THE OUTSIDE RELATIVITY SPACE - ENERGY UNIVERSE

*The article presents the how Work as **rotating Energy is dissipated** on the tiny monads as **Temperature** and damped on the quantized spaces as **Kinetic Energy** and Spin and in the semi and viscously damped continuum as **Electromagnetism** and **velocity** and **Generalized mass** on the non-viscous damped wave motion solids.*

Markos Georgallides : Tel-00357-99 634628
Civil Engineer(NTUA) Athens : Fax -24 653551
N .Mylona St 15 , 6010 , Larnaca Cyprus
Expelled from Famagusta town occupied by
The Barbaric Turks - Au.1974 .
Email < georgallides.marcos@cytanet.com.cy >

1.. Introduction . This independent article is part of [27] , aiming to the connection with the prior ones . **Point** , *which is nothing and has not any Position may be anywhere in Space* , therefore , the **Primary point A** *being nothing also in no Space* , is the only Point and nowhere i.e. *Primary Point is the only Space and from this all the others* which have Position , *therefore is the only Space and to exist point* A *at a second point* B *somewhere else , point* A *must move at point* B *, where then* A ≡ B *. Point* B *is the Primary Anti-Space which Equilibrium point* A , [PNS] = [A≡ B].The position of points in [PNS] creates the infinite dipole and all quantum quantities which acquire Potential difference and an Intrinsic moment **Λ** in the three Spatial dimensions (x , y , z) and on the infinite points of the (i) Layers at these points , which exist from the other Layers of Primary Space Anti-Space and Sub-Space , and this is because Spaces = monads = quaternion [9] . **Since Primary point A** is the only Space , then on it *exists the Principle of Virtual Displacements* $W = \int P.ds = 0$ *or* [ds .(PA + P B) = 0] i.e. for any ds > 0 Impulse P = (PA + P B) = 0 . All *points may exist with* $P = 0 \rightarrow$ *(PNS) and also with* P ≠ 0 , (P A + P B = 0) *, for all points in Spaces and Anti – Spaces , therefore* [*PNS*] is self created *, and because at each point may exist also with* P ≠ 0 *, then* [PNS] *is a* (***perfectly elastic***) *Field with infinite points which have a* ± *Charge with* P = 0 → P = Λ → ∞ .
Since points A , B of [PNS] coincide with the infinite Points , of the infinite Spaces , Anti-Spaces and Sub-Spaces of [PNS] and exists rotational energy **Λ** and since Motion may occur at all Bounded Sub-Spaces (**Λ , λ**) , then this *Relative motion* is happening between all points belonging to [PNS] and to those points belonging to the other Sub-Spaces (A ≡ B) .The Infinite points in [PNS] form *infinite* Units AiBi = ds̄ , which equilibrium by the Primary Anti-Space by an Inner Impulse (P) at edges A , B where $P\,i_A + P\,i_B \neq 0$, and ds = 0 → N → ∞ **.**
Monads = Quantum = ds = AB/**(** n = ∞ → 0) = [a ± b.i] = 0 → ∞ create Spaces (S), Anti-Spaces (A-S) and Sub-Spaces (S-S) of AB , which Sub-Spaces are Bounded *Spaces , Anti-Spaces and Sub Spaces in it* and are not purely spatial because are Complex numbers which exist for all Spaces , and since ds^{n} is Complex number also . Monad **ĀB** is the ENTITY and [**A , B – P**$_{A^-}$ **, P** $_{B^-}$ **]** is the LAW , so Entities are embodied with the Laws .
Entity is **quaternion** A⁻B , and law |AB| = length of points A , B and imaginary part forces P_{A^-}, P_{B^-} .
Dipole A⁻ B = [λ , Λ] in [PNS] are composed of the two elements λ , Λ which are created from points A,B only where *Real* part **|AB| = λ** = wavelength (*dipoles*) and from the embodied Work the *Imaginary* part **W** = W = ∫ *P.ds* =(r.dP) = r̄xp̄ = I.w = [λ.p] = **λ.Λ = k2** , where momentum **Λ** = **p** and Forces **dP =** $P^-_B - P^-_A$ are the stationary sources of the Space Energy field [22-25] . **Euler's rotation** in 3D space is represented by an axis (vector) and an angle of rotation , which is a property of complex numbers and defined as **z = [s ± v̄.i]** where **s , |**v̄| are real numbers and **i** the imaginary part such that $i^2 = -1$. Extending imaginary part to three dimensions v̄1 i ,v̄2 j ,v̄3 k → **v̄.∇i** then becomes **quaternion.**
In [24] monad [0 , Λ] = Energy, is dissipated on points and on the quantized tiny Spaces of the Perfectly Elastic Field [$0 < AB=\lambda < 10^{-35}$ m] and to the greater to Planck scale . Beyond Planck scale **Energy is dissipated as Temperature** in the Perfectly Elastic Configuration and in the individual particles with $ds <= 10^{-35}$ m following the ideal Gas equation [Λ = n.RT / V] of Entropy in Thermodynamics (***perfectly elastic***) and in a specific number of ***independent moles*** called ***Fermions*** and ***Bosons*** with quite different properties .Then the moving charges *is velocity* **v̄** *created from the rotating Kinetic Energy momentum vector* [Λ =Ω= (λ.P) = ± Spin] which creates on monad **ds** the Centrifugal force ($\mathbf{F}_f$) , the equal and opposite to it Centripetal force ($\mathbf{F}_p$) and acceleration **ā** *mapped* **[*and because of the viscous (semi-elastic medium) is damped*]** *on the perpendicular to* Λ *plane as* → **v̄** E||dP and **v̄** B ⊥ dP) *following* ***Kirchhoff 's circuit* R, L ,C *rules*** *with circuits , the Sub-spaces of the tiny monads . The kinetic rotated energy in the semi-elastic viscously damped configuration (as a Lagrange's Ray light viscously damped system) is dissipated as Electromagnetism* . **Since** (dP⊥ ±Λ⁻) work occurring from momentum p̄ = mv̄ = Λ acting on force **dP** is zero , so when **v̄** $_{E^-}$= 0 *, momentum* Λ⁻ = mv̄ *only , is exerting the velocity vector* v̄ B *to the dipole vector* **,** *λ , and* kinetic energy is interchanged as velocity v̄ and the generalized mass **M** (*the reaction to the change of the velocity* ***v***⁻) creating component forces , F_E||dP⁻**.** v̄ and F_B ⊥ dP⁻**x** v̄ in the non-viscous damped monads (**the solids**) . [24]
Energy in a vibrating System is either ***dissipated (damped) into Heat*** which is another type of energy [*Energy ,momentum vector* **Λ.λ** *is then damped on the perpendicular to* Λ *plane* , ***as this is a Spring-mass System , with viscous dumping ,*** *on co variants Energy* **E** *, mass* **M** *, velocity* **v̄** *,] or* ***radiated away*** *.* Spin = **Λ** = **r̄**.m.**ū** r is the rotating energy of the *oscillatory system* . ***Oscillatory motion is the simplest case of Energy dissipation of Work embodied in dipole . In any vibratory system , Energy* k = λΛ *is the Spin of Dipole* λ *, and is dissipated on perpendicular to* Λ *plane in the three quantized Planck Spaces (* $10^{-34} < \lambda > 10^{34}$ *) and damped as the linear momentum vector* Λ = M.v⁻ *in them , i.e Space – Energy Configuration is a constant Sinusoidal Potential System . An extend analysis in*** [28] .

2.. The method .

Equilibrium of Spaces presupposes Homogenous Space and the Symmetrical Anti-Space which is the configuration of primary dipole in PNS .

For two points A , B which coincide , exists *Principle of Superposition* (A ≡ B) which is a Steady State containing Extrema for each point separately . i.e. In three dimentional Space , the infinite points exist as Space because of the Equal and Opposite Impulses (***Opposite Forces***) which is a new ***Notion , for Mass and Energy in AB distance .*** (Points A ,B are embodied with Opposite Forces) . Dipole $\bar{A}B$ on the infinite others Spaces in [PNS] carry all quantum quantities and from this point laws of Physics start using the ***Quaternions Conformation manifold*** .

Primary Quaternion of equilibrium dipole $\bar{A}B = \bar{r} = \lambda$ in Space , Anti-space and of Force P :

The couple P , - P creates Work as moment M = P.(r/2).sinθ = [r .P] .sinθ/ 2 = W = [P.λ] . As logarithm maps points on the sphere into points in the tangent sphere , so work P.λ is transformed as angular momentum **Ḻ** = p x λ where then **P** = **p** and it is the amount of rotation **Λ** i.e. P = p = Λ , or The work W, for the infinite points on the two tangential to **r** planes is equal to W= [r.P] = [λ.Λ]

where .

λ = displacement of A to B and it is a scalar magnitude called wavelength of dipole AB .

Λ = the amount of rotation on dipole AB (this is angular momentum Ḻ and it is a vector) .

i.***e*** **λ . Λ** = ***constant for all dipole*** ***λ*** , *and* ***since λ is constant Λ is also constant , and from*** equivalent formula of **Λ** = **Ḻ** = r̄ x p = I.w = [λ.p] = r̄.(P.sinθ) = P.r̄ sinθ = constant → ***Spin of λ .***

The infinite dipole AB,(λ.p) = AB,(λ.Λ) in Primary Space [PNS] are quaternion as ,

z̄ o = [s , v̄n.∇i] = **[λ , ±Λ** .∇i] = **[λ , ± Ḻ.**∇i] ……………..(m1) is the quaternion of the Primary Space dipole , ***where***

λ = ***the length of dipole which is a scalar magnitude*** ,

Λ.λ = ***the spin of dipole , equal to the angular momentum vector*** p.r = **Ḻ** *and exponentially*

z o = [s , v̄n.∇i] **= [λ , ±Λ** .∇i] = **[λ ,± Ḻ**.∇i] = **| zo |.e^** arc.cos|λ/**zo**|.[Λ/ |Λ|.∇i] = **| zo|.e^**θ.∇i … …. (m2)

The conjugate quaternion is **z̄'o** = (λ , + Λ .∇i) (λ , - **Λ** .∇i) = **[λ² - |Λ|²]**

Repetition quaternion is z̄o1 = (λ , + Λ .∇i) (λ ,+ Λ .∇i) = [λ² - |Λ|² + 2.λxΛ.∇I]

= [λ² -Λ²] = [λ² - (i²+ j²+k²) |Λ²|] since λ , Λ are axially

In Polar form z̄o = (λ , Λ .∇i) = | √z̄ 'o . z̄o |e^[(λ / |√z̄'o . z̄o|) . Λ/ √Λ'Λ] ……..…(m3)

i.e. Primary Space quaternion z̄o multiplied by its conjugate z̄'o , is cancelling the vector Λ . ∇i and leaving the scalars λ , |Λ| only .

Repetition quaternion's property (z̄o1) ***is a new quaternion by transforming the scalar magnitudes*** *wavelength λ and spin magnitude |Λ|* ***, to vectors*** Λ∇i) ***. In particles (*** *it is a spherical rotation in opposite directions for Space Anti-space equilibrium)* ***consists the source motionless frame .***

It is shown later that this rotating source **Λ.λ = Spin = Energy on dipole** is mapped in perpendicular to |Λ| plane as velocity vector v̄ , which creates the equilibrium Centrifugal and Centripetal accelerations proportional to v̄ and so the Wave motion of Dipole AiBi . Conservation Newton's laws exist on centrifugal and Centripetal forces created by the equal and opposite accelerations

Primary Space does not depend on Time because λ and Λ are constants and (∂/t , 0) (λ,Λ∇i) = 0

The tangential to **λ** quaternions are (∂/λ,∇i) (λ,Λ∇i) = 0 – Λ , p - λ∇i + Λ

= **- [λ , Λ∇i].∇i** = - (∂/λ ,∇i) (λ , Λ∇i) ……..…(m4)

i.e. The equilibrium Anti-Space , (*on the roll axis , equilibrium Spin of Space and Spin of Anti-Space*).

Using the quaternion multiplication rule (žϖ = −ž . ϖ , ž **x** ϖ) and since also ∇i.∇i = - 1 then , on any reference frame , Euclidean product for two quaternion **z̄o , z̄** is **z̄o © z̄** →

z̄o © z̄ = **[λ , Λ** .∇i] © **[s , v**.∇i] = **λ s - Λ v̄.**∇i , **λ v̄.**∇i **- Λ s .**∇i - **Λ x v̄.**∇i ..……… (m5)

exponentially

z̄o © z̄ = **[λ , Λ** .∇i] © **[s** , **v̄**.∇i] = **{ z̄o© z̄ }** +| **[z̄o© z̄] |.e^ (π½).[z̄o*z̄].**∇i / |**[z̄o*z̄]**| ……. (m6)

and represents the extrinsic rotation**, which is equal to the intrinsic rotation and by the same angles**, of any quaternion of Spin Λλ,** but with inverted order of rotations and vice-versa**. Imbedded Events (Time) on (m5,6) are now the flipped signs in reverse order, related to Primary Space quaternion.

where

λ s - Λ v̄.∇i = The Intrinsic alterations of the reference frame,

λ v̄.∇i = The Translational alterations, they are in the special case of rotational motion where rotation on two or more axes creates linear acceleration, *in one only different rotational axis J*.

Λ s.∇i = The Coriolis alterations, a centripetal acceleration is that of a force by which bodies (*of the reference frames*) are drawn or impelled towards a point or to a centre (*the Primary Space is the hypothetical* motionless *non-rotational frame*),

Λ v̄.∇i = The Azimuthal alterations, which appears in a non-uniform rotating reference frame in which there is variation in the angular velocity of the reference frame.

Time **T** interfere with the calculations in reference frame only and ***does not*** with the motionless frame. Since work in [PNS] is $W=\int_{A\text{-}B}$ = [P.ds̄] = 0 and is stored on points A,B as **quaternion** $\bar{z}_o$ **=[λ, Λ∇i]** then forces (***the spin***) ***are conservative and because work from conservative forces between points is independent of the taken path and on a closed loop is zero, curl = 0 and Force becomes from the Potential function gradient***, and also from the equilibrium of Spaces Anti-spaces, ***where then Spin rotations , Λ , - Λ , are in inverted order of rotation and vice-versa ,*** then even function f(Λ) = f(-Λ) and odd function is - f(Λ) = f(-Λ) and their sum f(Λ) + f(-Λ) = 0) i.e.

