

# 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  $\rightarrow W = \int P \cdot ds = 0$ , which is the cause of Spaces existence. Also, are Presented the fundamental equations of [PNS], unifying the known homogenous Euclidean geometry ( $|\lambda| = \lambda \nabla$ ) and the source term Energy ( $d\bar{s}$ .  $dP = \lambda$ .  $\Lambda = \text{constant}$  K1, 2, 3 with motion  $\Lambda$ ), and imbedding in them all conservation physical laws with the only two quantized magnitudes  $\lambda$ ,  $\bar{\Lambda}$  on Monad  $\bar{A}B$ ., i. e. The Space-Energy Universe. Breakages  $[s^2 = \pm (\bar{w} \cdot r)^2]$  in Inertial systems consist [MFMF] Field and  $[\nabla i] = 2(\bar{w} \cdot r)^2$  the Gravity force. Momentum as velocity  $\rightarrow [\text{velocity} = \bar{v}g = \text{the breakage } 2(\bar{w}r)^2]$ , is the cross product of two velocity vectors  $\bar{v}1, \bar{v}2$ , which form on Medium  $\rightarrow |\pm(\bar{w} \cdot r)^2| = |\lambda|$  the Intrinsic Electromagnetic Stationary Field  $\rightarrow [\text{Electric (E)} \perp \text{Magnetic (P)}]$ , following the cycloid motion. Breakages and Particles with velocity,  $\bar{v}$ , being the units of matter with Electric charge,  $q = \lambda m$ , as their physical property is, when placed in prior referred Electromagnetic Field  $E \perp P$ , where like charges repel and unlike charges attract, experience a force as Lorentz force, and this is called Gravity- Force, and equal to  $\rightarrow Fg = q \cdot [E + \bar{v} \times P] \leftarrow$  where also Gravity- Field  $\rightarrow Gf = [E + \bar{v} \times P] \leftarrow$ . 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

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## 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  $A \equiv B$ . 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  $\pm \Lambda$  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  $W = \int P \cdot ds = 0$  or  $[ds \cdot (PA + PB) = 0]$  i. e. for any  $ds > 0$  Impulse  $P = (PA + PB) = 0$ .  $[ds \cdot (PA + PB) = 0]$ , Therefore, Each Unit  $AB = ds > 0$  exists, by this Inner Impulse (P) and so  $PA + PB = 0$

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  $A = \text{Black Hole} \rightarrow ds = 0$  and  $P = \infty$ ).

All points may exist with  $P = 0 \rightarrow (PNS)$  and also with  $P \neq 0$ , ( $PA + PB = 0$ ), for all points in Spaces and Anti - Spaces, therefore [PNS] is self created, and because at each point may exist also with  $P \neq 0$ , then [PNS] is a ( perfectly Homogenous, Isotropic and Elastic Medium ) Field with infinite points which have a  $\pm$  Charge with  $P = 0 \rightarrow P = \Lambda \rightarrow \infty$ .

Since points A, B of [PNS] coincide with the infinite Points, of the infinite Spaces, Anti-Spaces and Sub-Spaces of [PNS] and exists rotational energy  $\pm \Lambda$  and since Motion may occur at all Bounded Sub - Spaces ( $\pm \Lambda, \lambda$ ), 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 (monads)  $AiBi = d\bar{s}$ , which equilibrium by the Primary Anti-Space by an Inner Impulse (P) at edges A, B where  $P \cdot iA + P \cdot iB \neq 0$ , and  $ds = 0 \rightarrow N \rightarrow \infty$ .

Monad (Unit)  $\bar{A}B$  is the ENTITY and  $[A, B - P\bar{A}, P\bar{B}]$  is the LAW, so Entities are embodied with the Laws.

Entity is quaternion  $\bar{A}B$ , and law  $|AB| = \text{length of points A, B and imaginary part forces, } P\bar{A}, P\bar{B} \text{ or fields.}$

By definition  $i = \sqrt{-1}$  and  $(-1)^2 = -1$  i. e.

$[\text{Energy}]^2 = -[\text{Space}] = \text{Anti-space}$  and since also exists  $\Lambda$   $\times \Lambda = -(-m \cdot 1)^2 = \pm \Lambda \cdot \nabla i$ , the basic equation of quaternion becomes  $[-(\Lambda \times \Lambda)/m \pm \Lambda \times \nabla i] = [\lambda, \pm \Lambda \times \nabla i]$

i. e. wavelength  $\lambda = -(\Lambda \times \Lambda)/m$  where  $m = a$  constant depending on reactions to present or other conditions.

Applying this in energy cavities there  $\nabla i \cdot [(\pi/2) \cdot b]^2$

$= e^{-i \cdot (\frac{2\pi}{2}) \cdot b} = e^{-i \cdot (\pi) \cdot b} \rightarrow$  i. e. The massive mechanism

Diffraction and the Energy mechanism Diffraction are Interchangeable,  $e^{-i \cdot (1,78 \cdot 10^{-7})^2} = e^{-i \cdot (3,56 \cdot 10^{-14})}$ , and for Relativity massive Energy  $(\Lambda \times \Lambda) = (-m \cdot i) \times (-m \cdot i) = m(i)^2 = -m \cdot (\bar{v})^2 = -m\bar{v}^2$ , where imaginary part  $\bar{v}$ , i. e. Space acquires energy as velocity.

Applying quaternion equation  $[-\nabla \Lambda, \nabla \times \Lambda] = 0$  for point, O, and constant velocity,  $\bar{c}$ , then  $[-\nabla c, \nabla \times c] = 0$  where  $[-\nabla c] \perp [\nabla \times c]$  meaning that it is a mechanism that instantly transports breakage masses dynamically and perpendicularly to all Inertial frames Layers. [26]

## 2. Complex Numbers – Quaternion

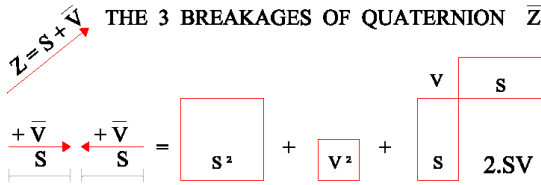


Fig. 1-2. The Action of quaternion  $\bar{z} \cdot \bar{z} = [s + \bar{v} \cdot \nabla i]^2 \rightarrow \bar{z} \cdot \bar{z} = [s + \bar{v} \cdot \nabla i]^2 = s^2 - |\bar{v}|^2 + [2\bar{w} \cdot |s| \cdot |r| \cdot \nabla i \cdot \bar{w}]$ .

Quaternion Actions: Action (©) of a quaternion  $\bar{z} = s + \bar{v} \cdot i$   $= s + \bar{v} \cdot \nabla i$  on point P (a, x, y, z) is  $a\bar{z}' = \bar{z}p\bar{z}'$  (screw = helicoidally motion) and for  $a \neq 0$  then  $z$  and  $a \odot z = az$  which have the same action  $\bar{z}p\bar{z}'$ , meaning that quaternion is homogeneous in nature. Action of a Unit quaternion  $\bar{z}$  on a scalar,  $s$ , is  $s\bar{z} = \bar{z}s\bar{z}' = s$ . Action of a Unit quaternion  $\bar{z}$  on a vector ( $\bar{v}\nabla i$ ) is  $\bar{z}\bar{v}\nabla i = \bar{v}'$  i. e. another vector  $\bar{v}'$  (quaternion)  $\bar{v}' = (0, \bar{v}'\nabla i)$ , and of vector type  $\bar{v}' \cdot \nabla i = \bar{z}\bar{v} \cdot \nabla i + 2\bar{v} \cdot \nabla i (\bar{v} \times \bar{z})$ .

Every quaternion,  $q$ , is equal to its versor,  $V(q)$ , multiplied by its tensor (norm), and for versor  $V(q) = e^{(0+\pi i)} \rightarrow$  then  $|V(q)| = \sqrt{3}$  and  $q = V(q) \cdot \sqrt{3} \cdot \pi$ .

Action (©) of a quaternion  $\bar{z} = s + \bar{v} \cdot i = s + \bar{v} \cdot \nabla i$  on itself is the Binomial type i. e.

$$(s + \bar{v} \cdot \nabla i)(s + \bar{v} \cdot \nabla i) = [s + \bar{v} \cdot \nabla i]^2 = s^2 + |\bar{v}|^2 \cdot \nabla i^2 + 2|s| \cdot \bar{v} \cdot \nabla i = s^2 - |\bar{v}|^2 + 2|s| \cdot |\bar{w}| \cdot |r| \cdot \nabla i = s^2 - |\bar{v}|^2 + [2\bar{w} \cdot |s| \cdot |r| \cdot \nabla i]$$

where,

$s^2 \rightarrow$  is the real part of the new quaternion and it is a Positive Scalar magnitude.

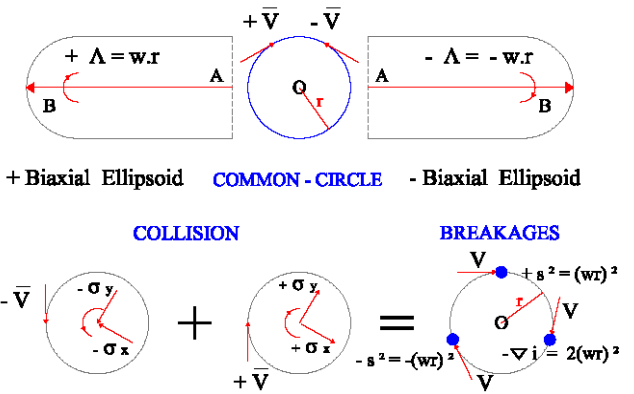
$-|\bar{w}|^2 \rightarrow$  the always negative Anti-space which is always a Negative Scalar magnitude.

$[2\bar{w} \cdot |s| \cdot |\bar{r}| \cdot \nabla i] \rightarrow$  the double angular velocity term which is a Vector magnitude.

## 3. The Method

THE BALANCING OF SPACE  $\rightarrow$  ANTI - SPACE, IN SUB-SPACE COMMON - CIRCLE.

### THE TWO OPPOSITE EQUILIBRIUM MOMENTUM ELLIPSOIDS



$$[\rightarrow \odot \odot \leftarrow] = [\rightarrow \odot + \odot \leftarrow] = \odot \odot \rightarrow \odot \odot \odot$$

Fig. 2-3. Equilibrium vorticity (vortices)  $\pm \Lambda$  (Rotating energy)  $\odot \odot$  Collision on common circle  $[CC] \odot \odot \leftarrow$  Thrust on Breakages  $= V, \odot \odot$ .

The work  $W$ , of the two opposite dipole  $\bar{A}B, \bar{B}A$  with planes is equal to  $W = [n \cdot P \cdot ds] = [\lambda = \Lambda \Lambda, \Lambda \times \Lambda]$  where,  $\lambda$  = displacement of A to B and it is a scalar magnitude called wavelength of dipole  $\bar{A}B$ .

$\Lambda$  = the amount of rotation on dipole  $\bar{A}B$  (this is angular momentum  $\bar{L}$  and it is a vector parallel to  $\bar{a}$ , axis).

Momentum  $\pm \Lambda = r \cdot m \cdot v = r \cdot m \cdot wr = mr^2 \cdot w$ , where,  $r$ , is the radius and angular velocity  $\bar{w} = (\text{spin})$  which maps velocity vector  $\bar{v}$ , on the perpendicular to  $\bar{a}$ , axis plane with the two components  $\bar{v} \cdot E \perp \bar{v} \cdot B$ . Tangential velocity  $\bar{v} \cdot E = \bar{w} \cdot r$  is a quaternion  $\bar{v} \cdot E = \bar{w} \cdot r = \bar{z} = [s + \bar{v} \cdot \nabla i]$  where  $s = |\bar{v} \cdot E| = |\bar{r} \cdot \bar{w}|$  and  $\bar{v} \cdot \nabla i = |\bar{w} \times \bar{r}| = |\bar{w}| \cdot |\bar{r}| \perp |\bar{w}| \cdot r$  where the two opposite biaxial ellipsoid equilibrium.

In a spherical cave the Biaxial Ellipsoid ( $\sigma x = \sigma y$ ) exists as momentum  $+\Lambda$  on caves of diameter  $2r$  with parallel circles  $\rightarrow 0$ . The Biaxial Anti-Ellipsoid ( $-\sigma x = -\sigma y$ ) exists as equal and opposite momentum  $-\Lambda$  on the same diameter  $2r$  with anti-parallel circles  $\rightarrow 0$ . Equilibrium of the two Ellipsoids  $\pm \Lambda$ , presupposes a Stabilizer system attached to Ellipsoids such that opposite Momentum is distributed to the Center of Mass of the total system and, recover equilibrium, which is the center of the spherical cave. The Biaxial Ellipsoid and Anti-Ellipsoid are inversely directed and rotated in the same circle, so the two opposite velocity vectors collide. This collision of the two opposite velocity vectors is the Action (Thrust) of the two quaternion and it is, Action of quaternion's

$$(s + \bar{v} \cdot \nabla i)(s + \bar{v} \cdot \nabla i) = [s + \bar{v} \cdot \nabla i]^2 = s^2 + |\bar{v}|^2 \cdot \nabla i^2 + 2|s| \cdot \bar{v} \cdot \nabla i = s^2 - |\bar{v}|^2 + 2|s| \cdot |\bar{w}| \cdot |r| \cdot \nabla i = s^2 - |\bar{v}|^2 + [2\bar{w} \cdot |s| \cdot |r| \cdot \nabla i] \dots (3-a)$$

where,

$[+s^2] \rightarrow s^2 = (w \cdot r)^2$ , is the real part of a new quaternion which is, the positive Scalar product, of Space from the same scalar product,  $s$ , with  $1/2, 3/2, \dots$ , spin, and represents the, Space, part of quaternion.

