the general science journal

THE ELASTIC LIMIT OF SPACE AND THE QUANTUM CONDITION

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Znidarsic Science Books

Revised 9/2012

ABSTRACT

The quantum condition describes the angular momentum of a quantum system. This angular momentum is a multiple of Planck's constant. Max Planck, Niels Bohr, and Albert Einstein sought a classical explanation for the quantum condition. Ernest Rutherford also looked for a classical solution, gave up, and began his work with the nucleus. It has now been over one hundred years since a classical solution was sought. Science has moved on and it is now assumed that there is no causative explanation for the quantum condition. There currently is no causative classical explanation for the cause of spin, for the duality of particles and waves, for the existence of zero point energy, or for the origin of uncertainty. It is believed that these phenomena exist only within the quantum realm. According to this philosophy the everyday classical realm is only a subset of this mysterious quantum realm.

Frank Znidarsic discovered a causative classical explanation for the quantum condition. The quantum condition emerges as an effect of a classical limit in elasticity. The introduction of an elastic limit provides a new understanding of the mysterious quantum realm. According to Znidarsic's philosophy the properties of the quantum realm are special condition within the laws of Newtonian mechanics.

INTRODUCTION

The force produced by a spring equals the product its constant K_s and its displacement x (1). All natural quantities, within a finite universe, are limited. Springs have a classical limit to which they can be stretched. A spring stretched beyond its limit will inelasticity deform.

(1)

$$Force = K_s x$$

The intensity of the electric field is a function of the geometry its field. This geometry was measured in units of reciprocal capacitance (2). This geometry was qualified in units of capacitance in order to describe the effect within fields of all geometric shapes.

(2)

$$Intensity = Q_{-e}\frac{1}{C}$$

The spring displacement x in a mechanical system is conceptually equivalent to the reciprocal of the capacitance (1/C) in an electrical system. Like the force on a spring in the classical realm, the intensity of an electrical field will reach a finite limit. The electron inelastically deforms as it is compressed beyond its limit of elasticity.

The geometry at which the electron reaches a limit in its elasticity was qualified in units of capacitance (C_q =1.5676 x 10^{-25} Farads). The capacitance of a sphere of radius $2r_p$ equals 1.5676 x 10^{-25} Farads. The quantum condition emerges as an effect of this classical maximum of elasticity.

THE HISTORICAL FACTORING

Since the days of Faraday, the force between two electrical charges has been described with a force that diminishes with the square of their separation. This force has been qualified (3) as the product of Coulomb's constant K_c and the reciprocal of the separation distance squared.

(3)

$$Force = \frac{K_c Q^2}{r^2}$$

The energy contained by of force field is proportional to the integral through which the force acts (4).

(4)

$$Energy = K_c \int_{\infty}^{r} \frac{1}{r^2} Q^2 dr$$

The solution of (5) gave the energy of the electromagnetic field as a function of displacement.

(5)

$$Energy = -\frac{K_c Q^2}{r}$$

Historically Coulomb's constant K_c is factored into the form of Equation (6).

(6)

$$Energy = -\frac{Q^2}{4\pi e_0 r}$$

The result Coulomb's equation (6) has been fundamental to our understanding of the natural realm. It has provided the basis for much of our technology. Maxwell extended (6) and showed that the factors e_o (the permittivity of free space) and u_0 (the permeability of free space) determine speed of light (6B).

(6B)

$$c = \sqrt{\frac{1}{e_0 u_0}}$$

These results were a crowning achievement of classical physics. In spite of these results the philosophy of classical physics could not offer an explanation for the quantum condition.

A NEW FACTORING

It order to provide an new understanding of these quantum mysteries the electrical force was expressed as the elastic force of a spring (6B).

(6B)

$$Force = -Kx$$

The elastic limit of the electrical field was expressed in (7) as the product of a pressure P(r) acting upon and an area. The area under the curve of the integral is that of a square surface.

(7)

$$Force = P(r)\int_0^d 2x\,dx$$

The pressure P(r) varies inversely with displacement from the center of the electron. A maximum of force F_{max} is exerted by two electrons compressed to within one classical radius of each other $2r_p$. The limit of integration emerged as an effect of this boundary condition (7B). Equation (7B) expresses the force necessary to poke a hole in an electric field of area $2r_p^2$.

