Spacetime or, Space-energy Universe

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Abstract: This article is Supplementary of my prior [38], where was shown in, Flow Plan, that Energy-Space universe (the beyond Planck’s length, Gravity’s and Spaces’ levels) is [PNS] Space Anti-Space as work → W = ∫ P. ds = 0, which is the cause of Spaces existence. Also, are Presented the fundamental equations of [PNS], unifying the known homogenous Euclidean geometry (|λ|=λ ∇) and the source term Energy (dS. dP=λ. Λ=constant K1, 2, 3 with motion Λ), and imbedding in them all conservation physical laws with the only two quantized magnitudes λ, Λ on Monad ĀB., i. e. The Space-Energy Universe. Breakages [s²= ± (ω. r)²] in Inertial systems consist [MFMF] Field and [∇i] =2(ω. r)² the Gravity force. Momentum as velocity → [velocity= v(g = the breakage 2(ωr)²], is the cross product of two velocity vectors v1, v2, which form on Medium→ |±(ω. r)²| = |λ| the Intrinsic Electromagnetic Stationary Field →[Electric (E) ┴ Magnetic (P)], following the cycloid motion. Breakages and Particles with velocity, ∇, being the units of matter with Electric charge, q=λm, as their physical property is, when placed in prior referred Electromagnetic Field E┴P, where like charges repel and unlike charges attract, experience a force as Lorentz force, and this is called Gravity- Force, and equal to → Fg = q. [E+vxP] ← where also Gravity- Field → Gf = [E+vxP] ←. Analysis of the, Intrinsic Stationary Electromagnetic wave of particles, and a wide critic in Mechanics and Relativity is added.

Keywords: The Space-Energy Unification, Gravity and Relativity, the Absolute Frames in Nature

1. Introduction

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 it is the only Space and so to exist point A at a second point B somewhere else, point A must move towards 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 this exists the Principle of Virtual Displacements W = ∫ P. ds=0 or [ds. (PA + PB) = 0] i. e. for any ds > 0 Impulse P = (PA + PB) = 0, [ds. (PA + PB) = 0], Therefore, Each Unit AB = ds > 0 exists, by this Inner Impulse (P) and so PA + P B = 0

i. e. The Position and Dimension of all Points which are connected across the Universe and that of Spaces exists, because of this Static Inner Impulse, on the contrary should be one point only ( Primary Point A = Black Hole → ds = 0 and P = ∞).

All points may exist with P = 0 (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 Homogenous, Isotopic and Elastic Medium ) 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 (monads) AiBi = dS, which equilibrium by the Primary Anti-Space by an Inner Impulse (P) at edges A, B where P i A + P i B ≠ 0, and ds = 0 → N → ∞.

Monad (Unit) ĀB is the ENTITY and [A, B – P A, P B] is the LAW, so Entities are embodied with the Laws.

Entity is quaternion ĀB, and law |AB| = length of points A, B and imaginary part forces, PĀ, P B or fields.

By definition i = √-m. 1 and(-m1)² = -1mi. e.
2. Complex Numbers – Quaternion

THE 3 BREAKAGES OF QUATERNION Z

\[ Z = s + v \]

\[ +v \rightarrow s + v \rightarrow s \]

\[ -v \]

\[ + v \]

\[ - v \]

\[ Z = s + v \]

\[ v \rightarrow s \]

\[ s \]

\[ 2sv \]

Fig. 1-2. The Action of quaternion \( Z \rightarrow Z' = [s + 0 \cdot \nabla] Z' = [s + \mp \nabla] Z' = s^2 - |s| \mp |s| \nabla \] on point P (a, x, y, z) is a biaxial ellipsoid equilibrium. In a spherical cave the Biaxial Ellipsoid \( \sigma = \sigma_y \) exists as \( [2sv] \cdot |s| \nabla \] on a, axis plane with the two components \( \nabla = [s + \mp \nabla] \) of \( \nabla = |s| \nabla \).

The work \( W \) of the two opposite dipole \( \vec{A}B, \vec{B}A \) with planes is equal to \( W = n \cdot \nabla \cdot \nabla = \pm \nabla \cdot \nabla = \pm \nabla \cdot \nabla \) which is, the radius and angular velocity \( \psi \rightarrow (\psi) \) which maps velocity vector \( \nabla \), on the perpendicular to, a, axis plane with the two components \( \nabla = [s + \mp \nabla] \) of \( \nabla = |s| \nabla \).

The two opposite biaxial ellipsoid equilibrium.

In a spherical cave the Biaxial Ellipsoid \( \sigma = \sigma_y \) exists as scalar momentum \( L \) and it is a vector parallel to, a, axis.

The work \( W \) of the two opposite dipole \( \vec{A}B, \vec{B}A \) with planes is equal to \( W = n \cdot \nabla \cdot \nabla = \pm \nabla \cdot \nabla = \pm \nabla \cdot \nabla \) which is, the radius and angular velocity \( \psi \rightarrow (\psi) \) which maps velocity vector \( \nabla \), on the perpendicular to, a, axis plane with the two components \( \nabla = [s + \mp \nabla] \) of \( \nabla = |s| \nabla \).

The two opposite biaxial ellipsoid equilibrium.

In a spherical cave the Biaxial Ellipsoid \( \sigma = \sigma_y \) exists as...
\[ [\mathbf{V} i] \rightarrow 2, |s| |\mathbf{w}. \mathbf{r}|, \mathbf{V} i = 2|\mathbf{w}r|, [(\mathbf{w}r)], \mathbf{V} i = 2, (w, r)^2 \rightarrow \text{is a vector of, the velocity vector product, from the cross product of}, \ \mathbf{w}, \mathbf{r} \text{ vectors with double angular velocity term and represents the, Velocity vector product, of quaternion giving}, 1, 3, 5, \text{ spin. i.e.}

In the recovery equilibrium (a surface of a cylinder with 2r diameter), and because velocity vector is on the circumference, the infinite breakages Identify with points A, B, C(of the extreme triangles ABC of Space ABC) and with points AE, BE, CE(of the extreme triangles AE. BE. CE of Anti-Space) all, on the same circumference of the prior formulation and are rotated with the same angular velocity vector \( \mathbf{w} \). The inversely directionally rotated Energy \( \pm \mathbf{A} \) equilibrium into the common circle, so Spaces and Anti-Spaces meet in this circle which is the common Sub-space. Extreme Spaces (the Extreme triangles ABC) meet Anti-Spaces (the Extreme triangles AE. BE. CE), through the only Gateway which is the Plane Geometrical Formulation Mechanism (mould) of the [STPL] line, or as cylinder. [17]

The \( \rightarrow [\text{ Space, Anti- Space equilibrium, } \pm \mathbf{A}, \text{ Absolute System } [S] \leftarrow], \text{ as Angular momentum } \mathbf{A} = \Omega = \text{ m. vr }, \text{ is Crushed out into Fragments and, becoming the three Breakages } [s^2 = (\mathbf{w}r)^2], [-s^2 = - (\mathbf{w}r)^2], [\mathbf{V} i = 2(\mathbf{w}r)^2]. \text{, and after clashed with the velocity vector } \mathbf{v} \text{ of } [S], (\text{unless succeed to escape unclashed through centre O in STPL line and this because } \mathbf{v} = 0), \text{ are Thrown OFF this System } [S], \text{ conveyed into the Linear momentum, the Inertial and Energy-Space, the Relative [STPL] System } [R] \text{ as Particles}

Fermions \( \rightarrow [\pm \mathbf{v}, \mathbf{s}] \text{ and Bosons } \rightarrow [\mathbf{V}, \mathbf{v}]. \)

\[ \text{Fig. 3-3. } \text{DA, DB, DC, } \leftrightarrow \text{ PA, PB, PC } \text{ The Six Triple Points Line [STPL].} \]

Index : DA \( \rightarrow \text{PA = x axis, A} \perp (\text{DA } \rightarrow \text{PA}) = \text{y axis, Positive vorticity } \mathbf{v} \uparrow + \), Negative vorticity (vortices) \( \mathbf{v} \downarrow - \).

Un-clashed Fragments through center O, \( \text{consist the Medium-Field Material-Fragment } \rightarrow [\pm s^2 ] = [\text{MFMF}] \text{ as base for all motions, and Gravity as force } [\mathbf{V} i], \text{ while the clashed with the constant velocity, } \mathbf{c}, \text{ consist the Dark matter } [\pm \mathbf{c}, \mathbf{s}] \text{ and theDark energy } [\mathbf{c}, \mathbf{v}]. \text{ or}

Breakages \( [\pm s^2 = (\mathbf{w}r)^2], [\mathbf{V} i = 2(\mathbf{w}r)^2]. \)

A. \( [\pm \mathbf{v}, s^2] \rightarrow \text{Fermions } \rightarrow [\mathbf{V}, \mathbf{v}] \rightarrow \text{Bosons}

B. \( [\pm s^2] \rightarrow [\text{MFMF}] \text{ Field} [\mathbf{V} i] \rightarrow \text{Gravity force}

C. \( [\pm \mathbf{c}, s^2] \rightarrow \text{Dark matter} [\mathbf{c}, \mathbf{v}] \rightarrow \text{Dark energy}

\rightarrow A. \ [\pm \mathbf{v}, s^2] \rightarrow \text{Fermions } \rightarrow [\mathbf{V}, \mathbf{v}] \rightarrow \text{Bosons}

Thrust \( (\mathbf{v} = \mathbf{w} . r) \) continually acting on the Breakages \( [s^2, \mathbf{v}^2, 2\mathbf{w}], [s| \mathbf{r} | = 2(\mathbf{w} . r)^2] \) produces the \([1-1+2] \), \( \mathbf{w} \), \( \mathbf{v} \) magnitudes (w, r)^2, which is a Positive Scalar magnitude, with Positive or zero electric charge and with, \( 1/2 \alpha > 1 \), spin. [30] [2\mathbf{w}], [s| \mathbf{v} |, \mathbf{V}]

1. Positive breakage Quantity \( [\mathbf{v}^2 = \mathbf{w} \mathbf{x} \mathbf{r}^2 = \mathbf{w} . r]^2 \rightarrow \text{Being at Space points A, B, C then Action magnitudes Q at}

coinciding points DA, DB, DC - PA, PB, PC Produces Leptons and Quarks, and carry them on [STPL] line.

2. Negative breakage Quantity \( [-\mathbf{v}^2 = - \mathbf{w} \mathbf{x} \mathbf{r}^2 = - \mathbf{w} . r]^2 \rightarrow \text{Being at Space points A, B, C then Action magnitudes Q at}

coinciding points DA, DB, DC - PA, PB, PC Produces Anti-Leptons and Anti-Quarks, and carry them on [STPL] line.

3. Positive breakage Quantity \( [2\mathbf{w}], |s| \mathbf{v} |, \mathbf{V} i = 2w, (sr), \mathbf{v} i = 2w, (r^2), \mathbf{V} i = 2w, r^2 w, \mathbf{V} i \rightarrow \text{Bosons, being at Space points A, B, C then Action magnitudes Q at}

coinciding points DA, DB, DC - PA, PB, PC Produces Anti-Leptons and Anti-Quarks, and carry them on [STPL] line.

4. Breakage Quantities \( [s^2 = (\mathbf{w}r)^2], \text{ being at, O, commons’ circle center and shacked OFF into [STPL], and this because of } \mathbf{v} = 0, \text{ formulate the [MFMF] Field, which}

consist the base of all motions .

