^{-12} \text{ m} = 0.0646 \text{ fm}$ . This is the quark's interaction radius as a proton component based on Einstein's m-space point concept with its  $x_4 = ct$  interaction distance to the proton's other two component quarks and Yukawa's fixed force messenger distance. It is not the quarks' observed radius or resultant quark interaction proton radius.

This vertical integration with the electron's Compton state can be extended to include the HERA observed radius by factoring the interactive radius with a  $1/\alpha$  Sommerfeld size factor reduction to its internal speed of light radius, corresponding to the orbital electron's ground state energy radial size reduction to its Compton wavelength, and  $\sqrt{3}$  spherical distribution of its energy to yield a  $r_{qo} = r_{qi}\alpha\sqrt{3} = 0.8165 \times 10^{-18} \text{ m}$ . Thus vertical integration of a Singularity Principle quark energy state extends to both its boundaries, its actual size and the atomic domain's electron ground and saturated sizes.

A triton Up-Down-Up proton component quark configuration would require 3 Up quark ground state energies with a quantum excited state operating in 3 spherical degrees of freedom to bind the 3 Up quarks. Thus the Down quark energy state must be a minimum  $\sqrt{3} m_{Uq} = \sqrt{3} (2\pi\sqrt{2}\sqrt{3})E_C = 6.8109 \text{ MeV}$  quantized energy state. This minimum possible stable energy state configuration also requires an angular momentum rotation of the Down quark  $\sqrt{3}$  excited state energy between the 3 Up quark ground states and result in a gyration of the 3-D structure with a  $3^2$  compounded resultant similar to the result of a pendulum's two opposing energy states being rotated in a 3-D gyration.

This would result in a spherical  $3^2 r_{qi}$  energy distributed in 3-D with a  $3^{1/3}$  cube root radius, or proton quark structural radius of  $r_{pq} = r_{qi}2\pi3^{2/3} = 0.844 \text{ fm}$ , within 0.3% of the Max Planck Institute 0.84184 fm

Quantum Optic measurement. However this is not the resultant or interactive radii of the proton because it does not account for its mass,  $\frac{1}{2}$ -spin, magneton or pion nuclear bond force messenger.

The proton's interactive radius results from the Down quark's excited state rotation, the  $3^2$  resultant gyration 3-D energy distribution, and the  $3^{1/3}$  cube root radius of the resultant 3-D structure, factored by 2 since it's a  $\frac{1}{2}$ -wavelength resultant, with the other  $\frac{1}{2}$  resulting in the m-space particle point pion bond with another particle point. Thus the interactive radius is  $r_{pi} = \frac{1}{2} \cdot 3^{2/3} (r_{qi} = \frac{1}{2} \lambda_c \alpha^2) (2\pi \sqrt{2} \sqrt{3}) = 1.034 \text{ fm}$ .

While this structural progression may appear complex it actually follows a simple geometric pattern. The observed quark is  $\alpha$  times smaller is than the proton Compton wavelength energy compression because it's a domain size change from the proton-electron structure domain and its energy must distribute equally in a sphere. The quark's interactive radius with other quarks however is in the proton-electron structural domain because it generates the proton and derives from the electron's  $\frac{1}{2} m_e c^2$  Compton energy state. Then the 3 quarks bond by a  $\sqrt{3}$  excitation state energy and this structure like, nuclear triton structures, occupies a 3 radial volume and the rotation of their bond energy causes a simple  $a^2 + b^2 = c^2$  Pythagorean  $3^2$  compound gyration which yields the proton's interactive radius.

The rotation of the charge state is a structural rotation that results in a  $\frac{1}{2} e h / 2\pi$  Maxwell magnetic field with  $\sqrt{2} \sqrt{3}$  angular and spherical momentum distributions that occur in 3-D at the speed of light, so the net magneton-mass is  $m_{pem} = (\frac{1}{2} e h / 2\pi) \sqrt{2} \sqrt{3} 3c^3 - 1.6727 \times 10^{-27} \text{ kg}$  mass-energy. Since this is a "field with a definite energy value" (Einstein's "Electrodynamics of Moving Bodies") it increases the relative  $\mu\epsilon$  permeability-permittivity of free space and, by  $m = E/c^2$  equivalence, requires  $KE = \frac{1}{2} m v^2$  to accelerate it.

This is the basis of the triton structure gyration that causes a 3 quark structure light speed 3-D orbital around the magnetic field mass-energy it generates, and yields a reciprocally opposing momentum mass-defect in  $\sqrt{2} \sqrt{3}$  3-D, compounded by a  $\alpha^2$  energy density increase per  $\frac{1}{2}$ -wavelength so the generated mass reduces to  $1.6727 \times 10^{-27} \text{ kg} (1 - \alpha^2 \sqrt{2} \sqrt{3} / \pi) = 1.67263 \times 10^{-27} \text{ kg}$  proton mass, within 0.00045% of its value.

The generated field energy divides between free space's  $\mu_0 \epsilon_0$  and the proton mass-energy relative  $\mu\epsilon$  permeability-permittivity so its magneton is  $\mu_p = \frac{1}{2} (e/m_p) (h/2\pi)$ , where  $m$  is the generated mass-energy that captures the total magnetic field according to the ratio of relative  $\mu\epsilon$  permeability-permittivity to free space's  $\mu_0 \epsilon_0$ , like transformer core linkage. The reasoning extends to the electron with an energy density adjustment, since the smaller electron has a higher  $\rho = m/V$  density than a proton's interactive radius volume so its lower density captures less field and yields a greater magneton by  $(r_{pi}/r_{ei})^3 / (m_p/m_e) / \sqrt{3} = 4.837/\sqrt{3} = 2.7928$ .

The implication of this is that free space's  $\mu_0 \epsilon_0$  result from "field-free" m-space points of uniformly distributed energy in Planck's constant  $h = 6.626075 \times 10^{-34} \text{ Joule-second}$  4-D  $E = F \cdot d$  space-time. As such they would generate a 0-velocity mass-energy resultant that sums to  $\infty$ -inertia when integrated over the  $\infty$  limits of space. Since the points have  $\sqrt{2} \sqrt{3}$  angular and spherical orientation polarities they must exist as reciprocally oriented symmetrical pairs so as to result in 0 net field or inertia.

As shown by Einstein's  $ds^2 = g_{ik} dx_i dx_k + \dots$  Riemann construct any external field applied to space would result in "flipping" of these m-space points to "flip" into excited state polarities to absorb the field energy, hence the reciprocally symmetry of EM waves and  $c = 1/(\mu_0 \epsilon_0)^{1/2}$  speed of light limit. As the EM wave passes, the  $\mu_0 \epsilon_0$  m-space points flip back to their neutral equilibrium state. While this interpretation may require modification as further experiments uncover unaccounted for parameters, it vertically integrates the quantized-continuous m-space concept with quarks, mass, EM theory, and Gravity.

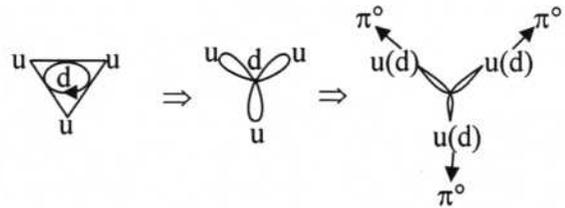
It is further substantiated by the fact that the generated centripetal force mass-energy is  $m_{pq} = \sqrt{3} [m_{Uq}/\alpha + (m_{Dq} - m_{Uq})] (1 - \alpha^2) = 938.2765 \text{ MeV} \cdot c^2$ , within 0.006% of the measured  $938.2723 \text{ MeV} \cdot c^2 = 1.672623 \times 10^{-27} \text{ kg}$ , and by the fact that the gyration yields a  $\frac{1}{2}$ -spin angle =  $\arcsin (r_{pq}/r_{pi}) = \arcsin 2/\sqrt{2} \sqrt{3} = 54.74^\circ$ , so all proton parameters horizontally and vertically integrate with the quarks.

However the analysis is not complete without explanation of how particles form and decay stable bonds between particles, Yukawa pion nuclear force messenger and Weak force decays. Yukawa brilliantly predicted the pion by embracing the concept of a quantized force, assigning the nuclear bond distance to it

and then using the Heisenberg Uncertainty wavelength and de Broglie's  $\lambda = h/mv$  matter wave relation to solve for momentum and  $mc^2$  energy for the pion moving at light speed within the Heisenberg Uncertainty distance (time period) so as not to violate Conservation of Energy.

By incorporating proton quark structure concept into the quantized 4-D m-space particle point concept it is possible to derive a LOGIC based cause for the pion quantized force messenger and bond length to complement Yukawa's NOT LOGIC derivation of the pion effect. Conceptually the proton's 3 quark triton structure is 3 Up quark energy states with an excited  $\sqrt{3} m_{Uq}$  Down quark state rotating sequentially with an angular momentum between 3 relative Up quark depleted regions.

The orbital however can't be circular because it's an  $e^{-ix}$  wave function excited state elevated quantum frequency one state above the circular orbit in a clover leaf so instead of a 3 quark  $2\pi$  wavelength transit time it is  $3/2$ . At light speed the clover leaf relativistically contracts to a more pointed excited energy state impact with the depleted Up quark energy and a  $180^\circ$  direction reversal.



For equilibrium the impact pulse must inertially transmit through the depleted Up quark state out into free space and equalize with its impedance. Otherwise it would act to inertially propel the Up quark from its rotating excited state triton structure depleted region energy well equilibrium. The impulse energy traveling into free space creates a much greater Up quark depleted region, so it isn't just a depleted state region relative to the Down quark energy state, it is also depleted by the instantaneous pion energy traveling into free space. This creates a  $\frac{1}{2}$ -wavelength in equilibrium with the Down quark energy traveling between the Up quarks, giving an angular momentum component to its magnitude, plus a second angular momentum component and equilibrium with the generated EM mass energy and the triton's structural rotating about it.

This results in a somewhat complex compounded angular to linear momentum function. Thus the impulse energy from each of the 3 quarks is the  $\frac{1}{2}m_e c^2$  Compton wavelength and energy compounded by the  $\alpha$  size reduction to  $(\alpha/3) \cdot (\frac{1}{2}m_e c^2) = 105.0378858$  MeV plus the two  $\sqrt{2}$  angular momentum resultants from the Down quark excitation energy's angular momentum and the rotational angular momentum of the triton structure around the EM mass energy it generates, or  $2\sqrt{2} \cdot \frac{1}{2}m_e c^2 = 0.72266$  MeV, for a total  $m_\mu = 105.76$  MeV energy state. This is a mathematical muon energy state with perfect conditions and zero size points. The actual muon is an electron energy based on interaction with a neutron's  $E_n = 0.78233$  MeV electron energy state reduced from 3 to 1 degrees of freedom,  $E_n/3$ , compounded by the electron's relativistic energy density increase,  $(E_n + m_e)/m_e = 2.531$ , to yield the more familiar  $(3/2\alpha)m_e c^2 + (E_n/3)[(E_n + m_e)/m_e] = 105.04$  MeV +  $0.66$  MeV =  $105.7$  MeV.

