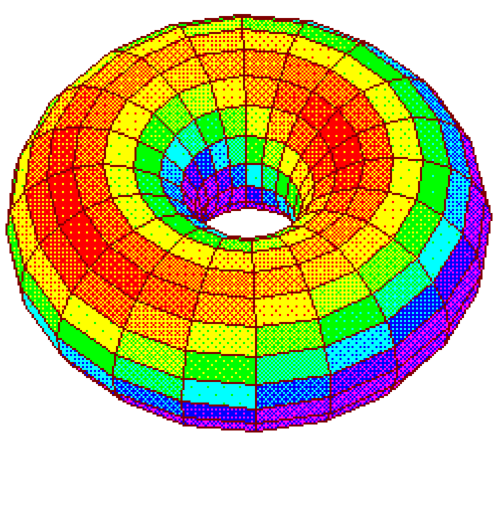
ELECTROGRAVITATION AS A UNIFIED FIELD THEORY

by

JERRY E. BAYLES



Included with this paper is a table of related constants which are pertinent to the formulas that will be presented. Most of the constants will be recognized immediately while some are developed within the text itself. All units are in the MKS system.

Table of Physical Constants:
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1. Gravitational Constant, $G := 6.672590000 \cdot 10^{-11} \cdot \frac{m^3}{kg \cdot sec^2}$

2. Speed of light, c, $c := 2.997924580000000 \cdot 10^{8} \cdot m \cdot sec^{-1}$

3. Magnetic permeability, u_o, $\mu_o := 1.256637061000001 \cdot 10^{-6} \cdot \frac{newton}{amp^2}$

4. Electric permittivity, e_o, $\varepsilon_o := 8.854187817000001 \cdot 10^{-12} \cdot \frac{farad}{m}$

5. Bohr n1 Velocity, V_{n1}, $V_{n1} := 2.187691415844453 \cdot 10^{6} \cdot \frac{m}{sec}$

6. Electron charge, q_o, $q_o := 1.602177330000001 \cdot 10^{-19} \cdot coul$

7. Electron mass, m_e, $m_e := 9.109389700000001 \cdot 10^{-31} \cdot kg$

8. Compton Electron radius, r_c, $r_c := 3.861593228000001 \cdot 10^{-13} \cdot m$

9. Bohr Radius, r_{n1}, $r_{n1} := 5.291772490000000 \cdot 10^{-11} \cdot m$

10. Fine structure constant, a, $\alpha := 7.297353080000001 \cdot 10^{-03}$

11. Plank constant, h, $h := 6.6260755 \cdot 10^{-34} \cdot joule \cdot sec$

12. Compton Electron time, t_c, $t_c := 8.0933010000001 \cdot 10^{-21} \cdot sec$

13. Quantum electromagnetic frequency, f_{Lm}, $f_{LM} := 1.00322480500001 \cdot 10^{1} \cdot Hz$

14. Quantum electric field frequency, f_h, $f_h := 9.016534884 \cdot 10^{17} \cdot Hz$

15. Quantum acceleration field constant, A_{em}, $A_{em} := 3.007592302 \cdot 10^{09} \cdot \frac{m}{sec^2}$

16. Field acceleration frequency constant, f_a, $f_a := 3.520758889 \cdot 10^{10} \cdot Hz$

17. Free space resistance, R_s, $R_s := \mu_o \cdot c$ and $1 \cdot \Omega = 1 \cdot kg \cdot m^2 \cdot sec^{-1} \cdot coul^{-2}$

$$R_s = 376.7303133310863 \cdot ohm$$

and/or... $R_s := \frac{1}{\varepsilon_o \cdot c}$

$$R_s = 376.730313488167 \cdot ohm$$

18. Quantum Hall Ohm, R_Q, $R_Q := \frac{h}{q_o^{\,2}}$

$$R_Q = 2.58128058743606 \cdot 10^4 \cdot ohm$$

Additional related constants are included for the discussions past page 21 below.

	(SUN MASS)		**(SUN rad.)**
$m_r := 1.99 \cdot 10^{30} \cdot kg$	**= 1.99 x 10^30** kg	$r_s := 6.96 \cdot 10^8 \cdot m$	**= 6.96 x 10^8** m

$\pi := 3.141592654000001$

$m_p := 1.672623100000001 \cdot 10^{-27} \cdot kg$

$m_e := 9.109389700000001 \cdot 10^{-31} \cdot kg$

$l_q := 2.817940920000001 \cdot 10^{-15} \cdot m$

$m_a := 1.660540200000001 \cdot 10^{-27} \cdot kg$

Note.............

((V_{n1} & V_{LM} are <u>SELECT</u>))

$V_{n1} := 2.187691415844453 \cdot 10^6 \cdot m \cdot sec^{-1}$

$V_{LM} := -0.085363289893272 \cdot m \cdot sec^{-1}$

NOTE: $\frac{V_{n1}}{V_{LM}^{\,2}} = 3.002228710934959 \cdot 10^8 \cdot m^{-1} \cdot sec$ $\qquad V_n := \frac{V_{n1}}{\alpha}$

$$\frac{V_n}{c} = 0.999999999587411$$

$\lambda_\Delta := 2 \cdot \pi \cdot r_{n1}$ $\qquad m_\Delta := m_e$ $\qquad t_\Delta := \frac{h}{m_e \cdot V_{n1}^{\,2}}$ $\qquad r_x := r_{n1}$

$t_h := \frac{t_c}{\alpha}$ $\qquad f_h := \frac{1}{t_h}$ $\qquad$ and constants in general that are also used are:

$t := 1 \cdot sec$ $\qquad Q_i := q_o \cdot t^{-1}$ $\qquad L := 1 \cdot m$

PREFACE

Welcome to ELECTROGRAVITATION AS A UNIFIED FIELD THEORY. The first chapter deals with a non-relativistic approach employing concepts that utilize quantum limits as the fundamental force beginnings and whereby they are related to each other. The second chapter presents the electrical and magnetic forces in the light of the Special Theory of Relativity and how the electrogravitational force may be connected to that concept of space-time very intimately. The third chapter presents the connection of the electrogravitational force to the General Theory of Relativity and how the force itself generates curved space. The remaining chapters explore the finer aspects of my theory as well as its implications.

I have long been of the opinion that curved space is not the cause of what we call gravity but rather the effect of a very basic electrical-magnetic action force that is simply not understood for what it is. Curved space may very well exist and follow all of the rules as predicted by Einstein's General Theory of Relativity due to the amount of standing wave matter fields (we call mass) that affects the space-time geometry in a local region but curved space is again most likely the effect and not the cause of the gravitational field as presented in contemporary physics lectures and articles.

Another misleading aspect of contemporary physics is how the electromagnetic force concerning quantum electrodynamics is presented to the general public today which limits the forces to only four and completely overlooks the magnetic force which is the fundamental connection force necessary to unify all the other forces. By calling the electric and magnetic forces a single force (electromagnetic) the magnetic force is not given the weight that it may have otherwise had in the overall force picture.

It is my objective to illustrate a most likely causal mechanism of the force we call gravity and to not only unify that force to the strong, weak, coulomb (electric), and magnetic fields but to show that mass is a standing wave of the magnetic field vectors and that inertia is the result of the need to restore all matter from one instant to the next. What is left over from atomic constructs of matter-energy is the necessary energy to create the electrogravitational field as proposed in this paper.

Einstein pointed out that the three equations of the electric, magnetic, and gravitational forces all had the same general form of a constant times squared terms in the numerator divided by squared distance terms in the denominator. The problem with tying them to a common causal action has led to a very complicated approach which arrives at a description of the effect rather than a succinct description of the cause. The matter becomes even more confused when the effect is then promoted as the cause. Ergo, curved space is taken as the cause rather than the effect of gravity.