5. Breakage Quantities \( [\pm \mathbf{c}, s^2] \text{ and } [\mathbf{c}, \mathbf{v}], \text{ the clashed with the constant velocity, } \mathbf{c}, \text{ formulate in [STPL]cylinder Dark}

matter and Dark Energy respectively } .
4. Geometrical Moulds

4.1. Cycloid Motion

\[\text{Breakage } A = (wr)^2 = \text{mass } m\]

\[\text{Force } F = 2(wr) \cdot m = g \cdot m\]

\[\text{Velocity } v = 2wr\]

\[\text{Properties:}\]

Cycloid is the curve described (traced) by a point on the circumference of a circle of radius, \(r\), as this rolls along a straight line without slipping. In an orthogonal coordinate system \((x, y)\) the equations of motion are \(x = r(1 - \cos t)\), \(y = r(\text{sin } t)\) where \(t = \text{time}\).

The area between the curve and the straight line is \(A = 3\pi r^2\) and the arc length \(l = 8r\). Differential equation of the curve 
\[
\frac{dy}{dx} = \frac{y}{2r-y}
\]

is also satisfied.

Motion on a cycloid is such that, as long as a particle moves under gravity, \(g\), then the total period of oscillation is \(T = 4\pi \sqrt{\frac{r}{g}}\) which does not depend on speed of rolling, (Huygens cycloid pendulum). The arc length \(l = 8r\) is completed for faster, as one revolution in less time than the slower one, meaning that, On cycloid all points of \(y\) axis reach \(x-x\) axis at the same time, regardless of the height from which they begin (isochrones). This property is used for breakages to reach STPL line isochrones. Evolutes also of a cycloid are a cycloid itself, (apart from coordinate shift). Velocity vector of a motion is directed along the tangent and is the sum of the velocity vectors of the constituent motion, thus at each point of a cycloid, the line joining that point, to the point that circle is, then at the top of the generative circle is tangent to the cycloid and the line joining point that is to that of bottom (of circle) is normal to the cycloid. [5]

Evolutes of a cycloid is the balancing cycloid, Anti-cycloid.

For trajectory element \(ds^2 = dx^2 + dy^2\) and \(ds = \sqrt{2r(y^2+1)}\) and with a coordinate system \((y=0, s=0)\) then \(C= 0\) and \(s= 2\sqrt{2ry} = 4r \cdot \sin \phi\). (F-4)

Since velocity \(\dot{v}\) is tangent to the point then component \(\ddot{v}\).
\[\text{sin } \phi = s/4\text{rand then equation of motion becomes } - \frac{ds^2}{dt^2} = - \frac{g}{4r}\cdot s\]

which is a harmonic oscillation with total time period \(T = 4\pi \sqrt{\frac{r}{g}}\) which is independent of any amplitude (Displacement, Energy), i.e. On cycloid, all moving points on \(y\) axis reach \(x-x\) axis at the same time (isochrones motion) regardless of the height from which they begin (they do not depend on the oscillation amplitudes), or if, a particle of mass \(m=(wr)^2\) tied to a fix point \(A\) executes a Simple harmonic motion under the action (Thrust) of the tangential velocity \(\ddot{v} = \frac{v}{c}\), and since \(\tau\text{-linear momentum } \vec{p} = \text{Breakage x Velocity}\) \(= (\vec{w} \cdot r)^2\), \(2(\vec{w} \cdot r)^2 = 2(\vec{w} \cdot r = g)\). \((\vec{w} \cdot r)^2 = 2. g\cdot m\), then it follows a cycloids trajectory with a Total time period \(T = 4\pi \sqrt{\frac{r}{g}}\) = \(Rc. \gamma/c\) which is dependent on angular velocity only and it is the Spin of particle \(|AA|\).

Remarks:

Breakage x Velocity = \(mc. \dot{v} = (\vec{w} \cdot r)^2\), \((\vec{w} \cdot r)\) and force

\[F = [(\vec{w} \cdot r)^2, (\vec{w} \cdot r)] = 2(\vec{w} \cdot r)^2, (\vec{w} \cdot r) = 2mg\]

This property is used to show that the wavelength of norm \(\overline{v}\), of vectors\(\vec{v}\), is a Stationary wave, with the two edges as Energy material nodes, Cycloidally carried on wavelength \(|\lambda| = 2|A1-A2|\) twice the norm.

This rolling circle has a constant velocity \(\ddot{v} = \frac{\sqrt{rg}}{2}\)

\[\text{Period } T = \frac{2\pi}{\sqrt{gr}} = \frac{2\pi\sqrt{r}}{\sqrt{g}} = \pi \cdot \sqrt{\frac{r}{g}}\]

Area of moving circle \(A = \pi \cdot r^2 = \pi (2r \cdot \cos \phi)^2 = \pi R^2 \cdot \cos^2 \phi\)
Thrust is the velocity vector \( \mathbf{v} = \mathbf{w} \cdot r \) on the circumference of common circle of the inversely rotating Space, anti-Space becoming from the rotational energy vector \( \pm \Lambda \) of PNS. The wavelength of norm of velocity \( |\mathbf{v}| \) is the static equilibrium position vector of amplitude, \( ds \), of dipole \(|\mathbf{AB}| = |\mathbf{v}| = ds\) and in terms of the static deflection, \( ds \), then \( T = 1/f = 2\pi/w \) where \( ds = z = \mathbf{v} = A. e^{iwt} = \mathbf{v} \cos wt + i \mathbf{v} \sin wt \).

i.e. Breakages acquire different velocities and are following cycloid trajectories, thus, need the same time (isochrones) to reach [STPL] line. Simultaneity is a property of Absolute system and the intrinsic property of vectors and Poinsot’s ellipsoid now becomes \( \mathbf{a} \rightarrow \mathbf{c} \) coordinate system with constant velocity, \( \mathbf{w} \) wavelength of norm of velocity \( |\mathbf{v}| \) is the static equilibrium of \( \mathbf{v}_{\text{fr}} \) becomes \( 2. (wr)^2 \) acting on point \( A \rightarrow 2wr. \mathbf{m} \) of common circle. The same also for points \( A, B, C \) of Space and \( \mathbf{A}, \mathbf{B}, \mathbf{C} \) of Anti-Space. Because all velocity vectors \( \mathbf{A}, \mathbf{B}, \mathbf{C} \) carry material points \( A, B, C \) at points \( D_A, D_B, D_C \) in time \( t \), isochrones, then material points follow a cycloid with period the norm of wavelength of velocities \( |\mathbf{AA}|, |\mathbf{BB}|, |\mathbf{CC}| \).

This Simultaneity is succeeded by Lorentz factor where transformations between Inertial frames that preserve the velocity of light will not preserve simultaneously. The Geometrical expression of this transformation (it is the base Mould, of natural Universe) follows.

4.2. Lorentz Factor \( \gamma \)

Geometry does not need the meter, time, to perform any logic because it is the logic. Motion (quantization of energy) occurs as mould (Tensor) on a geometrical formation, because in motion interferes the meter of time, so material points \( \{ \text{real, imaginary} \} = \{ x, y, z, -\mathbf{V}i = \Lambda = r. \mathbf{m} = r. \cos. wt \} \) acquire different meters of time independently of any system.

Since in, common circle, exist the constant tangential to, \( r \), circle velocities, \( \mathbf{w} \), and on center \( O \) where \( r = 0 \), Coriolis,

Centrifugal and Centripetal forces are present, then the corresponding velocities equilibrium and Centrifugal velocity, \( \mathbf{v}_{\text{fr}} = \mathbf{w} \cdot r \), is a constant, \( \mathbf{c} \), because acceleration \( \frac{d\mathbf{v}}{dt} = \frac{d(\mathbf{w} \cdot r)}{dt} = 0 \) is zero, i.e. constancy exists a Priori in all Inertial Systems and is not needed any other propositions. Breakages \( \{ \pm (w. r)^2 \}, \{ w. r \}\) on circumference \( \rightarrow \) formulate Particles which are exported in STPL line, while on center \( O \) breakages \( \rightarrow \) vanish and exported in STPL cylinder formulating the Rest Medium Field and Gravity force, the Dark matter and Dark energy, as follows.

Consider \( O(x, y, z, c = O, D_A) \) being an Absolute Cartesian coordinate system with constant velocity, \( \mathbf{c} \), due to the tangential velocity \( \mathbf{v} = \Lambda \). \( D_A \) of the same system and \( O(x, y, z', \mathbf{v}) \) being another one Cartesian coordinate system on [STPL] line and as direction \( D_A, P_A \).

And since frequency \( f = 1/T \) and energy \( E = h. f \) then Cycloid motion controls constancy of Energy by changing velocity, \( \mathbf{v} = \mathbf{w} \cdot r \), and period, \( T \), of monads.

Breakage quantity \( 2. (wr)^2 \) under the tangential action \( \mathbf{v} \) becomes \( 2. (wr)^2 \) acting on point \( A \rightarrow 2wr. \mathbf{m} \) of common circle. The same also for points \( A, B, C \) of Space and \( \mathbf{A}, \mathbf{B}, \mathbf{C} \) of Anti-Space. Because all velocity vectors \( \mathbf{A}, \mathbf{B}, \mathbf{C} \) carry material points \( A, B, C \) at points \( D_A, D_B, D_C \) in time \( t \), isochrones, then material points follow a cycloid with period the norm of wavelength of velocities \( |\mathbf{AA}|, |\mathbf{BB}|, |\mathbf{CC}| \).

**Fig. 5-4. The Geometrical expression of Lorentz factor \( \gamma \) where sec. \( \varphi = \gamma = ODA : ADA = \pm 1 / [\sqrt{1 - (v/c)^2}] \).**
v²), and represents the Geometrical expression of Lorentz’s factor, the master key of all universe, and STPL line - cylinder is the Navel Cord of Galaxies.

Remarks:
a. The two velocity vectors \( \vec{v}, \vec{c} \) coincide at \( DA, \) point, therefore, the meter of their changes is the same and equal to \( t, \) and \( \vec{0}, DA = c, \vec{A}, DA = \vec{v}, \) i.e. on constant velocity vector \( \vec{0}, DA \) point O removes from position O to position DA. The same also for point A which removes from position A to DA. This removal is <Isocrones> because the two velocity vectors coincide at edge DA, which means that points O, A of this System remove to point DA at the same time (isocrones), independently of oscillation amplitude on the cycloid.

Since acceleration for quaternion \( z = (s+i\vec{v}), V_i \) is \( a = [d^2z/dt^2] = (d/dt, \vec{w}), (-\vec{w}z, d(zd\vec{x}+wz)) = 0, \) and this because \( \vec{w} = \) constant, therefore velocity \( \vec{v} = \) constant.

When element \( d\vec{x} = \vec{A}, DA = \vec{v}, t = \lambda t, \) constant = \( \vec{c}. \) T then \( ds^2 = dx^2+dy^2+dz^2 = (cT)^2 \) being a spatial equation.

Self-rotation velocity \( V_c = \lambda^2/T = \lambda^2. f = |√1-(v/c)^2|². f = v \) motion of speed consisted of two parts, The one because of the translational and the Energy mechan ism in (1)-(2) directional, plane, into the two orthogonal velocity vectors \( \vec{v} \) and \( \vec{c} \) independent of amplitudes (displacements, or strengths).

