



THE NEWTONIAN CONSTANT OF GRAVITATION - GRAVITY CONSTANT AND THEIR PHYSICAL INTERPRETATION

Markos Georgallides

¹Larnaca – Cyprus

(Expelled from Famagusta town occupied by the Barbaric Turks Aug-1974) ,

Cyprus , Civil-Structural Engineer (NATUA) , Athens
Email address : georgallides.marcos@cytanet.com.cy

Abstract

Distance is the Quanta in E - Geometry, while **Material-point** is the Quanta in Material-Geometry which is the composition of opposites and the Elements in Chemistry and Physics . **As in Algebra** Zero ,0, is the **Master-key** number for all Positive and Negative numbers and this because their sum and multiplication becomes zero, *and the same* on any coordinate-system where \pm axes pass from zero , The Rolling of Positive \oplus , constituent on the Negative \ominus , constituent , creates the Neutral Material point which Equilibrium . Its Angular momentum is identical with **Spin S** , and consists the **First-Discrete-Energy-monad** which occupies , **Discrete Value and Direction** , in contradiction to the point which is nothing , *Dimensionless* and *without any Direction* . **Quaternion** $[(+)\cup\cup(-)] \equiv \text{Box } \mathbf{B}_Q \equiv \text{Material Point}$, carries the Principal stress σ between A(+), B(-) , which σ , as **Centripetal-acceleration** is the minimum Energy becoming from the in-storage AB acceleration and is **equal to the Gravity g** . Because in-Box may exist different motions , *Revolving and Periodic* , the acceleration of Gravity $g \equiv \pm \sigma$ exists for the First Box- \mathbf{B}_R , while for the Second Box- \mathbf{B}_P is followed **the Local-Extreme-case** where acceleration of Gravity $g \equiv \pm \sigma$, is Locally altering **S** , by changing the Principal-stress σ with an Local-uniform Pressure $\mathbf{g}_L \equiv g k_E = g * [\text{Force/Area}] = G$, i.e. is proved that the minimum Local - Energy acceleration is the known , **Universal Gravitational-constant** $G = g k = \mathbf{k}_E g = \mathbf{k}_L \sigma = g \cdot g_L k_L$, such for *Macrocosm as for Microcosm* , and for both cases Obeying Newton`s Laws of motion . **Photon is a Box** $\mathbf{B}_R \equiv \{\text{The moving Energy-Storage} , r \equiv \text{The Golden ratio frequencies} \rightarrow f_n = [\frac{n\sigma}{8 r^2}] \cdot \bar{B} \equiv \frac{(1+\sqrt{5}) \cdot \sigma}{4\pi r} = \frac{E}{h}\}$, **Transported** with Light velocity by **An Electromagnetic-Radiation** of wavelength $\lambda = c / f_n = c / f_1$. It was Proved that Force **G** pressing , through Stress **g** , to Enter the Critical-cave in Planck-length with minimum-energy creates the **Hydrogen-cave** , while vibration \mathbf{f}_n , on the Energy-Space-meters \mathbf{g} , π , creates the **Electron** , e .

Keywords : Newtonian constant of Gravitation G and g , The Hydrogen , The Electron

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A.. INTRODUCTION :

1.. Article [75] is the completion of [72-74] and the Physical interpretation of the three constants of nature , that of Planck constant L_p , Newton`s Gravitational constant G , and Gravity Constant , with a rigorous Geometrical and Mechanical logic It was shown [33-36] that Un-clashed Fragments through center , O , consist the Medium-Field Material-Fragment $\rightarrow [\pm s^2] = [MFMF] \equiv \textit{The Chaos}$, as base for all motions , and Gravity as force $[\nabla i]$, while the clashed with the constant velocity , \bar{c} , consist the Dark matter $[\pm \bar{c}.s]$ and the Dark energy $[\bar{c}.\nabla i]$, **declaring that** \rightarrow Antimatter-Galaxies and Antimatter-Asteroids can exist only as Dark-matter or and Dark-Energy and **Not** as Antimatter light , - c , alone , or from \rightarrow velocity - Breakages , $[\pm s^2 = \pm (wr)^2]$ and $[\nabla i = 2(wr)^2]$, where then become Waves { *The distance $ds = |AA_E|$ is the Work embedded in monads and it is what is vibrated* } and Material-Points with their Vibrating equations of motion , and after to become ,

- A \rightarrow Particles , with Inherent Vibration occupying distance $r = ds = |AA_E|$,
- B \rightarrow Gravity-Field-Energy without Vibration , the only Stationary-rotating material-points.
- C \rightarrow Dark-matter-Energy constituents as below ,
- A.. $[\pm \bar{v}.s^2] \rightarrow$ Fermions , *Quarks and Leptons* , and $\rightarrow [\bar{v}.\nabla i] \rightarrow$ Bosons ,
- B.. $[\pm s^2] \rightarrow [MFMF]$ *Neutral Field* $\equiv \textit{The Energy - Chaos}$, and the *Negative-Energy* binder Field is $[\nabla i] \rightarrow$ Gravity force ,
- C.. $[\pm \bar{c}.s^2] \rightarrow$ Dark matter , and the binder Gravity force $[\nabla i]$, $[\bar{c}.\nabla i] \rightarrow$ The Expanding Dark Energy , *Positive-Energy*, which both are moving with light velocity , c , causing the universe to grow.

From above in , **A** , and , **C**, case \rightarrow Energy as velocity , \bar{v} , and , \bar{c} , exists in the *Discrete monads* , $\pm \bar{v}.s^2$ and $\pm \bar{c}.s^2$.

B , case is the transportation of Energy , from Chaos to stationary Material points .

Dark Energy $DE \equiv [\bar{c}.\nabla i]$ (©) \rightarrow Acting ,*Positive-Energy*, on the Five Constituents \rightarrow { $(\nabla i), (+s^2), (-s^2), (+cs^2), (-cs^2)$ } produces

- $[\pm s^2] \rightarrow$ MFMF Field $[\pm \bar{c}.s^2] \rightarrow$ DM-DE Field , of , Dark matter and Anti-matter
- $[\pm \bar{v}.s^2] \rightarrow$ Fermions $[\nabla i] \rightarrow G_f \equiv$ Gravity-Force in DM-DE Stationary Field .
- $[\bar{v}.\nabla i] \rightarrow$ Bosons , $[\bar{c}.\nabla i] \equiv DE \rightarrow$ Dark Energy $c \times$ (©) $[\nabla i]$
- \rightarrow Gravity Force $DE \equiv [\bar{c}.\nabla i] = \bar{c} [\nabla i] =$ The Travelling-Energy with , c , velocity.

In all above issue Kepler-laws , denoting that *Macrocosm and Microcosm* Obey Newton`s Laws of motion in all Scales , as was proofed .

A.. In [68] is shown that Motion may be **Linear or Rotational** for any displacement , r , so exists a constant-work , k , during these motions of velocities , \bar{v} , and since are vectors $k = \bar{v}x\bar{v} . \bar{r} = v^2.r . \bar{n} . = v^2 . r = (wr)^2.r = \left[\frac{2\pi}{T}\right]^2.r = \frac{4\pi^2 r^2}{T^2} . r = \frac{4\pi^2 r^3}{T^2} = 4\pi^2 . \frac{r^3}{T^2} = 4\pi^2.r^3.f^2_p$ A Photon during Motion in $[MFMF] \equiv$ Chaos , collides with other Photons by means of Cross - Product and produces a constant Work which is stored **into the Only-Four Energy - Geometrical - Shapes** , of the motion which shapes are the Conic – sections . The Interior motion is kept in its Wavelength-Tank $2r = n\lambda$, as well as the Outer-Linear motion as an Propagating Electromagnetic-Wave , which carries the Energy-conveyer,

i.e. The stored energy in the loop is $\rightarrow W_1 = v^2 \left[\frac{h}{2\pi} \right] = 4\pi^2 \cdot r^3 \cdot f_p^2$, it is **The Particle** and dependent on velocity, v , and Planck's constant h , or *on loop, r , and frequency*, f_p , which is **The Wave**. It is proved that this minimum wave - constant $\rightarrow k = g$.

B.. **Kinetic Energy**, *motion, in Orbits* becomes from the, *Piezoelectric-effect*, where Orbit is subjected to a Mechanical-stress, $\sigma = \pm \frac{4\pi r}{(1+\sqrt{5})} \cdot f_p$, *becoming from the Centripetal-acceleration \bar{a}_p of the Planet* and thus is appeared a Positive charge at the *Nucleus* and a Negative-charge at the *Planet*, so is created an electric-signal with a given frequency f_p . The two faces at **N** and **P** are connected by the in-between **Energy-Vectors** $\bar{B} = \frac{\pi r^3 \sigma}{8} [1 + \sqrt{5}]$ of Gravity-field-Pointy MP $[\nabla i] = [\oplus \cup \cup \ominus]$.

C.. **Orbit** or, *Negative - Energy - Rim in monad Atom*, is the Stable and Stationary Granular - lattice – Energy - Disk, which is kept in the Plane - Orbit of motion, *Ellipse area, πab , in Gravity – field*, and in a way is **Opposite** to that which Follows the Central motion, i.e. the Gravity-Force-Point-Vectors \bar{B} , is the Spin $[\oplus \cup \cup \ominus]$ of the Material-points. *These are packets into the Orbit-Rim as the Energy - Granular - Conveyers* for the interactions between, **Nucleus N** and the orbiting object, *the Planet P*, and consists the quanta and which is, *the minimum constant energy*, of the Rotational motion $\rightarrow [\oplus \cup \cup \ominus] \leftarrow$ and is equal to g .

D.. **Black Holes** Follow Kepler laws where, *On any moving Particle when is Tangentially-colliding or under any angle ϕ with a Material-Point executing Circular motion*, then the Total Energy is Negative, the Particle follows constant Elliptical-Energy-Orbits on the same semi major axis as, $1 = c \cdot f_n^2 \cdot a^3$, and of the same constant Energy. Semi major axis, a , is related to energy as $\rightarrow a = GMm / 2E$, i.e. for very large Energies, semi major axis tents to a **Negative-Energy-Point**, which is the beginning of the Black hole such as in microcosm and macrocosm. *For axis $a \rightarrow \pm 0$, then $f_n \rightarrow \infty$, which is a Black-hole.*

E.. The $\{n\}$ **Energy - Storages** of The Moving – Monads . Figure-1

In Store, r , Wavelength $\lambda_n = \frac{2r}{n}$, Fundamental-frequency $f_1 = \left[\frac{\sigma(1+\sqrt{5})}{4\pi r} \right]$, Work = $h \cdot f_1$

The Energy-Storage length E-P = $\lambda/2$, and is composed of 4 Lobes with wavelength

$$\lambda_4 = \frac{2r}{4}, f_4 = \frac{4v}{2r} = 4f_0, W_4 = \frac{h}{2r} v_4 \quad \text{and for } \rightarrow \text{Total-Work}$$

$$W = \left[\frac{4\pi r^2 f_1}{3} \right] \cdot n \cdot (n+1) \quad \text{or } W = \frac{80 \cdot \pi r^2 f_1}{3}, \quad v_4 = \lambda_4 \cdot f_4 = 4 \cdot \lambda_4 \cdot f_0$$

$$n = 1 \rightarrow f_1 = 1 \cdot \left[\frac{\sigma(1+\sqrt{5})}{4\pi r} \right], \text{Wavelength } \lambda_1 = \frac{2r}{1}, \text{Energy } W_1 = \left[\frac{4\pi r^2}{3} \right] \cdot f_1 = 1 \cdot \frac{(1+\sqrt{5})\sigma r}{3}$$

$$n = 2 \rightarrow f_2 = 2 \cdot \left[\frac{\sigma(1+\sqrt{5})}{4\pi r} \right], \text{Wavelength } \lambda_2 = \frac{2r}{2}, \text{Energy } W_2 = \left[\frac{4\pi r^2}{3} \right] \cdot f_2 = 2 \cdot \frac{(1+\sqrt{5})\sigma r}{3}$$

$$n = 3 \rightarrow f_3 = 3 \cdot \left[\frac{\sigma(1+\sqrt{5})}{4\pi r} \right], \text{Wavelength } \lambda_3 = \frac{2r}{3}, \text{Energy } W_3 = \left[\frac{4\pi r^2}{3} \right] \cdot f_3 = 3 \cdot \frac{(1+\sqrt{5})\sigma r}{3}$$

$$n = 4 \rightarrow f_4 = 4 \cdot \left[\frac{\sigma(1+\sqrt{5})}{4\pi r} \right], \text{Wavelength } \lambda_4 = \frac{2r}{4}, \text{Energy } W_4 = \left[\frac{4\pi r^2}{3} \right] \cdot f_4 = 4 \cdot \frac{(1+\sqrt{5})\sigma r}{3}$$

