

THE WAVE - NATURE OF THE GEOMETRY PRIMARY DIPOLE

*This article presents the how **rotating Energy (Spin) is interchanged** on co variants ($m, \vec{v}r$) of the dipole $A^-B = (\lambda, \Lambda = rmv)$ into the perpendicular to A plane as Velocity $\vec{v}r$ vector, which creates Newton smallest accelerations by the configuration of Centrifugal and Centripetal forces and then the **Wave motion***

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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 $A \equiv B$. Point B is the Primary Anti-Space which Equilibrium point A , [PNS] = [$A \equiv B$] . 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 . [9]

Since Primary point A is the only Space , then on it exists Principle of Virtual Displacements $W = \int P.ds = 0$ or $[ds .(P_A + P_B) = 0]$ i.e . for any $ds > 0$ Impulse $P = (P_A + P_B) = 0$. All points may exist with $P = 0 \rightarrow (PNS)$ and also with $P \neq 0$, ($P_A + P_B = 0$) , for all points in Spaces and Anti - Spaces , therefore [PNS] is self created , and because at each point may exist also $P \neq 0$, then [PNS] is a Field with infinite points which have a \pm Charge with $P = 0 \rightarrow P \rightarrow \infty$.

Since points A , B of [PNS] coincide with the infinite Points , of the infinite Spaces , Anti-Spaces and Sub-Spaces of [PNS] 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 ($A \equiv B$) . The Infinite points in [PNS] form infinite Units $A_i B_i = ds$, which equilibrium by Primary Anti- Space by an Inner Impulse (P) at edges A , B where $P_i A + P_i B \neq 0$, and $ds = 0 \rightarrow N \rightarrow \infty$

Monads = Quantum = $ds = AB / (n = \infty \rightarrow 0) = [a \pm b.i] = 0 \rightarrow \infty$ 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 , since ds^n is Complex number also . Monad $\bar{A}B$ 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 $|AB| = \text{length of points A , B}$ and imaginary part forces P_A^-, P_B^- **Dipole** $A^-B = [\lambda, \Lambda]$ in [PNS] are composed of the two elements λ, Λ which are created from points A, B only where *Real part* $|AB| = \lambda = \text{wavelength (dipoles)}$ and from the embodied work the *Imaginary part* $W = \int P.ds = (r.dP) = \vec{r} \times p = I.w = [\lambda.p] = \lambda.\Lambda = k^2$, where momentum $\Lambda = p$ 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 $z = [s \pm \vec{v}.i]$ where $s, |\vec{v}|$ are real numbers and i the imaginary part such that $i^2 = -1$. Extending imaginary part to three dimensions $\vec{v}_1 i, \vec{v}_2 j, \vec{v}_3 k \rightarrow \vec{v} . \nabla i$ then becomes quaternion . **The moving charges** is velocity \vec{v} created from the rotating Energy momentum vector [$\Omega = (\lambda.P) = \pm \text{Spin}$] which creates the Centrifugal force (F_f) , the equal and opposite to it Centripetal force (F_p) and acceleration \vec{a} mapped (damped) on the perpendicular to Λ plane as $\rightarrow \vec{v}_E \parallel dP$ and $\vec{v}_B \perp dP$. Since $(dP \perp \pm \Lambda)$ the work occurring from momentum $\vec{p} = m\vec{v} = \Lambda$ acting on force dP is zero , so when $\vec{v}_E = 0$, **momentum $\Lambda = m\vec{v}$ only , is exerting the velocity vector \vec{v}_B to the dipole , λ , and** the generalized mass M (the reaction to the change of velocity \vec{v}) which creates the component forces , $F_E \parallel dP \cdot \vec{v}$ and $F_B \perp dP \cdot \vec{x} \vec{v}$. **Energy** in a vibrating system is either *dissipated into heat* which is another type of energy (Energy, momentum vector $A\lambda$ is damped on the perpendicular to A plane, as it is a Spring-mass System with viscous dumping , on co variants Energy E , mass M , velocity \vec{v}) or radiated away . Spin = $\Lambda = \vec{r}.m.\vec{u}r$ is the rotating energy of the oscillatory system . **Oscillatory motion is the simplest case of Energy dissipation of Work embodied in dipole . In the vibratory system , Energy $k^2 = \lambda\Lambda$ is Spin of Dipole , dissipated on perpendicular to Λ plane and damped as linear momentum vector $M\vec{v}$.**

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* ($A \equiv B$) which is a Steady State containing Extrema for each point separately . i.e. In three dimensional 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{AB} 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 $\bar{AB} = \bar{r} = \lambda$ in Space , Anti-space and of Force **P :**

The couple $P, -P$ creates Work as moment $M = P.(r/2).\sin\theta = [r.P].\sin\theta/2 = W = [P.\lambda]$. As logarithm maps points on the sphere into points in the tangent sphere , so work $P.\lambda$ is transformed as angular momentum $\bar{L} = p \times \lambda$ where then $P = p$ and it is the amount of rotation Λ i.e. $P = p = \Lambda$, or The work W, for the infinite points on the two tangential to r planes is equal to $W = [r.P] = [\lambda.\Lambda]$ 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 \bar{L} and it is a vector) .

i.e $\lambda . \Lambda = \text{constant for all dipole } \lambda$, and since λ is constant Λ is also constant , and from equivalent formula of $\Lambda = \bar{L} = \bar{r} \times p = I.w = [\lambda.p] = \bar{r}.(P.\sin\theta) = P.\bar{r} \sin\theta = \text{constant} \rightarrow \text{Spin of } \lambda$. The infinite dipole $AB, (\lambda.p) = AB, (\lambda.\Lambda)$ in Primary Space [PNS] are quaternion as ,

$$\bar{z}_o = [s, \bar{v}_n.\nabla i] = [\lambda, \pm\Lambda.\nabla i] = [\lambda, \pm\bar{L}.\nabla i] \dots\dots\dots(m1) \text{ is the quaternion of the Primary Space dipole , where}$$

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

$\Lambda.\lambda$ = the spin of dipole , equal to the angular momentum vector $p.r = \bar{L}$ and exponentially

$$\mathbf{z}_o = [s, \bar{v}_n.\nabla i] = [\lambda, \pm\Lambda.\nabla i] = [\lambda, \pm\bar{L}.\nabla i] = |z_o|.e^{\text{arc.cos}[\lambda/z_o].[\Lambda/|\Lambda|.\nabla i]} = |z_o|.e^{\theta.\nabla i} \dots\dots\dots (m2)$$

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

$$\text{In Polar form } \bar{z}_o = (\lambda, \Lambda.\nabla i) = |\sqrt{z}'_o|. \bar{z}_o [e^{\lambda/|\sqrt{z}'_o|. \bar{z}_o} . \Lambda/ \sqrt{\Lambda'\Lambda}] \dots\dots\dots(m3)$$

i.e. Primary Space quaternion \bar{z}_o multiplied by its conjugate \bar{z}'_o , is cancelling the vector $\Lambda.\nabla i$ and leaving the scalars $\lambda, |\Lambda|$ only .

Repetition quaternion's property (\bar{z}_{o1}) is a new quaternion by transforming the scalar magnitudes wavelength λ and spin magnitude $|\Lambda|$, to vectors $\Lambda.\nabla i$) . 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 $\Lambda.\lambda = \text{Spin} = \text{Energy on dipole}$ is mapped in perpendicular to $|\Lambda|$ plane as velocity vector \bar{v} , which creates the equilibrium Centrifugal and Centripetal accelerations proportional to \bar{v} 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 $(\partial/t, 0) (\lambda, \Lambda.\nabla i) = 0$

$$\text{The tangential to } \lambda \text{ quaternions are } (\partial/\lambda, \nabla i) (\lambda, \Lambda.\nabla i) = 0 - \Lambda , p - \lambda.\nabla i + \Lambda = -[\lambda, \Lambda.\nabla i].\nabla i = -(\partial/\lambda, \nabla i) (\lambda, \Lambda.\nabla i) \dots\dots\dots(m4)$$

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

Using the quaternion multiplication rule ($\check{z}\varpi = -\check{z} . \varpi , \check{z} \times \varpi$) and since also $\nabla i.\nabla i = -1$ then , on any reference frame , Euclidean product for two quaternion \bar{z}_o, \bar{z} is $\bar{z}_o \odot \bar{z} \rightarrow$

$$\bar{z}_o \odot \bar{z} = [\lambda, \Lambda.\nabla i] \odot [s, v.\nabla i] = \lambda s - \Lambda \bar{v}.\nabla i , \lambda \bar{v}.\nabla i - \Lambda s .\nabla i - \Lambda \times \bar{v}.\nabla i \dots\dots\dots (m5)$$

$$\bar{z}_0 \odot \bar{z} = [\lambda, \Lambda \cdot \nabla i] \odot [s, \bar{v} \cdot \nabla i] = \{ \bar{z}_0 \odot \bar{z} \} + [\bar{z}_0 \odot \bar{z}] \cdot e^{\Lambda (\pi^{1/2})} \cdot [\bar{z}_0 * \bar{z}] \cdot \nabla i / [| \bar{z}_0 * \bar{z} |] \dots\dots (m6)$$

and represents the extrinsic rotation, which is equal to the intrinsic rotation and by the same angles, of any quaternion of Spin $\Lambda\lambda$, 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

- $\lambda s - \Lambda \bar{v} \cdot \nabla i$ = The Intrinsic alterations of the reference frame,
- $\lambda \bar{v} \cdot \nabla i$ = 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.
- $\Lambda s \cdot \nabla i$ = 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),
- $\Lambda \bar{v} \cdot \nabla i$ = 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 $W = \int_{A-B} [P \cdot d\bar{s}] = 0$ and is stored on points A,B as quaternion $\bar{z}_0 = [\lambda, \Lambda \nabla i]$ 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, $\Lambda, -\Lambda$, are in inverted order of rotation and vice-versa, then even function $f(\Lambda) = f(-\Lambda)$ and odd function is $-f(\Lambda) = f(-\Lambda)$ and their sum $f(\Lambda) + f(-\Lambda) = 0$ i.e.