Mapping (graph) of Even function f(Λ), is always symmetrical about Λ axis (i.e. a mirror) and of Odd symmetrical about the origin and this is the interpretation of the Wave nature of spaces* [PNS].** Differential operator of *even* order quaternion ***plus differential operator of *odd* order quaternion is zero. ***It is the Mapping (graph) of Even function* f(Λ) *and of Odd* f(-Λ) *and is the interpretation of the Wave nature of Spaces and all the others (i.e.The Physical Universe behaves as a simple harmonic oscillator*).** Because functions f(Λ) , f(-Λ) are Stationary and only their sum creates their *conjugation ope*ration through ***mould*** $\bar{z}_o$, therefore their sum is zero independently of time (*negation truth*) as ,

even function f(Λ) → (∂/∂t ,∇) © (λ , - Λ∇) = 0 , **- ∇ λ**
odd function f(-Λ) → (∂/∂t ,∇) © (λ , Λ∇) = 0 , ∇ **x** Λ
even + odd = 0 → (λ ,- Λ∇) + (λ , Λ∇) = **[0 - ∇ λ , - 0 + ∇** x **Λ] = 0** = nt …… (m7)

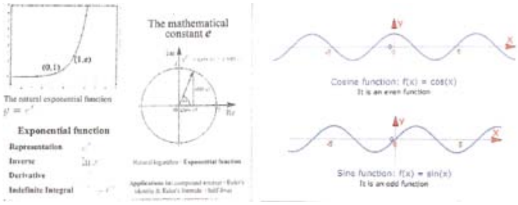
Quaternion of the Primary Space dipole is $\bar{z}_o$ **= [s,** $\bar{v}_n$∇i]**= [λ , Λ**∇i] and the only one Physical existing truth monad ($\bar{z}_o$ =1) , and (nt = 0) the only Physical non-existing equilibrium monad ,*negation truth* ***, so non-existence (0) becomes existence with [PNS] motionless dynamic mould ($\bar{z}_o$ =1) , and it is Done everywhere*** , following Boolean logic operations with all combinational rules and laws , as follows ,

Element [$\bar{z}_o$ =1]	Element [nt = 0]	Conjunction [$\bar{z}_o$ → 0]	Conjugation [$\bar{z}_o$ © 0]	Quaternion [$\bar{z}_o$ ≡ nt]
0	0	z_o	0	z_o
z_o	0	0	z_o	0
0	z_o	z_o	z_o	0
z_o	z_o	z_o	0	z_o

Quaternions (m1),(m3),(m7) ↔ $\bar{z}_o$ **= [λ , ± Λ**∇i] **,** $\bar{z}'_o$ = **[** λ^2 **-** $|\Lambda|^2$**] , nt** = **[-∇ λ , ∇** x **Λ] = 0**

are the three fundamental equations of [PNS] ,unifying the ***homogenous Euclidean geometry*** (**λ=λ∇**) and the ***source term Energy*** (dš.dP = λ.p = constant $K_{1,2,3}$ with motion Λ) ,and imbedding in them all conservation physical laws with the only two quantized magnitudes **λ , Λ** *which are*

λ = *the length of geometry primary dipole which is a scalar magnitude* ,
Λλ = k , ***the spin of dipole , source term , equal to the angular momentum vector*** λ**p = λΛ .**
***The how is refereed later and in* [27]**



(Fig.2-1)

2..1 Gravitational field and Newton's 2nd Law in a Non-inertial rotating Frame :

When conjugation is done between nt = [$-\nabla\lambda$, $\nabla \times \Lambda$] = 0 , and a quaternion of the differential time operator $\partial/\partial t$ and 3D angular speed vector ϖ then , $(\partial/\partial t , \varpi) © (-\nabla\lambda , \nabla \times \Lambda)$ = $d/dt(-\nabla \lambda) + \varpi.\nabla x\Lambda$, $d/dt(\nabla x\Lambda) + \varpi.\nabla\lambda - \varpi\, x\nabla \times \Lambda = 0 - \varpi.\Lambda$, $0 + \varpi\lambda + \varpi.\Lambda = 0$, $\varpi.\lambda$ or ,

$(\partial/\partial t , \varpi) © (-\nabla\lambda , \nabla \times \Lambda) = 0$, $\varpi.\lambda$ = [0 , p] = [0 , Λ] ………………(N1)

Equation (N1) implies that the new quaternion which maps the alterations of , *negation truth Unit* , by rotation only , transforms only vector term magnitudes and since ϖ is velocity $\varpi.\lambda$ is momentum p, i.e. ***negation truth Unit* nt** = [$-\nabla\lambda$,$\nabla x\Lambda$] = 0 is a machine that instantly transforms Inertial mass , ***momentum* p = $\varpi.\lambda$ = m.v̄** to all Inertial frames Layers **K**$_{1,2,3}$ = **λ.p** and over spaces ***NOT as said with Big-Bang*** but of this reason only. This Inertial mass which is a meter of the reaction to the change of velocity (*the meter of the reaction to the motion*) is created from Newton's equilibrium of Centrifugal and Centripetal forces from the *mapped velocity of Spin* .

Wavelength (**λ**) may be equal to **0** , where then angular velocity $\varpi \to \infty$ meaning that , this is also happening to all Inertial frames or not . Label 'gravity' probably is referred to something heavy . Conjugation between the quaternion of the differential time operator $\partial/\partial t$ and 3D angular speed vector ϖ and the Position quaternion z̄ = (t ,ž) is the velocity $(\partial/\partial t, \varpi) © (0 ,ž) = (- \varpi.ž , \varpi \times ž + dž /dt)$ and $(\partial/\partial t, \varpi) © (- \varpi.ž , \varpi \times ž + dž /dt) = (- d\varpi/dt .ž , d^2ž /dt^2+2 \varpi \times dž /dt + d\varpi/dt \times ž - \varpi.ž\varpi)$ is the acceleration which transforms both scalar and vector parts . Time , which is a phenomenological reference concept and it is the only element in the scalar of an event of a Position quaternion , does not exists in **nt** unit where Energy is related as momentum **λΛ = λp .**

Force field is the derivative of the potential of Newton's scalar field equation $\nabla^2\Phi = 4\pi G\rho$ and for vacuum $\Phi = GM / \sqrt{(x^2+ y^2+z^2)}$ which is the same as the square quaternion of **nt** → $(nt)^2 = [\nabla\lambda , \Lambda x\nabla]^2$ $=[\lambda^2 - \Lambda^2 \pm 2\lambda.\Lambda\nabla^2] = \lambda^2 - \Lambda^2 \pm 2\lambda.\Lambda = \lambda^2-\Lambda^2\pm 2.\lambda\, x\Lambda = [\lambda^2 -\Lambda^2] = [\lambda^2 - (i^2+ j^2+k^2) |\Lambda^2|]$ since λ , Λ are axially . ………. (N2)

The upper relation was used by Special relativity [*Minkowski metric* (gμν)] *for Events to be represented as 4-vectors for all scalar operations*, ***without knowing that this is*** **(nt)^2** , ***which equilibrium the two opposite and spherical rotations of Space Anti-space and transform spin magnitudes*** ± **|Λ|** ***to all other, 4- vectors*** **z̄ = [s, v̄.**∇i] . Conjugation of **z̄n** © $(nt)^2$ = **[s**n , **v̄**n.∇i].[$\lambda^2-\Lambda^2$] = λ^2.**s**n $-\Lambda^2$.**v̄**n.∇i **, - s**n .Λ^2 - λ^2.**v̄**n.∇i- (**v̄**n$x\Lambda^2$)∇i which may give an explanation to linear central force and to inverse square law .
Newton's laws are applicable everywhere in nature while Relativity is confined in Space-Time , Planck - time and not assessing the outer reality of Spaces . Time which is not existing and it is only a meter of changes is applicable to the correlations of monads and not the essence of monads which is λ . Λ = k only .

Metric (distance) of Euclidean Spaces :
The Spatial interpretation of a point P is [P = a+v̄.i **,** where tan**θ** = v̄/a , in *Complex System*], and in3D space *Cartesian System* **P** (a,x,y,z) , where $a^2+x^2+y^2+z^2 = 1$, and then point P represents a rotation around the axis directed by the vector (x,y,z) of the unit sphere by an angle $\varphi = 2\cos^{-1} a$, and in Polar form point p = (a+v̄ i) = √p'p.e^[|a/√p'p|.|v̄ i/√v̄'.v|]. For two points $P_1 = a_1$+v̄.i , $P_2 = a_2$+v̄.i becomes

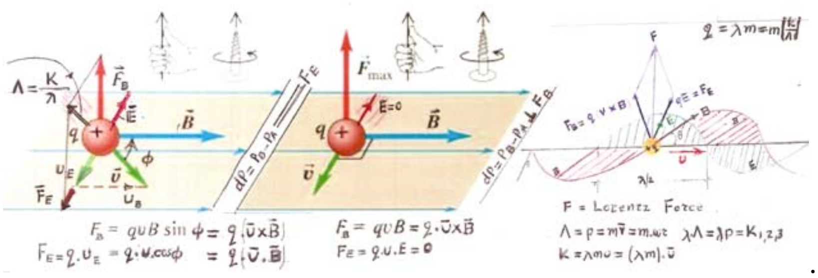
ds̄(P_1,P_2) =ds̄= Normalized (P_1+P_2) = (P_1+P_2)'©(P_1+P_2) = [√|P'**1**.P_1|+|P'**2**.P_2|] = [√|P'**1**.P_1|+|P'**2**.P_2 |] ..(N3)

Conjugating N1 on point P then [0, p] © [a+v̄.i **]** = 0 -pv̄ , 0+ pa+ pxv̄ **= - |p|.|v̄|** **,** a**p + pxv̄** ….(N4)
For p = [k / λ] then [0, p] © [a+v̄.i **] = -** [k /Λ] , a.Λ + Λxv̄ and for points where a = 0 then
[0, p] © [a+v̄.i **]** **=** - [k /Λ] , a.Λ + Λxv̄ **= - (k / λ) , Λ x v̄ =**
Quaternion N4 instantly transforms momentum **p** = Intrinsic **Spin** of [PNS] to all Frames Layers **K**$_{1,2,3}$ = **λp**

as , Black Holes Scale conjugation →
Planck Scale Matter conjugation → In Inertial Configuration Frames as Gravity waves .
Dark Matter Scale conjugation →

***Directional dipole* z̄o ,** is the rotation corresponding to keeping a cube held fixed at the point , and rotating it 2θo about the long diagonal through this fixed point , where the three axes are permuted cyclically, and influence on any other quaternions **z**n [s+v̄.i**]** equal to **eo** = [|r|+r̄.i **]** ©[0, Λ̄] © [s + v̄.i**]** following rotations at static points P[|r| , r̄∇i] of [PNS] , in the two , *perpendicularly interchanged and conserved* , equilibrium states – **|Λ̄ |.|r̄| = |**r**| . Λ̄** and **- |Λ̄ |.|r̄| = Λ̄ xr̄** where |r|**Λ̄** ⊥ **Λ̄xr̄** .

2..2 The Beyond Gravity Forced Fields :



. (F.2-2)

Dipole Λ̄ B = [λ ,Λ] in [PNS] are composed of the two elements λ , Λ which are created from points A , B **|AB| = λ** = wavelength (*dipoles*) and from W= (r.dP) = r̄xp = I.w = [λ.p] = λ.Λ = k2 → **Λ** = **p** = momentum and Forces **dP =** P^{-}_{B} –P^{-}_{A}) which are the sources of Space field .(*the moving charges is velocity* **v̄** *created from dipole momentum* ±*λ Λ*⁻ *when is mapped on the perpendicular to Λ plane as →* **v̄** E || dP and **v̄** B ⊥ dP). Since (dP ⊥ ± Λ̄) the work occurring from momentum p̄ = mv̄ = Λλ (Spin) acting on force **dP** is zero , so ***momentum* Λ̄ = mv̄ *only , is exerting the velocity vector* v̄ *to the dipole , λ ,*** with the generalized mass **m** (*the reaction to the motion v̄*) which creates the component forces , **F**E || dP⁻**.**v̄ and **F**B ⊥ dP⁻**x** v̄.

Forces dP *//* (parallel) *to the parallel of Space Anti-Space lines* { [S] ≡ [AS] } , create a Static force field **E** in (dP , λ) plane where E⁻ ⊥ ± Λ̄ and so E⁻, v̄ E⁻, dP are co plane .

Forces dP *⊥* (perpendicular) *to the parallel of Space Anti-Space lines* { [S] ≡ [AS] } , create a Static force field **B** which is perpendicular to **E** force field and perpendicular to dP , λ plane also .

Velocity vector **v̄** (**v̄** E , **v̄** B) is in [v̄**.** B⁻] plane forming an angle θ < 180° to the force field **B⁻** .
The oriented parallelogram spanned by the cross product of the two vectors **v̄** and **B** is the bivector **B⁻**^ **v̄** which cross product is vector v̄ **x** B⁻ **,** therefore is created a force in a vector product → **F**B = (λm). **v̄** x **B** (*because velocity vector* **v̄** *=(p/m) = (Λ /m) = [k2 / λm] and → (λm).v̄ = k 2*) and for the coplanar force field **E⁻** the vector **v̄ . E⁻** = (**v̄** E). **E⁻** which experience a force → **F** E = (λm).**E .** i.e.

The two perpendicular Static force fields **E** and Static force field **B** of Space-Anti-Space ,experience on any moving dipole Λ̄ B = [λ , Λ] with velocity **v̄** a total force **F** = **F** E + **F** B = (λm). **E** + (λm). **v̄** x **B** which combination of the two types result in a helical motion , with stability demand → E = -(v̄**x**B) = **-(**v̄.B)⊥ …(N4)
which is the alternative conservation of momentum [k 2= $Λ^2$/2λm] *in the two perpendicular fields E , B* .
In case (λm) = **q** then total force **F** = **F** E+**F** B = q.E + q.v̄ x B **=** **q**.[**E** + **v̄** **x B**] → ***which is Lorentz force in the Electromagnetic crossed fields*** *E* ***and*** *B* ***with electric charge*** *q* = λm ***and are the two beyond Gravity Fields interpret ting the fundamental cause (effect) of motion , in small and large scales ..***

Example : The vector length of forces F E , F B is the action on dipole [λ , Λ] representing the energy equivalence state ET (***the Total energy state of a quaternion***) .Velocity vector **v̄** components follow Pythagoras conservation law v = √**v̄** E^2 + **v̄** B^2 and (N2) also ,where **E**T = √ [|**Λ̄**|.|**r̄**|]² +[**Λ̄.r̄** + **Λ̄xr̄**] ² ...(N5)
Since λ.Λ = k = λ mv̄ = (λ m)v̄ = (λm).wr̄ and Λ = mv̄ = m.wr̄ where vector **v̄** (**v̄** E , **v̄** B) is mapped from Λ only on a perpendicular to Λ plane as **v̄** E , **v̄** B then the real norm is **r̄ = v̄** and [|Λ̄|.|r̄|] = [|Λ̄|**.**|**v̄**|] = mv̄.**v**E.