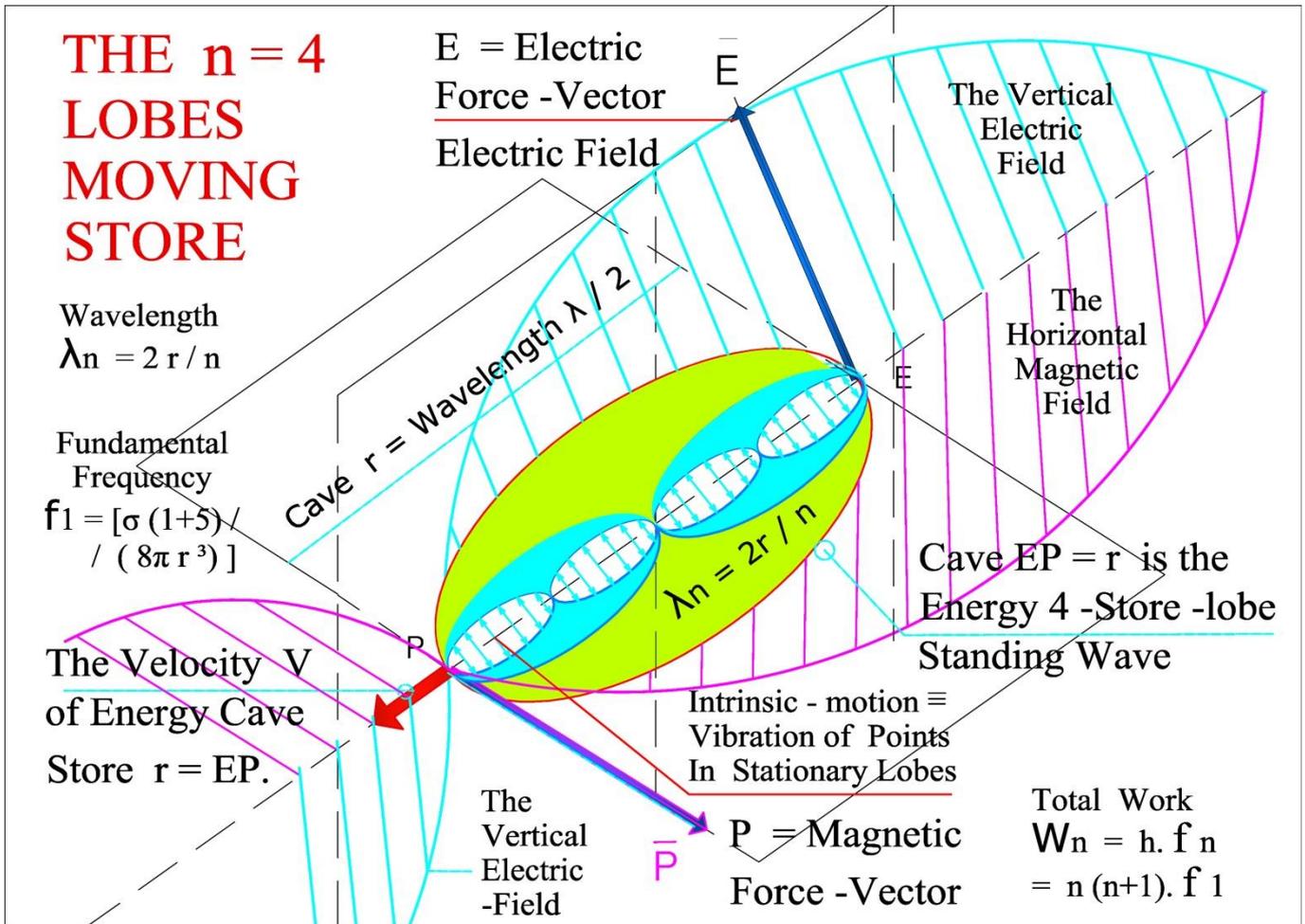


Figure-1.

In figure $r = \lambda/2 = EP$ is the **Energy-Storage-monad** [$S \equiv EM-R \equiv f_{1=N}, f_2, f_3, f_D, f_n$] with wavelength $\lambda_n = \frac{\sigma \cdot (1+\sqrt{5})}{4\pi r} = \frac{n \cdot \bar{B}}{4\pi r^2}$, as **Particle**, where velocity $\bar{v} = w \cdot r$, follows the **Breakage-Principle** which is Quaternion $\bar{z} = [s + \bar{v} \nabla i \text{ or } \rightarrow s^2 - |\bar{s}|^2 + 2|\bar{s}|^2 \cdot \nabla i \leftarrow$

$\equiv [\epsilon E^2 + \mu B^2] \equiv$ **The Energy-monad EP**, as **The Wave**, as,

Matter (+) \equiv Magnetic-field $\rightarrow [\mu B^2]$

Antimatter (-) \equiv Electric-field $\rightarrow [\epsilon E^2]$

Energy (+ \leftrightarrow -) \equiv Motion in n lobes $\rightarrow [\partial E / \partial t, \partial H / \partial t]$ i.e.

The stationary-cave-lobes, consist the **Particle-Photon** as the Inside motion, in the $r = n [\lambda/2]$ Energy-Storage, and $[E^2 + H^2] = 2 \cdot (2r) \cdot c \cdot \sin 2\phi$, the **Wave Photon**. **Energy-Storage-monads** are consisted of the above **three-constituents** all-together,

or each-one of them Work ratio is $\rightarrow W_n / W_1 = f_n / f_1 = n(n+1) \cdot [v_n / v_1] =$

$$n(n+1) \frac{\lambda_n f_n}{\lambda_1 f_1} = n(n+1) \frac{n \lambda_n f_1}{2r \cdot f_1} = n^2(n+1) \frac{\lambda_n}{2r} = n(n+1) \quad \text{and}$$

$$\text{for } \lambda_n = 2r, v_n = v_1, \text{ then } \quad \mathbf{n \cdot \lambda_n = 2 \cdot r} \quad \text{or}$$

The Work , W , Produced *from the Wave-Energy-Pattern with wavelengths λ_n , and Created from all Points of the Periodic Oscillation in any Cave , r , is Stored into the , n , Integer and Energy - Lobes of this cave r .*

From Mechanics , the *Only - Possible motions* are , *the Periodic excitation* , and *the Revolving motion* therefore all *Moving-Energy- Stores travel as a Wave and Not as a Particle* . The **n** , Energy-tanks , the N Antinodes in its moving Store $2\lambda = r = h/p \equiv [f_1, f_2, f_n \equiv n \text{ lobes}]$ follows the *Stationary-Wave-Nodes-Principle*, *i.e. The Glue-Bond-Stress Rotation of opposites on Small - circles creates n , Integer number of lobes , which is the Wave-Nodes-Principle of the moving-energy-stores*, one of which is the Photon.

B.. THE PHOTON :

Electromagnetic waves are created by the vibration of an electric charge . In Material – Point , the eternal rotation of the \oplus constituent around the \ominus constituent creates the , n Energy-lobes in a tank $r = n \frac{\lambda}{2}$ or $\lambda = \frac{2r}{n}$, since the velocity of the wave is $\bar{v} = \lambda/T = \lambda \times f$. The frequency is $f = \frac{n \cdot \bar{v}}{2 \cdot r}$ where **n** is a positive integer number . Because in lobes the inner particles are the [+] , [-] constituents of Space and of Anti-space , the maximum amplitude of each constituent is related with its position and each amplitude oscillates periodically as the **wave equation** ,

$$\mathbf{x} = \mathbf{v}_o \cdot \mathbf{sin} \mathbf{wt} = A \cdot \mathbf{sin} [\sqrt{(\mathbf{a}/\mathbf{Am})} \cdot \mathbf{t} + \pi/2] , \dots\dots\dots(1) \text{ where}$$

a.. Velocity $\rightarrow |\bar{v}| = \omega \cdot r/2 = \frac{2\pi}{2T} \cdot r = 4\pi r \cdot f$, and $f_n = \frac{n \cdot v}{4r} = \frac{n\sigma}{8r} [1 + \sqrt{5}]$,

b.. Angular velocity $\rightarrow |\bar{\omega}| = \frac{\sigma}{2r} [1 + \sqrt{5}]$ and *Fundamental frequency* $f = \frac{(1 + \sqrt{5}) \cdot \sigma}{4\pi r}$

in cave , r .and then ,Wave propagate , as in a magnetic-device the arced pattern , by travelling from North to the South Pole and thus creating the Inner - Electromagnetic-Displacement-current $\rightarrow \partial E / \partial t$, $\partial H / \partial t \leftarrow$ and when reduced to one line as ,

$$\mathbf{E} \rightarrow \partial \mathbf{E} / \partial \mathbf{t} \rightarrow \mathbf{H} \rightarrow \partial \mathbf{H} / \partial \mathbf{t} \rightarrow \mathbf{H} .$$

This vibration of opposites creates a wave which has both an Electric , **E** , and an Magnetic component , **H** , perpendicular each other and is as

$$[E^2 + H^2] = 2 \cdot (2r) \cdot c \cdot \mathbf{sin} \mathbf{2\phi} \dots\dots (2) \text{ on-where exists the Skin-effect .}$$

This happens because of the difference in density *on Stress-common-curve* $\rho = \sigma$ instead – of $\rho = 0$ at the center.

This Property in Material-point Launches *The Inner-Electromagnetic-Wave* ,out **The-Particle** $\equiv [E^2 + H^2] = 2(2r) \cdot c \cdot \mathbf{sin} \mathbf{2\phi}$, of wavelength λ , *Outward* λ , as *The Outer Electromagnetic-Wave* $\rightarrow \{ \mathbf{The-Wave} \equiv [\epsilon E^2 + \mu B^2] = 2 \cdot \lambda \cdot c \cdot \mathbf{sin} \mathbf{2\phi} \} \leftarrow$ and allows all the *Energy-Wave-Storages* to Propagate any Distance in Vacuum without dissipation. This Inner-motion \equiv Work W , from the Wave-Energy-Pattern with Wavelengths λ_n , is created from all \pm Points of the Periodic Oscillation in any cave **r** , and is stored in the **n** lobes as motion .This motion is conserved and is transported through vacuum at the speed of light **c** . Since the **Medium-Field- is the Material-Fragment** $\rightarrow [\pm s^2] = [\mathbf{MFMF}] \equiv \mathbf{The Chaos}$, is the base for all motions *so then it is , the Motion of Photons* : All motions create Work which is conserved , Motion presupposes the velocity vector \bar{v} , which *when it is in motion collides with other velocity vectors* , creating a Constant Work **k** .