Mapping (graph) of Even function $f(\Lambda)$, 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 $f(\Lambda)$ and of Odd $f(-\Lambda)$ 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 $f(\Lambda), f(-\Lambda)$ are Stationary and only their sum creates their conjugation operation through mould \bar{z}_0 , therefore their sum is zero independently of time (negation truth) as,

$$\begin{aligned} \text{even function } f(\Lambda) &\rightarrow (\partial/\partial t, \nabla) \odot (\lambda, -\Lambda \nabla) = 0, -\nabla \lambda \\ \text{odd function } f(-\Lambda) &\rightarrow (\partial/\partial t, \nabla) \odot (\lambda, \Lambda \nabla) = 0, \nabla \times \Lambda \\ \text{even + odd} &= 0 \rightarrow (\lambda, -\Lambda \nabla) + (\lambda, \Lambda \nabla) = [0 - \nabla \lambda, -0 + \nabla \times \Lambda] = 0 = nt \dots\dots (m7) \end{aligned}$$

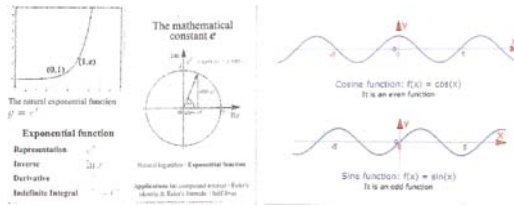
Quaternion of the Primary Space dipole is $\bar{z}_0 = [s, \bar{v}_0 \cdot \nabla i] = [\lambda, \Lambda \nabla i]$ and the only one Physical existing truth monad ($\bar{z}_0 = 1$), and ($nt = 0$) the only Physical non-existing equilibrium monad, negation truth, so non-existence (0) becomes existence with [PNS] motionless dynamic mould ($\bar{z}_0 = 1$), and it is Done everywhere, following Boolean logic operations with all combinational rules and laws, as follows,

Element [$\bar{z}_0 = 1$]	Element [$nt = 0$]	Conjunction [$\bar{z}_0 \rightarrow 0$]	Conjugation [$\bar{z}_0 \odot 0$]	Quaternion [$\bar{z}_0 \equiv nt$]
0	0	z_0	0	z_0
z_0	0	0	z_0	0
0	z_0	z_0	z_0	0
z_0	z_0	z_0	0	z_0

$$\text{Quaternions (m1),(m3),(m7)} \leftrightarrow \bar{z}_0 = [\lambda, \pm \Lambda \nabla i], \bar{z}'_0 = [\lambda^2 - |\Lambda|^2], nt = [-\nabla \lambda, \nabla \times \Lambda] = 0$$

are the three fundamental equations of [PNS], unifying the homogenous Euclidean geometry ($\lambda = \lambda \nabla$) and the source term Energy ($d\bar{s} \cdot dP = \lambda \cdot p = \text{constant } K_{1,2,3}$ 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,
- $\Lambda \lambda = k$, the spin of dipole, source term, equal to the angular momentum vector $\lambda p = \lambda \Lambda$.



(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 ω then , $(\partial/\partial t, \omega) \odot (-\nabla \lambda, \nabla \times \Lambda) = d/dt(-\nabla \lambda) + \omega \cdot \nabla \times \Lambda$, $d/dt(\nabla \times \Lambda) + \omega \cdot \nabla \lambda - \omega \times \nabla \times \Lambda = 0 - \omega \cdot \Lambda$, $0 + \omega \lambda + \omega \cdot \Lambda = 0$, $\omega \cdot \lambda$ or , $(\partial/\partial t, \omega) \odot (-\nabla \lambda, \nabla \times \Lambda) = 0$, $\omega \cdot \lambda = [0, p] = [0, \Lambda]$ (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 ω is velocity $\omega \cdot \lambda$ is momentum p , i.e. *negation truth Unit* $nt = [-\nabla \lambda, \nabla \times \Lambda] = 0$ is a machine that instantly transforms Inertial mass , **momentum** $p = \omega \cdot \lambda = m \cdot v$ to all Inertial frames Layers $K_{1,2,3} = \lambda \cdot p$ 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 $\omega \rightarrow \infty$ 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 ω and the Position quaternion $\bar{z} = (t, \check{z})$ is the velocity $(\partial/\partial t, \omega) \odot (0, \check{z}) = (-\omega \cdot \check{z}, \omega \times \check{z} + d\check{z}/dt)$ and $(\partial/\partial t, \omega) \odot (-\omega \cdot \check{z}, \omega \times \check{z} + d\check{z}/dt) = (-d\omega/dt \cdot \check{z}, d^2\check{z}/dt^2 + 2\omega \times d\check{z}/dt + d\omega/dt \times \check{z} - \omega \cdot \check{z}\omega)$ 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 $\lambda \Lambda = \lambda p$.

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 $nt \rightarrow (nt)^2 = [\nabla \lambda, \Lambda \times \nabla]^2 = [\lambda^2 - \Lambda^2 \pm 2\lambda \cdot \Lambda \nabla^2] = \lambda^2 - \Lambda^2 \pm 2\lambda \cdot \Lambda = \lambda^2 - \Lambda^2 \pm 2\lambda \times \Lambda = [\lambda^2 - \Lambda^2] = [\lambda^2 - (i^2 + j^2 + k^2) |\Lambda|^2]$ since λ, Λ are axially (N2)

The upper relation was used by Special relativity [Minkowski metric (g_{μν})] 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 $\bar{z} = [s, \bar{v} \cdot \nabla i]$. Conjugation of $\bar{z}n \odot (nt)^2 = [s_n, \bar{v}_n \cdot \nabla i] \cdot [\lambda^2 - \Lambda^2] = \lambda^2 \cdot s_n - \Lambda^2 \cdot \bar{v}_n \cdot \nabla i$, $-s_n \cdot \Lambda^2 - \lambda^2 \cdot \bar{v}_n \cdot \nabla i - (\bar{v}_n \times \Lambda^2) \nabla i$ 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 $\lambda \cdot \Lambda = k$ only .

Metric (distance) of Euclidean Spaces :

The Spatial interpretation of a point P is $[P = a + \bar{v} \cdot i]$, where $\tan \theta = \bar{v}/a$, in *Complex System*], and in 3D 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 $\phi = 2\cos^{-1} a$, and in Polar form point $p = (a + \bar{v} \cdot i) = \sqrt{p \cdot p} \cdot e^{i[a/\sqrt{p \cdot p}]} \cdot [\bar{v} \cdot i / \sqrt{v \cdot v}]$. For two points $P_1 = a_1 + \bar{v}_1 \cdot i$, $P_2 = a_2 + \bar{v}_2 \cdot i$ becomes

$$d\bar{s}(P_1, P_2) = d\bar{s} = \text{Normalized } (P_1 + P_2) = (P_1 + P_2) \odot (P_1 + P_2) = [\sqrt{|P_1 \cdot P_1| + |P_2 \cdot P_2|}] = [\sqrt{|P_1 \cdot P_1| + |P_2 \cdot P_2|}] \dots (N3)$$

$$\text{Conjugating N1 on point P then } [0, p] \odot [a + \bar{v} \cdot i] = 0 - p\bar{v} , 0 + pa + p \times \bar{v} = -|p| \cdot |\bar{v}| , ap + p \times \bar{v} \dots (N4)$$

For $p = [k/\lambda]$ then $[0, p] \odot [a + \bar{v} \cdot i] = -[k/\Lambda]$, $a \cdot \Lambda + \Lambda \times \bar{v}$ and for points where $a = 0$ then

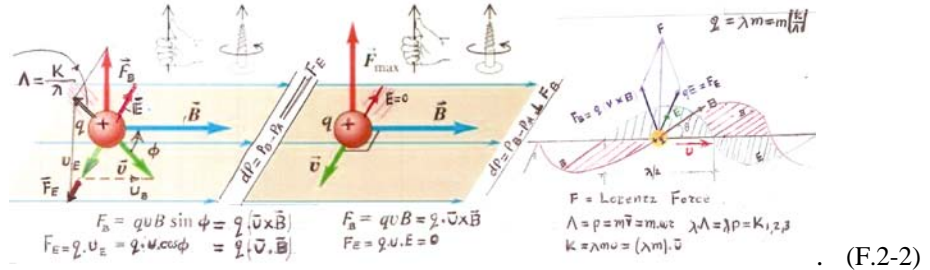
$$[0, p] \odot [a + \bar{v} \cdot i] = -[k/\Lambda] , a \cdot \Lambda + \Lambda \times \bar{v} = -(k/\lambda) , \Lambda \times \bar{v} =$$