While we are on the subject of causal I would like to explain why I became fascinated at a very early age with the gravitational action. Very briefly I saw something in the sky in broad daylight as bright as the sun over a small town on the Columbia river in the state of Oregon named Umatilla. This was about 1952 and I was six or seven years old at the time. The object stayed in the sky all afternoon and had the town in an uproar as to what it was. Two smaller bright objects came out of it soon after it appeared and they flew geometric patterns around the much larger object until late in the afternoon. Then they returned to the larger craft and then the large object began to glow a reddish color on one side and then took off across the sky away from the sunset at a very accelerated pace and was gone in a matter of seconds leaving hardly any trail or vestige of its former existence. Ever since that sighting I have endevored to determine how that object worked and as time has permitted, have continued working towards that conclusion.

J. E. Bayles

ELECTROGRAVITATION AS A UNIFIED FIELD THEORY

- By -

Jerry E. Bayles

(Chapter 1)

The purpose of this book will be to present a plausible connection of the gravitational force-field to the electric and magnetic force-fields. It will also show a possible connection between these fields to the strong and weak force-fields.

While the conventional terminology of force-fields present force-fields as *The Four* F*orces* this book will present five force-fields, as the electromagnetic force will be expanded to include the component electric and magnetic force-fields. Thus the electric, magnetic, strong, weak, and the electrogravitational force-fields will encompass the normal *Four Forces* terminology.

Also, In this book, fields are considered as real entities and although invisible to the naked eye they represent a special case of energy which has a momentum and thus an equivalent rest mass. (With the possible exception of the electrogravitational field.) Fields are then treated as an extension of rest mass that embody time dependent properties that define the nature of the field being considered.

While contemporary work in quantum physics involving field theories tend to lead into complex mathematical realms involving gauge fields, metric tensors, gauge bosons, and so on, it is the purpose of this paper to present the five forces in terms that will involve as little abstract mathematics as possible. This will be done so as to allow for the widest possible understanding of the field theory presented herein.

Again, the main intent of this paper is to unify the five forces by association of their common structures starting from one of the most commonly observed forces, namely the coulomb force between charges. Further, these forces will be reduced to their smallest level of quantum interaction in order that the quantum nature of charge and magnetism can best be presented. From there we will proceed to the electrograv-itational case involving quantum charges in motion. Finally the quantum cases involving charge-field interactions for the strong and weak forces will be presented.

From all of this a possibly fundamental frequency for the electric, magnetic, and electrogravitational interactions will be derived which would be ubiquitous in all force-fields.

Suppose for the moment that the whole of creation consisted of a singular electron and that electron had just been created out of a singularity in as much the same fashion as the universe has been theorized to have been created in the Big Bang theory. Further, let the charge-field begin to expand away from the electron out into space towards infinity. This expansion process would take an infinite amount of time and would result in an infinite amount of energy. It is natural to ponder upon the source of all this field energy considering that the rest mass of the Electron is not infinite but very much smaller indeed than infinity.

A natural solution for this dilemma is to imagine that the electron is created repeatedly and that part of this creation energy is converted into field energy. Thus, over a period of many creations, the field energy is metered out through a series of equally timed field "gates". It is further natural to propose that all matter is thus recreated from one time interval to the next. This would have to include matter not normally exhibiting an external charge-field but in those cases the field is in motion but is a terminated field. (The field vector is connected to a conjugate vector field.) This would include neutrons, bosons, and particles exhibiting zero charge in general. **Mass would then be the result of standing wave fields.**

The source for all this energy would come from the same place as the energy came from that initiated the Big Bang but due to the geometry of the electron, instead of being allowed one creation pulse of a very great magnitude and a very short duration, as in the Big Bang, it is allowed to have a great many creation pulses of the magnitude required to support its field and mass geometry. Also, since all electrons would exhibit like geometry and field expansion characteristics, then all electrons would be deriving the required energy pulse inputs from the same source.

It may be further theorized that the center of energy input for all Electrons may be at the same point in the dimension of time that in itself has the required built in singularity that unifies all matter throughout time and space. This is akin to a series of frames of a motion picture which are able to imply motion to an observer of the artifacts that are projected upon the screen and these frames must be of the proper time duration and interval in order to create continuity in the overall picture. The energy in this case is supplied by the projector lamp and the apparent motion is created by a displacement of the images in each successive frame, each one arriving at the screen in carefully metered out cadence. The entire picture, (our temporary local universe in this case), stems from one source and one time interval. It is easily seen that an image can be placed anywhere on the screen and then made to suddenly appear somewhere else, apparently instantaneously.

So what is charge that gives rise to field energy, energy without rest mass flowing seemingly forever into a counter-point in space. When it flows out, it flows across space and into a point and does so without losing strength over an infinitely long period of time. An endless source of field energy absorbed by an oppositely charged bottomless receptor-well. No real power is absorbed at the termination point nor is any lost by the source. What a curious and unique phenomena. The source does not lose any mass energy in the process nor does the receptor gain any. The field rate of growth is equivalent to the velocity of light in free space.

The bottomless connector point may be connected to the source point through hyperspace, which is not our space but an extension thereof. The field has an equivalent momentum since it has energy. The rate of exchange of energy per unit time is power. This power is a constant over time for all field connected charges. The power remains constant whether the charges are proton to electron or positron to electron, etc. It has no rest mass. It has a rotational vector equivalent to momentum that is directly related to the energy transferred. The equation below will hopefully serve to illustrate this concept, where q_o is the charge on the electron, h is Planks constant, e_o is the permittivity of free space and V_{n1t} is the rotational vector velocity.

$$(1) \qquad V_{n1t} := \frac{q_o^{\,2}}{2 \cdot h \cdot \varepsilon_o} \quad \text{or,} \qquad V_{n1t} = 2.187691396926174 \cdot 10^{6} \cdot m \cdot sec^{-1}$$

If the equivalent mass of the field goes up the radius related to a matter-field wavelength goes down so that V_{n1} remains a constant. This is by reason of Heisenbergs expression for h related to matterwaves and momentum wherein we consider a change in *relative field mass* while holding velocity a constant.

$$(2) \quad h_t := m_\Delta \cdot \left(V_{n1}\right) \cdot \lambda_\Delta \quad \text{or,} \quad h_t = 6.626075452110047 \cdot 10^{-34} \cdot sec\,joule$$

Therefore all charge fields move outwards from the source at V = C and have a rotational vector component equal to Vn1. Vn1 is 1/137 that of C, (1/137 is the fine structure constant), and powers of this constant appear throughout the Theory Of Quantum Electrodynamics. The quantum expression for power is Planks constant and is related to the quantum ohm as shown in the below expression in (3) involving the charge of the electron squared divided into Planks constant.

$$(3) \quad R_{Qt} := \frac{h}{{q_o}^2} \qquad R_{Qt} = 2.58128058743606 \cdot 10^4 \cdot \mathrm{ohm}$$

(4) Power = Current^2 x Impedance

The expression in (4) is the classical expression for power in an electrical circuit. The two are equivalent to each other but h in (3) is equal to (energy x time) while classical power in (4) is equal to (energy / time). This is but one difference between the classical and the quantum in the realm of physics. Ergo, when energy is increased in the classical sense power increases but in the quantum sense power remains the same. This is true for momentum as well (including (2) above) as the two famous Heisenberg expressions below illustrate.