= m.**v**E..**v**E. = [**m .v**E.²] and [Λ̄ .r̄ +Λ̄xr̄] = [Λ̄.**v̄** + Λ̄x**v̄** **] = [** Λ̄ **.**v̄B + Λ̄ X v̄B..] = [**Λ.vB + Λ** X **vB**] where,

[m .**v**E.²] → the energy component depended on gauge magnitude **m** and the velocity **v**E..
[Λ.**v**B.+ Λ X **v**B..] → the energy component depended on gauge magnitude **Λ** and the velocity **v**B..

The total energy equivalence , states that quaternion has a certain energy independence of time and motion which is inter built in $\bar{r}$ gauge magnitude and in energy (*momentum*) **Λ** state . Magnitude $\bar{r}$ maybe the wavelength λ of quaternion and on magnitude ± Λ the spin which maps velocity vector $\bar{v}$ on the perpendicular to ± Λ plane with the two components $\bar{v}_E \perp \bar{v}_B$ .Since E_T is constant for every one quaternion , so quantity (m .v_E^2) must be interchanged in (Λ.v_B.+ Λ x v_B.) quantity and vice versa , meaning that the two quantities are contributed and mass m is a meter of proportionality to this equilibrium and is correct saying that *m = mass = a meter of the reaction to the motion* , or how much resists in velocity **v** change [F/(dv/dt)] , to be accelerated . Since velocity $\bar{v}$ is produced from the ±**Λ** momentum vector only , then E_T is a moving energy which is conserved either as mass **m** or as momentum **Λ** in a) velocity vector $\bar{v}$ ($\bar{v}_E$, $\bar{v}_B$) b) in the two curled fields **E , B**, or in both . There is not any loss of energy because the total velocity $\bar{v}$ is conserved and the two components ($\bar{v}_E$, $\bar{v}_B$) follow Pythagoras conservation law and so when ,

$\bar{v}_E = 0$ then E_T = Λ.v_B.+ Λ x v_B → which is the *accelerating removing energy* Λ towards v_B .
m = **0** then E_T = Λ.v_B.+ Λ x v_B → which is the *linearly removing energy* Λ towards v_B .
$\bar{v}_B = 0$ then E_T = m .v_E^2 → which is the *Kinetic energy in Newtonian mechanics* towards v_E .

Stability is obtained by the opposite momentum – Λ^- where E = **-** ($\bar{v}$x**B**) = **-** ($\bar{v}$.B) ⊥ → or and **B ⊥ E .** The two perpendicular Static force fields **E** and Static force field **B** of Space-Anti-Space , ***experience*** on any moving dipole A^- B = [λ , Λ] with velocity $\bar{v}$ (*momentum* Λ^- = m$\bar{v}$ *only is exerting the velocity vector* $\bar{v}$ *to the dipole* **λ**) a total force **F** = **F** $_E$ + **F** $_B$ = (λm). **E** + (λm). $\bar{v}$ x **B** which combination of the two types result in a helical motion and generally to any Space Configuration (*Continuum*) extensive property , as ***Kinetic*** (3-current motion) and ***Potential*** (*the perpendicular Stored curl fields E , B*) ***energy , by displacement*** (*the magnitude of a vector from initial to the subsequent position*) ***and rotation*** and equation is as (N5) which is analytically as follows ,

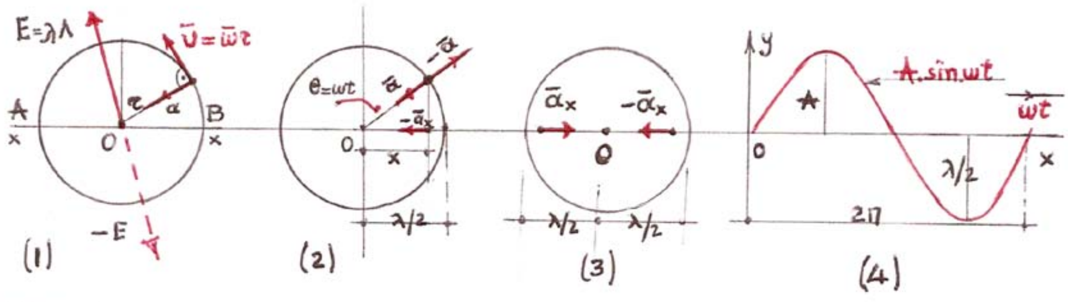
The Total Energy State of a quaternion $E_T = \sqrt{[\, m.v_E^2\,]^2 + [\,\Lambda.v_B + \Lambda \times v_B\,]^2} = \sqrt{[\, m.v_E^2\,]^2 + T^2}$
$= \sqrt{[\, m.v_E^2\,]^2 + |\sqrt{p_1 v_{B1}}|^2 + |\sqrt{p_2 v_{B2}}|^2 + |\sqrt{p_3 v_{B3}}|^2}$

i.e. a moving Energy cuboid (**a**x**b**x**c**) , *rectangular parallelepiped* ***, with space diagonal length***

T = $\sqrt{a^2+b^2+c^2}$ where → **a** = |$p_1 v_{B1}$| , **b** = |$p_2 v_{B2}$| , **c** = |$p_3 v_{B3}$| and when

$\bar{v}_E = 0$ then E_T = Λ.v_B.+ Λ x v_B → which is the *accelerating removing , rotating energy* Λ towards v_B .
m = **0** then E_T = Λ.v_B.+ Λ x v_B → which is the *linearly removing , energy* Λ towards v_B .
$\bar{v}_B = 0$ then E_T = m .v_E^2 → which is the *Kinetic energy in Newtonian mechanics* towards v_E .

2..3.. The Wave nature of dipole (Monad) A^-B .



(F.2-3)

Monad $\bar{\text{A}}$**B** is the ENTITY and [**A , B – P_A^- , P_B^-]** is the content which is the LAW , so Entities are embodied with the Laws . Entity is quaternion A^-B , and law the *Real* part |AB| = The length between points A,B and *Imaginary* part the equal and opposite forces P_A^-, P_B^- such that P_A^- + P_B^- = 0 . [18]

Dipole A^- B = [λ ,Λ] in [PNS] are composed of the two elements λ , Λ which are created from points A ,B only where *Real* part **|AB|** = **λ** = wavelength (*dipoles*) and from the embodied work the *Imaginary* part W = (r.dP) = $\bar{r}$x$\bar{p}$ = I.w = [λ.p] = λ.Λ = k2 , where momentum **Λ** = $\bar{\mathbf{p}}$ and Forces **dP** = P^-_B –P^-_A are the stationary sources of the Space Energy field . [22-25] .

The moving charges is velocity $\bar{v}$ *created from dipole momentum vector* $\pm \Lambda^{-}$ *when is mapped on the perpendicular to* Λ *plane as* $\rightarrow$ $\bar{v}_E \parallel dP$ and $\bar{v}_B \perp dP$) . Since ($dP \perp \pm \Lambda^{-}$) the work occurring from momentum $\bar{p} = m\bar{v} = \Lambda$ acting on force **dP** is zero , so ***momentum*** $\Lambda^{-} = m\bar{v}$ ***only , is exerting the velocity vector*** $\bar{v}$ ***to the dipole ,*** λ **,** with the generalized mass **m** (*the reaction to the change of velocity* $\bar{v}$) which creates the component forces , $F_E \parallel dP^{-}.\bar{v}$ and $F_B \perp dP^{-} \mathbf{x}\, \bar{v}$. Dipole momentum { $\Omega = (\lambda . \Lambda)$ = Spin } is the rotating total Energy on dipole $A^{-}B$ and mapped on the perpendicular to Λ plane as , *velocity* $\bar{v}$ *, mass* ***m*** *, on radius* ***r*** *to AB/2 =* ***λ/2 .*** From F.7-3 velocity $\bar{v}$ only creates the Centrifugal force (F_f) , and the equal and opposite to it Centripetal force (F_P) with acceleration $\bar{a}$, and the *mete*r of **x** component equal to $\mathbf{a}.\sin\theta = \mathbf{a}.(x/A) = (a/A).x$. The equation of motion is then , $m.(d^2x/dt^2) = -(a/A).x$ with the general solution , $\mathbf{x} = C_1 \sin\theta + C_2 \cos\theta = C_1 \sin.\mathbf{w}t + C_2 \cos.\mathbf{w}t$, *where,*

$\mathbf{w}^2 = (a/Am)$ **,,** C1 , C2 constants **,,** and for $\theta = 0$ then ,
$\mathbf{v} = \mathbf{v}_o = w.r = w. \lambda / 2 = (\mathbf{w}\lambda) / 2$ and $\mathbf{x}_o = A = \boldsymbol{\lambda/2}$
A = The amplitude of oscillation , and when $x = 0$ then $A = \lambda / 2$.

Considering motion from time $t = 0$ where motion passes through O , ($x = 0$) with velocity $\mathbf{v}_o$ // Ox ,
then *displacement* $\mathbf{x} = \mathbf{v}_o .\sin \mathbf{w}t = A.\sin [\sqrt{(a/Am)}.\mathbf{t} + \pi/2]$ ………..… (1)
velocity $\dot{x} = dx/dt = \mathbf{v}_o.\mathbf{w}.\sin (\mathbf{w}t + \pi/2) = A\sqrt{(a/Am)}.\sin [\sqrt{(a/Am)}.\mathbf{t} + \pi/2]$
acceleration $\ddot{x} = d^2x/dt^2 = -\mathbf{v}_o.\mathbf{w}^2.\sin(\mathbf{w}t + \pi) = (a/m).\sin [\sqrt{(a/Am)}.\mathbf{t} + \pi] = -(a/Am)\mathbf{x} = -(2a/\lambda m).\mathbf{x}$

The amplitude of oscillation (**x** max) is equal to the constant $\mathbf{v}_o / \mathbf{w}$ while the period **T** of a complete oscillation to the constant $2\pi /w$ is as , $w = 2\pi /T = 2\pi f = \sqrt{(a/Am)}$ where f = frequency and solving a , $\mathbf{a} = (2\pi /T)^2. (Am) = \mathbf{w}^2.(Am) = \mathbf{w}^2.(\lambda m) / 2$, (1-1) → i.e
When the motion is repeated in equal intervals of time T , or multiple T, then distance **x** and velocity **dx/dt** have the same initial magnitudes and it is *a periodic motion* which is satisfied by the relationship $\mathbf{x}(t) = \mathbf{x}(t + T)$ .The angular speed of line segment r (*or angular frequency*) is $w = 2\pi / T = 2\pi.f = 2\pi.\bar{v}/\lambda$ where **f** is the frequency of the harmonic motion and equal to $1/T = 1/(\lambda/\bar{v}) = \bar{v} / \lambda = f$.
When velocity $\mathbf{v}_o$ is not parallel to Ox then motion is not linear and instead of Scalar magnitude **x** , vector magnitude $\bar{\mathbf{r}}$ is used and the equation of motion is then , $m.(d^2\bar{r}/dt^2) = -(a/A).\bar{r}$ with general solution $\bar{\mathbf{r}} = C_1 \sin\theta + C_2 \cos\theta = C_1 \sin.\mathbf{w}t + C_2 \cos.\mathbf{w}t$, $\bar{\mathbf{v}} = \bar{\mathbf{v}}_o = w.\bar{\mathbf{r}}_o = w.\lambda /2 = (\mathbf{w}\lambda) /2$ and $\bar{\mathbf{r}}_o = A = \boldsymbol{\lambda/2}$ and for $t = 0$ where vector $\bar{\mathbf{r}} = \bar{\mathbf{r}}_o$ and velocity $\bar{\mathbf{v}} = \mathbf{v}_o$, and then equations of motion are ,

$\bar{\mathbf{r}} = [\bar{\mathbf{v}}_o / w] . \sin.\mathbf{w}t + \bar{\mathbf{r}}_o\, \mathbf{w}.\cos.\mathbf{w}t$, $\bar{\mathbf{v}} = d\bar{r}/dt = \bar{\mathbf{v}}_o . \cos.\mathbf{w}t - \bar{\mathbf{r}}_o\, \mathbf{w}.\sin.\mathbf{w}t$ or ,

$$\bar{\mathbf{r}} = \frac{(\bar{\mathbf{v}}_o)}{[\sqrt{(a/Am)}]} . \sin [\sqrt{(a/Am)}.\mathbf{t}] + A . [\sqrt{(a/Am)}] . \cos [\sqrt{(a/Am)}.\mathbf{t}]$$

$$\dot{\mathbf{r}} = \frac{(\bar{\mathbf{v}}_o)}{[\sqrt{(a/Am)}]} . \cos [\sqrt{(a/Am)}.\mathbf{t}] - A . [\sqrt{(a/Am)}] . \sin [\sqrt{(a/Am)}.\mathbf{t}] \qquad \text{…………...… (1.a)}$$

where

$$\ddot{\mathbf{r}} = - \frac{(\bar{\mathbf{v}}_o)}{[(a/Am)]} . \sin [\sqrt{(a/Am)}.\mathbf{t}] - A . [(a/Am)] . \cos [\sqrt{(a/Am)}.\mathbf{t}]$$

Because increasing of $\bar{\mathbf{r}}$ is perpendicular to $\bar{\mathbf{v}}$ (vector $\bar{\mathbf{v}}_o \perp \bar{\mathbf{r}}_o$) the harmonic components x , y are →

$\mathbf{x} = \bar{\mathbf{r}}_o \cos.\mathbf{w}t$, $\mathbf{y} = [\bar{\mathbf{v}}_o /w].\sin.\mathbf{w}t$ and since also $\sin^2 \theta + \cos^2\theta = 1$ then

$$\frac{\mathbf{x}^2}{\bar{\mathbf{r}}_o^2} + \frac{\mathbf{y}^2}{[\bar{\mathbf{v}}_o/w]^2} = \mathbf{1} = \frac{\mathbf{x}^2}{\mathbf{A}^2} + \frac{\mathbf{y}^2}{[\mathbf{v}_o.(\sqrt{Am/a})]^2} = \frac{\mathbf{x}^2}{[\lambda/2]^2} + \frac{\mathbf{y}^2}{[\mathbf{v}_o.\sqrt{\lambda m/2a}]^2} \rightarrow \text{…(2)}$$

i.e. *an Ellipsoid with point O as centre.*

Motion of equal time repeats itself in $\mathbf{2\pi}$ radians with period T and angular frequency $w = 2\pi f$ as → $T = 2\pi / [\sqrt{\mathbf{a}}/Am] = 2\pi . [\sqrt{Am/\mathbf{a}}] = 2\pi . [\sqrt{\lambda m/2.\mathbf{a}}] = (\pi/2) . [\sqrt{\lambda m/ \mathbf{a}}]$ and frequency $f = [\sqrt{a/Am}] / 2\pi$

What is measured as $|\Lambda^{-}| = | k2 / \lambda |$ is the Total energy embedded in dipole $A^{-}B$, *to Quaternions Extensive Configuration* , as ***New Quaternions*** (with Scalar λm and Vector $\bar{v}$ magnitudes) .
Points in Spaces carry A priori the work $W = \int_{A-B} [P.ds] = 0$, *as Spin on points* , where magnitudes **P** , $\mathbf{d\bar{s}}$ and **m , w ,** $\bar{\mathbf{r}}$, *can be varied leaving work unaltered* which is $\pm$ Spin $= \Lambda = \lambda\, m\bar{v} /2 = (\lambda^2 m).w/4$.
The face Energy on Planck's horizon is $\mathbf{E} = k_2 = W_2 = (m.a).ds = (w^2\lambda/2).\lambda_2$ where $\lambda_2 = 1{,}616.10^{-35}$ m .