The mathematical muon energy state is also a 1-D impulse resultant of the  $3/2$  excited quantum energy state, or  $(3/2)^{1/2} m_\mu = 129.53$  MeV, plus the excited Down quark energy state minus the other two Up quark 1-D energy states (i.e. with their angular momentum components), or  $(m_{Dq} - 2m_{Uq}/2\pi) = (m_{Dq} - \sqrt{2} \cdot \sqrt{3} m_e c^2) = 5.559$  MeV, to yield a neutral pion<sup>0</sup> mass-energy of  $m_{\pi^0} = (3/2)^{1/2} m_\mu + (m_{Dq} - m_{Uq}/\pi) = 135.09$  MeV. As a neutral composite EM energy state the physical and mathematical pions are the same. However, as with the physical muon, the actual negative pion incorporates a neutron state electron angular momentum,  $\sqrt{2} m_e$ , with the  $(3/2)^{1/2}$  excited state,  $\sqrt{2} \cdot \sqrt{3}$  angular and spherical momentums, and neutron energy state, or  $(3/2)^{1/2} \cdot \sqrt{2} \cdot \sqrt{3} (m_e + E_n)$  mass-energy of  $m_{\pi^-}$  of  $= m_{\pi^0} + [\sqrt{2} m_e + (3/2)^{1/2} \cdot \sqrt{2} \cdot \sqrt{3} (m_e + E_n)] = 139.69$  MeV.

In other words, a negative pion is a composite resultant of a neutral pion interaction with a neutron electron component. Similarly, the positive pion would result from a higher energy state proton-proton interaction, and as such the positive and negative pions are subject to proximity based Weak force quantum tunneling decay through the impedance of the mass-defect bond energy well. Since the energy well results from equal and opposite momentum energies the bond decay releases an excited energy state beta particle that may carry some of the pion force messenger mass energy with it.

The distinguishing signature of a Weak force decay is a beta particle capture or release with variable energy, proximity density based statistically predictable  $\frac{1}{2}$ -life decay rates, relatively long decay periods, and a proton-neutron transmutation atomic number change, compared to fast Strong force quantized gamma ray discharges. Weak nuclear to EM atomic decays are well understood, but not the Strong-Weak connection.

The connection is shown by Strong and Weak force interaction times, the EM – beta particle energy release, and the  $\alpha = \frac{1}{2}e^2/\epsilon_0hc$  Sommerfeld number size and energy density ratio between nuclear and atomic domains. The  $\lambda_C = h/m_e c = 2.42631 \times 10^{-12}$  m and  $E_C = \frac{1}{2}m_e c^2 = 0.2555$  MeV Compton wavelength-energy establishes the boundary between the domains and then Einstein's  $x = ct$  m-space and Yukawa's  $\lambda = h/mc$  messenger particle connections relate the particle inside to outside energy transition and establish a  $t_C = \lambda_C/c = 0.80933 \times 10^{-20}$  s Strong force EM energy interaction time baseline reference.

Factoring this value by the  $\alpha/\sqrt{2} \sqrt{3} 2\pi$  geometry ratio between quark and particle structures brings the EM energy transition down into the  $t_q = t_C \cdot \alpha/\sqrt{2} \sqrt{3} 2\pi = 3.8374 \times 10^{-24}$  s quark interaction domain but more practical is that transforming from EM  $mc$  momentum energy in particles to  $m_e c$  beta particle KE outside particles correlates Strong  $\gamma$ -ray and Weak  $\beta$ -decay times, yielding a  $t_{\pi^0} = t_C \sqrt{3} / \pi \alpha^2 = 0.838 \times 10^{-16}$  s neutral pion  $\gamma$ -ray decay time,  $v_o = \alpha c = 2.1877 \times 10^6$  m/s orbital electron ground state and  $t_{WV} = (\pi/\sqrt{3}) \cdot (\sqrt{2} \sqrt{3} 2\pi) t_{\pi^0} / \alpha^2 = t_C \sqrt{3} / \pi \alpha^2 / \alpha^2 (\pi/\sqrt{3}) (\sqrt{2} \sqrt{3} 2\pi) = 0.44 \times 10^{-10}$  s decay to an orbital electron state when the EM energy is applied to electron inertial mass. Factoring by a  $\sqrt{2} \pi/\alpha$  structural density change by going from  $c$  to sub-light velocities yields a  $t_{WV} \sqrt{2} \pi/\alpha = 2.68 \times 10^{-8}$  s pion to muon decay time.

Einstein's 1905 papers, and particularly his Production and Transformation of Light, and Quantum Theory establish direct connections between thermal kinetic and quantized EM energies by electron interaction, and Boltzmann's  $e^{-E_i/E_a}$  factor and Schrodinger's  $e^{-ix}$  wave functions correlate their energies and statistical behaviors. The same principles interrelate the Weak force proximity based  $\frac{1}{2}$ -life decay rates by both kinetic and EM energy interactions.

The nuclear bond mass defect is shown to result from equally opposing momentums, the proton's neutral pion interaction with a neutron relates this to the proton's internal quark structure and energies, and Quantum Theory principles and Strong-Weak decay time relations externally connect EM and thermal kinetic energies to the Strong force.

This is demonstrated by deuterium fusion from magnetic pinch and laser thermal excitement and also a chemical reaction driven compression to initiate fission detonations. However resolution of the Strong-Weak decay relation also shows that it is possible to initiate and control nuclear reactions externally by modulation of system macrostate and component microstate entropic degrees of freedom, thus providing a next generation of nuclear energy capability without fission waste or fusion technical problems.

### VIII) Singularity Applications

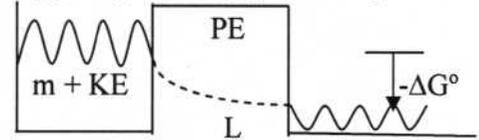
From the  $\mu_0 \epsilon_0$  permeability-permittivity Dark Energy of free space to Black Holes the only distinction between these events is the information operating on the energy's substance. This information exists, undiscovered by the substance, in the dimension of time. It is not just cause and effect evolution, it is also NOT LOGIC available entropic degrees of freedom and contextual circumstances revolutionary change.

It isn't statistically random, since effects influence the entropic degrees of freedom by increasing or decreasing them. In a near absolute vacuum the neutral  $\mu_0 \epsilon_0$  permeability-permittivity of space's un-activated dark energy experiences infinite space-time degrees of freedom, an infinite  $PE = F \cdot d$  force on an infinitely neutral energy substance source whose existence creates a vacant  $c = 1/\sqrt{\epsilon_0 \mu_0}$  light speed velocity limit degree of freedom which further results in a  $c^2 = \partial^2 E / \partial x^2 / \partial^2 E / \partial t^2 = \partial^2 B / \partial x^2 / \partial^2 B / \partial t^2 = E/m$  Cauchy-Riemann Laplacian harmonic equilibrium quantum energy state available degree of freedom.

These are mathematical  $\partial^2 u / \partial x^2 + \partial^2 u / \partial y^2 + \partial^2 u / \partial z^2 + \partial^2 u / \partial t^2 = 0$  harmonic 0-size m-space points that acquire  $E = F \cdot d$  size and create newly available degrees of freedom by the presence of energy. But they don't just present an even harmonic 2<sup>nd</sup> order derivative opportunity, odd harmonics are just as likely since energy transforms are  $e^x$  functions. They are fermionic and transform into  $e^{-ix}$  bosonic equilibria by fermionic combination of like sine and cosine functions like protons and electrons. Thus virtual particles statistically form from space's infinite  $\mu_0 \epsilon_0$  neutral dark energy, and some combine to form electron, quark, nucleon, atom, ..., energy information states.

This is evolutionary, the forces of the function contained in the existence of the energy, but fermionic states cause revolutionary changes by  $e^x$  interactions, and that is the nature of information. A domain of infinite 4-D m-space  $\mu_0 \epsilon_0$  permeability-permittivity does not just have a possibility of becoming something tangible, it has a finite  $100\% = \int_{-\infty}^{\infty} |\psi(x)|^2 dx = 1$  probability of doing so, as long as harmonic microstates can form harmonic system macrostates with the energy sources, hence a unified  $\mu_0 \epsilon_0$  EM based physical reality.

As a quantifiable situation it's a simple  $T = e^{-2KL}$  quantum tunneling problem, as in Singularity Rules of Equivalence (p. 16), with thermodynamic  $\Delta G_{rp}^\circ = -RT \ln [\text{Products}]/[\text{Reactants}]$  transformation and  $\Delta G_s^\circ = \Delta H^\circ - T \cdot \Delta S^\circ$  equilibrium state solutions, where  $K = \sqrt{2m(PE - KE)}$  is m magnitude mass-energy root cause based on KE energy impeded by a PE energy barrier of L linear density width between reactant and product equilibrium states, L is width or linear density inhibiting it,  $\Delta G_{rp}^\circ$  is the reactant-product equilibrium state free energy difference, R is Boltzmann's factor, RT is average energy,  $\ln [\text{Products}]/[\text{Reactants}]$  is the system's  $e^{-ix}$  equilibrium ratio between macrostate resultants and products,  $\Delta G_s^\circ$  product stability is a function of its  $\Delta H^\circ$  enthalpic energy well minus the available energy T, and  $\Delta S^\circ$  is the change in available entropic degrees of freedom.



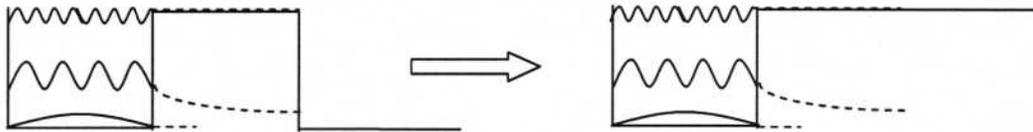
An  $\infty$ -Universe of  $\infty$  dark energy dust differentiated only by its distribution between  $\infty$  m-space points creates an  $\infty$  PE for differentiation into  $\infty$  differentiated system macrostate "complexions". The dust could not help but to become something because m-space points create quantized  $PE = F \cdot d$  force disparity between degrees of freedom since distributing energy with a natural law behavior to seek mass defect ground states creates  $1/n^2$  Cauchy-Riemann Laplacian harmonic probabilities.

The  $PE = \infty$ ,  $KE = 0$ , mass of  $\infty$ -inertia 0-velocity space-time is  $\infty$  and the potential opportunity factored by 0-impedance yields singularities and the differentiated information must eventually form an  $e^{-ix}$  dark-tangible energy equilibrium. Physical matter states, one energy with two manifestation forms, one PE available in NOT LOGIC and the other physical LOGIC cause and effect.

### A) Security

In Quantum Tunneling differentiation between substance and degrees of freedom constitutes a force. Thus in Business or National Defense, no matter how much security exists, partitioned entities become an information transform, since all barriers relate to the information of some level and thus become a  $T = e^{-2KL}$  Transmission mode. However information isn't tangible unless applied to energy substance so Transmission - Reflection does not equal one, as in normal quantum tunneling. Absent quantized limit substance the information is subject to  $\infty$  replication, as with the natural laws in all reference frames, so  $E_a$  may divide into infinite parts so  $E_i \Rightarrow E_a$  and Transmission becomes a  $100\% \int |\psi(x)|^2 dx$  predictable certainty.

However Quantum Tunneling is only possible when available  $\Delta S^\circ$  entropic degrees of freedom exist. When  $\Delta E_i \Rightarrow 0$  available degrees of freedom saturate at  $S = 0$  they constitute a microstate PE  $e^{-ix}$  Singularity transform into an adjacent  $S = 1$  available entropic degrees of freedom domain (i.e. when high information components are presented with low information density degrees of freedom, since their availability actually constitutes information that quantum tunnels to interact with the high density information contained by the barriers). Hence a migration force proliferates the information and creates more Universe with  $S = 1$  domains as it goes.



