the general science journal

THE CONTROL OF THE NATURAL FORCES

Frank Znidarsic
Znidarsic Science Books

Revised 12/2012

ABSTRACT

An understanding of the natural world has progressed in the direction of higher energies. The stationary quantum state has emerged as a central theme within this quest. The stationary quantum states were used to explain the workings of nature. The emergence of the macroscopic multi-body cold fusion phenomena has allowed an understanding of the nature to progress in the direction of lower energies. Quantum effects emerge from the Newtonian classical realm at these intermediate energy levels. This author's qualification of this realm has revealed the transitional speed. The introduction of the transitional speed has provided a causative explanation for the quantum condition. This paper will produce the energy of the photon, the energy levels of the hydrogen atom, and the probability of transition as effects of the transitional speed. An understanding of the process of the quantum transition may lead to the development of many new technologies.

INTRODUCTION

Joseph von Fraunhofer devised the first spectrometer, in the early 1800's. He discovered, with his device, spectral lines within the Sun's light. He used these lines as reference points in the design of achromatic lenses.[1] Robert Bunsen and Gustav Kirchhoff, in the mid 1800's, discovered spectral lines in the light that emanated from the elements within the flame of their Bunsen burner.[2] Johann Balmer produced an empirical equation that described this spectrum, in the late 1800's.[3] Johannes Rydberg extended Baumer's formulation to the spectra of all of the elements.[4] These discoveries allowed astronomers to determine the elemental composition of stellar objects. These early scientists could not, however, provide a causative explanation for the spectral emissions.

In the early 1900's Max Planck offered an explanation for these spectral emissions. He introduced the idea that thermal energy is bundled into tiny quantum units.[5] Albert Einstein used Planck's constant and showed that the energy of light is bundled into particle like photons.[6] The principle of quantum correspondence emerged with the appearance of the photon. It states that the square of the amplitude of a classical light wave directly corresponds, in some limiting way, to the frequency of a photon. Niels Bohr applied Planck's construct to the atomic structure of the atom. Bohr's solar system like semi-classical model explained the emission spectrum of the atoms and the chemical properties of the elements.[7] According to classical electromagnetic theory of James Clerk Maxwell orbiting electrons should continuously emit electromagnetic energy.[8] Atoms emit packets of energy at random intervals. Bohr's model could not explain the stability of the stationary atomic states, produce the probability of transition, or explain why the frequency of the emitted photon is not coupled to the frequency of a stationary quantum state. Lewis deBroglie offered, what has now become, the contemporary solution to this problem. He proposed that the electron has wave like properties.[9] The electron does not accelerate around the nucleus, but rather, it encircles it in the form of a standing wave. A particle like photon is emitted as these standing waves instantaneously collapse. The emitted photon exists as both a wave and a particle. These properties are mutually exclusive and their simultaneous emergence is a paradox. In an attempt to reconcile some of these difficulties Bohr introduced the principle of complementarily. It states that the frequency of a quantum wave exists, in some mysterious way, as a complement to its particle of energy. This solution attempted to describe the quantum condition and, in the process, introduced many intractable problems. The deBroglie wave is a curious mathematical formulation that shrinks and swells with speed. It has no classical analog. No explanation was provided as to why the undulating deBroglie waves do not continuously leak

energy through a process of radiation. The problem of the stability of the atom was, in effect, transferred from the stationary quantum state to the deBroglie wave.

Max Born's Copenhagen interpretation attempted to get around these difficulties and stated that matter's deBroglie wave is not real.[10] Born's matter wave is a subjective construct of probability that exists only within a mathematical configuration space. Albert Einstein rejected the subjective nature of this construct and believed, until his death, that the theory of quantum mechanics was not complete.[11]

In the late 20th Century Frank Znidarsic observed a speed within some cold fusion and gravitomagnetic experiments. He discovered that speed is that of 'sound' within the nucleus. He produced a classical model of quantum reality that includes both the atomic spectra and this new observable. He discovered that the quantum condition is the result of a classical impedance match that occurs when the speed of light within the electronic structure of the atom equals the speed of 'sound' within its nuclear structure. Momentum is carried by the magnetic components of the force fields. Magnetism is not a conserved property. This model suggests that the magnitude of the magnetic, gravitomagnetic, and nuclear spin orbit forces converge during the quantum transition.

A FLOW OF ENERGY

Energy flows in a system of matched characteristic impedance and bounces around in a non-impedance matched system. A common example of an impedance matched system is the case where one billiard ball directly impacts a second billiard ball. The first ball stops and transfers all of its kinetic energy to the second ball. The second ball, neglecting friction, moves away at the speed of impacting ball. One burst of sound is emitted, likewise during the quantum transition a single photon is emitted. The emission of a single photon suggests that, during transition, the electron flows through a channel of matching characteristic impedance. As in the case of the billiard ball, this action is characterized by a match in speed of the interacting partners. The quantum condition is established as an effect of this process.