(7B)

$$Force = P(r)\int_0^{2r_p} 2x\,dx$$

A solution of (7B) gave (8), the force of the electron as a function of a pressure and the area $(2r_p)^2$.

(8)

$$Force = -P(r)(2r_p)^2$$

The force between two electrons compressed to within $2r_p$ is 29.05 Newtons. The force diminishes inversely with the square of the displacement r from this point. The force exerted upon the elastic discontinuity $2r_p$ varies with the intensity of the electric field just as the bouncy of a Zeppelin varies inversely with the density of the air at a certain altitude. The buoyancy of a ship in water is described, in a similar way, by its displacement. It is, in fact, common practice to express the resultant force within a fluid medium in this way. The electric field is an encompassing fluid medium and, as such, its formulation by such a construct is quite natural. The factor $(29.05/r^2)$ qualified the pressure P(r) in (9). The pressure is expressed in Newtons per square meter. Equation (9) gives the same resultant force as does Faraday's Equation (3).

(9)

$$Force = -\left(\frac{29.05}{r^2}\right)(2r_p)^2$$

The elastic energy (9A) is the integral of the distance through which the force acts. The integral (9A) expresses the energy necessary to move the elastic discontinuity of one electric field within the field of another.

(9A)

$$Energy = (2r_p)^2 \int_{\infty}^{r} \frac{29.05}{r^2} dr$$

The solution of (9A) yields the energy of the electric field (9B) in the mathematical form of a spring. Equation (9B) is recursive in that the second integral of (6B) produced the same mathematical form (the form of a spring). The benefit of the double integration is that constants of the motion naturally emerge from the boundary conditions. The double integration, for example, has revealed that the factor of ½ does not appear as a coefficient in a formulation expressing the elastic energy in a medium that varies inversely with the square of its displacement. Equation (9B) produces the same quantity of energy as does Faraday's Equation (6). A new set of factors (29.05/r), and $2r_p$ emerged within Znidarsic's factoring. The factor (29.05/r), is the elastic constant of the electric field K_{-e} and the displacement $2r_p$ is associated with the wave number $(2\pi/2r_p)$of the electric field.

(9B)

$$Energy = -\left(\frac{29.05}{r}\right)(2r_p)^2$$

Both (6) and (9B) gave the energy associated with interacting charges. The refactoring of Coulomb's equation extended (9B) and produced the elastic constant K_{-e} and the wave number $(2\pi/2r_p)$ of the electric field. These factors determine the quantum condition. The elastic constant K_{-e} determines the wavelike properties of stuff and the wave number $(2\pi/2r_p)$ determines the particle like properties of a things. These factors express the duality of nature just as Coulomb's original equations expressed the speed of light. The implications of Maxwell's (6B) and Znidarsic's formulations are both wide ranging and instructive.

THE WAVELIKE PROPERTIES OF STUFF

The mass of the electron oscillates in classical harmonic motion at its fundamental Compton frequency (10). The terms in (9B) were used to formulate this harmonic motion. A principle quantum number of the hydrogen atom n and the radius of the corresponding orbit r have to be inserted into (10), (11), and (12) ad-hoc. In this author's paper, "The Control of the Natural Forces" these parameters are produced from a fundamental analysis. Set the elastic constant K_{-e}, (29.05/r) for now, to the ground state radius of the hydrogen atom (29.05/.529 angstroms) and set n to one. The result f_c is the Compton frequency of the electron.

(10)

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

The superposition of the Compton frequency and its Doppler shifted reflection equals the deBroglie wavelength of matter wavelength. The deBroglie wavelength, in turn, establishes the foundation for the Schrodinger's wave equation. Special Relativity also emerges, from the restrained wave, as an effect of the phase of its kinetic and potential energy.

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

The emergence of the elastic constant K_{-e} provides a classical framework that describes the wave like properties of matter.