The ***Total Energy*** **E =k=** $\lambda_2\Lambda = \lambda_2(\lambda m\bar{v}/2) = \lambda_2.\lambda m\bar{v}/2 = \lambda_2.\lambda m(w.\lambda/4) = m\lambda_2.w\,\lambda^2/4 = C_2.f$ where the two quantities λ_2 , Λ are inextricably inter wined by the factor **k** showing that ,what is measured is magnitude (λ m) as the gauge of what is called mass (*the reaction to the change of velocity* $\bar{v}$) or a constant of proportionality (k/ v) which means that , [PNS] is a twist field which has a North and a South pole on points (*the directional unit axis*) , and points are present with the effect on the infinite dipole AiBi → (λm) . Since energy E is initially absorbed , in λ_2 quantized region , is a quantized constant momentum $\lambda_2\Lambda = \lambda_2 m_2 v_2 = \lambda_2 m_2(\lambda f) = \lambda_2.m_2.\lambda(f) = C_2.f$, where $\lambda_2.m_2.$ and $\lambda_2.m_2.\lambda$, *is the outer and inner* , constants for region k2 .

From above equations and in k2 region $E = \lambda_2\Lambda = \lambda.m\bar{v}$ and $m = [2E/\lambda_2.\lambda\bar{v}] = [4E/w\lambda_2.\lambda^2] = [2C_2/\lambda_2.\pi\lambda^2]$ where C_2 is constant = **E/ f** which is a gauge magnitude depended on the angular velocity $\bar{w}$, the velocity $\bar{v}$, and the wavelength λ , for $E = (h\lambda_2^2/\lambda^2)\,f = m\bar{v} = m.(2\pi.f).\lambda$ and $m = (h\lambda_2^2/2\pi.\lambda^3)$ i.e. The total energy E of a monad is conserved as momentum ($m\bar{v}$) or angular momentum ($\Lambda = r.m\bar{v} = m.w\lambda^2/2$) or both and constant C_2 as is shown later to be Planck's constant since energy $E = \lambda_2.m_2.\lambda.(f) = C_2.f = h f = h.v = h.(\lambda/T) = h.(\lambda w/2\pi) = h(\lambda.f) = (h\lambda/2\pi).w$ or $C_2 = \lambda_2.m_2.\lambda$. Considering oscillatory motion as the simplest case of Energy dissipation then Work embodied in dipole *is a* < ***Spring-mass System with viscous dumping*** > with co variants , energy **E** , mass **m** , velocity $\bar{v} = \bar{v}_E$, wavelength λ , and then Energy dissipation is the damping force equal $F_d = C_o.\dot{x}$ where C = a constant and $\dot{x}$ the velocity . Following the steady-state of displacement and velocity then , $x = A.\sin(wt-\theta)$ and $\dot{x} = wA.\cos(wt-\theta)$ where the energy dissipated per cycle is work ,

$$W_d = F_d.dx = \oint C_o.\dot{x}.dx = \oint C_o\,\dot{x}^2.dt = \pi C_o w A^2 = (\pi/4)C_o\,w\lambda^2 . \qquad \ldots\ldots(3)$$

The Energy dissipated per cycle W_d , by the damping force F_d , is mapped by writing velocity $\dot{x}$ in the form --

$$\dot{x} = wA.\cos(wt-\theta) = \pm\, wA.[\sqrt{1-\sin^2(wt-\theta)}] = \pm w.[\sqrt{A^2-x^2}] \qquad \ldots (3.a)$$

where then the dumping force F_d is $F_d = C_o.\dot{x} = \pm C_o w.[\sqrt{A^2-x^2}]$
and by rearranging $[\cos^2(wt-\theta) + \sin^2(wt-\theta) = 1]$ then becomes ,

$$\frac{F_d^{\,2}}{(C_o w A)^2} + \frac{x^2}{A^2} = 1 \qquad \ldots\ldots (3.b)\,.$$

i.e. an Ellipse with F_d , *x mapped along the vertical and horizontal axes respectively and the energy dissipated Per cycle is the given by the area enclosed by the ellipse .*

i.e.

The total energy $E = \lambda_2.\Lambda$ *which is embodied in monad* $\overline{AB}$ *is moving as an Ellipsoid in the Configuration of covariants* λ , m , $v = \bar{v}_E$, as ***Kinetic*** (*Energy of motion* Ω^-) and ***Potential*** (*Stored Energy in* λ , m , v) ***energy*** *by rotation and displacement* , on the principal axis (*through center of monad*) , which is mapped out , as in Solid material configuration by the nib of vector ($\Omega^- = \delta\bar{r}c$) = $[\bar{v}c + \bar{w}.\bar{r}\,n].\delta t$, as the Inertia ellipsoid [Poinsot's ellipsoid construction] in Absolute Frame which instantaneously rotates around vector axis $\bar{w},\theta$ with the constant polar distance $\bar{w}.F_d/|F_d|$ and the constant angles $\theta s,\theta b$, traced on, Reference (Body Frame) cone and on (Absolute Frame) cone ,which are rolling around the common axis of $\bar{w}$ vector , *without slipping*, and if $\Omega^- =$ Fe , is the Diagonal of the Energy Cuboid with dimensions a,b,c *which follow Pythagoras conservation law* ,then the three magnitudes (J,E,B) of Energy-state follow Cuboidal , Plane , or Linear Diagonal direction . [25-26].

Remarks :

From above , mass $m = 2.C_2/\pi\lambda^2$ and from energy , $E = m\lambda_2.w\lambda^2/4 = \pi C_o.w\lambda^2/4$ where then $C_o = m\lambda_2/\pi$ and by substituting m , then $2C_2/(\pi\lambda^2).\lambda_2.(1/\pi) =$ $C_o = 2C_2/(\pi^2\lambda^2) = 2.h/(\pi^2\lambda^2)$ ……. (3.b)

Equation (3) is written as $W_d = (\pi/4)C_o\,w\lambda^2 = (\pi/4).(2C_2.\lambda_2/\pi^2\lambda^2).w.\lambda^2 = C_2\,\lambda_2 w/2\pi = [C_2.\lambda_2/2\pi].w = (h/2\pi).w$
$C_2 = h$ *Planck's constant, and since also* $W_d = E_T = \sqrt{[m.v_E.^2]^2 + T^2} = \sqrt{[m.v_E.^2]^2 + [\Lambda.v_B + \Lambda \times v_B]^2}$ then work in k2 is exhibited as $W_d = (\pi/4).C_o.w\lambda^2 = E_T$ and angular frequency

$$w = [2\pi/C_2].E_T = (2\pi/h).E_T = [2\pi/h].\sqrt{[m.v_E.^2]^2 + [\Lambda.v_B + \Lambda \times v_B]^2} = 2\pi.E_T / h \qquad \ldots (3.c)$$

The face Energy on Planck's horizon is $E = k = W_{d2} = (\pi/4).C_o.w\lambda^2 = (\pi/4).[2h/(\pi^2\lambda^2)].w.(\lambda_2^2) =$
$E = hw.(\lambda_2^2)/(2\pi\lambda^2) = (h.\lambda_2^2/2\pi).(w/\lambda^2) = (h.\lambda_2^2).(f/\lambda^2) = (h.\lambda_2^2/\lambda^2).f$ ….. (3.d)

The quantized energy E_T in the three quantized regions **k1,k2,k3** as Monads ↺↻ with the **h** boundaries is ,

k1 = [A⁻ B] = Work = Energy = [PNS] [$\lambda_1\,\Lambda$] with $\lambda_1 < 1{,}616\,.\,10^{-35}$ m
k1→k2 = $C_2.\lambda_2.w/2\pi = C_2.\lambda_2.f = \lambda_2.h.f$ $\lambda_1 = < 1{,}616.0^{-35}$ m
k2 = [A⁻ B] = Work = Energy = [PNS] [$\lambda_2\,\Lambda$] = $\lambda\,\Lambda$ = Rotational Energy = $\lambda.(\bar{r}.M.w.|r|)$ = Spin = Ω
$1{,}616\,.\,10^{-35}$ m < λ > $1{,}616\,.\,10^{-35}$ m = Planck Scale
k3 = [A⁻ B] = Work = Energy = [PNS] [$\lambda_3\,\Lambda$] with $\lambda_3 > 1{,}616\,.\,10^{-35}$ m

Work (W) is quantized on points as ± (Λ) and from this equilibrium of the quantized angular momentum independently of time , is capable of forming the wave nature of Dipole AiBi , following the Boolean logic and distorting momentum Λ as energy , *on the intrinsic orientation position of points* , on all points of the microscopic and macroscopic homogeneity configuration as $(\partial/\partial t, \boldsymbol{\Omega}^{-}) © (-\lambda m, \nabla \times \Lambda) = [0, \Lambda]$.
Mapping (graph) of Even function f(Λ) , is always symmetrical about Λ axis (i.e. a mirror) and of Odd symmetrical about the Origin and this is the interpretation of ***, the Wave Nature of Dipole ,*** in [PNS] .
i.e The Infinite dipole AiBi *of the Physical Universe behave as a simple harmonic oscillator.*
Accelerations are the changes in velocities , either by changing in magnitude (*change in speed*) or by changing in direction (b*y turning*) and mapped on , the perpendicular to **E** vector , plane as momentum $p = \Lambda = m\bar{v} = m(w.A) = m(w.\lambda/2) = \lambda m(w/2)$, *therefore* all alterations in λ ,w, happen also in $m = [2E/w\lambda^2]$ following vector Properties for magnitudes and direction as for ,

(1) $\bar{v}$ ā=0 $\bar{v}$ → **0** →	(2) $\bar{v}$ ā → →	(3) $\bar{v}$ ā → ↑	(4) $\bar{v}$ ā → ↕	(5) ā $\bar{v}$ → \
$\bar{v}_F = \bar{v} + \bar{a} = \bar{v}$	$\bar{v}_F = \bar{v} + \bar{a}$	$\bar{v}_F = \bar{v} + \bar{a}$	$\bar{v}_F = \bar{v} \pm \bar{a}$	$\bar{v}_F = -\bar{a} + \bar{v}$
F = 0 ↔	F = m.a →	F = m.a ↑	F = m.a ↕	F = m.a \

1 $\bar{v}$ = constant , acceleration ā , = 0 , Final velocity $\bar{v}_F$ = Initial $\bar{v}$ + 0 = $\bar{v}$, Force F = 0
2 $\bar{v}$ changes to $\bar{v}_F$, acceleration ā , = ā ‖ $\bar{v}$, Final velocity $\bar{v}_F$ = Initial $\bar{v}$ + ā , Force F = m.|ā|
3 $\bar{v}$ changes to $\bar{v}_F$, acceleration ā , = ā // $\bar{v}$, Final velocity $\bar{v}_F$ = Initial $\bar{v}$ + ā , Force F = m.|ā|
4 $\bar{v}$ changes to $\bar{v}_F$, acceleration ā , = ā ⊥ $\bar{v}$, Final velocity $\bar{v}_F$ = Initial $\bar{v}$ ± ā , Force F = m.|ā|
5 $\bar{v}$ changes to $\bar{v}_F$, acceleration ā , = ā \ $\bar{v}$, Final velocity $\bar{v}_F$ = Initial $\bar{v}$ - ā , Force F = m.|ā| .