Quaternion N4 instantly transforms momentum $p =$ Intrinsic **Spin** of [PNS] to all Frames Layers $K_{1,2,3} = \lambda p$

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

Directional dipole \vec{z}_0 , is the rotation corresponding to keeping a cube held fixed at the point , and rotating it $2\theta_0$ about the long diagonal through this fixed point , where the three axes are permuted cyclically, and influence on any other quaternions $\vec{z}_n [s+\vec{v}.i]$ equal to $\vec{e}_0 = [|\vec{r}|+\vec{r}.i] \odot [0, \Lambda] \odot [s+\vec{v}.i]$ following rotations at static points $P[|\vec{r}|, \vec{r}\vec{v}.i]$ of [PNS] , in the two , *perpendicularly interchanged and conserved* , equilibrium states $-|\Lambda| \cdot |\vec{r}| = |\vec{r}| \cdot \Lambda$ and $-|\Lambda| \cdot |\vec{r}| = \Lambda \times \vec{r}$ where $|\vec{r}| \perp \Lambda \times \vec{r}$.

2..2 The Beyond Gravity Forced Fields :



Dipole $\Lambda B = [\lambda, \Lambda]$ in [PNS] are composed of the two elements λ, Λ which are created from points A, B $|\mathbf{AB}| = \lambda = \text{wavelength (dipoles)}$ and from $W = (r.dP) = \vec{r} \times p = I.w = [\lambda.p] = \lambda.\Lambda = k2 \rightarrow \Lambda = \mathbf{p} = \text{momentum}$ and Forces $dP = P^-_B - P^-_A$ which are the sources of Space field .(*the moving charges is velocity \vec{v} created from dipole momentum $\pm \lambda \Lambda^-$ when is mapped on the perpendicular to Λ plane as $\rightarrow \vec{v}_E \parallel dP$ and $\vec{v}_B \perp dP$). Since $(dP \perp \pm \Lambda^-)$ the work occurring from momentum $\vec{p} = m\vec{v} = \Lambda\lambda$ (Spin) acting on force dP is zero , so **momentum $\Lambda^- = m\vec{v}$ only , is exerting the velocity vector \vec{v} to the dipole , λ** , with the generalized mass m (*the reaction to the motion \vec{v}*) which creates the component forces , $\mathbf{F}_E \parallel dP \cdot \vec{v}$ and $\mathbf{F}_B \perp dP \times \vec{v}$.*

Forces $dP \parallel$ (parallel) to the parallel of Space Anti-Space lines { [S] \equiv [AS] } , create a Static force field \mathbf{E} in (dP, λ) plane where $\mathbf{E}^- \perp \pm \Lambda^-$ and so $\mathbf{E}^-, \vec{v} \mathbf{E}^-, dP$ are co plane .

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

Velocity vector $\vec{v} (\vec{v}_E, \vec{v}_B)$ is in $[\vec{v}, B^-]$ plane forming an angle $\theta < 180^\circ$ to the force field \mathbf{B}^- . The oriented parallelogram spanned by the cross product of the two vectors \vec{v} and \mathbf{B} is the bivector $\mathbf{B}^- \wedge \vec{v}$ which cross product is vector $\vec{v} \times \mathbf{B}^-$, therefore is created a force in a vector product $\rightarrow \mathbf{F}_B = (\lambda m) \cdot \vec{v} \times \mathbf{B}$ (*because velocity vector $\vec{v} = (p/m) = (\Lambda / m) = [k2 / \lambda m]$ and $\rightarrow (\lambda m) \cdot \vec{v} = k2$) and for the coplanar force field \mathbf{E}^- the vector $\vec{v} \cdot \mathbf{E}^- = (\vec{v}_E) \cdot \mathbf{E}^-$ which experience a force $\rightarrow \mathbf{F}_E = (\lambda m) \cdot \mathbf{E}$. i.e.*

The two perpendicular Static force fields \mathbf{E} and Static force field \mathbf{B} of Space-Anti-Space ,experience on any moving dipole $\Lambda B = [\lambda, \Lambda]$ with velocity \vec{v} a total force $\mathbf{F} = \mathbf{F}_E + \mathbf{F}_B = (\lambda m) \cdot \mathbf{E} + (\lambda m) \cdot \vec{v} \times \mathbf{B}$ which combination of the two types result in a helical motion , with stability demand $\rightarrow \mathbf{E} = -(\vec{v} \times \mathbf{B}) = -(\vec{v} \cdot \mathbf{B}) \perp \dots$ (N4) *which is the alternative conservation of momentum [$k2 = \Lambda^2 / 2\lambda m$] in the two perpendicular fields E, B . In case $(\lambda m) = q$ then total force $\mathbf{F} = \mathbf{F}_E + \mathbf{F}_B = q \cdot \mathbf{E} + q \cdot \vec{v} \times \mathbf{B} = q \cdot [\mathbf{E} + \vec{v} \times \mathbf{B}] \rightarrow$ **which is Lorentz force in the Electromagnetic crossed fields E and B with electric charge $q = \lambda m$ and are the two beyond Gravity Fields interpreting 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 $[\lambda, \Lambda]$ representing the energy equivalence state E_T (**the Total energy state of a quaternion**) .Velocity vector \vec{v} components follow Pythagoras conservation law $v = \sqrt{\vec{v}_E^2 + \vec{v}_B^2}$ and (N2) also ,where $\mathbf{E}_T = \sqrt{[|\Lambda| \cdot |\vec{r}|]^2 + [|\Lambda \cdot \vec{r} + \Lambda \times \vec{r}|]^2} \dots$ (N5) Since $\lambda \cdot \Lambda = k = \lambda m \vec{v} = (\lambda m) \vec{v} = (\lambda m) \cdot w \vec{r}$ and $\Lambda = m \vec{v} = m \cdot w \vec{r}$ where vector $\vec{v} (\vec{v}_E, \vec{v}_B)$ is mapped from Λ only on a perpendicular to Λ plane as \vec{v}_E, \vec{v}_B then the real norm is $\vec{r} = \vec{v}$ and $[|\Lambda| \cdot |\vec{r}|] = [|\Lambda| \cdot |\vec{v}|] = m \vec{v} \cdot \mathbf{v}_E$

$= m \cdot \mathbf{v}_E \cdot \mathbf{v}_E = [m \cdot \mathbf{v}_E^2]$ and $[|\Lambda \cdot \vec{r} + \Lambda \times \vec{r}|] = [|\Lambda \cdot \vec{v} + \Lambda \times \vec{v}|] = [|\Lambda \cdot \vec{v}_B + \Lambda \times \vec{v}_B|] = [|\Lambda \cdot \mathbf{v}_B + \Lambda \times \mathbf{v}_B|]$ where,

$[m \cdot \mathbf{v}_E^2]$ \rightarrow the energy component depended on gauge magnitude m and the velocity \mathbf{v}_E .
 $[|\Lambda \cdot \mathbf{v}_B + \Lambda \times \mathbf{v}_B|]$ \rightarrow the energy component depended on gauge magnitude Λ and the velocity \mathbf{v}_B .

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

$\bar{\mathbf{v}}_E = \mathbf{0}$ then $E_T = \Lambda \cdot v_B + \Lambda \times v_B \rightarrow$ which is the *accelerating removing energy* Λ towards v_B .

$\mathbf{m} = \mathbf{0}$ then $E_T = \Lambda \cdot v_B + \Lambda \times v_B \rightarrow$ which is the *linearly removing energy* Λ towards v_B .

$\bar{\mathbf{v}}_B = \mathbf{0}$ then $E_T = m \cdot v_E^2 \rightarrow$ which is the *Kinetic energy in Newtonian mechanics* towards v_E .