Motion may be *Linear or Rotational* for any displacement , **r** , in any cave , so exists in vectors the constant - Work $\rightarrow \mathbf{k} = \bar{v} \times \bar{v} \cdot \bar{r} = v^2 \cdot \mathbf{r}$, and becomes , from the relation $n\lambda = 2r$ issuing $2r = nv/f$, and is $v = \lambda f$ or $\rightarrow \bar{v} = \bar{c} = \lambda f$.

Constant-Work $k = v^2 \cdot r = (wr)^2 \cdot r = \left[\frac{2\pi}{T}\right]^2 \cdot r = \frac{4\pi^2 r^2}{T^2} \cdot r = \frac{4\pi^2 r^3}{T^2} = 4\pi^2 \cdot \frac{r^3}{T^2} = 4\pi^2 \cdot r^3 \cdot f^2_p$
 \rightarrow which are the universal **Kepler Laws for macrocosm**.

*i.e. Photon during Motion in [MFMF] Chaos collides with other Photons, by means of Cross-Product produces a constant Work, which is stored into the **Only-Four Energy-Geometrical-Shapes**, of the motion which are the Conic-Sections. The Interior motion is kept in its Wavelength-Storage $2r = n\lambda$, and the Linear motion is continued by the Propagating **Electromagnetic-Wave-conveyer**.*

The mechanism of **Energy-transport through a Medium** involves the **Absorption and the Reemission** of the wave-energy by the atoms of the material. Since Quanta of Energy occupy a finite space $\lambda = 2r$, as motion, then an electromagnetic wave impinging upon the atoms of a material, its energy is absorbed by the atoms of the material, and since Energy \equiv motion then occurs **Resonance**, and electrons within the atoms undergo vibrations. After a short period of vibrational-motion, the vibrating electrons create a **New Electromagnetic wave** with the same frequency as the first one and thus delay motion through the medium.

Because energy is related to wavelength λ , as equation $E = h \cdot f = h \cdot (c/\lambda)$, then once the energy of EM-wave is reemitted then it travels through a small region of space between atoms and once it reaches the next atom the EM-wave is absorbed and transformed into electron vibrations and then reemitted as an Electromagnetic-wave.

The actual **speed of an Electromagnetic-wave through a material-medium**, due to the Absorption and Reemission-process, is dependent upon the **optical-density** of the medium, or when their atoms are closely packed upon their, **material-density**. i.e.

Photon is an Energy-store, r , in a Stationary-wave of wavelength $n\lambda = 2r$, consisted of n stationary lobes filled in λ with inner motion the Electromagnetic-Displacement-current, while is Outward Propagating with light speed as Energy-store $\lambda = 2r/n$, [+] Electric-field as Space, and [-] Magnetic-field as Anti-space. [70]

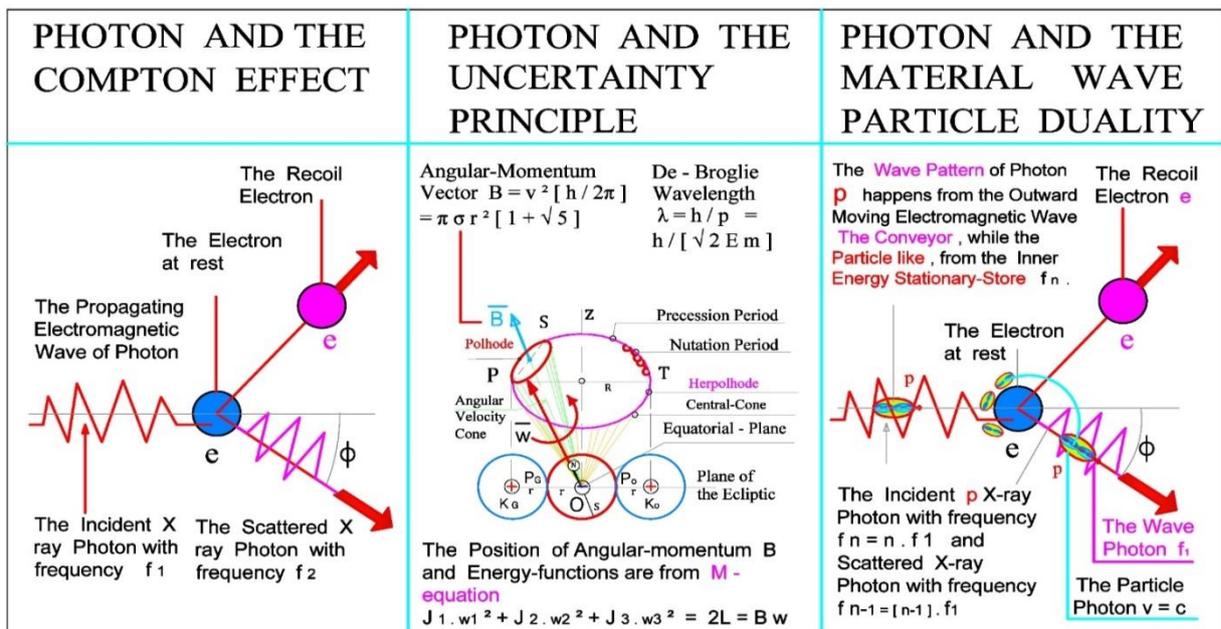


Figure-2.

The Wave $[f_1 = (E^2 + H^2) = n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma \cdot \bar{B}}{8 r^2}]$ - Particle $[\bar{v} = \bar{c} = \lambda f] \rightarrow$ Duality

-
- 1.. The experiment of A-Compton, *light behaves as a wave*, is consisted on an X-ray Photon of frequency f_1 which collides with a stationary electron and Scattered with frequency $f_2 < f_1$ which is an energy loss $df = f_1 - f_2$.
 - 2.. The Uncertainty Principle for the Wave-Particle accepts each particle with a definite momentum can be described by a Wave-function , which created the suspicious of finding a Particle in the biggest envelope of the wave .
Instead of above , its momentum \mathbf{B} rotates into the , Angular – Velocity – cone .
 - 3.. The Material Wave-Particle Duality : All moving Energy-Storages are ***Standing – Waves- Particles as all Quantum - Particles*** , and their ***Propagating-Energy as an Electromagnetic-Wave*** , and are [***Quantum - Particles***] their Conveyer .
In Energy-Storages issues the ***Stability of Equilibrium*** as this is in Energy-Rims \equiv Orbitals , also .

a.. The Compton Effect :

The moving stores which are the EM-Waves are consisted of three parts ,

- 1.. The Energy-store $r = n \cdot \frac{\lambda}{2}$, is consisted of , \mathbf{n} , energy lobes in the Stationary –Wave of cave , \mathbf{r} , as the ***Golden-ratio-frequency*** $f_n = \frac{n\sigma}{8r} [1 + \sqrt{5}]$, and consists the Massive-energy-part of Photon , \mathbf{p} , that part considered as particle.
- 2.. The Vertical Electric-field \mathbf{E} is perpendicular to \mathbf{r} , axis of motion and consists the Space Energy - part of Photon.
- 3.. The Horizontal Magnetic-field \mathbf{P} , perpendicular to \mathbf{r} , axis and field \mathbf{E} , both being always in Phase and consists the Anti-space-energy-part of Photon.

b.. The Wave-Particle duality and Uncertainty Principles :

All quantum objects and Photon ,exhibit Wave-like and Particle-like properties such as diffraction and interference on the length scale of their wavelength. Experiments confirm that the Photon is not a short pulse of Electromagnetic radiation because it does not spread-out as it propagates, nor does it divide when it encounters a beam splitter . Because Photon is a ***Material-point*** is absorbed or emitted as a whole by arbitrary smaller than its wavelength or even point-like electrons or small-systems It was shown [66] that Photon which is an , ***Energy-Storage-monad*** is consisted of ***two-real-constituents , and one Energy . That imaginary - constituent which creates the Electromagnetic field , is resulting from the local and Energy – cave*** , by launching The Inner-Electromagnetic -Wave of monad $\lambda = 2r/n$ outward the λ .

c.. The Material Wave-Particle Duality :

The Recoiled-electron position can be resolved to the New position as well as the Scattered Photon of the Energy-storage by its new frequency . Momentum equal to Spin is not changed because issues the law of energy-conservation . Electromagnetic energy is supplemented by the incoming wavelength $\lambda = 2r/n$, or by angle ϕ . The Storage r , modifies the Intrinsic-radiation and avoids spontaneous emission .[68]

A photon with $\mathbf{E} \perp \mathbf{B}$ wave when entering a transparent material , the Photon is then absorbed by an atom and the reemitted , ***because wave vector would not be preserved*** , by the material and so there would be a scattering .

Light Storage $r \equiv \mathbf{E} \perp \mathbf{H}$, using electromagnetically-induced transparency , interaction between photon and an Ensemble of atoms ***is tuned , to the group velocity of the photon reduced to zero*** and to the remaining EB-Storage-field within the interaction zone .

The excitation is not purely photonic , but instead has been mapped smoothly from a single photon to an ensemble of EB-Storage atoms .

Photon is regenerated by its Intrinsic Electromagnetic wave $E \perp B$ and is indistinguishable from the input one, *exactly the same*.

The interpretation that the Photon has been stored within the material is false, on the contrary **Storage is the E, H, Energy-tank with n, frequencies, f_n in Photon, and the Electromagnetic Radiation, E, B, the conveyer \rightarrow the carrier of Storage.**

C.. THE TOTAL – ENERGY IN LOOPS :

It was shown in [58] that the maximum velocity in a closed system occurs in Common circle, when the two velocities, \bar{c} , \bar{v} are perpendicular between them, and are not producing Work, from where then dispersion follows Pythagoras theorem and the resultant Quantized linear Space length, r , becomes, as the Resultant of Energy Vectors

$$r = |(\bar{c}.T)| = \sqrt{v^2 + c^2} \text{ and by using Space Vector } \bar{r} = |(\bar{c}.T)| = \sqrt{v^2 + c^2} \text{ then The total Rotating energy is } \rightarrow \pm \bar{\Lambda} = \bar{p}.r = (M.c).r = (M.c). \sqrt{v^2 + c^2} \text{ and squaring both sites } [\pm \bar{\Lambda}]^2 = p^2.r^2 = M^2.c^2.(v^2+c^2) = (M^2.v^2).c^2 + M^2.c^4 = (p^2.c^2) + M^2.c^4 =$$

$$[p.c]^2 + [m_0.c^2]^2 \text{ or is } E_T = E_R + E_K \rightarrow \text{ i.e.}$$

Total - Energy of Elementary-particle = Intrinsic Rotational + Kinetic Energy,

The velocity of Elementary particles is the light velocity $c = v = 2\pi r. f_e$ and

$$\text{frequency } \rightarrow f_e = \frac{c}{2\pi r} \dots\dots(a) \text{ Rotational Energy } E_R = \bar{B} \cdot \bar{w} = 2L = J.w^2 \text{ and}$$

$$\rightarrow E_R = \left[\frac{\pi r^4}{8} \right] \cdot \left[\frac{c}{r} \right]^2 = \frac{\pi c^2}{8} r^2 = 3,535.10^{16} \cdot r^2 \dots\dots\dots(b)$$

Energy and frequency of Elementary particles can be found from cave r , only since c ,

$$\text{constant, Total-Energy } \rightarrow E_T = E_R + E_K = \frac{\pi c^2}{8} r^2 + \frac{1}{2} m.v^2 = 3,535.10^{16} \cdot r^2 + \frac{1}{2} m.v^2 \dots(c)$$

Mass of elementary particles is $m = \frac{E}{2r^2.w^2} = \frac{J.w^2}{2} \cdot \frac{1}{2r^2.w^2} = \frac{J}{4.r^2} = \frac{\pi.r^2}{16}$, i.e. dependent on radius of cave, and for $r = 10^{-62}$ then mass $\rightarrow m = \frac{\pi.10^{-124}}{16} = 1,935. 10^{-125}$ kg.

a).. Dot Product and Cross Product :

The **Dot-product** happens for interactions between Similar dimensions, while the **Cross-product** between Different-dimensions. Cross-product of any two vectors \bar{a}, \bar{b} is $\bar{a} \times \bar{b} = |\bar{a}|.|\bar{b}| \sin \theta.\bar{n}$ and for $\bar{a} = \bar{b}$ and $\theta = 90^\circ$ then $\bar{a} \times \bar{a} = \bar{a}^2$, and for Quaternion, s , which performs the Work of rotating the one vector around the other \rightarrow Work = $\bar{a} \times \bar{a} = \bar{a}^2 \cdot \bar{r}$, and for $\bar{a} = \bar{v}$ then, Work = $\bar{v}^2 \cdot \bar{r} = |\bar{v}|.|\bar{v}|.\bar{r} = v^2 \cdot r \cdot \bar{n} = (wr)^2r \cdot \bar{n} = (2\pi r/T)^2r.\bar{n} = (4\pi^2r^2/T^2) \cdot r \cdot \bar{n} = \frac{4\pi^2r^3}{T^2} \cdot \bar{n} = (4\pi^2r^2.f^2) \cdot r \cdot \bar{n}$, or ... (w)

$$W = 4\pi^2 \frac{r^3}{T^2} \cdot \bar{n} = 4\pi^2 \cdot r^3 \cdot f^2 \cdot \bar{n}$$
, which is the Kepler celestial law for *microcosm*.