In any quantized system, where  $\partial^2 u / \partial x^2 + \partial^2 v / \partial x^2 = 0$  harmonic conditions exist, there is a 100% =  $\int |\psi(x)|^2 dx = 1$  transmission probability that the system's  $e^{-ix}$  wave function will transmit through the barrier depending on the degree of harmonic wavelength mis-match there is to attenuate the transmission. This can be accomplished by making length  $L$  infinite, making it Classical (homogenous) to dampen harmonics, and by keeping the harmonic energy low while flooding the outside domain with other unrelated harmonics.

There are three areas this must be applied to: 1) design; 2) implementation; and 3) distribution. High technology, production, or risk designs need to be fail-safe. They must not leak energy information to create unstable state failure modes, such as creation of injury liability to users, back or front door hacking avenues, or means of reverse engineering. Implementation compounds the exposure because it opens new degrees of freedom by budgeting or personnel exposure, inventory "shrinkage," or sabotage.

The  $e^{-ix}$  system transmission wave function is lowest near ground state so as production or exposure increases and arouses competitive interest, discourage and divert competition by introducing other products. Business and National Defense are war and rules of war say keep contacts low to avoid competitive analysis, Blitzkrieg them with the superfluous to keep them off balance, and confuse with mis-information. Patents promote competition by offering "design around" avenues so keep them general with proprietary specifics.

If an impedance barrier is infinite  $L \Rightarrow \infty$  and  $T = e^{-\infty}$  transmission can't occur. This does not mean create détente by giving information away, it means mask it in forms that saturate the domain's degrees of freedom, so  $S = 1 \Rightarrow S = 0$ , and removes available degrees of freedom for the proprietary information to transmit to. The best détente is economic, fear of loss and greed to gain. "The laws of history are the laws of economics," especially when both forces are applied to create a money making frenzy on one level in combination with fear of loss on a fundamental level. In times of uncertainty herd instincts dominate at the expense of reason.

The potential energy of information is a function of its significance and if other businesses or nations are not aware of it or do not see a need for it there is no PE. In 1939 Einstein wrote Roosevelt about a "possible ... nuclear chain reaction ... [s]ingle bomb [that could] destroy [a] whole port ...." In 1945 he wrote that it "has not created a new problem .... [because only] two-thirds of the people [would be] killed ...." And in 1949 he wrote that "[t]he next World War will be fought with stones."

This didn't mean the need for the bomb didn't exist as we entered WWII. The Nazis were already developing one and if they had been successful the war's outcome would have changed. However in 1946 Allen Dulles told Truman we need to keep an eye on the Russians because they were developing one, as McCarthy was promoting a House of Un-Americans Activity "Red Menace" scare that that created the Cold War's roots by informing the Russians that a Senator was aligning the US against them.

This was a major political blunder that created a foreign threat, caused a national debt, and diverted technology and resources at a time of severe stagflation. Be prepared for threats but don't create them by turning potential enemies into real ones, and don't broadcast intentions through secondary harmonic channels like formal budgeting, R & D proposal submissions, parts procurement, disgruntled employees, etc.

Enemies, especially ideological ones, are unpredictable because the domain of their logic is different. Not only must adequate security be maintained, theirs must be clocked (i.e. decrypt their behaviors). By the Singularity Principle all logic becomes harmonized in some domain so the only way to a win is to gain along the way by playing the game faster and on more fronts than the competition can keep up with, saturating their degrees of freedom so  $e^{-Ei/Ea} \Rightarrow e^{-1/\infty}$  on the way.

Responsibility for the Cold War wasn't just the Manhattan Project's magnitude or use of A-bombs near war's end. The enemy was trying to develop one and it was an inevitable outcome of technology.

People find ways to apply technology to perceived needs, which become especially focused when potential business profits or national security are involved. That's their purpose, people benefit from them, so much so that socio-economic-political risks are not assessed or are minimized by the more immediate needs.

Thus if something needs to be secure it shouldn't be broadcast, formally funded, demonstrated, or used unless absolutely necessary, and produced and tested only under the diversionary cover of a legitimate effort, internally as component microstate and externally as system macrostate functions. This way S system and s component entropies are controlled and  $e^{-E_i/E_a} W = k \ln S$  probabilities become controllable.

Fail-safe mechanisms don't just apply to the tangible, like sub-critical mass components or software "firewalls," they must also apply at system macrostate information levels and the singularity boundary condition to the next  $S = 1$  domain in all available degrees of freedom including patterns over time. This an important element in the design and implementation if businesses seek to avoid "recalls" or liabilities and nations wish to avoid creating national security threats.

Designing the next generation partially avoids this because failure modes become apparent when functions are differentiated. Extending functional capability to an  $S = 0$  entropic degree of freedom saturation state causes the differential to go to a 0 node since the  $\int 1/f(x) dx$  singularity integration includes all possible states at saturation, and if the outcome isn't directed into a stable  $e^{-ix}$  quantized equilibrium the system  $e^{-ix}$  wave function can carry it through the boundary into a decay condition, like economic loads such as urban blight or global economic contraction. Nature ensures this by "mass defect" "negative energy well" ground states where component behaviors "bond" them into  $e^{-ix}$  equilibriums.

These are avoidable pitfalls when information is analyzed to saturated state conditions. Proliferation of nuclear weapons increases risk of use, but it doesn't mean nuclear technology should be avoided because it offers medical, environmental and economic benefits. It's simply a matter of identifying negative states and transforming them into positive outcomes. Security is part of the design, but only part of it.

## **B) Riemannian Economics**

### **1) What It Is**

Riemannian Economics is a Singularity Principle application that isolates economic losses and identifies potential revenue sources by factoring out ideal mathematical conditions.

It is similar to  $F(s) = \int e^{-sx} f(x) dx$  Laplace Transforms that factor all  $e^x = x^0/0! + x^1/1! + x^2/2! + \dots$  fundamental Calculus differentiation and integration operations from functions, since  $e^{-sx} f(x) = f(x)/e^{sx}$ , and tracks the number of operations because s does not factor out. In other words, it simply sums the number of s standard  $e^x$  calculus operations factored from the  $f(x)$  function.

Riemannian Economics does the same by factoring fundamental singularity functions from the existing global economy to identify potential revenue sources and saturated economic loads. It deciphers where to make money (economic energy's measure) and where to cut losses in the global  $F(x)$  economic function. As such, it is particularly useful in identifying new markets on the positive side and organized crime, political graft and corruption, terrorism and large scale health and environmental losses on the other.

As with any tool, its effectiveness depends on its proper use, the claw to pull the nail and the head to hammer it, which means the better the  $F(x)$  system economic functional characterization and individual  $f(x)$  microstate identification the more successful it will be. Current economics floats between Adam Smith's fundamentals and John Nash's Controlling Dynamics, generally instantly responsive to economic, political, social and anti-social factors, but only slowly and somewhat ineffectively corrective, if at all.

To be of actual value an economic model must be predictive so as to reduce statistical probabilities of losses and increase probabilities of gains. The use of the claw is minimized by knowing when and how intensely to use the head. The Singularity Principle integrates all S macro and s micro state entropic degrees of freedom with the substance of energy to isolate its current and potential information needed to transform into new domains.

It was initially applied to particles to demonstrate its ability to unify the behavioral peculiarities of the nuclear, atomic and classical-relative domains. The world is Wittgenstein's sum total existent atomic facts so it equally applies to economic energy's substance and information because the natural law rules of energy are the same in all domains but behaviors are contextual functions determined by the  $W = k \ln S$  Boltzmann probability principle applied to the  $S$  and  $s$  macro and micro state entropies and Boltzmann  $e^{-E_i/E_a}$  energy distribution, where  $E_i$  is a  $1/n^2 f(E_a)$  quantum function of the  $E_a$  average energy equally distributed between the microstates.

The point of such an  $E_i = f(E_a)$  function is that it affects probabilities since, as Einstein realized in *Production and Transformation of Light*, energy has both quantized and continuous forms in its microstate "complexions" so they can interact differently by the Heisenberg Transform, depending on circumstances. Thus  $E_i$  instantaneous energies are not the  $E_a$  average energy equally divided between microstates as Planck proposed. That would be like saying the Gross National Product equally divides between all citizens.

Obviously any economic model that can't accommodate  $E_i$  individual instantaneous economic states can't account for criminal, political, health and environmental factors' influences on  $E_i$  values. However, because the Singularity Principle relates  $E_i$  values to system and microstate factors it shows how to isolate legal and illegal gains and statistically reduce losses and increase gains because  $E_i$  deviations can be factored by the purely mathematical statistical distributions to identify them, like the effects of the proton's and electron's actual interactive radii in Electron Capture and quantum behavior. It uses a statistical standard to isolate aberrant deviations and available economic degrees of freedom.

## 2) Economic Singularity Correlations

The quantum ground state of economics is Adam Smith's Profits = Market Price – (Labor + Energy + Materials + Technology) Costs, the excited quantum states are determined by John Nash's statistically based Controlling Dynamics, and entropic degree of freedom limits are fixed by the Sommerfeld Transform, the continuity relation between energy's potential and kinetic forms and their actual  $v_0$  ground state and potential  $c$  speed of light limits, where  $v_0 = \alpha c$ , where  $\alpha = \frac{1}{2}e^2/\epsilon_0 hc = 1/137.0359804$ .

In economics, the  $v_0$  and  $c$  velocities correlate to actual  $\frac{1}{2}mv^2$  and potential  $\frac{1}{2}mc^2$  cash flow energies with respect to Total Asset mass  $m$  of the company. To be stable the  $E_0$  ground state energy must exist in an  $e^{-ix}$  equilibrium negative energy well like the hydrogen atom's -13.6 eV electron kinetic energy in a 27.2 eV potential energy barrier between the proton and electron. In actuality these KE and PE values change with the circumstances of an atom's number of protons and electrons and  $1/n^2$  quantized energy states.

In short, the Controlling Dynamics of a company's internal  $1/n^2$  quantized operational states depends on components and sub-component parts, departments and individuals. One man companies have different contexts than 100,000+ multi-nationals that must account for local and international circumstances. Also, this mathematical standard is only a standard, like Einstein's "field free"  $m$ -space points used as a reference for his "Riemann construct" gravitational model and Singularity Principle's continuous EM, quantized Strong, and statistically interactive Weak forces.

Circumstances vary, like introduction of new products or competitors, infiltration by organized crime or espionage, etc., so all factors must be included. Equally important are individual microstate complexions that vary according to their circumstances so they must also be included. Considering individual employees potential capabilities and problems takes advantage of opportunities and minimizes losses, such as skills or liability problems like alcoholism or other behaviors.

The mathematical model presents optimum system as a reference for actual circumstances. Excited states are real and necessary risks that constitute  $1/n^2$  intermediate free radical  $E_i$  instantaneous interaction energy states. Chemical reactions yield desired products by interactive free radicals and nuclear reactors work by long term unstable isotopic energy states like U-235. This similarly applies to individuals and departments within organizations so they must be accounted for, but they also allow things like political influences to interfere with desired results.

The main thing is to first develop an adequate Adam Smith ground state reference but the traditional view that labor, energy, materials and technology are Costs must be reexamined. They're actually functional determinants of profits because, even though they are subtracted from Market Price to determine Profits they are actually part of the system's  $e^{-ix}$  dynamic change wave function in the  $\int |\psi(x)|^2 dx$  system probabilities. They contribute, and without them there can be no profits or products, but more importantly they constitute the free radicals of system change as quantized  $1/n^2$  internal growth or PE for transform into a new domain.