Stability is obtained by the opposite momentum $-\Lambda^-$ where $E = -(\bar{\mathbf{v}} \times \mathbf{B}) = -(\bar{\mathbf{v}} \cdot \mathbf{B}) \perp \rightarrow$ or and $\mathbf{B} \perp \mathbf{E}$. The two perpendicular Static force fields \mathbf{E} and Static force field \mathbf{B} of Space-Anti-Space, *experience* on any moving dipole $A \ B = [\lambda, \Lambda]$ with velocity $\bar{\mathbf{v}}$ (*momentum* $\Lambda = m\bar{\mathbf{v}}$ only is exerting the velocity vector $\bar{\mathbf{v}}$ to the dipole λ) a total force $\mathbf{F} = \mathbf{F}_E + \mathbf{F}_B = (\lambda m) \cdot \mathbf{E} + (\lambda m) \cdot \bar{\mathbf{v}} \times \mathbf{B}$ 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,

$$\text{The Total Energy State of a quaternion } E_T = \sqrt{[m \cdot v_E^2]^2 + [\Lambda \cdot v_B + \Lambda \times v_B]^2} = \sqrt{[m \cdot v_E^2]^2 + T^2} \\ = \sqrt{[m \cdot v_E^2]^2 + |\mathbf{p}_1 v_{B1}|^2 + |\mathbf{p}_2 v_{B2}|^2 + |\mathbf{p}_3 v_{B3}|^2}$$

i.e. a moving Energy cuboid (axbxc), rectangular parallelepiped, with space diagonal length

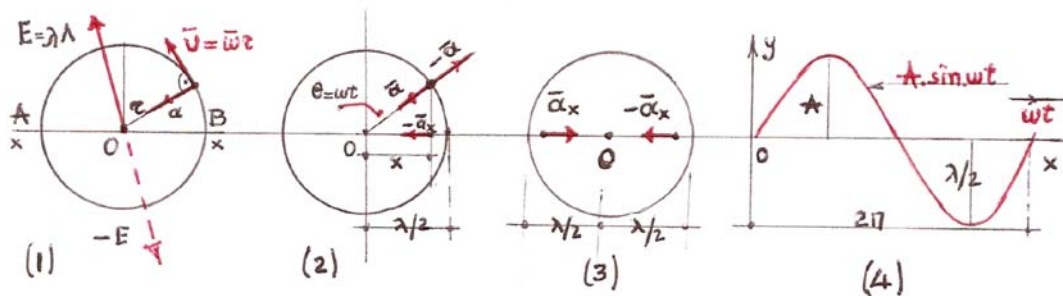
$$T = \sqrt{a^2 + b^2 + c^2} \quad \text{where } \rightarrow \mathbf{a} = |\mathbf{p}_1 v_{B1}|, \mathbf{b} = |\mathbf{p}_2 v_{B2}|, \mathbf{c} = |\mathbf{p}_3 v_{B3}| \quad \text{and when}$$

$\bar{\mathbf{v}}_E = \mathbf{0}$ then $E_T = \Lambda \cdot v_B + \Lambda \times v_B \rightarrow$ which is the *accelerating removing, rotating energy* Λ towards v_B .

$\mathbf{m} = \mathbf{0}$ then $E_T = \Lambda \cdot v_B + \Lambda \times v_B \rightarrow$ which is the *linearly removing, energy* Λ towards v_B .

$\bar{\mathbf{v}}_B = \mathbf{0}$ then $E_T = m \cdot v_E^2 \rightarrow$ 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 $\bar{A}B$ is the ENTITY 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]

Dipole $A^- B^- = [\lambda, \Lambda]$ in [PNS] are composed of the two elements λ, Λ which are created from points A, B only where *Real* part $|AB| = \lambda =$ wavelength (*dipoles*) and from the embodied work the *Imaginary* part $W = (r \cdot dP) = \bar{\mathbf{r}} \times \mathbf{p} = I \cdot w = [\lambda \cdot p] = \lambda \cdot \Lambda = k^2$, where momentum $\Lambda = \mathbf{p}$ and Forces $d\mathbf{P} = P^-_B - P^-_A$ are the stationary sources of the Space Energy field. [22-25].

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

$$x = C_1 \sin\theta + C_2 \cos\theta = C_1 \sin.wt + C_2 \cos.wt, \quad \text{where,}$$

$$w^2 = (a/Am),, C_1, C_2 \text{ constants ,, and for } \theta = 0 \text{ then,}$$

$$v = v_0 = w \cdot r = w \cdot \lambda / 2 = (w\lambda) / 2 \text{ and } x_0 = A = \lambda/2$$

$$A = \text{The amplitude of oscillation, and when } x = 0 \text{ then } A = \lambda / 2.$$

Considering motion from time $t = 0$ where motion passes through O , ($x = 0$) with velocity $v_0 // O_x$, then displacement $x = v_0 \cdot \sin wt = A \cdot \sin [\sqrt{(a/Am)} \cdot t + \pi/2]$ (1)
 velocity $\dot{x} = dx/dt = v_0 \cdot w \cdot \cos (wt + \pi/2) = A \sqrt{(a/Am)} \cdot \sin [\sqrt{(a/Am)} \cdot t + \pi/2]$
 acceleration $\ddot{x} = d^2x/dt^2 = -v_0 \cdot w^2 \cdot \sin(wt + \pi) = (a/m) \cdot \sin [\sqrt{(a/Am)} \cdot t + \pi] = - (a/Am)x = - (2a/\lambda m) \cdot x$

The amplitude of oscillation (x max) is equal to the constant v_0/w while the period T of a complete oscillation to the constant $2\pi/w$ is as, $T = 2\pi/w = 2\pi / [\sqrt{(a/Am)}] = 2\pi \cdot [\sqrt{(Am/a)}]$ and solving a, $a = (2\pi/T)^2 \cdot (Am) = w^2 \cdot (Am) = 2w^2 \cdot (\lambda m)$, \rightarrow 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 $x(t) = x(t+T)$. The angular speed of line segment r (or angular frequency) is $w = 2\pi/T = 2\pi \cdot f$, where f is the frequency of the harmonic motion.

When velocity v_0 is not parallel to O_x then motion is not linear and instead of Scalar magnitude x , vector magnitude \vec{r} is used and the equation of motion is then, $m \cdot (d^2\vec{r}/dt^2) = - (a/A) \cdot \vec{r}$ with general solution $\vec{r} = C_1 \sin\theta + C_2 \cos\theta = C_1 \sin.wt + C_2 \cos.wt$, $\vec{v} = \vec{v}_0 = w \cdot \vec{r}_0 = w \cdot \lambda / 2 = (w\lambda) / 2$ and $\vec{r}_0 = A = \lambda/2$ and for $t = 0$ where vector $\vec{r} = \vec{r}_0$ and velocity $\vec{v} = v_0$, and then equations of motion are,

$$\vec{r} = [\vec{v}_0 / w] \cdot \sin.wt + \vec{r}_0 w \cdot \cos.wt, \quad \vec{v} = d\vec{r}/dt = \vec{v}_0 \cdot \cos.wt - \vec{r}_0 w \cdot \sin.wt \quad \text{or,}$$

$$\vec{r} = \frac{(\vec{v}_0)}{[\sqrt{(a/Am)}]} \cdot \sin [\sqrt{(a/Am)} \cdot t] + A \cdot [\sqrt{(a/Am)}] \cdot \cos [\sqrt{(a/Am)} \cdot t]$$

$$\dot{\vec{r}} = \frac{(\vec{v}_0)}{[\sqrt{(a/Am)}]} \cdot \cos [\sqrt{(a/Am)} \cdot t] - A \cdot [\sqrt{(a/Am)}] \cdot \sin [\sqrt{(a/Am)} \cdot t] \quad \text{..... (1.a)}$$

$$\ddot{\vec{r}} = - \frac{(\vec{v}_0)}{[a/Am]} \cdot \sin [\sqrt{(a/Am)} \cdot t] - A \cdot [a/Am] \cdot \cos [\sqrt{(a/Am)} \cdot t]$$

where

Because increasing of \vec{r} is perpendicular to \vec{v} (vector $\vec{v}_0 \perp \vec{r}_0$) the harmonic components x, y are \rightarrow

$$x = \vec{r}_0 \cos.wt, \quad y = [\vec{v}_0/w] \cdot \sin.wt \quad \text{and since also } \sin^2\theta + \cos^2\theta = 1 \quad \text{then}$$

$$\frac{x^2}{\vec{r}_0^2} + \frac{y^2}{[\vec{v}_0/w]^2} = 1 = \frac{x^2}{A^2} + \frac{y^2}{[\vec{v}_0 \cdot (\sqrt{Am/a})]^2} = \frac{x^2}{[\lambda/2]^2} + \frac{y^2}{[\vec{v}_0 \cdot \sqrt{\lambda m/2a}]^2} \rightarrow \dots(2) \quad \text{i.e. an Ellipsoid with point } O \text{ as centre.}$$

Motion of equal time repeats itself in 2π radians with period T as \rightarrow
 $T = 2\pi / [\sqrt{a/Am}] = 2\pi \cdot [\sqrt{Am/a}] = 2\pi \cdot [\sqrt{\lambda m/2 \cdot a}] = \pi \cdot [\sqrt{\lambda m/a}]$

What is measured as $|\Lambda^-| = |k^2/\lambda|$ is the Total energy embedded in dipole AB , to *Quaternions Extensive Configuration*, as **New Quaternions** (with Scalar λm and Vector \vec{v} magnitudes).

Points in Spaces carry A priori the work $W = \int_{A-B} [P \cdot ds] = 0$, as *Spin on points*, where magnitudes P, ds and m, w, \vec{r} , can be varied leaving work unaltered which is $\pm \text{Spin} = \lambda \Lambda = \lambda \cdot m\vec{v} = (\lambda^2 m) \cdot w/2$.

