Lagrangian Uncertainties

by William Gray

A solution to the workings of the universe exists but Quantum Theory, the Standard Model and String Theory can only predict the periodicity of effects like mass, size, spin, charge or magnetism not their causes, unless the Lagrangian Uncertainties are removed.

Lagrangians

"Mathematics, the non-empirical...science of sciences, delivering the key to those laws of nature and the universe...concealed by appearances." (Hannah Arendt) Its converse is equally true, keys to the laws of nature are concealed by mathematics misapplied.

Lagrangians are powerful tools that show what to put in equations when there are more "unknowns" than "knowns." They predict events like mass from prior events, partially revealing what is concealed by appearances and to some degree even predicting the future.

The universe has a property called periodicity. It causes earths to orbit suns in a year, pendulums to keep time, and electrons and photons to have wave behaviors. In his Nobel acceptance speech de Broglie stated, "a purely corpuscular theory contains nothing that enables us to define frequency; for this reason...,in the case of light, we are compelled to introduce the idea of a corpuscle and that of periodicity simultaneously.... Determination of the stable motion of electrons in atoms...introduces integers, and...the only phenomena involving integers in physics were those of interference and...modes of vibration. This fact suggested to me the idea that electrons too could not be considered simply as corpuscles, but that periodicity must be assigned to them also."

De Broglie had realized something very important. Since light has both wave and momentum characteristics then a relation must exist between these behaviors and if electrons have momentum then they must also have a wave behavior. This was very clever and he used Einstein's $E = mc^2$ mass-energy equivalence the show it.

A photon's energy is related to its frequency by Planck's Constant by $E = hf$ and if $E = mc^2$ then light has an mc momentum. Frequency is the velocity of a wavelength so a photon's frequency is $f = c/\lambda$ and its energy is $E = hc/\lambda$. Using $E = mc^2$ for energy simplified this to $mc = h/\lambda$ momentum and $\lambda = h/mc$ wavelength relations.

If electrons have a wavelength then it should similarly relate to its mv momentum by $\lambda = h/mv$, and double-slit experiments showed this in fact to be true. Schrodinger used this concept to explain discrepancies in Bohr's quantum mechanics model of hydrogen (its spectra and 0 spin), everyone was happy, they all received Noble prizes, and quantum theory was accepted as the answer to all their questions. -- Hold on, there's still a pretty big key missing!

What causes wave behavior? They assigned a behavior that explains other events but that's only a Lagrangian analysis that identifies wave periodicity and predicts things without explaining them. The aspects of real behaviors can be isolated by describing them with mathematical f(x) functions and then applying Calculus. Calculus is merely math that shows what occurs when adding (integration) or removing (differentiation) degrees of freedom, like going from a circle to a cylinder or period to an orbit and vice versa.

Differentiation of a line yields a starting point, and of a curve yields the slope or tangent to the curve at points along its path. If a curve oscillates in a wave then the tangents at its peaks are horizontal lines with 0 slope. These are the Lagrangian "maximums" and "minimums" of a wave as it moves in a direction that allow one **to determine its period by differentiation** if the wave function is known, or its wave function by integration if its period is known, simply by realizing that the wave function's df(x) / dx derivative is 0 slope at its maximum and minimum peaks.

Lagrangians are useful when no one understands periodicity's cause since peaks identify characteristics like mass-energy, wave length and momentum by using de Broglie's $\lambda = h/mv$ and Einstein's $E = mc^2$ relations and yield "knowns" where only "unknowns" existed before.

Predictability

Lagrangian df(x)/dx = 0 functions indicate wave peaks and waves result from potential energy (force) and kinetic energy (inertia) resonances. When a mass swings to a peak, gravity and its height determine its peak PE = mgh potential energy, and during the swing its velocity determines its KE = $\frac{1}{2}mv^2$ kinetic energy. This shows a $\frac{1}{2}v^2$ calculus relation between peak PE force and peak KE momentum by $\frac{1}{2}mv^2 = mgh$ and thus all parameters can be predicted if only a few are known by using Lagrangians.

The PE-KE wave function resonance occurs at right angles in space and time, called orthogonal or i imaginary dimensions, since their energies are out of phase with each other so the E = PE + KE total energy has sine and cosine energy components. This is described by Euler's $e^{ix} = \cos x + i \sin x$ Identity so Lagrangians can also identify wave midpoints merely by realizing that the peak cosine energy is the midpoint of the sine energy and vice versa.