This means that by identifying microstate entropies the system's internal and external potential gains can be realized and losses can be identified. It also means that developing resources leads to profitability and failing to do so leads to competitive losses. This is done for energy and materials in commodity contracts but is not effectively addressed in the comparatively greater profit and loss factors of employees and technology, especially with regard to labor because income translates into a compounded positive derivative of credit based purchasing power and income and sales tax revenues.

### 3) Negative Derivative Contraction

Certain practices of the past 25 years have led to a very tenacious economic contraction, specifically the practice of assigning asset value to negative labor and credit derivatives. Economics is the science of commerce and currency and measure of its energy. As Smith said in *Wealth of Nations* (1776), "Labor ... is the real measure of the exchangeable value of all commodities." That was the measure of energy at the time, and when the Framers adopted the Constitution (1787) they were not contemplating the deregulation of business when they authorized Congress "To regulate commerce with foreign nations, and states ...." (Art. I, §8.3), just as they were not contemplating use of patents as a "design around" tool in §8.8 when they wrote "To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

In the early 80's tax incentives and subsidies were authorized under a "Developing Underdeveloped Nations" policy to outsource production jobs to restore corporate profits after a decade of Stagflation caused by a 1971 policy to stop redeeming dollars from foreign nations with gold, a value referenced commodity. Outsourcing production jobs was an M4 Derivative currency devaluation because it translated to reduced labor cost and increased profits. There are 3 legitimate currency categories: M1 – cash, M2 – semi-liquid assets, and M3 – non-liquid assets. M4 is an assigned value attributed to fraudulently created assets, like counterfeit, misstatement of earnings reports, or some other contrived inflation of value.

It may be a standard accounting practice to refer to products produced by other countries' labor as US productivity, especially when authorized under a Developing Underdeveloped Nations policy, but if currency is to be a legitimate measure of economic mass-energy (i.e. assets and commerce) it cannot be discredited into a paradoxical undefined open-closed system that calls other nations' productivity US wealth. This is the same misapplication as using Einstein's Lorentz transformation to obtain speed of light  $\infty$ -mass. He bounded his work by  $E = mc^2$ , a mass-energy equivalence determined by the radioactive decay of a finite mass into EM energy moving at the speed of light. Reversing the application does not authorize  $\infty$ -mass creation from light speed velocity. His equations would have no meaning, and if economics is to have value as a legitimate science its equations cannot create the wealth of a nation from the productivity of others.

The Constitution is an explicit limited grant of power to safeguard people's interests, with fiduciary responsibility to administer it. They were not authorized to de-regulate commerce so that businesses could create equity assets by calling the productivity of other nations our productivity. That's giving business the power to coin money, authorized only to Government. This doesn't mean businesses can't sell services and products overseas, that is commerce, but subsidizing businesses to use foreign labor and call it an asset to restore corporate profitability, when in fact it is a cost, is financing counterfeit equity assets by tax dollars collected from US citizens to their disadvantage.

This would be the worst form of Ponzi scheme because it mandates taxing citizens to take their jobs to increase the wealth of others. "A corporation is an artificial thing, invisible, intangible, and existing only in the contemplation of the law." *Dartmouth College v. Woodward*, 4 Wheaton 518 (1819). It derives from

1<sup>st</sup> Amendment peaceable assembly and right to petition, East. R.R. Presidents Conf. v. Noerr Motor Freight, 365 US 127, 135-138 (1961) and United Mine Workers of Am. V. Pennington, 381 US 657, 670 (1965).

This Noerr-Pennington doctrine was a corollary to the Parker doctrine (Parker v. Brown, 317 US 341, 351 (1943)) that prohibited federal antitrust application to state regulations based on the Framers' concepts of federalism and state sovereignty. Federalism is the Separation of Power distribution between the Legislative, Executive and Judicial branches mandated by Articles I, II and III, and state sovereignty in Article IV and the 10<sup>th</sup> Amendment. An important constraint imposed by the implementation of federalism is that citizen's are "entitled to all privileges and immunities of citizens in the several states." Art. 14, §2.1; and the 5<sup>th</sup>, 10<sup>th</sup> and 14<sup>th</sup> Amendments.

The Court further limited state sovereignty in favor of individual rights in Gomillion v. Lightfoot, 364 US 339, 347-348 (1960). "Acts generally lawful may become unlawful when done to accomplish an unlawful end, United States v. Reading Co., 226 US 324, 357, and a Constitutional power cannot be used by way of condition to attain an unconstitutional result. Western Union Telegraph Co. v. Foster, 247 US 105, 114." It is unfathomable to conclude that an artificial entity "existing only in the contemplation of law" under the peaceable assembly clause could be authorized and subsidized by compulsory revenues from all citizens to enrich only those few who own the equity of the artificial entities.

These are intangible upon intangible 2<sup>nd</sup> order derivatives that do not satisfy Cauchy-Riemann  $\partial^2 u / \partial x^2 + \partial^2 v / \partial x^2 = 0$  2<sup>nd</sup> order derivative Laplacian harmonic equilibrium requirements where u constitutes individual rights and v constitutes artificial entity rights that derive from individual rights. Thus u is the independent variable established by the Constitution and v is the dependent variable that derives from it. Even the Noerr-Pennington doctrine prohibits such unfavorable government action, "a mere sham to cover what is actually nothing more than a sham." (Noerr at 144)

To be fair, based on 6<sup>th</sup> Amendment presumption of innocence, this argument has probably not been presented to Congress, and the "character of every act depends on the circumstances in which it is done" (Schenck v. US, 249 US 47 (1919)), but the accelerated enlargement of v's assets at u's expense is a 2<sup>nd</sup> order derivative of a negative 1<sup>st</sup> order derivative,  $-du/dx + \partial^2 v / \partial x^2$ , and cannot reach a 0 equilibrium state because it diverges by negating the negative 1<sup>st</sup> order derivative sign in a 2<sup>nd</sup> order derivative function of it that accelerates to  $\infty$  at the expense of the 1<sup>st</sup> order derivative that continues downward toward  $-\infty$ .

This uses government to accumulate the wealth of the nation in the hands of a few at the expense of the many. Aside from circumventing the Constitution, US Supreme Court legal decisions and fundamental mathematics, an acceptable Brandeis Brief argument under the Ashwander doctrine (Ashwander v. TVA, 297 US 288 (1939)), "[T]he best test of truth is the power of the thought to get itself accepted in the competition of the market" (Abrams v. US, 250 US 616, 630 (1919)). No one can argue that our negative derivative asset creation economics has benefited us as a nation.

Outsourcing was not the only such practice, but the resulting US factory closures directly resulted in the late 80's "Homeless Epidemic." The negative derivative asset creation was extended into the Credit Card and Real Estate loan markets during the 90's, mainly in the form of qualifying bad risks or over-extending credit. Funds for these risky investments were obtained by repackaging them with "credit swap" guarantees against default by major financial institutions. An international 3<sup>rd</sup> Qtr 2006 T-bill sell-off caused interest rates to spike, and a wave of "sub-prime" mortgage payment defaults started.

None of the financial institutions could cover the guarantees. Faced with an industry wide collapse, government bailed them out with T-bill backed guarantees. The defaults were transformed into Federal debt and resulted into a US credit rating downgrade. When Congress asked Greenspan how he let this happen he said his model didn't account for it. When asked "what," he said, "we" deregulated business and relied on them to regulate themselves. We didn't expect them to take advantage of it.

Even the Framers, 200 years ago, felt it necessary to include the regulate commerce clause. The objective of business is profits, not regulation, and de-regulation was an open-ended green light to justify by any means practices regardless of consequences. The responsibility was Congress', even if only through

agencies monitored by Oversight Committees. Could it be that Greenspan was saying that his model did not account for Congress deregulating them? They dismissed him from the Hearing as soon as he said it.

#### 4) Positive Derivative Expansion

If nothing else, it's clear that categorizing Costs as Assets and using derivative accounting to transform negative factors into compounded assets is nothing more than calling a debt obligation a net worth asset increase. It gives new meaning to business, intangible entities with intangible intangible assets, clearly contrary to the Adam Smith concept of wealth. Riemannian Economics on the other hand produces tangible assets by using the m-space time degree of freedom, increasing direct labor costs up front to create  $\Delta G^\circ = -RT \ln [\text{Products}]/[\text{Reactants}]$  future tangible assets.

In other words,  $\Delta G^\circ$  is the added human resource development labor cost and [Products] represent future assets that result when labor is trained and educated to be more than what they were hired for. This would be in the form of salary increases for educational achievement, tuition paid for, and benchmark bonuses, in a compensatory reward development program. This added value to labor transforms individuals into free radicals that will statistically result in new products. The dust asks questions because of what it is and what circumstances present to it. Outsourcing in the form of Developing Underdeveloped Nations is still encouraged, but in a form where labor cost savings over domestic rates must be invested in infrastructure development and available credit in the labor source's nation. This way the nation is developed as a market.

This primary distinction between current and Riemannian labor costs is that Riemannian labor costs become a John Nash Controlling Dynamics asset by incorporating the time degree of freedom into market development. Traditional economics is a bit Simon Legree, war with a burn the cities and salt the earth policy that squeezes whatever it can from its resources and then destroys them, eventually running out.

Investing in resources to develop them is the same as using credit to buy raw land and developing it into valuable real estate. The profit margins are high and developers get rich when they are good at what they do. Credit extended to develop resources into assets is investment with high future Price to Earnings ratios, positive derivatives in a Value-Growth investment strategy. It works because it finds undervalued equity values, and then acquires and develops them with conservative non-speculative credit practices.

This is an important distinction. Speculative credit practices relax qualification standards and rely on market dynamics to drive sales. Conservative credit practices optimize statistical returns on investment by developing investments to increase the return percentages. One is Diminishing Return Economics that saturates the market and the other is Increasing Returns Economics that increases the market. That's the point of the Singularity Principle. Components of a domain are considered to be systems with their own s entropic degrees of freedom, and if the entropies are system functions the  $W = k \ln S$  Boltzmann probability principle can be controlled to shift probability outcomes.

Furthermore when the system S entropic degrees of freedom saturate at  $S = 0$  it's a domain boundary condition and Potential Energy in the system's  $e^{-ix}$  wave function that transforms into the next domain's Kinetic Energy with totally unsaturated  $S = 1$  newly available entropic degrees of freedom, a new market. The distinction between the operational  $F_o(e^{-ix})$  and system  $F_s(e^{-ix})$  wave functions is that the first is a conservative closed system microstate function and the second is a non-conservative open-closed statistical macrostate system function that depends on its degrees of freedom.

It is an open system because a domain's  $S = 0$  saturation point is only the system  $F_s(e^{-ix})$  wave node at the  $1/n^2 = 1/\infty = 0$  quantum to Classical Bohr Correspondence Principle transition point and the power of Schrodinger's  $\int |\psi(x)|^2 dx$  probability function is that it integrates both  $F_o(e^{-ix})$  and  $F_s(e^{-ix})$  wave functions as root causes of a system probability resultant. Schrodinger only applied it to explain atomic spectra, energy conservatively absorbed and emitted, so it wasn't extended to open-closed system applications. His orbital electron could exist at any point in the Universe but it was always part of the atom so it always returned.