The **Total Energy** $E = k = \lambda \cdot \Lambda = \lambda \cdot m\vec{v} = \lambda m \cdot \vec{v} = \lambda m (w \cdot \lambda/2) = m \cdot w \lambda^2 / 2$, where the two quantities λ, Λ

are inextricably interwined by the factor \mathbf{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 (\mathbf{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 $A_i B_i \rightarrow (\lambda m)$. By accelerating, the twist wavelength then is shortened and frequency is increasing in Energy level ($\lambda m \cdot v = \text{constant}$). From above equations $E = \lambda m \cdot \bar{v}$ then, $\mathbf{m} = [\mathbf{E}/\lambda \bar{v}] = [2\mathbf{E}/w\lambda^2]$ which is a gauge magnitude depended on the angular velocity \bar{w} , the velocity \bar{v} , and the wavelength λ . i.e. The total energy E of a monad is conserved as momentum ($m\bar{v}$) or angular momentum ($\Lambda = r \cdot m\bar{v} = m \cdot \lambda^2 \cdot w$) or both.

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 \mathbf{E} , mass \mathbf{m} , velocity $\bar{v} = \bar{v}_E$, wavelength λ , and then Energy dissipation is the damping force equal $F_d = C \cdot \dot{x}$ where C is a constant, and \dot{x} the velocity. Following the steady-state of displacement and velocity then, $x = A \cdot \sin(wt - \theta)$ and $\dot{x} = wA \cdot \cos(wt - \theta)$ where the energy dissipated per cycle is work,

$$W_d = F_d \cdot dx = \oint C \cdot \dot{x} \cdot dx = \oint C \dot{x}^2 \cdot dt = \pi C w A^2 = (\pi/4) C w \lambda^2 \quad \dots\dots\dots(3)$$

The Energy dissipated per cycle W_d , by the damping force F_d , is mapped by writing velocity \dot{x} in the form -- $\dot{x} = wA \cdot \cos(wt - \theta) = \pm wA \cdot [\sqrt{1 - \sin^2(wt - \theta)}] = \pm w \cdot [\sqrt{A^2 - x^2}] \quad \dots \quad (3.a)$

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

$$\frac{F_d^2}{(CwA)^2} + \frac{x^2}{A^2} = 1 \quad \dots\dots\dots(3.b) \quad \text{i.e.} \quad \text{an Ellipse with } F_d, x \text{ mapped along the vertical and horizontal axes respectively and the energy dissipated Per cycle is the given by the area enclosed by the ellipse.}$$

i.e.

The total energy $E = \lambda \cdot A$ which is embodied in monad AB is moving as an Ellipsoid in the Configuration of covariants $\lambda, m, v = \bar{v}_E$, 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 ($\Omega = \delta \bar{r} c$) = $[\bar{v} c + \bar{w} \cdot \bar{r}_n] \cdot \delta t$, as the Inertia ellipsoid [Poinso's ellipsoid construction] in Absolute Frame which instantaneously rotates around vector axis \bar{w} , θ with the constant polar distance $\bar{w} \cdot F_d / |F_d|$ and the constant angles θ_s, θ_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 $\Omega^- = F_e$, 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.

Work (W) is quantized on points as $\pm (\Lambda)$ and from this equilibrium of the quantized angular momentum independently of time, is capable of forming the wave nature of Dipole $A_i B_i$, 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 $(\partial/\partial t, \Omega^-) \odot (-\lambda m, \nabla \times \Lambda) = [0, \Lambda]$.

Mapping (graph) of Even function $f(A)$, is always symmetrical about A 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 $A_i B_i$ 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 (by *turning*) and mapped on, the perpendicular to \mathbf{E} vector, plane as momentum $p = \Lambda = m\bar{v} = m(w \cdot A) = m(w \cdot \lambda/2) = \lambda m(w/2)$, therefore all alterations in λ, w , happen also in $m = [2E/w\lambda^2]$ following vector Properties for magnitudes and direction as for,

(1) $\bar{v} \xrightarrow{\bar{a}=0} \bar{v}$	(2) $\bar{v} \xrightarrow{\bar{a}} \bar{v}$	(3) $\bar{v} \xrightarrow{\bar{a}} \uparrow$	(4) $\bar{v} \xrightarrow{\bar{a}} \downarrow$	(5) $\bar{a} \xrightarrow{\bar{v}} \backslash$
$\bar{v}_F = \bar{v} + \bar{a} = \bar{v}$	$\bar{v}_F = \bar{v} + \bar{a}$	$\bar{v}_F = \bar{v} + \bar{a}$	$\bar{v}_F = \bar{v} \pm \bar{a}$	$\bar{v}_F = -\bar{a} + \bar{v}$
$F = 0 \leftrightarrow$	$F = m \cdot a \rightarrow$	$F = m \cdot a \uparrow$	$F = m \cdot a \downarrow$	$F = m \cdot a \backslash$

- 1 $\bar{v} = \text{constant}$, acceleration $\bar{a}, = 0$, Final velocity $\bar{v}_F = \text{Initial } \bar{v} + 0 = \bar{v}$, Force $F = 0$
- 2 \bar{v} changes to \bar{v}_F , acceleration $\bar{a}, = \bar{a} \parallel \bar{v}$, Final velocity $\bar{v}_F = \text{Initial } \bar{v} + \bar{a}$, Force $F = m \cdot |\bar{a}|$
- 3 \bar{v} changes to \bar{v}_F , acceleration $\bar{a}, = \bar{a} \parallel \bar{v}$, Final velocity $\bar{v}_F = \text{Initial } \bar{v} + \bar{a}$, Force $F = m \cdot |\bar{a}|$
- 4 \bar{v} changes to \bar{v}_F , acceleration $\bar{a}, = \bar{a} \perp \bar{v}$, Final velocity $\bar{v}_F = \text{Initial } \bar{v} \pm \bar{a}$, Force $F = m \cdot |\bar{a}|$
- 5 \bar{v} changes to \bar{v}_F , acceleration $\bar{a}, = \bar{a} \backslash \bar{v}$, Final velocity $\bar{v}_F = \text{Initial } \bar{v} - \bar{a}$, Force $F = m \cdot |\bar{a}|$.

3.. Examples :

3.1.. Force instantly exerted to velocity vector \equiv wavelength as $<$ by changing of speed $>$

Using equation (2) for Force $F = m \cdot \ddot{x} = m \cdot d^2x/dt^2 = -m \cdot v_0 \cdot w^2 \cdot \sin(wt + \pi) = -(2a/\lambda) \cdot \bar{x}$ and from [27]
Critical damping in Spaces happens when characteristic equation $2 \cdot [\sqrt{(2a/\lambda m)}]$ is in damping limits

1.. $2 \cdot [\sqrt{(a/\lambda m)}] = (\sqrt{\lambda^2 m / 2a})$, $2 \cdot \sqrt{(a/\lambda m)} = 2 \cdot \sqrt{\lambda}$ and then $2a/\lambda m = 2\lambda \rightarrow a = m \cdot \lambda^2$

2.. $2 \cdot [\sqrt{(a/\lambda m)}] = (\sqrt{\lambda m / 2})$, $2 \cdot \sqrt{(a/\lambda m)} = 2 \cdot \sqrt{a}$ and then $2a/\lambda m = 1 \rightarrow m \cdot \lambda = 1$

3.. $2 \cdot [\sqrt{(a/\lambda m)}] = (\sqrt{\lambda m^2 / 2a})$, $2 \cdot \sqrt{(a/\lambda m)} = 2 \cdot \sqrt{m}$ and then $2a/\lambda m = 2m \rightarrow a = \lambda \cdot m^2$

and for compatibility $a = \lambda$, $a = \lambda = m$, $a = m$ and $F_c = (2a/\lambda) \cdot x = 2(2\lambda/2) = 2 \cdot \lambda$ i.e

The critical acceleration (ac) happens when Force velocity vector $|F| = 2 \cdot |\lambda|$

Higgs Boson and Gravity : (Preliminaries)

1nm = 1⁻⁹ m, 1T = (T) = 1¹², 1Hz = s⁻¹, 1N = Kg m/s², 1Pa = N/m², 1J = Kg m²/s² = Nm = Pa.m³ = Ws = CV = 1J = 10⁷ erg = 6,2425.10¹⁸eV.s = 0,239cal.s = 2,39.10⁻⁴ Kcal.s = 9,478 . 10⁻⁴BTU = 2,7778.10⁻⁷ KW.h = 2,7778.10⁻⁴Wh = 9,8692.10⁻³atm = 11,1265 .mass-energy = 10⁻⁴⁴ Foe, 1W = J/s = Kg m²/s³ 1C = sA, 1V = W/A = Kg m²/As³, 1Cal = 4,184J = 2,611.10¹⁹.Ev = 1,163.10⁻⁶ KWh = 0,003964 BTU, 1eV = 1,603.10⁻¹⁹J, (1eV/c²) = 1,793.10⁻³⁶ Kg, 1J = N.m = Pa.m³ = W.s = C.V, W = Watt, V = Volt, (1V/m) = (m.Kg.s⁻³.A⁻¹) = (Kg m²/s²) = (1J/Ams), C = Coulomb, c = 3.10⁸ (m/s), $\lambda = 4,5 \cdot 10^{-7}$ (m), h = 4,1357 .10⁻¹⁵ (eV.s) = 6,625.10⁻³⁴ (J), E = 2,15eV = 3,44.10¹⁹ (J), E = hf = hc/ λ = 1,2398/532 green (eV.nm)/(nm) = 2,33 eV.