The concept predicted pions when Yukawa realized that if particles have a periodic wave behavior that relates force and distance to a Lagrangian maximum-minimum PE-KE resonance then nuclear force must equate the wave length between nucleons to a particle energy. He theorized that if the distance between nucleons is $\frac{1}{2}$ a wave length then a particle emitted from one nucleon at near light speed would not violate conservation of the nucleon's mass since Heisenberg's Uncertainty says it's not possible to measure a change in its mass within that time. Thus, nucleons emit subparticles which travel and return within Heisenberg's Uncertainty so conservation is not violated and their kinetic energy averages to a nuclear PE force.

De Broglie's wave relation for a particle at light speed yielded a 140 MEV particle at nuclear binding distances and it was called a pion to signify dependence on light speed for its momentum and its ½ wave length distance between the nucleons. Everyone was happy with this discovery since it gave rise to quantum force fields, as opposed to non-linear action at a distance EM and gravity forces, and this permutated into the Standard Model quarks inside nucleons to explain nucleon characteristics.

Lagrangian analyses have successfully predicted many particles in terms of nuclear interaction energies, wave lengths, and momentums because Lagrangians indicate maximum energy states that manifest as periodic patterns of particles. This pattern of particles in turn pointed to fundamental constituents within them called quarks with specific variations of the particles' properties. The problem with the Standard Model is that quarks are assigned properties to explain particles' behaviors and no quarks have ever been found.

String Theory

To explain Standard Model weaknesses a String Theory was developed to reconcile nonlinear gravity and EM forces to the very powerful quantum forces that only operate over fixed particle wave lengths. If one thinks of a volume enclosed by a surface, the surface has 2 dimensions orthogonal to each of the volume's 3 dimensions, which yields a 5-dimensional space structure. This concept can further be extended so each dimension is a "string" with a 2-dimensional surface, with a radius and length, in its simplest form.

A "string" concept gives each dimension of the volume and surface an additional 2 dimensions for a total of 10. This has advantages over the Standard Model since each dimension can have a PE-KE wave function orthogonal to the other level's dimensions: the surface and length of each string, the 3 strings of the volume, and the 2 strings of the surface that contains it. Each level has different degrees of freedom from intersecting orthogonal levels so there is a calculus relation between the KE of one to the PE of another.

This is a powerful concept that might possibly correlate nonlinear gravity and EM forces between matter over distances with quantum forces between and within nucleons. Since each level has different degrees of freedom there is a convergence and divergence of forces and energies between levels, with forces being PE manifestations. Since these are calculus relations the force manifestations can be orders of magnitude different, since the relative change in volume is infinite as its 3rd dimension's energy increases from 0 (i.e. from a disk to a sphere) while the surface area it intersects with only increases from the 2 sides of a disk to the area of a sphere.

The fundamental problem with String Theory is that the dimensions of each level are Lagrangian functions that vary from a 0 minimum to some maximum that depends on the Lagrangians of the dimensions in intersecting levels. The Standard Model and String Theory are derivatives of Quantum Theory that seek to explain what it cannot.

Because Quantum Theory is based on wave behavior, each dimension with a wave length and amplitude, the only values that can be known are Lagrangian maximums and minimums that quantify observed effects but can never precisely define their internal causes.

Lagrangian Uncertainties

The Achilles Heal of Quantum Theory is Heisenberg's Uncertainty, that a particle's position and momentum cannot be simultaneously measured with infinite accuracy. Any photon used to measure the particle's position transfers energy to it and alters its position and momentum by the time it can return to the observer. Only the particle's wavelength and amplitude can be determined, not its exact position and momentum within its wavelength or the time it takes light to travel its wavelength.

Yukawa used this principle to predict the pion, a particle whose mass-energy was determined by the concept that the nuclear bond length and speed of light define a $mc^2 = \hbar c/2d$ PE = force-distance that exists within the Heisenberg Uncertainty of a measurement of the nucleon's mass-energy. In other words Quantum Theory predicts effects based on an Uncertainty which says that one cannot know the position and momentum energy within the particle's wavelength.

One fundamental weakness of Quantum Theory is that a wave function cannot predict its future values except statistically because the wave function's causes cannot be determined within its wavelength. The $\int_{-\infty}^{+\infty} |\psi|^2 \, dx = 1$ calculus integration of the wavelength however yields a 100% probability that an electron exists within an atom's +/- infinity 3-dimensional structure, based on the dictum that all regions are accessible and all energy states are available unless occupied. That's a safe bet but a limit to its applications.