3.. Examples :

3.1.. Force instantly exerted to velocity vector ≡ wavelength as < *by changing of speed* >
Using equation (2) for Force $F = m.\ddot{x} = m.d^2x/dt^2 = -m.v_o.\mathbf{w}^2.\sin(\mathbf{w}t + \pi) = -(2a/\lambda).\bar{x}$ and from [27]
Critical damping in Spaces happens when characteristic equation 2. [√(2a/λm) is in damping limits

1.. 2.[√(a/Am)] = (√λ²m/2a). 2√(a/Am) = 2.√λ and then 2a/ λm = 2λ → a = m.λ²
2.. 2.[√(a/Am)] = (√λm/2) . 2√(a/Am) = 2.√a and then 2a/ λm = 1 → m.λ = 1
3.. 2.[√(a/Am)] = (√λm²/2a). 2√(a/Am) = 2.√m and then 2a/ λm = 2m → a = λ.m²
and for compatibility a = λ , a = λ = m , a = m and **Fc = (2a/λ).x = 2(2λ/2) = 2.λ** i.e
The critical acceleration ($\mathbf{a}_c$) happens when Force velocity vector **| F | = 2.| λ |**

Higgs Boson and Gravity : (Preliminaries)
1nm = 1^ -9 m , **1T** = (T) = 1^12 , **1Hz** = s̄1, 1N =Kgm/s² ,**1Pa** = N/m² , 1J = Kgm²/s² = Nm = Pa.m³ = Ws = CV = **1J** = 10^7 erg = 6,2425.10^18 eV.s = 0,239cal.s = 2,39.10^-4 Kcal.s = 9,478 .10^¯4BTU = 2,7778.10^¯ 7KW.h = 2,7778.10¯4 **Wh** = 9,8692.10¯3 atm = 11,1265 . mass-energy = 10^¯ 44 Foe , **1W** = J/s = Kgm²/s³ 1C = sA , **1V** = W/A = Kgm²/As³ , **1Cal** = 4,184J = 2,611.10^19.Ev = 1,163.10^¯ 6 KWh = 0,003964 BTU , **1eV** = 1,603.10^¯19J , (1eV /c²) =1,793.10 ^¯36 Kg , **1GeV/c²** = 1,793.10^¯27 Kg , **1J** = N.m = Pa.m³ = W.s = C.V , W = Watt. ,V = Volt , (1V/m) = (m.Kg.s̄ ³.A¯ ') = (Kgm²/s²) = (1J/Ams) , C= Coulomb , **c** = 3.10^ 8 (m/s) , **λ** = 4,5.10^ ¯ 7 (m) , **h** = 4,1357 .10^ ¯15 (eV.s) = 6,626.10^ ¯34 (J) , **E** = 2,15eV = 3,44.10^19 (J) , **E** = hf = hc/λ = 1,2398/532 green (eV.nm) / (nm) = 2,33 eV .
In SI system : mass = **1eV/c²** = 1,78.10^ ¯36 Kg , Temperature **(eV/kB)** = 11604,5[20C] K , Energy E , **E** = hf = hc/ **λ =** (4,135667233.10^ ¯15 eV.s) . (2998.10^5 m/s) / (λ (nm)) = 1239,8 / λ [eV.nm/nm] , Momentum **Λ = p** = (1GeV/c) = [(1.10^9).(1,603.10^ ¯19 C).V] / [2,998.10^8 m/s] = 5,347.10^ ¯19 Kgm/s/c . **hc** = 1,99. 10^ ¯25 Jm.1eV/1,602.10^ ¯19 = 1,24 .10^ ¯6 eV.m **, E** = 1,24. 10^ ¯6 eV.m.(0,6/10^ ¯6) = 2,063 eV= 3,31.10^ 19J = 6,626.10^ ¯34 Kg/s. **WT** = kB.T where k_B = Boltzmann's constant .

Electromagnetic Spectrum regimes :Energy $E = 10^7$ eV/c²=$1{,}6.10^{-12}$ J, Frequency $f = 10^{21}$ Hz , Wavelength $\lambda = 10^{-13}$ m .

Planck's Outer Horizon :

In [24] monad [0, Λ] = Energy is dissipated on points and on quantized spaces smaller and greater to Planck scale. In Planck scale, **Energy is Temperature** in the individual particle with L = ds = 10^{-35} m following the ideal Gas equation [**Λ = n.R.T / V**] of Entropy in Thermodynamics (***which is* perfectly elastic** ***and all the internal kinetic energy and any change in internal energy is accompanied by a change in*** **Temperature**) and in a specific number of independent **moles** called ***Fermions*** *and* ***Bosons*** with quite different properties where ,
T = The absolute temperature (273,15 K = 0° C) . The hottest region of the sun is 2.10^7 K
n = The number of moles (quantized units) , and according to [17] n = 18
R = The universal gas constant equal to 8,3145 J / mol K
V = The volume of mole = π.L³/6 = 5.10^¯ ^{105} m

The moving charges *is velocity* $\bar{\mathbf{v}}$ *created from the rotating Energy momentum vector* [**Λ** = **Ω** = (λ.P) = ± Spin] which creates the Centrifugal force ($\mathbf{F}_f$) , the equal and opposite to it Centripetal force ($\mathbf{F}_p$) and acceleration $\bar{\mathbf{a}}$ *mapped* , **(** ***because of the semi-elastic medium , is damped*** **)** *on the perpendicular to* Λ *plane as* → $\bar{\mathbf{v}}_E \parallel dP$ and $\bar{\mathbf{v}}_B \perp dP$) . **Since** ($dP \perp \pm\bar{\Lambda}$) work occurring from momentum $\bar{p} = m\bar{v} = \Lambda$ acting on force **dP** is zero, so when $\bar{\mathbf{v}}_E = 0$, *momentum* $\bar{\Lambda} = m\bar{v}$ *only , is exerting the velocity vector* $\bar{v}_B$ *to the dipole* **, λ** *, and* the generalized mass **M** (*the reaction to the change of velocity* $\bar{v}$) which creates the cross component forces , $\mathbf{F}_E \| d\bar{P}.\bar{v}$ and $\mathbf{F}_B \perp d\bar{P} \mathbf{x}\, \bar{v}$ .The energy damped in Planck's scale volume is energy density **Λ = n.R.T / V** or **Λ** /m³ = **n. R. T / V** = 18**.** 8,3145 (J/mol.K) . (2.10^{7} K) / 6.[π.10^{-105} m³] = **1,588. 10^{113} J/m ³.**
Energy **Λ =** 1,588.10^{113} J/m ³**.** 10^{-105} m³ = 1,588 10^{8} J and using constant frequency **f = 10^{21} H .**
then from (3d) Energy Λ= mw.$\lambda_2^2/4$ and **m = 4.Λ / w.λ_2^2** = 4.1,588.10^{8}/ 10^{21}.10^{-70} = **6, 35. 10^{57} Kg .**
Energy density **Up = E / λ2³ =** 1,588.10^{8} / 10^{-105} = 1,588 . 10^{113} , a new region where limitations imposed by Relativity do not hold in this outer Planck's scale .

Planck's Horizon :

The Rotational energy Λ is *Elastically* **damped in monad $\lambda_2 = 10^{-35}$ m as → mass** m **, velocity** $\bar{v}$ **, angular velocity** w **, and finally as a Constant Frequency** f **, which is dissipated in the fundamental particles (** *Fermions and Bosons* **) by altering the two variables , velocity** $\bar{v}$ **and wavelength λ , only .**
The ***Total Energy*** **E = k2 = Λ = (m$\bar{v}$).λ2/2 = (m.wλ2/2).λ2/2 = (mw).λ_2^2/4 = (m.2πf).λ_2^2/4 = f (mπ.λ_2^2/2)**.

From equation of Work = Energy E = P.d$\bar{s}$ = P.$\bar{v}$.dT = P.$\bar{v}$.(2π/w) = P.$\bar{v}$.(2π/2π.λ) = P.$\bar{v}$ / λ = hf = h(**v/L**) then
→ ***during refraction ,***d$\bar{s}$ ***, frequency*** ,f, ***doesn't change and only the velocity*** ,$\bar{v}$, ***and wavelength*** ,λ, ***changes*** ←

From (3.d) and energy above (mw).λ_2^2/4 = (h.w.λ²) / (2π. λ_2^2) or m.(λ_2^2. λ_2^2).π/2 = h.λ² and solving **m**
Mp = m = 2. h.λ² / π.(λ_2^2. λ_2^2) and for λ = λ2 then **Mp = 2h / π .λ_2^2 Kg** in Planck scale .
Mp = 2h / π.λ_2^2 = 2 .6,636.10^¯34 / π. 10^¯70 **= 4 , 225 . 10^{36} Kg**
Using (3d) and Mp then E = mw.λ_2^2/4 = w.(2h/π.λ_2^2).λ_2^2/4 = w.(h/2 π) = h.f = h.(1/T) = h(1/λv) = h.(v/λ)
E = h .f = 6,636.10^¯34 J . 10^ 21 H **= 6 , 636 . 10^{-13} J**
From above energy E = Λ = (m$\bar{v}$).λ2/2 = m.(wλ2/2).λ2/2 = m(2πf .λ_2^2/4) = m.(π.λ_2^2/2).f *and* **f = 2Λ / m(π.λ_2^2)**
f = 2Λ / m(π.λ_2^2) = 2.6,636.10^¯13 / 4,225 10^36.(π.10^¯70 **)** = **10^{21} H** .
Energy density **Up = E / λ2³** = 6,636 .10^¯13 J / 10^¯ 105 m³ **= 6 , 636 . 10^{92} J / m³**
Mass density **ρ** = **Mp / [Vo = (4/3) π.(λ2³/8)]** = 6. 4,225.10^36 / π.10^¯ 105 m ³ **= 8,069.10^{141} Kg/ m³**
Energy density **Up = E / λ2³ = T.[Mp / Vo]** is Temperature and mass and this because on Planck's horizon mass and energy are interchanged as Temperature → Energy.
Impedance = (***Elasticity***) and as in Elasticity , *Force = Stiffness . Distance* (**F = I . d$\bar{s}$)** then Impedance I
I = Force / ds = Λ / ds = 6,636.10^¯13 / 10^¯35 = **6,636 . 10^{23} J / m**

Since Monads are quaternion = waves so Gravity Particle is a quantized Wave also and since is generated with no need for any type of other matter ,can pass over and through any intervening matter and that of photon without being scattered significantly ,so is produced from the rotating energy E =Λλ. *Acceleration is involved in Rotational Ellipsoid radiated away by loosing angular momentum* **rmv** *and conserved as momentum* **mv** *where emission of linear momentum creates vector* $\bar{\mathbf{v}}$ *of generalized mass* ***M****. For outer constant* **λ**2.**m**2.**λ / 2** *all dynamic magnitudes are multiplied by* **λ**2 = 10^¯ 35 .

In quantum systems , rotated energy **Λ = Ω** can be isolated as frequency (*in carbon monoxide molecule as integer multiples of 115 GHz = 115.(10^9 Hz) = 1,15 .10 ^11 Hz = cycles / second and λ=1,128.10* ^¯10m) and then using formula (3.c) for angular frequency related to Planck constant **h** then Wd = (π/4)Co wλ² = (hw/2π)= hf and constant **Co = 2.h / (π²λ²) =** 2. (6,63.10^ ¯34 J s) / (9,8696.1,128.10^11.1,272.10^¯10 = **1,191.10^{-24}** and **Wd =** π.1,191.10^¯ 24.(6,283.1,15.10^11).1,272.10^¯20)/4 J = **0,9354 .10^{-33} J =**
/ 1,602.10^¯19 = **5,839. 10^{-15} (eVs²/m²)** .
Rotating Energy Λ is bounded (***flowing***) in the three Energy States k1 , k2 = the Plank Scale , k3 as below ,

W=Λd$\bar{s}$1= k2=**Λ.10^{-35} m**=ET= √[m**v**E.²]² +[Λ**v**B +**Λ**x**v**B]² = (π/4).**C**.wλ² =(h/λ).λ=h=ET= **Λ.10^{35} m** = k3=Λd$\bar{s}$3= **W**

i.e. Work is embodied in the three regions k1 , k2 , k3 as the ***rotating Energy* Λ**. on dipole $\bar{A}$ B = d$\bar{s}$1, d$\bar{s}$2 , d$\bar{s}$3 in the Configuration of co variants **Λ , d$\bar{s}$** , with constant **C** = 4.Λd$\bar{s}$/(πwλ²) and d$\bar{s}$ = 10^∓35 *and to exist simultaneously the Equation of Quaternion* = Space d$\bar{s}$ =10^∓35 = $\bar{z}$ = [s ± $\bar{n}$.∇i] = [s ± $\bar{n}$.i] = Work = Total Energy = ET = [Λ∇ +Λ x ∇] = [Λ.M +Λ x M] = √ [m.vE.²]² + [Λ.vB +Λx vB]² = √[m.vE.²]² +T ² = √[m.vE.²]² +|√p1vB1 |²+|√p2vB2 |²+|√p3vB3 |² = ($\bar{z}_o$)^{w} = (λ , Λ.∇i)^{w} = | $\bar{z}_o$|^{w} e^ [$\bar{h}$ wθ] =

= | $\bar{z}_o$|^w. e^{[Λ‾ ∇i /√ Λ'Λ‾].[ArcCos (**w**|λ|/2 |√$\bar{z}$'o.$\bar{z}_o$|] } ***is therefore of Wave motion*** , **w = 4.Wd / (π.C.λ²)** *with velocity* **v̄** of the Energy Ellipsoid in the two perpendicular fields **E = ∇. Λ** and **B = ∇ x Λ** *and* **wp = 4.Wd / (π.C.λ²) = 4.Ω / (π.C.λ²) = 4.Ω / (π.h.λ)** → angular velocity and for f = 1,15.10^ 11 Hz *then* **Cp = 4h/(π.wp.λ²)** = 7,334.10^ 25(Js²/m²) / 1,602. .10^⁻19 = 4,578.10^44 (eVs²/m²)

This quantized angular momentum **Ω** is enforced by the rotating energy **Λ** , *of The Beyond Gravity Forced Fields,* mapped as force **F** =FE+FB= q.E+q.v̄xB = q.[E+ v̄xB] = **√ [|Λ̄|.|r̄|]² +[Λ̄.r̄ +Λ̄xr̄]²** = √[|Λ̄|.|λ|]² + [Λ̄.λ+Λ̄xλ]² on the infinite dipole AiBi = r̄i = λ
Considering **Gravity** as the first particle entering Planck's length Lp = 1,6.10^⁻35 m , then exponential power corresponding to this space is |zo|^w.e^ i.(φ+2kπ) w / |zo|^{w}e^ i.(φ+2.1.π)w = e^ i.w.(2π+φ -φ) = **e^ i.w.(2π)** or **fg = 10^ (21.2π) > = 10** $^{(133)}$ **H** , so Gravity which is entering all regions k1,2,3 **w g = 6,283.10** ^{133} **H**
From (3d) E = hw.λ² / 2π.λ2² and solving to λ² = 2πE.λ2² / h.w then **λ = √ 2πE.λ2² /h.w** …. (λg)

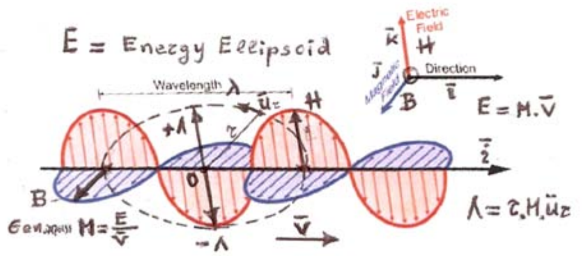
Wd = (h.f) = 6,636.10^⁻34.10^133 = 6,636.10^ 100 J / 1,603.10^⁻19 = **4,14.10^ 119 eV**
λg = √2π.6,636.10^ 100 J .10^⁻ 70 / 6,636.10^ ⁻34.6,283.10^ 133 = √10^ ⁻ 69 = **3,16 . 10^ ⁻ 35 m**
fg = **10^ (21.2π) > = 10 ^ (133) H** and **wg = 2π.fg = 6,283.10** $^{-133}$ **H**
Λg = Wd / λg = 6,636.10^ 100 /3,16.10^⁻ 35 = **2,1 .10** ^{135} **Kgm** and **mg = Λ.λ2² / 4w = 8,355 .10** ^{196} **Kg**
From above Λ = (mw).λ2²/4 or m = Λ.λ2² / 4w = 2,1.10^ 135.10^⁻70 / 4. 6,283.10^⁻133 = 8,355.10^ 196 Kg
v̄g = 2E / m.λ2 = 2 .6,636 .10 ^100 / 8,355.10 ^ 196 .10 ^⁻35 m/s = **1,588 . 10**$^{-61}$ **m / s** .