$[-s^2] \rightarrow -|\bar{v}|^2 = |\bar{w} \cdot \bar{r}|^2 = -[|\bar{w}| \cdot |\bar{r}|]^2 = -(w \cdot r)^2 \rightarrow$  is the always, the negative Scalar product, of Anti-space from the dot product of,  $|\bar{w}|, \bar{r}$  vectors, with  $-1/2, -3/2, \dots$ , spin, and represents the, Anti-Space, part of quaternion.

$[\nabla i] \rightarrow 2. |s| \times |\vec{w} \cdot \vec{r}|. \nabla i = 2|\vec{w} \cdot \vec{r}|. |(\vec{w} \cdot \vec{r})|. \nabla i = 2. (\vec{w} \cdot \vec{r})^2 \rightarrow$  is a vector of, the velocity vector product, from the cross product of,  $\vec{w}, \vec{r}$  vectors with double angular velocity term and represents the, Velocity vector product, of quaternion giving 1, 3, 5, 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  $\vec{w}$ . The inversely directionally rotated Energy  $\pm \bar{\Lambda}$  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  $\rightarrow$  [Space, Anti-Space equilibrium,  $\pm \bar{\Lambda}$ , Absolute System [S]  $\leftarrow$ ], as Angular momentum  $\bar{\Lambda} = \Omega = m. v r$ , is Crushed out into Fragments and, becoming the three Breakages  $[s^2 = (\vec{w} \cdot \vec{r})^2]$ ,  $[-s^2 = -(\vec{w} \cdot \vec{r})^2]$ ,  $[\nabla i = 2(\vec{w} \cdot \vec{r})^2]$ , and after clashed with the velocity vector  $\vec{v}$  of [S], (unless succeed to escape unclashed through centre O in STPL line and this because  $\vec{v} = 0$ ), are Thrown OFF this System [S], conveyed into the Linear momentum, the Inertial and Energy-Space, the Relative [STPL] System [R] as Particles

Fermions  $\rightarrow [\pm \vec{v} \cdot s]$  and Bosons  $\rightarrow [\vec{v} \cdot \nabla i]$ .

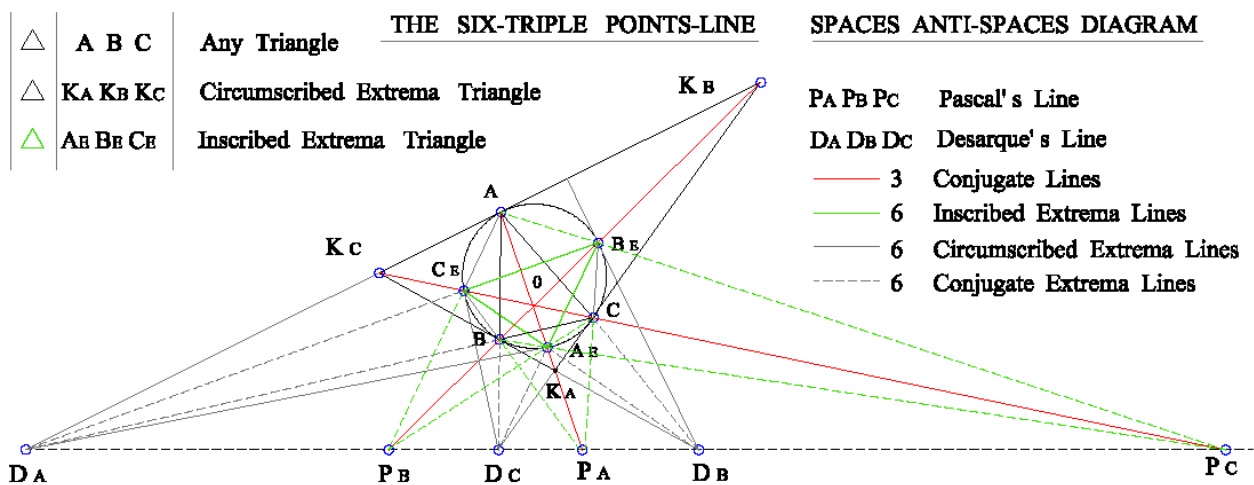


Fig. 3-3. DA, DB, DC,  $\leftrightarrow$  PA, PB, PC = The Six Triple Points Line [STPL].

Index : DA  $\rightarrow$  PA = x axis, A  $\perp$  (DA  $\rightarrow$  PA) = y axis, Positive vorticity  $\odot + \uparrow$ , Negative vorticity (vortices)  $\ominus - \downarrow$ .

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

Breakages  $[\pm s^2 = \pm (\vec{w} \cdot \vec{r})^2] - [\nabla i = 2(\vec{w} \cdot \vec{r})^2]$

A.  $[\pm \vec{v} \cdot s^2] \rightarrow$  Fermions ---  $[\vec{v} \cdot \nabla i] \rightarrow$  Bosons

B.  $[\pm s^2] \rightarrow [\text{MFMF}]$  Field  $[\nabla i] \rightarrow$  Gravity force

C.  $[\pm \vec{c} \cdot s^2] \rightarrow$  Dark matter  $[\vec{c} \cdot \nabla i] \rightarrow$  Dark energy

$\rightarrow$  A.  $[\pm \vec{v} \cdot s^2] \rightarrow$  Fermions ---  $[\vec{v} \cdot \nabla i] \rightarrow$  Bosons

Thrust ( $\vec{v} = \vec{w} \cdot \vec{r}$ ) continually acting on the Breakages  $[s^2, -|\vec{v}|^2, [2\vec{w} \cdot \vec{r}]. |s| |\vec{r}| = 2(\vec{w} \cdot \vec{r})^2]$  produces the  $[1-1+2]. \vec{w}^3. |\vec{r}|^3$  magnitudes  $(\vec{w} \cdot \vec{r})^3$ , which is a Positive Scalar magnitude, with Positive or zero electric charge and with,  $\frac{1}{2}$  or 1, spin. [30]  $[2\vec{w} \cdot \vec{r}]. |s|. |\vec{r}|. \nabla$

1. Positive breakage Quantity  $|\vec{v}|^2 = |\vec{w} \times \vec{r}|^2 = |\vec{w} \cdot \vec{r}|^2 \rightarrow$  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  $-|\vec{v}|^2 = -|\vec{w} \times \vec{r}|^2 = -|\vec{w} \cdot \vec{r}|^2 \rightarrow$  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  $[2\vec{w} \cdot \vec{r}]. |s|. |\vec{r}|. \nabla i = 2\vec{w} \cdot (\vec{r}^2 \cdot \vec{w}). \nabla i = 2\vec{w} \cdot \vec{r}^2 \vec{w}. \nabla i \rightarrow$  Bosons, being at Space points A, B, C then Action magnitudes Q at coinciding points DA, DB, DC - PA, PB, PC Produces Bosons, and carry them on [STPL] line.

4. Breakage Quantities  $[\pm s^2 = \pm (\vec{w} \cdot \vec{r})^2]$ , being at, O, commons' circle center and shackd OFF into [STPL], and this because of  $v=0$ , formulate the [MFMF] Field, which consist the base of all motions.

5. Breakage Quantities  $\nabla i = 2(\vec{w} \cdot \vec{r})^2]$  being at, O, commons' circle center and shackd OFF into [STPL], and this because of  $v=0$ , formulate the Gravity force.

6. Breakage Quantities  $[\pm \vec{c} \cdot s^2]$  and  $[\vec{c} \cdot \nabla i]$ , the clashed with the constant velocity,  $\vec{c}$ , formulate in [STPL] cylinder Dark matter and Dark Energy respectively.

## 4. Geometrical Moulds

### 4.1. Cycloid Motion

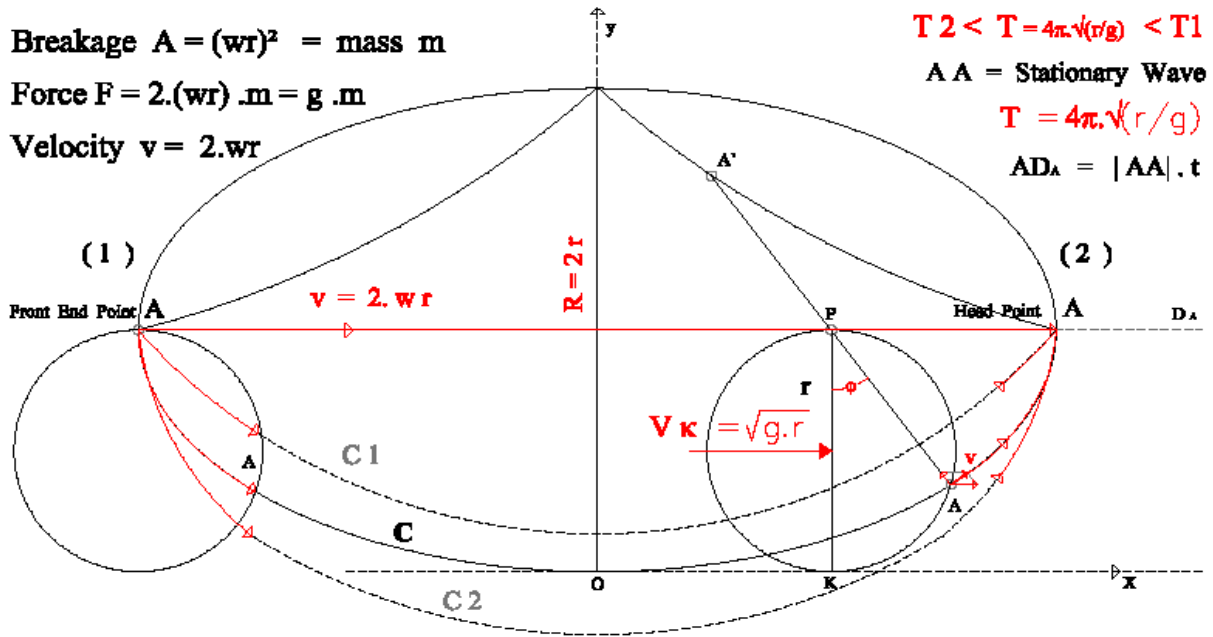


Fig. 4-4. The Cycloid motion of material point  $A1 \rightarrow A2 = |AA|$ , The Brachistochrone Curve  $A1 \rightarrow A2$ .

#### 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  $x = r \cdot (t - \sin t)$ ,  $y = r(1 - \cos t)$  where  $t$  = 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  $(dy/dx)^2 = y/(2r - y)$  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  $T = 4\pi\sqrt{r/g}$  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  $ds = \sqrt{2r/y} \cdot dy$  and  $s = 2 \cdot \sqrt{2ry} + C$  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  $\bar{v}$  is tangent to the point then component  $\bar{v} \cdot \sin\phi$  is  $\sin\phi = s/4r$  and then equation of motion becomes  $\rightarrow [ds^2 / dt^2] = - (g/4r) \cdot s$  which is a harmonic oscillation with total time period  $T = 4\pi\sqrt{r/g}$  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  $\bar{v} = \bar{w} \cdot \bar{r}$ , and since  $\rightarrow$  linear momentum  $\bar{p} = \text{Breakage} \times \text{Velocity} = |\bar{w} \cdot r| \cdot 2(\bar{w} \cdot r)^2 = 2(\bar{w} \cdot r) = g$ .  $[(\bar{w} \cdot r)^2 = m] = 2 \cdot g \cdot m$ , then it follows a cycloids trajectory with a Total time period  $T = 4\pi\sqrt{r/g} = R \cdot c/\gamma$  which is dependent on angular velocity only and it is the Spin of particle  $|AA|$ .

#### Remarks:

Breakage  $\times$  Velocity =  $mc \cdot v = (\bar{w} \cdot r)^2 \cdot (\bar{w} \cdot r)$  and force

$$F = [(\bar{w} \cdot r)^2 \cdot (\bar{w} \cdot r)] = 2 \cdot (\bar{w} \cdot r)^2 \cdot (\bar{w} \cdot r) = 2mg$$

This property is used to show that the wavelength of norm  $|\bar{v}|$ , of vectors  $\bar{v}$ , 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  $\bar{v} \cdot r = \sqrt{rg}$

$$\text{Period } T = \frac{2\pi r}{\sqrt{gr}} = \frac{2\pi\sqrt{r}}{\sqrt{g}} = 2\pi \frac{\sqrt{R}}{\sqrt{2g}} = \pi \cdot \sqrt{2} \cdot \sqrt{\frac{R}{g}}$$

$$\text{Area of moving circle } A = \pi \cdot r^2 = \pi \cdot (2r \cdot \cos\phi)^2 = \pi R^2 \cdot \cos^2\phi$$

Thrust is the velocity vector  $\vec{v} = \vec{\omega} \cdot \vec{r}$  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  $|\vec{v}|$  is the static equilibrium position vector of amplitude,  $ds$ , of dipole  $|AB| = |\vec{v}| = ds$  and in terms of the static deflection,  $ds$ , then  $T = 1/f = 2\pi/\omega$  where  $ds = z = \vec{v} = A \cdot e^{i\omega t} = \vec{v} \cdot \cos. \omega t + i \cdot \vec{v} \cdot \sin. \omega t$ .

i. e. Breakages acquire different velocities and different energy, and because 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 Poincaré's ellipsoid now becomes a  $\rightarrow$  < Cycloidal ellipsoid >, since on  $c1(T1) > c2(T2)$ .