$$(5) \quad h_{t1} := m_{\Delta} \cdot V_{n1} \cdot \lambda_{\Delta} \qquad (6) \quad h_{t2} := m_{\Delta} \cdot {V_{n1}}^2 \cdot t_{\Delta}$$

Again, the idea of the Electron being successively recreated makes it a distant grandson of the GREAT GREAT Granddaddy Big Bang which gave birth to the whole process of particle creation but instead of only happening once, the electron measures out its field energy in evenly spaced portions over evenly spaced pulse intervals over a potentially infinite time. It has been theorized that the Four forces were unified into the same force during the creation event but that they became separated while matter was expanding and cooling. The order of magnitude and time to separation would be the strong force, the electroweak force, the electro-magnetic force, and then the gravitational force. When further examining the electromagnetic force, the two forces contained therein, namely the electric and the magnetic forces are also separated in magnitude and the electric force can be theorized to have been created before the magnetic force was as it will be shown that the electric force is stronger than the magnetic force by a multiple equal to C^2. It therefore is possible to prove that there is a connection particle for the electromagnetic force to the weak force called the Z^o particle at 92 gigavolts of energy as well as a supposed *X* particle at even higher energies that will unite the strong force to the weak force. Thus the gravitational connection particle will not likely be discovered in the higher energy realm but in the very weakest as it will have the lowest quantum energy. It will be developed later what the mechanics of that connection may be.

Based on the above conceptual view of the electron and its associated energy field being constantly recreated, it can be postulated that there is no such thing as a static field, electrical or otherwise.

Secondly, it can be postulated that all charge-point sources are in exact synchronization with all other charge-point sources through a master clock in hyperspace where all charge-point sources become one point.

Since no real power is gained or lost in the uniform electric field source-to-receptor energy transfer, then for the sake of convention herein the electron can be defined as purely inductive and its counterpoint charge-receptor as purely capacitive so that the net resonant or reactive result consumes no real power.

It can be shown mathematically that the energy density at the surface of the electron is very large indeed compared to its rest mass. The concept of metered out energy which is properly scaled down by time and allowed area not only places this energy density at a real quantum value but gives a hint as to the geometrical construction of the electron mass-field itlself.

If the rest-mass energy of the electron is divided by the field energy at the compton radius of the electron the quotient is the number 137.0359895 which is the inverse of the fine structure constant encountered throughout modern quantum electrodynamic theory. (7) below is the equation for the potential field energy at the compton radius of the electron.

(7) $$E_{Epot} := \frac{q_o^2}{4 \cdot \pi \cdot \varepsilon_o \cdot r_c}$$ (8) $$r_{ct} := \frac{h}{2 \cdot \pi \cdot m_e \cdot c}$$

For those not familiar with the term compton radius, it is derived from the deBroglie expression for matterwaves and is shown in (8). This is the shortest possible wavelength related directly to the rest-mass of a particle taking the velocity to the theoretical maximum, or C, the velocity of light in free space. This is Planks constant divided by 2 times Pi times the momentum portion, mass times velocity C.

Now that the quantum potential field energy of the electron has been presented the total energy density of the field can be arrived at by dividing the potential field energy by the volume for the same compton radius. This expression for the total field related energy density is shown in (9).

(9) $$E_{density} := \frac{q_o^2}{32 \cdot \pi^2 \cdot \varepsilon_o \cdot r_c^4} = \frac{\dfrac{q_o^2}{4 \cdot \pi \cdot \varepsilon_o \cdot r_c}}{8 \cdot \pi \cdot r_c^3}$$

The term on the left is arrived at directly from classical field theory, as in (11) below. The expression for the E field potential in volts / meter is shown below in (10) also.

(10) $$E := \frac{q_o}{4 \cdot \pi \cdot \varepsilon_o \cdot r_c^2}$$ (11) $$E_{density1} := \frac{\varepsilon_o \cdot E^2}{2}$$

From all of this the volume is determined to be a special shape, that of a cylinder eight times as long as the radius! This infers a preferred shape for the volume of an electric field in general. One may well ask if that specially inferred shape may extend to any volume of space. In general, it logically should.

The energy density arrived at in equation (9) above is very large. It has been argued that this is an inordinate amount of energy compared to the rest-mass energy of the electron and rightly so. It can be shown however that this large amount of energy does not exist at the quantum compton radius of the electron.

As was previously proposed where the term *time-gate* was used to describe the metering out of energy from the electron into its surrounding field, that concept applies to the energy density surrounding the electron at the compton radius where the quantum distance for the field can grow no smaller.

Since Planks constant h can be related to power which is equal to the electron charge squared times the quantum ohm, (which again is the same as the expression for electrical power), then h may be related to Poyntings` vector, ($S_{avg.}$) by the below expression in (12).

(12) $S_{max} = E_{field\ density} \times c$ (13) $E_{field\ density} = E_{pot}$ / field vol.

If the value for (Smax.) is calculated based on the volume of the cylinder and then that value is scaled down by multiplying by the compton area and by the compton time a value approximately equal to the correct potential field energy is arrived at. If however a volume equal to a compton **torus** is assumed wherein the cylinder is bent around to form a torus, then the exact potential field energy is arrived at as required by the equation in (7).

In equation (13) above the general relationship involving the energy density of the electric field is shown whereas in (14) below the (Smax.) power of the compton torus is shown.

$$(14) \quad S_{max} := \frac{q_o^2 \cdot c}{8 \cdot \pi^3 \cdot \varepsilon_o \cdot r_c^4} \quad \text{or,} \quad S_{max} = 1.575750434657439 \cdot 10^{29} \cdot m^{-2} \cdot \text{watt}$$

Then in equation (15) the scaling factors of the compton area and the compton time of the electron are applied to arrive at the potential field energy of the electron which is 1 / 137.0359895 that of the electron rest-mass.

$$(15) \qquad E_{nt} := S_{max} \cdot \pi \cdot r_c^{2} \cdot t_c \qquad \text{or,} \qquad E_{nt} = 5.97442411695454 \cdot 10^{-16} \cdot \text{joule}$$

Thus the quantum volume associated with the electric field related to energy density and potential field energy is very likely a **torus** while at a macroscopic scale the volume assumes the shape of a cylinder. The torus shape at a quantum level is quite interesting as it becomes possible to imagine such things as a closed system with such characteristics as standing wave energy or resonance involving matter and charge that would appear to a casual observer to be a *static* field.

One can imagine a torus that has both radius vectors equal to the compton radius of the electron and that has one of the radius vectors pointing out to the central circumference and a second radius vector rotating through an area perpendicular to the plane of rotation of the first radius vector. The combined action would take a net shape of a spring wrapped around to meet itself and the endpoints of the moving vectors would form a three dimensional moving torus in quantum space. The compton time would be the base time for this system and would be the fourth dimensional aspect of the torus described.

After some investigation and evaluation of the torus shape equation (16) below was discovered to present the area of the electron`s compton torus and then relate that to Plank's constant h and the rest mass of the electron.

$$(16) \qquad m_{et} := \left(\frac{q_o^{2}}{2 \cdot V_{n1} \cdot \varepsilon_o}\right) \cdot \left(\frac{t_c}{4 \cdot \pi^{2} \cdot r_c^{2}}\right) \qquad \text{or,} \quad m_{et} = 9.109389745137863 \cdot 10^{-31} \cdot \text{kg}$$

The equations in (17 a & b) below are presented to help clarify the concept of torus area and volume discussed above. Also, in (16) above the term (charge squared) / ((2V_{n1}) x epsilon) is equal to Planks constant h, where V_{n1} is also equal to the velocity of the electron in the lowest orbital (n1 ground state) of the element Hydrogen.