The electric field of the isolated, spin ½ , electron is asymmetric. It tends, like a football to roll on impact. The electron does not bounce, and it cannot be partially reflected. These restrictions confine the electron to the surface of a stationary quantum state. The electron can pass through this surface at points of matching impedance. Spin one particles are symmetric. These particles bounce, like a basketball, and do not need to follow paths of matching impedance. Spin one particles can bounce away their energy and they tend accumulate in lowest energy state of the system.

THE NEW OBSERVABLES

Thermal energy, nuclear transmutations, and a few high energy particles have reportedly been produced during cold fusion experiments. The transmutation of heavy elements has also been reported.[12,13,14] The name Low Energy Nuclear Reactions is now used to describe the process. The process was renamed to include the reported transmutation of heavy elements. According to contemporary theory heavy element transmutations can only progress at energies in the millions of electron volts. The available energy at room temperature is only a fraction of an electron volt. These experimental results do not fit within the confine of any contemporary theoretical constructs. They have been widely criticized on this basis. These experiments have produced very little, if no, radiation. The lack of high energy radiation is also a source of contention. Nuclear reactions can proceed, smoothly through the coulombic potential barrier, under a condition where the range of the nuclear spin orbit force is extended. The process of cold fusion may require a radical restructuring of the range and strength of the magnetic component of the strong nuclear force (the spin orbit force). The condition of the active nuclear environment provides some clues. Low Energy Nuclear reactions proceed in a domain of 50 nanometers.[15,] They have a positive thermal coefficient.[16] The product of the domain size and the thermal frequency is approximately one million meters per second. Equation #1 is an empirical formulation that expresses this observation. It produces the transitional speed (1,094,000 m/s) as the product of the angular frequency and the size of the active domain. The downshifted angular frequency is a fraction n of the electron's Compton frequency f_c. The size of the active domain is a multiple n of half the classical radius r_p of the electron.

The result (1) is the speed of a longitudinal sound wave S_n, across atomic distances, within a gas that is dissolved in a metallic proton conductor. S_n is associated with the speed of the free protons.

(1)

$$S_n = \left(\frac{2\pi f_c}{n}\right)(nr_p)$$

The gravitational experiments of Eugene Podkletnov involved the 3 megahertz stimulation of a 1/3 of a meter superconducting disk. These experiments reportedly produced a strong gravitational anomaly.[17, 18, 19,20] The results also do not appear to fit within the contemporary scientific construct. They have been widely criticized. It is assumed that the generation of a strong local gravitational field violates the principle of the conservation of energy. The strength of the electrical field can be modified with the use of a dielectric. The existence of a gravitational "di-force-field" no more violates the principle of the conservation of energy than does the existence of an electrical dielectric. The geometry of the superconducting structure provides collaborating information. The product of the disk size and the stimulation frequency expresses, as in the case with cold fusion, a speed of one meter million meters per second. This speed S_n may be associated with stimulated optical phonons within the superconductive structure. [21] The process of gravity modification may require a radical increase in the strength of the magnetic component of the gravitational field (the gravitomagnetic force).

THE SPEED OF SOUND WITHIN THE NUCLEUS

The energy produced by two interacting charges is expressed by Coulomb's Equation (2).

(2)

$$\text{Energy} = \left(\frac{Q^2}{4\pi e_0}\right)\frac{1}{r_x}$$

In order to analyze S_n this author refactored the constants in Coulomb's formulation, equation (2), into the form a spring, equation (3). The reformulation reveals a wavelike elastic constant and a particle like elastic discontinuity. It expresses the energy E of a force field that diminishes with the square of its displacement. It suggests that the electrical force is produced as a particle like discontinuity r_p disrupts the field of another electron. The force produced by the disruption is similar to the buoyancy force in water. The displacement r_p may be a classical effect that is associated with a maximum of elasticity. The classical radius of the electron $2r_p$ is a multiple of this point.

(3)

$$E = K_{-e}(2r_p)^2$$

The variable, classical elastic constant of the electron K_{-e} emerged from this redistribution. It is expressed in equation (4). The elastic constant of the electric field resembles that of a rubber band in that it starts at a maximum and decreases with displacement. The electron's wavelike properties emerge as effects of this elastic constant.

(4)

$$K_{-e} = \frac{29.05}{r}$$

The elastic constant of the electrical field equals the elastic constant of the strong nuclear force at points where the expansive electromagnetic force balances the compressive strong nuclear force. Under this condition the electrical elastic constant K_{-e} may be employed to produce the harmonic motion of a nucleon. The electrical force is expelled from the nucleus, does not act between nucleons, and was not factored into the calculation. The frequency of a longitudinal mechanical wave, at small displacements, was produced in equation (5) as a function the square root of the system's elastic constant divided by it mass. The elastic constant was doubled to account for the motion of a chain of interacting nucleons. As with all standing waves, harmonics n of this frequency exist.