Applying all equations of Mechanics and Physics in Common circle (c) of radius \( rc, \) angular velocity \( \omega, \) and for constant velocity \( vc = c \) then, velocity on radius \( is \ \vec{w}. c, \) and for constant velocity \( \vec{v}, \vec{c} = vc² = (wr)². \) and

\[ \text{mass (m)} \to mc. \ \gamma = m \cdot |√1-(v/c)^2|² \] (b)

\[ \text{radius, } rc, \text{ of cycloid helix } \to rc = \Lambda/2\pi. \gamma m. c \] (c)

Since, \( m = \frac{E/c²}{h²/c²} = h/Tc² \) (Einstein’s de Broglie’s), \( Radio \ \text{Radius} \ \text{Re} = 2, \ \text{rc} = 2. √L. γ. \gamma m. c = [h / 2. c. 1 / 2π. c²] = \frac{c}{2. c / 2π. c²} = \frac{c}{2π} \] = \( 2c / w. γ \) [2c² / \( w(c²-v²) \)] and

\[ \sqrt{rc} = c / w. γ \] (d)

\[ \text{Period } Tc = 4π. \sqrt{rc} / \gamma = π. \sqrt{(rc)/g} \] (e)

\[ \text{Where } \lambda = \text{Rotational Energy (Spin)}, \ \vec{v} = \text{Velocity of particle in Inertia System } [R], \ \vec{w} = \sqrt{g. (rc)} = \text{The Rolling circle center constant velocity}, \ \vec{c} = \text{The constant velocity of the System, (of Light)}, \ rc = 2. \ (rc) = \text{The radius of, Cycloid helix}, \ g = \text{Gravity’s force} \to 2. (w²), \text{acceleration }, \]

\[ Tc = \text{The intrinsic Cycloid period, } π√(r \cdot c² / g) = \text{The relation between constancy (c) of Light, Laurence factor (γ), Wavelength (λ = Lc), Cycloid helix rolling circle frequency(γc)→ [39].} \]

5. Beyond Gravity Forces

5.1. Gravity’s Medium Field – Gravity-Force

**GRAVITY’S STATIONARY WAVE - LENGTH**

![Diagram](image)

**Fig. 6-5.** \([ \pm s² \] \to [MFMF] Field, \( \vec{V} \) \) Gravity force. Gravity Transport mechanism in cave \( λ = 10^{-62} \) m and through breakage \( ag = [±(\vec{w}. r)^{2}] \) \( \text{Standing wave } \to \text{as the Medium Field of Material Fragment, [MFMF]} \) \( \to (1)-(2) \).

Properties:

Since, Distance = Velocity. Time, then \( λ = v. T \)

The un-clashed through center, \( O, \) Fragments \( s² = ±(\vec{w}. r)^{2}/\vec{V} \) occupy the minimum quantized space \( |s²| \) and fill all [STPL] cylinder and thus consist the Rest, Homogenous, Isotropic Base of all motions. On this Base moves force \( [2. (\vec{w}. r)^{2}/\vec{V}] \), the rotational Gravity Momentum force and all other clashed
or un-clashed fragments of the cylinder consisting the Relative System [R] to Absolute, Space, Anti-Space, ±, System [S].

Time T interfere with the calculations in reference frame only and does not into the motionless frame. [26]

Since work in [PNS] is \( W = \int A \cdot dS \) = 0 and is stored on points A, B as quaternion \( \tilde{z}_0 = [\lambda, \Lambda \nabla] \) then forces (the spin \( \tilde{A} \)) are conservative and because work from conservative forces points is independent of the taken path and on a closed loop is zero, \( \text{curl} = 0 \) and Force becomes from the Potential function gradient, and also from the equilibrium of Spaces Anti-spaces, where then Spin rotations, \( \tilde{A} - \tilde{A} \), 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 \( \Lambda \) 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 through mould \( \tilde{z}_0 \), so their sum is zero and independently of time (negation truth) as, even function

\[
f(\Lambda) \to \left( \frac{\partial f}{\partial \tau} \right), \nabla \bigotimes (\lambda=0, \Lambda \nabla) = -\nabla, x \Lambda = eo
\]

odd function \( f(-\Lambda) \) → \( \left( \frac{\partial f}{\partial \tau} \right), \nabla \bigotimes (\lambda=0, -\Lambda \nabla) = -\nabla, -\nabla x \Lambda = eo\)

\( e + odd = 0 \to (\nabla \Lambda, \nabla x \Lambda) = [0, 0 + 0] = 0\)

\( e + even = 0 \to (\nabla \Lambda, \nabla x \Lambda) = [-\nabla, -\nabla x \Lambda] = [2, -\Lambda \nabla, \nabla x \Lambda] \) i.e. e. is double.

In Calculus when a function in recognized in terms of the Even and Odd functions then \( x(\tau) = E(\tau) + O(\tau) \). Because an even function \( E(\tau) \) is symmetric about the origin then \( E(\tau) = E(-\tau) \), i.e. cos. wt = cos(-wt) and because an Odd function satisfies the relationship \( O(\tau) = -O(-\tau) \) then sin. wt = -sin(-wt) and then

\[
\int_{t_1}^{t_2} E(\tau) \sin. wt \, dt = 0 \quad \text{and} \quad \int_{t_1}^{t_2} O(\tau) \cos. wt \, dt = 0
\]

Quaternion of the Primary Space dipole is \( \tilde{z}_0 = [s, \tilde{v}, \nabla \nabla] \) is the only one Physical existing truth monad(\( \tilde{z}_0 = 1 \)) and (eo = 0) the only Physical non-existing equilibrium monad, This negation truth = the equilibrium of the two equal and opposite momentum \( p = x \tilde{A} \), on points and by using the additive form of Binary quaternion then

\[
[\nabla \Lambda, 0] + [0, -\nabla x \tilde{A}] = [\nabla \Lambda, -\nabla x \tilde{A}] = 0 \quad i.e.
\]

non-existence(0) becomes existence with [PNS] motionless dynamic mould (\( \tilde{z}_0 = 1 \)), and it is Done everywhere, following Boolean logic operations with all combinational rules and laws, as follows, Element \( [\tilde{z} \circ 1] \) Element \( [eo = 0] \)

Conjugation \( [\tilde{z} \circ 0] \) Quaternion \( [\tilde{z} \circ eo] \to 0 \), \( zo, \tilde{z} \to 0, zo, \tilde{z} \to 0, zo, 0, \tilde{z} \to 0, 0, 0, zo, \to 0 \), so Quaternion’s \( \tilde{z} \circ 0 = [\lambda, \pm \Lambda \nabla] \), \( \tilde{z}_0 = [\lambda \pm \Lambda \nabla] \), eo = \( [\Lambda \nabla, -\nabla x \tilde{A}] \) are the three fundamental equations of [PNS].

unifying the known homogenous Euclidean geometry (\( \nabla \bigotimes \nabla \)) and the source term Energy (\( \text{dS} \cdot \text{dP} = \Lambda \lambda \), \( \lambda = \text{constant} K1, 2, 3 \) with motion \( \Lambda \), and imbedding in them all conservation physical laws with the only two quantized magnitudes, \( \tilde{A} \) on Monad \( \tilde{A} \) which are, \( \Lambda \), the length of geometry primary dipole (wavelength of dipole AB) which is a scalar magnitude, \( \Lambda \) is the spin of dipole, source term, the amount of rotation on dipole \( \tilde{A} \), equal to angular momentum vector \( \tilde{p} = \tilde{A} \tilde{w} \). \( \lambda = m. \tilde{v} = \text{d}/\text{ds} \{[\int_{A}^{B} \cdot P \cdot ds] \}, \) and Time = The conversion factor, \( t \), equal to Zero.

The mechanism of Energy Transport as (\( \tilde{v} \)) through its quantized wavelength \( \tilde{v} = \tilde{v} \). \( T_1 \) is a property of any standing wave, into the Medium \( |\lambda| = (1)-(2), \) and involves the Absorption and Reemission of the wave quantized energy \( J = (J1)=(2) \) by the two neighbor edges (1) and (2) of the medium. The Absorption of energy causes, \( J1 \), within edge (1) to undergo vibrations as \( \frac{\text{ds}1^2}{\text{dt}^2} = \frac{g}{4r} \) which causes a new wave with the same frequency (because \( f = \frac{E}{h} \)) as the first but delaying the motion through the medium until Reemission by travelling, \( J1 \) to \( J2 \), through this small region of space between edges (1) and (2) and once the energy of wave is reemitted by its neighbor edge (2) then mechanism is recycled. This mechanism is succeeded by the intrinsic property of the waves (→ quaternion’s, monads, vectors, Tensors) which is, the Stationary wave nature of Spaces, and works as follows. It was shown in [27] that on dipole \( AB = [\lambda m, \Lambda] \) under the influence of Space Anti-Space forces \( dP = PB-PA \), which are created from forces \( dP/ \) Space lines the Static Field \( E \), from forces \( dP/ \) Space lines the Static Force Field, \( P \), where \( P \perp E \), which then experience on any moving dipole \( AB \) with velocity \( \tilde{v} \), a total force \( F = F \tilde{E} + F \tilde{P} = (\lambda m). \tilde{E} + (\lambda m). \tilde{P} \) which combination of the two types result in a helical motion, with stability demand \( \tilde{E} = (\nabla P) \) which is the alternative conservation of momentum \( \Lambda^2/2m \), in the two perpendicular fields \( E, P \).

In case (\( \lambda m \)) = q then total force \( F = F \tilde{E} + F \tilde{P} \)

\[
q. E + q. \tilde{v} \times P = q. [E + \tilde{v} \times P] \to
\]

which is Lorentz force in the Electromagnetic crossed fields \( E \) and \( P \) 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.

Gravity Force \( F_g \), Gravity field \( G_f \):

Equilibrium of Space Anti-space forces creates energy as velocity vector \( \tilde{v} \) which is decomposed in two cross product velocity vector fields (Electric and Magnetic) into which breakage \( 2(\tilde{w}. r) \) as charge, \( q \), causes the Lorentz force in this small scale [27].

The standing waves in cavity (1)-(2) with the scalar breakage \( |\tilde{E}. \tilde{r}| \) as medium (1)-(2) = |\( \tilde{E}. \tilde{w}| \) Field, and Energy \( |\Lambda x \nabla| = (J1) = 2(\tilde{w} \cdot \tilde{r}) \) as velocity \( \tilde{v} \) only at point
(1), [and this because Work as Force in extreme case where zero area (\(A=0\)) becomes velocity \(\vec{v}\)] need the same time (different velocities and different energy on (1) are isochrones and this because are following cycloidal trajectories in medium (1)-(2) to reach edge (2)). Energy (J1) as velocity vector, \(\vec{v}\), is the cross product of two velocity vectors \(\vec{v}_1, \vec{v}_2\) or ---> \(\vec{v} = \vec{v}_1 \times \vec{v}_2\), with head at point (1) and analyzed, in a perpendicular to (1)-(2) directional, plane, into the two orthogonal velocity vectors \(\vec{v}_1, \vec{v}_2\) which heads are at point (1). Energy J1 is carried to point (2) by following the cycloid motion (1)-(2).

During contracting (shifting), velocity vectors \(\vec{v}_1, \vec{v}_2\), being vectors, undergo vibrations (expand as oscillation) Wave in medium \(s^2 = \pm|\vec{v}\times\vec{v}|\), through the Electric (E) and Magnetic (P) curled fields, following the cycloid motion.

b. Velocity, \(\vec{v}_g\), is binding the Medium, the breakage \((\vec{w} \cdot \vec{r})^2\), through the Electric (E) and Magnetic (P) curled fields, following the cycloid motion.

c. Breakages and Particles with velocity, \(\vec{v}\), being the units of matter with Electric charge, \(q=\lambda m\), as their physical property is. When placed in prior referred Electromagnetic Field E=|P| experience a force as Lorentz’ Force and this is called Gravity equal to \(\vec{F}\) Gravity - Force \(\vec{F}_g = q [E+\vec{v} \times \vec{P}] \leftrightarrow\) and the Homogeneous Gravity – Field \(\vec{G}_f = [E+\vec{v} \times \vec{P}] \leftrightarrow\)

5.2. Dark matter – Dark Energy

C. \((\vec{c}, s^2) \rightarrow Dark matter and (\vec{c}, \vec{v}) \rightarrow Dark energy\)

Thrust \((\vec{v}=\vec{w}, r)\) on circumference of, \(\text{common circle}\), is continually acting on the three Breakages \([\vec{w} \cdot \vec{r}]\), \([-\vec{w} \cdot \vec{r}]\), \((\vec{w} \cdot \vec{r})^2\), producing the fundamental particles

\[\text{Leptons and Bosons}\]

It has been referred that in case Thrust \((\vec{v}=\vec{w}, r)\) is not acting on the Breakages, (it is the case where \(r=0\) where then Thrust \(\vec{v} = \vec{w}, r = 0\) the un-clashed through center \(O\),

\[\text{Fragments } s^2 \rightarrow (\vec{w} \cdot \vec{r})^2 \text{ which occupy the minimum quantized space } s^2\] are deported and fill all STPL cylinder which is the Base of all motions.