In SI system : mass = eV/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) . (2998.10⁵ m/s) / (λ (nm)) = 1239,8 / λ [eV.nm/nm], Momentum $\Lambda = p = (1GeV/c) = [(1.10^9).(1,603.10^{-19} C).V] / [2,998.10^8 m/s] = 5,347.10^{-19} Kg m/s$.

hc = 1,99. 10⁻²⁵Jm.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 = 3,31.10¹⁹J = 6,626.10⁻³⁴ Kg/s.

Electromagnetic spectrum regimes is: Energy E =10⁷eV/c², Frequency f =10²¹ Hz/s, Wavelength λ =10⁻¹³ m

$E = 2,33 \text{ eV} = 2,33.[1,603.10^{-19} \text{ J}] = 3,73 \cdot 10^{-19} \text{ J}$.

Mass of $m_H = 125,3 \text{ MeV} \cdot (1\text{GeV}/1000\text{MeV}) \cdot (1,603.10^{-27}\text{Kg}/\text{GeV}) = 2.10^{-28} \text{ Kg}$

Momentum $\Lambda = p = (1\text{eV}/c) = [(1,603.10^{-19} \text{ C}).V] / [2,998.10^8 \text{ m/s}] = 5,347.10^{-28} \text{ Kg m/s}$.

Smallest acceleration (ac) = $2 \cdot |\lambda| = 2 \cdot 10^{-16} \text{ m/s}^2$, For gamma rays.

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 and also can pass through any intervening matter and that of photon without being scattered significantly, so is produced from the rotating energy $E = \Lambda \lambda$. Acceleration is involved in Rotational Ellipsoid, radiated away by losing angular momentum \mathbf{rmv} and conserved as momentum \mathbf{mv} where emission of linear momentum creates vector \bar{v} of generalized mass \mathbf{M} .

Using formula $\ddot{x} = -v_0 \cdot w^2 = a$ then $w^2 = a / v_0$ and for gravity on earth and on Planck horizon

$w_e = \sqrt{[2 \cdot 10^{-15} \text{ m/s}^2] / [9,8]} = 1,43.10^{-8} \text{ Hz}$, $w_h = \sqrt{[2 \cdot 10^{-15} \text{ m/s}^2] / [3 \cdot 10^{-8}]} = 2,58.10^{-8} \text{ Hz}$

max.m of photon $m_p = 10^{-14} (\text{eV}/c^2) = 10^{-14} (1,793 \cdot 10^{-36} \text{ Kg}) = 1,793.10^{-50} \text{ Kg}$.

velocity of photon $v_p = c = 3.10^8 \text{ m/s}$

momentum $m_p \cdot v_p = 5,4.10^{-42} \text{ Kg.m}$, and since the new quantized monad $ds < r/2$ then for Gravity,

$\lambda_g = 2.10^{-15} \text{ m}$ and the total rotational Energy,

$\Lambda_g = 2 \cdot r \cdot mv = 2 \cdot 10^{-15} \cdot 5,4 \cdot 10^{-42} \text{ Kg.m/s} = 10^{-56} \text{ Kg.m/s}$ and mass m

$m_g = (\Lambda / \lambda_g) = 5.10^{-40} \text{ Kg}$, $v^2 = \Lambda/m = 10^{-56}/5.10^{-40} = 2.10^{-15} = 20.10^{-16} \text{ m/s}$,

$\bar{v}_g = 4,47 \cdot 10^{-32} \text{ m/s}$ velocity, and frequency

$f_g = (4 \cdot \Lambda) / (m \lambda^2) = (4 \cdot 10^{-56}) / (5 \cdot 10^{-40} \cdot 4 \cdot 10^{-30}) = 2 \cdot 10^{13} \text{ Hz}$

3.2.. Force instantly exerted to velocity vector \bar{v} , from $0 \rightarrow \bar{v}$

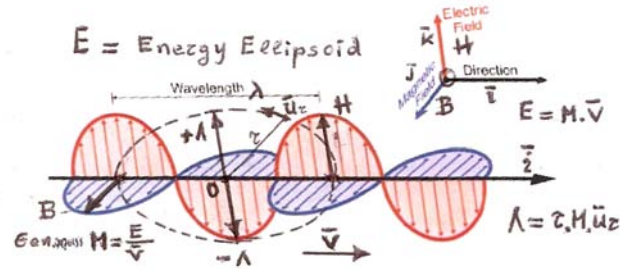
$$\begin{matrix} \lambda \uparrow & \bar{v} \\ \longrightarrow & v \end{matrix}$$

Using Newton's second law for accelerations the length λ is covered with

initial velocity $\bar{v}_i = 0$ and final \bar{v}_f in time t so $\lambda = (1/2) \cdot |\bar{a}| \cdot t^2$, and if in same time $|\bar{v}_i| = |\bar{v}_f| = \bar{v}$ then $\lambda = |\bar{v}|t$.

Substituting $t = \lambda / |\bar{v}|$ then $\lambda = (|\bar{a}| / 2) \cdot (\lambda^2 / |\bar{v}|^2)$ or $2 = |\bar{a}| \lambda / |\bar{v}|^2$ and for $|\bar{v}| = \lambda$ then $2 = |\bar{a}| / \lambda$ or $|\bar{a}| = 2 \cdot \lambda$, i.e. in Electromagnetic Spectrum minimum acceleration is $|\bar{a}| = 2 \cdot \lambda = 2 \cdot 10^{-15} \text{ m/s}^2$ as before.

3.3.. Monad $A \bar{B}$: $A \bar{B} = \text{Work} = \text{Energy} = [\text{PNS}] [\bar{s} \cdot \bar{P}] = \lambda \Lambda = \text{Rotational Energy} = \lambda \cdot (\bar{r} \cdot \mathbf{M} \cdot \bar{u} |\bar{r}|) = S_{\text{pin}}$



(F.3.3)

Monad $\bar{A}B$ 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 $\bar{A}B$ 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 $\bar{z} = [s \pm \vec{n} \cdot \mathbf{i}]$ where $s, |\vec{n}|$ are real numbers and \mathbf{i} the imaginary part such that $\mathbf{i}^2 = -1$. Extending imaginary part to three dimensions $n_1 \mathbf{i}, n_2 \mathbf{j}, n_3 \mathbf{k} \rightarrow \vec{n} \cdot \nabla \mathbf{i}$ then becomes *quaternion* $\bar{z} = [s \pm \vec{n} \cdot \nabla \mathbf{i}] = [s \pm \vec{n} \cdot \mathbf{i}]$. Conjugation of $\bar{z}_0 \odot \bar{z} = [\lambda, \pm \Lambda \cdot \nabla \mathbf{i}] \odot [s, \vec{n} \cdot \nabla \mathbf{i}] = \lambda s - \Lambda \vec{n} \cdot \nabla \mathbf{i}, \lambda \vec{n} - \Lambda s - \Lambda \times \vec{n}$ with Norm $\sqrt{(\lambda s - \Lambda \vec{n} \cdot \nabla \mathbf{i})^2 + (\lambda \vec{n} - \Lambda s - \Lambda \times \vec{n})^2}$ and for $\vec{s} =$ velocity $\vec{v}E$. then $[|\Lambda|, |\vec{v}|] = m\vec{v}E \cdot \vec{v}E = [m \cdot \vec{v}E \cdot \vec{v}E]$ and $[\Lambda \cdot \vec{v} + \Lambda \times \vec{v}] = [\Lambda \cdot \vec{v}_B + \Lambda \times \vec{v}_B] = [\Lambda \cdot \vec{v}_B + \Lambda \times \vec{v}_B]$ meaning that Norm = *The Total Energy State of any quaternion*, as [25].

$$E_T = \sqrt{[m \cdot \vec{v}E \cdot \vec{v}E]^2 + [\Lambda \cdot \vec{v}_B + \Lambda \times \vec{v}_B]^2} = \sqrt{[m \cdot \vec{v}E \cdot \vec{v}E]^2 + T^2} = \sqrt{[m \cdot \vec{v}E \cdot \vec{v}E]^2 + |\sqrt{p_1 v_{B1}}|^2 + |\sqrt{p_2 v_{B2}}|^2 + |\sqrt{p_3 v_{B3}}|^2} \dots (3.3)$$

and for any w power, as the Spaces are, then Spaces exponential equation is, $(\bar{z}_0)^w$

$$(\bar{z}_0)^w = (\lambda, \Lambda \cdot \nabla \mathbf{i})^w = |\bar{z}_0|^w \cdot e^{\Lambda [\vec{n} \cdot \nabla \mathbf{i}]} = |\bar{z}_0|^w \cdot e^{\Lambda \{ [\Lambda \cdot \nabla \mathbf{i} / \sqrt{\Lambda \cdot \Lambda}] \cdot [\text{ArcCos}(w|\lambda|/2 \sqrt{z'_0} \cdot \bar{z}_0)] \}} \dots (3.4)$$