(5)

$$f_n = \frac{n}{2\pi}\sqrt{\frac{2K_{-e}}{M_n}}$$

The elastic constant of the electron was inserted into equation (5) producing equation (6). S_n emerged as a product of the harmonic motion of the nucleons at a displacement equal to the Fermi spacing r_n of the nucleons. [22] The Fermi spacing (momentum spacing) is a little longer than the radius of a proton as a result of the movement of adjacent nucleons.

(6)

$$S_n = \frac{n}{2\pi}\sqrt{\frac{2(29.05)/r_n}{M_n}}r_n$$

The result S_n is the speed of "sound" within the nucleus. This speed is also exhibited across atomic distances within the active regions of cold fusion experiments (1). S_n is slightly dependent upon the number of neutrons. The kinetic isotope effect emerges from this dependency.[27] The Fermi momentum spacing is independent of the atomic number Z therefore the speed S_n is natural constant of nature. The quantum condition is established through the action of S_n.

THE ENERGY OF THE PHOTON

Max Planck introduced the quantum and, with it, offered a solution to the problem of spectral emission. As a conventional physicist Planck struggled to find a classical solution. Over one hundred years later the emergence of new observables has enabled Frank Znidarsic to propose one. The quantization of energy emerges as a classical effect of a condition where the speed of light within the electronic structure of the atom equals the speed of sound within its nuclear structure. The equalization of velocities aligns the impedance of the interacting states. Energy flows without bounce, in an impedance matched system, and the single step process emits only one photon. The speed of quantum transition was expressed as the product of frequency and wavelength in (7).

(7)

$$S_n = f_a \lambda_a$$

The frequency of the emitted photon is not that of any stationary atomic state. It does, however, equal the frequency of the atomic state f_a. The energy of a photon emerges as an effect of the interaction of the atomic length λ_a and an electrical charge. The simultaneous emergence of both the photon's frequency and energy is fundamental to Bohr's principle of complementarily. In combination, these affects reconcile the particle like and wave like duality of light.

Capacitance is a function of geometry. A flat plate capacitor was used, in this analysis, to qualify the geometry of a plain wave. The capacitance C of a flat plate capacitor of area A and spacing d is given in Equation (8).

(8)

$$C = \frac{e_0 A}{d}$$

This analysis considers an incoming traveling wave that interacts with a single electron. The geometry of the incoming plane wave is unknown. This geometry will be considered to be as simple as possible. It is cube with sides one wavelength long.

(9)

$$C = \frac{e_0 \lambda^2}{\lambda}$$

The reduction of (9) has shown in (10) that the capacitance experienced by a quantum is a function of the length λ.

(10)

$$C = e_0 \lambda$$

Equation (7) was solved for wavelength producing (11).

(11)

$$\lambda_a = S_n / f_a$$

The atomic length λ_a was simultaneously inserted into equation (10) producing (12). The solution sets the speed of "sound" in the nucleus S_n equal to the speed of light within the electronic structure of the atom. The plane wave collapses upon the electron at this speed. The process of speed matching, matches the impedance of the interacting partners. A single photon is emitted by the prompt action of the impedance matched, non-bouncing system.

Like a tidal wave, the voltage of the wave increases to conserve energy as the speed of the incoming wave collapses. The duality of matter and waves emerges as a condition of this action. In the rare case of bi-photonic emission harmonics of the nuclear speed are accessed. The capacitance of the light wave was expressed in terms of its frequency in (12).

(12)

$$C = \frac{e_0\ S_n}{f_a}$$

The energy of an electrical charge was expressed in terms of its capacitance in equation (13).

(13)

$$E = \frac{Q^2}{2C}$$

The simultaneous solution of equations (12) and (13) describes the classical path that the energy must take as it interacts with a single electron. Equation (14) was reduced by a factor of ½ to account for the root mean square energy of the incoming sin wave. The impedance of the interacting systems is matched and the energy of the photon emerges from the condition as a constant of the motion. Equations (12) and (13) reveal that this energy varies inversely with capacitance. The voltage produced by an electrical charge increases as its capacitance decreases. The energy of a photon is proportionate to the amplitude of this voltage. The energy of a photon and a classical wave are both functions amplitude. The relationship between the photon's energy and frequency that was described by Planck is dependent upon this voltage. The action of the amplitude of this voltage is fundamental to the principle of quantum correspondence.

(14)

$$Energy = [\frac{Q^2}{4\pi e_0 S_n}]f_a$$

The reduction of the terms within the brackets [ ] in (14) produced (15) Einstein's famous equation describing the photo-electric effect.