Constant velocity \(\vec{c}\) is acting in \([R]\) system only, off the common circle and when acting on Breakages \(\pm(\vec{w} \cdot \vec{r})^2\) produce Dark matter \(\pm\vec{c}, (\vec{w} \cdot \vec{r})^2\) being the opposite in Relative \([R]\) system and this because of equilibrium of masses, and when acting on Breakages \(2(\vec{w} \cdot \vec{r})^2\) produce Dark energy \(2E(\vec{w} \cdot \vec{r})^2\) which is an active force in all Relative parallel frames which are the Inertial frames. Because it is of the same homogenous material, is interacting with gravity only and since is of negative pressure is acting repulsively.

On the same Base, \((\vec{w} \cdot \vec{r})^2 \rightarrow\) moves force \((\vec{w} \cdot \vec{r})^2\) as Intrinsinc Stationary wave in \(\vec{w} \cdot \vec{r})^2\) cavity, and it is Gravity and all other clashed or un-clashed fragments of the cylinder consisting the Relative System \([R]\) to Absolute , Space, Anti- Space, \(\pm \vec{A}\), System \([S]\).

In case that Thrust, \(\vec{c}\), is not acting on the Breakages they are then resting in STPL cylinder and continually existing as \(\text{Field } \pm(\vec{w} \cdot \vec{r})^2\) and force Gravity \(2(\vec{w} \cdot \vec{r})^2\).

Because power of \((\vec{w} \cdot \vec{r})^2\) is 2 so is a homogenous form of repulsively acting energy, not very dense, in STPL cylinder which permeates all of space interacting with gravity only and following acceleration of universe. Because of the velocities retardations (birefringence of STPL) red shifts must be observed at distance. Dark matter \(\vec{c}, (\vec{w} \cdot \vec{r})^2\) having energy density properties defects in STPL cylinder.

5.3. Relative Motion

Because properties in and on [STPL] line are relative to the only one equilibrium and Absolute system \(\pm \Lambda = \tau, m \vec{w}, r = m, \vec{w} \cdot \vec{r} = m \vec{r}^2\), \(\vec{w}\), so exists that called Relativity. As Absolute System let be \([S] = [DA-O]\) and as the Relative (Reference, Affine) System, \([R] = [DA-PA]\).

Relative motion of \([S] = [DA-O], [R] = [DA-PA]\) Systems
Fig. 7-5. Reference System \( \{DA-PA\} = [R](x', y', z', t') \) moves with velocity \( \vec{v} \), parallel to \( x-x' \) axis with respect to the fixed and Absolute System \( \{DA-O\} = [S](x, y, z, t) \).

It was shown (4-1, 2), that in \( \{DA-O\} \), \( x, y, z, t \), System \( c, v \), vectors are isochrones i.e. period \( T = L/V = 2\pi R/V = 2\pi/[c/r(c)] = 2\pi/[v/r(v)] \rightarrow c(r) = v(r) \rightarrow c, r \) where \( r(v), r(c) \) are the radius of their intrinsic rolling circles. This relation is geometrically expressed as sec. \( \phi = \frac{O}{DA : A} \).

Newton’s laws are true into Reference System \( \{DA-PA\} \) Considering \( \{DA-O\}, (x, y, z, t) \), as the fixed frame \( [S] \) of the coordinate system in the Gravity cave (\( d=2r \)) and point \( A(x, y, z) \) is fixed on circle \( (O, OA) \) and is rotating with a velocity \( \vec{v} = \vec{w} \vec{r} \) and of angular velocity \( \vec{w} \vec{r} = 2\pi/T \) where period of rotation, \( T \), is constant also.

Since acceleration for a quaternion \( z = (s + \vec{v} \cdot \nabla) \) is \( \vec{a} = \frac{d^2 z}{dt^2} = (s + \vec{v} \cdot \nabla) \vec{a} \) and \( \vec{a} = 0 + \vec{v} \cdot \frac{d(\vec{w} \cdot \vec{r})}{dt} = 0 + \vec{v} \cdot \frac{d(c)}{dt} = 0 + \vec{v} \cdot \frac{d(c)}{dt} \) and this because \( \vec{w} = \text{constant for both} \), therefore, velocity \( \vec{v} = \text{constant} \), i.e. → Centrifugal velocity of Absolute system \( [S] \) is any constant, \( c \), and thus it is not needed to accept apriori this constancy of velocity \( \vec{v} = 0 \rightarrow \vec{v} \rightarrow \infty \) on circle \( (O, OA) \) to exist in frame, so automatically is defined the conversion factor \( t = \text{time} \), between the conventional time units (second) and length units (meter = A. DA) or as \( c = \frac{r(v)}{r(c)} \) which is happening with the same, \( w \), without any restrictions.

This is why conversion factor, \( t = \text{time} \), has not any essence in all universe but this aim only.

Because [STPL] line of the fixed frame is becoming from this system \( [S] \), then this relative frame \( [R] \) is common to the fixed one (common DA) and let it be \( [R](x', y', z', t') \).

From figure F. 7-5, \( \sin \phi = (\vec{v} \cdot \vec{c}) \) meaning that the Relative system, \( [R](x', y', z', t') \), (Affine Frame) is the projection of Absolute Frame \( [S] = \{DA-O\} - (x, y, z, t) \) where exists as Simultaneity for all motions, i.e.

\[
[R] = \{DA-A\} = [(x', y', z', t')] = [S] = \{DA-O\} = (x, y, z, t). \gamma
\]

Considering point DA as the common center and [STPL] as the x-x axis of the two systems, then becomes \( DA(x, y=y', z = z', t) \) and for all linear systems \( DA(x', y'= y, z '= z, t') \) respectively.

This specific state of constancy, i.e., the Centrifugal velocity of Absolute system \( [S] \) to be a constant, \( c \), and the rectilinear motion with respect to one another, defines the natural Inertial frames, uniformity of Space and motion and the same meter of their changes (Time).

Since points \( O \), \( A \) remove to point DA isochrones by their intrinsic property motion, which is → wavelengths are a Stationary wave ↔, following Lorentz's factor, \( \gamma \), then this following, happens also to all frames which make this motion, and so issues \( \{DA-0\} = \gamma \cdot \{DA-A\} \) (F. 5-4)

On this system \( DA(x', y'= y, z = z, t') \) are conveyed, the Breakages \( [\pm (wr)², 2(wr)²] \) of \( (O, OA) \) circle after the colliding with the rotating velocity \( \vec{v} = \vec{w} \vec{r} \) of \( [S] \) system, and are the fundamental particles, Fermions and Bosons, or by escaping consisting the Rest Field and Gravity, or Dark matter and Dark Energy, as analytically is shown.

Remarks:

a. Material point \( A = \pm |(\vec{w} \cdot \vec{r})| \) of the Fixed System \( \{DA-O\} \) travels with velocity \( \vec{v} \) at point DA, so geometrical distance \( A \) DA in the Relative System \( [R] = \{DA-PA\} \) is \( A \cdot DA = x' + \vec{v} \cdot t' \) and because of the isochrones motion in the Fixed System \( [S] = \{DA-O\} \) it is

\[
x=(x'+\vec{v} \cdot t'). \gamma \quad \text{or} \quad x=(x'+\vec{v} \cdot t'). \gamma = [x' + v \cdot t'] : [\sqrt{1-(v/c)^2}] \quad (5a)
\]

Inversely, using (5a) where \( [S] = \{DA-A\} = \{DA-0\} / \gamma \), then if Material point \( A \) of the Fixed System \( \{DA-O\} \) travels with velocity \( \vec{v} \) at point DA, the geometrical distance \( A \) DA in the Fixed System \( [S] = \{DA-O\} \) is \( A \cdot DA = x - \vec{v} \cdot t \) and in the Relative System \( [R] = \{DA-PA\} \) it is

\[
x' = (x - vt). \gamma = (x - vt) : [\sqrt{1-(v/c)^2}] \quad \ldots \quad (5b)
\]

b. Conversion factor \( t = \text{time} \), between the conventional time...
units (second) and length units (meter) and because of the isochrones motion of vectors \( \vec{c} = \vec{O}, \vec{DA} \) and \( \vec{v} = \vec{A}, \vec{DA} \), then vectors \( \vec{O}, \vec{DA} = c, t \) and \( \vec{A}, \vec{DA} = v, t' \) reach point \( \vec{DA} \) simultaneously. This Geometrically means that conversion factor, \( t \), on, \( c \), is projected on, \( v \), and so,

\[ t \times \sin \phi = t - (v/c) = (1-v/c) \times t / c . \]

From above Question, and because \( w = \text{constant} \) where then Centrifugal velocity \( v \) is also constant and such that velocity, \( c \), is kept the same in two reference frames, valid→

\[ c = x/t = x'/ t' \]
\[ t = x /c, \ t' = x' / c \]

or \( t = (x' + vt) / c, \) \( (\sqrt{1-(v/c)^2}) = (x'/c) + (v/c) \times t' \)

From relation \( t' = (x - vt) / c, \) \( (\sqrt{1-(v/c)^2}) = (t' - (v/c^2)x) / (\sqrt{1-(v/c)^2}) \)

\[ [t(e - (v/c)^2)] : \sqrt{1-(v/c)^2} \]

i.e. equations,

\[ x = (x' + vt'), y = y', z = z', t = t' \]
\[ t = (x - vt), y/c = (t' - (v/c)^2)x] : \sqrt{1-(v/c)^2} \]

\[ y = y', z = z' \]
\[ x' = (x' - vt'), y' = y, z' = z, t' = t' \]

are the known equations of Relativity.

C. For constant velocity \( c = \infty \) equations become

\[ x = x' + v \cdot t', y = y', z = z', t = t' \]

and inversely

\[ x' = x - v \cdot t, y' = y, z' = z, t' = t \]

issuing in [PNS] Spaces.

Breakages \( |wr|^2, - |wr|^2, 2(\vec{w}, r)^2 \), being masses off the system \([S]\), under the Action of the constant velocity \( \vec{c} \), which is not changed, are multiplied by Lorentz factor, \( \gamma \), where then the new masses are,

\[ m' = m \times \gamma = 2m/[(\sqrt{1-(v/c)^2})^2] \]

The embedded energy to Breakages, masses, is as

\[ E = mc^2/2 = (2m/[(\sqrt{1-(v/c)^2})^2]) \times \gamma \]

which is the known formula of Einstein in GR.

c1. For \( t = 0 \) then \( \sin \theta = vt/c \) independently of velocities, \( v, c, \) where sec. \( \phi = \pm (1 - 1/v^2) \) and since \( \sin \theta = vt/c \) at \( c = \infty \) also, then Systems

\[ [S] \rightarrow x' = x' + v \cdot t', y = y', z = z', t = t' \]
\[ [R] \rightarrow x' = x - v \cdot t, y' = y, z' = z, t' = t \]

Momentum \( p = m \gamma \times hK \) and Energy \( E = mc^2/[(\sqrt{1-(v/c)^2})^2] \) possesses the double helix structures (the screw motion).

6. Photo Elasticity

In Photo elasticity, the speed of light (vector \( \vec{v} \)) through a Homogenous and Isotropic material, (transparency, outstanding toughness, dimensional stability, mold ability, very low shrink rate, etc.), varies as a function of the direction and magnitude of the applied or residual stresses.