Since in Mechanics issues $z^2 = s^2 - s^2 + 2.s.s = 1$, and from Unit-quaternion $s^2 + [iv]^2 = 1$ then is $\rightarrow s^2 - v^2 = 1 \dots(d)$ Equation (d) is a Cone relation on where Total-energy, Kinetic and Potential is conserved and for Photon, Electromagnetic radiation is the Kinetic-energy and the Velocity-vector-Energy - tank is the Potential. Photon is an Energy-store, r , in a Stationary-wave of wavelength $n \lambda = 2r$ consisted of n stationary lobes filled in λ with inner motion the Electromagnetic – Displacement-current and Outward the Propagating, Energy-store $\lambda = 2r / n$, with the light speed, c , the two transverse fields, {the + Electric-field and the - Magnetic-field}. Equation (w) declares the relation between the **Total-Energy W** in caves and **the Geometry** of Energy=cave Space $r \equiv [EM-R \equiv f_{1=N}, f_2, f_3, f_D, \dots, f_n]$ with a binding constant, **proved to** be the g .

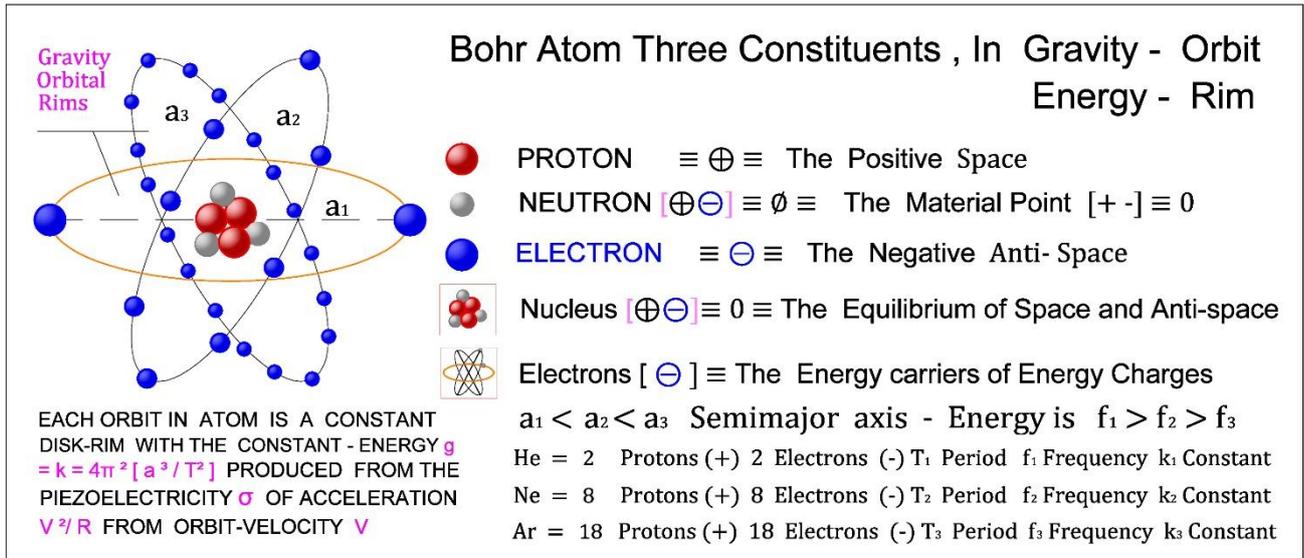


Figure-3.

Proton , in Bohr-model , consists the \rightarrow Positive Breakage (+) of the three constituents , Electron consists the \rightarrow Negative Breakage (-) of the three constituents , Neutron consists the third \rightarrow Equilibrium Material Point (+ -) of the Spaces and the Anti-spaces .

Nucleus consists the \rightarrow Equilibrium **Positive** Breakage Store , in Atom-Model. Electron Orbits are the \rightarrow Equilibrium **Negative** Breakage Store-Rims in Atom . Orbital Electron is the \rightarrow Moving-Charge-carrier of Energy in Atom -Model .

It was prior referred that , when Matter and Antimatter annihilate at rest or when Anti-space comes in contact with its regular Space counterpart , they mutually destroy each other and all of their Energy is converted to the **Three Breakages**

$$\rightarrow s^2 , -|\bar{v}|^2 , [2\bar{w}] \cdot |s| |r| \cdot \nabla_i \leftarrow \text{ where for , } \bar{v} = s \equiv \text{the cave ,}$$

$[s^2] \rightarrow$ is the Real part, **Matter**, of the new monad ,and is **a Positive Scalar magnitude**
 $-[s^2] \rightarrow$ is the always Negative part , **Anti-matter** , which is always **a Negative Scalar-magnitude** .

$2s^2 \cdot \nabla_i \rightarrow$ is the double Angular-Velocity Term , **The Energy Term** , and which is **a Vector magnitude** .

Photon is a Material-point in cave **r**, where its **Inner** is **the Stationary-Standing-wave** the Electromagnetic-Wave $[E^2+H^2] = 2(2r) \cdot c \cdot \sin 2\phi$ with **n** Lobes representing the

Normal mode vibration with frequencies $f_n = n \cdot f_1 = \frac{E}{h} = \frac{n \cdot v}{4r} = \frac{n\sigma}{8r} [1+\sqrt{5}]$, while its

Outward is the Propagating Electromagnetic-Wave $\rightarrow \{[\epsilon E^2 + \mu B^2] = 2 \cdot \lambda \cdot c \cdot \sin 2\phi\} \leftarrow$ where Particle $2r = n \lambda$, **Cave r** , is the **Electromagnetic-Energy-Storage** , and Electromagnetic-Radiation E,B is the **Wave Conveyer** . Following above constituents of Photon then , Since **Energy is motion** and the **Total - Energy of Elementary - Particle** is equal to the \rightarrow **Intrinsic Rotational + Kinetic Energy from velocity** , then according to the conservation law of Energy , **This Energy is stored into Neutral caves as Stationary Loops consisting the Lobes** , and thus producing the **Space and the Anti - Space Particles with velocity vector the remaining of the**

Energy Term. It is proved that g , Entering the Planck-cave creates the *Hydrogen-cave* as the lightest and less-mass element, while Entering the Energy-Space-meters g, π , creates the *Electron*, e .

The Breakage – Principle, is the way of Energy conservation, where Energy never annihilates and which is always reverted into \rightarrow the two Opposites $\{ (\pm w) \}$ or the Conveyers \equiv Carriers $\}$ and an Neutral Part $2 \cdot \nabla_i$ which is the Energy-store \equiv Tank Energy \equiv or as *Matter* $(+ w)$, as *Antimatter* $(- w)$ and as *Energy part*, $2L = \bar{B} \cdot \bar{w}$ i.e. **Energy \equiv Motion \equiv Space + Anti space + Kinetic Energy**,

Vibrations of Systems issues for Orbits as $\rightarrow W = 4\pi^2 \cdot \frac{r^3}{T^2} \cdot \bar{n} = 4\pi^2 \cdot r^3 \cdot f_p^2 \cdot \bar{n} \leftarrow$ on radius r , and agree, to Kepler celestial law such as for *macrocosm and microcosm*.

D.. THE PERMISSIBLE - PERMEABLE RESONANCE – PATH :

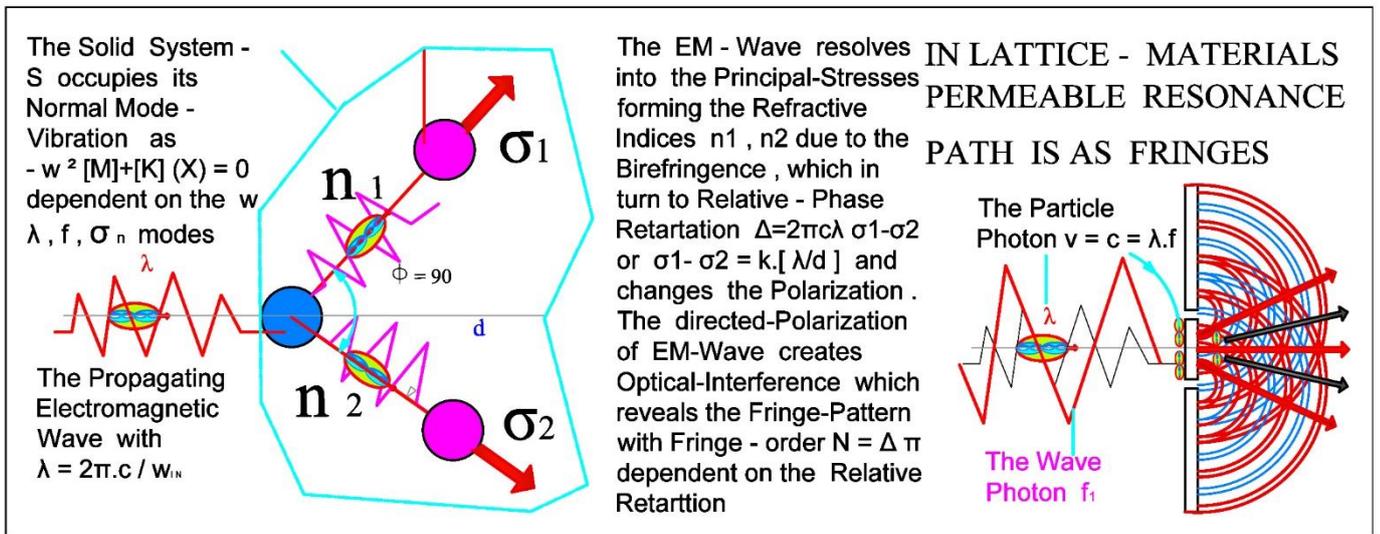


Figure-4.