(17.a) $\text{Torus}_{\text{Area}} := 4\cdot\pi^2\cdot r_c^{\,2}$ (17.b) $\text{Torus}_{\text{Volume}} := 2\cdot\pi^2\cdot r_c^{\,3}$

Equation (18) below also shows a relationship between charge and Planks constant h and is where the term discussed in (16) came from.

(18) $q_{ot} := \sqrt{2\cdot h\cdot V_{n1}\cdot\varepsilon_o}$ or, $q_{ot} = 1.602177336927495\cdot 10^{-19}\cdot\text{coul}$

Equation (18) is a very significant relationship as it relates charge to h directly in the quantum sense. By relating the charge of the Electron to h as in (18), charge is then related to momentum, wavelength, energy, and time through Heisenbergs formulas where (momentum x wavelength = h) and (energy x time also = h).

Equat. (18) also establishes V_{n1} as fundamental to the quantum electric charge of the Electron and it is suggested here that V_{n1} is a rotational vector end-point velocity equal to the fine structure constant times the velocity of light in free space. (Rotational vector end-point velocity is suggestive of an electric field action analogous to spin.)

The next force to consider is the magnetic force which exists any time there is a charge-particle in motion and for the main part of the following topic on the magnetic force action the rotational motion of the magnetic vector is the main theme.

The magnetic force in an electromagnetic wave is a vector force 90 degrees to an in-phase electric field in motion and it is 90 degrees away from both the electric field and the direction of the resultant particle/wave direction of motion.

When equal and distinct quantum charges separated by the same distance are considered however, the magnitude of the electric force is greater than the magnitude of the magnetic force by a factor of the speed of light squared. An equivalant formula for the force between two parallel wires is shown in (19) below where mu_o is the magnetic permeability of free space and r_{n1} is the Bohr radius of the Hydrogen atom.

$$(19) \quad F_{Mt} := \frac{\mu_o \cdot Q_i^2}{2 \cdot \pi \cdot r_{n1}} \cdot L \quad \text{or,} \quad F_{Mt} = 9.701748139743987 \cdot 10^{-35} \cdot \text{newton}$$

In equation (20) below the two wires are closed into parallel loops and then the corresponding geometrical correction is applied to arrive at the fundamental statement for magnetic force between parallel orbital charges. This discussion leads directly to the magnetic forces between charge-particles in circular motion on a quantum scale and the quantum scale is where the fundamental action forces play the basic role in quantum electrodynamics.

$$(20) \quad F_{MT} := \frac{V_{LM}^2}{L \cdot 2 \cdot l_q} \cdot \frac{\mu_o \cdot q_o^2}{2 \cdot \pi \cdot r_{n1}} \cdot L \quad \text{or,} \quad F_{MT} = 1.254383710426251 \cdot 10^{-22} \cdot \text{newton}$$

In equation (21) below the interrelationship between electric field mass-energy and magnetic-mass field energy is shown. This places the magnetic quantum field energy at a force level proportional to 1 / C^2 that of the quantum electric field force at the same radius of action.

$$(21) \quad M_{Efield} := \frac{q_o^2 \cdot V_{LM}^2}{4 \cdot \pi \cdot \varepsilon_o \cdot c^2 \cdot l_q} \quad \text{equals} \quad E_{Mfield} := \frac{\mu_o \cdot q_o^2 \cdot V_{LM}^2}{4 \cdot \pi \cdot l_q}$$

The next equation will assign a quantum frequency to this magnetic energy by use of the quantum expression (E = h f) which is a form of the Heisenberg equation previously presented as (E * t = h). This equation is shown in (22) below and is the fundamental electrogravitational and magnetic action related quantum frequency as will be presented later on.

$$(22) \qquad F_{Lmt1} := \frac{M_{Efield}}{h} \quad \text{and} \quad F_{Lmt1} = 10.01786534654713 \cdot Hz$$

The following is the result of much study of the different aspects of quantum magnetic energy as it relates to mass and the topic will be explained and developed further in the remainder of this paper. In equation (23) the electrogravitational expression involving two charge-field systems of interaction states the case for gravitation through the aspect of quantum electric and magnetic separate system forces creating another force, gravity.

$$(23) \qquad F_{Gt} := \frac{\mu_o}{c^2} \cdot \left(\frac{\mu_o \cdot q_o^2 \cdot V_{LM}^2}{4 \cdot \pi \cdot r_x \cdot l_q} \right) \cdot \left(\frac{q_o^2 \cdot V_{LM}^2}{4 \cdot \pi \cdot \varepsilon_o \cdot r_x \cdot l_q} \right)$$

Please refer to the APPENDIX #8 for comments on the units in eq. #(23).

or,

$$F_{Gt} = 1.977291389792974 \cdot 10^{-50} \cdot m^{-1} \cdot henry \cdot newton^2$$

The term (mu_o) / (C^2) can be likened to the gravitational constant and thereby designated as G`. The gravitational constant G is utilized in the normal expression for gravitational force and that equation is presented in equation (24). Notice that the general form of this force expression follows the electric and magnetic force expression forms very closely in the similar arrangement of terms. It will be developed later that the classical gravitational expression can be related to the magnetic force expression very closely.

$$(24) \qquad F_G := \frac{G \cdot (m_e \cdot m_e)}{r_x^2} \quad \text{where,} \quad F_G = 1.97729138896852 \cdot 10^{-50} \cdot newton$$

The constant term that was expressed in equation (23) that was expressed as G` can be related directly to G in equation (25) wherein the fine structure constant and the V_{n1} constant are shown as related to G also. It is apparent that the macroscopic form of G then has a hidden aspect of the magnetic forces and also that this hidden aspect opens the door to a different perspective concerning the possible case for electrogravitation. In fact these new aspects can be expressed in the various forms that follow which may help to lend weight to the argument for the magnetic-electric case for the electrogravitational force-action.

$$(25) \quad G'_1 := \frac{G}{c^2 \cdot \alpha^2} \quad = \quad G'_2 := \frac{G}{V_{n1}{}^2} \quad = \quad G'_3 := \frac{\mu_o}{c^2}$$

Before moving on to present these various cases for electrogravitation a general form of G as it relates to the magnetic constant (mu_o) is presented in (26). This new form of G embodies the terms that appear frequently in electric and magnetic field theory. Magnitude is the feature of most interest in the below expression.

$$(26) \qquad G_t := \mu_o \cdot \alpha^2 \qquad G_t = 6.691763500548768 \cdot 10^{-11} \cdot kg \cdot m \cdot coul^{-2}$$

The following equations are placed in groups of four cases each for the electric force, the magnetic force, the electrogravitational force, the weak force, and the strong force respectively. The weak force and the strong force equations follow naturally from the electrogravitational force equations wherein the main difference is that both the weak and the strong force equations embody the products of the electric and magnetic forces and an appropriate connecting constant in the overall product expressions.

It will be readily seen that a marked similarity between the equations in general is immediately apparent and that an even more fundamental relationship between the five forces may be at work which is not so readily apparent. The one thing that may be at work is that time is a real dimension in all of our perceived three-dimensional space. That is, height, length, and depth are all distance related and distance is the result of the product of velocity and time. This implies that time may well be the foundation of n-dimensional space wherein intervals related to time translate in our three-dimensional senses into distance and related velocities.

ELECTRIC FORCE QUADSET of EQUATIONS:

(I) $$F_{Et1} := \frac{q_o^2}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}$$

(27) $$F_{Et1} = 8.238729464946122\cdot 10^{-8}\cdot\text{newton}$$

(II) $$F_{Et2} := \frac{q_o^2\cdot(t_h)\cdot(f_h)}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}$$ [Where (t_h) x $(f_h) = 1$].