Any material point [Medium-Field Material-Fragment]  $\rightarrow [\pm s^2] = |\vec{\omega} \times \vec{r}|^2 \rightarrow$  [MFMF] Field following trajectory, in= $(c1)$ , or, out= $(c2)$ , Cycloid= $(c) = |A1-A2|$  needs more or less time  $T(2) < T = 4\pi \sqrt{r/g} < T(1)$  to reach end  $A2$ .

And since frequency  $f = 1/T$  and energy  $E = h \cdot f$  then Cycloid motion Controls constancy of Energy by changing velocity,  $\vec{v} = \vec{\omega} \cdot \vec{r}$ , and period,  $T$ , of monads.

Breakage quantity 2.  $(\omega r)^2$  under the tangential action  $\vec{v} = \omega r$  becomes 2.  $(\omega r)^3$  acting on point  $A \rightarrow 2\omega r$ .  $m$  of common circle. The same also for points  $A, B, C$  of Space and  $AE, BE, CE$  of Anti-Space. Because all velocity vectors  $AA, BB, CC$  carry material points  $A, B, C$  at points  $DA, DB, DC$  in time,  $t$ , isochrones, then material points follow a cycloid with period the norm of wavelength of velocities  $|AA|, |BB|, |CC|$ .

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 $\gamma$

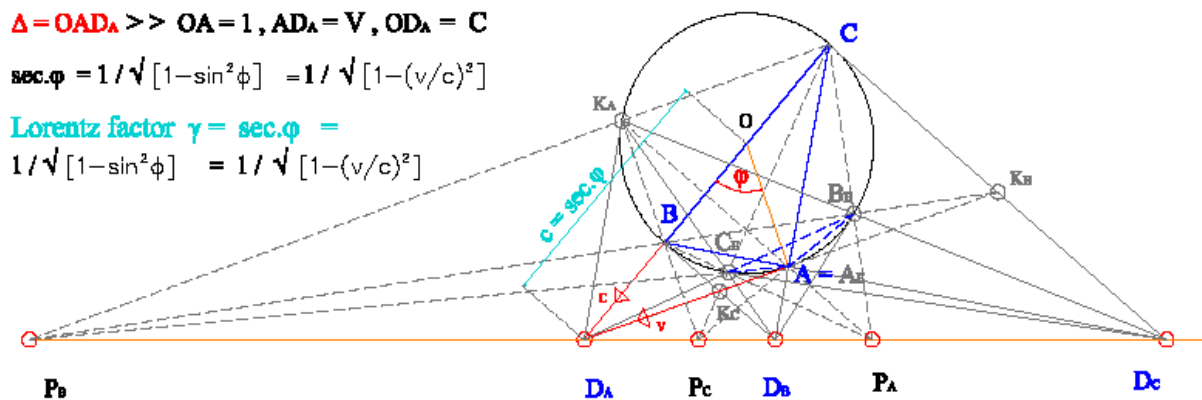


Fig. 5-4. The Geometrical expression of Lorentz factor  $\gamma$  where  $\sec. \phi = \gamma = ODA : ADA = \pm 1 / [\sqrt{1 - (v/c)^2}]$ .

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 [ real, imaginary] =  $[x, y, z - Vi] = \Lambda = r \cdot mv = r^2mw = r \cdot m \cdot (s/t)$  acquire different meters of time independently of any system.

Since in, common circle, exist the constant tangential to,  $r$ , circle velocities,  $\vec{v}$ , and on center  $O$  where  $r = 0$ , Coriolis,

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

Consider  $O(x, y, z, c = O \cdot DA)$  being an Absolute Cartesian coordinate system with constant velocity,  $\vec{c}$ , due to the tangential velocity  $\vec{v} = A \cdot DA$  of the same system and  $O'(x', y', z', \vec{v})$  being another one Cartesian coordinate system on

[STPL] line and as direction  $DA, PA$ .

Question?? When and how the two systems keep Centrifugal velocity  $|O \cdot DA| = \text{constant}$  independently of any changes of velocity,  $\vec{v}$ , of the system??

A first answer is that the two vectors  $|\vec{O}, DA|, |\vec{A}, DA|$  must have the same edge  $DA$  with not any set restrictions, or their interior period  $T = 4\pi \sqrt{r/g}$  to be the same for all equal vectors, which happens to the Cycloid motion on wavelength of norm  $|\vec{c}|$  and  $|\vec{v}|$  of their stationary wave with common period  $T$ . A second is the prior where Centrifugal velocity,  $\vec{v} = \vec{\omega}r$ , is always a constant  $\vec{c}$ , because acceleration  $[d\vec{v}/dt = d(\vec{\omega}r/dt) = 0]$  is zero since  $\vec{\omega}$  is constant.

Since  $r = OA$  maybe any cave of rotation, then is considered a unit length ( $OA=1$ ) and circle  $(O, OA)$  as unit circle. In triangle  $\Delta [O, A, DA]$ ,  $\{OA=1\}$ ,  $\{A, DA = \vec{v}\}$ ,  $\{O, DA = \vec{c}\}$  and  $\sin \phi = (v/c)$  and  $O, DA = \sec. \phi = 1 : (\cos. \phi) = \pm 1 / (\sqrt{1 - \sin^2 \phi})$  and issues  $\sec. \phi = \pm 1 / [\sqrt{1 - (v/c)^2}] = c / [\sqrt{c^2 - v^2}]$  i. e. velocity  $\vec{O}, DA$  is constant independently of the position [either circle  $(O, OA)$  or magnitude  $\vec{A}, DA$  and direction]  $\rightarrow A \cdot DA$  of velocity  $\vec{A}, DA = \vec{v}$  and this mould valid for all points on [STPL] line, cylinder, so  $\sec. \phi$  is identical to the,  $\gamma$ , Lorentz's factor or  $\rightarrow \sec. \phi = \gamma = \pm 1 / [\sqrt{1 - (v/c)^2}] = c / [\sqrt{c^2 - v^2}]$ .



$v^2$  ], 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  $\bar{v}, \bar{c}$  coincide at , DA, point, therefore, the meter of their changes is the same and equal to , t, and  $\bar{O}, DA = c, \bar{A}, DA = \bar{v}. t$ , i. e. on constant velocity vector  $\bar{O}, DA$  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 <Isochrones> 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 (isochrones), independently of oscillation amplitude on the cycloid.

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

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

Since quaternion  $[Energy]^2 = - [Space]^2 = \text{Anti-space} = [-(\Lambda x \Lambda)/m \pm \Lambda x \nabla i] = [\lambda, \pm \Lambda x \nabla i]$  meaning that the massive mechanism Diffraction and the Energy mechanism Diffraction are Interchangeable.

A Particle with wavelength  $\lambda = (1)-(2)$  and spin say ,  $h/2$ , is consisted of two parts, The one because of the translational motion of speed  $\bar{v}$ , and the second of the, *common circle*, self-rotation velocity  $V_c = \lambda^2/T = \lambda^2$ .  $f = [1-(v/c)^2]$ . f. Energy  $[\Lambda x \nabla i] = (J1)$  as velocity vector ,  $v$ , is the cross product of two velocity vectors ,  $\bar{v}1, \bar{v}2$  or  $\rightarrow \bar{v} = \bar{v}1 \times \bar{v}2$ , with head at point (1) and analyzed, in a perpendicular to (1)-(2) directional, plane, into the two orthogonal velocity vectors  $\bar{v}1, \bar{v}2$  which heads are at point (1). Energy J1 is carried to point (2) by following the cycloid motion in  $\lambda = (1)-(2)$  as follows, in F. 4-4.

b. Following the above logic, the vector-quaternion Norm is kept constant by an intrinsic ( in wavelength norm) isochrones (harmonic oscillation) because of the cycloid motion, and independently of amplitudes ( displacements, or strengths).

i. e. Quaternion  $q = [\lambda, \pm \Lambda \nabla i]$  with norm, wavelength  $|\lambda|$  is a Standing wave (a plane Stationary wave) which preserve the constant position of magnitude  $|\lambda|$  with the two edges as nodes independently of amplitude, with a period  $T = [\gamma \lambda / 2c]$ ,  $\Lambda = r. m \bar{v} = r \bar{p} = r. m(\bar{v}r)^2 = mr^2 \bar{v}^2$  depending on ,  $\bar{w}$ , only (it is spin) and thus forming the spherical standing waves. F. 6-5

*Conclusion:*

Applying all equations of Mechanics and Physics in Common circle (c) of radius  $rc$ , angular velocity  $\bar{w}c$ , then velocity on radius is  $\bar{v}c = \bar{w}c. rc$ , and the reaction to this motion which is mass ,  $mc$ , is  $mc = \bar{v}c. \bar{v}c = \bar{v}c^2 = (wr)^2$ . Linear momentum  $\bar{p} = m \bar{v}c$  and the resultant rotational energy  $\Lambda = rc. \bar{p}c = rc. mc. \bar{v}. c$  and then since work on circle is  $W = \bar{p}c. L = \bar{p}c. (2\pi rc) = mc. \bar{v}c. 2\pi rc = \Lambda$ , by solving to ,  $rc$ , and for constant velocity  $\bar{v}c = c$  then,

$$rc = \Lambda / 2\pi. mc. \bar{v}c, rc = \Lambda / 2\pi. mc. c \quad (a)$$

Applying equation (a) for the fundamental particles (monads) OFF the common circle, then magnitudes are transformed as ,

$$\text{mass (m)} \rightarrow mc. \gamma = m. [\sqrt{1-(v/c)^2}] \quad (b)$$

$$\text{radius, rc, of cycloid helix} \rightarrow rc = \Lambda / 2\pi. \gamma m. c \quad (c)$$

Since,  $m = E/c^2 = hf/c^2 = h/Tc^2$  (Einstein's de Broglie's),  $\text{Radius } Rc = 2. rc = 2. \Lambda / 2\pi. \gamma m. c = [h / 2\pi. c \gamma (m = E/c^2 = hf / c^2)] = c / 2\pi. \gamma. f = [c. T / 2\pi. \gamma] = [2c / w. \gamma] [2c^3 / w(c^2-v^2)]$  and

$$(rc) = c / w. \gamma \quad (d)$$

$$\text{Period } Tc = 4\pi. \sqrt{(rc) / g} = \pi. \sqrt{(Rc) / g} \quad (e)$$

Length  $Lc = \bar{v}r. Tc = [\sqrt{g. rc}]$ .  $[4\pi. \sqrt{rc / g}] = 4\pi. (rc) = 4\pi(c/w. \gamma) = A1-A2$ , is the wavelength  $\lambda = Lc \rightarrow$  from which *Constant velocity*  $\rightarrow \bar{c} = w. \gamma. (rc) = w. \gamma. (\lambda / 4\pi) = \gamma. Lc. (fc) / 2 \rightarrow \dots (f)$  Where

$\Lambda = h = \text{Rotational Energy (Spin)}$ ,

$\bar{v} = \text{Velocity of particle in Inertia System [R]}$ ,

$\bar{v}r = \sqrt{g. (rc)} = \text{The Rolling circle center constant velocity}$ ,

$\bar{c} = \text{The constant velocity of the System, (of Light)}$ ,

$Rc = 2. (rc) = \text{The radius of, Cycloid helix}$ ,

$g = \text{Gravity's force} \rightarrow 2. (wr)^2$ , acceleration ,

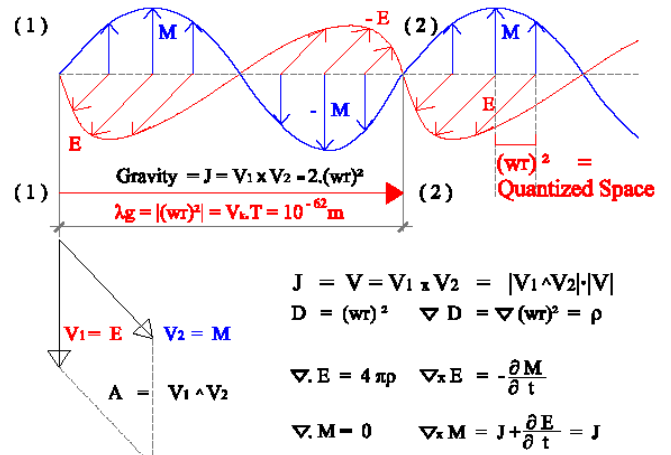
$Tc = \text{The intrinsic Cycloid period, } \pi \sqrt{(Rc) / g}$

$\bar{c} = \gamma Lc(fc) / 2 = \text{The relation between constancy (c) of Light, Laurence factor } (\gamma), \text{ Wavelength } (\lambda = Lc), \text{ Cycloid helix rolling circle frequency}(fc) \rightarrow [39]$ .

## 5. Beyond Gravity Forces

### 5.1. Gravity's Medium Field–Gravity-Force

#### GRAVITY'S STATIONARY WAVE - LENGTH



**Fig. 6-5.**  $[\pm s^2] \rightarrow [MFMF] \text{ Field, } [\bar{V}i] \rightarrow \text{Gravity force. Gravity Transport mechanism in cave } \lambda = 10^{-62} \text{ m and through breakage } \lambda g = [\pm s^2 = \pm |(\bar{w}. r)^2|] = \text{Standing wave} \rightarrow \text{as the Medium Field of Material Fragment, [MFMF]} \rightarrow (1)-(2). \bar{w}$ .