a) The Transmitted Electromagnetic Wave of wavelength $\lambda = 2\pi c/w \equiv c / f$ follows the Hook's Elastic deformation and resolves into the Principal Stresses-Pattern σ_1, σ_2 In order to Pass a Force through a Medium, or mass, is needed the Permissible Path a *Conductor*. For Gravitational Force G is the acceleration of Gravity constant g ,

b) The Permissible - Permeable - Resonance - Path is for,

- 1) Solids \rightarrow The Normal-mode-Vibration - System $\{ -w^2 [M] + [K] (X) \} = 0$
- 2) Liquids \rightarrow The Cauchy Stress-Tensor as Momentum equation $\nabla \cdot \sigma = -\nabla p + \nabla \cdot \tau$
- 3) Gases \rightarrow The combined Avogadro's Pressure-law $PV = nRT = n \cdot mv^2/3$
- 4) Crystals \rightarrow The Cauchy Ellipsoid-Stress-tensor where $E \perp B \perp r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$
- 5) Molecules \rightarrow The Lattice-Crystal-Arrangement with Chemical Bonds relation
- 6) Atoms \rightarrow The Energy-Rims with Chemical Bonds, *Ionic, Covalent*, relation
- 7) Particles \rightarrow The Resultance One-Dimensional-Collision $\bar{v}_{ij} = \bar{v}_j - \bar{v}_i = \bar{w}_{ij} \cdot \bar{r}_{ij}$
- 8) M-Points \rightarrow The Resonance-frequencies $f_R [S \equiv f_{1=n}, f_2, f_3, f_R = w^2] = f_n = \frac{n(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma \cdot \bar{B}}{8r^2} \rightarrow$ i.e. **the Golden-ratio-Pattern, which is related to Spin.**
- 9) Cave-Orbit \rightarrow The Relation $c \cdot L_s = L_v$, Light-velocity $3 \cdot 10^8$ m/s * 1.10^{-42} m cave $= 3 \cdot 10^{-34}$ m²/s are the Cave-Energy-Plane-Rims in Atom's, Planet orbits

Vibrations of Systems issues for Orbits as $\rightarrow \mathbf{W} = 4\pi^2 \cdot \frac{r^3}{T^2} \cdot \bar{\mathbf{n}} = 4\pi^2 \cdot \mathbf{r}^3 \cdot \mathbf{f}_p^2 \cdot \bar{\mathbf{n}} \leftarrow$
 which is the Energy in the Conic-Sections Kepler`s Orbits .

Remarks :

The Path Permeable to a common motion is following one of the , \mathbf{w} , \mathbf{f} , σ_n , quantities as the below procedure ,

- 1.. A transmitted Electromagnetic wave with angular velocity vector $\omega = 2\pi f = 2\pi c/\lambda$ strikes on a Body .
- 2.. The Electromagnetic wave entering into the Body follows Hook`s Elastic deformation , and resolves into the Principal Net-Stresses-Pattern .
- 3.. Because of Principal-Stresses resolving , different Refractive-Indices are experienced on their perpendicular components due to the Birefringence .
- 4.. The difference in the Refractive-Indices leads to a Relative - Phase –Retardation between the components given as $\Delta = (2\pi c/\lambda).k.(\sigma_1 - \sigma_2)$ or as
 $\sigma_1 - \sigma_2 = [\frac{\lambda}{d}] \cdot \frac{\Delta}{2\pi c} = k \cdot [\frac{\lambda}{d}] \dots$ (a) *where*
 $\Delta =$ The Controlled Phase-Retardation from the transmitted Electromagnetic wave
 $\lambda = \frac{2\pi c}{\omega}$, is the vacuum wavelength
 $d =$ The thickness of the Body or of Specimen
- 5.. The Relative Phase Retardation changes the Polarization of the transmitted EM Wave ,which changes also the Polarization of the Principal stresses , and thus many different waves are so produced .The Optical interference of the Waves Fringe - Pattern are revealed with Fringe-order $N = \Delta/2\pi$ dependent on Relative-Retardation .
- 6.. Studying the Fringe-Pattern one can determine the State of stress at various points of the material and the General Permeable Paths of Electromagnetic-State of the body. In Fig-4.(3) is seen the Energy-Storage p , which is transported by the Electromagnetic conveyer f_n .

The Energy-Storages $r = n.[\frac{\lambda}{2}] \equiv W_{n(n+1)} = [\frac{4\pi r^2 f_1}{3}] . n.(n+1)$, **are travelling through**

Bodies and follow, Lame Stress Ellipsoid $n_1^2 + n_2^2 + n_3^2 = \frac{T_1^2}{\sigma_1^2} + \frac{T_2^2}{\sigma_2^2} + \frac{T_3^2}{\sigma_3^2} = 1$

on principal stresses $\pm\sigma_1, \pm\sigma_2, \pm\sigma_3$, which **is the Passage** through which Forces (The EM-Radiation) can travel in any Solid either in Motion or at Rest .

Laplace`s Orbital Angular-momentum $e^{i.2\pi n} = 1$ and for $n = 0, \pm 1, \pm 2, \pm 3, \pm n$, consist the eigenvalues operator L_z **which agree with prior** Resonance-frequencies \mathbf{f}_R [$S \equiv f_{1=N}, f_2, f_3, f_R = \omega^2$] as wavelengths $\lambda \equiv [f_1, f_2 \dots f_n = \omega^2] \equiv$ the **n lobes** , or
 $\rightarrow f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma \cdot \bar{B}}{8 r^2}$, a Principal-Stresses σ , and a Resonance-frequencies \mathbf{f}_R relation , which is the Energy stored in the MP-lobes. [70]

The Physical Properties and **Crystal-types :**

The **Physical properties** of Crystals , depend on the **Kinds and Strengths of the only Attractive forces** that hold the particles together in the Bodies [Solids , Liquids ,Gases , Crystals etc.] while the **Types** depend upon the Kinds of Particles located at sites in the lattice-Material-geometry-formation .

An Ion is an Atom or Molecule in which the number of Electrons differs the number of Protons , or $E_n \neq P_n$, and if $E_n > P_n$ or $E_n < P_n$ then is **Negative or Positive Ion** . The **Lattice - crystal** is a Regular 3D geometrical arrangement of Atoms , Molecules or Ions in a crystal , which follows the Material–Geometry rules . [70]

Lattice - Energy is the Energy required to separate the Ions of an Ionic ,with Atoms or Molecules Solid . The mapping of Crystal-types is as below ,

Type - Particles at sites - Type of Bounding-Force - Properties - EM-Radiation

Ionic : \oplus, \ominus Ions - Electrostatic $\oplus \leftrightarrow \ominus$ - non-conductors - Infrared
Molecular : Atoms or Molecules - Dipole Attraction - Repulsion - non-conductors -
 Chemical-Bonds .

Covalent : Atoms - Network- Bonds between Atoms -non-conductors - EM-Spectrum

Metallic. : Atoms - Ions and Electrons Attraction - Conductors - E-conduction .

The **Kinetic-Energy** E_K of a moving Material-point , *as this is the Photon* , is stored as motion in its Storage , $\mathbf{r} = [n.\lambda/2]$ with the , \mathbf{n} frequencies $f_n = n.f_1$, with \mathbf{n} lobes and fundamental frequency f_1 . From above is seen the **Passage and The-How EM-Radiation can travel in Crystals** and which are the Cauchy-stress-tensor where $E \perp B \perp r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$, in-where Energy Propagates along Directions **without Birefringence** , and carries the Energy-Storage \mathbf{r} , which radiation is **The conveyer**.

Above procedure can be used in Cells , where cells are cases of an Birefringence material and the Resonance-Passage happens as the Force , *an EM-Radiation in Two directions , can travel in Cell* through Cauchy-stress-tensor where the two Conveyers $E \perp B \perp r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$, can carry the Energy-Storage , \mathbf{r} , in Cell , **and change the Inner-Structure of Cell to another desirable Property** .

From Inner-velocity equation $v = wr = (2\pi/T).r = 2\pi.f_1 r$, wavelength $\lambda = cT=c/f_1$, $r = n.[\lambda/2]$, then $r = n.(c/2f_1)$ and $\mathbf{v} = 2\pi.f_1[n.c/2f_1] = \mathbf{n}.\pi.c$ or $\mathbf{v} = \mathbf{n}.\pi.c \dots(4)$ showing that velocities in lobes are , $\mathbf{n}.\pi$,times that of light and for $n = 1$ then $\mathbf{v} = \pi.c$ more than three times faster of light velocity.

Because of the above velocity \mathbf{v} , an **E** field is produced , which produces the $\partial D/ \partial t$ field , which in turn produces the **H** field which produces the $\partial B/ \partial t$ field and which again produces the **E** field , i.e. the total **EM**-field regenerates itself as it rotates , and *is a Phenomenon happening in a Propagating Plane-wave* .

Permeable - Resonance - Path is impossible in an three-times stronger EM-field .

The Geometry and Physical Configuration - Structure of the Energy - Systems.

- A.. The Point-Line-Plane-Volume : E-Geometry : (1) . (2) .. (3) . . (4)
- B.. The Material-Point : M-Point : $[\oplus \cup \cup \ominus]$, $|\ominus \leftrightarrow \oplus|$
- C.. The Material-Point-Spaces : M-Geometry : $f_R [S \equiv f_{1=N} , f_2 , f_2, f_R] \leftarrow f_R \equiv f_N$
- D.. The Forced-Nodes -Structure : Mechanics : $[-\lambda M + K]X = 0$, $[\bar{A} - \lambda I]Y = 0$, $\lambda = w^2$
 $\textcircled{R} \textcircled{R}$
- E.. The Valence-Bond-Particles : Chemistry : $\textcircled{R} \textcircled{R}$, $\textcircled{R} \textcircled{R} \textcircled{R} \textcircled{R}$, $\textcircled{R} \textcircled{R} \textcircled{R} \textcircled{R}$, $\textcircled{R} \textcircled{R}$
 $\textcircled{R} \textcircled{R}$

In Euclidean-Geometry are shown the different Stationary-Shapes that Points maybe formatted . The Points on Plane or Volume Shapes are called *Vertices* .

In Material-Geometry are shown the different Stationary-Shapes that Material-Points maybe formatted .The Points on Shapes are called *Spaces* , \oplus , *Anti-spaces* , \ominus , or (+) , (-) charge and consist a Stationary-System .

In Mechanics are shown the modes of Non-stationary-Shapes in General-coordinates equal in number to degrees of freedom of the system , and by using Energy-Equation of motion is converted to the Standard-eigenvalue-form of frequencies $w^2 = f_1, f_N$ where $f_R [S \equiv f_{1=N} , f_2 , f_2, f_n] \leftarrow$ and $f_{\text{Resonance}} \equiv f_N$.

The Points on Shapes are characterized with the *Degrees of freedom* , which are , Loaded or Unloaded.

In Chemistry are shown the different , Stationary or Non-stationary-Shapes of the

Elementary-Particles Atoms , Ions , Molecules , Crystals , etc. and Compounds , placed with their Chemical-Bonds , that maybe formatted. The Points on mode-Shapes are in *each-State* the System of *Atoms-Ions-Molecules- etc.* which are Loaded or Unloaded

→ All above , **Configuration - Structures , Are under a Common-Relationship , That of Resonance , i.e. Gravitation through Gravity acceleration follows the Permissible-Permeable-Path to communicate with all Energy-Structures.** ←

In Material-point, ***M-Point - Resonance*** occurs on Material-point when placed in a uniform Magnetic Field . Its energy $E = W = \left[\frac{4\pi r^2}{3} \right] \cdot f_n = n \frac{(1+\sqrt{5}) \cdot \sigma r}{3} = 2L = \bar{B} \cdot \bar{w} = J \cdot w^2$ is split into the ,**n**, finite numbers of Energy-lobes dependent on the angular – momentum-vector $\bar{B} \equiv \text{Spin}$. Reorientation of Spin creates a New Nutation-Period $f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r}$ as in Fig-7. and a New wavelength $\lambda_N = \frac{2r}{n}$, where $\lambda = 2r$. Since frequency $f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{\lambda_N}{c}$, then $\lambda_N = \frac{n\sigma c (1+\sqrt{5})}{4\pi r} = \frac{3c}{nr\sigma\bar{B}}$ which is the New wavelength . If Material-point is ticked with a field of another frequency then is unlikely to transition only-when acquire a common frequency f_T . This common Transition-frequency is the ***M-Point-Resonance*** .