This was a quantum tunneling through the system's energy well boundary and return because it was always just a wave. In this case the system's  $F_s(e^{-ix})$  wave node is always centered at the systems  $1/n$  quantum state and the L width of the system boundary condition barrier is  $1/n_s^2 - 1/n_o^2$ , where  $n_s$  is the

system saturation state limit and  $n_0$  is the operational state. Thus the system's wave probability node shifts as energy is added. At the system limit the electron behavior becomes classical either as an ionization state atomic free radical or neutron state nuclear free radical.

One shifts into the chemical reaction domain and the other shifts into the nuclear reaction domain. Free radicals are fermionic and thus conform to a  $\Delta G^0 = -RT \ln [\text{Product}]/[\text{Reactant}]$  product-reactant equilibrium distribution. Applying this to business means controlling the microstates' entropies to affect system macrostate outcomes, like a coin where its heads or tails faces are externally controlled to shift macrostate probabilities. These system operational shifts, however only utilize half the potential.

The other half is controlling market conditions to create degrees of freedom for products, like providing credit for customers, but that still limits sales to the market's saturation point which is shared by competitors. It is much more effective to create customers, like employees with credit, but that is still limited by its saturation point and competition. So a true Law of Increasing Returns market must be transformed into a dynamic system wave function that can create its own new domains.

This is not as difficult as it sounds. If an electron in an atom is excited in the right way it can be made to react in a more statistically desirable way to yield pre-determined products. Generally, chemistry relies on thermodynamic processes to yield statistical product distributions, and then optimizes the process to shift yields, like use of fractionation, solvents or catalysts. However it's also possible to shift yields by controlling the electrons in specific atoms by light or EM energy. For instance, every element has its own spectral absorption and emission signatures so specific frequencies can increase specific states probabilities.

Borghi in the 50's and Missfeldt in the 70's used EM energy to excite hydrogen electrons to shift electron capture probabilities to create neutrons, and Borghi even went a step further by lining his reaction vessel with specific radioisotopes to capture the neutron and shift the isotope decay rates. This was brilliant because it utilized Schrodinger's system wave function to attain predetermined isotope transmutations. Ironically Borghi's theory and work were twice rejected, at a conference in Italy in the 40's and his work in Brazil in the 50's, because his calculations relied on classical analysis so it was decided that his work did not comply with quantum theory and couldn't be correct.

This was a big mistake because an entire technology was discarded and lost, and this is a perfect example of how to optimize business using Riemannian Economic. Experts are trained and make their careers in what Is, and are therefore prudent about risking their reputations and potential future careers on speculative possibilities. Their work is thus predominately evolutionary  $1/n$  linear increases. However the revolutionary development domain is more statistical in  $1/n^2$  definitive quantized steps, usually attributed to free thinkers, like free radical statistical anomalies. As Freeman Dyson put it, for a theory that at first glance doesn't appear hopeless there is no hope, and the Singularity Principle allows this to be capitalized on.

Since it shows that all domains are connected by the same underlying natural laws, and the cognitive product of mathematics correlates, it is possible to select individual microstates and develop them to statistically manipulate revolutionary technological developments by differentiating between evolutionary and revolutionary thinkers. They behave differently, and thus represent microstate asset types that can be developed and channeled to yield higher probabilities of revolutionary and evolutionary product types because the cognitive process correlates to Singularity principle statistics.

This is only one application, the flip-side of developing consumers for products by providing credit for employees. It statistically develops employees' attributes and reduces boundary condition impediments, transforming them into a more direct controls of market dynamics. With only 6.5 B people in the world a data base with 6.5 B records is completely manageable, but selection of record information is critical since individuals are systems with both micro and macro state entries that allow market dynamics development.

## 5) Profits and Individual Development

Every individual is a global economy microstate with internal and external functional contexts in four psychological domains: (1) They have fundamental needs, the deprivation of which can result in neurotic compulsions (Freud); (2) They have some degree of altruistic or spiritual aspiration (Jung); (3)

They have a need to succeed (Adler); and (4) They have a Gestalt or regressive parental sentence that harmonizes these motivations (Maslowe).

While each of these behavioral contexts can have complex internal and external factors they are all bounded by some form of limits and they are progressive developments from fundamental ground states, like a progressive  $e^x = x^0/0! + x^1/1! + x^2/2! + x^3/3! + \dots$  elemental Calculus expansion bounded by stable  $e^{-ix} = \cos x - i \sin x$  ground and excited quantum state fermionic interactions and  $e^{-1/x}$  decay transform functions. Absent un-quantized spiritual interventions the cognitive function cannot exceed the entropic degrees of freedom that result from physical reality's Singularity Principle.

This is simply an upper boundary definition, like the speed of light limit on  $dx/dt \mu_0 \epsilon_0$  interaction velocities. It is not stated to imply that human beings can only do so much and no more. As the Singularity Principle shows, from quarks to gravity, there are fundamental underlying natural laws that govern energy's behavior that have guided it into seemingly  $\infty$  forms and functions, and the cognitive process has the potential to achieve sentient understanding of this by recognizing the boundary limits of each functional domain as underlying common denominators of the LOGIC state and NOT LOGIC potentials. If the Universe is  $\infty$ , then so is our capability to understand and utilize it; but dust may not exceed its own limits.

This means that individuals have a potential to do nothing but occupy space and consume resources or rise to levels of significant interactive influence on external circumstances, which can be positive or negative compounded derivatives. They are capable of significant constructive or destructive superposition interference, just as all wave functions. As a case in point, the entire 20<sup>th</sup> Century, 100 years, was dominated by two ideological boundaries, fascism and communism, centered around a ground state of democracy.

The roots of these boundaries were birthed in the writings of Nietzsche and Marx in the last half of the 19<sup>th</sup> Century. Their influences may be summarized as "Man is a rope stretched between the animal and the Superman – a rope over an abyss" and "Abolition of private property," one saying that man can become more than his apparent limits and the other reducing him to a fundamental "from each according to their abilities; to each according to his needs" subsistence level economics. Both rose from the thoughts of two men subject to circumstances of aristocratic controls.

Ironically the product of their pens were conflicting ideologies that resulted in further global wide controls on individuals by the influences of others who capitalized on their circumstances with promises. There is an underlying  $a^2 + b^2 = c^2$  Pythagorean mathematics to these events. The aristocratic controls that dominated individuals were the observed resultant  $c$  of the times and  $a$  and  $b$  were the derived root solutions, one saying that individuals have the potential to rise above the controls and the other an orthogonal perspective that no one should be able to acquire the means of controlling others. These philosophical roots were then compounded by unattainable political aspirations fueled by promises, the bonds that enslave men.

The underlying roots were thus Freudian need and Jungian aspiration, negating the need to succeed and need for self-restraint axis. There is no recognition of individual self when allocating basic necessities under a dogmatic ideological aspiration (a mathematical acceleration). The orthogonal of this is individual self determination in the context of a nation of individuals united to safeguard their individual rights under a Constitutional representative democracy that seems to have survived the two ideological conflicts.

The result was 20% of the global economy by 5% of its population, plus all their technological achievements. It may be undergoing a severe economic and educational contraction at the moment but its nature safeguards the means to correct itself. "Freedom of the press is not an end in itself but a means to the end of a free society," Justice Frankfurter, *Pennkamp v. Florida*, concurring opinion, and the same can be said for the Framers' other declarations of our rights. Leonard Frank stated it best:

|              |   |                   |   |            |      |
|--------------|---|-------------------|---|------------|------|
| Democracy    | + | Private Ownership | = | Capitalism | (11) |
| Democracy    | + | Public Ownership  | = | Socialism  | (10) |
| Dictatorship | + | Private Ownership | = | Fascism    | (01) |
| Dictatorship | + | Public Ownership  | = | Communism  | (00) |

Clearly, "the best test of truth is the power of the thought to get itself accepted in the competition of the market," Justice Holmes, *Abrams v. US*, 250 US 616, 630 (1919), and 20% of the global economy from 5% of its population speaks for itself. Even Communist China had to restore private ownership and individual rights before it could become the fastest growing and 2<sup>nd</sup> largest global economy. This is not a philosophical contest between ideologies, it's simple economics and individual psychology because Adler's need to succeed manifests as real dollars, and Leo Frank's epigram states it as a simple binary factor with Communism as "00" and Democracy as "11".

As microstates, the world's 6.5B individuals constitute a vast untapped resource and each microstate has internal and external entropic degrees of freedom, with form of government constituting a significant external factor. The success of a "Riemann construct" depends on the selection of variables and functions assigned as weighting factors. Many have already been determined in psychological, sociological, anthropological and demographic research, and many have yet to be characterized, but the skill a company uses to derive and correlate them into their economic model will be a major factor in their success.

Adam Smith fundamentals and John Nash controlling dynamics depend on individuals' productivity and consumption, and any economic model that fails to include individual optimization will fail the market test. Current US economics clearly falls into this category because its  $-du/dx + \partial^2 v / \partial x^2$  growth differential is accelerating negatively. Even though the figures show some GNP growth, compared to growth of nations like China and Brazil it is actually negative.

## 6) Labor Resource Destruction

I was fortunate enough to attend University of Santa Clara Law School at the end of the 60's but was unfortunately forced to drop out because of family and career obligations. However my Constitutional Law Professor taught me something profound. He asked the question, "Should we have the 'rugged individualist' Constitutional government of the Framers, or the paternalistic socially oriented one we are headed for?"

No one answered, so he asked again, and still no answer. We all assumed it rhetorical, but he waited so I answered that we should have the Framers'. As soon as I did however everyone else attacked, and the Professor leaned back with a smile on his face and his arms folded. Apparently I was the only one who believed buyers should always beware. My response was that if we turn over responsibility for our rights and responsibilities to those in power we will lose the power and understanding needed to do so as a society.

By the end of the session about a quarter of the class of 60 had swung to my side, but I had an uneasy deep down feeling that we were headed in a bad direction. My classmates were going to be tomorrow's attorneys, judges and legislators. Now, in the midst of our economic contraction, as we search for solutions, some disparities become apparent. In 1961 President Eisenhower gave us a warning, "The conjunction of an immense military ... and a large arms industry is new to the American experience .... [W]e must guard against unwarranted influence .... The potential for the disastrous rise of misplaced power exists and persists." He was prophesizing special interest influence.

A few years later, in 1965, Justice Warren wrote the *US v. Brown* opinion, 381 US 437, 443-447, a Bill of Attainder case in which he stated that our "'separation of powers' was not instituted ... [to] promote government efficiency .... [it is] a bulwark against tyranny." He then went on to state that "the legislative power ... feel[s] all the passions which actuate a multitude ... [and] barriers had to be created to ensure that the legislature would not overstep the bounds of its authority...." He also stated that the executive branch is most likely to forget the bounds of its authority.

In 1923 Goebbels, Hitler's propaganda minister, stated, "It is the absolute right of the state to supervise the formation of public opinion," hence the Nazi rise to power. In our Democracy government has no rights, it is a limited grant of power, "a government of laws, not men," to safeguard our individual rights, and as Justice Holmes opined in *Schenck v. US*, 249 US 47 (1919), "The most stringent protection of free speech would not protect a man in falsely shouting fire in a theatre and causing a panic."

A bill of attainder is a legislative act that imposes punishment and under *In re Winship*, 397 US 358, 363 (1970), stigmatization deserves the same 6<sup>th</sup> Amendment presumption of criminal innocence, and yet

legislative and executive branch members regularly stigmatize and sensationalize criminal stereotypes to inflame public "passions" and fears to garner votes. George Bush did it by referring to anyone who spoke against his Patriot Act as un-American, even though most of his evidence of WMD's was fabricated.