*Properties:*

Since, Distance = Velocity. Time, then  $\lambda = v. T$

The un-clashed through center , O, Fragments  $s^2 = \pm |(\bar{w}. r)^2|$  occupy the minimum quantized space  $|s^2|$  and fill all [STPL] cylinder and thus consist the Rest, Homogenous, Isotropic Base of all motions. On this Base moves force  $[2. |(\bar{w}. r)^2 \bar{V}i|]$ , 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,  $\pm \bar{\Lambda}$ , 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  $W = [\int_A^B P \cdot ds] = 0$  and is stored on points A, B as quaternion  $\bar{z}o = [\lambda, \Lambda \nabla i]$  then forces (the spin  $\bar{\Lambda}$ ) 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,  $\bar{\Lambda} - \bar{\Lambda}$ , 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  $\Lambda$  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 operation through mould  $\bar{z}o$ , so their sum is zero and independently of time (negation truth) as, even function

$$f(\Lambda) \rightarrow (\partial/\partial t, \nabla) \odot (\lambda=0, \Lambda \nabla) = -\nabla, \Lambda \nabla = eo$$

$$\text{odd function } f(-\Lambda) \rightarrow (\partial/\partial t, \nabla) \odot (\lambda=0, -\Lambda \nabla) = \nabla \Lambda, -\nabla \Lambda = eo$$

$$\text{even} + \text{odd} = 0 \rightarrow (-\nabla \Lambda, \nabla \Lambda) + (\nabla \Lambda, -\nabla \Lambda) = [0, 0 + 0] = 0$$

$$\text{even-odd} = 0 \rightarrow (-\nabla \Lambda, \nabla \Lambda) - (\nabla \Lambda, -\nabla \Lambda) = 2[-\Lambda \nabla, \nabla \Lambda] \text{ i. e. is doubled.}$$

In Calculus when a function is 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

$$\int_{\tau/2}^{\tau/2} E(\tau) \cdot \sin. wt. dt = 0 \text{ and } \int_{-\tau/2}^{\tau/2} O(\tau) \cdot \cos. wt. dt = 0$$

Quaternion of the Primary Space dipole is  $\bar{z}o = [s, \bar{\nabla} n. \nabla i] = [\lambda, \Lambda \nabla i]$  and it is the only one Physical existing truth monad ( $\bar{z}o = 1$ ) and ( $eo = 0$ ) the only Physical non-existing equilibrium monad, This negation truth = the equilibrium of the two equal and opposite momentum  $p = \pm \bar{\Lambda}$ , on points and by using the additive form of Binary quaternion then

$$[\nabla \Lambda, 0] + [0, -\nabla \Lambda] = [\nabla \Lambda, -\nabla \Lambda] = 0 \text{ i. e.}$$

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

Conjunction [ $z \times \bar{z}o \rightarrow 0$ ]

Conjugation [ $\bar{z}o \odot 0$ ] Quaternion [ $\bar{z}o \equiv eo$ ]  $\rightarrow 0, zo, 0, zo - 0, 0, zo, zo - zo, 0, zo, zo - 0, zo, zo, 0 - zo, 0, 0, zo, so$  Quaternion's  $\leftrightarrow \bar{z}o = [\lambda, \pm \Lambda \nabla i]$ ,  $\bar{z}o' = [\lambda^2 - |\bar{\Lambda}|^2]$ ,  $eo = [\Lambda \nabla, -\nabla \times \bar{\Lambda}]$  are the three fundamental equations of [PNS], unifying the known homogenous Euclidean geometry ( $\lambda = \lambda \nabla$ ) and the source term Energy ( $d\bar{s}$ .  $dP = \lambda$ .  $\Lambda = \text{constant K1, 2, 3 with motion } \Lambda$ ), and imbedding in them all conservation physical laws with the only two quantized magnitudes  $\lambda$ ,  $\bar{\Lambda}$  on Monad  $\bar{A}B$  which are,  $\lambda = \text{the length of geometry primary dipole (wavelength of dipole } \bar{A}B) \text{ which is a scalar magnitude, } \bar{\Lambda} = \text{the spin of dipole, source term, the amount of rotation on dipole } \bar{A}B, \text{ equal to angular momentum vector } \bar{p} = \bar{\Lambda} = \bar{w}$ .  $\lambda = m$ .  $\bar{v} = d/ds \{ [\int_A^B P \cdot ds] \}$ , and Time = The conversion factor,  $t$ , equal to Zero.

The mechanism of Energy Transport as ( $\bar{v}$ ) through its quantized wavelength  $|\lambda| = \bar{v} \cdot T$ , 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  $[ds^2/dt^2] = -(g/4r)$ .  $s$  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,  $J1$  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 ( $\rightarrow$  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  $\bar{A}B = [\lambda m, \Lambda]$  under the influence of Space Anti-Space forces  $dP = PB - PA$  are created from forces  $dP \parallel$  Space lines the Static Force Field,  $E$ , from forces  $dP \perp$  Space lines the Static Force Field,  $P$ , where  $P \perp E$ , which then experience on any moving dipole  $\bar{A}B$  with velocity  $\bar{v}$ , a total force  $F = F E + F P = (\lambda m) \cdot E + (\lambda m) \cdot \bar{v} \times P$  which combination of the two types result in a helical motion, with stability demand  $\rightarrow E = -(\bar{v} \times P) = -(\bar{v} \cdot P) \perp$  which is the alternative conservation of momentum  $\Lambda^2/2\lambda m$ , in the two perpendicular fields  $E, P$ .

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

$$q \cdot E + q \cdot \bar{v} \times P = q \cdot [E + \bar{v} \times P] \rightarrow$$

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  $\bar{v}$  which is decomposed in two cross product velocity vector fields (Electric and Magnetic) into which breakage  $2(\bar{w} \cdot r)^2$  as charge,  $q$ , causes the Lorentz force in this small scale [27].

The standing waves in cavity (1) - (2) with the scalar breakage  $|\pm(\bar{w} \cdot r)|^2$  as medium (1)-(2) =  $|\pm(\bar{w} \cdot r)|^2$  Field, and Energy  $[\Lambda \times \nabla i] = (J1) = 2 \cdot (\bar{w} \cdot r)^2$  as velocity  $\bar{v}$  only at point

(1), [ and this because Work as Force in extreme case where zero area ( $A=0$ ) becomes velocity  $\bar{v}$  ], need the same time ( different velocities and different energy on (1) are isochrones and this because are following cycloid trajectories in medium (1)-(2) ) to reach edge (2). Energy (J1) as velocity vector,  $\bar{v}$ , is the cross product of two velocity vectors  $\bar{v}_1, \bar{v}_2$  or  $\rightarrow \bar{v} = \bar{v}_1 \times \bar{v}_2$ , with head at point (1) and analyzed, in a perpendicular to (1)-(2) directional, plane, into the two orthogonal velocity vectors  $\bar{v}_1, \bar{v}_2$  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  $\bar{v}_1, \bar{v}_2$ , being vectors, undergo vibrations ( expand as oscillation ) which causes two waves that represent the two Electric and Magnetic perpendicular components ( The combination of vibration (O) and oscillation ( $\rightarrow$ ) is what determines the frequency rate, the cyclic pattern of scalar waves ) until reaching point (2) which is the Reemission of the wave and it is the new head of velocity,  $\bar{v}$ , where then mechanism is recycled. These scalar waves are standing waves that flash on and off.

Since wavelength,  $\lambda$ , as distance (1)-(2) is equal to product velocity ( $v$ ). period (T) then  $\lambda = \bar{v} T$ .

Medium in cavity  $\lambda = (1)-(2)$ , is breakage  $|\pm(\bar{w}. r)^2|$  and Energy (J1) is momentum as velocity vector  $\bar{v} = 2(\bar{w}. r)^2$ , so this velocity vector fits to the scalar magnitude  $|[(\bar{w}. r)^2]| = (1)-(2)$  which is the force in all Inertial systems and is called GRAVITY or momentum GM. Because any particle of mass  $m = 2(wr)^2$  tied to a fix point (1) executes a Simple harmonic motion in Medium (1)-(2) which is breakage  $|\pm(\bar{w}. r)^2|$ , then  $GM = 2(\bar{w}. r)^2$  is a Force also, and it is the intrinsic Stationary velocity vector, which is binding points of this Homogenous-Isotropic, Rest and mass-less nature Field  $\pm(\bar{w}. r)^2$

What is then Gravity Force  $F_g$  and what is Gravity field  $G_f$ ? Since Gravity, momentum, is  $\rightarrow 2(\bar{w}. r)^2$  and medium  $|\pm(\bar{w}. r)^2|$ , then is consisted of very penetrating material in the same material where breakage  $\pm(\bar{w}. r)^2$  formulate infinite dipole that rotate and thus configuration becomes attractive and, is the why Gravity is always attractive.

Since Gravity Force is equally scattered in all universe and as a Rest force is affective, attractive to massive Energy, (matter  $\rightarrow$  Dark matter, Dark energy, the fundamental particles Fermions and Bosons etc. ) as Gravitational Force is differing from, Electromagnetic

Force, which is one of the interaction of other forces of the STPL cylinder, so Gravity Force is as  $\rightarrow$  The Effective process of Gravity Force  $F_g \rightarrow$  Breakage  $|[s^2 = \pm(\bar{w}. r)^2]|$  represents the Infinite Space, Anti - Space and is spread in all dimensions as the Rest and simple harmonic Oscillating Dipole  $\rightarrow (1)-(2) = |[s^2] \leftrightarrow 2[s^2] \leftrightarrow [-s^2]|$  where  $|[\pm s^2]| \rightarrow$  is the Field-Length of Medium 2.  $[s^2] \leftrightarrow$  is the Gravity as momentum ( $m\bar{v}. g$ )  $m = 1 \rightarrow$  because exists zero resistance to motion and happens,

a. Momentum as velocity  $\bar{v}. g$  = the breakage  $2(\bar{w}. r)^2$ , is the cross product of two velocity vectors  $\bar{v}_1 \perp \bar{v}_2$  and is forming the two Fields on Medium  $|(\bar{w}. r)^2|$ , which is a Stationary Wave in medium  $s^2 = |(\bar{w}. r)^2|$ .

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

c. Breakages and Particles with velocity,  $\bar{v}$ , being the units of matter with Electric charge,  $q = \lambda m$ , as their physical property is, When placed in prior referred Electromagnetic Field  $E \perp P$  experience a force as Lorentz's Force and this is called Gravity equal to  $\rightarrow$  Gravity - Force  $F_g = q. [E + \bar{v} \times P] \leftarrow$  and the Homogeneous Gravity - Field  $G_f = [E + \bar{v} \times P] \leftarrow$

## 5.2. Dark matter – Dark Energy

C.  $[\pm \bar{c}. s^2] \rightarrow$  Dark matter and  $[\bar{c}. \nabla i] \rightarrow$  Dark energy

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

Leptons and Bosons with  $\frac{1}{2}$  and 1 spin.

It has been referred that in case Thrust ( $\bar{v} = \bar{w}. r$ ) is not acting on the Breakages, (it is the case where  $r=0$  where then Thrust  $= \bar{v} = \bar{w}. r = 0$ ) the un-clashed through center, O, Fragments  $s^2 = \pm |(\bar{w}. r)^2|$  which occupy the minimum quantized space  $|s^2|$  are deported and fill all [STPL] cylinder which is the Base of all motions.

Constant velocity  $\bar{c}$  is acting in [R] system only, off the common circle and when acting on Breakages  $\pm [(\bar{w}. r)^2]$  produce Dark matter  $\pm \bar{c}. [(\bar{w}. r)^2]$  being the opposite in Relative [R] system and this because of equilibrium of masses, and when acting on Breakages  $2[(\bar{w}. r)^2]$  produce Dark energy  $2\bar{c}[(\bar{w}. r)^2]$  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,  $[(\bar{w}. r)^2] \rightarrow$  moves force  $|[(\bar{w}. r)^2] \nabla i| = 2[(\bar{w}. r)^2]$  as Intrinsic Stationary wave in  $|(\bar{w}. r)^2|$  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,  $\pm \bar{\Lambda}$ , System [S].