In Mechanics , ***Resonance*** occurs in a Mechanical-System under the **EXCITATION** of an Oscillatory-System. If the frequency of excitation coincides with one of the natural-frequencies of the system , a condition of Resonance is encountered .

Vibrating Systems are all subject to damping because energy is dissipated by the resistances of motion .

In Physics , ***Physical - Resonance*** occurs in a Physical-System when another Vibrating - system or external forces **DRIVE** the System to oscillate with greater amplitude at specific frequencies called Resonance-frequencies . This property is found in Orbits either in Atoms , or in Universe .

In Electricity , ***Electrical-Resonance*** occurs in an Electric-circuit , Resistor [R] , Inductor [L] , Capacitor [C] at a particular , *Resonant-frequency* , when the Imaginary-parts of Impedance $Z = R+iX$, of the circuit elements cancel each other.

In Medicine , ***MRI-Medicine-Resonance*** occurs between the Nucleus , *of the Two-Hydrogen-atoms in water-molecules* , consisted of a single Proton and when ***excited by an Strong-Magnetic-field*** then is twisting its orientation so that aligned with the field. Proton all by itself may absorb and reemit 900 MHz photons , but when it gets near other charges it gets twisted and distorted and its Resonance frequency shifting to 906 MHz . This means that MRI Machine maybe used to generate special Spectra corresponding to the amount of Resonance at various frequencies and which in turn reveals the details of the structure of molecules . Newton`s ,First-Law states that , *Any change in vector \bar{v} , to motion or direction $d\bar{v}$, involves acceleration $a = F / m = 2S/t^2$, or $E=F \cdot dS=(ma) \cdot d(at^2/2) = m \cdot a^2t dt$, i.e. ***Resonance $w^2_R \cong acceleration \bar{a}_R$****

In Cells which are growing and moving alone , Energy-Path is through Photosynthesis and not by fossil fuels in order to sustain , **Growth , Metabolism and Reproduction** . From-Web , In order to transform the energy held in the chemical bonds of the food molecules into more readily usable forms , *as these are for Cellular Nutrients sugar and fat which are molecules* , have to pass their membrane which is semi-permeable using Oxidation , *a type of chemical reaction*, and Glycolysis , *sugar splitting* , and thus their Electrons are transformed from one molecule to another . Because chemical reactions in Cells may need accomplished too long time , exist Enzymes which are Proteins ,that accelerate chemical reactions within the Cell . i.e.

Cells need energy to accomplish the task of life , beginning with the Energy - Sources obtained from their environment in the form of , *Sunlight and Organic food molecules* , **via the Energy - Pathways Photosynthesis and Glycolysis** , → → →

All above mentioned processes fulfil many purposes and principally the main one which is that of the Direct-Communication of the Golden-ratio-frequency-Pattern the $\{ f_n = [\frac{\sigma \cdot (1+\sqrt{5})}{2}] \frac{1}{2\pi r} = \frac{E_n}{h}$ of Material-Point } **which is the Energy-needed via the referred Energy- Pathways to Kick-Everything-Done in this world** . ← ← ←

In Momentum-Paradox of light , **MP - Light-Resonance** occurs, when the Photon as a System S , as this is $\{ [\mathbf{B}_p \equiv \text{EM-R} \equiv f_{1=N}, f_2, f_3, f_D, f_n]$ and $\lambda_N = \frac{\sigma \cdot (1+\sqrt{5})}{4\pi r} = \frac{n \cdot \bar{B}}{4\pi r^2}$ } and which is a moving Energy-tank as EM-Radiation and , **DRIVE** the System of the Dielectric-Medium $[S_D \equiv f_D]$ to oscillate with a common amplitude , *that of the Dielectric-Polarization frequency* f_D , with a → New-mass Density-Wave , becoming from *the Reaction to the New Reorientation of the Spin* .It was proved that when Spin = \bar{B} vector changes direction , then frequency is between $[f_{1,..., f_n}]$ and becomes another Particle .

A light-Pulse , Driven forward , in a sort of Optoelectric shock-wave , E.M-R $\equiv f_{1=N}, f_2, f_3, f_R, \dots, f_n$, *Electromagnetic-Radiation* , then Photon`s momentum $\bar{B} = \frac{r \cdot \sigma \cdot (1+\sqrt{5})}{n} = [\frac{\sigma \cdot (1+\sqrt{5})}{2}] \frac{2r}{n} = v_R \cdot \frac{2r}{n} = \frac{2rc}{n \cdot N_R}$ i.e. Photon`s momentum follows the Inverse-dependence of Radiation-pressure on the Refractive-Index N_R .

In Gravity which is a Potential-energy with binder Energy - Field $[\nabla_i]$, becoming from the Excitation-motion , *the called Gravity force without Vibration but only local rotation* , **Gravity-Resonance** occurs in any Material-Point , *as the Photon is* , when collides with one of the $\{ [\pm s^2]$ dipole Spin-constituent in MFMF} – Field , becoming from the Revolving-motion , **and say this is an Energy - Vector Resonance** , because happens axially on Spins-Vector and , Resonance is the Orientation of both Spins .

In Orbits which are Negative – Energy-Rims with binder Energy the attraction between the opposite forces $P_A \leftrightarrow P_B$ at points A , B , is created the Central motion where , **Orbital-Resonance** , are the Plane Surfaces , representing a Constant-Energy-Rim following the Celestial Kepler Laws , **and say this as an Plane-Energy-Resonance** , because happens in-Plane and on Energy-Field-vectors → the Infinite series of Spin \bar{B} . In Figure -5-7- are shown the Ellipse-Orbits , $1 = c \cdot f_n^2 \cdot r^3$, with their content which is The Spin-Field-vectors \bar{B} in all area πab of MFMF field .

During orbiting centripetal acceleration $\bar{a}_P = \sigma = \pm \frac{4\pi r}{(1+\sqrt{5})} \cdot f$ i.e. *Orbit is subject to a Mechanical-stress, σ , becoming from the Centripetal-acceleration \bar{a}_P , therefore is appeared from stress σ , the Piezoelectric-effect with Positive-charge at the Nucleus and Negative-charge at the Planet \equiv Material-point.*

The two faces at N, P are connected by the in-between Gravity-field $[\nabla i] = [\pm s^2]$ in [MFMF] Field, so flows Current which is the Resonance on Orbit. In the Inverse Piezoelectric-effect on Orbit, when a voltage is applied across its opposite faces at N, P becoming from the $[\oplus \leftrightarrow \ominus]$ stretching then Orbit becomes mechanically stressed and Deformed in Shape by the Resonance at N, P, faces.

From above, motion needs the Granular-Layer-Gravity-field $[\nabla i]$ to make a circuit in Orbit tiny Battery. In Atoms Negative-Energy-Rims are the Energy-Plane-Field vectors the Rims, so that at focus the Proton and at Orbits the electron or electrons, to follow the Central motion, and motion conserved.

The Energy, as motion, is transformed into velocity vectors, the moving Energy-tank in wavelength $\lambda_N = \frac{2r}{n}$, and the Velocity vector, \bar{v}_i , to a Field-Vector, $\nabla \cdot \bar{v}_i$, which is the Stationary Surface of the Motion in Orbit, because follows the Extrema Principle, as Figures 5-7.

Vibrations of Systems: For Orbits issues $\rightarrow W = 4\pi^2 \cdot \frac{r^3}{T^2} \cdot \bar{n} = 4\pi^2 \cdot r^3 \cdot f_p^2 \cdot \bar{n} \leftarrow$ which is Kepler celestial law for microcosm.

For the vibration of systems of many degrees of freedom and because an estimate of the Fundamental and a few of the lower modes is sufficient Rayleigh's method and Dunkerley's equation, are of great value and importance in the theory of Resonance. For M and K, the Mass and Stiffness matrices and X, the assumed Displacement vector for amplitude of vibration, then for Harmonic motion, the maximum Kinetic and Potential energies are written as,

$T_{\max} = \frac{1}{2} w^2 \cdot X^T \cdot M \cdot X$ and $U_{\max} = \frac{1}{2} X^T \cdot K \cdot X$ where, w, are the frequencies $[B_P \equiv EM-R \equiv f_{1=N}, f_2, f_3, f_D, f_n, w^2 = f_n]$ of the System.

By equating the two and solving for w^2 , then $w^2 = \frac{X^T \cdot K \cdot X}{X^T \cdot M \cdot X}$ which is the lowest natural frequency from the high side and by expressing the assumed displacement curve, wavelength λ , in terms of the normal modes X_i as $X = X_1 + C_2 X_2 + C_3 X_3 + \dots$ then by normalizing to the same number equation becomes,

$$w^2 = w_1^2 \cdot [1 + C_2^2 \left(\frac{w_2^2}{w_1^2} - 1\right) + \dots] \dots (a) \text{ i.e. a relation between the}$$

Fundamental frequency $f_n = \frac{w}{2\pi}$, which is found as the Natural-Frequency

$f_n = \frac{n \cdot v}{4r} = \frac{n\sigma}{8r} [1 + \sqrt{5}]$, which is the Golden-ratio-frequency-Pattern and all the other harmonics in any cave r, of the, n, lobes.

The plus and minus signs show the phase of the antinodes at a particular instant.

In Mechanics equation (a) is a regression method as the, Least Squares, to approximate the solution of overdetermined systems for angular velocity vector \bar{w} .

Because \bar{w} is related to the Total work $2L = \bar{B} \cdot \bar{w}$ then $w_1 = 2\pi \cdot f_1 = \frac{(1 + \sqrt{5}) \cdot \sigma}{8\pi r} = \frac{[1 + \sqrt{5}] \sigma}{4 \cdot r}$ i.e. dependent on cave, r, and Glue-Bond, σ . Moreover since in monads

exist n , frequencies as equation of , Spin = $\bar{B} = f_n \cdot \left(\frac{8r^2}{n\sigma}\right) = \text{Energy in } n \text{ wave-node}$
loop where $f_n = \left[n \frac{\sigma(1+\sqrt{5})}{\pi(2r)^3} \right] \equiv \frac{(1+\sqrt{5}) \cdot \sigma}{4\pi r} = \frac{E}{h}$, $\bar{B} = [r \cdot \sigma \cdot (1 + \sqrt{5})]$, and
Energy $2L = 2n(3 + \sqrt{5}) \left[\frac{\sigma^2}{\pi r^2} \right] \dots\dots\dots[70]$

Orbitals in an Atom are the three dimension standing waves because electrons are waves following the Breakage - Principle and consist the eigenvalues or and , the Eigen-frequencies . Since the wavelength λ , follows the sequence $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{n}$, and frequency in , n , lobes the Odd and Even sequences $1, 2, 3, 4, 5, 6 \dots$ and $1, 3, 5, 7, 9$, wavelength is fractionally quantized while Energy as whole numbers . Equation (a) shows the fundamental deflection (*or mode*) X_1 which is the greatest of all . Since infinite large number in algebra, is what is called *Maxima* in Geometry, and *Zero* in the New *Material-Geometry* then article [65 -70] consists ***The Energy - Beacon*** , for understanding nature.

Question . How Energy \equiv Work \equiv Motion is penetrating matter ???