The same applies to special interest groups who consolidate large voting and contribution blocks, and capitalize on their political status with the media to obtain favored treatment. Politicians who enflame public opinion are using Goebbels fascist tactic to formulate public opinion by the status of their office. When done in conjunction with special interest groups for gain a disastrous rise of misplaced power exists. Even though entities derive the same rights as individuals under peaceable assembly, money and voting blocks garner favored representation that individuals don't have.

It no longer threatens our democracy, it has undermined it economically and politically. While this may be regarded as pontification, and I defend any ones right to say so, I oppose special interest favored representation and members of government telling people what they need. They have an unfair and disparate advantage over individuals, and our economy and the state of our constitutional safeguards state my case.

A 1993 Perceptions in Neighborhood Crime US Dept. of Justice report stated that even though crime had fallen since 1980, excluding an end of 80's 5 year 30% bubble because of the homeless epidemic from job outsourcing and shutting down factories (Developing Underdeveloped Nations policy), 95% of citizens believed crime was increasing. The report concluded that this resulted from "podium pounding politicians" who sought to get elected on "Get Tough On Crime" platforms and media sensationalism to boost ratings.

Politically backed by guards unions, state legislatures sensationalized specific incidents in the media to formulate a public perception that crime was epidemic, simple Machiavellian Fascist disfavored class villainization for political gain. Sentences were lengthened and judicial safeguards were corrupted, followed by a conviction rate and prison population increase. Over the next 20 years prison budgets increased over 200%, along with guards salaries, benefits and political contributions. Direct prisoner cost (i.e. utilities, food, clothes,...) is only about \$1,000/yr but accounting costs run between \$35,000 to \$50,000 per inmate a year. Nice fat profit margins from simple fear mongering.

At the same time Congress started enacting legislation to reduce prisoners' rights so they had to "exhaust ... 'administrative remedies' ... before suing over prison conditions" under the 1995 Prison Litigation Reform Act (PLRA), Booth v. Churner, et al., 532 US 731 (2001). Notice the time delay between the Act and decision. (Maxim of Law: "Justice delayed is justice denied.") The case pertained to a challenge that if administrative remedies couldn't provide the relief sought then the 1<sup>st</sup> Amendment petition for redress of grievances clause should allow prisoners to go directly to the courts for relief. **DENIED!**

The following year Congress enacted the Antiterrorist Effective Death Penalty Act (AEDPA) that required all habeas corpus issues to be filed within a year of conviction and deferred to the correctness of state court determinations. One California representative even proposed eliminating federal habeas review for state prisoners. Prior to this, under Fay v. Noia, 372 US 391, 424-428 (1963), a detailed historical analysis of the Great Writ, as understood by the Framers, no procedural policy could turn a "rule of timing into a doctrine of forfeitures" of constitutional rights. Congress had now decided that prisoners lose their rights on issues after a year, which essentially decided that citizens with less than 8<sup>th</sup> grade educations had to acquire the expertise of attorneys with law school and college degrees within a year and file on their issues or lose their right to constitutional protection on them.

This Act, subsequently upheld in the courts, circumvented the Fay determination of what the Framers intended in the right to habeas clause (Art. 1, §9.2), and both Acts (PLRA and AEDPA) impeded prisoners' 1<sup>st</sup> Amendment right to petition government for redress. In Marbury v. Madison, 5 US 137, 163 (1803), the Court determined that "The very essence of civil liberty certainly consists in the right of every individual to claim the protection of the laws, whenever he receives an injury. One of the first duties of government is to afford that right" because if "there is a legal right, there is also a legal remedy."

The Marbury Court (at 176) stated, "The powers of the Legislature are defined and limited," and "the constitution controls any legislative act" and can't be changed "by ordinary means," meaning only by Art. V Amendment. Both the AEDPA and PLRA were enactments, not Amendments, that limited the magnitude

and scope of prisoners rights. Fifteen years prior, two years after ratification of the Constitution, the Calder v. Bull, 3 US 386, 387-388 (1798), Court determined that Government powers are delegated to it by the Constitution "and NO CONSTRUCTIVE powers can be exercised by it." "There are acts which the ... Legislature ... cannot do ... [like] take away that security for personal liberty ... for the protection whereof the government was established."

In Role of the Judiciary: From Marbury to Anderson, California Law Review, Vol. 60: 1262, 1264-1268, Donald W. Wright, former Chief Justice of the Supreme Court of California, quoted Marbury (at 177-178), "It is ... province and duty of the judicial department to say what the law is" and "the Constitution [is] the fundamental and paramount law of the nation." Justice Chase then stated that the "fundamental rights [are] guaranteed to all, including the members of the minority," the "Constitution is a statement of principles designed to allocate powers between people and their government," and if "a politically impotent minority is the victim of repressive legislation" courts must "prevent the will of the majority from unfairly interfering with the rights of individuals who ... may be unable to protect themselves through the political process."

How then is it that Congress was able limit prisoners' fundamental right to petition the courts when courts since the time of the Constitution had determined that this entitlement was unobstructed, and how is it that legal entities, businesses and unions, enjoy unobstructed right to petition legislatures under the Noerr-Pennington doctrine when their entitlements derive from the rights guaranteed to all individuals equally?

Can it be constitutional for Congress to subvert Separation of Powers by limiting prisoners' rights to petition, when the Court had already determined they were entitled to do so without limit, while allowing "artificial entities existing only in the contemplation of the law" to petition legislatures with unlimited contributions to limit prisoners' rights to appeal because they depend on them for their livelihood? Artificial entities now enjoy more constitutional entitlements than individuals for whose protection whereof the Constitution was established. It is unlawful and unconstitutional to use the law or the Constitution to achieve an unlawful or unconstitutional condition. Gomillion v. Lightfoot, 364 US 339, 347-348 (1960).

The Framers made this country by the Constitution. It grew from 13 conflicted colonies into 20% of the global economy and the technology leader by this guarantee. However in the last 50 years the guarantee has been eroded in favor of entities' interests, and now the nation has 50+ million with criminal records, 2+ million in prisons and jails, and rapidly decreasing economic, educational and technical leadership. How can a nation maintain leadership when its leading economic growth industry is criminalization of nearly 20% of its citizens? Does criminalizing and restricting the rights of 20% of the nation's labor and consumers restrict or improve their ability to perform these necessary functions? Does creating a nation of thieves regulate commerce positively? What innovations will they contribute? Is our greatest threat from outside terrorists, or political leaders who terrorize the Constitution's most fundamental protections?

## 7) Labor Resource Development

Restoration of individual rights is not just a government responsibility, it's a major labor-consumer resource development economic interest. This does not mean open-ended liberal affirmative action programs that blanketly justify any action. School busing didn't improve education. Uprooting and disrupting children didn't help them. If some schools are inadequate then the corrective action should be to fix them instead of compensating at the expense of all children. The problem was that government got involved and made it a political issue, garnering votes by feigned concern. Children's futures shouldn't be political stepping stones.

This doesn't mean government shouldn't play a role in solving problems that are everyone's. There are many ideological interpretations about what is best for everyone, especially in regards to the importance of individuals, environment, business and government with respect to each other. In actuality all are equally necessary and as important as our needs for air, water, food and defense. We depend on the environment for air, water and food. We need national defense, regulation of commerce and judicial review. Business is our source of jobs, wealth and products, and satisfies our need to succeed. They benefit us and they benefit from us, all equally important and necessary.

Government is political and controversial whereas business is smart when profits are involved. They fix problems for profits, and positively differentiated individuals have a higher probability of success, and

businesses with them. Raising individuals'  $1/n^2$  quantum states results in interactions and new products that translate into revenues. The alternative is a fast growing sub-class cultural demographic that doesn't know how to work and can't qualify for consumer credit. The nation's economy reflects its actions to its citizens. Government bureaucracy creates a degree of freedom to grow itself, a non-producing load that won't solve any problem that eliminates the need for it, but businesses profit by solving problems.

The method of reform isn't difficult, and it equally applies to health and environment. History's laws of are the laws of economics, and just as there are 4 currencies (liquid M1, semi-liquid M2, non-liquid M3, and counterfeit M4), there are 4 liabilities (immediate L1, potential L2, interactive L3, and conjecture L4). A fundamental business operation must balance these to maintain a stable  $e^{-ix}$  operation. M1 Cash on Hand is kinetic energy, M2 Receivables are potential energy, M3 Assets are mass, and M4 losses are impedance. L1 Immediate are daily operating costs like wages, benefits, emptying the trash and scheduled maintenance, L2 Potential are people costs like injuries and sexual harassment and unfair practices suits, L3 Interactive risks arise from business interactions with customers, competitors, environment, etc., and L4 Conjecture risks are remote like disgruntled employees, espionage, organized crime, terrorism, weather, fire, etc.

All currencies and liabilities correlate to employees some way, and can therefore be maximized and minimized by making employees benefit from and be accountable for actions. Rights incur responsibilities, just as a limited grant of power invokes a limited fiduciary performance responsibility. People may complain about government but if they don't hold it accountable through redress they are part of the problem. Rights and responsibilities stem from the same source. Tainting one man's water taints and everyone's.

It's simple due process and equal protection principles. Government governs laws, citizens govern government. This means artificial entities existing only in the contemplation of the law need to assume their responsibilities, not ethically or morally, that's not business, but instead, profitably. If employees are over-worked they become tired, careless, and less conscientious. Therefore, businesses should not degrade performance, increase risk of accidents, or reduce their ability to circumvent and prevent problems so don't pay time-and-a-half overtime. Instead, reward positive and tax negative behaviors.

If employees exceed monthly quotas they get 10% bonuses for the month, if a department exceeds its for the month everyone gets a 10% bonus plus their individual bonuses, same if a division does, so everyone can get a 30% bonus each month for a simple 10% performance increase, including supervisors and managers because they motivate everyone and track it all. It's cheaper than time and a half and trains responsibility and team work. Also, employees can get tuition costs and 10% bonuses for training and education classes. It's a longer term investment and it's cheaper to develop from within than find and compete for people you need. Same with exercise programs, they reduce insurance costs. And retirement contributions should be indexed to business performance over long term operations.

#### **8) Labor Resource Protection**

Conversely, losses from product liabilities, environmental, health or injury hazards, espionage, inappropriate conduct, etc. should ultimately track to their source, with minor penalties for minor infractions to terminations and lawsuits for major offenses. A balance of bonuses and penalties is important because it affects morale and business performance, but err on the side of presumption of innocence. In the words of Blackstone and Montesquieu, the Framers' inspirations, it's better to let 10 guilty go free than convict one innocent. Our principles are based on guaranteeing rights, and that's easier to deal with than libel or wrongful termination suits.

Facilities should be monitored with audio-visual records transmitted to off site archives for at least the liability period of civil, criminal and environmental actions. They should also have local recordings for immediate viewing, but never connected to or stored on the company's computer because offsite archiving transmission offers a potential hacking back door. Every EM energy has a wave form propagation on some level, and thus a quantum tunneling probability.

Monitoring reduces exposure to intangible liabilities like inventory shrinkage, espionage, health or hazard risks, or sexual harassment and discrimination suits. Individuals, equity owners and employees have a right not to have their interests placed in jeopardy. If one individual steals products or information, creates

hazards, harasses or discriminates, it reflects on everyone, but it's just as wrong to falsely accuse someone of it. Everyone suffers by stigmatization and possibly unfair financial loss. This is alleviated by prevention, such as monitoring for risks and wrong acts before they become major problems.