Light through a Polarizing filter (a Plane cavity of thickness \( L \)) blocks spatial components except those in the plane of vibration, (the norm of stationary wave) and if through a second Plane cavity, then the components of the light wave vibrate in that plane only. Polarized light passing through different Flat caves (stressed material), splits into two wave fronts travelling at different velocities, each parallel to a direction of principal stress but perpendicular to each other.

(This is the Birefringence property of stress material with two
The components of the light waves interfere with each other to produce a color spectrum as this happens in < common circle > .

[Retardation , δ, (1. nm =10⁻⁹) is the phase difference between the two light vectors through the material at different velocities (fast, slow) and divided by the material thickness (L) is proportional to the difference between the two indices of refraction i.e. δ=L/2 - n1 = C. (σ1-σ2) where , σ1, σ2, are the Principal stresses.

Retardation , δ, determines color bands or fringes (A fringe is each integer multiple of the wavelength) where the areas of lowest orientation and stress appear black followed by gray and white and as Retardation and stress(σ) go up then the colors cycle through a more or less repeating pattern and the Intensity of the colors diminishes (decreases).

Because the colors repeat at different levels of retardation and stress, then is tracked as color band sequence from the black (very high energy) or white (very low energy) regions and are repeated periodically following the whole fringe of the colors, as Black Gray, Violet [ f=668-789THz and λ=380-450nm], Blue≡ [ f = 606-668THz and λ=450-495nm], Green≡ [ f = 526 – 606 THz and λ=495-570nm] , Yellow≡ [ f = 508 – 526 THz and λ=570-590nm], Orange≡ [ f = 484 – 508 THz and λ=590-620nm], Red≡ [ f = 400 – 484 THz and λ = 620-750nm] as the1st order fringe), Blue-green, -yellow, Orange (dark-yellow), Red, Violet (2nd order fringe ).

Meaning that White light is the Mixture (Diffraction) of all frequencies, a vector with Low energy E = h. f at Red (Red-shift) → low f = 400-484THz, long λ = 620-750nm (Blue-shift) → high f = 606-668THz, short λ = 450-495nm and High energy since E = h. f at Blue.

Wave nature of light is proved by Young’s Double Slit experiment where energy is carried by the dark fringes and Particle nature by Compton’s Photoelectric Effect experiment with energy carried through the emission of electrons.

In this way Light is PARTICLE as Photon, λ = 380-780nm = (3, 8-7, 8). 10⁻¹⁰m and WAVE, as The Stationary Wave in , λ , Meaning that, since Photon is the only Electric Displacement field D = ε. E+B, then in the rate of change is alternately in terms of The Electric field (δE/δt) and The Magnetic field (δE/δt). This is called the Dual Nature of light or Wave-Particle Duality .

Because GR was confined in Planck’s length cavity (clef, slit) of ħ = 1, 054. 10⁻³⁴ Js failed to perceive the infinite cavities of nature being beyond Planck’s level and which are wavelengths, λ, of monads = quaternion = q = [s+ v. Vi ]. [31-36]

Energy confined in a monad [ The inner structure of monads ] is the Stationary wave on the Real part [ |s| = λ = wavelength ] and the Electric Displacement field (F = ε. E + B ), alternately in terms of The Electric field E = (δB/δt) and The Magnetic field B = (δE/δt) (f. 9-7).

Common circle is not empty space because of different angular velocity vector, v = w. r, and because of the malty refractivity and birefringence behaves as crystal with single or double or multi refraction and in the absence of applied Torques produces a color Spectrum which is, the Color Forces → Gluon Red, Gluon Green, Gluon Blue…

Stability is obtained by the opposite momentum – Ā where E = - (6kB) = - (v. B) ↓ → or and B.L.E.

The two perpendicular Static force fields E and Static force field B of Space-Anti-Space, experience on any moving dipole ĀB = [ λ, Λ ] with velocity v (momentum Ā = m. v only is exerting the velocity vector v to the dipole λ) a total force F = F E + F B = (λm). E + (λm). v x B which combination of the two types result in a helical motion and generally to any Space Configuration (the Continuum) extensive property, as Kinetic ( the 3-current motion) and Potential ( the perpendicular Stored curf fields E, B) energy, by displacement (the magnitude of a vector from initial to the subsequent position) and rotation of equation as [25]

The Total Energy State of a quaternion is→ ET = √ [m. vE. ²] + [λ.vB + λ x vB] Σ = √ [m. vE. ²] + (λv2) E + B1|² + |p2. v. B2|² + |p3. vB3|². i. e. a moving Energy cuboids (axbxc), rectangular parallelepiped, with space diagonal length equal to E =√ a²+b²+c ² where→ a=[p1. √vB1], b=[p2. √vB2], c=[p3. √vB3] and when v = 0 then ET = Λ. vB + λ x vB → which is the accelerating removing energy A towards vB is m = 0, and then ET = ΛvB + λ x vB + vB → which is the linearly removing energy A towards vB and for vB = 0, then ET = m. vE. ² → which is the Kinetic energy in Newtonian mechanics towards vE.

6.1. Conclusions

Any moving monad [ z = s + v. w ] is transformed into → 1. In Elastic material Configuration, as Strain Energy and is absorbed as Support Reactions and displacement field [ Vε : ( v, v, w ) ] upon the deformed placement, (where these alterations of shape by pressure or stress is the equilibrium state of the Configuration [26], and equations of Elasticity are, G. v² + ε + [ m. G / (m-2)] [Vε . v] = F ) or in isotropic material [ μ. vE. ² + (λ+μ). Vε. ε] + F = 0. [22-23]

2. In Solid material Configuration, as Kinetic (Energy of motion v ) and Potential (Stored Energy) energy by displacement (the magnitude of a vector from initial to subsequent position) and rotation, on the principal axis (through center of mass of the Solid) as ellipsoid, which is mapped out, by the nib of vector (δF. c) = [ v. c + w. Fn]. δt , as the Inertia ellipsoid [Poinset's ellipsoid construction] in [S] frame which instantaneously rotates around vector axis w, φ with the constant polar distance w, Fe / Fε and the constant angles 0s, 0b, traced on, Reference [R] cone and on [S] cone, which are rolling around the common axis of w vector without slipping, and if Fe, is the Diagonal of the Energy Cuboids with dimensions a, b, c which follow Pythagoras conservation law, then the three magnitudes (J, E, B) of Energy-state follow Cuboids (Cycloid), Plane, or Linear Diagonal direction, and IF Potential Energy is zero, then vector w is on the surface of the Inertia Ellipsoid. [23-27-28].

3. In Quaternion Extensive Configuration, as New Quaternion’s (with Scalar and Vector magnitudes). Points in Primary Space [PNS] carry A priori the work W = [A-B [ P. ds ] = 0, where magnitudes P, dś can be varied leaving work
un altered. The Diffusion (decomposition) of Energy is as the mechanism of Energy Transport as \( \langle \theta \rangle \), through its quantized wavelength \(| \lambda | \), which is a property of any standing wave, into the Medium \(| \lambda | = (1) - (2) \), and involves the Absorption and Reemission of the wave quantized energy \( J = (1) - (2) \) as Electric and Magnetic field of Electric Displacement by the two neighbor edges (1) and (2) of the medium following Cylcoid motion. Operation is the minimum Energy-Space Quanta.

4. In Space conserved Extensive property Continuum (Spatial Configuration), as Kinetic ( 3-current motion ) and Potential (perpendicular Stored curl fields) Energy by Cylcoid motion (the magnitude of wavelength vector \(| \lambda | \), from initial (1) to subsequent position (2), as \(| \lambda | = (1) - (2) \). During shifting Energy as velocity vector, \( v \), (and this because extreme case happens for zero application area ) is decomposed into two velocity vectors \( v_1, v_2 \), being vectors, undergo vibrations which causes two waves that represent the two Electric and Magnetic perpendicular components until reaching point (2) which is the Reemission of the wave and it is the new head of velocity, \( v \), where then mechanism is recycled.

5. The dynamics of any System = Work = Total Energy, is transferred as generalized force \( Q_n = \partial W/\partial(\delta q_n)n \). \( (\delta q_n) \) is the real part, \(|s|\), and the Magnitude of Imaginary part as Vector \( \vec{v} = \vec{V} \cdot \vec{V} \), decomposed into velocity vectors \( v_1, v_2 \). [STPL] cylinder is a Geometrical Mechanism (Mould) which transfers the two Quantities of the breakable monads from one Level (Confinement) to another Level using Quantities or the Breakages of collision between monads. This Mechanism is not the Origin of monads, but it is the Mould (the Regulative Universe Valve). It was shown that Energy-Space (s) and Vector Fields (\( \vec{V} \)) of a frame to a new unit, maps the alterations of Unit by rotation only and transforms scalar magnitudes (particle properties) to vectors (wave properties) and vice-versa, and so, all particle-like properties are both of waves and particles. In Planck Scale, when the electron is being accelerated by gravity which exists in all energy levels as above, gravity is still exerting its force, so Electrodynamics can be derived from Newton's second law. [31-36].

6.2. General Remarks

From breakages \( \rightarrow v \cdot (\vec{w}, r^2) \), \( -v \) \( \cdot (\vec{w}, r^2) \), \( (\vec{w}, r^2) \) on, common circle, are produced Particles \( \rightarrow \) Fermions \( \pm (\vec{w}, r^2) \) and Bosons \( \pm 2 \cdot (\vec{w}, r^2) \) which are conveyed in STPL cylinder. [35]

From the constant velocity, \( \vec{c} \), on centre, \( O, \) of, common circle, are produced \( \rightarrow \) Dark matter \( \rightarrow \) [± c. \( \vec{w}, r^2 \)] and→ Dark Energy \( \rightarrow (\pm 2c)(\vec{w}, r^2) \) in STPL cylinder,

From breakages \( \rightarrow [\pm (\vec{w}, r^2)] \rightarrow Medium Field material \rightarrow \pm (\vec{w}, r^2) \) and the \( \rightarrow \) Gravity force \( \rightarrow [2 \cdot (\vec{w}, r^2)] \). [36]

From, vector analysis, multiplication of a Scalar (s) magnitude and a vector (\( \vec{v} \)) magnitude is \( \rightarrow s \cdot \vec{v} = vector Dot product of two vectors \), \( v_1, v_2 \) yields a scalar

Cross product of two vectors \( v_1 \times v_2 \) yields a vector

Breakage \( (\vec{w}, r)^2 = [\vec{w}, r] \), \( (\vec{w}, r) \) is the massive real part therefore is a scalar magnitude.

Breakage - \( (\vec{w}, r)^2 \rightarrow - (\vec{w}, r) \), \( (\vec{w}, r) \) is the massive energy part therefore is a scalar magnitude.

Breakage 2. \( (\vec{w}, r)^2 = 2(\vec{w}, r) \), \( (\vec{w}, r) \) is a Force acting on the minimum quantized quantity of rotating energy (the Spin), and it is a vector.

Two perpendicular vectors produce zero work and since Dark-energy vector is perpendicular to, Gravity - vector, then Gravity is affecting on all particles except that of Dark-energy

Gravity is affecting on (-) Field-Medium only for the equilibrium of spaces.

Electromagnetic waves are created by the vibration of an electric charge. This vibration creates a wave which has both an Electric and a Magnetic perpendicular component

The mechanism, of Energy Transport through a Medium, involves the Absorption and Reemission of the wave energy by two neighbor atoms (1) and (2) of medium. The Absorption of energy causes the electrons within the atoms (1) to undergo vibrations which creates a new wave with the same frequency (because \( f = E/h \)) as the first wave but delaying the motion through the medium until Reemission by travelling through a
small region of space between atoms (1) and (2) and once the energy of wave is reemitted by its neighbor atom (2) then mechanism is recycled. This mechanism is succeeded by the intrinsic property of waves (= quaternion’s, monads, vectors) which is the Stationary wave nature of spaces.