For electron , as one of the fundamental particles , amplitude A = λ/2 = 1,213.10^ ⁻12 m , ƛ = 3,86.10^ ⁻13m
we = 7,76.10^20 Hz the rotating energy **Λ** is as (3.a) and accelerated energy **E** as (3.d) , or
We = (π/4) C wλ² = (π/4) . 9,14.10^⁻ 11. 7,76 . 10 ^ 20 .1,47.10 ^⁻ 24 = 8,188.10 ^{15} Kg m.m
Λe = We / λe = 8,188.10 ^ 15 / 2,426.10 ^⁻ 12 = 3,375 .10 ^{27} J
v̄e = (w . Λ) = 7,76 .10 ^ 20 s⁻1 . 3,375.10 ^ 27 J = 2,299 .10 ^{47} m/s
me = (Λe / v̄e) = 3,375 .10 ^ 27 J / 2,299.10^47 m/s = 1,468.10 $^{-20}$ Kg
Λ = ET = (π/4)..h.λw = (π/4).6,63.10^ ⁻34 J s .(2. 1,213 .10 ^ ⁻ 12) .7,76 .10 ^ 20 Hz = 9,818.10 $^{-25}$ J and
E = (π/4)..h.λw^2 = (π/4). 6,63.10^ ⁻34 Js .(2,426 .10^ ⁻ 12) . [7,76 .10 ^ 20 Hz]^2 = 7,61.10 $^{-6}$ J
2m= E/v =7,61.10^ ⁻6 J / 2,299.10^ 47= 8,1.10^⁻53Kg, **a**= w²(λm/4) = 60,218.10^40Hz .8,9.10^⁻33= 5,361.10 ^{9} m.s̄2
v = (wλ/2) = 7,76. 10^20Hz. 1,213.10^⁻12 m = 9,413.10 ^{8} m/s i.e velocity near that of light .

3.2.. Force instantly exerted to velocity vector v̄ , from 0 → v̄ λ ↑ v̄
—→ v

Using Newton's second law for accelerations the length λ is covered with initial velocity v̄i = 0 and final v̄F in time t so λ = (1/2).|ā|.t^2 , and if in same time |v̄i| = |v̄F| = v̄ then λ= |v̄|t. Substituting t = λ / |v̄| then λ = (|ā| /2).(λ^2/|v̄|^2) or 2= |ā| λ/ |v̄|^2 and for |v̄|= λ then 2 = |ā| /λ or **|ā| = 2.λ ,** i.e. in Electromagnetic Spectrum minimum acceleration is **|ā| = 2.λ** = 2 . 10 $^{-15}$ m/s² as before .

3.3.. Monad A‾ B : A‾ B = Work = Energy = [PNS] [s̄.P‾] = λ Λ= Rotational Energy = λ .(r̄.M.ū |r|) = Spin



(F.3.3)

Monad ĀB is the ENTITY in [PNS] and [**A , B – PA‾ , PB‾]** is the content which is the LAW , so Entities are embodied with the Laws . Entity is quaternion A‾B , and law the *Real* part |AB| = The length between points A,B and *Imaginary* part the equal and opposite forces PA‾, PB‾ such that PA‾ + PB‾ = 0 . [18]
Quaternion AB is Euler's rotation Vector AB in 3D space which is represented by an axis (of vector) and an angle of rotation , which is a property of complex number and defined as **z̄ = [s ± n̄.i]** where , **s , |n̄|** are real numbers and **i** the imaginary part such that i² = -1 . Extending imaginary part to three dimensions **n**1 i ,**n**2j ,**n**3k → **n̄** ∇i then becomes ***quaternion*** **z̄ = [s ± n̄.∇i]** =**[s ± n̄.i] .** Conjugation of **z̄o** © **z̄** = **[λ , ±Λ** .∇i] © **[s ,n̄**.∇i] = **λ s** -Λ n̄ ,λ n̄ -Λ s - Λ x n̄ with Norm √ (**λ s̄** -Λ n̄)^2 + (λ n̄ -Λ s –Λx n̄)^2 and for s̄ = velocity **v**E. then [|Λ̄|.|v̄|] = mv̄E.**v**E = [**m .v**E.²] and [Λ̄.**v̄** + Λ̄x**v̄] = [** Λ̄ .**v̄**B + Λ̄ x **v̄**B..] =

[$\Lambda.\bar{v}_B + \Lambda \times \bar{v}_B$] meaning that Norm = ***The Total Energy State of any quaternion , as*** [25] →

$E_T = \sqrt{[m.v_E.^2]^2 + [\Lambda.v_B + \Lambda \times v_B]^2} = \sqrt{[m.v_E.^2]^2 + T^2} = \sqrt{[m.v_E.^2]^2 + |\sqrt{p_1 v_{B1}}|^2 + |\sqrt{p_2 v_{B2}}|^2 + |\sqrt{p_3 v_{B3}}|^2}$ ….(3.3)

and for any **w** power , as the Spaces are , then Spaces exponential equation is , $(\bar{z}_o)^W$

$(\bar{z}_o)^w = (\lambda, \Lambda.\nabla i)^w = |\bar{z}_o|^w.e\wedge[\hbar w\theta] = |\bar{z}_o|^w.e\wedge\{[\Lambda^{-}\nabla i/\sqrt{\Lambda'\Lambda^{-}}].[\text{ArcCos}(w|\lambda|/2\,|\sqrt{\bar{z}'_o.\bar{z}_o}|]\}$ …...(3.4)

[PNS] is quantized in the three Regions **k1 , k2 , k3** as Monads ↺ ↻ with the $\bar{s}_{1,2,3}$ boundaries. Conservation laws for the two quantized magnitudes $\bar{s} = \lambda$ **,** the displacement **λ** and $P^{-} = \Lambda$ the Rotational Energy **Λ** valid for all monads AiBi of the three Regions , ***without any*** **- BING BANG -** ***existing .***

i.e, ***The Norm of any Quaternion with a real vector*** **s̄ = |v̄ |** ***= (velocity vector) and a rotational Energy vector |Λ| , is the total Energy embodied in quaternions as in (3.3) . Work is embodied in Dipole Monad*** **$A^{-}B$** ***as*** **W = [s̄.P⁻] = [λ , Λ]** ***and dissipated as Energy*** **E = [P⁻ s̄] = [M.v̄]** ***in dipole vectors →*** **s̄ = [|s| ± k⁻. ∇i]** ***where ,*** **M** ***= Lagrange's generalized mass ,*** **S** ***= The Spin =*** **(Λ = r̄.M.ū |r|)** ***of the rotational Energy ,*** **r̄** ***= The radius of Ellipsoid ,*** **$\bar{u}_r = \bar{w}_r.\bar{r}$** ***is The rotational velocity vector in the perpendicular*** **(⊥)** ***to*** **Λ** ***vector plane ,*** **$\bar{w}_r$** ***= 2π.f is the angular velocity , f = 2π/T frequency*** …[22-25]
From [22]

Quaternion **:** $\bar{z} = s + \bar{v} = [s + \bar{v}.i] = s + [v1 + v2 + v3].\nabla i = [s + \bar{v}\nabla i]$, where s is the Scalar part and $\bar{v} = [v1 + v2 + v3]$ the Imaginary part of it , equal to $\bar{v}\nabla i$.
Decomposition of **z̄** into exponential form is $\bar{z} = [s+\bar{v}\nabla i] = |\bar{z}|.e\wedge(\theta/2).\bar{u}\nabla i = \sqrt{\bar{z}'\bar{z}}.[\cos(\theta/2) - \bar{u}.\sin(\theta/2)]$
where $\theta = \text{ArcCos}(s/|\bar{z}|)$, is the rotation angle and $\bar{u} = (\bar{v}.\nabla i)/|(\bar{z})|$ is the rotation unit axis ($\bar{u} = -1$) where Unit axis $\bar{u} = e\wedge(\theta/2) = \cos(\theta/2) - i.\sin(\theta/2)$ called also Rotor and $\bar{z} = e\wedge\bar{u}.\nabla i$ the Translator.
If **ū** is Unit quaternion then $\bar{u} = [s+\bar{v}\nabla i] = \cos\varphi + \sin\varphi.\nabla i$ where $\varphi = \text{ArcCos}(s)$, $s^2+v1^2+v2^2+v3^2 = 1$ and vector $\bar{v} = [v1/\sin\varphi + v2/\sin\varphi + v3/\sin\varphi]$ and exponentially $\bar{u} = e\wedge[(\theta/2).\bar{u}\nabla i] = \cos(\theta/2)+\sin(\theta/2)$
Euler's formula for complex numbers is $e\wedge(s + i.v) = e\wedge(s).e(iv) = e(s).[\cos.v + i.\cos.v]$.
Quaternion Conjugate **:** $\bar{z}' = s - \bar{v}.i = s - [v1 + v2 + v3]].\nabla i = s - \bar{v}.\nabla i$, which is defined by negating the vector part of the quaternion . Quaternion Conjugation **:** $\bar{z}.\bar{z}' = (s + \bar{v}).(s - \bar{v}) = s^2 - \bar{v}^2$
Quaternion magnitude : The magnitude (Norm) is defined by $|\bar{z}| = \sqrt{\bar{z}.\bar{z}'} = \sqrt{s^2+|\bar{v}|^2} = \sqrt{s^2+|\bar{v}\nabla i|^2}$,
and for two $\bar{z}1, \bar{z}2 \rightarrow |\bar{z}1, \bar{z}2| = |\bar{z}1|.|\bar{z}2| = (\sqrt{\bar{z}1\,\bar{z}1'}).(\sqrt{\bar{z}2\,\bar{z}2'}) = (\sqrt{s1^2 + |\bar{v}1|^2}).(\sqrt{s2^2 + |\bar{v}2|^2}) = (|s1|^2+|\bar{v}1|^2).(|s2|^2+|\bar{v}2|^2) = [\sqrt{s1^2 + |\bar{v}1\nabla i|^2}].[\sqrt{s2^2 + |\bar{v}2\nabla i|^2}]$
The Normalized (the versor) $\bar{z}v = \bar{z}/|\bar{z}|$, and the Inverse is $\bar{z}^{-1} = \bar{z}'/|\bar{z}|^2 = \bar{z}'/(s^2+\bar{v}^2) = z'/(s^2+|\bar{v}\nabla i|^2)$
λ . Λ ***= constant for all dipole*** **λ** , ***and since*** **λ** ***is constant*** **Λ** ***is also constant , and from*** equivalent formula of $\Lambda = L^{-} = \bar{r} \times p = I.w = [\lambda.p] = \bar{r}.(P.\sin\theta) = P.\bar{r}\sin\theta$ = constant → ***Spin of*** **λ .**
so the infinite dipole $A^{-}B,(\lambda.p) = A^{-}B,(\lambda.\Lambda)$ in Primary Space [PNS] are quaternion as ,

$\bar{z}_o = [s, \bar{v}n.\nabla i] = [\lambda, \pm\Lambda^{-}.\nabla i] = [\lambda, \pm L^{-}.\nabla i]$ which is the quaternion of the Primary Space-dipole ***where***

λ = ***the length of dipole (wavelength) which is a scalar magnitude*** ,
Λ = ***the spin (S) of dipole , equal to the angular momentum vector*** p = **L⁻** ***and exponentially***
$z_o = [s, \bar{v}n.\nabla i] = [\lambda, \pm\Lambda^{-}.\nabla i] = [\lambda, \pm L^{-}.\nabla i] = |\bar{z}o|.e\wedge[\text{arc.cos}|\lambda/\bar{z}o|.[\Lambda^{-}.\nabla i/|\Lambda|] = |\bar{z}o|.e\wedge\theta.\Lambda\nabla i]$

The conjugate quaternion is $\bar{z}'o = (\lambda, +\Lambda^{-}.\nabla i)(\lambda, -\Lambda^{-}.\nabla i) = [\lambda^2 - |\Lambda|^2]$
Repetition quaternion is $\bar{z}o1 = (\lambda, +\Lambda^{-}.\nabla i)(\lambda, +\Lambda^{-}.\nabla i) = [\lambda^2 + |\Lambda^{-}|^2 + 2.\lambda x\Lambda.\nabla i] =$
$= [\lambda^2 + \Lambda^2] = [\lambda^2 + (i^2+j^2+k^2)|\Lambda^2|]$ since λ, Λ^{-} are ⊥ axially.
In Polar form $\bar{z}o1 = (\lambda, \Lambda^{-}.\nabla i) = |\sqrt{\bar{z}'o.\bar{z}o}|e\wedge\{\text{ArcCos}(\lambda/|\sqrt{\bar{z}'o.\bar{z}o1}|)\}.\Lambda^{-}.\nabla i/\sqrt{\Lambda'\Lambda^{-}}]$
Quaternion magnitude : Norm is defined by $|\bar{z}| = \sqrt{\bar{z}.\bar{z}'} = \sqrt{s^2+|\bar{v}|^2} = \sqrt{s^2+|\bar{v}\nabla i|^2}$,

3.3.1.. Velocity v̄ :
The quaternion equation is $E = |F|.|\bar{s}+d\bar{s}| + F x|\bar{s}+d\bar{s}| = \bar{v} + 0 = \bar{v} = |F|.|\bar{s}+d\bar{s}|$ because **F \\ s**
i.e. Energy **E** is dissipated into velocity vector $\bar{v} = |F|.\bar{s}$ as |F| = Force = (M.s̄) and s̄ , where ,
|s̄| = The distance (*Norm*) of monad (*which is the absolute distance in PNS frame*) ,
(M.s̄) = The meter to the reaction of change of vector v̄ (*Lagrange's generalized mass*) ,
v̄ = Velocity vector = $(ds/dt).dt = E/[M.\bar{s}] = E/[(\Lambda/\bar{r}.\bar{u}r)] = E.(\bar{r}.\bar{u}r)/\Lambda$
and for **F ⊥ s** then Norm $E = \Lambda.\bar{v} = (\bar{r}.M.\bar{u}|r|).\bar{v} = (\bar{r}.M.\bar{w}r.\bar{r}).\bar{v} = M.\bar{r}^2.\bar{w}r.\bar{v}$ *where*
w̄r = The angular velocity of the radius **r̄** of Ellipsoid of rotational motion .
r⁻ = The radius **r̄** of Energy Ellipsoid , dt = The meter of the changes of displacement ds̄ .