(28) $$F_{Et2} = 8.238729464946122\cdot 10^{-8}\cdot\text{newton}$$

(III) $$F_{Et3} := \frac{h\cdot(V_{n1})}{2\cdot\pi\cdot r_x^2}$$

(29) $$F_{Et3} = 8.238729536191356\cdot 10^{-8}\cdot\text{newton}$$

(IV) $$F_{Et4} := \frac{h\cdot(f_h)}{r_x}\cdot\frac{r_c}{r_x}$$

(30) $$F_{Et4} = 8.238729483360807\cdot 10^{-8}\cdot\text{newton}$$

The constant term f_h that appears in equations (28 & 30) above is the electric field quantum base frequency derived from the maximum field energy at the surface of the electron. Then also t_h is the inverse of that frequency which of course is time. Equation (31) next expresses the equation for this basic quantum frequency.

$$(31)\quad f_{hE1} := \frac{\dfrac{q_o^{2}}{4\cdot\pi\cdot\varepsilon_o\cdot r_c}}{h}$$

where,

$$f_{hE1} = 9.016534864685412\cdot10^{17}\cdot Hz$$

MAGNETIC FORCE QUADSET of EQUATIONS:

(I) (32)

$$F_{Mt1} := \frac{\mu_o\cdot q_o^{2}\cdot V_{LM}^{2}}{4\cdot\pi\cdot l_q\cdot r_x}$$

$$F_{Mt1} = 1.254383710426251\cdot10^{-22}\cdot newton$$

(II) (33)

$$F_{Mt2} := \frac{q_o^{2}\cdot(t_c)\cdot(f_{LM})}{4\cdot\pi\cdot\varepsilon_o\cdot l_q\cdot r_x}$$

$$F_{Mt2} = 1.256184635226011\cdot10^{-22}\cdot newton$$

(III) (34)

$$F_{Mt3} := \frac{h\cdot(V_{n1})\cdot V_{LM}^{2}}{2\cdot\pi\cdot c^{2}\cdot l_q\cdot r_x}$$

$$F_{Mt3} = 1.254383721796684\cdot10^{-22}\cdot newton$$

(IV) (35)

$$F_{Mt4} := \frac{h\cdot f_{LM}}{l_q}\cdot\frac{l_q}{r_x}$$

$$F_{Mt4} = 1.256184636426583\cdot10^{-22}\cdot newton$$

The constant term f_{LM} in equation (33) and (35) is the result of the equation (22) on page 12 and represents the quantum frequency associated with magnetic fields in general. This frequency is associated to the Compton frequency and radius of the electron in equation (36) on the next page.

Let: $f_c := \frac{1}{t_c}$ then, (36) $f_{LMt} := \frac{V_{LM}^2}{(2\cdot\pi\cdot r_{n1})\cdot(2\cdot\pi\cdot l_q)\cdot f_c}$

$f_{LMt} = 10.01786550605671 \cdot Hz$

and where, $F_{Lmt1} = 10.01786534654713 \cdot Hz$

Equation (36) is a very basic quantum expression for showing how the case involving the n1 orbital of Hydrogen is directly involved with the magnetic quantum frequency and the classic radius of the electron.

The next set of four equations present the electrogravitational force quadset.

ELECTROGRAVITATIONAL FORCE QUADSET of EQUATIONS:

(I) (37)

$$F_{Gt1} := \frac{\mu_o \cdot q_o^2 \cdot V_{LM}^2}{4\cdot\pi\cdot(l_q)\cdot r_x}\cdot\mu_o\cdot\frac{\mu_o\cdot q_o^2\cdot V_{LM}^2}{4\cdot\pi\cdot(l_q)\cdot r_x}$$

$$F_{Gt1} = 1.977291388968526\cdot 10^{-50}\cdot m^{-1}\cdot henry\cdot newton^2$$

(II) (38)

$$F_{Gt2} := \frac{q_o^2\cdot(t_c)\cdot(f_{LM})}{4\cdot\pi\cdot\varepsilon_o\cdot(l_q)\cdot r_x}\cdot\mu_o\cdot\frac{q_o^2\cdot(t_c)\cdot(f_{LM})}{4\cdot\pi\cdot\varepsilon_o\cdot(l_q)\cdot r_x}$$

$$F_{Gt2} = 1.982973078403706\cdot 10^{-50}\cdot m^{-1}\cdot henry\cdot newton^2$$

(III) (39)

$$F_{Gt3} := \frac{h\cdot(V_{n1})\cdot V_{LM}^2}{2\cdot\pi\cdot c^2\cdot(l_q)\cdot r_x}\cdot\mu_o\cdot\frac{h\cdot(V_{n1})\cdot V_{LM}^2}{2\cdot\pi\cdot c^2\cdot(l_q)\cdot r_x}$$

$$F_{Gt3} = 1.977291424815071\cdot 10^{-50}\cdot m^{-1}\cdot henry\cdot newton^2$$

(IV) (40)

$$F_{Gt4} := \frac{h\cdot(f_{LM})}{r_x}\cdot\mu_o\cdot\frac{h\cdot(f_{LM})}{r_x}$$

$$F_{Gt4} = 1.982973082194077\cdot 10^{-50}\cdot m^{-1}\cdot henry\cdot newton^2$$

The four equations above connect two separate magnetic force systems to the electrogravitational force. Notice that the interconnection constant mu_o is present in all four equations and also that all four equations use terms that were developed for the electric and magnetic force equations previously presented. It can be postulated that this F_G action takes a vector in-line to the motion of the charge-action motion and that it differs from the magnetic force action only by the geometry involved for a two system magnetic interaction. Further, there is a magnetic vector interaction which has a rotational velocity equal to the square root of the quantum magnetic energy divided by the rest mass of the Electron or, $(E_m / m_e)^{1/2}$. This is the fundamental electrogravitational vector interaction velocity, V_{LM}.

The next set of four equations present the weak force in both electric and magnetic terms.

WEAK FORCE QUADSET OF EQUATIONS.

(I)

$$F_{Wt1} := \frac{q_o^2}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}\cdot\left(\frac{\pi}{\varepsilon_o}\right)\cdot\frac{\mu_o\cdot q_o^2\cdot V_{LM}^2}{4\cdot\pi\cdot r_c\cdot r_x}$$

(41)

$$F_{Wt1} = 2.675821566980811\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

(II)

$$F_{Wt2} := \frac{q_o^2\cdot(t_h)\cdot(f_h)}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}\cdot\left(\frac{\pi}{\varepsilon_o}\right)\cdot\frac{q_o^2\cdot(t_c)\cdot(f_{LM})}{4\cdot\pi\cdot\varepsilon_o\cdot r_c\cdot r_x}$$

(42)

$$F_{Wt2} = 2.679663257031196\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

(III)

$$F_{Wt3} := \frac{h\cdot(V_{n1})}{2\cdot\pi\cdot r_x^2}\cdot\left(\frac{\pi}{\varepsilon_o}\right)\cdot\frac{h\cdot(V_{n1})\cdot V_{LM}^2}{2\cdot\pi\cdot c^2\cdot r_c\cdot r_x}$$

(43)

$$F_{Wt3} = 2.675821614375385\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

(IV)

$$F_{Wt4} := \frac{h\cdot(f_h)}{r_x}\cdot\frac{r_c}{r_x}\cdot\left(\frac{\pi}{\varepsilon_o}\right)\cdot\frac{h\cdot(f_{LM})}{r_c}\cdot\frac{l_q}{r_x}$$

(44)

$$F_{Wt4} = 2.679663265581642\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

The weak force follows the 1 / r_x^3 dimensional expression where force falls off very rapidly as the distance from the center of energy increases. The weak force geometry gives rise to a connection particle called the Z^o particle which has only recently been verified to exist as the Quantum Electrodynamic Theory predicted should exist. This particle has an energy of 91.2 Gev.