(15)

$$E = hf_a$$

The energy of a photon is a classical function of its amplitude. This amplitude was expressed in volts. The photon interacts with matter at points were the speed of 'sound' (longitudinal mechanical wave) within the nucleus equals the speed of light (transverse electrical wave) within the electronic environment. The photon exhibits particle like properties at these points. The action of light, at other points, is that of a wave. The frequency of the emitted photon is not that of any stationary quantum state, it is that of the transitional quantum state.

The Energy Levels of the Hydrogen Atom

Maxwell's theory predicts that accelerating electrons will continuously emit electromagnetic radiation and spiral into the nucleus. Bound electrons experience a constant centripetal acceleration, however, they do not continuously emit energy. Atoms emit random bursts of energy as their electrons transit between a set of allowed orbits. These allowed atomic orbits were quantified, by Bohr and Schrödinger, as points containing multiples of Planck's quantity of angular momentum. This qualification has no classical analog.

The amplitude of the fundamental harmonic motion of a standing wave is given in (16). The wave number is k and the angular frequency is ω. As with all standing waves, harmonics n of the natural frequency exist.

(16)

$$Y = \cos\left(\frac{2\pi x}{\lambda}\right)\sin(n\omega_{-e}t)$$

The elastic constant K_{-e} and the wave number $(2\pi/r_p)$ emerged from the refactoring of Coulomb's equation (3&4). These terms were factored into (16) producing (16A). The wave number was increased by two because the fundamental is one half of a wavelength.

(16A)

$$y = \cos\left[\frac{2\pi}{r_p}x\right] sin\left[n\sqrt{\frac{K_{-e}}{M_{-e}}}t\right]$$

A solution (ω/k) of (16A), yields (17), which describes the apparent speed of the electronic standing wave as the product of frequency and wavelength. The frequency emerges from the wave-like elastic constant and the wavelength emerges from the particle like elastic discontinuity. In combination, these affects reconcile the particle like and wave like duality of matter.

(17)

$$V = \frac{n}{2\pi}\sqrt{\frac{K_{-e}}{M_{-e}}}r_p$$

Znidarsic proposes that the transient stability of the atom is established through the pinning action of the elastic discontinuity r_p. Resonant vibration shakes the natural force fields away from the grip of the elastic discontinuity r_p. The amplitude of the vibration squared equals the probability of transition. An electron slips the grip of the discontinuity and flows through a channel of matching impedance. Nodes, of matching impedance, were qualified (18) by setting the speed of a longitudinal mechanical wave the nucleus S_n equal to the angular speed S of the stationary electron. The elastic constant of the electron K_{-e} was expanded and the function was multiplied by 2π to get the circumferential speed. The characteristic impedance of the interacting systems is aligned at the speed described by these frequencies and harmonics. Bohr's construct of the quantization of angular momentum, is dependent upon the classical conditions expressed within (18).

(18)

$$S_n = n\sqrt{\frac{29.05/r_x}{M_{-e}}}r_p$$

Equation (18) was solved for r_x resulting in (19). Note that 29.05 is replaced with F_{max}.

(19)

$$r_x = n^2 \left[\frac{F_{max} r_p^2}{S_n^2 M_{-e}}\right]$$

The quantity within the brackets [ ] equals the ground state radius of the hydrogen atom. The reduction of the terms within the brackets produced equation (20).

(20)

$$r_x = n^2 r_{+h}$$

The result r_x equals the principle radii of the hydrogen atom. The principle energy levels of the hydrogen atom were produced as a condition of matching impedance. This qualification is classical.

The effect of multiple nuclear electric charges Z increases the elastic constant K_{-e} of the system by a factor of Z (20B). The displacement r_p remains an independent constant of nature.

(20B)

$$\mathrm{y} = \cos\left[\frac{2\pi}{r_p} x\right] sin\left[n\sqrt{\frac{ZK_{-e}}{M_{-e}}}\, t\right]$$

A solution $2\pi(\omega/k)$ of (20B) is (20C). A harmonic Z of the nuclear speed Sn is selected as a simultaneous solution were the rotational frequency of the electron matches its elastic harmonic frequency. These conditions are simultaneously expressed in (20C).

(20C)

$$ZS_n = \mathrm{n}\sqrt{\frac{ZF_{max}/r_x}{M_{-e}}}\, r_p$$

The radii r_x are that of a single electron higher Z atomic ions. The energy levels of the heavier elements also exist as points of matching impedance.

ABOUT CHARACTERISTIC IMPEDANCE

The speed S is inversely proportional to the inductance and capacitance of the system.

(21)

$$S \alpha \frac{1}{\sqrt{LC}}$$

This author has also described the energy levels of the atoms in terms of an impedance match. Electrical characteristic impedance Ω also a function of the capacitance and inductance of the system.