Wave functions are defined by Lagrangian $df(x)/dx = 0$ periodicity and Heisenberg's Uncertainty forecloses meaningful interpretation of position and momentum energies within them. Thus any Lagrangian interpretation always contains an uncertainty in causes connection to their effects. An example is hydrogen's spin 1 in an external magnetic field. Wave functions are statistically symmetrical and spherical in their ground state and yield spin 0 but because their energies are quantized in terms of Planck's Constant they predict higher quantum spin states without explaining how.

Quantum states predict the existence of other quantum states but never explain themselves because de Broglie assigned periodicity to particles and thus defined their angular momentum as $mvr = n\hbar$ to fit observed phenomena. Because of this both the Lagrangian based Standard Model and String Theory derivatives of Quantum Theory can also predict effects but can never completely explain the causes. Lagrangians identify the observable peaks that can range from sine wave peaks, to triangle wave points, to quantum square wave energy states that may result from infinite odd subharmonic energies, but will never be able to absolutely define the energy transformations of the peaks' transition regions.

"The solution to any problem is in its proper statement."

Einstein felt "physical reality in terms of fields which satisfy partial differential equations without singularities," would lead to integral forms such as EM waves, particles, nuclei and atoms, and describe "a portion of space at whose boundaries electrical density disappears...[but] contains a total electrical charge whose size is represented by a whole number." He would not accept the Uncertainty in Quantum Theory's wave functions because he was seeking an explanation of quantum effects based on electrical and magnetic fields like those of Maxwell's $d^2E/dx^2 = u_o\epsilon_o\ d^2E/dt^2$ and $d^2B/dx^2 = u_o\epsilon_o\ d^2B/dt^2$ EM wave equations that could somehow capture themselves into integral structures. He almost succeeded save for a slight omission in Minkowski's Four Dimensional Space.

The one thing that Maxwell's partial differential EM wave solution recognized was the need for properties of space that permit the EM waves to occur. Einstein determined space must contract, and time dilate, to equate gravity and 1-dimensional inertia. However space must also be able to support angular momentum, and it must exhibit $u_o\epsilon_o$ permeability-permittivity to support electric and magnetic fields. Otherwise planets and electrons could not orbit stars and nuclei, and EM waves could not maintain their integrity.

Einstein and Maxwell showed that space and matter are codependent phenomena, that inertial energy manifests as a "mass" effect and associated space-time contraction-dilation, and that a reciprocal relation exists between EM wave momentum and the permeability and permittivity, since EM waves have the partial differential $d^2g/dx^2 = 1/v^2\ d^2g/dt^2$ general wave equation form so the speed of light and $u_o\epsilon_o$ equate by $1/c^2 = u_o\epsilon_o$.

The general wave equation equates velocity to the wave amplitude by $v^2 = d^2g/dt^2\ /\ d^2g/dx^2 = dx^2/dt^2$ and Maxwell's Equations show that $u_o\epsilon_o = d^2E/dx^2\ /\ d^2E/dt^2 = d^2B/dx^2\ /\ d^2B/dt^2 = dt^2/dx^2$ so $1/c^2 = u_o\epsilon_o$. They also show that the permeability-permeability of space is a partial differential relation of time varying electric and magnetic fields that results in an upper boundary condition of inertial mass at the speed of light by the $m = m_o\ /\ (1 - v^2/c^2)^2$ Lorentz Transform and $m = m_o\ /\ (1 - u_o\epsilon_o v^2)^2$.

This is significant since the $\mu_B = \frac{1}{2}e\hbar/m_e$ Bohr magneton shows a reciprocal $\mu_B m_e = \frac{1}{2}e\hbar$ mass and magnetic field relation. Maxwell's $\S\ E\ ds = -d\Phi_B/dt$ and $\S\ B\ ds = u_o\epsilon_o\ d\Phi_E/dt$ Faraday and Ampere law relations also show a differential relation between electric and magnetic field energy and space dimensions under angular momentum conditions, since they can be rewritten as $\S\ ds = -d\Phi_B\ /\ \S\ E\ dt = u_o\epsilon_o\ d\Phi_E\ /\ \S\ B\ dt$ so the space around the closed loop depends on the change in electric and magnetic fields within the loop.

Einstein equated inertial mass to effects on space-time dimensions and these interpretations of Maxwell's Equations equate the $u_o\epsilon_o$ properties of space and electric and magnetic fields to space-time dimensions. Thus an expanded interpretation of space's properties

can be formulated to show mass-charge equivalence just as Einstein showed mass-inertial energy equivalence. First, the structure of space must allow for angular momentum energies since it does occur and electric and magnetic fields are correlated by it. Second, the $u_o c_o$ permeability-permittivity of space requires a neutral ground state Electromagnetic field energy to exist in space since $u_o \epsilon_o = d^2E/dx^2 \; / \; d^2E/dt^2 = d^2B/dx^2 \; / \; d^2B/dt^2$.