Given the External-Forces that are acting on a System , to determine the distribution of Internal-Stresses throughout the system . Explicitly is the Cauchy-stress-tensor at every point. In a Solid-object, *By Newton`s laws of motion where any external forces that act on a system must be balanced by internal reaction forces or cause the particles in the effected part to accelerate* , all particles must move substantially Resonated in order to keep overall the shape , so follows that any force applied to one part must give rise to internal reaction forces that propagate from particle to particle of the system. All these internal forces are due to the very short-range intermolecular interactions ,manifested as surface contact forces σ , between adjacent particles , which is what is said as Stress . *Since now* , the Work executed in the Elastic material Configuration the Strain energy is absorbed as Support Reactions and displacement field in the three dimensions $[\nabla \epsilon (\bar{u}, \bar{v}, \bar{w})]$ upon the deformed placement (these alterations of shape by pressure or stress is the Euler`s-Lagrange elastic Equilibrium State of the Configuration and is as

$$G \cdot \nabla^2 \cdot \epsilon + [m \cdot G / (m-2)] \cdot \nabla [\nabla \cdot \epsilon] = F \dots\dots\dots(1) , \text{ where}$$

$E =$ Young modulus of elasticity. $G =$ Shear modulus = $E \cdot m/2(m+1)$
 $m =$ Poisson`s ratio = $1 / \mu \approx 10/3$ $\sigma =$ Stress = Force / Area.
 $\epsilon =$ Strain = change of length / length . $F =$ External forces .

In Electricity , the linear Electrical behavior , *Field and Strength* , of a Material point is $\check{D} = \epsilon \hat{E}$, where \check{D} = the Electric displacement field , \hat{E} = the Inside Electric field strength and then according to Maxwell`s equations $\rightarrow \nabla \cdot \check{D} = 0 , \nabla \times \hat{E} = 0$ and since in Elasticity , Hook`s law $\rightarrow \epsilon = E \cdot \sigma$ then $\nabla \cdot \sigma = 0$, $\epsilon = \frac{\nabla u + u \nabla}{2}$ where

u = the displacement. All above when combined in *coupled equations then*
 $\epsilon = E \cdot \sigma + \partial \hat{E}$ and $\check{D} = \epsilon \hat{E} + \partial \sigma \dots\dots(2)$ and since in Material-point $\sigma = 2(1+\sqrt{5}) \cdot \bar{v}$ = constant , *because* $v = w \cdot r$, then (1) becomes , $\epsilon = E \cdot \sigma + \partial \hat{E} = 2 \cdot E(1+\sqrt{5}) \cdot \bar{v} + \partial \hat{E}$,
 $\check{D} = \epsilon \hat{E} + \partial \sigma = \epsilon \hat{E} + 0 = \epsilon \hat{E} \dots\dots(3)$

System (3) defines the Strain , ϵ , and the Electric displacement field $\hat{E} = [\ominus]$, in M-Point which is the Work in a much deeper stresses-level as $dW = \frac{\sigma^2}{2E} (dx \cdot dy \cdot dz)$
Work is always motion in the three dimensions dx , dy , dz , **therefore** , **Energy To be transported** , is needed **First to be conserved in caves** and then transported.
Perhaps this remark for Energy-Packaging , will be useful for *future research* .

E.. THE CONIC-SECTIONS AND PLANAR – CURVES :

Menaechmus came to think of producing curves by cutting a cone from the circle definition which is → *Since the center O of a circle is of equal distance to all points in Plane of the circumference the same also to all Centers O_n from center O which are on line OO_n and Perpendicular to this Plane* ←

In Figure -5 , Line OO_n is the generator axis of a right-angled cone and all the shapes of the curve produced by cutting a right-cone by a plane obliquely inclined to its axis is a conic section . In circle [O,OP] with only one center issues for point P , OP + PO = 2R is constant , while in ellipse [O₁P,PO₂] of two centers O₁,O₂ issues for point P , PO₁+ PO₂= major-axis , which is constant . This property allows Central-motion to be seen as a Geometrical problem of Proportional on Points and lines [44] .

In [70] Torsional-Momentum is $\bar{M} = [\bar{r} \times \bar{p}] = \frac{d\bar{B}}{dt}$ → the Theorem of Equal-Areas and Kepler`s 1st Law , i.e. Momentum \bar{p} , of a force \bar{P} , to a constant center O , of radius \bar{r} , is equal to the change of the angular - momentum \bar{B} at time t , related to the same center O , and its trajectory lies on the same Plane .

a.. The Geometrical Central motion : Huygens and Johannes Bernoulli came to think of producing the Shortest-Time curve between Two points on a vertical Plane by a point acted only by gravity and which is , → *To find the Path - curve or surface for which a given variation has a Stationary value* , Stationary or Extrema is the maximum or minimum between two points (1) , (2) ← *It was proved the Cycloid.*

From Geometry Figure -5 , Equality $A_1O = p/e = AP + OP \cdot \cos \varphi = r/e + r \cdot \cos \varphi$ and is → $p = r + r e \cdot \cos \varphi = r (1 + e \cdot \cos \varphi)$ (1) where , p = a constant parameter , r = the orbit radius from O . Inversing (1) then → $\frac{1}{r} = \frac{1+e \cdot \cos \varphi}{p}$ and

$$\text{Derivative } \rightarrow \frac{d^2 1/r}{d\varphi^2} = - \frac{e \cdot \cos \varphi}{p} , \rightarrow \frac{d^2 1/r}{d\varphi^2} + \frac{1}{r} = \frac{1}{p} \dots (2)$$

$$\text{Integrating (2) is the acceleration at point P and equal to } \rightarrow \mathbf{a} = - \frac{4A^2}{r^2} \frac{1}{p} \dots (3)$$

where the constant area O,P,P₁ = $A = \frac{1}{2} \cdot r^2 \cdot \frac{d\varphi}{dt}$, and for ellipse the Area = $(\pi a_e b_e)$.

For ellipse $a_p^2 = p \cdot b_p$, or $\frac{1}{p} = \frac{a_p}{b_p^2}$ and period of rotation T , then the Constant is

$$\text{for a period , T , as } A = (\pi a_p b_p) / T \text{ and (3) becomes } \mathbf{a} = - \frac{4\pi^2}{T^2 r^2} a_p^2 b_p^2 \cdot \frac{a_p}{b_p^2} =$$

$$= - \left[\frac{4\pi^2}{T^2} a_p^3 \right] \frac{1}{r^2} = - \left[\frac{4\pi^2}{T^2} \right] \frac{a_p^3}{r^2} = - k \frac{1}{r^2} \dots (4) \text{ or acceleration}$$

$$\mathbf{a} = - \left[\frac{4\pi^2}{T^2} \right] \frac{a_p^3}{r^2} = - k \frac{1}{r^2} , \text{ where } \mathbf{k} = \left[\frac{4\pi^2 a_p^3}{T^2} \right] = 4\pi^2 \cdot a_p^3 \cdot f^2 \rightarrow \mathbf{a \text{ constant}} \dots (4a)$$

Equation (4a) is Kepler second Planetary law , Spotting constant **k** , to be a function of the Orbit $\equiv a_p^3 \equiv$ the Semi-major axis \equiv Space and as a function of Time T , or the frequency f_p of orbiting . *This significant property is used also in atom`s structure.*

For circular motion $a_e = r$, then (4a) becomes $\mathbf{k} = - \left[\frac{4\pi^2}{T^2} \right] \frac{r^3}{r^2} = - \left[\frac{4\pi^2 r}{T^2} \right] = 4\pi^2 \cdot r^3 \cdot f_e^2$

and constant $\mathbf{k} = \left[\frac{4\pi^2 r^3}{T^2} \right] = 4\pi^2 \cdot r^3 \cdot f_e^2$, i.e.

- 1.. Kepler`s First law of Orbits : All Planets move in Elliptical orbits , with the sun at one focus .
- 2.. Kepler`s Second law of Areas : A line that connects a Planet to the sun sweeps out equal areas in equal times .
- 3.. Kepler`s Third law of Periods : The square of the period of any Planet is proportional to the cube of the semimajor axis of its orbit .
- 4.. Kepler`s constant $k = 4\pi^2 r^3 (1/T)^2$: The constant k , is Not-Only constant during the motion of a Planet , because being also $k \cong r^3 \cdot (1/T)^2 = \text{constant}$ for all Planets.
- 5.. **Spotting** → **on Kepler`s constant \mathbf{k}** :

During the Central-Plane-motion of a Planet \equiv Momentum $\bar{\mathbf{B}}$ and a Sun \equiv focus O, the coefficient $r^3 \cdot (1/T)^2 = r^3 \cdot f_p^2$ is Constant.

Applying above property to Caves \equiv Energy-Storages \equiv Orbits , then since

$r^3 \cdot f_p^2 = C = \text{Constant}$, then change of , r , follows change of f_p , **or in cave** ,

Electromagnetic-wave $\mathbf{E}_1 = \left[\frac{4\pi r^2}{3} \right] \cdot \mathbf{f}_1 = C$, **constant** , is absorbed or emitted .

Remark :

- 1.. Since ,Caves \equiv Energy-Storages \equiv Orbits \equiv Stationary-lobes \equiv Energy-Rims $\equiv r^3 \cdot f_p^2$
 $E_n = n \cdot \left[\frac{4\pi r^2}{3} \right] \cdot \mathbf{f}_1 = C$, therefore , Atoms Wheel-Rim , the Protons-Neutrons in Nucleus and Electrons in Orbits is an Energy - Rim , for each Electron-Energy-Orbit .
- 2.. It was shown that all particles have the same acceleration , g , in our gravitational field with frequency unchanged , and → velocity, $d\bar{v}$, with wavelength , λ , to be changed ← so light being a particle also is deviated in gravity field and ,Inertial mass is equal to the Gravitational mass which is the Necessary and Sufficient Condition only in Mass of Material-point where $c T = \lambda = c / f$, of this Isochronous motion .
- 3.. The Spotting on Kepler`s constant \mathbf{k} : **Question ??**

Since the Central-Plane-motion of point $P \equiv$ Planet \equiv Momentum $\bar{\mathbf{B}}$, and a Sun \equiv Focus O is a Conic-section , **to find** of producing the Shortest - closed - Surface on any Plane , such that Energy \equiv motion , to be constant \equiv The closed-Surface of the two points , and which is , → **To find the Energy-Path-closed-Curve of the two Points which Surface is of Constant-Energy** .

Constant is not a maximum or minimum magnitude between the two points , P and O, instead is a Fixed sum from rotation $\equiv [\oplus \cup \cup \ominus] \equiv$ motion, trapped in a closed-curve.

The Energy-quantity k is constant in Planck`s scale cave 10^{-34} m and exists , in Plane Rims , becoming from the continuous Central - Rotation of masses in scales .

It is shown in ,Kepler`s third law, that this constant is $k = \left[\frac{4\pi^2 r^3}{T^2} \right] = 4\pi^2 \cdot r^3 \cdot f_p^2$,where for the Sun-Earth-Rim Semi-major-axis , $r = 15 \cdot 10^{10}$ m , and the period $T = 1$ year the Energy in this Plane-Sun-Earth Rim is $k = 3 \cdot 10^{-34} = [3 \cdot 10^8] \cdot 10^{-42} \text{ y}^2/\text{m}^3$.