THE PARTICLE LIKE PROPERTIES OF THINGS

The energy of the electric field, was expressed in terms of mechanical spring in equation (7). This solution describes the energy of the electric field in terms of the product of the elastic constant K_{-e} and twice a discontinuity of length r_p squared. The displacement r_p equals the radius at which the electrical field begins to inelastically deform when compressed. It also equals one half the classical radius of the electron. The solution suggests that the electromagnetic force is produced as one electromagnetic field tries to expel or induct the elastic discontinuity of another electromagnetic field. The resultant force is similar to the force of bouncy in water. This classical affect produces the force that is normally assigned to the electric charge. Conventional electric charges come in two flavors positive and negative. The electric field of the photon (or a long wavelength radio wave) are is not attracted to an electrical charge. This suggests that the electrical field comes in a third neutral flavor. The condition under which the discontinuity was formed, as observed in a superconductor, tends to lock in or lock out a quantity of force field. The magnitude of this trapped or expelled field is correlated with the sign (positive or negative) of the static electric field. The electric charge comes in a single flavor, it is the condition of the discontinuity that is variable. A resultant electrical force is produced as the superposition of the two discontinuities tends to restore the composite field to its neutral condition.

The electromagnetic field of a photon flies free. The electromagnetic field of the electron and proton is attached. The elastic discontinuity attaches the electromagnetic field to a particle. These affects reduce of the number of actions that produce the electromagnetic force to one. This result is in accordance with the principle of Ockham's Razor.

A positive sign will be assigned to the elastic discontinuity of the electron effectively correcting the signing error of Benjamin Franklin. The concept of an elastic displacement is fundamental to the construct of an electric charge in that it reduces the number of mechanisms that impart electrical forces to one, it does not require a separate set quantum rules, and it reveals the mechanism (a classical discontinuity) that pins the force fields into the stationary states of matter.

The collapse of the wavefunction and the non-local nature of the quantum realm provide support for the existence of an elastic discontinuity. Given that the elastic discontinuity encloses a fixed number of charges, the energy that it contains is independent of the size, shape, or position of the discontinuity. The zero energy elastic discontinuity is able to immediately collapse. This movement is associated with quantum entanglement. The emergence of the discontinuity r_p provides a classical framework that describes the particle like properties of matter.

THE SPEED OF ATOMIC ELECTRONS

Spin expresses the intrinsic angular momentum of a particle. It is considered to be exclusively of a quantum origin. It is often used to demonstrate that Newtonian mechanics does apply on the quantum scale. The amplitude of a traveling electronic wave was described in (11A) as the cosine of the difference of its wave number ($2\pi/\lambda$) and its angular frequency ω_{-e}. Harmonics of the natural frequency do not emerge within traveling waves. Waves of number n exist.

(11A)

$$Y = \cos\left[\frac{2\pi n x}{\lambda} - \omega_{-e} t\right]$$

.

The terms in the refactoring of Coulomb's equation (9B) form a subset from which the wave number and angular frequency emerge (11B).

(11B)

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

The solution of (ω/k) of (11B) gives (11C). The solution (11C) was multiplied by 2π to give the circumferential velocity. K_{-e}. was replaced by the expanded elastic constant. The expanded elastic constant was set to the radii of the hydrogen atom. The speed S_a is of a full wave, as expressed by $2r_{p,}$ and is always twice that of highest accessible harmonic of the nuclear velocity.

(11C)

$$S_a = \frac{1}{n}\sqrt{\frac{29.05/(n^2 r_{+h})}{M_{-e}}}\, 2r_p$$

Equation 11C was reduced. The result (11D) gave the circumferential speeds S_a (2.18 million meters per second/n^2) of hydrogen's electrons.

(11D)

$$S_a = \frac{1}{n^2}\sqrt{\frac{29.05/r_{+h}}{M_{-e}}}\, 2r_p$$

The speed S_a is establishes the spin of the hydrogen's electrons. Spin emerged as a classical effect of mass, elasticity, and elastic limit.

The terms in (10) form a subset from which Planck's constant emerges. Planck's is expressed in Joules-seconds and is, as such, is the product of energy and time . The result (12) is the product of the rest energy of the electron and time. Time was expressed as the reciprocal of the natural Compton frequency of the electron. The electron's wave like and particle like properties classically emerge from its mass, elasticity, and elastic limit (12).