(22)

$$\Omega = \sqrt{L/C}$$

A change in the dielectric of a material equally effects the characteristic impedance and the speed of light. The electrical properties of materials tend to vary and the magnetic properties remain mostly constant. The principle quantum number are effects of a change in the electrical constant. These states exist as points of matching speed. The principle spectral lines split into several fine lines under the influence of a magnetic field. Arnold Sommerfeld qualified these fine lines through the introduction of a second quantum number *"l"* and the third quantum number *"m"*.[23] Equations (21) and (22) diverge under a condition were the magnetic permeability of the material is varied. States of matching impedance are no longer associated with states of matching velocities. The fine structure of the atom emerges under this condition. The difference between the length of the longer fine and the length of the shorter fine line divided by the length of the longer line yields the fine structure constant. The origin of this constant has been a mystery. Richard Feynman stated, "Physicists put this number up on their wall and worry about it." This author has classically produced the fine structure α constant as the ratio of twice the transitional speed to the speed of light.[24]

(23)

$$\alpha = 2S_n/c$$

The index of refraction is determined by the dispersive properties of a stationary medium. It normally has a value of less than ten. The solution of (23) for (24) suggests that the index of refraction N_t of the transitional quantum state is in the hundreds.

(24)

$$N_t = \frac{C}{S_n}$$

This author suggests that the high index of refraction is set by the dispersive action of quickly moving particles.

The Intensity of Spectral Emission

Bohr's semi-classical atomic model could not account for the probability of transition or the intensity of the spectral lines. Werner Heisenberg arranged the properties of the electron on a matrix. Planck's empirical constant was inserted ad-hoc into the formulation as a commutative property of matrix multiplication. Heisenberg's solution produced the intensity of the spectral emission. The particle like solution established the field of quantum physics, however, it did not provide visual image of the process. Lewis deBroglie proposed that matter is a wave. Erwin Schrödinger incorporated deBroglie's electron waves into a solution that also produced the intensity of spectral emission. The introduction of the deBroglie wave produced a cleaner solution but, in the process, it introduced a conceptual problem. How do the discrete properties of matter emerge from a continuous wave? Schrödinger proposed that the superposition of an infinite number of waves localized the wave function. Wave patterns repeat at intervals. The solution suggests that the particle appears at intervals in remote locations. Matter's particle nature did not spontaneously emerge from the analysis and Planck's empirical constant had to be, once again, injected ad-hoc into the solution.

A particle emerges, from the probability wave, upon the immediate collapse of the wavefunction. The solution attempted to extract a particle out of a wave and to solve the problem of wave particle duality. The interpretation did not provide for a mechanism to bind the electron to a state, disclose the whereabouts of configuration space, or explain how a wavefunction collapses at superluminal velocities

The great scientists knew nothing of the path of the quantum transition.[25] Their solutions did not incorporate the probability of transition. Znidarsic claims to have discovered the path of the quantum transition. His construct is centered upon the probability of transition. The amplitude (displacement) of vibration at the dimensional frequency of S_n squared is proportionate to the probability of transition.

Equation (19) was presented as (25) below. The equation expresses the atomic energy levels r_a of an electron attracted to a single nuclear electrical charge. In atom of higher atomic number Z the screening effect of the other electrons produces a similar result

(25)

$$r_a = n^2 \left[\frac{F_{max} r_p^2}{S_n^2 M_{-e}}\right]$$

Light attempts to interact with matter through every path. The only path that is open to it is one of matching impedance. This path was characterized by a state where the speed of sound in the nucleus equals the frequency of the atomic state. The photon has no elastic or orbital restrictions and can access of harmonics n of the nuclear speed S_a. A factor of 2π relates the transverse atomic speed to the longitudinal nuclear speed (light speed=sound speed). The frequency of the photon was expressed as a condition of its atomic path in (26).

(26)

$$nS_n = (2\pi f_a) r_a$$

The speed was inserted into (25) and produced (27). These conditions were expressed in (27).

(27)

$$r_a = n^2 \left[\frac{F_{max} r_p^2}{(2\pi f_a) r_a (nS_n) M_{-e}}\right]$$

The reduction of (27) produced (28).

(28)

$$r_a^2 = \mathrm{n}\left[\frac{F_{max} r_p^2}{(2\pi f_a) S_n M_{-e}}\right]$$

The constants in equation (28) were regrouped and the numerator and denominator were multiplied by a factor of 4π resulting in equation (29).

(29)

$$\mathrm{r_a}^2 = [\frac{4\pi F_{\max} r_p{}^2}{S_n}](\frac{n}{8\pi^2 M_{-e} f_a})$$

The factors within the [ ] equal Planck's constant. The reduction of the terms within the brackets produced, Equation (30), the known formulation for the amplitude of electronic harmonic motion squared.