[PNS] is quantized in the three Regions k_1, k_2, k_3 as Monads $\cup \cup$ with the \bar{s} boundaries

$$k_1 = [A^-B] = \text{Work} = \text{Energy} = [\text{PNS}] [\bar{s} \cdot P^-] \text{ with } \bar{s} < 1,616 \cdot 10^{-35} \text{ m}$$

$$k_2 = [A^-B] = \text{Work} = \text{Energy} = [\text{PNS}] [\bar{s} \cdot P^-] = \lambda \Lambda = \text{Rotational Energy} = \lambda \cdot (\vec{r} \cdot M \cdot \vec{u} |r|) = \text{Spin}$$

$$1,616 \cdot 10^{-35} \text{ m} < \bar{s} > 1,616 \cdot 10^{35} \text{ m}$$

$$k_3 = [A^-B] = \text{Work} = \text{Energy} = [\text{PNS}] [\bar{s} \cdot P^-] \text{ with } \bar{s} > 1,616 \cdot 10^{35} \text{ m}$$

Conservation laws for the two quantized magnitudes $\bar{s} = \lambda, P^- = \Lambda$ of displacement λ and Rotational Energy Λ valid for all monads $A_i B_i$ of the three Regions *without any - BING BANG - existing*.

i.e, *The Norm of any Quaternion with a real vector $\bar{s} = |\vec{v}| =$ (velocity vector) and a rotational Energy vector $|\Lambda|$, is the total Energy embodied in quaternions as in (3.3). Work is embodied in Dipole Monad A^-B as $W = [\bar{s} \cdot P^-] = [\lambda, \Lambda]$ and dissipated as Energy $E = [P^- \bar{s}] = [M \cdot \vec{v}]$ in dipole vectors $\rightarrow \bar{s} = [|\vec{s}| \pm \vec{\kappa} \cdot \nabla \mathbf{i}]$ where, $M =$ Lagrange's generalized mass, $S =$ The Spin $= (\Lambda = \vec{r} \cdot M \cdot \vec{u} |r|)$ of the rotational Energy, $\vec{r} =$ The radius of Ellipsoid, $\vec{u}_r = \vec{w}_r \cdot \vec{r}$ is The rotational velocity vector in the perpendicular (\perp) to Λ vector plane, $\vec{w}_r = 2\pi \cdot f$ is the angular velocity, $f = 2\pi/T$ frequency ... [22-25]*

From [22]

Quaternion : $\bar{z} = s + \vec{v} = [s + \vec{v} \cdot \mathbf{i}] = s + [v_1 + v_2 + v_3] \cdot \nabla \mathbf{i} = [s + \vec{v} \cdot \nabla \mathbf{i}]$, where s is the Scalar part and $\vec{v} = [v_1 + v_2 + v_3]$ the Imaginary part of it, equal to $\vec{v} \cdot \nabla \mathbf{i}$.

Decomposition of \bar{z} into exponential form is $\bar{z} = [s + \vec{v} \cdot \nabla \mathbf{i}] = |\bar{z}| \cdot e^{\Lambda(\theta/2) \cdot \vec{u} \cdot \nabla \mathbf{i}} = \sqrt{z} \bar{z} \cdot [\cos(\theta/2) - \vec{u} \cdot \sin(\theta/2)]$

where $\theta = \text{ArcCos}(s / |\bar{z}|)$, is the rotation angle and $\vec{u} = (\vec{v} \cdot \nabla \mathbf{i}) / (|\bar{z}|)$ is the rotation unit axis ($\vec{u} = -1$)

where Unit axis $\vec{u} = e^{\Lambda(\theta/2)} = \cos(\theta/2) - \mathbf{i} \cdot \sin(\theta/2)$ called also Rotor and $\bar{z} = e^{\Lambda \vec{u} \cdot \nabla \mathbf{i}}$ the Translator.

If \vec{u} is Unit quaternion then $\vec{u} = [s + \vec{v} \cdot \nabla \mathbf{i}] = \cos\phi + \sin\phi \cdot \nabla \mathbf{i}$ where $\phi = \text{ArcCos}(s)$, $s^2 + v_1^2 + v_2^2 + v_3^2 = 1$ and vector $\vec{v} = [v_1 / \sin\phi + v_2 / \sin\phi + v_3 / \sin\phi]$ and exponentially $\vec{u} = e^{\Lambda(\theta/2) \cdot \vec{u} \cdot \nabla \mathbf{i}} = \cos(\theta/2) + \sin(\theta/2)$ Euler's formula for complex numbers is $e^{\Lambda(s + \mathbf{i} \cdot v)} = e^{\Lambda(s)} \cdot e^{\Lambda(\mathbf{i} \cdot v)} = e^{\Lambda(s)} \cdot [\cos \cdot v + \mathbf{i} \cdot \cos \cdot v]$.

Quaternion Conjugate : $\bar{z}' = s - \vec{v} \cdot \mathbf{i} = s - [v_1 + v_2 + v_3] \cdot \nabla \mathbf{i} = s - \vec{v} \cdot \nabla \mathbf{i}$, which is defined by negating the vector part of the quaternion.

$$\text{Quaternion Conjugation : } \bar{z} \cdot \bar{z}' = (s + \vec{v}) \cdot (s - \vec{v}) = s^2 - \vec{v}^2$$

Quaternion magnitude : The magnitude (Norm) is defined by $|\bar{z}| = \sqrt{\bar{z} \cdot \bar{z}'} = \sqrt{s^2 + |\vec{v}|^2} = \sqrt{s^2 + |\vec{v} \cdot \nabla \mathbf{i}|^2}$, and for two $\bar{z}_1, \bar{z}_2 \rightarrow |\bar{z}_1, \bar{z}_2| = |\bar{z}_1| \cdot |\bar{z}_2| = (\sqrt{z_1} \bar{z}_1') \cdot (\sqrt{z_2} \bar{z}_2') = (\sqrt{s_1^2 + |\vec{v}_1|^2}) \cdot (\sqrt{s_2^2 + |\vec{v}_2|^2}) =$

$$(|s_1|^2+|\bar{v}_1|^2).(|s_2|^2+|\bar{v}_2|^2) = [\sqrt{s_1^2+|\bar{v}_1\nabla i|^2}].[\sqrt{s_2^2+|\bar{v}_2\nabla i|^2}]$$

The Normalized (the versor) $\bar{z}v = \bar{z} / |\bar{z}|$, and the Inverse is $\bar{z}^{-1} = \bar{z}' / |\bar{z}'|^2 = \bar{z}' / (s^2+|\bar{v}\nabla i|^2) = \bar{z}' / (s^2+|\bar{v}\nabla i|^2)$

$\lambda \cdot \Lambda = \text{constant for all dipole } \lambda$, and since λ is constant Λ is also constant, and from equivalent formula of $\Lambda = \bar{L} = \bar{r} \times p = I.w = [\lambda.p] = \bar{r}.(P.\sin\theta) = P.\bar{r} \sin\theta = \text{constant} \rightarrow \text{Spin of } \lambda$.
so the infinite dipole $A^B,(\lambda.p) = A^B,(\lambda.\Lambda)$ in Primary Space [PNS] are quaternion as ,

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

where

$\lambda = \text{the length of dipole (wavelength) which is a scalar magnitude}$,

$\Lambda = \text{the spin (S) of dipole , equal to the angular momentum vector } p = \bar{L}$ and exponentially

$$\bar{z}_o = [s , \bar{v}_n.\nabla i] = [\lambda , \pm \Lambda^{\cdot}.\nabla i] = [\lambda , \pm \bar{L}^{\cdot}.\nabla i] = | \bar{z}_o | . e^{\Lambda} [\text{arc.cos}|\lambda/\bar{z}_o| , [\Lambda^{\cdot}.\nabla i / |\Lambda|]] = | \bar{z}_o | . e^{\Lambda \theta} . \Lambda \nabla i$$

The conjugate quaternion is $\bar{z}'_o = (\lambda , + \Lambda^{\cdot}.\nabla i) (\lambda , - \Lambda^{\cdot}.\nabla i) = [\lambda^2 - |\Lambda|^2]$

Repetition quaternion is $\bar{z}_{o1} = (\lambda , + \Lambda^{\cdot}.\nabla i) (\lambda , + \Lambda^{\cdot}.\nabla i) = [\lambda^2 + |\Lambda^{\cdot}|^2 + 2.\lambda x \Lambda^{\cdot}.\nabla i] = [\lambda^2 + \Lambda^2] = [\lambda^2 + (i^2+j^2+k^2) |\Lambda^2|]$ since $\lambda , \Lambda^{\cdot}$ are \perp axially.