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

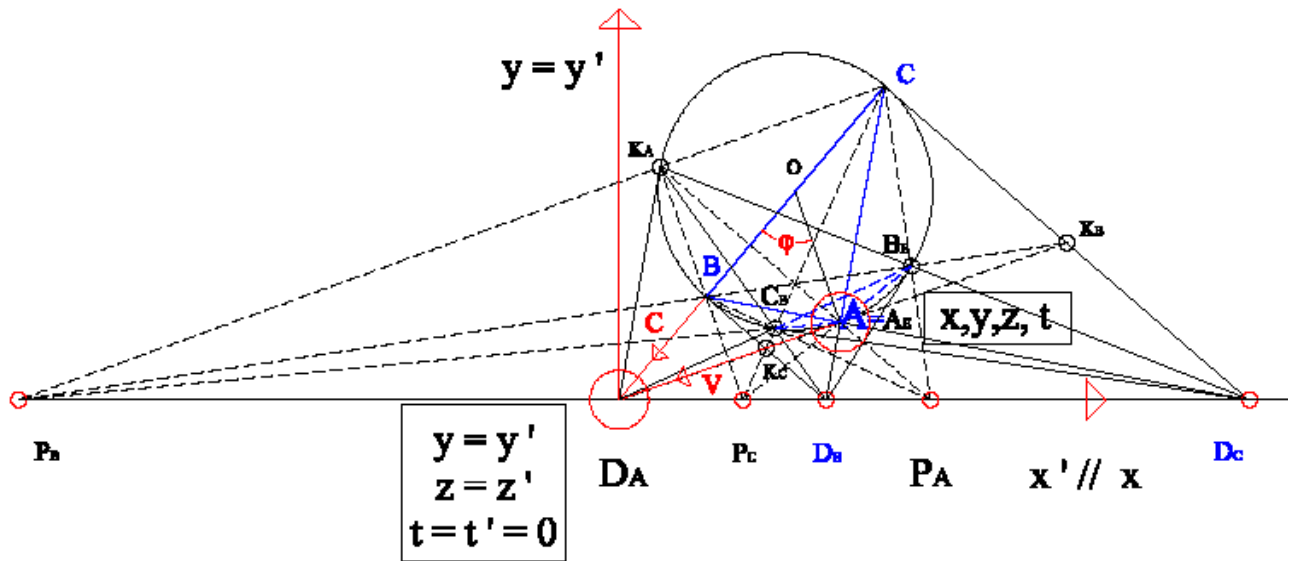
Because power of  $(\bar{w}. r)^2$  is 2 so is a homogenous form of repulsively acting energy, not very dense, in STPL cylinder which permeates all of space interacting with gravity only and following acceleration of universe. Because of the velocities retardations (birefringence of STPL) red shifts must be observed at distance. Dark matter  $\bar{c}. [\pm(\bar{w}. r)^2]$  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  $\pm \Lambda = r. m\bar{v} = r. m. \bar{w}. r = mr^2. \bar{w}$ , so exists that called Relativity. As Absolute System let be [S]  $\equiv \{DA-O\}$  and as the Relative (Reference, Affine) System, [R]  $\equiv \{DA-PA\}$ .

Relative motion of [S]  $\equiv \{DA-O\}$ , [R]  $\equiv \{DA-PA\}$  Systems





**Fig. 7-5.** Reference System  $\{DA-PA\} = [R](x', y', z', t')$  moves with velocity,  $\bar{v}$ , 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  $\bar{c}, \bar{v}$ , vectors are isochrones i. e. period  $T = L/V = 2\pi R/V = 2\pi/[c/r(c)] = 2\pi/[v/r(v)] \rightarrow c/r(c) = v/r(v) \rightarrow c \cdot r(v) = v \cdot r(c)$  where  $r(v)$ ,  $r(c)$  are the radius of their intrinsic rolling circles. This relation is geometrically expressed as sec.  $\phi = O$ .  $DA : A$ .  $DA = \gamma = \pm 1 / [\sqrt{1-(v/c)^2}] = c / [\sqrt{c^2 - v^2}]$  and it is a Cycloid property equal to Lorentz's  $\gamma$ , factor.

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  $\bar{v} = \bar{w}r$  and of angular velocity  $\bar{w}r = 2\pi/T$  where period of rotation,  $T$ , is constant also.

Since acceleration for a quaternion  $z = (s + \bar{v} \cdot \nabla i)$  is  $a = [d^2z/dt^2] = (ds/dt \cdot \bar{v} \cdot \nabla i) + s \cdot d(\bar{v} \cdot \nabla i)/dt = 0 + s \cdot d(wr)/dt = 0 + 0$ , and this because  $\bar{w} = \text{constant for both}$ , therefore, velocity  $\bar{v} = \text{constant}$ , i. e.  $\rightarrow$  Centrifugal velocity of Absolute system  $[S]$  is any constant,  $\bar{c}$ , and thus is not needed to accept apriori this constancy of velocity  $\bar{c} = 0 \rightarrow v \rightarrow \infty$  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  $\bar{c} \cdot r(v) = \bar{v} \cdot r(c) \rightarrow \bar{c} (v)(T/2\pi) = \bar{v} (c)(T/2\pi) \rightarrow \bar{c} (v)/w = \bar{v} (c)/w$  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,  $\sin\phi = (\bar{v}/\bar{c})$  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.

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

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,  $\bar{c}$ , 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  $\rightarrow$  wavelengths are a Stationary wave  $\leftarrow$ , following Lorentz's factor,  $\gamma$ , then this following, happens also to all frames which make this motion, and so issues  $\{DA-O\} = \gamma \cdot \{DA-A\} \dots (F. 5-4)$

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  $\bar{v} = \bar{w} \cdot r$  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  $A \equiv \pm [(\bar{w} \cdot r)^2]$  of the Fixed System  $\{DA-O\}$  travels with velocity  $\bar{v}$  at point DA, so geometrical distance A. DA in the Relative System  $[R] \equiv \{DA-PA\}$  is A.  $DA = x' + \bar{v}t'$ , and because of the isochrones motion in the Fixed System  $[S] \equiv \{DA-O\}$  it is

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

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

$$x' = (x - \bar{v}t) \cdot \gamma = [x - vt] : [\sqrt{1-(v/c)^2}] \dots \quad (5b)$$

b. Conversion factor  $t = \text{time}$ , between the conventional time

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

$$t - t. \sin\phi = t - t(v/c) = (1-v/c). t = (c - v). t / c.$$

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

$$c = x/t = x'/t', \text{ and time } t = x/c, t' = x'/c$$

$$\text{or } t = (x' + vt') / c. (\sqrt{1-(v/c)^2}) = (x'/c) + (v/c). t' : N$$

$$= [(t' + (v/c^2). x') : N = [t' + (v/c^2)x'] : [\sqrt{1-(v/c)^2}] \dots \quad (5c)$$

$$\text{From relation } t' = x'/c = (x-vt). \gamma/c = [t - (v/c^2)x] : N$$

$$= [t - (v/c^2). x] : [\sqrt{1-(v/c)^2}] \dots \quad (5d)$$

i. e. equations,

$$x = (x' + vt'). \gamma = [x' + v. t'] : [\sqrt{1-(v/c)^2}] \dots \quad (5a)$$

$$t = (x' + vt'). \gamma/c = [t' + (v/c^2). x'] : [\sqrt{1-(v/c)^2}] \dots \quad (5c)$$

$$y = y', z = z'$$

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

$$t' = (x - vt). \gamma/c = [t - (v/c^2). x] : [\sqrt{1-(v/c)^2}] \dots \quad (5d)$$

$$y' = y, z' = z$$

are the known equations of Relativity.

c. For constant velocity  $c = \infty$  equations become

$$x = x' + v. t', y = y', z = z', t = t',$$

and inversely

$$x' = x - v. t, y' = y, z' = z, t' = t.$$

issuing in [PNS] Spaces.

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

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

The embedded energy to Breakages, masses, is as

$$E = mv^2/2 = \{2m / [\sqrt{1-(v/c)^2}]\}. c^2/2 = mc^2 / [\sqrt{1-(v/c)^2}]$$

which is the known formula of Einstein in GR.

c1. For  $t = 0$  then  $\sin\phi = vt/c = 0$  independently of velocities,  $v, c$ , where  $\sec. \phi = \pm 1 / [\sqrt{1 - 0^2}] = \pm 1$  and since  $\sin\phi = vt/c = 0$  and when  $c = \infty$  also, then Systems

$$[S] \rightarrow x = x' + v. t', y = y', z = z', t = t',$$

$$[R] \rightarrow x' = x - v. t, y' = y, z' = z, t' = t$$

$$m' = m. \gamma = 2m / [\sqrt{1-(v/c)^2}] \text{ and } E = mc^2 / [\sqrt{1-(v/c)^2}]$$

i. e. [PNS] Space is such that, velocities,  $\bar{v}, \bar{c}$ , exist independently of the Zero conversion factor,  $t$ , and of the constant velocity being  $c = \infty$ , and mass  $M = 2m$ , that of Space and the equilibrium Anti-Space, and infinite energy  $E = mc^2 = \infty$  equilibrium from opposite energy of Anti-Space.

c2. For  $t = c/v$  or,  $v = c$ , then  $\sin\phi = vc/vc = 1$  and  $\sec. \phi = \pm 1 / [\sqrt{1 - 1^2}] = \pm \infty$ , and the Systems →

$$[S] \rightarrow x = x' + v. t', y = y', z = z', t = t',$$

$$[R] \rightarrow x' = x - v. t, y' = y, z' = z, t' = t$$

$m' = m\gamma = \infty$  and  $E = \infty$ , independently of velocities  $v, c$  but from their relation only, i. e. it is a NEW Space where velocities,  $v, c$ , dependent on their relation only and conversion factor,  $t$ , also.

c3. For  $t = 1$  then  $\sin\phi = vt/c = v/c$  and  $\sec. \phi = \pm 1 / [\sqrt{1 - (v/c)^2}] = \pm 1$  and the Systems →

$$[S] \rightarrow x = [x' + v. t'] / [\sqrt{1-(v/c)^2}], y = y', z = z', t = t',$$

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

$$m' = m. \gamma = 2m / [\sqrt{1-(v/c)^2}] \text{ and } E = mc^2 / [\sqrt{1-(v/c)^2}]$$

i. e. it is a Space where velocities,  $\bar{v}, \bar{c}$ , exist and dependent on the conversion factor,  $t$ , and the constant velocity  $\bar{c}$  mass  $m' = 2m / [\sqrt{1-(v/c)^2}]$  and energy  $E = mc^2 / [\sqrt{1-(v/c)^2}]$ .

c4. For  $t = \text{any}, t$ , then  $\sin\phi = vt/c$  and  $\sec. \phi = \pm 1 / [\sqrt{1 - (vt/c)^2}]$  and the Systems →

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

$$[R] \rightarrow x' = [x - vt] / [\sqrt{1-(vt/c)^2}], y' = y, z' = z, t' = t$$

$$m' = m. \gamma = 2m / [\sqrt{1-(vt/c)^2}] \text{ and } E = mc^2 / [\sqrt{1-(v/c)^2}]$$

i. e. it is a Space where velocities,  $\bar{v}, \bar{c}$ , exist and dependent on the conversion factor,  $t$ , and the constant velocity,  $\bar{c}$ , and mass  $m' = 2m / [\sqrt{1-(v/c)^2}]$  and energy  $E = mc^2 / [\sqrt{1-(v/c)^2}]$ . Momentum  $\bar{p} = m\bar{v} = hK$  and Energy  $E = mc^2 = h. f$  possess the double helix structures (the screw motion).

## 6. Photo Elasticity

In Photo elasticity, the speed of light (vector  $\bar{v}$ ) 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

indices,  $n_1, n_2$ , of refraction).

The components of the light waves interfere with each other to produce a color spectrum as this happens in < common circle >.

[Retardation,  $\delta$ , ( $1 \text{ nm} = 10^{-9}$ ) 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.  $\delta/L = n_2 - n_1 = C \cdot (\sigma_1 - \sigma_2)$  where,  $\sigma_1, \sigma_2$ , are the Principal stresses.

Retardation,  $\delta$ , determines color bands or fringes (A fringe  $N$  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 ( $\sigma$ ) 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 [ $f=668\text{-}789\text{THz}$  and  $\lambda=380\text{-}450\text{nm}$ ], Blue  $\equiv [f=606\text{-}668\text{THz}$  and  $\lambda=450\text{-}495\text{nm}]$ , Green  $\equiv [f=526\text{-}606\text{THz}$  and  $\lambda=495\text{-}570\text{nm}]$ , Yellow  $\equiv [f=508\text{-}526\text{THz}$  and  $\lambda=570\text{-}590\text{nm}]$ , Orange  $\equiv [f=484\text{-}508\text{THz}$  and  $\lambda=590\text{-}620\text{nm}]$ , Red  $\equiv [f=400\text{-}484\text{THz}$  and  $\lambda=620\text{-}750\text{nm}]$  as the (1<sup>st</sup> order fringe), Blue-green, -yellow, Orange (dark-yellow), Red, Violet (2<sup>nd</sup> order fringe).

Meaning that White light is the Mixture (Diffraction) of all frequencies, a vector with Low energy  $E = h \cdot f$  at Red (Red-shift)  $\rightarrow$  low  $f = 400\text{-}484\text{THz}$ , long  $\lambda = 620\text{-}750\text{nm}$  (Blue-shift)  $\rightarrow$  high  $f = 606\text{-}668\text{THz}$ , short  $\lambda = 450\text{-}495\text{nm}$  and High energy since  $E = h \cdot f$  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,  $\lambda = 380\text{-}780\text{nm} = (3, 8\text{-}7, 8) \cdot 10^{-7}\text{m}$  and WAVE, as The Stationary Wave in,  $\lambda$ , Meaning that, since Photon is the only Electric Displacement field  $D = \epsilon \cdot E + B$ , then in the rate of change is alternately in terms of The Electric field ( $\partial B/\partial t$ ) and The Magnetic field ( $\partial E/\partial t$ ). This is called the Dual Nature of light or Wave-Particle Duality.

Because GR was confined in Planck's length cavity (clef, slit) of  $\hbar \equiv 1, 054 \cdot 10^{-34} \text{ Js}$  failed to perceive the infinite cavities of nature being beyond Planck's level and which are wavelengths,  $\lambda$ , of monads  $\equiv$  quaternion  $\equiv q = [s + \bar{v} \cdot \bar{v}i]$ . [31-36]

Energy confined in a monad [The inner structure of monads] is the Stationary wave on the Real part [ $|s| = \lambda = \text{wavelength}$ ], and the Electric Displacement field ( $\bar{v} = \epsilon \cdot E + B$ ), alternately in terms of The Electric field  $E = (\partial B/\partial t)$  and The Magnetic field  $B = (\partial E/\partial t)$  (F. 9-7)

Common circle is not empty space because of different angular velocity vector,  $v = \bar{w} \cdot r$ , and because of the malty refractivity and birefringence behaves as crystal with single or double or multi refractivity and in the absence of applied

Torques produces a color Spectrum which is, the Color Forces  $\rightarrow$  Gluon Red, Gluon Green, Gluon Blue...