Breakage ± (\(\vec{w} \cdot \vec{r}\))^2 = s, is the Medium, mediator, filling all Space (STPL cylinder) is massive, massless without viscosity, incompressible and continuous in very small scale, motionless because inactive, without exerting any pressure on other breakages, Homogenous and Isotropic i. e. Breakage ± (\(\vec{w} \cdot \vec{r}\))^2 is a Rest, Neutral, Homogenous and Isotropic material and also the mediator of all fields - changes such that these cannot exceed the constant velocity \(\overline{c}\), on which motions may happen.

Assuming the postulate of Relativity was valid without restrictions, this would imply that all forces of nature must be invariant under Lorentz transformations in order that principle be rigorously and universally true.

Since acceleration for a quaternion \(z = (s + \vec{v}, \vec{v})\) is \(a = [d^2\vec{v}/dt^2] = (d/dt, w). (-wz, dz/dt + wxx) = 0\), and this because \(\vec{w} = \text{constant}\), therefore velocity \(\overline{v} = \text{constant}\)

6.3. Properties of Space-Energy Configuration

1. All universe is Isotropic and Homogenous in all reference frames of points (in spatial and Temporal domain) and work (\(W\)) is quantized on points as spin \(\pm (\vec{p})\) and from this equilibrium of the quantized angular momentum, independently of time, is capable of forming the wave nature of Spaces, following the Boolean logic and distorting momentum \(\vec{p} = \Lambda\) as energy, on the intrinsic orientation position of points, on points of the microscopic and macroscopic homogeneity as \((\partial \vec{v}/\partial t, \vec{w}) \otimes (-\lambda \vec{p}, \vec{v} \times \Lambda) = [0, \Lambda]\).

2. Momentum \(\vec{p} = \Lambda\) on the infinite dipole AiBi with a momentum lever equal to zero(0) or equal to wavelength \(\lambda\) create linear motion, while with a momentum lever \(\neq 0\) creates the rotational motion (Euler, Coriolis, Centrifugal) \(\rightarrow m. [(d^2\vec{v}/dt^2) + m. (d\vec{w}/dt \times \vec{w} + 2\vec{x} \times (d\vec{w}/dt) + \vec{w} \times (\vec{w} \times \vec{f})] where\) momentum \(\vec{p} = m. \vec{w}\) and mass \(m = \text{constant}\) equal to, \(\text{the Reaction to the motion}\), or as Inertia (I) which are a natural property of dipole and both are conserved versa. Forces \(\vec{d}P = \vec{PA} + \vec{PB}\) parallel to the Space, Anti-Space lines \([S]^I[AS]\), create a Static force field \(\vec{B}\), and when Forces \(\vec{d}P\) are perpendicular to the Space Anti-Space lines, create a Static force field \(\vec{E}\), which experience Lorentz force and it is the fundamental interpretation cause of motion, in small and large scales. On all dipole of wavelength , \(\lambda\), and momentum \(\Lambda\), their product \(\lambda. \Lambda = k\ 1, 2, 3\) constant for each energy level. The fundamental force in universe is the total kinetic energy \(T = 1/2m\vec{v}^2 = \Sigma (L/2.1)\), a repulsive force following Pythagoras law such that both \(T\) and \(L\) be conserved (when \(T\) decreases then this lost energy is transferred to angular momentum \(L\) and vice versa, in \(L\) by changing angular velocity vector \(\vec{w}\), differently is needed a speed faster than that of light. Energy is conserved on three perpendicular fields \(J, E, B\), on dipole such that the total kinetic energy to be the diagonal of the cuboids.

3. The action of a quaternion on point is equivalent as energy density and pressure - the state of stress at a point on the deformed placement or new configuration which is on the directional axis of the point. Gravity exists upon the point axis as \([(d\vec{w}/dt \times \vec{w} + 2\vec{x} \times (d\vec{w}/dt) + \vec{w} \times (\vec{w} \times \vec{f})] where\) angular velocity \(\vec{w} = [\Lambda]/[\vec{f}] = k(\lambda m)\) and so exerts a direct action between two events, i. e. Stationary points of [PNS] are rotating dipole and may be pictured as wave existing in the infinite points of Spaces and exerting an action (pressure) on the moving Spaces, dipole. The Stability is achieved by the Anti-space.

4. In Black hole Energy scale (\(\lambda. \Lambda = k 1\)) there are infinite high frequency small amplitude vacuum fluctuations at Planck energy density of \(10^{113}\) J/m3 that exert action (pressure) on the moving Spaces dipole and their Stability is achieved by Anti-space also. A wide analysis for gravity force and gravity medium is shown in Maxwell’s Displacement field which follows.

5. Dipole vectors are quaternion’s (versors) of waving nature, i. e., on one wavelength in circumference in energy levels, that conserve energy by transferring Total kinetic energy \(T\) into angular momentum \(L = r\vec{m}, \vec{r} = \vec{r}\vec{p} = r\Lambda\), where mass \(m = \text{constant}\). Different versors with different Energy (scalar) possess the same angular momentum. A Composition of Scalar Fields (s) and Vector Fields (\(\vec{v}\)) of a frame, to a new unit which maps the alterations of Unit by rotation only and transforms scalar magnitudes (particle properties) to vectors (wave properties) and vice-versa, and so, has all particle-like properties of waves and particles. In Planck Scale, when the electron is being accelerated by gravity which exists in all energy levels as above, the gravity is still exerting its force. Matter is built out of the primary dipole AiBi

7. A Summary of Newton, Euler-Lagrange Einstein, Equations of motion

7.1. Newtonian Mechanics

Start with the three laws that define the behavior of Objects to, Stand Still, when Moving, and when Forces act upon them. →

It is required mainly a rectangular coordinate system on which are considered all constraint forces. The laws, a. Everybody persists in its state of Rest or uniform Motion in a straight line unless it is compelled to change that state by forces impressed on it, (The Inertia law), b. Force is equal to the change in momentum (r. mv Rotational, mv Linear) per change in time. For a constant mass, force equals < mass times acceleration \(F = ma\), or \(F = dp/dt = \vec{d}(mv)/dt = m. a\), c. For every Action, there is an equal and opposite Reaction, Remarks: In Euclidean logic, Points follow Principles as follows,

\(A = B\) The Principle of Equality,
\(A \neq B\) The Principle of Inequality,
\(PA + PB = 0\) The Principle of Stability,
\[ A=B \text{ Principle of infinite Superposition ( extreme )} \]
\[ A/B = C/D \text{ The Principle of Proportionality} \]

And in Mechanics one is, \( A \leftrightarrow B = \infty \), The Principle of Virtual Displacements \( \Sigma \left( P_i + Hi \right) \). \( \delta F_i = 0 \rightarrow W = \int P \cdot ds = 0 \).

1. The state, is the reaction to the change of motion (in magnitude and direction) which presupposes Force only.

Applying this logic in Principle of Stability then →

As in geometry the same in Physics, \( PAB = \rho \) PBA or \( PAB = 0 \), or as, The Infinite points in \([PNS]\) form infinite Units, monads \( AiBi = d \) magnitude and direction) which presupposes Force only.

By differentiating the equation
\[ \frac{dD}{dt} = JD = \varepsilon \cdot (\partial E/\partial t) + (\partial P/\partial z) \]

where, \( (\partial E/\partial t) = \) The Magnetic field \( \rightarrow B \leftarrow \)

\[ (\partial P/\partial z) = \text{The Electric field } \rightarrow E \leftarrow \]

and in Isotropic dielectric case \( (P=0) \) then \( D = \varepsilon \cdot E \).

Maxwell’s equations become:
\[ \nabla \cdot D = \varepsilon \cdot \varepsilon_0 \cdot E \]
\[ \nabla \times B = \mu_0 \cdot j \]
\[ \nabla \cdot B = 0 \]
\[ \nabla \times E = -\partial B/\partial t \]
\[ \nabla \cdot H = 0 \]

Remarks (a) :
Since wavelength, \( \lambda \), as distance is equal to product velocity \( c \), period \( T \) then \( \lambda = \frac{c}{T} \). Displacement current is a current like the conduction current and produces a magnetic field. It is a stationary wave in individual charges in motion as this is velocity vector \( \vec{v} = \vec{w} \). \( \lambda \) being wavelength which is connected to angular momentum \( \dot{\vec{A}} = \vec{r} \cdot m \vec{v} = m \vec{w} \cdot \vec{r} \) in Planck’s or beyond Planck’s length \( L_p = 1.616 \times 10^{-35} \text{m} \). Velocity describes the origin of magnetic in the law field as variation of Electric Flux. Since De had never been directly detected, proof is the following reasonable logic.

Displacement current density, \( D \), is Energy in cavity \( (1-2) \) \( = \lambda \) which is a standing wave following cycloid trajectories in cavity to reach edge \( (2) \). Medium of cavity is breakage \( |(\vec{w} \cdot r)| \) of Gravity Field and Energy on \( (1) \) is the density velocity vector \( \vec{v} = |(D1)| \).

In stationary wave conservation of energy (charge) is assembled.

Velocity vector, \( \vec{v} \), which is the cross product of two
velocity vectors \( \vec{v}_1, \vec{v}_2 \) or \( \vec{v} = \vec{v}_1 \times \vec{v}_2 \), with head at point (1) and analyzed, in a perpendicular to \( \lambda = (1)-(2) \) directional plane into the two orthogonal velocity vectors, \( \vec{v}_1, \vec{v}_2 \) which heads are at point (1), is carried to point (2) by following the cycloid motion (1)-(2). During shifting, velocity vectors \( \vec{v}_1, \vec{v}_2 \), being vectors, undergo vibrations which causes the two waves that represent the Electric \([E]\) and the Magnetic \([P]\) perpendicular components until reaching point (2) which is the Reemission of the wave and it is the new head of velocity, \( \vec{v} \), where then mechanism is recycled. Source is Rotation dipoles \( \vec{v} = \vec{w} \cdot r \), because of angular velocity vector \( \vec{w} \), in Stationary wave decomposed into the two velocity vectors \( \vec{v}_1, \vec{v}_2 \) forming Electrical and Magnetic field, \( E, P \), as sink following cycloid Isochrones motion. i.e.

Electric Displacement density (field), \( D = \varepsilon \cdot E+P \), in an dielectric medium, of any moving charge of wavelength, \( \lambda \), in the rate of change, is alternately in terms of The Electric field \( \partial E/\partial t \) and of The Magnetic field \( \partial P/\partial t \), in phase with each other in the wavelength, \( \lambda \), and generally meaning that velocity vector \( \vec{v} = \vec{\lambda}/T = \vec{\lambda} \cdot T \), of Photon (or any other moving charges) is a Stationary Electromagnetic wave in Photon’s wavelength, \( \lambda \), and a self-propagating transverse oscillating wave producing a changing Magnetic field \( \partial E/\partial t \) around itself and according to the second of Maxwell’s equations (Ampere-Maxwell law). The resulting Magnetic field creates an Electric field \( \partial P/\partial t \) around itself according to the first of Maxwell’s equations (Faraday’s law of the Electromagnetic Induction).

This alternative Electromagnetic wave travels as velocity vector, \( \vec{v} \), (charge = momentum, or the assembled conserved unaltered energy, internal interchanges).

The Duality Principle of Photon is the Intensity of light vector \( \vec{I} = \text{real part} \), which is Particle and since light is quaternion \( \vec{q} = s + \vec{V}_i \times \vec{D}_i \) then photon represents the intensity of light where \( s = \text{Particle} \), and as Wave is the Electromagnetic fields \( E, P = \vec{V}_i \times \vec{D}_i \) = Wave nature as energy, where \( \vec{V}_1 = \vec{V} = \vec{\lambda} \cdot f = \vec{\lambda} \cdot T \), and for all moving monads consisting the Energy-Space Quanta.