In Polar form $\bar{z}_{o1} = (\lambda , \Lambda^{\cdot}.\nabla i) = | \sqrt{\bar{z}'_o} . \bar{z}_o | e^{\Lambda} \{ \text{ArcCos} (\lambda / | \sqrt{\bar{z}'_o} . \bar{z}_{o1} |) \} . \Lambda^{\cdot}.\nabla i / \sqrt{\Lambda^{\cdot}.\nabla i}$

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 \bar{v} :

The quaternion equation is $\mathbf{E} = |F|.|\bar{s}+d\bar{s}| + Fx|\bar{s}+d\bar{s}| = \bar{v} + 0 = \bar{v} = |F|.|\bar{s}+d\bar{s}|$ because $\mathbf{F} \parallel \mathbf{s}$
i.e. Energy \mathbf{E} is dissipated into velocity vector $\bar{v} = |F|.|\bar{s}|$ as $|F| = \text{Force} = (M.\bar{s})$ and \bar{s} , where ,

$|\bar{s}| = \text{The distance (Norm) of monad (which is the absolute distance in PNS frame)}$,

$(M.\bar{s}) = \text{The meter to the reaction of change of vector } \bar{v} \text{ (Lagrange's generalized mass)}$,

$\bar{v} = \text{Velocity vector} = (ds/dt).dt = E / [M.\bar{s}] = E / [(\Lambda / \bar{r}.\bar{u}_r)] = E . (\bar{r}.\bar{u}_r) / \Lambda$

and for $\mathbf{F} \perp \mathbf{s}$ then Norm $E = \Lambda . \bar{v} = (\bar{r} . M . \bar{u} |r|) . \bar{v} = (\bar{r} . M . \bar{w}_r . \bar{r}) . \bar{v} = M . \bar{r}^2 . \bar{w}_r . \bar{v}$

$\bar{w}_r = \text{The angular velocity of the radius } \bar{r} \text{ of Ellipsoid of rotational motion .}$

$\bar{r} = \text{The radius } \bar{r} \text{ of Energy Ellipsoid .}$

$dt = \text{The meter of the changes of displacement } d\bar{s} .$

Let infrared Photon travelling with a velocity vector $|\bar{v}| = 3.10^8 \text{ m/sec}$ carrying an amount of energy $\mathbf{E} = 22,97.10^{28} \text{ Kgm/s}$.

In this case Monad $A^B = \bar{s} = \bar{v}$, 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 $\mathbf{M} = \mathbf{E} / |\bar{v}| = 22,97.10^{28} / 3.10^8 = 7,6566.10^{36} [\text{Kg.m.s} / \text{s.m}] \text{ Kg}$ which is generated from the total energy \mathbf{E} and kinetic energy of \bar{v} .
- 2...From Pauli equation for Spin $\mathbf{S} = h.\sqrt{s.(s+1)} / 2\pi$, and for $s=1$, $\mathbf{S} = 6,626.10^{34} \times 1,4142 / 6,28 = 1,492.10^{34} (\text{e.V.s}).(1,603.10^{19} \text{J}) = 2,39167.10^{53} \text{ J.s}$, the maximum quantity of rotating Energy \mathbf{S} .
- 3...When $|\bar{v}|=0$, mass \mathbf{M} is damped (*conserved by the changing of Spin*) on the new rotating energy vector $\Lambda = \bar{r}.M.\bar{u}_r$, (as Electric field $H^- = E/c$ and Magnetic field $B^- = E / c$) which is mapped as velocity vector \perp to Λ as $\bar{u}_r = \Lambda / (\bar{r}.M) = \mathbf{S} / (\lambda/2.M) = 2,391676.10^{53} / (1,148.10^9.10^{36}) [\text{Kg.m}^2/\text{s} / (\text{m.Kg})] = 2,08366.10^{26} \text{ m/s}$ and since $\mathbf{S} = \Lambda = \bar{r}.M.\bar{u}_r = \bar{r}.M.(\bar{w}_r . \bar{r}) = (M.\bar{r}^2) . \bar{w}_r$, then angular velocity $(\bar{w}_r) = \Lambda / (M.\bar{r}^2) = 22,97.10^{28} / [17,22.10^8] = 1,333.10^8 \text{ (m/s)}$.

In a reference system $(i^-,j^-,k^-) \equiv (x,y,z)$ $B^- \parallel -k^-$ Magnetic magnitude $B^- = E / c$ and Electric magnitude field $H^- = E/c$. After period $T = 1/f$, where vector $|\bar{v}|=0$, Energy \mathbf{E} is damped in the two perpendicular Electromagnetic fields $H \perp B$, which fields map on $\bar{x}^- \rightarrow i^-$ direction axis , $\perp \bar{u}_r$, as the new velocity vector equal to the initial $|\bar{v}| = \sqrt{|\mathbf{vE}^2 + \mathbf{vB}^2}$ [25] . Velocity \mathbf{vE} . becomes from Electrical field and velocity \mathbf{vB} - from Magnetic field .

Since total work $W = [\bar{s}.P] = \lambda.\Lambda = \text{constant}$ therefore , for temperature also which is a type of Energy, exists Temperature x Wavelength = constant or \mathbf{T} (Kelvin). λ (m) = \mathbf{C} (Kelvin) = $31,835.10^{12} \text{ K}$

For Thermal Energy units Work is in $J = 1 \text{ Kg.m}^2/\text{s}^2$, Thermal work 1 cal = 4,184 J ,energy content $q = m.cq.T$
For Sun data $m = 1,989.10^{30} \text{ Kg}$,Specific heat for core $cq. = 6.10^{14} \text{ J/Kg.K}$,Temperature $T = 15,6.10^6 \text{ K}$
Total energy produced $E = 6.10^4 (\text{J/Kg}).1,989.10^{30} \text{ Kg} = 11,9.10^4 \text{ J}$.i.e. a correlation of all types of energy

3.3.2.. Acceleration \bar{a} :

4.. Spaces of Monad $A^{-}B$:

Since Spaces , anti-Spaces $\{z^w, -z^w\}$ and Subspaces $\{\sqrt{z}\}$, 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 $\bar{A}B$ complex exponential dualities w, n where $w \cdot n = 1$, 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 $\rightarrow \log.w(1=w.n) = \log.w(w)+\log.w(n=1/w) = 1+1/w = 1+n$ which is the base of natural logarithms e and since $1= w.n$ then $\rightarrow (1+n)^w = (1+1/w)^w = \text{constant} = m = e$ which is independent of any Space and coordinate 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 $\bar{A}B$ which is a complex number z , on the constant base.

Since $\int ds/s = \ln(s) + C$ and $d/ds[\ln(s)] = 1/s$ then $\int ds/s = (1/s) / (d/ds) = 1 = w.n$.

Spaces of $(AB) = \text{Exponential } q \rightarrow e^{\Lambda}(q) = e^{\Lambda}(r, \bar{r}) = e^{\Lambda}|r|$. $[\cos\|r\| + \bar{r}/\|r\| \cdot \sin\|r\|]$, Natural Ln of $q \rightarrow = \ln\|q\| + (\bar{r}/\|r\|) \cdot \text{ArcCos}(\bar{r}/\|r\|)$, and the ,w, Power decomposition of $q \rightarrow q^w = |q|^w \cdot e^{\Lambda(w\theta)} = |q|^w \cdot (\cos.w\theta + \bar{a} \cdot \sin.w\theta)$.

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 $[A]$ which is bounded in the three constant Energy Layer States $k_{1,2,3}$. This Energy is mapped on the perpendicular to A plane as velocity \bar{v} which creates Newton smallest equilibrium accelerations $(\bar{a}_f + \bar{a}_p = 0)$ from Centrifugal (F_f) and Centripetal (F_p) forces . This rotating energy $E = \Lambda \lambda$ is transformed into the Acceleration a and Rotational Ellipsoid , and radiated away , by losing angular momentum $E = r m v r$ and conserved as momentum $E = m v$ where emission of linear momentum creates vector \bar{v} 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 the 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 interchanged on dipole $A^{-}B = (\lambda, \Lambda = mv)$ in the Configuration of co variants λ, m, \bar{v} as ellipsoid in the two perpendicular fields $E = \nabla \cdot A$ and $B = \nabla \times A$ following conservation laws only .

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 \rightarrow

$$E_T = \sqrt{[(k/\lambda\bar{v}) \cdot \bar{v}E]^2 + [\Lambda \cdot \bar{v}B + \Lambda_x \bar{v}B]^2} = \sqrt{[(k/\lambda\bar{v}) \cdot \bar{v}E]^2 + T^2}$$

which is completely refining Time and leaving only $\lambda \cdot \Lambda = k$ which indicates a Space-Energy Universe .

Energy in a vibrating system is either **dissipated into Heat** (temperature) which is **another type of energy** [Energy E as momentum vector $\Lambda \lambda$ is damped on the perpendicular to Λ plane , as it is a Spring-mass System with viscous dumping , **on the basic three covariants** Energy E , Lagrange's generalized mass $M = m$ and velocity \bar{v} with Norm the wavelength λ , and **secondly** on the rotating Energy $\Lambda = \bar{r} \cdot M \cdot \bar{u} r$] or radiated away .

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 \bar{v}) , exists Centrifugal and Centripetal forces which create acceleration and the Oscillatory motion . Since also velocity \bar{v} maybe equal to $0 \rightarrow c \rightarrow \infty$ 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 $\Lambda \cdot \bar{v}B$ with $\bar{v}B >$ greater than that of light) .

4... Light , which is a quaternion is travelling either as wave (photon Λ) either as particle ($M = m \lambda$) and in both cases as , a **travelling Energy** $\lambda \cdot \Lambda = k$ interchanged in the two perpendicular forced fields $E = \nabla \cdot A$ and $B = \nabla \times A$ (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]

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 [Answer] → *but ...*

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 $\bar{A}\bar{B}$ = 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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