Stability is obtained by the opposite momentum  $-\bar{\Lambda}$  where  $E = -(\bar{v} \times B) = -(\bar{v} \cdot B) \perp \rightarrow$  or and  $B \perp E$ .

The two perpendicular Static force fields  $E$  and Static force field  $B$  of Space-Anti-Space, experience on any moving dipole  $\bar{AB} = [\lambda, \Lambda]$  with velocity  $\bar{v}$  (momentum  $\bar{\Lambda} = m \cdot \bar{v}$  only is exerting the velocity vector  $\bar{v}$  to the dipole  $\lambda$ ) a total force  $F = F_E + F_B = (\lambda m) \cdot E + (\Lambda m) \cdot \bar{v} \times B$  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 curl 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  $\rightarrow ET = \sqrt{[m \cdot vE]^2 + [\Lambda \cdot vB + \Lambda \times vB]^2} = \sqrt{[m \cdot \bar{v}E]^2 + E^2} = \sqrt{[m \cdot \bar{v} \cdot E^2]^2 + |\sqrt{p1} \bar{v} \cdot B|^2 + |\sqrt{p2} \bar{v} \cdot B|^2 + |\sqrt{p3} \bar{v} \cdot B|^2}$  i. e. a moving Energy cuboids ( $a \times b \times c$ ), rectangular parallelepiped, with space diagonal length equal to  $E = \sqrt{a^2 + b^2 + c^2}$  where  $\rightarrow a = |p1 \cdot \bar{v}B|$ ,  $b = |p2 \cdot \bar{v}B|$ ,  $c = |p3 \cdot \bar{v}B|$  and when  $\bar{v} \cdot E = 0$  then  $ET = \Lambda \cdot \bar{v}B + \Lambda \times \bar{v}B \rightarrow$  which is the accelerating removing energy  $\Lambda$  towards  $\bar{v}B$  is  $m = 0$ , and then  $ET = \Lambda \bar{v}B + \Lambda \times \bar{v}B \rightarrow$  which is the linearly removing energy  $\Lambda$  towards  $\bar{v}B$ , and for  $\bar{v}B = 0$ , then  $ET = m \cdot \bar{v}E^2 \rightarrow$  which is the Kinetic energy in Newtonian mechanics towards  $\bar{v}E$ .

## 6.1. Conclusions

Any moving monad [ $z = s + \bar{v}$ ] is transformed into  $\rightarrow$

1. In Elastic material Configuration, as Strain Energy and is absorbed as Support Reactions and displacement field [ $\nabla \epsilon$  ( $\bar{u}, \bar{v}, \bar{w}$ )] upon the deformed placement, (where these alterations of shape by pressure or stress is the equilibrium state of the Configuration [26], and then equations of Elasticity are,  $G \cdot \nabla^2 \cdot \epsilon + [m \cdot G / (m-2)] \cdot \nabla[\nabla \cdot \epsilon] = F$ ) or in isotropic material [ $\mu \cdot \nabla^2 \cdot \epsilon + (\lambda + \mu) \cdot \nabla(\nabla \cdot \epsilon)] + F = 0$ ]. [22-23]

2. In Solid material Configuration, as Kinetic (Energy of motion  $\bar{v}$ ) 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 ( $\delta \bar{r} \cdot c$ )  $= [\bar{v} \cdot c + \bar{w} \cdot \bar{r}n] \delta t$ , as the Inertia ellipsoid [Poinot's ellipsoid construction] in [S] frame which instantaneously rotates around vector axis  $\bar{w}$ ,  $\phi$  with the constant polar distance  $\bar{w} \cdot Fe / |Fe|$  and the constant angles  $\theta_s, \theta_b$ , traced on, Reference [R] cone and on [S] cone, which are rolling around the common axis of  $\bar{w}$  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  $\bar{w}$  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  $W = [A-B] \cdot P \cdot ds = 0$ , where magnitudes  $P, d\bar{s}$  can be varied leaving work

unaltered. The Diffusion (decomposition) of Energy is as the mechanism of Energy Transport as ( $\bar{v}$ ), 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  $J = (J1)=(J2)$  as Electric and Magnetic field of Electric Displacement by the two neighbor edges (1) and (2) of the medium following Cycloid 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 Cycloid motion (the magnitude of wavelength vector  $|\lambda|$ ), from initial (1) to subsequent position (2), as  $|\lambda| = (1)-(2)$ . During shifting Energy as velocity vector,  $\bar{v}$ , (and this because extreme case happens for zero application area) is decomposed into two velocity vectors  $\bar{v}1$ ,  $\bar{v}2$ , 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,  $\bar{v}$ , where then mechanism is recycled.

5. The dynamics of any System = Work = Total Energy, is transferred as generalized force  $Q_n$  as,  $Q_n = \partial W / \partial (\delta \bar{q}_n)$ , ( $\delta \bar{q}_n$ ) =  $\bar{v}n$ .  $\delta t = [\bar{v}c + \bar{w} \cdot \bar{r}n]$   $\delta t = (\text{Translational} + \text{rotational velocity})$ .  $\delta t$  as velocity and  $Q_n = [\bar{v}c \cdot (\partial T / \partial t) + \bar{w} \cdot \bar{r}n] \cdot (\partial T / \partial t) \rightarrow \text{Translational kinetic energy} + \text{Rotational kinetic energy as Energy}$ . [40]

6. The ultimate Constituents of Monads ( $s$ ,  $\bar{v}$ ,  $\bar{V}i$ ) is the real part,  $|s|$ , and the Magnitude of Imaginary part as Vector  $\bar{v} = \bar{V}i$ , decomposed into velocity vectors  $\bar{v}1$ ,  $\bar{v}2$ . [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 into Gravity cave  $L_g = 2 \cdot r = e^{-i \cdot (-9\pi/2)b} = 3,969 \cdot 10^{-62} \text{m}$ , is inversely balancing the Common circle, of Space, Anti-. For rotations Space, with velocities  $[\bar{v}g = \bar{w}r]$  that of light,  $\bar{c}$ , tending to zero in cave  $L_c > L_g$  then exist velocities  $[\bar{v}c > c]$  tending to infinity. The hidden pattern of universe is, STPL line, which is off the Spaces and connect them (it maintains, conserve and support all universe), so may say, it is *The Naval Cord (string) of Galaxies*. [33-34]. i. e.

In Common Circle (the Sub-Space) of rotating Space Anti-Space  $[\pm \Lambda]$ , with maximum angular Velocity Vector,  $v = w \cdot r$  on circumference, [in the absence of applied Torques and because of the Birefringence property of stress continuum with different indices,  $n$ , of refraction, which creates the Retardation,  $\delta$ , determining Color Bands or Fringes] Produces a color Spectrum which is, the *<Color Forces>*  $\rightarrow$  Gluon Red, Gluon Green, Gluon Blue.

When tangential velocity  $\bar{v} = w \cdot r$  on circumference of a cave,  $r$ , is in another of radius  $R > r$ , then the new tangential velocity  $\bar{v} = \bar{w} \cdot R$  is greater than  $\bar{v}$  and when  $v \nearrow$  is the speed of light, then the new  $\bar{v}$  are velocities greater than that of light.

7. In Black holes Energy scale  $[\lambda]$ .  $\Lambda = k \cdot 1$  there are infinite high frequency small amplitude vacuum fluctuations at Planck energy density of  $10^{113} \text{J/m}^3$  that exert action (pressure) on the moving Spaces dipole and their Stability is always achieved by Anti-space in rotational equilibrium.

8. Dipole vectors are quaternion's (versors) of waving nature, i. e., one wavelength  $|\lambda|$  in circumference in energy levels, that conserve energy by transferring the Total kinetic energy  $T$  into angular momentum  $L = \bar{r}m\bar{v} = \bar{r} \cdot \bar{p} = \bar{r}\Lambda$ , as constant mass  $m = \pm [(\bar{w} \cdot r)^2]$ . Different versors with different Energy (scalar) possess the same angular momentum. A Composition of Scalar Fields ( $s$ ) and Vector Fields ( $\bar{v}$ ) 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  $\rightarrow v \cdot [(\bar{w} \cdot r)^2]$ ,  $-v \cdot [(\bar{w} \cdot r)^2]$ ,  $2 \cdot (\bar{w} \cdot r)^2$  on, common circle, are produced Particles  $\rightarrow$  Fermions  $\pm (\bar{w} \cdot r)[(\bar{w} \cdot r)^2]$  and Bosons  $\pm 2 \cdot (\bar{w} \cdot r)[(\bar{w} \cdot r)^2]$  which are conveyed in STPL cylinder. [35]

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

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

From, vector analysis, multiplication of a Scalar ( $s$ ) magnitude and a vector ( $\bar{v}$ ) magnitude is  $\rightarrow s \cdot \bar{v} =$  vector Dot product of two vectors,  $v1 \cdot v2 =$  yields a scalar

Cross product of two vectors  $v1 \times v2 =$  yields a vector

Breakage  $(\bar{w} \cdot r)^2 = |(\bar{w} \cdot r)| \cdot |(\bar{w} \cdot r)|$  is the massive real part therefore is a scalar magnitude.

Breakage  $-(\bar{w} \cdot r)^2 = -(\bar{w} \cdot r) \cdot (\bar{w} \cdot r)$  is the massive energy part therefore is a scalar magnitude.

Breakage  $2 \cdot (\bar{w} \cdot r)^2 = 2|(\bar{w} \cdot r)| \cdot |(\bar{w} \cdot r)|$  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 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 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  $\pm(\bar{w} \cdot r)^2 = s$ , 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  $\pm(\bar{w} \cdot r)^2$  is a Rest, Neutral, Homogenous and Isotropic material and also the mediator of all fields - changes such that these cannot exceed the constant velocity,  $\bar{c}$ , 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  $z = (s + \bar{v} \cdot \nabla i)$  is  $a = [d^2z/dt^2] = (d/dt, w)$ .  $(-wz, dz/dt + wxz) = 0$ , and this because  $\bar{w} = \text{constant}$ , therefore velocity  $\bar{v} = \text{constant}$

### 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  $\pm(\bar{p})$  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  $\bar{p} = \Lambda$  as energy, *on the intrinsic orientation position of points*, on all points of the microscopic and macroscopic homogeneity as  $(\partial/\partial t, \bar{w}) \odot (-\lambda\bar{p}, \nabla_x \Lambda) = [0, \Lambda]$ .

2. Momentum  $\bar{p} = \Lambda$  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)  $\rightarrow m$ .  $[d^2\bar{r}/dt^2 + m \cdot [d\bar{w}/dt \times \bar{r} + 2\bar{w} \times (d\bar{r}/dt) + \bar{w} \times (\bar{w} \times \bar{r})]$  where momentum  $\bar{p} = m \cdot r\bar{w}$  and mass  $m$  is a constant equal to, *the Reaction to the motion*, or as Inertia ( $I$ ) which are a natural property of dipole and both are conserved vice versa. Forces  $dP = PA - PB$  parallel to the Space, Anti-Space lines  $[S] \perp [AS]$ , create a Static force field  $B$ , and when Forces  $dP$  are perpendicular to the Space Anti-Space lines, create a Static force field  $E$ , 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  $\lambda \cdot \Lambda = k \cdot 1, 2, 3$  constant for each energy level. The fundamental force in universe is the total kinetic energy  $T = 1/2 \bar{w}L = \Sigma(L^2/2 \cdot I)$ , a repulsive force following Pythagoras conservation 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*  $\bar{w}$ , 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  $[d\bar{w}/dt \times \bar{r} + 2\bar{w} \times (d\bar{r}/dt) + \bar{w} \times (\bar{w} \times \bar{r})]$  where angular velocity is  $\bar{w} = |\Lambda| / |\bar{r}| = k/(\lambda m)$  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 ( $\lambda \cdot \Lambda = k \cdot 1$ ) there are infinite high frequency small amplitude vacuum fluctuations at Planck energy density of  $10^{113}$  J/m<sup>3</sup> 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.*, one wavelength in circumference in energy levels, that conserve energy by transferring Total kinetic energy  $T$

into angular momentum  $L = \bar{r}m\bar{v} = \bar{r}p = \bar{r}\Lambda$ , where mass  $m$  is a Constant. Different versors with different Energy (scalar) possess the same angular momentum. A Composition of Scalar Fields ( $s$ ) and Vector Fields ( $\bar{v}$ ) 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.*  $\rightarrow$

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 ( $r \cdot mv$  Rotational,  $mv$  Linear) per change in time. For a constant mass, force equals  $< \text{mass times acceleration } F = ma >$ , or  $F = dp/dt = d(mv)/dt = m(dv/dt) = m \cdot a$ ,

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,



$A \equiv B$  Principle of infinite Superposition ( extreme )

$A/B = C/D$  The Principle of Proportionality

And in Mechanics one is,  $A \leftrightarrow B = \infty$ , The Principle of Virtual Displacements  $\sum [P_i + H_i] \cdot \delta \vec{r}_i = 0 \rightarrow W = \int P \cdot ds = 0$ ,