Note: To help put the above in perspective as far as force -field magnitudes are concerned for a given distance of particle separation, page 110 of Scientific American (January 1990) in the article "Handedness of the Universe" states that "*The weak force is 1000 times less powerful than the electromagnetic force and 100,000 times less powerful than the strong nuclear force."*

The next set of four force equations are for the strong nuclear force.

STRONG FORCE QUADSET OF EQUATIONS.

(I)

$$F_{St1} := \frac{q_o^2}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}\cdot\left(\frac{2\cdot\pi\cdot r_{n1}}{\varepsilon_o\cdot r_x}\right)\cdot\frac{\mu_o\cdot q_o^2\cdot V_{LM}^2}{4\cdot\pi\cdot r_c\cdot r_x}$$

(45)

$$F_{St1} = 5.351643133961623\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

(II)

$$F_{St2} := \frac{q_o^2\cdot(t_h)\cdot(f_h)}{4\cdot\pi\cdot\varepsilon_o\cdot r_x^2}\cdot\left(\frac{2\cdot\pi\cdot r_{n1}}{\varepsilon_o\cdot r_x}\right)\cdot\frac{q_o^2\cdot(t_c)\cdot(f_{LM})}{4\cdot\pi\cdot\varepsilon_o\cdot r_c\cdot r_x}$$

(46)

$$F_{St2} = 5.359326514062391\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

(III)

$$F_{St3} := \frac{h\cdot(V_{n1})}{2\cdot\pi\cdot r_x^2}\cdot\left(\frac{2\cdot\pi\cdot r_{n1}}{\varepsilon_o\cdot r_x}\right)\cdot\frac{h\cdot(V_{n1})\cdot V_{LM}^2}{2\cdot\pi\cdot c^2\cdot r_c\cdot r_x}$$

(47)

$$F_{St3} = 5.351643228750769\cdot10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

$$\text{(IV)} \qquad F_{St4} := \frac{h\cdot(f_h)}{r_x}\cdot\frac{r_c}{r_x}\cdot\left(\frac{2\cdot\pi\cdot r_{n1}}{\varepsilon_o\cdot r_x}\right)\cdot\frac{h\cdot(f_{LM})}{r_c}\cdot\frac{l_q}{r_x}$$

$$(48) \qquad F_{St4} = 5.359326531163284\cdot 10^{-20}\cdot kg^{-1}\cdot henry\cdot newton^3$$

It is of interest that the weak and strong force equations have both the electric and magnetic force expressions as products and have the connecting term of 1 over the permittivity of free space which is also the central connecting term. Also it should be noted that for the strong force, the force falls off even more rapidly than for the weak force, where the strong force falls off at the 1 / (r_x^4) rate. That means that the weak and the strong force cannot exist outside the nucleus where the given radius is on the order of less than one Fermi. (One Fermi is on the order of 1 x 10^{-15} meters.) Thus the strong and weak forces are not long range forces as are the electric,magnetic, and gravitational force fields.

The previous pages 14 through 19 have presented the five aforementioned force fields in four cases each where the four cases each present the associated force field in different aspects of geometrical constants such as the Bohr radius, the electric quantum field potential energy frequency f_h, the magnetic quantum potential field energy frequency f_{LM}, and the associated basic electron charge. These equations form the basic construct for the unification of the five forces but are not the only aspect equations that may be considered. For instance, the previous equation (12) presented the power involving the Poynting vector and this can be related to F_E, F_M, and F_G also.

For the electric force and S_h:

$$(49) \qquad S_h := \frac{h \cdot (V_{n1})}{2 \cdot \pi \cdot r_c} \qquad S_h = 5.974424127843209 \cdot 10^{-16} \cdot \text{joule}$$

$$(50) \qquad S_{h\Delta} := \frac{h \cdot (V_{n1})}{2 \cdot \pi \cdot r_x} \qquad S_{h\Delta} = 4.359748231216787 \cdot 10^{-18} \cdot \text{joule}$$

For the electric force and S_h:

$$(51) \qquad F_{E\Delta} := \frac{S_h}{r_x} \qquad F_{E\Delta} = 1.129002454117828 \cdot 10^{-5} \cdot \text{newton}$$

For the magnetic force and S_h:

$$(52) \qquad F_{m\Delta} := \frac{S_h \cdot V_{LM}^2}{c^2 \cdot r_c} \qquad F_{m\Delta} = 1.254383720145065 \cdot 10^{-22} \cdot \text{newton}$$

For the electrogravitational force and S:

$$(53) \qquad F_{G\Delta} := \frac{S_h \cdot V_{LM}^2}{c^2 \cdot r_c} \cdot \mu_o \cdot \frac{S_h \cdot V_{LM}^2}{c^2 \cdot r_c}$$

$$F_{G\Delta} = 1.977291419608158 \cdot 10^{-50} \cdot m^{-1} \cdot \text{henry} \cdot \text{newton}^2$$

It is of interest to note that the electrogravitational force-action occurs not only at long ranges but at the Compton radius of the electron or proton charge-equivalent particle and thus is quite different insofar as the force-action mechanism compared to the other four force-action mechanisms. (Note the r_c term as well as the delta r_x term above in the electrogravitational expression, equ. (49) & (53).)

It should be noted at this time that S_h in equation (49) is not the same as S_{max} of equation (12) since S_h in equation (49) is that quantum power obtained in equation

(15) which is expressed in energy/second which was obtained by the reduction to quantum power from power (max.) in equation (12). Equation (54) below further illustrates the quantum magnitude of S_h.

$$(54) \qquad S_{QuantumTorus} := m_e \cdot c^2 \cdot \alpha$$

$$S_{QuantumTorus} = 5.974424089815703 \cdot 10^{-16} \cdot \text{joule}$$

Note that in equation (54) Sh is written as $S_{QuantumTorus}$ but they are one and the same. The $S_{QuantumTorus}$ is pertinent to the reduction of the $S_{TorusMax}$ value in equation (14) by equation (15) which arrives at an energy that in magnitude is equivalent to power as time is taken at unity. Since the volume of a torus is $2\,\pi^2\,r^3$ then equation 14 is further clarified by equation (55) below wherein energy density is related to torus volume instead of cylindrical volume.

$$(55) \qquad E_{DTorus} := \frac{q_o^2 \cdot c}{8 \cdot \pi^3 \cdot \varepsilon_o \cdot r_c^4} = \left(\frac{q_o^2}{4 \cdot \pi \cdot \varepsilon_o \cdot r_c} \right) \cdot \frac{c}{2 \cdot \pi^2 \cdot r_c^3}$$

or, $$E_{DTorus} = 1.575750434657439 \cdot 10^{29} \cdot m^{-2} \cdot \text{watt}$$

Again, the power related to energy density (max.) reduces to potential field energy (max.) at the Compton radius of the electron when the volume of the field involved is torus volume where both radius vectors are equal to each other and the energy density (max.) is multiplied by the Compton area and time of the electron as shown previously in equation (15) page 9.

The torus area also applies to the geometry of the electron wherein equation (16) page 9 utilized the area expression of the torus at the Compton radius of the electron, which is $4\,\pi^2\,r_e^2$. In equation (16) the Compton electron time divided by the

Compton torus area yields a fundamental constant that herein is labeled as 1 / Go. Note that the electron rest mass multiplied by Go = h which is Planks constant and that the two forms of the Heisenberg expression for energy and momentum related to h contain Go in the m x (v^2) x (t) = h and m x (v) x (2 x (pi) x r) = h expressions in the portions contained within the parentheses.