Let infrared Photon travelling with a velocity vector $|\bar{v}| = 3.10^8$ m/sec carrying an amount of energy energy **E** = 22,97.10^ ¯ 28 Kgm/s . In this case Monad A¯B = $\bar{s} = \bar{v} = [\lambda = \sqrt{[v_E{}^2]^2 + [\Lambda.v_B + \Lambda \times v_B]^2}]$ = $[\lambda = \sqrt{[v_E{}^2 + v_B{}^2]}$, $\mathbf{E} = |\sqrt{p_1 v_{B1}}|^2 + |\sqrt{p_2 v_{B2}}|^2 + |\sqrt{p_3 v_{B3}}|^2 = M.\bar{v}$] = **[** $|\bar{v}|$, **E]** the velocity vector $\bar{v}$ as *Imaginary* and the Norm of $|\bar{v}| = \lambda$ as the *Real* part of quaternion .

The procedure of calculations is :

1...Generalized mass **M = E / | v̄ |** = 22,97.10^ ¯28 / 3.10^8 = 7,6566.10^ ¯ 36 [Kg.m.s /s.m =] Kg which is generated from the total energy E and kinetic energy of v̄ .

2...From Pauli equation for Spin **S** = h.√s.(s+1)/ 2π *, and for* s=1 , **S** = 6,626.10^ ¯ 34 x1,4142 /6,28 = 1,492.10^ ¯34(eV.s).(1,603.10^ ¯19J) = 2,39167.10^¯53 J.s) , the maximum quantity of rotating Energy S.

3...When **|v̄|= 0** , mass **M** is damped (*conserved by the changing of Spin*) on the new rotating energy vector **Λ = r̄.M.ū** r , (*as Electric field* H ¯= E/c *and Magnetic field* B ¯ = E / c) which is mapped as velocity vector ⊥ **to Λ** as **ū** r = **Λ**/(**r̄.M**) = **S** / (**λ/2**.M) = 2,391676.10^ ¯ 53 / (1,148.10^9.10^ ¯ 36) [Kg.m²/s / (m.Kg)] = 2,08366 .10 ^¯ 26 m/s and since **S = Λ = r̄**.M.**ū** r = **r̄**.M.(**w̄**r.**r̄**) = (M.**r̄** ²).**w̄**r , then angular velocity (**w̄**r) = **Λ** /(M.**r̄** ²) = 22,97.10^ ¯ 28 / [17,22.10^ ¯ 8] = 1,333.10^ ¯8 (m/s) .

In a reference system (i¯,j¯,k¯) ≡ (x,y,z) B ¯ || - k Magnetic magnitude B ¯ = E / c and Electric magnitude field H ¯= E/c . After period T = 1/f , where vector **|v̄|= 0** , Energy E is damped in the two perpendicular Electromagnetic fields H ⊥ B , which fields map on **x̄ → i** ¯ direction axis , ⊥**ū** r , as the new velocity vector equal to the initial **| v̄ | =** √**[vE.**² + **vB** ²] [25] . Velocity **vE.** becomes from Electrical field and velocity **vB**¯ from Magnetic field .

Since total work W = [s̄.P¯] = λ.Λ = constant therefore *, for temperature also which is a type of Energy,* exists ***Temperature*** **x** ***Wavelength*** *= constant* or **T** (Kelvin)**.λ** (m) = **C** (Kelvin) = 31,835.10 ^ 12 K
For Thermal Energy units Work is in J = 1 Kg.m²/s² , Thermal work 1 cal = 4,184 J ,energy content q = m.cq.T
For Sun data m = 1,989.10^30 Kg ,Specific heat for core **c**q.= 6.10^14 J/Kg.K ,Temperature T = 15,6.10^6 K
Total energy produced E = 6.10^4 (J/Kg).1,989.10^30 Kg = 11,9.10^ 4 J **.i.e.** a correlation of all types of energy

3.3.2.. Acceleration ā :
3.3.3.. The geometry of the (18) **Fundamental Particles , [*Fermions* , *Bosons*] :**

4.. Spaces of Monad A¯B :
Since Spaces , anti-Spaces $\{z^w, -z^w\}$ and Subspaces $\{\sqrt[n]{z}\}$, which are the similar regular polygons , on and in unit monad AB = z , are both simultaneously created by the Summation of the exponentially unified in monad ĀB complex exponential dualities w, n where **w. n =** 1 , so the repetition of monads AB exist as this constant Summation on this common base **m ,** which is according to one of the four basic properties of logs as → log.w(**1**=w.n) = log.w(w)+log.w(n =1/w) = 1+1/w = 1+ n which is the base of natural logarithms **e** and since 1= w.n then → $(1+n)^w = (1+1/w)^w$ = constant **= m = e** which is independed of any Space and cordinate system that may be used , meaning also that Spaces , anti - Spaces (the conjugates) and Subspaces , all as Regular Polygons represent the mapping (to any natural real and complex number as power **w = 1/n** of any unit ĀB which is a complex number **z** , on the constant base.
Since ∫ ds/s = ln(s) + C and d/ds[ln(s)] = 1/s then ∫ ds/s = (1/s) / (d/ds) = 1= w.n .

The ,w, Spaces of monad (AB) = complex number z = r.(cos.x +isin.x) are Exponential $z^w = r^w.e^{[i.w(x+2k\pi)]}$ = $|r^w|.[\cos.w(x+2k\pi) + i.\sin.w(x+2k\pi)]$, and the 1/w Sub-spaces of monad (AB) = complex number $z^{1/w}$

$z^{1/w} = r^{1/w}.e^{[i.(x+2k\pi)/w]} = |r^{1/w}|.[\cos.(x+2k\pi)/w + i.\sin.(x+2k\pi)/w]$. where **k** is an integer and the different roots of **z** are to consider integer values of k from **0** to **w-1** . [22]

Since monad (AB) = quaternion = **z** and the ,**w**, Spaces and ,**1/w,** Sub-spaces are monads in ,**w**, power and ,**1/w**, root which represent the Regular Circumscribed and Regular Inscribed Polygons in monad AB then

$z^w = \bar{z} = s + \bar{v} = s + \bar{v}.i = s + [v_1 + v_2 + v_3].\nabla i = s + \bar{v}\,\nabla i$, where **s** is the Scalar part and $\bar{v} = [v_1 + v_2 + v_3]$ the Imaginary part of it , equal to $\bar{v}\,\nabla i$, then

→ $z^w = (s + \bar{v}\,\nabla i)^w = [z_o.(\cos.\varphi + i\sin.\varphi)]^w = |z_o|^w.(\cos.w\varphi + \varepsilon.\sin.w\varphi) = |z_o|^w.e^{(i.(w\varphi)}$ *where* ..… (4.1)

→ $|z_o| = \sqrt{s^2 + v_1{}^2 + v_2{}^2 + v_3{}^2}$, $\varepsilon = [v_1.i + v_2.j + v_3.k] / [\sqrt{v_1{}^2 + v_2{}^2 + v_3{}^2}]$, $\cos.\varphi = s / |z_o|$ and
→ $z^{1/w} = (s + \bar{v}\,\nabla i)^{1/w} = |z_o|^{1/w}.[\cos.(\varphi+2k\pi)/w + i.\sin.(\varphi+2k\pi)/w] = |z_o|^{1/w}.e^{i.(\varphi+2k\pi)/w}$ ……(4.2)

Rotating Energy Λ is bounded (***flowing***) in the three Energy States k1 , k2 = *the Plank Scale* , k3 as below ,

Work = $P_{AB}.\bar{A}B = \mathbf{\Lambda}.d\bar{s}1 = k1 = E_{T1} = [(d\bar{s}1/2).m1(w_1.d\bar{s}1/2)].d\bar{s}1 = [m_1.w_1.s_1^3] / 4 =$ *monads with* $ds_1 < 10^{-35}m$
W$=\Lambda d\bar{s}2= k2=\mathbf{\Lambda.10^{-35}m}=E_T= \sqrt{[mv_{E.}{}^2]^2 +[\Lambda v_B +\Lambda x v_B]^2} = (\pi/4).\mathbf{C}.w\lambda^2 =(h/\lambda).\lambda=h=E_T= \mathbf{\Lambda.10^{35}m} = k3=\Lambda d\bar{s}3=$ **W**
W$=\Lambda d\bar{s}3= k3=\mathbf{\Lambda.10^{-35}m}=E_T= \sqrt{[mv_{E.}{}^2]^2 +[\Lambda v_B +\Lambda x v_B]^2} = (\pi/4).\mathbf{C}.w\lambda^2 =(h/\lambda).\lambda=h=E_T= \mathbf{\Lambda.10^{35}m} = k3=\Lambda d\bar{s}3=$ **W**

Equation of Quaternion = Space = $\bar{z} = [s \pm \bar{n}.\nabla i] = [s \pm \bar{n}.i]$ = Work =Total Energy = $|E_T| = [|\Lambda|.\nabla + \Lambda x\nabla] =$
$[|\Lambda|.M +\Lambda x M]= \sqrt{[m.v_{\bar{E}.}{}^2]^2 + [\Lambda.v_B +\Lambda x\, v_B]^2} = \sqrt{[m.v_{\bar{E}.}{}^2]^2 + T^2} = \sqrt{[m.v_{\bar{E}.}{}^2]^2 +|\sqrt{p1v_B1}|^2+|\sqrt{p2v_B2}|^2+|\sqrt{p3v_B3}|^2}$
$= (\bar{z}_o)^w = (\lambda , \Lambda.\nabla i)^w = | \bar{z}_o|^w. e^{[\bar{h}\ w\theta]} = | \bar{z}_o|^w.e^{\{ [\bar{\Lambda}\nabla i/\sqrt{\Lambda'\bar{\Lambda}}].[ArcCos (w|\lambda|/2 |\sqrt{\bar{z}'_o.\bar{z}_o}|] \}}$

Energy is damped (*in the semi elastic Sub-Spaces*) as linear momentum vector $M\bar{v}$ in them , i.e Spaces is a Sinusoidal Potential System which follows Kirchhoff's circuit **R , L , C** rules with circuits the Sub-spaces .

i.e Energy - Spaces is a sinusoidal Potential System which follows Kirchhoff's circuit RLC rules

$$\mathbf{[A,B-P_{\bar{A}},P_{\bar{B}}]\equiv[s \pm \bar{n}.\nabla i] \equiv E_T \equiv[C+R+L] \equiv \sqrt{[m.\bar{v}_{E.}{}^2]^2 +|\sqrt{p1\bar{v}_{B1}}|^2+|\sqrt{p2\bar{v}_{B2}}|^2+|\sqrt{p3\bar{v}_{B3}}|^2} \equiv \sqrt{[m.\bar{v}_{E.}{}^2]^2 +T^2}}$$

where

E_T = The total Work = Energy embodied in any Monad = Quaternion = T = $ds.\Lambda= \lambda\Lambda= \lambda(M\bar{v}) =(\lambda M)\bar{v} = M(r\bar{v}_r)$
R = The ***Resistor*** from wavelength λ which is (*any Configuration*) anything , that motion ($\bar{v}$ = A → B) cannot travel through it easily (wavelength λ =ds= E_T/Λ) = **Spin S /C** , where Spin S = $M(r\bar{v}_r)$ → is being stored,
C = The ***Capacity*** from the generalized mass M = $(E/\bar{v})=(\Lambda/r\bar{v}_r)$ through Conductor which is any Configuration and that motion ($\bar{v}$ = A → B) which can easily travel through it (**C = Λ / S**) ,
L = The ***Inductor*** from linear momentum **$M(d\bar{v}/dt)$** = $M(d^2\bar{s}/dt^2) = d(M.ds/dt)/dt = d(dS/dt)/dt = d^2S/dt^2$ through Inductance which is the property of a Conductor by which any change in motion (velocity $\bar{v}$) flowing through it , is conserved as Work again , and it is Lagrange's generalized mass M .
S = The ***Spin*** of particles in wavelength λ .
Λ = The ***Rotational Energy*** (Ω) in Monads AB of wavelength $\bar{s}$.
Since magnitudes E_T = T , R , C , L are constants and follow conservation law , then $T(t) = T(t)_C + T(t)_R+ T(t)_L$
or $T(t) -T(t)_C - T(t)_R - T(t)_L = T(t) - [S/\mathbf{C}+ \mathbf{R}(dS/dt)+ \mathbf{L}\, d(M)/dt] = T(t) - [S/\mathbf{C} + \mathbf{R}(dS/dt) + \mathbf{L}\, d(M\bar{v})/dt] =$
$T(t) - [S/\mathbf{C} + \mathbf{R}(dS/dt) + \mathbf{L}\, (d^2S/dt^2) /dt] = 0$ and for T= 0 $\rightarrow[S/\mathbf{C} + \mathbf{R}(dS/dt) + \mathbf{L}\, (d^2S/dt^2) /dt] = 0$ ← **…(1)**

i.e. a homogenous equation with general solution **S** = A.e^(s1.t) + B.e^(s2.t) , where A , B are constants evaluated from the Initial conditions S(0) and d[S(0)]/dt . Assuming a solution of the form **S** = e^(s.t) where s = constant then (1) becomes $[(S/\mathbf{C}) + \mathbf{R}.s + \mathbf{L}\,.s^2].e^{(st)} = 0$, which is satisfied for all values of t when , $[(S/\mathbf{LC}) + (\mathbf{R/L}).s + s^2] = 0$, which is the characteristic equation with the two roots s1,2 as

$s1,2 = - (R/2L) \pm \sqrt{[(R/2L)^2 - (S/LC)]}$ *and the Dumping of the Spin in R , C , L Configuration Systems is as ,*
$\mathbf{\Lambda = S = e^{-[(R/2L).t]} . \{ [A.(e^{[\sqrt{(R/2L)^2 - (S/LC)}]).t}) + B.(e^{-[\sqrt{(R/2L)^2 - (S/LC)}]).t} \}}$ **………(2)**

Equation (2) is the General Equations of Spaces in Quaternion type representing the behavior of the rotating Energy Λ as Spin S and linear momentum $M\bar{v}$, in the three Configuration Systems R, C, L

and when

1). The damping term $(R/2L)^2$ of the parenthesis is larger than (S/LC) then the exponents are Real numbers and no Oscillations are possible (*over damped*) .
2). The damping term $(R/2L)^2$ is less than (S/LC) then the exponent becomes an imaginary number and the terms of Oscillations are possible (*under damped*) .
3). The damping term $(R/2L)^2$ is equal to (S/LC) then the radical is zero and the damping is between Oscillatory and non Oscillatory motion (*critical damped* C_c) .