(12)

$$\frac{h}{2\pi} = (M_{-e}c^2)\frac{1}{n\sqrt{\frac{K_{-e}}{M_{-e}}}}$$

The point like electrical charge appears to reside within the bounds of $r_{p.}$ The radius r_p is intrinsic to equation (12). The bounds of the elastic discontinuity r_p act as a Faraday cage. The position of the apparent electrical charge, within a Faraday cage, cannot be detected from outside of the cage. This affect produces an amount of classical uncertainty equal to r_p. If (12) is reduced by a factor of two, the Heisenberg uncertainty relationship, as expressed between energy and time, emerges as an effect of this classical uncertainty. In combination a particle like elastic discontinuity r_p and a wave like elastic constant K_{-e} establish a classical foundation that determines the structure of the quantum realm.

THE GRAVITATIONAL FORCE ESTABLISHES THE AN ELASTIC LIMIT

Size is a relative measure when it comes to most things. No general principle of relativity applies to the size of the universe and to the size of elementary particles. The sizes of these entities can only be the unique values that they are. Paul Dirac linked the size of the universe and the size of elementary particles in his riddle of large numbers. Dirac's ideas, in this area, were dismissed as a mathematical coincidence. Znidarsic extended Dirac's idea and demonstrated a link between the geometry of the universe and the discontinuity $r_{p.}$. The universe contains an equal number of positive and negative charges. The net electrical field produced by these opposing charges is zero and an isolated electrical field has no affect upon the aggregate energy of the universe. The energetics of this isolation allow an electrical field to increase without bound. A shielded electrical field does, however, experience a minimum of intensity at the visible radius of the universe. The electrical capacitance C_u of a sphere with a radius (r_u) of 13.4 billion light years (1.25×10^{26} meters) was derived in (13) [2].

(13)

$$1.4x10^{16} Farads = 4\pi e_0 r_u$$

The gravitational force experiences no shielding and a residual of gravitational potential builds up. This residual of gravitational potential establishes the negative gravitational potential of the universe. The positive energy of the universe is balanced by this negative gravitation potential. A maximum of gravitational potential energy exists at the edge of the visible universe. Everywhere from there is down and is of less potential. The geometry, of this maximum of potential, was qualified with a maximum of gravitational capacitance. The gravitational force between a proton and an electron is 2.27×10^{39} times weaker than the electrical force.

The electrical capacitance of a sphere, as large as the visible universe, was reduced by the amount of the gravitational coupling constant. Equation (13) derived a minimum of electrical capacitance with this technique. The result (14) equals a quantum of capacitance C_q Farads.

(14)

$$1.5x10^{-25}\ Farads = \frac{C_u}{(2\pi)^2(2.27x10^{-39})}$$

The origin of the factor of 2π squared is unknown. It may be a geometric constant related to the doubly centric nature of a hypersphere.

Matter energetically couples to the gravitational background at the surface of a hypersphere. This surface contacts matter within the three dimensional classical realm. The positive potential energy of a force field cannot exceed a maximum of negative gravitational potential. The force field will inelasticity deform when compressed or stretched beyond this limit. The geometric effect, of this coupling, was qualified in units of capacitance. The electric field experiences a maximum in intensity when compressed to a geometry described by a quantum of capacitance. This maximum of intensity establishes the discontinuity r_p as a classical property of the visible universe. The emergence of the elastic discontinuity of displacement r_p provides a classical framework that determines many of the quantum properties of mater and energy.

THE ELASTIC LIMIT AND THE STRONG NUCLEAR FORCE

The strong nuclear force is hundreds of thousands of times stronger than the electromagnetic. It drops off in a non-linear fashion near the edge of the nucleon. It reaches its half power point at a displacement of about .8 Fermi's. The edge of the nuclear halo rests at radii of just over one Fermi. A discontinuity exists at the edge of the halo. This discontinuity is the crush radius of the electrical field of the proton. The nuclear-magnetic spin orbit force is expelled to the crush radius radius r_p (1.409 fm). Equation (15) expresses a relationship between the quantum of capacitance C_q and the nuclear displacement r_p.

(15)

$$r_p = \frac{C_q}{4\pi e_0}$$

The elastic limit of space expresses itself through a maximum of nuclear displacement. Both the electro-magnetic and nuclear spin orbit force, of the proton, reside at the radius r_p.

THE ELASTIC LIMIT AND THE WEAK NUCLEAR FORCE

The weak nuclear force is not weak. It is very strong at a dimension 1/580 the radius of the proton. It quickly diminishes and becomes weak at the dimensions of the proton. It is 1 x 10^{-5} times weaker than the electromagnetic force at the surface of the proton. The weak force vibrates in concert with the Compton frequency of the electron as it interacts with the electromagnetic field. The Compton frequency of the weak force was expressed in terms of simple harmonic motion of the electromagnetic field in (16).