To meet these conditions Minkowski's $ds^2 = dx^2 + dy^2 + dz^2 + dt^2$ Four Dimensional Space must be modified so independent time flow variables are incorporated in each dimension to allow for angular momentum's phase shifted 3-D energies. Otherwise angular momentum could not be sustained by space and the time dilation from these energies would not exist to maintain angular momentum's oriented inertias. Einstein showed that 1-D inertia derives from 1-D energy effects on space-time and the oriented 1-D inertias of 3-D angular momentum with precession are no different. He also showed by his $E = E_o/(1 - v^2/c^2)^2$ Lorentz Transform that an E_o ground state energy is required by space to support its inertial effects.

The simplest energy-space structure supporting these criteria is a 0 velocity EM wave defined by Maxwell's partial differentials with no singularities, constitutes an integral periodic quantum effect, and provides a reciprocal $u_o \epsilon_o$ permeability-permittivity effect for EM waves with velocity c by this ground state energy. The 2nd Law of Thermodynamics requirement that entropy increase in natural processes and Quantum Theory's dictum that all regions and energy states are accessible and available are also met. Energy in a 3-D oscillation, each out of phase in a precessional angular momentum, has a resultant that rotates by accelerating into available energy states and accessible regions according to the Maxwell-Boltzmann Distribution Law and thus constitutes continuous entropy increase.

A 3-D oscillation's resultant has a $\cos^{-1} 1/3^{\frac{1}{2}}$ oriented $\frac{1}{2}$-spin so space has oppositely orientated Pauli Exclusion Principle pairs to yield a neutral ground state and allow absorption of E and B field energies from polarized spin +1/-1 right/left hand EM waves. Each $\frac{1}{2}$-spin fermionic point and its oppositely oriented neighbor bonds to form bosonic ($\frac{1}{2}$-spin - $\frac{1}{2}$-spin) = spin 0 neutral space. EM wave fields realign the neutral oscillation energy pairs to spin +1 or -1 "excited" quantum energy states as the EM wave enters a region and decay of the state returns the EM wave's energy, oscillating with a wavelength dependent on the ratio of the EM wave's $E = mc^2$ energy at velocity c to space's $E_o = m_o/u_o \epsilon_o$ ground state energy.

Neither light nor space exhibits any apparent mass because angular momentum cancels inertial energy mass effects over its oscillation cycle but leaves light with an mc momentum in its motion direction and the reciprocal partial differential solutions for space and EM waves results in light's periodic integral structure. Proof of the EM wave and Dark Energy structures is shown by mass-charge energy equivalence like Einstein's inertial mass-energy equivalence. In ground state hydrogen the proton-electron charge dipole represents an excited state of Dark Energy with angular momentum. The charge

field energy and dipole velocity are E_o = 13.605698 eV and v_o = 2.187691411 x 10^6 m/s according to Bohr's analysis.

Einstein showed that compression of space and mass increase relate by the $(1 - v^2/c^2)^2$ Lorentz Transform and compressing hydrogen's charge field energy by angular momentum should yield a mass-charge equivalence. The Pythagorean result of orthogonal angular momentum energies is $2^{\frac{1}{2}}$ times the energy in either dimension and if the angular momentum precesses to form a spherical mass-charge energy structure the relativistic compression effect would compound to yield the $m_e = E_o (2^{\frac{1}{2}} c/v_o)^2$ = 0.51099906 MeV electron mass. This is the $E = mc^2$ equivalent inertial mass effect if a ground state charge field is accelerated to light speed by angular momentum.

This also explains the reciprocal $\mu_B m_e = \frac{1}{2} e\hbar$ mass-magneton effects since compressing the Dark Energy would also capture the magnetic field in direct proportion to the increase in mass. The electron's $\frac{1}{2}$-spin, size and charge, along with the proton's and neutron's and the nuclear binding energies, spins and magnetons for deuterium, tritium, helium-3 and helium-4 have also been derived by this line of reasoning. This analysis indicates that mass, gravity, size, spin, charge, magnetic and nuclear force effects all derive from EM waves with angular momentum in conjunction with stationary EM waves. Since EM waves are completely defined by Maxwell's partial differential wave equations this solution comports with Quantum Theory's Lagrangian description but without its uncertainty. (A complete description is available for review at www.mqnf.com.)