(30)

$$r_t^2 = \frac{nh}{8\pi^2 M_{-e} f_a}$$

This formulation expresses the intensity of the light emitted by the harmonic motion of an electron. The intensity of this emission is a function of the probability of transition. The probability of transition is proportionate to the amplitude of the vibrational motion squared. The solution requires no probability waves, special configuration spaces, or paradoxical quantum principles.[26]

A CONVERGENCE OF THE MOTION CONSTANTS

It has been shown that the quantum condition arises through the action of an impedance match. It resembles that of one billiard ball hitting directly into another billiard ball. All of the energy is transferred at once and the speed of the exiting billiard is that of the incoming billiard. Impedance matched atomic states emit one photon, not a progressive series of lower energy photons. This single step result requires, that the forces that mediate the mechanical and electrical waves, interact at once. This action progresses by means of a convergence in the magnetic component of the force fields. At this instant electromagnetic and mechanical waves propagate at the same speed. The ease in which the fields can be driven into this configuration is proportional to the probability of transition. This author suggests that impedance matching property of the transitional quantum state extends to the dynamic component of each of the natural forces. These magnetic components are not conserved and can be amplified under certain conditions The dynamic magnetic component of the natural forces interact strongly and at range during the quantum transition. This author's theorem, "The constants of the motion tend toward the electromagnetic in a Bose condensate that is stimulated at a dimensional frequency of 1.094 megahertz-meters" describes the strong gravitomagnetic and electromagnetic interaction that accompanies this process.

The experimental results of cold fusion experiments also support the idea that the natural force interact strongly. These reactions proceed without producing a commensurate amount radiation. No radiation will be emitted after the range of the strong nuclear spin orbit force has extended beyond that of the electromagnetic.

The process of quantum transition also supports the idea of a convergence in the motion constants occurs. This process changes the state of a particle. The frequency of an emitted photon, for example, is not that of any stationary quantum state. The frequency of the emitted photon is an effect of the action of the transitional quantum state. The reconfiguration of a state is facilitated through the strong interaction of natural forces.

The flow of the mathematics within this paper also support the idea of a convergence in the motion constants occurs. The radius r_p rests just outside of the proton radius. It is the point where the strength of a proton's expelled nuclear-magnetic and electro-magnetic fields set. The equalization of these magnetic fields establishes the transitional atomic state as a point magnetic continuity.

The radius $2r_p$ is at a point where the electrical force between two electrons is 29.05 Newtons. Einstein's formula for gravitational induction (31-left) was set equals to Newtown's gravitational formulation (31-right). The solution of (31) for the unknown force (dp/dt) exerted by the gravitational field yields 29.05 Newtows (F_{max}). The equalization in the force that is exerted by the electromagnetic, and the gravitomagnetic fields establishes the transitional atomic state as a point electromagnetic and, gravitomagnetic continuity.

(31)

$$\frac{G}{c^2 2r_p}\frac{dp}{dt} = \frac{GM_{-e}}{(2r_p)^2}$$

The Classical deBroglie Wave

Equation (1) was solved for frequency and n was set to one in equation (33). The result is the Compton frequency of the electron. The frequency and displacement are expressions of the spin of the system.

(33)

$$f_c = \frac{S_n}{2\pi r_p}$$

The electron undulates, at the Compton frequency, in simple harmonic motion. This motion is a function of the elastic constant of the electron at a displacement equal to the ground state radius of the hydrogen atom (34).

(34)

$$f_c = 1/2\pi\sqrt{K_{-e}/M_{-e}}$$

Current models offer no explanation as to why the undulating electronic waves do not continuously radiate energy. This issue was brushed aside in the Copenhagen Interpretation of quantum physics. Classical systems are constructed by fastening components together. Fasteners are mechanical discontinuities. The same binding mechanism can attach a field. The electromagnetic field is, for example, pinned into the structure of a superconductor by introduced defects (discontinuities). This author has suggested that mass and kinetic energy are pinned into the structure of matter at elastic discontinuities. This energy is shaken free of this discontinuity through the action of a vibration at the dimensional frequency of S_n. A particle like elastic discontinuity r_p appears in equations (3) and (17). The discontinuity acts as a pilot and prevents the continuous emission of the wave. The use of a single binding mechanism, in both classical and quantum systems, is a simplification. This simplification is in accordance with principle of Occam's razor. The phase speed of disturbances within the pinned fields is luminal. The group speed V of the packet is that of the discontinuity. The condition resembles that of a stiff imaginary bell. Sound within such a bell would propagate at the phase speed c. The entire bell would swing at the group speed V. DeBroglie suggested that the matter wave naturally emerges, from the superposition of the Compton wave and its Doppler shifted refection, under this condition. Classical Doppler shift is given in equation (35).