(16)

$$f_c = \frac{1}{2\pi}\sqrt{\frac{K_w}{M_n}}$$

It was assumed that the elastic constant of the weak nuclear force diminishes linearly with displacement. The elastic constant of the weak nuclear force was approximated with the use the electromagnetic form in equation (17).

(17)

$$f_c = \frac{1}{2\pi}\sqrt{\frac{Fmax/r_p}{M_n}}$$

A solution, equation (18) provided for the Fmax of the weak force.

(18)

$$\text{Fmax} = 9.58\text{x}10^{6}\ Newtons$$

The weak nuclear force is pushed out to the discontinuity r_p during transition. The force Fmax applied through radius r_p yields the mass of the W particle. It has mass is about 90 times that of the proton (19).

(19)

$$1.5x10^{-25}\text{Kg} = \frac{Fmax\ r_p}{c^2}$$

The weak nuclear force experiences the elastic limit of space through the energy of the W particle.

NEW TECHNOLOGIES

The movement of the electric discontinuity r_p through a static electrical field disrupts that static field. This author suggests that this disruption is the source of the magnetic field. Normally the size of the discontinuity is fixed at r_p. The discontinuity r_p expands dramatically outward toward the edge of the superconductor. This action confines the electro-static field within the superconductor and expels the electro-magnetic field beyond the edge of the superconductor. A point of matching characteristic impedance may be opened around the circumference of the superconductor through a process of vibration. The opening of this point adjoins trillions of atoms into a single state of transition. The domain, in which the expanded elastic discontinuity expresses itself, is extended to all of the natural forces. The dynamic component of the nuclear and gravitational force is expelled from the superconductor under this condition. The resultant, macroscopic long range nuclear-magnetic and strong local gravitomagnetic, fields can be classically exploited with technology. These technologies will classically harness all of the natural forces.

CONCLUSION

Michael Faraday described the electrical force in terms of the permittivity e_0 the permeability u_0 of free space. James Clerk Maxwell employed e_0 and u_0 and produced the speedof light c. This understanding was incorporated within much of our contemporary technology. Frank Znidarsic described the electrical force in terms of an elastic constant K_{-e} and a displacement $2r_p$. Znidarsic employed K_{-e} and r_p and produced the quantum condition. Znidarsic's derivation has shown that the quantum condition is a subset of Newtonian mechanics. This understanding is beginning to be incorporated within future technology.

A discontinuity exists at the edge of the visible universe. The gravitational force experiences this discontinuity through its weakness and its non-shieldability. This discontinuity was qualified in units of capacitance. The other natural forces energetically couple with the discontinuity upon contact with matter. The effect of this contact was is expressed in units of reciprocal capacitance. The forces experience this discontinuity in separate ways. The electromagnetic force experiences it through a maximum of intensity. The strong nuclear force experiences it at the extent of the proton and the neutron. The weak nuclear force experiences it through the energy of the W particle. These effects demonstrate that the classical elasticity of a particle and a classical elastic limit establish a Newtonian foundation from which the quantum condition emerges.

NOTES

1. Frank Znidarsic, "Force and Gravity", Infinite Energy, Issue 22, p 60, 1998

2. Lawrence M. Kruss, Scientific American, December 31, 2002, Pg 36 "The most recent analysis by our group puts the best-fit age of the universe at 13.4 Billion years."

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

r_p = 1.409×10^{-15} meters, The extent of the elastic discontinuity

r_{+h} = $.529 \times 10^{-10}$ meters, The radius of the hydrogen atom

C_q =1.5676×10^{-25} Farads, The quantum of capacitance

K_c= 8.987×10^{9} N m^2 / C^2, Coulomb's constant

F_n= 2.27×10^{23} Hertz, The Compton frequency of a nucleon

K_{-w}= $9.58 \times 10^{6} / r_p$, Newton's/meter, The effective elastic constant of the weak force

M_n= 1.67×10^{-27} kg, The approximate mass of a nucleon

r_u= 1.25×10^{26} meters, The radius of the visible universe in meters

S_n = 1,094,000 meters/sec The speed of sound in the nucleus