Within the aspect of the quantum force fields there may likely exist a quantum acceleration constant and thus in equation (56) below it is defined by the quantum terms of interaction, h, f_h, f_{Lm}, and the electron field mass at r_e.

$$(56) \qquad A_{emt} := \sqrt{\frac{h \cdot f_h \cdot f_{LM}^{\;2}}{m_e \cdot \alpha}} \qquad \text{or,} \qquad A_{emt} = 3.007592302103937 \cdot 10^{9} \cdot m \cdot sec^{-2}$$

This quantum acceleration is active at the the Compton radius of the electron and is directly field related and therefore influences the electron momentum. This is shown below where where the quantum field acceleration is applied to the rest mass of the electron in the case of the electrogravitational force at the Bohr radius of Hydrogen.

$$(57) \qquad F_{GT1} := 4 \cdot \pi^2 \cdot \mu_o \cdot \left(m_e \cdot \alpha \cdot A_{em}\right)^2 \qquad \text{(At the } r_{n1} \text{ radius.)}$$

$$F_{GT1} = 1.982973054935436 \cdot 10^{-50} \cdot m^{-1} \cdot henry \cdot newton^2$$

In equation (57) above the quantum field acceleration is applied to the rest mass of the electron and the resultant force products yield the quantum electrogravitational force. This acceleration is most likely related to circular field motion in the quantum sense. No loss of field energy due to radiation is detectable and the field is likened to a standing wave.

In the past the question has been posed, "how can the electron located in an orbital remain in a stable orbital without falling into the nucleus since it is undergoing acceleration by constantly changing direction?" (A charged particle that undergoes acceleration will radiate energy in the form of an electromagnetic wave causing that particle to give up its kinetic energy to wave energy.) This question is founded on the velocity having the two-component definition of direction as well as speed. A change of direction or speed will cause acceleration in otherwords. The answer is; *the action which makes a charge-particle radiate electromagnetically is a change in its kinetic energy which is a change in its linear speed*. For a charge-particle in orbital motion, a change in the radians per second or angular velocity would have to occur and this does not happen in a stable orbital. Note that one form of orbital acceleration is related to Force = m x a and also Force = m x v^2 / r so that a = v^2 / r and this form of expressing acceleration is not time-dependent. Another way of expressing acceleration is where a = (d1-d2) / $(t1\text{-}t2)^2$ which is time dependent and thus related to frequency or a change in angular rate. It is this second definition of acceleration that causes electromagnetic radiation from a charge-particle. A stable electron orbital can have the first form of non-time dependent acceleration and not radiate electromagnetic energy. However, field energy is flowing to its terminus counterpart but it is not radiating away since it is a standing-wave energy.

Thus, there exists a resonant condition where the field is in circular motion but is purely reactive in nature and is not connected to the impedance of free space. When energy is coupled to the impedance of free space it radiates with maximum efficiency when the source impedance matches the load impedance. (Coupled is another term for impedance matched.) The cross-product of force terms above in equation (57) using the $4\pi^2\mu_o$ term implies however that a small portion of each force term can interact with each other.

Equation (58) below shows how the quantum acceleration term is related to the rest mass of the electron. Again, two frequencies f_c and f_{Lm} are involved.

$$(58)\ h_{t1} := \frac{\left(A_{em}{}^2\right)\cdot m_e}{\left(f_{LM}{}^2\right)\cdot f_c} \quad \text{or,} \quad h_{t1} = 6.626075499542029\cdot 10^{-34}\ \cdot \mathrm{sec}\,\mathrm{joule}$$

The two aforementioned frequencies are fundamental field interaction frequencies for the electric and magnetic fields respectively. They are very basic quantum derived field frequencies related to the electric and magnetic field energy flow between charged particles.

It is entirely possible to relate this energy flow to the quantum acceleration term A_{em} on page 22 previous wherein that energy flow has a field rotational vector velocity V_{Lm} and the quantum frequencies f_{Lm} and f_c. This is shown in (59) below. VLm is the rotational vector velocity of the quantum magnetic field which is equal to 8.542454608 x 10^{-2} m/s, f_c is the Compton frequency related to the electron rest mass, and f_{Lm} is the electrogravitational interaction frequency as well as the quantum magnetic frequency.

$$(59) \qquad A_{em} := \left(V_{LM}\right)\cdot\sqrt{\left(f_c\right)\cdot\left(f_{LM}\right)}$$

$$\text{or,} \qquad A_{em} = -3.005435617341997\cdot 10^{9}\ \cdot \mathrm{m}\cdot \mathrm{sec}^{-2}$$

The above is the described field motion that was previously presented for equation (57) previous.

Figure (60) on the next page is much the same expression where A_{em} is expressed in terms of time rather than frequency and t_c and f_c are Compton related time and frequency respectively. In quantum terms the field motion describes the particle action-line and is the reason the particle can be ascribed motion at all. Putting it another way, quantum field motion is more basic than the apparent observed particle position or velocity. The particle follows the field and not the other way around. This is why the electron does not fall into the nucleus. The field geometry will not allow it to do so as the particle has to follow the geometry allowed by the lowest energy state of the field.

$$(60) \qquad A_{em} := \frac{V_{LM}}{\sqrt{t_c \cdot \left(\frac{1}{f_{LM}}\right)}} \quad \text{or,} \ A_{em} = -3.005435617341996 \cdot 10^{9} \cdot m \cdot sec^{-2}$$

From all of the preceding it becomes possible to postulate that there is a basic quantum frequency related to the quantum acceleration term, the Compton frequency f_c, and the quantum magnetic frequency term f_{Lm}. This is shown in equation (61) below. This frequency is likely to exist although it very likely has not been taken for what it is in the cosmic background radiation all around us.

$$(61) \qquad f_{at} := \sqrt{f_{LM} \cdot f_c} \qquad \text{or,} \qquad f_{at} = 3.520758889564392 \cdot 10^{10} \cdot Hz$$

The frequency shown in equation (61) above is basic in that it yields the same wavelength whether wavelength is derived from lambda = C / f or whether lambda = h / m_e x (V_{Lm}) = 8.514995423 x 10^{-3} meters. The only time that this happens is when the Compton energy for the electron is related to frequency and then that frequency is divided into the velocity of light. That will yield the same wavelength as when h is divided by m x C. This does not happen for the quantum orbitals for example where multiples of the fine structure constant result when a frequency (classic) is divided by a frequency (quantum).

Lambda (VLm) is the fundamental electrogravitational and magnetic wavelength as set forth by the previous introduction to the concept of electrogravitation as this paper has presented and the frequency in equation (61) is an associated frequency. This frequency of interaction occurs in the quantum magnetic interaction of charge-fields at the Compton wavelengths of the interaction particles concerned. (It is electromagnetic-wave-like but interacts at the Compton wavelength of an interaction particle.) This is seen in the r_c terms in equations (37), (38), and (39) on page 16 previous. Also, this is applicable to the electrogravitational case only and thus the quantum field action for the electrogravitational field has the particles Compton radius as two of the radius terms and the other two radius terms are macroscopically variable radius terms.