The fact that speed of light is constant and travels at the same speed regardless of any direction is because rotational energy \( \lambda = r \cdot m \cdot \vec{v} \), centrifugal velocity \( \vec{v} = \vec{w} \cdot r \) are constant because acceleration \( [\partial v/\partial t = d(\vec{v} \cdot r/\partial t)] = 0 \) is zero and when exported to STPL is also constant.

Michelson’s-Morley experiments cannot prove this reality because Gravity is the force \( (energy) \), which is connecting Material Points of the Medium.

Numerical value, \( s \), and Imaginary \( \vec{V}_i = E \cdot P \) are Variant in Invariant rotational energy \( \vec{A} = r \cdot m \cdot \vec{v} = m \cdot w^2 \), velocity \( \vec{v} = \vec{w} \cdot r \), meaning that quaternion \( \text{energy} \), travels by changing velocity \( \vec{v} \) and angular velocity \( \vec{w} = 2\pi/T \), and the Period \( T \) of vibration and because of Isochrones motion of Fields on cycloids trajectories, automatically distribute themselves uniformly (Electromagnetic wave) across the whole wavelength, \( \lambda \), of monad.

Relativity being confined in Planck’s length, Maxwell’s Displacement current where Displacement current is equivalent to an electric current and which produces a magnetic field, could not perceive the Intrinsic property of, monads or quaternion (velocity vector \( \vec{v} \)), to be Wave, as an Intrinsic Electromagnetic Wave with two perpendicular velocities forming the two Fields, and Particle, to be the real part of velocity \( \vec{v} \). The Monads in monads is a characteristic expression.

Einstein failed to see this reality (zero acceleration of rotational velocity \( \vec{w} \)) and to explain the WHY speed of light is constant, considering constancy of light as an axiom from which derived the rest of his theory of GR.

Galileo Galilei arguing that the mechanical laws of physics are the same for every inertial observer (those moving uniformly with constant speed in a straight line), and so one cannot distinguish, a state of rest, from, a state of constant velocity, was in reality.

Increasing-Decreasing of a Removal Source.

\[ \lambda = \text{Stochastic wavelength} \]
\[ f = \text{High frequency} \]
\[ \lambda = \text{Compressed wavelength} \]
\[ f = \text{Low frequency} \]

**Fig. 8-7. Increasing-Decreasing \( \lambda \) of a Removal Source \( V(f) \)**

b. Equivalence Principle:
In a uniformly and non-uniformly accelerated reference frame with acceleration, \( a \), situated in a Gravitational field of gravity, \( g \), then \( g = -a = \text{Intensity of gravity field} \) i.e. All particles have the same acceleration in a gravitational fields and is not possible with experiment to distinguish the effect of gravity from that of an accelerated reference frame using local observations.

This is a fundamental principle of GR and gravitational mass is identical to inertial mass. This implication of the principle is that, since photons have momentum and therefore must be attributed an inertial mass, they must also have a gravitational mass and thus photons should be deflected by gravity and also be impeded in their escape from a gravity field, leading to the gravitational red shift, the concept of a black hole, and to the gravitational lens effect. Above is, the Why charge of gravity is the Inertia of a body, or equivalency between Inertial mass and Gravitational mass.

**Remarks (b):**

Galileo’s Principle of Equivalence states that Inertial mass is equal to the gravitational mass and acceleration \( a = \partial v/\partial t \) equal to acceleration due to gravity, \( g \).

Gravity is the Stationary force \( \rightarrow [V1 = 2(wr)^2] \) on the base for all motions \( \rightarrow \) Medium-Field Material-Fragment, \( |s| = (wr)^2 \) in all universe and so Newtonian theory of gravity, acting instantaneously between two separated masses.
is correct.

Maxwell’s equations predict Electromagnetic waves in and out of monads, while Einstein’s equations of GR predict Gravitational waves that travel at the speed of light in order to explain Simultaneity. GR failed to conceive Gravity force as a Stationary force restraining breakages for monads beyond Planck’s length \[10^{-10} \text{-} 10^{-35}\].

Breakages acquire different velocities and different energy and because follow cycloid trajectories, thus need the same time (isochrones) to reach [STPL] line.

Fermat’s Principle of Least time in Isochrones Principle is embedded in all wavelengths, \(\lambda\), as vector monads.

During Intrinsic Diffraction, \(\delta \lambda = \lambda\), of isochronous motion of vectors, frequency, \(f\), doesn’t change and only the velocity, \(v\), and wavelength, \(\lambda\), changes so from equation

\[\lambda = \frac{v}{f}, \quad \frac{d\lambda}{df} = \frac{1}{f}, \quad \lambda f = \frac{df}{dt}\]

then \(a = \frac{dv}{dt} = \frac{d\lambda}{df} f\).

Let \(\lambda = \frac{\theta}{c}\) be the wavelength of a moving monad, \(t = \frac{\lambda}{c} \rightarrow \text{is Deflection due to acceleration, } \frac{\lambda}{c}\),

\[s = \frac{at^2}{2} \rightarrow \text{Deflection due to acceleration, } a, \]

\[H = gt^2 / 2 \rightarrow \text{Deflection due to acceleration of, } g,\]

For \(s = \lambda\), then \(s = \frac{at^2}{2} = c. T\) where \(T\) is the period of Isochrones displacement and \(t^2 = 2. cT / a \ldots (1)\) from equation (h) \(t^2 = 2. H / g \ldots (2)\) and by equating (1), (2) then \(cT/a = H/g\) and since in gravity field where cyclodi field (Simultaneity) defines the same displacement, \(cT, \text{H then } cT = H, \text{and also } a = g\),

Therefore all particles have the same acceleration, \(g\), in our gravitational field with frequency unchanged, and \(v\), with wavelength, \(\lambda\), to be changed \(\rightarrow \text{so light being a particle also, is deviated in gravity field.}\)

c. Mercury’s Perihelion advance:

The perihelion of the orbit of the planet advances, 2 degrees per century, 80s accounted by the perturbations from the other planets and 43s by Einstein’s GR theory.

Remarks (c):

The \(\text{\rightarrow}\) [Space, Anti-Space equilibrium, \(\pm \lambda\), Absolute System [S] \(\leftarrow\)], as Angular momentum \(\lambda = \Omega = m\nu r\), is Crushed out into Fragments and, becoming the three Breakages \([-a = (wr)^2], [-a = -(wr)^2], [\nu = 2(wr)^2]\), and after clashed with the velocity vector \(\nu\) of [S], (unless succeed to escape un-clashed through center \(O\) in STPL cylinder and this because of \(\nu = 0\)), are Thrown OFF this System [S], conveyed into the, Relative [STPL] System [R], with Linear momentum and Inertial Energy-Space, as the Particles Fermions \(\rightarrow [\pm \nu, \nu]\) and Bosons \(\rightarrow [\nu, \nu]\).

The un-clashed through center \(O\), Fragments \(s^2 = \pm [\nu, r]^2\) occupy the minimum quantized space \(s^2\) and consist the Medium-Field Material-Fragment \(\rightarrow [s^2] = [\text{MFMF}]\) as base for all motions, fill all [STPL] cylinder and thus consist the Rest, Homogenous, Isotropic Base of all motions.

This Base, force \([\nu] = [2. (\nu, r)^2] = \text{Gravity is connecting material points of Medium, while all the other clashed or un-clashed fragments of the cylinder move, consisting the Relative System [R] to Absolute, Space, Anti- Space, \(\pm \lambda\), System [S].\)

Un-clashed Fragments through center \(O\), clashed with the constant velocity, \(\nu\), consist the Dark matter \([\pm \nu, s^2]\) and the Dark energy \([\nu, Vi]\), or in summary,

\[\begin{align*}
A. [\pm \nu, s^2] & \rightarrow \text{Fermions } [\nu, Vi] \rightarrow \text{Bosons} \\
B. [\pm s^2] & \rightarrow [\text{MFMF}] \text{ Field } [\nu] \rightarrow \text{Gravity force} \\
C. [\pm \nu, s^2] & \rightarrow \text{Dark matter } [\nu, Vi] \rightarrow \text{Dark energy}
\end{align*}\]

Since [MFMF] \([-s^2] = (w^2 r^2)\) is the base for all motions and Gravity force \([Vi] = [2. (\nu, r)^2]\) \(\rightarrow \text{Gravity force, or perturbations from other planets 80s )}, \text{so Base is} \rightarrow 80 / 2 = 40\text{s, which are the Unaccounted last 40 seconds of arc.}\)

d. Gravitational deflection of light by the Sun: in GR indicated that light from a star, which just grazed the sun, should be deflected by 1, 75 seconds of arc.

Remarks (d):

Monads, as an Electromagnetic Standing wave move in Field [MFMF] \([s^2] = \pm [(w/2r)^2]\) as the smallest quantized space of this level. Let, \(L\), be the length of an undergoing constant acceleration monad in gravity field,

\[\begin{align*}
t = L / c & \rightarrow \text{is the needed time to cross length } L, \\
s = at^2 / 2 & \rightarrow aL^2 / 2c^2 \rightarrow \text{Deflection due to acceleration, } a,
\end{align*}\]

1. For a monad in Planck’s length \(10^{-35}\)m then \(T = 8, 906, \text{10}^3 \text{m} \rightarrow 3.10^8 = 2, 968, 10^{-35}\) and \(s = aT^2 / 2 = 9, 81, 809, 10^{-70} = 4, 32, 10^{-69} \text{m}\)

2. For Photon wavelength \(\lambda = 6, 21, 10^{-7}\text{m as Monad in monad Photons} = 9, 81(\lambda/c) / 2 = 101, 10^{-12} \text{m corresponding to an angle } \theta = \frac{s}{3600} = 386, 10^{-18} \text{degrees of second.}\)

3. For an arc on earth surface \(\pi. (\text{Km})^2 = 3142, 10^3 \text{m then} \frac{s}{9, 81, 9872/9} = (\text{long \(\lambda = 620-750 \text{nm}\) shifted to red (red-shift) \(\rightarrow\) low } f = 400 - 484 \text{THz}) \text{ and higher frequencies of light \(\lambda \text{short } T = 450-495 \text{nm}\) are shifted to blue (blue-shifted } f = 606 - 668 \text{THz} \text{ and Time Dilation the opposite}}

\[\begin{align*}
e. \text{Gravitational red-shift and Time Dilation:} \\
\text{Gravitational red-shift is the Phenomenon where low frequencies of light \(\text{long } T = 620-750 \text{nm}\) shifted to red (red-shift) \(\rightarrow f = 400 - 484 \text{THz}) \text{ and higher frequencies of light \(\text{short } T = 450-495 \text{nm}\) are shifted to blue (blue-shifted } f = 606 - 668 \text{THz)}\]
\end{align*}\]

\[\begin{align*}
e. \text{Gravitational red-shift and Time Dilation:} \\
\text{the answer is as below using the intrinsic property of} \\
\text{Constant light velocity vector } [\nu], \text{which is a \textit{Stationary wave in Photon’s wavelength } \lambda, \text{as } \rightarrow \nu = \lambda / T = \lambda f}
\end{align*}\]

In a Stress-Strain System, the State of Principle Stresses, \(\pm \sigma\) at each point, is the double refraction in Photo-Elasticity and expressed as the Isochromatic lines \([\sigma_{1} - \sigma_{2}] = J. k / d\) or as Isochromatic surfaces, depending on the direction of force (pressure) which is the same in gravity field as length-contracted and length-expanded in a given piece of quantized space.