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  $\rightarrow$

As in geometry the same in Physics,  $PAB = -PBA$  or  $PAB + PBA = 0$ , or as, The Infinite points in [PNS] form infinite Units, monads  $A_i B_i = d\vec{s}$ , which equilibrium by the Primary Anti-Space by an Inner Impulse (P) at edges A, B where  $P \cdot iA + P \cdot iB = 0$ , and  $ds = 0 \rightarrow N \rightarrow \infty$  and where Monad  $\bar{A}B$  is the ENTITY and Elements=Breakages  $[A, B] - P\bar{A}, P\bar{B}$  is the LAW of monad AB, and also  $\rightarrow$  The {Space, Anti-Space equilibrium,  $\pm \bar{A}$ , Absolute System [S] } is at Rest, as Angular momentum  $\bar{A} = \Omega = mvr$ , and is Crushed out into Fragments, becoming the three Breakages  $[s^2 = (wr)^2]$ ,  $[-s^2 = - (wr)^2]$ ,  $[V_i = 2(wr)^2]$  and after clashed with the velocity vector  $\bar{v}$  of [S], (unless succeed escaping un clashed through center O of [S] into [R]=[STPL] and this because  $\bar{v} = 0$ ), are Thrown OFF this System [S], (in order to avoid scattering, in STPL line) conveyed into the Linear momentum, the Inertial and Energy-Space, the Relative [STPL] System [R] as the Particles Fermions  $\rightarrow [\bar{v} \cdot s^2]$  and Bosons  $\rightarrow [\bar{v} \cdot V_i]$  with momentum,  $m\vec{v}$ , which behave, as Mass and as Force, in Relative System [R], The Un-clashed through center, O, Fragments  $s^2 = \pm |(\bar{w} \cdot r)^2|$  occupying the minimum quantized space  $|s^2|$  are deported and fill all [STPL] cylinder which is the Rest Quantized Field  $\pm [(\bar{w} \cdot r)^2]$  or, The material point in mechanics, as the base of all motions and the force  $[|(\bar{w} \cdot r)^2 V_i] = 2 \cdot [(\bar{w} \cdot r)^2]$ , Vibrating on  $[|(\bar{w} \cdot r)^2|] = \lambda$  as an Stationary Wave creates a curl Electromagnetic Field  $E \perp P$  which is the Universal Quantized force called Gravity, meaning that Newton's laws issue in both, Absolute System [S] and Relative System [R].

2). Object in mechanics, may be the Material point (1) at Euclidean point (1), which is now Breakage  $\pm [(\bar{w} \cdot r)^2]$  magnitude in the Rest Homogenously – Isotropically Quantized mass-less Field  $\pm [(\bar{w} \cdot r)^2]$  and is the required coordinate System and base for all motions and forces. This rest Space system [PNS] (the Base) is [MFMF] Field with the less space distance  $ds = |\bar{w} \cdot \vec{r}|^2$  is the *Space Quanta*.

3). Object in mechanics may be also the Material wavelength  $\lambda = (1)-(2)$  in the {[Medium-Field Material Fragment]  $\rightarrow [\pm s^2] = |\bar{w} \cdot \vec{r}|^2 = [MFMF]$  Field  $\leftarrow$ } which is a standing wave in cavity (1)-(2) with scalar breakage  $|\pm(\bar{w} \cdot r)^2|$  as medium (1)-(2) field, and (J1) as energy at point (1) and carried to point (2) by following the cycloid motion from (1) to (2) which is isochrones. Velocity,  $\bar{v}$ , during shifting is analyzed into two velocity vectors  $\bar{v}_1, \bar{v}_2$ , which undergo vibrations causing two waves that represent the two Electric and Magnetic perpendicular components following the trajectory, in=(c1), out=(c2). On cycloid = (c)=|A1-A2| is needed the isochrones time  $T=2\pi\sqrt{2}/w$  to reach end A2 < Fermat's Principle of Least time > is the Extreme in < Isochrones Principle > which is embedded in all wavelength vector monads which consist the *Energy Quanta*.

## 7.2. Einstein's General Relativity [ GR ]

A. The, *Laws of Physics*, are the same for all Inertial reference frames

B. Light always propagates through a Vacuum at a, *definite velocity*,  $c$ , which is independent of the state of motion of the emitting body.

a. *Maxwell's Displacement current*  $\rightarrow Dc$  :

$Dc$  is a quantity appearing in Maxwell's equations of Electromagnetism and is defined in terms of the rate of change of, *electric displacement fields*  $D$ , in a dielectric medium and is defined as  $D = \epsilon \cdot E + P$  where,

$\epsilon$  = The permittivity of the free space,

$E$  = The electric field intensity,

$P$  = The polarization of the medium. By differentiating equation

$$dD/dt = JD = \epsilon \cdot (\partial E / \partial t) + (\partial P / \partial t)$$

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

$(\partial P / \partial t)$  = The Electric field  $\rightarrow E \leftarrow$

and in Isotropic dielectric case ( $P=0$ ) then  $D = \epsilon \cdot E$  and Maxwell's equations become :

$\nabla \cdot D = \rho \rightarrow$  Gauss's law for Electrostatic

$\nabla \cdot B = 0 \rightarrow$  Gauss's law for Magneto static

$\nabla \cdot B = \rho / \epsilon_0 \rightarrow$  Gauss's law for Magnetism.

$\nabla \times D = J \rightarrow$  Ampere's law

$\nabla \times E + (\partial B / \partial t) = 0 \rightarrow$  Faradays' law where

$D = \epsilon \cdot E, H = B / \mu \rightarrow$  in SI units,

$\rho$  = The free charge density

$\epsilon_0$  = Electric constant

For the origin of Maxwell's equations [40].

Relativity considers such a current could be very directly connected to empirical phenomena, < *Speculation had proved itself superior to empiricism* >

Remarks (a) :

Since wavelength,  $\lambda$ , as distance is equal to product velocity ( $v$ ). period ( $T$ ) then  $\lambda = \bar{v} \cdot T$ . 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  $\bar{v} = \bar{w} \cdot r$  being wavelength which is connected to angular momentum  $\bar{A} = r \cdot m\bar{v} = m \cdot \bar{w} \cdot r^2$  in Planck's or beyond Planck's length  $L_p = 1,616 \cdot 10^{-35} \times \pi \cdot \sqrt{3} = 8,906 \cdot 10^{-35} \text{ m}$ , decomposed into the two perpendicular velocity vectors  $\bar{v}_1, \bar{v}_2$  which create Electric (E) and Magnetic field (P). The same also for macroscopic bound current circulation around a material's (monad) surface. [29]

Velocity describes the origin of magnetic in the law field as variation of Electric Flux. Since  $Dc$  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  $|\pm(\bar{w} \cdot r)^2|$  of Gravity Field and Energy on (1) is the density velocity vector  $\bar{v} = |D(1)|$ . In stationary wave conservation of energy (charge) is assembled.

Velocity vector,  $\bar{v}$ , which is the cross product of two

velocity vectors  $\bar{v}_1$ ,  $\bar{v}_2$  or  $\rightarrow \bar{v} = \bar{v}_1 \times \bar{v}_2$ , with head at point (1) and analyzed, in a perpendicular to  $\lambda = (1)-(2)$  directional plane into the two orthogonal velocity vectors,  $\bar{v}_1$ ,  $\bar{v}_2$  which heads are at point (1), is carried to point (2) by following the cycloid motion (1)-(2). During shifting, velocity vectors  $\bar{v}_1$ ,  $\bar{v}_2$ , 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,  $\bar{v}$ , where then mechanism is recycled. Source is Rotation dipoles  $\bar{v} = \bar{\omega} \cdot r$ , because of angular velocity vector  $\bar{\omega}$ , in Stationary wave decomposed into the two velocity vectors  $\bar{v}_1 \perp \bar{v}_2$  forming Electrical and Magnetic field, E, P, as sink following cycloid Isochrones motion. i. e.

Electric Displacement density (field),  $D = \epsilon \cdot E + P$ , in an dielectric medium, of any moving charge of wavelength,  $\lambda$ , in the rate of change, is alternately in terms of The Electric field ( $\partial P / \partial t$ ) and of The Magnetic field ( $\partial E / \partial t$ ) in phase with each other in the wavelength,  $\lambda$ ,  $\rightarrow$  and generally meaning that velocity vector  $\bar{v} = \lambda / T = \lambda f$ , 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 Electromagnetism Induction).

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

The Duality Principle of Photon is the Intensity of light vector  $|\bar{v}|$  = real part, which is Particle and since light is quaternion  $\rightarrow [q = s + \nabla i \times D i]$  then photon represents the intensity of light where  $s$  = Particle, and as Wave is the Electromagnetic fields  $E, P = \nabla i \times D i$  = Wave nature as energy, where  $\nabla i = \bar{v} = \lambda f = \lambda / T$ , 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  $\bar{A} = r \cdot m \cdot \bar{v}$ , centrifugal velocity  $\bar{v} = \bar{\omega} \cdot r$  are constant because acceleration  $[d\bar{v}/dt = d(\bar{\omega} \cdot r)/dt = 0]$  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  $\nabla i = ExP$  are Variant in Invariant rotational energy  $\bar{A} = r \cdot m \cdot \bar{v} = m \cdot \omega r^2$  as velocity  $\bar{v} = \bar{\omega} r$ , meaning that quaternion = energy, travels by changing velocity  $\bar{v}$  and angular velocity  $\bar{\omega} = 2\pi/T$ , 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  $\bar{v}$ ), 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  $\bar{v}$ , The Monads in monads is a characteristic expression.

Einstein failed to see this reality (zero acceleration of rotational velocity  $\cdot \bar{\omega}$ ) 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.

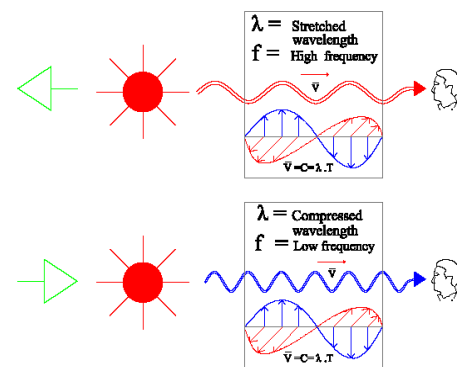


Fig. 8-7. Increasing-Decreasing  $\lambda$  of a Removal Source  $V(f)$

b. Equivalence Principle:

In a uniformly and non-uniformly accelerated reference frame with acceleration,  $a$ , situated in a Gravitational field of gravity,  $g$ , then  $g = -a$  = 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

$a = d\bar{v}/dt \rightarrow$  equal to acceleration due to gravity,  $g$ .

Gravity is the Stationary force  $\rightarrow [\nabla i = 2(\omega r)^2] \leftarrow$  on the base for all motions  $\rightarrow$  Medium-Field Material-Fragment,  $|\pm s^2| = (\omega r)^2 = [MFMF] \leftarrow$  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  $[10^{-62} - 10^{-35}]$ .

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 wavelength,  $\lambda$ , as vector monads.

During Intrinsic Diffraction,  $d\bar{s} = \lambda$ , of isochronous motion of vectors, frequency,  $f$ , doesn't change and only the velocity,  $\bar{v}$ , and wavelength,  $\lambda$ , changes so from equation

$$\lambda = \bar{v} \cdot T = \bar{v} / f, \quad \bar{v} = \lambda f \text{ and } a = d\bar{v}/dt = (d\lambda/dt) \cdot f + \lambda(df/dt)$$

then  $\rightarrow a = g = d\bar{v}/dt = (d\lambda/dt) \cdot f$  since  $f = \text{constant}$ ,  $\rightarrow$  or

Let  $\lambda \rightarrow$  be the wavelength of a moving monad,  $t = \lambda / c \rightarrow$  is the needed time to cross length,  $\lambda$ ,

$s = at^2 / 2 \rightarrow$  Deflection due to acceleration,  $a$ ,

$H = gt^2 / 2 \rightarrow$  Deflection due to acceleration of,  $g$ , (h)

For  $s = \lambda$  then  $s = at^2 / 2 = c \cdot T$  where  $T$  is the period of Isochrones displacement and  $t^2 = 2 \cdot cT / a \dots$  (1) from equation (h)  $t^2 = 2 \cdot H / g \dots$  (2) and by equating (1), (2) then  $cT/a = H/g$  and since in gravity field where cycloid motion (Simultaneity) defines the same displacement,  $cT, H$  then  $ct = H$ , and also  $a = g$ ,

Therefore all particles have the same acceleration,  $g$ , in our gravitational field with frequency unchanged, and  $\rightarrow$  velocity,  $\bar{v}$ , with wavelength,  $\lambda$ , to be changed  $\leftarrow$  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  $\rightarrow$  [Space, Anti-Space equilibrium,  $\pm \bar{\Lambda}$ , Absolute System [S]  $\leftarrow$ ], as Angular momentum  $\bar{\Lambda} = \Omega = mvr$ , is Crushed out into Fragments and, becoming the three Breakages  $[s^2 = (wr)^2]$ ,  $[-s^2 = - (wr)^2]$ ,  $[\nabla i = 2(wr)^2]$ , and after clashed with the velocity vector  $\bar{v}$  of [S], (unless succeed to escape un-clashed through center O in STPL cylinder and this because of  $\bar{v} = 0$ ), are Thrown OFF this System [S], conveyed into the, Relative [STPL] System [R], with Linear momentum and Inertial Energy-Space, as the Particles Fermions  $\rightarrow [\pm \bar{v} \cdot s^2]$  and Bosons  $\rightarrow [\bar{v} \cdot \nabla i]$ .