In equation (62) below another form of the quantum case of the electrogravitational force is presented where the function of a power product in quantum electromagnetic terms is shown along with the free space resistance for that electromagnetic wave and where the force interaction as a whole depends on the Compton wavelength of the particles of interaction as well as the variable distance between them. (Squared).

$$(62) \qquad F_{Gt3} := \frac{(376.73\cdot\Omega)\cdot\left(q_o^{\,2}\right)\cdot V_{LM}^{\,2}}{4\cdot\pi\cdot(c)\cdot l_q\cdot r_x}\cdot\mu_o\cdot\frac{(376.73\cdot\Omega)\cdot\left(q_o^{\,2}\right)\cdot V_{LM}^{\,2}}{4\cdot\pi\cdot(c)\cdot l_q\cdot r_x}$$

$$\text{or,} \qquad F_{Gt3} = 1.977288099896321\cdot 10^{-50}\cdot m^{-1}\cdot \text{henry}\cdot\text{newton}^2$$

Equation (40) back on page 16 shows best that in the electrogravitational equations presented previously the resultant interaction force is basically the result of h^2 or quantum power squared. There exists a quantum mechanics expression (the result of matrix mathematics) that relates the position operator **q** and the momentum operator **p** to the complex number ***i*** times (h / 2 x pi). This is shown below in equation (63).

(63) i x (h / 2 x pi)) = (p x q - q x p)

When the above expression is inserted for the value of h in equation (40) the equation (64) below is the result.

$$(64) \quad FG = \frac{2\cdot\pi\cdot(pq - qp)\cdot\left(f_{LM}\right)}{(i)\cdot r_x}\cdot\mu_o\cdot\frac{2\cdot\pi\cdot(pq - qp)\cdot\left(f_{LM}\right)}{(i)\cdot r_x}$$

This is leading to a very interesting result, since the square of ***i*** is equal to (-1). Note also that 2 x pi x f_{Lm} is omega_{Lm} in radians per second. Equation (65) on the next page presents the resultant electrogravitational force as a negative (-) force. A negative (-) force is one of attraction within the conventional viewpoint of physics. It is also suggested that if one of the (pq - qp) terms should yield a (-) result then the force of gravity would be one of repulsion as the F_G force would become positive.

$$(65) \quad -FG = \frac{(pq - qp)\cdot\omega LM}{r_x}\cdot\mu_o\cdot\frac{(pq - qp)\cdot\omega LM}{r_x}$$

The relationship of i to the quantum electric and magnetic force fields can also be presented by solving equation (63) previous for h and then substituting this h function for h in equation (29) for quantum electric force which was presented in terms of h and V_{n1}. Equation (66) (next) illustrates i in terms of the quantum electric force in equation (29). The force sign can be either (+) or (-) by reason of the V_{n1} term.

$$(66) \qquad FE = \frac{(pq - qp)\cdot(V_{n1})}{(i)\cdot\Delta r_x^{\,2}}$$

Equation (67) below illustrates i in terms of the quantum magnetic force from equation (34). The fact that electric and magnetic fields can exhibit a force of attraction or repulsion is due to the fact that the delta force terms in (66) and (67) rely on the vector nature of the V_{n1} term which can relate either to an aiding or opposing field structure. It is also suggested that either a capacitive or inductive situation can

$$(67) \qquad FM = \frac{(pq - qp)\cdot(V_{n1})}{(i)\cdot C^2\cdot\Delta r_x^{\,2}}$$

exist in quantum field terms. That is, reactive power can be nearly the whole of the field action force and thus exhibit real "static" forces but use virtually no real power in the force-field interaction. Note that the V_{n1} term is a real constant and relates to a rotational constant related to the quantum charge of the electron or quantum charge in general. The electrogravitational force expression in equation (39) shows this as well as in the weak and strong force expressions in equations (43) and (47) respectively. This rotational field velocity has an associated deBroglie matter wave that cannot be shielded against. (At least not in the conventional sense of shielding such as enclosing a volume of space by use of a metallic box, or the like.)

For the sake of presenting an easier to conceptualize view of the electron an its associated field the orbital description was presented wherein the electron follows a line around the nucleus in a well defined path. Alas, it actually resembles a cloud around the nucleus wherein the orbital position is the most probable location of the electron at any given instant of time. That is, the square of the energy operator yields the most probable location in the field that the electron may be located at. This can apply to uncharged particles as well and has to to with the real uncertainty of where particles are in the quantum sense.

This may be expanded upon by saying that ***a matter-field is that particle displaced from its most probable location in space-time such that the time that the particle spends at some distance from its most probable location is inversely proportional to the distance from its most probable location.***

Since the concept of matter-fields is basic to all particles then the field around a charge-particle can also be considered to be the electron-charge displaced in the same manner as for the matter-field. All of this happens instantaneously within the established field out to the limits of the field. Then also the total time spent in all of the field displacement positions is less than the Compton time related to the rest mass energy of the electron. This is also related to the accepted concept of *action at a distance.*

The relativistic expressions for distance and time can be arranged such that the terms relating to the radical in each expression equate to a common radical and thus the resulting time and distance ratio can lead to some interesting results when t_x is allowed to become less than t_o in the quantum sense. **This causes d_x to increase**. This relationship is shown in equation (68) below.

$$(68) \quad d_x / d_o = \text{sq rt } (1 - v^2 / c^2) = t_o / t_x$$

Again, when the quantum aspect of time and distance, (where the time and distance base terms are the Compton time and radius of the particle being considered), the expression shown involves a common connection of terms for the relativistic as well as the quantum aspect of action at a distance. It is but one step in logic to realize that on a quantum scale if particles could be aligned in the proper phase and with the proper time characteristics and then impacted all at once with enough energy through a laser action of stimulation then all of the particles would displace to some new point in space-time. On a macroscopic scale this could have a significant effect on the particles new surroundings if enough particles participated in the distance transition displacement and other particles were already at the new location. Also, this action could not be shielded against as the action described does not transit through normal space as was shown by equation (68) where the action is shown to be partially independent of relativistic constraints. The new location would depend only on the phase of the impact energy and the frequency thereof for each particle impacted. The action would also be instantaneous.

This type of action at a distance is illustrated by the quantum jump of the electron from one orbital energy level to another where it has been noted that the action would have to be instantaneous in order that the laws of conservation of energy and momentum be conserved. Also the tunneling affect of the electron across an energy barrier is another famous example of action at a distance and in another case where in the famous two-slit experiment where the particle matter-field demonstrates that the particle can apparently be in two places at the same time! In fact the entire particle-wave duality principle of quantum mechanics is just this type of particle action wherein it appears that any given particle can at the same time be both a particle and a wave and that the particle can be in more than place in any given time within an established probability field.

One could now conceive of displacing an entire vehicle of some design in discrete steps at a rate dependent only on the desired velocity relative to some beginning point and perhaps also realize that the "top end" is theoretically unlimited. Also since the displacement is through hyperspace then normal objects would not be a barrier.

Previously the energy that created "field" energy was compared to the creation energy input and also how particles that exhibited fields came from and utilized that same energy source but "gated" that energy in order that a definite amount of field was created with each particle's restoring pulse. Imagine what would happen if that miniature creation pulse width in Compton time were to suddenly open up to a constantly "on" condition with nothing to restrict the energy output. The result would be another "Big Bang". It is fortuitous indeed that nature keeps house so very well as regards to time and this has not happened. (Except perhaps in the beginning, 15 billion years or so ago.)

In concluding chapter one would like to point out that in the effort to simplify this presentation a great deal of difficult but beautiful mathematics was not presented concerning the quantum aspects of field theory but this is readily available to those desiring to explore the subject in greater depth.

After pondering upon the order that is involved in the immense totality of the Universe I for one have to say that this grand organized design did not, or better yet, could not have been brought into existence by random chance, but by the "hand" of an All Powerful Creator.