Streching Removal of \(\lambda\) creates, \(-\nu, \nu\), while, Compressed Removal of \(\lambda\) creates, \(\nu, \nu\), and since velocity, \(c\), is constant, long and short period \(T\), or low and high, \(f\), varies and a vector with Low energy \(E = h. f\) at Red, (Red-shift) \(\rightarrow \text{low } f = \nu, \nu\),
Particles and speed of light is constant in a Stress-Strain Photon to be as Particle and Wave also, but considering but in the Sphere (spherical triangle) .

In this way Light is s = Particle as Photon, s = λ = 380-780 nm = (3, 8-7, 8). 10⁻⁷ m and as Wave, the Stationary Electromagnetic fields E, P = Vi x Di which is of an Wave nature force where Vi = ɐ = λ / T, since Light also = quaternion → {q = s+Vi}. The Stationary Wave in, s = λ, which is meaning that, since Photon is the only Electric Displacement field D=ε. E+P, then in the rate of change is alternately in terms of The Electric field (∂E/∂t) and The Magnetic field (∂P/∂t) i. e. for Low energy Red-shift and for High energy Blue-shift as Wave, and then wavelength s = the Particle. Since also frequency f = 1/T and energy =h. f then Cycloid motion Controls constancy of Energy by changing velocity, ɐ = w. r, and period , T, of monads.

Einstein failed to see this reality and to explain the WHY → Wave nature , is the Intrinsic Electromagnetic Wave of Particles and speed of light is constant in a Stress-Strain System with ( Red-shift, as low f and-Blue-shift, as high f ) Photon to be as Particle and Wave also, but considering constancy of light as an axiom from which he derived the rest of his theory of GR.

Intrinsic Stationary Wave of a Removal Source F(f)

![Image](Fig. 9-7. Intrinsic Stationary Wave of a Removal Source V(f))

f. Gravity as Curvature GR of Einstein assimilates gravity as the curvature in space-time and not as Force and this based on Elliptic geometry, by contrast, stating that, all lines through a point M and parallel to a line AB intersect line. In Elliptic geometry the two lines “curve toward” each other and eventually intersect. The simplest model for Elliptic geometry, by contrast, stating that, all lines through a point M and parallel to a line AB intersect line.

Appealing space-time a Priori accepts the two elements, Space and Time, as the fundamental elements of universe without any proof for it, so anybody can say that this stay on air. It has been proved [22-26] that any space AB is composed of points A, B which are nothing and equilibrium by the opposite forces P̅A = - P̅B following Principle of Virtual Displacement.

Time (t) is the conversion factor between the conventional units (second) and length units (meter). By considering the moving monads (particles etc. in space) at the speed of light, pass also through Time, this is an widely agreeable illusion.

g. Tidal Forces :

Falling between small particles with very small mass and a rigid body with a large mass, change its shape with time, by stretching in the direction of the fall and press in the direction perpendicular to it, are what is called Tidal forces.

Remarks (g) :

According to Bernoulli equation of energy conservation in, non-viscous, incompressible fluid in steady flow, Potential and Kinetic Energy per unit volume is constant at any point as,
p + ρv²/2 + ρgh = constant, where, p = pressure, ρ = the density, v = the velocity, h = the elevation and g = the gravitational acceleration, and (1)-(2) points lie on a stream line. The one-dimensional continuity equation gives, p1-p2 = (ρ/2). υ²/υ-1 and A1v1=A2v2, therefore A2 < A1, v2 > v1 and v2 > v1, p2 > p1 or, decreasing area = increasing velocity and increasing velocity = decreasing pressure (Force). Spinning ball in airflow is a characteristic example, where velocity stretches in the velocity direction, and pressures are shrinking in perpendicular to velocity direction.

It was shown in [25-30] that

The mechanism of Energy Transport as (v) through its quantized wavelength $|\lambda = \vec{\nu} \cdot \vec{r}|$, is a property of any standing wave, into the Medium $|\lambda| = (1)-(2)$, and involves the Absorption and Reemission of the wave quantized energy $J = (J1)=(J2)$ by the two neighbor edges (1) and (2) of the medium. The Absorption of energy causes, $J1$, within edge (1) to undergo vibrations as $[ds1²/dt²] = -(g/4r)$. s which causes a new wave with the same frequency (because $f = E/h$) as the first wave but delaying the motion through the medium until Reemission by travelling, $J1 \rightarrow J2$, through this small region of space between edges (1) and (2) and once the energy of wave is reemitted by its neighbor edge (2) then mechanism is recycled. This mechanism is succeeded by the intrinsic property of the waves (→ quaternions, monads, vectors, Tensors) which is, the Stationary wave nature of Spaces.

8. Conclusions

The dynamics of any system =Work= Total energy, is transformed as generalized force $Fe \rightarrow$

$$Fe = \delta W / \vec{\delta}(\vec{r}, c), (\vec{\delta r}. c) = \vec{v}. \delta t = [ = \vec{v}c + = \vec{\nu}. \vec{r}n] \cdot \delta t = (\text{Translational + rotational velocity}). \delta \text{t and } Fe = \vec{v}. c, (\vec{\delta W}/\delta t) + \vec{\nu}. \vec{r}n. (\vec{\delta W}/\delta t) \rightarrow \text{Translational kinetic energy + Rotational kinetic energy→}$$

1. To the Elastic material Configurations, as Strain energy and is absorbed as Support Reactions and displacement field $[\vec{v}c (\vec{u}, \vec{v}, \vec{w})]$ upon the deformed placement, (where these alterations of shape by pressure or stress is the equilibrium state of the Configuration $G. \vec{W}². c + [m. G / (m-2)]. \vec{V}[ \vec{V}. c ] = F ]$, [5] and [14-16].

2. To Solid material Configuration, as Kinetic (Energy of motion $\vec{v}$) and Potential (Stored Energy) energy by displacement (the magnitude of a vector from initial to subsequent position) and rotation, on the principal axis (through center of mass of the Solid) as ellipsoid, which is mapped out, by the nib of vector $(\vec{\delta r}. c) = [\vec{v}c + \vec{\nu}. \vec{r}n] \cdot \delta t$, as the Inertia ellipsoid [Poinset's ellipsoid construction] in [S] frame which instantaneously rotates around vector axis $[\vec{w}, \nu]$ with the constant polar distance $\vec{w}$. Fe / $[Fe]$ and the constant angles $\theta s, \phi, \theta b$, traced on, Reference $[R, F]$ cone and on $[S, F]$ cone, which are rolling around the common axis of $\vec{W}$ vector, without slipping, and if Fe, is the Diagonal of the Energy Cuboids with dimensions a, b, c following Pythagoras conservation law, where the three magnitudes (J, E, B) of Energy-state follow Cuboids, Plane, or Linear Diagonal direction and If Potential Energy is zero then vector $\vec{w}$ is on the surface of the Inertia Ellipsoid. From the theory of elasticity the equilibrium of a surface Configuration, in an isotropic material, obeys equation $\mu. \vec{V}² + (\lambda + \mu). \vec{V}. [\vec{v}u] = 0 \ldots [23]

3. To Quaternions’ Extensive Configuration, as New Quaternions’ (with Scalar and Vector magnitudes). Points in Space carry A priori the work $W = [A-B] [P. ds] = 0$, where magnitudes P, d $\delta$ can be varied leaving work unaltered. Diffusion (decomposition) of energy follows Pythagoras conservation law where the three magnitudes (J, E, B) of Energy-State follow the Cuboids, Plane, or Linear Diagonal [18-20].

4. To Space conserved Extensive property Configuration (Continuum), as Kinetic (3-current motion) and Potential (the perpendicular E, P Stored as curl fields) energy by displacement (the magnitude of a vector from initial to the subsequent position) and rotation. Energy is thus conserved in E and P, curled Stationary fields of monad’s wavelength, and on quaternion’s norm. For more extension [40].

5. The STPL line as the passage of particles from Absolute [S] frame to all Relative [R] Frames is the Navel cord, string of galaxies [28],

6. The geometrical Reasoning of Planck Length [29],

7. The time as the meter of changes, or as the conversion factor, between time (s) and space (m) units [29],

8. The Geometries related to Euclidean by Lorentz factor $\gamma$ are the geometrical expression of Spaces [30],

9. The Cause and Events as the Energy quantization and the velocity Breakages as, masses, and velocity, $\vec{v}$, only as the Thrust of masses [30-31],

10. The Origin of Gravity from [S] to [R] Frame as escape mass = spin, and its Incorporation into QM [36-38],

11. The Structure of the Space-Energy universe and the boundaries of General Relativity [34],

12. The Origin of Particles as velocity-Thrust on Breakages and the Breakages as the Fragments of the Space, Anti-Space collision [35],

13. The Origin of Color forces from the Retardation and the Birefringence of Spaces [35],

14. The Binomial nature of Monads in Monad $|\lambda|$ and their intrinsic property, the Cycloid wave motion, with mass as spin forming plane and spherical standing waves and which is $<\text{The Inner structure of Particles}>$. [36-37],

15. The Definition of, Material Point $[=w = \vec{w}. r²]$, and minimum quantized Material Wavelength $[=w = \vec{w}. r²]$, in Planck’s scale space [37]. Confusion in basic ideas regarding Quanta vanishes, and article consists a provocation to all today Geometers and Mathematicians,

16. The Cycloidal motion as the intrinsic property of vectors which is a Stationary wave on wavelength of $|AA|$ where $<\text{Poinset’s ellipsoid}>$ becomes $\rightarrow$ Cycloidal Ellipsoid ← is the content of this article.

Acknowledgment

The reason of writing this scanty article is because I am Engineer, and my deep intuition contradicts to some very acceptable conceptions. The Natural Constants in Physics
become from the Laws and → Geometry constants are the meters of Laws. Physical constants represent the quantization of Energy in the different levels of Spaces. Sequence that Space was created before matter → Human mind, in front of this dilemma created the outlier in Religious and the myth of Big-Bang. Because in [S] System Centrifugal velocity is constant, Simultaneity in [R] System is such that is possible to exists in them, the geometrical expression of Lorentz factor, γ, and the related System-Spaces of Relativity to be placed as a part of the whole Euclidean geometry For a rotating system like the reference [R] with constant velocity ĉ is possible to be ĉ < ĉ → ∞ and then this would move faster than, ĉ, velocity of light. [27-29]

By Considering breakages as, masses, being off the system [S] and under the constant velocity c as Action , then Dark matter and Dark energy are Geometrically produced without any set restrictions, but from sec. φ = γ only. Because breakages travel in [R]=|DA-PA| system (frame) with the constant velocity , c, and so are in rectilinear motion between them, they occupy zero acceleration and thus can be converted to measurements in another by the simple Galilean transformations, because physical laws and electrodynamics take the same form in all inertial systems.

By contrast Inertial frame [R] is the frame of reference which describes the Energy-Space homogeneously and isotropic ally and in an genius manner, where arbitrary number, t = time is defined as the conversion factor between time units (second) and length units (meter), and this because of → sec. φ = γ = ct/vt).

In summary, the reason of writing this article is because my personal confidence is that nature is produced from Euclidean Geometry only, following Principle of Virtual work and not any other logical starting point. The essential difference between Euclidean and the non-Euclidean geometries has been attentive in the very specially written articl e ordered [32] for the nature of the parallel lines, a unique Postulate directly connected to the physical world. Now, [STPL] line (doubled cylinder in spatial CS) is the creation mould for Particles which are created between all Space-Levels. Since Spaces are directly connected, present article is the proof to what referred.

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Biography

Markos Georgallides comes from Cyprus and currently resides in the city of Larnaca, after being expelled from his home town Famagusta by the Barbaric Turks in August 1974. He works as a consultant civil and architect engineer having his own business. He is also the author of numerous scholarly articles focusing on mathematical and physics related subjects. He obtained his degree from the Athens, National Polytechnic University [NATUA] and subsequently studied in Germany with specialization in constructions (WAYSS & FREYTAG – Frankfurt A. M. Neue Mainzer strasse 59, Frankfurt).