The un-clashed through center, O, Fragments  $s^2 = \pm (\bar{w} \cdot r)^2$  occupy the minimum quantized space  $|s^2|$  and consist the Medium-Field Material-Fragment  $\rightarrow [\pm s^2] = [\text{MFMF}]$  as base for all motions, fill all [STPL] cylinder and thus consist the Rest, Homogenous, Isotropic Base of all motions . On this Base, force  $[\nabla i] = [2 \cdot |(\bar{w} \cdot r)^2| \nabla i]$  called 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,  $\pm \bar{\Lambda}$ , System [S] .

Un-clashed Fragments through center O, clashed with the constant velocity,  $\bar{v}$ , consist the Dark matter  $[\pm \bar{v} \cdot s^2]$  and the Dark energy  $[\bar{v} \cdot \nabla i]$ , or in summary,

A.  $[\pm \bar{v} \cdot s^2] \rightarrow$  Fermions  $[\bar{v} \cdot \nabla i] \rightarrow$  Bosons

B.  $[\pm s^2] \rightarrow [\text{MFMF}]$  Field  $[\nabla i] \rightarrow$  Gravity force

C.  $[\pm \bar{v} \cdot s^2] \rightarrow$  Dark matter  $[\bar{v} \cdot \nabla i] \rightarrow$  Dark energy

Since  $[\text{MFMF}] = [\pm s^2 = (wr)^2]$  is the base for all motions and Gravity force  $[\nabla i] = [2 \cdot |(\bar{w} \cdot r)^2| \nabla i] = 2 \cdot (\pm s^2) = 2(wr)^2$  then forces (from anywhere) is twice the Base, i. e. Base is half (1/2) of Gravity force, (or perturbations from other planets 80s), so Base is  $\rightarrow 80 / 2 = 40s$ , 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  $[\text{MFMF}] = s^2 = \pm |(\bar{w} \cdot r)^2|$  as the smallest quantized space of this level. Let,  $L$ , be the length of an undergoing constant acceleration monad in gravity field,

$t = L / c \rightarrow$  is the needed time to cross length  $L$ ,

$s = at^2 / 2 = aL^2 / 2c^2 \rightarrow$  is Deflection due to acceleration,  $a$ ,

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

2. For Photon wavelength  $\lambda = 6, 21 \cdot 10^{-7}m$  as Monad in monad Photons  $= 9, 81(\lambda/c)^2 / 2 = 2, 101 \cdot 10^{-14} m$  corresponding to an angle  $\theta = s/3600 = 5, 386 \cdot 10^{-18}$  degrees of second

3. For an arc on earth surface  $\pi \cdot (Km)^2 = 3142 \cdot 10^3 m$  then  $s = 9, 81 \cdot (9, 872/9) \cdot (10^{12}/10^{16}) = 5, 38 \cdot 10^{-4} = 0, 53810^3 mm$ , which corresponds to an angle  $\theta$  arc-sec  $\rightarrow 3600 \cdot s = 1, 883$ - arc. sec.

e. Gravitational red-shift and Time Dilation :

Gravitational red-shift is the Phenomenon where low frequencies of light [long  $T = 620-750 nm$ ] shifted to red (red-shift  $\rightarrow f = 400 - 484 THz$ ) and higher frequencies of light [short  $T = 450-495 nm$ ] are shifted to blue (blue-shifted  $\rightarrow f = 606 - 668 THz$ ) and Time Dilation the opposite Phenomenon for time.

Remarks (e):

The answer is as below using the intrinsic property of

Constant light velocity vector  $|\bar{v}|$ , which is a Stationary wave in Photon's wavelength  $\lambda$ , as  $\rightarrow \bar{v} = \lambda / T = \lambda f$

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  $[(\sigma_1 - \sigma_2) = J \cdot k/d]$  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.

Stretching Removal of  $\lambda$  creates,  $-\sigma_1$ , while, Compressed Removal of  $\lambda$  creates,  $+\sigma_1$ , and since velocity,  $c$ , is constant, long and short period  $T$ , or low and high,  $f$ , varies and a vector with Low energy  $E = h \cdot f$  at Red, (Red-shift)  $\rightarrow$  low  $f =$

400-484THz, long  $\lambda = 620-750\text{nm}$  (Blue-shift)  $\rightarrow$  high  $f = 606-668\text{ THz}$ , short  $\lambda = 450-495\text{nm}$  and High energy since  $E = h \cdot f$  at Blue.

In this way Light is  $s =$  Particle as Photon,  $s = \lambda = 380-780\text{ nm} = (3, 8-7, 8) \cdot 10^{-7}\text{ m}$  and as Wave, the Stationary Electromagnetic fields  $E, P = \nabla i \times D i$  which is of an Wave nature force where  $\nabla i = \bar{v} = \lambda f = \lambda / T$ , since Light also = quaternion  $\rightarrow [q = s + \nabla i]$ . The Stationary Wave in,  $s = \lambda$ , which is meaning that, since Photon is the only Electric Displacement field  $D = \epsilon \cdot E + P$ , then in the rate of change is alternately in terms of The Electric field  $(\partial P / \partial t)$  and The Magnetic field  $(\partial E / \partial t)$  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  $\bar{v} = E = h \cdot f$  then Cycloid motion Controls constancy of Energy by changing velocity,  $\bar{v} = \bar{\omega} \cdot r$ , and period  $T$ , of monads.

Einstein failed to see this reality and to explain the WHY  $\rightarrow$  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  $F(f)$

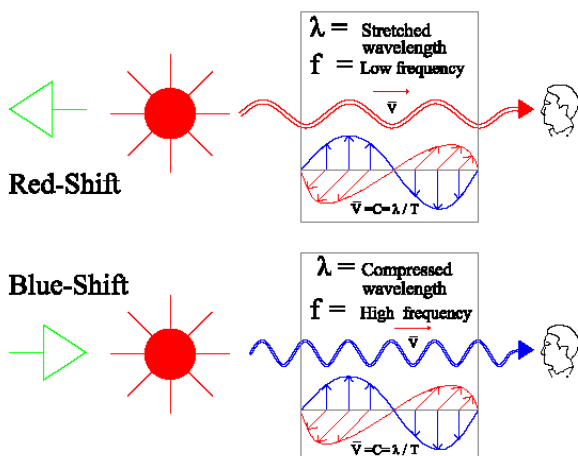


Fig. 9-7. Intrinsic Stationary Wave of a Removal Source  $V(f)$

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 is a sphere, where lines are “great circles”. For any great circle (which is not a straight line) and a point M which is not on the circle all circles through point M will intersect the circle. In elliptic geometry the three angles of a triangle add greater than  $180^\circ$ , without referring that triangle is not in Plane, but in the Sphere (spherical triangle). This omission created the wrong elliptic geometry and all others that follow.

Assuming the postulate of Relativity,  $c =$  constant, 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.

Also say that an object flying pass a massive object, the space time is curved by the massive object.

Remarks (f) :

It is was proved in [32-39] that from any point, M, not on line AB can be drawn one and only one parallel to AB, [39] which parallel doesn't intersect line, so the Elliptic Geometry must be revised and also in [36-37] Gravity is force  $[\nabla i = 2(\omega r)^2]$  in the Medium-Field Material-Fragment  $|\pm s^2| = (\omega r)^2 = [\text{MFMF}]$  which is the base for all motions.

This force is acting on Medium Field by having as wavelength the Stationary Breakage  $(1-2) = \pm [(\bar{\omega} \cdot r)^2]$  which consist the Material points, and on all moving Material wavelength  $\lambda = (1)-(2)$  massive or not Particles.

1). Object in mechanics, may be the Material point (1) at Euclidean point (1), which is now Breakage  $\pm [(\bar{\omega} \cdot r)^2]$  magnitude in the Rest Homogeneously – Isotropically Quantized massless Field  $\pm [(\bar{\omega} \cdot r)^2]$  and is the required coordinate System and base for all motions and forces.

2). Object in mechanics may be also the Material wavelength  $\lambda = (1)-(2)$  in the  $\{[\text{Medium-Field Material Fragment}] \rightarrow [\pm s^2] = |\bar{\omega} \cdot \bar{r}|^2 = [\text{MFMF}] \text{ Field} \leftarrow\}$  which is a standing wave in cavity (1)-(2) with scalar breakage  $|\pm(\bar{\omega} \cdot r)^2|$  as medium (1)-(2) field, and (J1) as energy at point (1) and carried to point (2) by following the cycloids motion from (1) to (2) which is isochrones. Velocity,  $\bar{v}$ , during shifting is analyzed into two velocity vectors  $\bar{v}1, \bar{v}2$ , which undergo vibrations causing two waves that represent the two Electric and Magnetic perpendicular components following the trajectory,  $\text{in}=(c1), \text{out}=(c2)$ . On cycloid  $=(c)=|A1-A2|$  is needed the isochrones time  $T = \pi \cdot \sqrt{Rc} / g$  to reach end A2.

So, Gravity is the minimum attractive and biding Force  $\nabla i = 2(\omega r)^2$  on  $[\text{MFMF}] = |(\omega r)^2|$  Base, which interact with all other particles, and also since acceleration  $a = d\bar{v} / dt = (d\lambda / dt) \cdot f$  then for,  $\lambda =$  any constant (or zero) and  $\bar{v} \rightarrow 0$ , then  $f \rightarrow \infty$ . This is the why the very strong gravitational fields are present and close to black holes where there  $\bar{v} = \bar{c} = 0$ .

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 proofed [22-26] that any space AB is composed of points A, B which are nothing and equilibrium by the opposite forces  $P\bar{A} = -P\bar{B}$  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,

$p + \rho v^2/2 + \rho gh = \text{constant}$ , where,  $p$  = pressure,  $\rho$  = 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,  $p_1 - p_2 = (\rho/2) \cdot (v_2^2 - v_1^2)$  and  $A_1 v_1 = A_2 v_2$ , therefore  $A_2 < A_1$ ,  $v_2 > v_1$  and  $p_2 < p_1$  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  $(\bar{v})$  through its quantized wavelength  $|\lambda| = \bar{v} \cdot T$ , is a property of any standing wave, into the Medium  $|\lambda| = (1)-(2)$ , and involves the Absorption and Reemission of the wave quantized energy  $J = (J_1) = (J_2)$  by the two neighbor edges (1) and (2) of the medium. The Absorption of energy causes,  $J_1$ , within edge (1) to undergo vibrations as  $[ds^2/dt^2] = -(g/4r) \cdot s$  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,  $J_1$  to  $J_2$ , 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 ( $\rightarrow$  quaternions, monads, vectors, Tensors) which is, the Stationary wave nature of Spaces.

## 8. Conclusions

The dynamics of any system = Work = Total energy, is transferred as generalized force  $F_e$  to  $\rightarrow$

$F_e = \partial W / \partial (\delta \bar{r} \cdot c)$ ,  $(\delta \bar{r} \cdot c) = \bar{v} \cdot i$ ,  $\delta t = [ \bar{v} c + \bar{w} \cdot \bar{r} n ] \delta t = ( \text{Translational} + \text{rotational velocity} )$ ,  $\delta t$  and  $F_e = \bar{v} c \cdot (\partial W / \partial t) + \bar{w} \cdot \bar{r} n$ .  $(\partial W / \partial t) \rightarrow$  Translational kinetic energy + Rotational kinetic energy  $\rightarrow$

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

2. To Solid material Configuration, as Kinetic (Energy of motion  $\bar{v}$ ) 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  $(\delta \bar{r} \cdot c) = [ \bar{v} c + \bar{w} \cdot \bar{r} n ] \delta t$ , as the Inertia ellipsoid [Poinso's ellipsoid construction] in [S] frame which instantaneously rotates around vector axis  $[ \bar{w}, \phi ]$  with the constant polar distance  $\bar{w} \cdot Fe / |Fe|$  and the constant angles  $\theta_s, \theta_b$ , traced on, Reference [R, F] cone and on [S, F] cone, which are rolling around the common axis of  $\bar{w}$  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  $\bar{w}$  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  $\mu \cdot \nabla^2 u + (\lambda + \mu) \cdot \nabla \cdot [ \nabla \cdot u ] = 0$ . [23]

3. To Quaternion's Extensive Configuration, as New Quaternion's (with Scalar and Vector magnitudes). Points in Space carry A priori the work  $W = \int A \cdot B [P \cdot ds] = 0$ , where magnitudes  $P, d\bar{s}$  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,  $\bar{v}$ , 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 < The Inner structure of Particles >. [36-37],

15. The Definition of, Material Point  $[\pm(w = \bar{w} \cdot r)^2]$ , and minimum quantized Material Wavelength  $[2(w = \bar{w} \cdot r)^2]$ , 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 < Poinso's ellipsoid > becomes  $\rightarrow$  Cycloidal Ellipsoid  $\leftarrow$  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  $\rightarrow$  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  $\rightarrow$  Human mind, in front of this dilemma created the outlet 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,  $\gamma$ , 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  $\bar{c}$  is possible to be  $\bar{c} < \bar{c}' \rightarrow \infty$  and then this would move faster than,  $\bar{c}$ , 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 is produced and the known formulas of GR for masses and Energy are Geometrically produced without any set restrictions, but from  $\sec. \phi = \gamma$  only.

Because breakages travel in [R]  $\equiv$  {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  $\rightarrow \sec. \phi = \gamma = (ct/vt)$ .

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 article (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



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