Individuals must be presumed innocent. Stigmatization is serious (In re Winship, 397 US 358, 363-4 (1970)), so allegations deserve respect and investigation for accuracy and reliability in the recordings. If true, act to correct the problem, and if false do the same because innocent employees have a legitimate claim if the company doesn't act to correct a wrongful accusation. It's as serious as a witness committing perjury. If an accuser can't prove it and the recordings don't show it there is no basis in fact for such claim.

Also there is a legal distinction between race, gender, age, handicap, etc. claims and demographic or cultural claims. We're born equal under the law but cultural behaviors are learned. Education, training and experience are job requirements, but some learned behaviors can be employment disabilities. Ethnicity is a general category of racial, national, tribal, religious, cultural or linguistic groupings and discrimination is an overt act against individuals based on stereotyping contrary to guaranteed legal rights. Favored hiring or wages based on stereotyping is discrimination against everyone else, and thus a potential liability.

A fair, unbiased, presumption of innocence work environment removes potential liability and sets a standard that discourages negative behaviors. Employees are entitled to fair treatment and no one should feel a threat of unfair stigmatization. Plaintiffs must be able to prove allegations and companies must hold a presumption of innocence standard. Recordings will show the facts. Don't shy from litigation if necessary. If nothing else Riemannian Economics is pragmatic, like Singularity Principle assignment of physical limits to m-space points like proton and electron radii to quantify their quantum and continuous behaviors as  $\partial^2 u / \partial x^2 + \partial^2 v / \partial x^2 = 0$  continuous  $e^{-ix}$  Laplacian harmonic functions with  $1/n^2$  states and  $e^x$  transforms.

## 9) Creating New Market Degrees of Freedom

In other words it defines a harmonized objective with  $1/n^2$  and  $e^x$  growth factors for the company and the global economy because  $\int |\psi(x)|^2 dx$  probability functions have system  $e^{-ix}$  equilibrium components with an  $S = 0$  entropy to  $S = 1$  ground state singularity node transform. Such a growth factor can't be achieved by avoiding the litigation degree of freedom. To expand market and product line simply find a company that is contaminating the environment, gather facts and proof before allegations are made so no one becomes aware of the strategy and attempts a cover up, and then file a Complaint and Move for Injunctive Relief.

This shuts them down, and no product equals no revenue. In the interim, acquire technology to fix the problem and then offer to acquire the company. This is not a "Hostile Takeover," it's a Friendly Acquisition because you want their employees and assets but you don't want to drag it out. It's a Blitzkrieg tactic to gain product market share by capitalizing on environmental violations. Offer equity holders market plus 10% or a stock swap and employees bonuses to stay. Install the technology and get back into operation.

This strategy takes advantage of Antitrust Law legal provisions around anti-competitive prohibitions. Antitrust elements are (1) conspiracy or agreement between two or more entities to a concerted action (In re Baby Food Antitrust Litigation, 166 F.3d 112, 117 (3d Cir. 1999) to (2) "unreasonably" restrain trade or commerce (15 U.S.C. §1 (1994)) (Nynex Corp. v. Discon, Inc., 119 S.Ct. 493, 396 (1998) to impede competition, create a monopoly, artificially maintain prices, restrict output, refuse to deal or interfere with free market forces (Monsanto Co. v. Spray-Rite Serv. Corp., 765 US 752, 761 (1984); Northern Pac. Ry. Co. v. US, 356 US 1, 5 (1958)) if such activities have no legitimate justification and lack redeeming competitive purpose (Dept. of Justice Antitrust Manual § 7-6.120; Northern Pac. Ry. Co. at 5); (3) impacts interstate commerce (US v. Romer, 148 F.3d 359, 364, n.1 (4<sup>th</sup> Cir. 1998); and (4) has a criminal intent of producing an anticompetitive effect (US v. United States Gypson Co., 438 US 422, 433-446 (1978)).

It's not "unreasonable" to utilize environmental violations because they are illegal and you are civilly enforcing the law and providing a remedy to prevent further eco-toxification, there is no conspiracy between entities because you have the single "economic reality" of expanding business within the law (Copperweld Corp. v. Independence Tube Corp., 467 US 752, and City of Mt. Pleasant, Iowa v. Assoc. Elect. Coop., Inc., 838 F.2d 268, 275 (8<sup>th</sup> Cir. 1988)), there is no restraint on trade if you try to acquire them and their employees to produce better products without a toxic footprint and you are petitioning government to do so

before you act (injunctive relief) under the Noerr-Pennington doctrine (Pennington, 381 US 657, 670; Noerr, 365 US 127, 135; and Columbia Pictures Indus. V. Redd Horne, Inc., 749 F.2d 744,745 (3d Cir. 1984))

If by some possibility the DOJ threatens to bring charges you simply suspend your Complaint pending decision by the Court to allow acquisition and withdraw your offer to acquire the company because an antitrust conspiracy ends at the time of its abandonment (US Gypsum at 430-431). It's a 1<sup>st</sup> Amendment right to petition issue and the DOJ can't stop that because it would be a civil rights violation that permits an illegal environmental contamination. Once you have a Court Order allowing the acquisition it's legal. It's not a "sham" to use the Court to acquire an illegally operating company because they are not a competitor (Noerr at 144) and you are using your right to petition the Courts to establish the legality of a business practice that actually promotes market competition.

When filing a Complaint to enjoin a company from further environmental toxification you are fully informing the Court of intent to acquire the company, its employees, and its assets by offering the owners market plus 10% at the time of filing or a comparable stock swap in order to install technical improvements, continue operations, and compete in the existing market without eco-toxification in accordance with law. State in the Complaint intent to establish the legality of a business practice of acquiring and refurbishing obsolete and illegally operating concerns for profit, thereby creating a new market for competition.

It is unlikely that the DOJ would attempt to frustrate such a practice because under RICO, a Clayton Act derivative that incorporated preventative civil remedy into the purely remedial Sherman [Antitrust] Act, proximate causation is a requirement in civil injury claims. Holmes v. Securities Investor Protection Corp., 503 US 258, 268 (1992) Establishing proof of an anti-competitive effect is easier under civil "preponderance of evidence" due process than under 6<sup>th</sup> Amendment "proof beyond a reasonable doubt" criminal due process, the jurisdiction of the DOJ. The entire acquisition process is based on a Court ordered injunction with full disclosure of intent. There is no act without the Order and sanction by the Court, and the only intent is to act based on the injunction because if the illegal environmental contamination operation is not enjoined there is no business expansion opportunity.

There are two obvious alternatives to the litigious approach. The first is to approach the owners with an offer to buy the company and the second is to lobby Congress to enact language to require the DOJ to prosecute environmental contaminators. Lobbyists are legislative representatives like lawyers are judicial representatives, and they stay in business by being effective. Both alternatives have advantages and disadvantages with regard to effectiveness and cost, but the right to petition the courts offers specific and immediate results for the purpose or acquisition and market expansion.

As a matter of law this practice merely seeks to profit by incorporating new technology into illegally operating concerns and making them legal. It's as corollary to copyright and patent market protection with new technology. They do not establish presumption of antitrust market power. (Columbia v. Omni Outdoor Adver. Inc., 499 US 365, 383 (1991) and C.R. Bard, Inc. v. M3 Systems, Inc., 157 F. 3d 1340, 1368 (Fed. Cir. 1998). Cleans-All, who captured over 90% of the market, was found to have done so by the use of better technology and natural market forces, a mark of competition.

If the DOJ, FTC or any other agency makes overtures they are most likely just attempting to entrap you into obstruction of justice by scaring you into lying to them, like they did with Martha Stewart. She was never guilty of insider trading but they scared her into lying about her prior communications with her Broker. It's a simple legal strategy they use to make headlines off of celebrities, like McCarthy did. They will most likely use a claim of a "per se" violation based on prior experience with a particular type of restraint [that] enables the Court to predict with confidence that the rule of reason analysis will condemn it." (State Oil CO. v. Kehn, 522 US 3, 10 (1997)) However under "rule of reason" you are entitled to review to determine if a restraint is "unreasonable" (Chicago Bd. Of Trade v. US, 246 US 231, 238 (1918)) or merely "regulates and perhaps thereby promotes competition ...."

Even if litigation is required to dis-integrate a company before its parts can be utilized in a more competitive operation, the parts are still good. Their direction just needs some re-direction to stay current with technology. This isn't 80's corporate piracy that closed factories and liquidated assets, it's a corporate

recycling to stay competitive. Anticompetitive practices can increase efficiency and competitiveness and thus don't constitute antitrust violations. Broadcast Music, Inc. v. CBS, 441 US 1, 23-24 (1979) These are the basis for a "quick look" "rule of reason" review by the Court. National Soc'y of Prof'l Eng'rs v. US, 435 US 679, 692-695 (1978).

The point is, litigation is an entropic degree of freedom for profits and market expansion in Nash's Controlling Dynamics. It is not just a liability resolution forum. You don't need Government permission for this, you only need judicial certification if the Executive branch attempts to control your efforts. They work for us, we don't work for them, but there is no Separation of Powers protection unless we raise it. Don't be afraid of litigation, embrace it. Business is war and this is a battlefield rich with spoils because everyone shies away from it and misses a tremendous opportunity for growth.

Attorneys are professionals and know how to litigate. Never undertake such an effort without them, plural because more than one perspective is synergistic, but don't let them discourage you because they won't be familiar with this strategy to open markets, and don't rely on them completely. The history of the country is written in its court cases and its agenda is in its business activities. (The laws of history are the laws of economics.) Cases are a tremendous source of ideas and litigators are only its soldiers. You need an overview to be able to make good strategic decisions. This also means litigious employees can be an asset. They aren't afraid to engage in battles and have the confidence of experience.

Internal litigation by employees is disruptive and counter-productive. If allegations against other employees can not be substantiated they need to undergo progressive recycling, suspension, and possible termination. Other employees don't need to live in fear of bullying or character assassination by others who want to use them as stepping stones for advancement or a settlement. It's tremendously counter-productive. However, employees who use their positions to take advantage of others can't be tolerated either, hence surveillance and recording inspection as a preventative.

#### 10) True Détente

In a complete economic system, employees are assets that affect profits, expansion and development of new markets. They are also the basis of consumption, affecting the nation we operate in and other nations we trade with. They should be extended qualified credit, conservative, not liberal, through contracts with banks to get the best rates. This is just as much part of an employee development as educational incentives, individual rights protection, health care, or quota and team bonuses. These investments ensure continuity and future growth, not just of the business, but for the nation as well.

Two final points. A nation's security involves both inner strength and ability to respond. This means solid economic, educational, technological, and individual development plus an effective military capability. This doesn't mean it should be used unnecessarily, but if action is required it should be swift and decisive so there is no mistake about its effectiveness. Minimize contact exposure. Conflicts are not productive. Nations who engage in them ultimately fade into history, and they consume resources, devastate environment, and promote diseases. Cold wars are particularly bad because they perpetuate out of fear and so responses are exaggerated. Was has always been business, but commerce is better business.

The most effective détente is not a threat of mutual annihilation where sides infiltrate each other with spies and escalate with parallel weapons developments and arms accumulation. With today's technology no nation is secure under a mutual annihilation possibility as one boundary condition of their existence. To be sure, an adequate defense and response capability is an absolute necessity, but the only true détente is an orthogonal domain of activity by which to establish an  $e^{-ix}$  equilibrium with the people of other nations, right down to the individual level. The most effective way to do this is commerce.