Any damping can then be expressed in terms of the critical damping $\mathbf{C_c = 2.L \sqrt{S/CL} = 2.L.w_n = 2.\sqrt{SL / C}}$ by the non dimentional number ζ called damping ratio $\zeta = R / C_c = R.\sqrt{C / 4SL}$. Further analysis in [27] .

A second possible solution of (1) is → $[S/ \mathbf{C} + \mathbf{R}(dS/dt) + \mathbf{L}\, (d^2S/dt^2) = \mathbf{T_o}. \sin (wt)$ with a positive solution $\mathbf{S(t) = S_o. Cos(wt-\varphi)}$ where the amplitude of the phase are ,respectively

$\mathbf{S_o} = (T_o /L) /\sqrt{[Rw/L]^2 + [w^2 -1/(LC)^2} = [T_o / w] /\sqrt{[R^2+ (wL - 1/wC)^2]} = [T_o/ w] / \sqrt{R^2 + T^2}$ and then

$T(0) = | k | = |\lambda\Lambda| = | E | = [\Lambda.M + \Lambda\, x\, M] = | \lambda , \Lambda.\nabla i | = \mathbf{|(\bar{z}_o)^w| = T_o}$ and equation of Spaces becomes
$\mathbf{S(t) = \Lambda = S_o. Cos(wt-\varphi) = \{ [T_o/ w] / (\sqrt{R^2 + T^2}) \}. Cos(wt - \varphi)}$ …………**(2a)** where ,
w = the angular velocity and **f** = $1/T1 = (1/2\pi).\sqrt{(1/LC) - (R/2L)^2}$ the frequency of the oscillator .

Remarks :

1… The beyond quantum-gravity fields are the Spaces [S] *and the equilibrium Anti-Spaces* [AS] *which are the stationary sources of the Space Energy fields . The position of points in Spaces creates Momentum* [Λ] *which is bounded in the three constant Energy Layer States **k** 1,2,3 . This Energy is mapped* **(*because of the semi-elastic medium , is damped*)** *on the perpendicular to Λ plane as velocity **v̄** which creates Newton smallest equilibrium accelerations* (**ā** f + **ā** p= 0) *from the Centrifugal (**F**f) and Centripetal* (**F**p) *forces . This rotating energy* E = Λ λ = Ω *is transformed into the Acceleration al and Rotational Ellipsoid ,* and radiated away , *by loosing angular momentum* **E=rmvr** *and conserved as momentum* **E = mv** *where emission of linear momentum creates vector **v̄** of generalized mass **M** . On the infinite points of* [PNS] *this acceleration creates the Wave motion of the infinite dipole* AiBi *which dipole are composed of wavelength* **λ** *and the rotating Energy* **Λ** . *From this Position ,* ***Time is entering in equations of motion as the meter of changes only .*** *This rotating Energy is constant and proportional to frequency* **f** *and interchanged on dipole A⁻B = (λ , Λ = mv) in the Configuration of co variants **λ** ,**m** ,**v̄** as ellipsoid in the two perpendicular fields **E = ∇. Λ** and **B = ∇x Λ** following conservation laws only .*

Energy in a vibrating System is either dissipated (damped) into Heat which is another type of energy (*Energy ,momentum vector* Λ.λ *is damped on the perpendicular to* Λ *plane ,* ***as it is a Spring-mass System with , viscous dumping ,*** *on co variants Energy* E , *mass* M , *velocity* v̄ ,) *or radiated away . Spin* = Λ = r̄.m.ū r *is the rotating energy of the oscillatory system . Oscillatory motion is the simplest case of Energy dissipation of Work embodied in dipole . In any vibratory system , Energy* k = λΛ *is the Spin of Dipole* λ , *dissipated on perpendicular to* Λ *plane in the three* already quantized *Planck Spaces* (10^⁻ 34 < λ > 10^ 34) *where then is damped* (in the semi elastic Sub-Spaces) *as linear momentum vector* Mv̄ *in them* ***i.e Spaces is a Sinusoidal Potential System which follows Kirchhoff 's circuit R ,L,C rules with circuits the Sub-spaces.***

2…The classical theory of Relativity is confined in Space-Time , Planck-time (which is not assessing the outer reality of Spaces) , and the Time which is not existing , which is only a meter of changes . Space and Time are two quite different things . Space is composed of infinite points which are related each other with a quantum of Work (Energy) . The Norm *is the Equation of Total Energy State of Monad equal to →*

$$E_T = \sqrt{[(k/\lambda\bar{v}).\bar{v}_E{}^2]^2 + [\Lambda.\bar{v}_B + \Lambda x\bar{v}_B]^2} = \sqrt{[(k/\lambda\bar{v}).\bar{v}_E.{}^2]^2 + T^2} \quad \leftarrow \textit{Total Energy}$$

$$w = 4.E_T \ / \ (\pi.h.\lambda) = 4\sqrt{[m.v_E.{}^2]^2 + [\Lambda.v_B + \Lambda x v_B]^2} / (\pi.h.\lambda) \quad \leftarrow \textit{Frequency}$$

which is completely refining Time and leaving only **λ .Λ = k** ***which indicates a Space-Energy Universe .***

3…Newton's laws have a Universal application in all Configuration Systems instead of the referred in Relativity as the Inertial ones . Even also to the smallest circular motion , (anywhere that exists velocity v̄ *), exists Centrifugal and Centripetal forces which create acceleration and the Oscillatory motion . Since also velocity **v̄** maybe equal to **0 → c** → ∞ then the velocity of light is not the faster in universe . In Black Holes Configuration a new Type of light is needed with a greater velocity than that of light to see what is happening there . (This is possible by analyzing* **Λ.vB** *with* **vB** *>greater than that of light).*

4…Light , which is a quaternion is travelling either as wave (*photon* **Λ**) *either as particle* (**M=mλ**) *and in both cases as ,* a ***travelling Energy*** **λ.Λ = k** *interchanged in the two perpendicular forced fields **E = ∇. Λ** and **B = ∇x Λ** (Electromagnetic fields) following conservation laws .Gauss laws spring from this property. Part of Natural Philosophy and some of the New mathematics must be adapted to this reality .*

The essence of Monad and the laws are embodied in this Quaternion nature of Dipole and not at later stage conditions which consist new quaternions ..

5…This sight of view allows infinite Newly Sources of Energy ... The how is left to the reader .

6…Universe is following Euclidean Geometry and not other geometries , (Elliptic , Spherical , Parabolic , Hyperbolic, Projective and all the others are a Part of the Euclidean) . [23]

7..Energy is dissipated as **Temperature** in the Perfect Elastic Configuration of [PNS] following the ***ideal Gas*** equation [Λ= nRT/V] and bounded in the three constant and Energy quantized Layer States k1,2,3 [10] .This rotating energy E =Λ λ= Ω is transformed into the ***Accelerational and Rotational Ellipsoid*** [25] and radiated away, by loosing the angular momentum E= r.m.vr and conserved (*quantized*) as linear momentum E = M.v̄ where emission of this linear momentum in *viscous medium* , is **damped as vector v̄** of the Lagrange's generalized mass M [26]) *following Kirchhoff 's circuit* R ,L,C *rules with circuits , the Sub-spaces of the tiny monads.* **The kinetic rotated energy in the viscously damped configuration** *(as a Lagrange's Raylight viscously damped system)* ***is dissipated as Electromagnetism.*** For vector v̄ = 0, this rotating Energy is generalized mass **M** which is mapped as Spin on the perpendicular to Λ plane as velocity v̄r which creates Newton smallest equilibrium accelerations (āf+āp = 0) from the Centrifugal (Ff) and Centripetal (Fp) force .The infinite dipole AiBi of this stationary dynamic system of rotating monads create component forces , **F**E || dP⁻**.** v̄ and **F**B ⊥ dP⁻**x** v̄ on the non-viscous damped monads (**the solids**) . i.e Work→ Energy→ Temperature → Electromagnetism → Velocity+Mass →Solid.

From this Position , Time enters in equations of motion as the meter of changes only . This rotating Energy is interchanged on dipole $A^{-}B = (\lambda , \Lambda = m\bar{v})$ in the Configuration of covariants λ ,m, $\bar{v}$ as ellipsoid in the two perpendicular fields $E = [(\partial/\partial x) + (\partial/dy) + (\partial/\partial z)].\Lambda = \nabla \Lambda$ and $B = [(\partial/\partial x) + (\partial/dy) + (\partial/\partial z)] \times \Lambda = \nabla \times \Lambda$ by following conservation laws only .***Classical theories are confined in Space -Time and Planck-time which are not assessing the outer reality of Spaces*** with Time , which is only a meter of changes , and not existing differently, *Space-time* .All particles , gravity for the three quantized energy regions k1,2,3 , and the infinite dipole are Spaces [23] which are composed of infinite points and are related each other with a quantum of Work (*rotating Energy*) . The Norm of any Monad is the Equation of Total Energy State and equal to $\rightarrow ET = \sqrt{[(k/\lambda\bar{v}) .\bar{v}\bar{E}^2]^2 + [\Lambda.\bar{v}B + \Lambda x\bar{v}\bar{B}]^2} = \sqrt{[(k/\lambda\bar{v}) .\bar{v}\bar{E}.^2]^2 + T^2} \leftarrow$ which is completely refining Time and leaving only $\lambda \Lambda = k$ which indicates ***a Space Energy Universe*** .Light which is a quaternion is travelling either as wave (photon Λ) either as particle ($E = M\bar{v} = r.m.\bar{v}r$) and in both cases as , a travelling Energy $\lambda.\Lambda = k$ interchanged in the two perpendicular forced fields $E = \nabla. \Lambda$ and $B = \nabla \times \Lambda$ (Electromagnetic fields) following conservation laws . Gauss laws spring from this property

5.. Acknowledgment .

The reason of writing this scanty article is because *I am Engineer* , and my deep intuition contradicts to some very acceptable conceptions . By the way some accepted , instead of as below written , *which are for me disputable* , are altering as follows by placing the **[Answer]** → ***but ..so***

Time comes first and nothing changes without time **[Answer]** → *Time* ***is not existing*** *and it is a meter of changes in the movable Spaces and this springs from Primary Space creation* , $W = \int P.ds = 0$.

Casually is the cause for every effect or observation → *Conservation of* ***the A priori work*** *on Points and on all Dipole between the infinite points in PNS is* , ***gravity of Spaces*** , *the only effective cause* .

Laws of Physics exist before the entities involved → ***Laws are*** : A=B *The Principle of the Equality* . $A \neq B =$ *Principle of the Inequality* , $A \leftrightarrow B = \infty$ *Principle of Virtual Displacements* $W = \int P.ds = 0$, $PA + PB = 0$ *Principle of Stability* , $A \equiv B$ *Principle of infinite Superposition (extrema)* → ***and Entities*** (*Monads* $A^{-}B$ ***) are embodied with the Laws*** (*A ,B - PA , P B*) because ***Entities = Monad*** $\bar{A}B$ **=** ***Quaternions*** [AB , $P^{-}A - P^{-}B$] and all of them built on the Euclidean logic.

Sequence that Space was created before matter → *Human mind , in front of this dilemma created the outlet in Religious and the myth of Big-Bang* .

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[10] MEASURING REGULAR POLYGONS AND HEPTAGON IN CIRCLE **(REGULAR.doc**)
[11] THE TRISECTION OF ANY ANGLE . (**TRISECTION.doc**)
[12] THE EUCLIDEAN PHILOSOPHY OF UNIVERSE . (**EUCLID .Spaces.doc**)
[13] UNIVERSE ORIGINATED **not** WITH BIG BANG (**EUCLID .not.BIG BANG .doc**)
[14] COMPLEX NUMBERS (QM) SPRING FROM EUCLIDEAN UNIVERSE. (**Complex.Quantum.Euclid.doc**)
[15] ZENOS PARADOX , NATURE OF POINTS IN QUANTIZED EUCLIDEAN GEOMETRY. [**ZENO-PARADOX.doc]**
[16] THE DECREASING TUNNEL BY PR.FLORENDIN SMARANDASHE (**ORTHIC.doc**)
[17] THE SIX –TRIPLE CONCURENCY LINES - LINE POINTS (Six.TriplePoi.Line.**doc)**
[18] ENERGY LAWS FOLLOW EUCLIDEAN MOULDS (Pythagoras.**doc)**
[19] HIGGS PARTICLE AND EUCLIDEAN GEOMETRY (Higgs-Particle.**doc)**
[20] HIGGS BOSON AND EUCLIDEAN GEOMETRY (Higgs-Boson.**doc)**
[21] GEOMETRY- SPACE UNIVERSE (Space-Universe.**doc)**
[22] QUANTIZATION OF POINTS AND ENERGY (Space-Energy.**doc)**
[23] THE PARALLEL POSTULATE AND SPACES (IN SciEP) ----
[24] GRAVITY AS VORTICITY IN GEOMETRY (Gravity.**doc)**
[25] THE BEYOND GRAVITY FORCED FIELDS (U-Gravity.**doc)**
[26] THE WAVE NATURE OF THE GEOMETRY DIPOLE (Wave.Na.**doc)**
[27] THE OUTSIDE RELATIVITY SPACE – ENERGY UNIVERSE (Energy.U.**doc)**
[28] THE QUANTIZATION OF POINTS AND POTENTIAL AND THE UNIFICATION OF SPACE AND ENERGY WITH THE UNIVERSAL PRINCIPLE OF VIRTUAL WORK , ON ***Geometry Primary dipole*** , (is done ? ?)

. by Markos Georgallides .