(35)

$$f_2 = f_1(1+-v/c)$$

The amplitude of a Compton wave, as given in equation (36), is the superposition of the wave and its Doppler shifted reflection. The phases of the waves, at time zero, were set 90 degrees out of phase by the addition of π. The amplitude of this wave at time zero is zero. This is the condition at the surface of matter.

(36)

$$f(t) = \sin(2\pi f_c t + \pi) + \sin(2\pi f_c (1 \pm v/c)t)$$

A maxima in the wave was produced by setting the phases, σ, of the waves equal. This is the condition at the center of the wave.

(37)

$$\sigma_1 = \sigma_2$$

(38)

$$2\pi f_c t + \pi = 2\pi f_c t \ (1 \pm v/c)$$

Replacing the Compton frequency with its contemporary value of the Compton frequency resulted in equation (39).

(39)

$$2\pi (Mc^2/h)\, t + \pi = 2\pi (Mc^2/h)\, t \ (1 \pm v/c)$$

The reduction of equation (39) yields equation (40).

(40)

$$ct = \pm \frac{h}{2Mv}$$

This author's interpretation states that the phase speed of the matter wave is luminal. This luminal displacement ct was replaced, under this interpretation, with the wavelength of the deBroglie wave. The result, equation (41), is the deBroglie wave of matter.

$$\lambda_d = \frac{h}{Mv} \tag{41}$$

Schrödinger incorporated Planck's constant and deBroglie's waves within his wave equation. Schrödinger's wave equation is currently held to be an irreducible tenement of nature. It describes most of physics and all of chemistry. This author has produced Planck's constant and the deBroglie wave from a fundamental classical argument.[26] This emergence has provided a classical foundation for the Schrödinger wave equation. No special configuration spaces were required.

This line of reasoning was extended to produce a unification of quantum physics and Special Relativity.

Refer to (http://www.wbabin.net/Science-Journals-Papers/Author/913/Frank,%20Znidarsic)

THE DISTRIBUTION OF AN ATOM'S ELECTRONS

The Pauli exclusion principle, as expressed in (42), is the quantum mechanical principle that describes the number of electrons in each atomic orbit number n.

(42)

$$n_{-e} = 2n^2$$

Equation (43) gives (ref 20C) the radii of the atomic orbits as points of matching impedance. Harmonics n of the standing electronic wave exist. The radius of the orbit ($n^2 r_g$) increases with the square (n^2) of the harmonic n and holds the Compton frequency of the electron constant. The atomic radii are expressed in multiples of the ground state orbit r_g. The quantum condition may also be derived given, the Compton frequency of the electron and Znidarsic's elastic constant K_{-e} and wave number ($2\pi/2r_p$.)

(43)

$$ZS_n = \mathrm{n}\sqrt{\frac{(ZF_{max}/\pm n^2 r_{g)}}{M_{-e}}}\ r_p$$

Points of matching impedance are given, as before, in (43). No accessible points of matching impedance exists below the ground state orbit r_g therefore shrunken atoms are not found in nature. Positive and negative radii $\pm r_g$ exist. Points of matching impedance reside along these radii. The electrons of the ground state orbit of an atom rest at two points of matching impedance.

The radius of the second orbit (n=2) of the atom is four times (2^2) that of the first. Equation (43) suggests that points of matching impedance exist at integer multiples of the ground state radius. Eight points of matching impedance ($\pm 2^2$) reside in the second principle orbit of the atom. The second principle atom orbit can hold eight electrons. This analysis can be extended to all of the atomic orbits.

The distribution of the electrons within the atom is determined from the Newtonian parameters of mass, elasticity, elastic limit, and bounce. Elastic energy is exchanged to and from kinetic energy during a bounce. Electrons (all spin ½ particles) do not bounce. These particles cannot bounce away their energy and must reside at points of matching impedance.

NEW TECHNOLOGIES

This analysis suggests that the process of vibration may force a macroscopic Bose condensate into a state of quantum transition. Trillions of atoms will be adjoined within a single transitional state. Strong local gravitational and long range nuclear forces will be induced. The use of these strong, long range forces could provide new sources of propulsion, allow for the reduction of nuclear waste, and lead to the development of new sources of energy.

CONCLUSION

The field of quantum physics was revolves around the stationary quantum state. New observables have emerged from experiments involving low energy nuclear reactions. This author, with the use of these observables, has developed results as a condition of the transitional quantum state. These results provide a causative classical explanation for the quantum condition and may lead to the development of revolutionary new technologies.