If an economic system includes all 6.5B in a utilization and development strategy that provides basic necessities and opportunities to succeed the global focus shifts from survival to growth. This is a far better and safer form of détente, one that benefits instead of threatens, and it must be embraced by the cumulative power of all political, financial, business and union entities. We don't need enemies, we need growth.

## 12) Health Care

The last point is global health in the form of health care, food, water, and pandemic threat reduction. Food, water and care are simple 1<sup>st</sup> order derivatives that are provided by infrastructure development, also necessary for optimizing labor and market resources, however pandemic threats are 2<sup>nd</sup> order derivatives that derive from interactions of different circumstance conditions. An incident in Malaysia serves to illustrate. Forests were defoliated for economic reasons. They were the habitat of Flying Fox Bats that carried a lethal virus they had long since become immune to. As a result of deforestation they had to fly further and further for their flying insect diet, eventually journeying over a pig farm with a million pigs. They were genetically close enough to the pigs for the virus in the bats' droppings to infect them, and the pigs were close enough to man for it to jump to humans, wiping out the pigs and many of the workers.

Viruses easily mutate and adapt to related hosts because they are simple genetic information packages that use the cells of related hosts to replicate. Their structures are typically single strand so they have little impedance to mutation. Adapting to and jumping host species is a significant entropic degree of freedom for their information, a quantum tunneling hole their survival depends on. It is not a question of if a lethal form will become airborne, it's a matter of when. All that is required is development of a resistance to oxidation and denaturing, and since they are evolving a definitive ability to adapt and jump species, it will be extremely difficult to develop an effective vaccine.

They are like bio-weapons with dual independent biological pathway genetic material that requires a dual protease and a transcriptase inhibitor "cocktail" vaccine to block the independent pathway replication. It's unusual for cells to host different viral species but mutations of the same species can take over host cells and become their own dual pathways (i.e. one species, two versions). Mutations are statistical  $\Delta G^\circ = -RT \ln [\text{Product}]/[\text{Reactant}]$  processes, with secondary interactions that diverge in variety because they occur on genetic levels with equal probability of replication. This means a viral species can be its own independent biological pathway, with multiple versions, not just dual versions as in bio-weapons. They have individual microstates with their own entropies and individual versions that have the same viral face macrostates with a global system S entropy of interactions between species, and cities, countries and continents at 500 mph.

This is a scary prospect with increasing probability in the time degree of freedom. There is a reason lethal pathogens originate in 3<sup>rd</sup> world countries and prisons. Humans are great Petri dishes with temperature and humidity control, abundant nutrients, and differentiated cells for replication and mutation. Couple this with high density host and septic conditions that act to reduce quantum tunneling barrier impedances and result in undefined microstate versions that their hosts develop immunities to because medical treatment is limited, but the pathogens are not just limited to them. Hospitals are a little better because they incorporate antiseptic procedures, but not good enough. With current vaccine technology we are completely vulnerable, HIV a case in point, so our best course of action is prevention, which means more than abundant clean water, soap and bathing facilities to impede viral transfers while they are still limited to contact transfer to impede mutation probabilities. Reduce statistical transfer as population interaction rates increase.

Soap, water, and reduction of population densities where possible, like prisons, is the simplest way to inhibit viral transfer. Third world countries have the same problem as prisons in different forms. Prisons are integration points for different geographic and cultural regions, pathogenic interaction melting pots and 3<sup>rd</sup> world countries integrate with different food species so there are plenty of entropic degrees of freedom. Reducing this foraging factor viral index vector is accomplished by alternative food source production.

Governments are not very effective, as shown by Katrina and Fukushima Daiichi response times. Their slow responses are political and bureaucratic. Businesses however have a tremendous opportunity here in the Utilities, Soap, Food Production, Transportation and Distribution sectors, but only if the people who need it can pay for it, which means jobs, credit and infrastructure development. That is why outsourcing should be tied to local infrastructure development to both equalize labor and consumption rates between countries and increase preventative health care. This and pathogen risk reduction won't happen without profit motivation and profits won't happen without markets to support the effort.

## 12) Related Expansion Opportunities

When Eisenhower warned that American Democracy was at risk from the alliance of financially powerful industries and government he was absolutely correct, but that was only recognition of a problem. The solution to any problem is in its proper statement. The problem is a cause and effect LOGIC, its solution is in the NOT LOGIC available degrees of freedom, the limits minus the cause, as Einstein showed.

Business and government alliances are dangerous, but only if they impede democratic principles, contrary to Adam Smith Labor and John Nash Controlling Dynamics market principles. We are feeling the effects of traditional Diminishing Returns open-ended derivative economics,  $-du/dx + \partial^2 v/\partial x^2$ , and a conservative application of  $\partial^2 u/\partial x^2 + \partial^2 v/\partial x^2 = 0$  Riemannian  $1/n^2$  Increasing Returns derivative economics is needed. Negative derivatives were applied to create wealth by cutting labor costs and increasing their debt and derivatives need to be applied to enhance labor as a resource function to create real wealth of nations, in quantized harmonic steps. The labor resources need to be brought up to the same level,  $-du/dx \cdot -du/dx = \partial^2 u/\partial x^2$ , to counteract the created  $\partial^2 v/\partial x^2$  debt based wealth. The alternative is not a pretty outcome.

Einstein used a "Riemann construct" overlay on a "field free" m-space to unify Gravity and mass. The Singularity Principle extended the application to quantized behavior, to connect the Strong, Weak, EM and Gravity domains by showing that energy density affects the point sizes, interactive distances, and time periods, depending on the ratio of internal and external energy density relative  $\mu\epsilon$  impedances to speed of light energy transfers. This means both internal s and external S micro and macro state functions are controllable degrees of freedom that affect  $\int |\psi(x)|^2 dx$  probability outcomes.

It connected the quark to gravity domains and commerce is simply a different energy form based on contextual circumstances at our level. It opens a new territory of economic expansion. Nations that don't understand this are likely to attempt to regulate it or un-regulate it incorrectly, with negative results as our current global situation shows because they did not comprehend the impending economic catastrophe of  $-du/dx + \partial^2 v/\partial x^2$  negative derivative divergence between real and paper values.

Businesses will apply the  $-du/dx \cdot -du/dx = \partial^2 u/\partial x^2$  transformation without realizing they are simply utilizing the equal and opposite momentum effect to create a new domain's stable negative energy well  $e^{-ix}$  equilibrium ground state, transitioning from  $S = 0$  saturated to  $S = 1$  available space for  $1/n^2$  expansions. It is a quantized  $n^2$  function, the square function cancels negatives. This means, add the expense to develop labor resources to derive future  $n^2$  derivative growth effect. Jobs, education, individual rights, conservative credit and preventative health care are all distinct costs that compound with direct labor costs to yield derivative returns in the form of product ideas, productivity and market development consumption. The negative costs must cancel to go from  $-du/dx + \partial^2 v/\partial x^2$  to  $\partial^2 u/\partial x^2 + \partial^2 v/\partial x^2 = 0$  quantum states over time. Maxwell got this in EM theory but somehow we forgot what it takes to unify micro and macro states into stable systems.

As a case in point, user software and search engine "garage developments" resulted in industries that exponentially outpaced hardware. They were  $e^{-ix}$  harmonious groups that yielded  $\int |\psi(x)|^2 dx$  revolutionary product development in multiple degrees of freedom that operate on existing  $1/n$  evolutionary hardware technology expansion in a single degree of freedom, and they quickly outpaced hardware economically. No one predicted the rapid growth of Information Technology because the causes were entropic, seemingly random convergences that synergistically created new degrees of freedom. If business doesn't capitalize on this capability by developing their employees internally they will lose out. They can either create new degrees of freedom by developing individual employee microstates or external system circumstance entropies will do it for them and cause their replacement. It's the way of the Universe, "adapt, move on, or die." Divergent component progression rates yield divergent results.

The problems of terrorism, organized crime, and environmental degeneration all have equally viable solutions based on the same principles – identify degrees of freedom, characterize contextual circumstances for both individual microstate complexions and macro state outcomes, and then factor them out of the context to make individual negative factors "light up," simple factoring to identify specific behaviors.

It should be noted that all of these are simply energy form expressions. They can be grouped as Socio-Economic-Political Terrorism, Eco-toxin, or Pathogen energy forms, and they are all progressively increasing by  $e^x$  exponential functions with congruent  $e^{-1/x}$  decays of existing conditions. It is apparent that these decay condition events are increasing in frequency and magnitude (i.e. economic contraction, diseases, terrorism, business and political frauds, earth quakes, tornadoes, hurricanes, etc.), and they seem to be converging into a cascade condition around end of 2013 (by simple  $e^x$  curve fitting).

This is a rough educated guess based on the frequency-magnitude product energy density increase over time, but there are many variable forms involved so individual energy forms manifest differently. The one thing they all have in common however is mankind, both as a cause and effect recipient. The weather and geological events may seem disconnected but we have increased  $\text{CO}_2$  levels, and global temperature by  $1^\circ\text{C}$ , since 1900 by fossil fuel combustion while reducing global forestation to only 30% of what it was in 1900, and temperature energy translates to statistical resultant products. The problem, as with all reactions, is reversible but the magnitude of the effort required is increasing exponentially as are costs, both in the form of insurance claims and cost to correct and reverse the current inertias.

The time to start the remedy is now because as soon as the problems cascade the civil unrest, disease, environmental, and economic problems will be occurring in close lock-step. Unfortunately political controversy obstructs solutions because the time delays and seemingly random manifestations mask the seriousness of the problem. However if we wish to avoid total political, economic, environmental and pathogenic destabilization at the present accelerated rates of growth we must turn these into a common solution for all affected. No longer can we afford to ignore these problems, they burden us all equally, and we must converge them with  $-du/dx \cdot -du/dx$  cost compounding to stabilize them with the  $\partial^2 v/\partial x^2$  gains we thought we could get for free.

Nothing is free. Energy, no matter what form, will always find its natural equilibrium state, and everything we think we've built will be sucked into it. This is fundamental 2<sup>nd</sup> order derivatives, and acceleration into a negative condition can only be transformed into a positive result, positive  $1/n^2$  harmonic  $e^{-ix}$  equilibrium wave functions, by compounding negative forms into a positive result. Economic systems that can't stabilize their fermionic component interactions will fail, as will their dependent governments.

### Conclusion

There are 5 laws of human existence:

(1) Parkinson's Law – every entity expands (evolves) to consume its allotted resources and available degrees of freedom. However, revolutionary changes (singularities) recreate resources and degrees of freedom.

(2) Peter Principle – we rise to our incompetence level, a buoyancy between solutions and problems. However, embracing the challenge of new goals restores our competency.

(3) Murphy's Law – If it can go wrong it will, heads and tails are equally probable. However, when both  $s$  microstate and  $S$  macrostate entropies are controllable system functions it "fixes" the dice.

(4) Obrien's Law – Murphy was an optimist, all microstates compete for opportunities so there is less than a 50/50 equal probability of success. However, utilizing the  $s$  microstate and  $S$  macrostate available degrees of freedom more optimally increases probability of success.

(5) Gray's Law – If you make it past all the other laws' the spiritual forces (unknown intangible pure information states) will act to both limit and enable you. Ultimately, focusing on the limits of the LOGIC (the problem) or on the evolutionary NOT LOGIC or revolutionary Singularity available degrees of freedom will determine the outcome. The solution to any problem is in its proper statement, not just its cause, its possible solutions as well.