NOMENCLATURE

F_c = 1.236×10^{20} Hertz, the Compton frequency of the electron
F_{max} = 29.05 Newtons, the electron's force maximum
K_{-e} = $29.05/r_x$ Newtons/meter, the elastic constant of the electron
M_{-e} = 9.109×10^{-31} kg, the mass of the electron
M_n = 1.67×10^{-27} kg, the mass of a nucleon
r_p = 1.409×10^{-15} meters, the radius of a nucleon's magnetic field
r_{+h} = $.529 \times 10^{-10}$ meters, the radius of the hydrogen atom
S_n = 1.093486×10^{6} meters per second, the speed of sound in the nucleus
r_n = 1.36×10^{-15} meters , the nuclear Fermi momentum spacing

ZNIDARSIC'S THEROMS

1. The constants of the motion tend toward the electromagnetic in a Bose condensate that is stimulated at a dimensional frequency of 1.094 megahertz-meters

2. Electrons do not bounce

REFERENCES

1. I. Bernard Cohen, Henry Crew, Joseph von Fraunhofer, De Witt Bristol Brac, *The Wave theory, light and Spectra*. Ayer Publishing, 1981
2. Robert Bunsen, Journal of the American Chemical Society, Volume 22, 900
3. L Hartmann, Johann Jakob Balmer, Physikalische Blätter 5 (1949), 11-4
4. W. Ritz, *Magnetische Atomfelder und Serienspektren*, Annalen der Physik, Vierte Folge. B and 25, 1908, p. 660–696.
5. Planck Max, *On the Law of the Distribution of Energy in the Normal Spectrum*, Annalon der Physik, Vol. 4, p 553, (1901).
6. Einstein Albert, *Development of our Conception of the Nature and Constitution of Radiation*, Physikalische Zeitschrift 22, (1909)
7. Bohr Niels, *On the Constitution of Atoms and Molecules*, Philosophical Magazine, Series 6, Vol. 26, pp 1-25 (1913)
8. Maxwell James Clerk, *A Dynamical Theory of the Electromagnetic Field*, Philosophical Transactions of the Royal Society of London, Vol. 155, (1865)
9. Lewis deBroglie, *Recherches sur la théorie des quanta* (Researches on the quantum theory), Thesis, Paris, 1924
10. Max Born, *The Statistical Interpretation of Quantum Mechanics*, Nobel Lectures, 1964
11. A Einstein, B. Podolsky, and N. Roses, *Can Quantum-Mechanical Description of Physical Reality Be Considered Complete*, Phys. Rev. 47, 777 - 780 (1935)
12. Miley George H., *Nuclear Transmutations in Thin-Film Nickel Coatings Undergoing Electrolysis*, 2nd International Conference on Low Energy Nuclear Reactions, (1996).
13. Mosier-Boss, Szpak S., Gorden F.E. and Forsley L.P.G., *Use of CR-39 in Pd/D co-deposition Experiments*, European Journal of Applied Physics, 40, 293-303, (2007)
14. Storms Edmond, Cold Fusion, *A Challenge to Modern Science*, The Journal of Scientific Exploration, Vol 9, No. 4, pp 585-594, (1995)
15. Rothwell Jed, Infinite Energy, Issue 29, p 23. (1999) "50 nano-meters ..is the magic domain that produces a detectable cold fusion reaction"
16. Arata Y. and Fujita H., Zhang Y., *Intense deuterium nuclear Fusion of Pycnodeuterium-Lumps Coagulated Locally within highly Deuterated Atomic Clusters*, Proceedings of the Japan Academy, Vol. 78, Ser.B, No.7 (2002)
17. Li Ning and Torr D.G., *Gravitational effects on the Magnetic Attenuation of Superconductors*, Physical Review B, Vol 46, #9, (1992)
18. Reiss Harrald, *Anomalies Observed During the Cool-Down of High Temperature Superconductors*, Physics Essays, Vol. 16, No. 2 (June 2002).
19. Tajmar M., deMathos C, *Coupling of Gravitational and Electromagnetism in the Weak Field Approximation*, http://arxiv.org/abs/gr-qc/0003011
20. Podkletnov E. and Levi A.D., *A Possibility of Gravitational Force Shielding by Bulk YBa2Cu307-x Superconductor*, Physica C, vol 203, pp 441-444 (1992).
21. Papaconstantopoulus D. A. and Klein B. M., *Superconductivity in Palladium-Hydrogen Systems*, Phys. Rev. Letters (July 14, 1975)
22. M. Modarres, *Momentum Distributions of Nuclear Matter*, 1987 *Europhys. Lett.* 3 1083
23. A. Sommerfeld, *Principles of the Quantum Theory and the Bohr Atomic Model*, Naturwissenschaften (1924), 12 1047-9
24. Richard Feynman, *The Strange Theory of Light and Matter*, 1988
25. The Lex Foundation, *What is Quantum Mechanics*, page 189, 1996
26. Znidarsic Frank, *A Reconciliation of Quantum Physics and Special Relativity*, The General Journal of Physics, Dec 2005, http://www.wbabin.net/science/znidarsic.pdf
27. http://en.wikipedia.org/wiki/Kinetic_isotope_effect