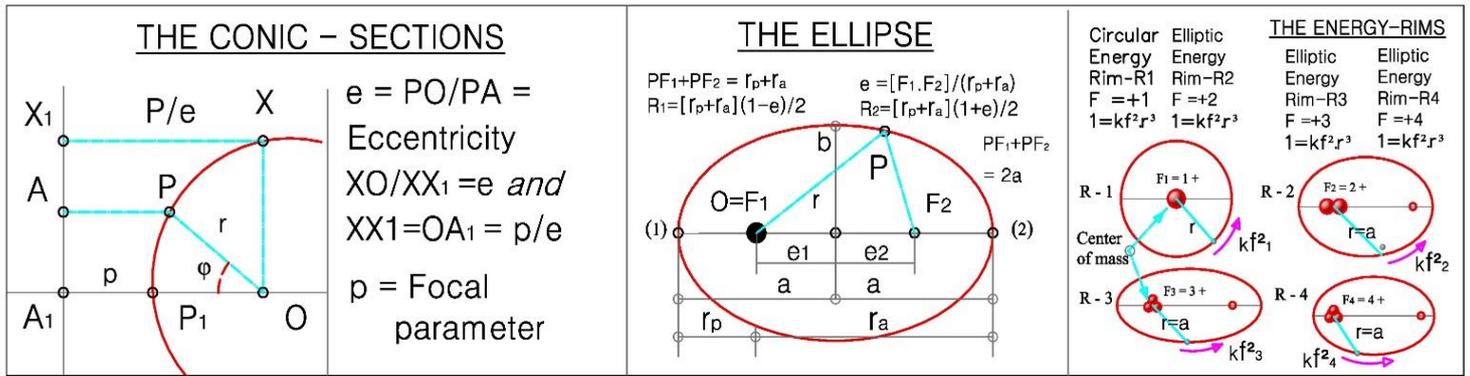


Figure-5.

The Conic-sections as Planar and Atoms-curves under Equilibrium of forces

1.. The generation of the Conic-sections : $O =$ The constant center of rotation , $P =$ The movable Point on Orbit , $p =$ The parameter of the conic , $e =$ the eccentricity of the conic $0 \leq e \leq 1$

2.. The Central Ellipse and Gravity relation for mass $m_p \rightarrow$ Planet , $O_n - m_s \rightarrow$ Sun.

3.. The Energy-Rim R_1 is circle because focus F_1 is consisted of one center , while the others for Focus F_n is of 2,3,4,.. centers due to \oplus elements are Ellipse for every one \ominus mass m_p . Kepler`s constant Planets relation is $\frac{T^2}{a^3} = k = [\frac{4\pi^2}{G \cdot m}] =$

$2,97.10^{-19} (s^2/m^3)$, where $G = 6,67.10^{-11} (Nm^2/Kg^2)$ becomes from the Light-velocity-Storage \bar{v} , when \bar{v} , is entering the cave $r = 1.10^{-42} m$, where is produced the Energy Plane-Cave-Rim equal to $R_n = 3.10^{-34} m^2/s$.

Since also exists the relation $k \cdot f_n^2 \cdot r^3 = 1$ where $r =$ semi major axis , a , then, An Energy - Rim is a Plane-Surface representing a Constant-Energy becoming from the squared frequency f_n^2 , representing the Imaginary - Energy - Part of monad , and r_n^3 representing the Real-Space-Part of monad $1 = k \cdot f_n^2 \cdot r^3$.

All these Energy-Rims consist the Quantized-Plane-curves .

a.. The Central motion and Gravity :

Kepler`s third law of harmonics suggested that , the ratio of the period of orbit squared (T^2) to the mean radius of orbit cubed (R^3) is the same value ,

$$k = 2,97.10^{-19} s^2/m^3 = T^2/R^3 , \text{ for all the Planets that orbit the sun.}$$

Centripetal force $C_F = m_p v^2 / R$ is the result of the Gravitational force that attracts the Planet towards the Sun and can be represented as \rightarrow Gravity-force $\rightarrow G_F$

$$G_F = [G \cdot m_p m_s] / R^2 \text{ and issues } C_F = G_F .$$

Since the mean-velocity of a Planet is $v_p = (2\pi R) / T$ then $v^2 = (4\pi^2 R^2) / T^2$ and substituting to prior , Centripetal force $m_p [4\pi^2 R^2] / RT^2 = [G \cdot m_p m_s] / R^2$ and by cross-multiplication is transformed to $T^2 / R^3 = [m_p 4\pi^2] / [G \cdot m_p m_s]$ and canceling the same from numerator and the denominator then ,

$$T^2/R^3 = [4\pi^2] / [G.m_s] \text{ or } Gm_s = [4\pi^2.f_p^2] R^3 = w^2R^3 \text{ where } E_1 = \left[\frac{4\pi r^2}{3}\right].f_p, k = R^3.f_p^2$$

The period $T(s)$ for an elliptical orbit is $T = 2\pi \sqrt{\frac{a^3}{G[M_1+M_2]}}$..(1), which is the same

for all ellipse with the same semi-major-axis a . Inversely for calculating the distance in meters ,where a body has to orbit in order to have a given orbital period ,*in second*,

$$a = \sqrt[3]{\frac{G[M_1 + M_2]T^2}{4\pi^2}} \dots\dots(2) \text{ where , } G = \text{The gravitational constant} =$$

$$= 6,67.10^{-11} \text{ Nm}^2/\text{Kg}^2, M_1, M_2 \text{ the masses of any two material-points .}$$

From above relation is seen that Energy – Rim - Shapes C , ***are Discrete-Packets of Energy – levels*** i.e.

1.. Attraction of opposite forces $F_o \leftrightarrow F_p$ at points O, P creates the Central motion and Kepler`s laws where Orbits are Plane-curves representing a Constant-Energy becoming from the squared Periods T^2 , or Frequency f_p^2 , representing the Imaginary-Energy-Part of monad and r_n^3 representing the Real - Space -Part of monad $1 = C.f_n^2.r^3$. These constant are the Quantized-Curve-Rims .

2.. Since both semi-major axis \bar{a} , *the Position-vector* , and velocity \bar{v} , *the Velocity-vector* , define the Orbital-Plane , then Angular-momentum-vector \bar{L} , is perpendicular to vectors \bar{a} , \bar{v} , and is $\bar{L} \perp [\bar{a} . \bar{v}]$, or

$$\text{The magnitude } \bar{L} = \bar{a} \times \bar{v} = \text{constant for all central motions .}$$

For circular orbits gravitational force G_F equals the centripetal force C_F , so $C_F = G_F$ and $m_p v^2 / R = [G.m_p m_s] / R^2$ and velocity $v^2 = GM/R$..(1)

Substituting the expression into the formula for Kinetic energy then ,

$$K_E = \frac{mv^2}{2} = \frac{m.GM}{2.R} = \frac{GMm}{2.R} \dots\dots(2) \text{ or } K_E = (1/2) (-P_E) = -\frac{P_E}{2} \text{ and } -P_E = 2.K_E \dots(3)$$

$$\text{The Total-energy } E = K_E + P_E = K_E - 2.K_E = -K_E \dots\dots\dots(4) \text{ i.e.}$$

The Potential - Energy is Always - Negative and Twice the Kinetic-energy

While The Total - Energy of an Central - Orbiting - System is Negative .

b.. Conservation laws in Astronomy :

1.. Newton`s second law tell us that acceleration on an object is proportional to the net-force acting on it so objects move at constant velocity if no force acts on them. Because of conservation of Momentum the Interacting objects exchange momentum through equal and opposite forces $[\oplus \leftrightarrow \ominus] \equiv [\bar{v}. \nabla i]$, therefore ***constant*** $C = r^3.f_e^2$, is a ***Quantized-Energy-Storage*** , a ***Constant Energy-Plane-Rim*** , in where Planets move at constant velocities ***without any force acting on them*** .

Perhaps the above remark maybe useful for future research on atoms and molecules where is later proved that , in Hydrogen atom exists the minimum Negative-Energy equal to Quantum , g .

2.. In [70] , the Work produced In Material-Point \overleftrightarrow{AB} is equal to $\rightarrow W = 2L = \overline{B} \cdot \overline{w} = J.w^2 \leftarrow$ consisting the First-Energy-Store which is a Stationary Wave with , n , lobes as , $W_{n(n+1)} = [\frac{4\pi r^2 f_1}{3}].n.(n+1)$ and wavelength $\lambda_N = \frac{\sigma.(1+\sqrt{5})}{4\pi r} = \frac{n.\overline{B}}{4\pi r^2}$ i.e. , that which **Happens in Material point** , Momentum as Work is $W_{n(n+1)} =$ constant in n-lobe , **Happens to Planets orbiting the Sun** , so Because of conservation of angular momentum in the Constant Energy-Plane-Rim-Orbits, **Planets with no twisting forces are continually rotating and orbiting the sun** . Energy is concentrated **at Trajectories \equiv Rims \equiv Orbits \equiv Circuits** because there exists the pressure of centripetal force Fig-6

3.. Energy = motion = Work , and makes the matter move. In [70] the Work produced In Material-Point is conserved but can travel from one object to another , or change in form . From figure -1 Energy \equiv motion is kept in the Storages $r = n(\lambda/2)$, and is so conserved and transferred from one object to another , or change in form . The types of energy - forms are , *The Rotational* , the eternal rotation of positive \oplus around the negative \ominus , The Kinetic , motion , *The Potential* , stored motion , *The Radioactive* , wave motion , so , objects get their energy = motion from the Primary M-Points in-which motion exists Apriori , and transformed from one type to another.

4.. Angular momentum is the Constant Energy-Plane-Rim-Orbits of the System Sun-Planet . Only friction or atmospheric drag can change the orbit , and if an object gains orbital energy it moves to a more distant orbit with more energy . This is obvious from Planets constant $C = r^3.f_e^2$, since frequency is increased .

The Kepler`s Planar constant Principle :

Planet	: Period of Rotation (y)	: Frequency (n)	: Semi-major axis (m)	: $T^2 / R^3 (s^2/m^3)$: $k.f_n^2.r^3 = 1$
Mercury	\rightarrow 0,2410	4,1494	$5,79 \cdot 10^{10}$	2 , 993	1
Earth	\rightarrow 1,0000	1,0000	$15,00 \cdot 10^{10}$	2 , 974	1
Pluto	\rightarrow 248,3000	0,0040	$590,00 \cdot 10^{10}$	2 , 993	$10^{-42} \equiv 1$

Each of the above Orbits consist an Energy-Plane- monad with a Constant –Quantized energy. We will show that above issues for Atom`s structure , where Nucleus at focus is consisted of 1 , 2 , 3 , 4 , n , , , [\oplus] Protons which define the figure of (1) focus to be Circular-Rim and for (2) and more focus to be Ellipse-Rim . Each Proton in Atom creates only one Energy-Rim .

Since Medium-Field Material-Fragment $\rightarrow [\pm s^2] = [MFMF] \equiv$ The Chaos , it is the base for all motions , the Scales of The Universe occupy the same Work .

All motions create Work which is conserved . Question ?? **Since Work \equiv motion \equiv Velocity-vector \equiv Energy-vector*Space-vector , then where this motion is kept ?**

Since Motion presupposes velocity vector \overline{v} which , when it is in motion collides with other velocity vectors and creates Constant work , **k** . Motion may be Linear ,

or Rotational for any displacement , r , where then is This Constant-Work is \rightarrow
 $k = \vec{v} \times \vec{v} \cdot \vec{r} = v^2 \cdot r$. Analyzing the two vectors then \rightarrow

$$k = v^2 \cdot r = (\omega r)^2 \cdot r = \left[\frac{2\pi}{T} r \right]^2 \cdot r = \frac{4\pi^2 r^2}{T^2} \cdot r = \frac{4\pi^2 r^3}{T^2} = 4\pi^2 \cdot \frac{r^3}{T^2} = 4\pi^2 \cdot r^3 \cdot f_p^2 \dots (k)$$

Equation (k) is Kepler-third-law , denoting that **Macrocosm and Microcosm Obey Newton`s Laws of motion in all Scales** . Because (k) is constant , $r^3 \cdot f_p^2$, is also a Constant multiplication of cave , r , and frequency $f \equiv$ energy, then **Work \equiv motion is conserved in cave , r , as the , n , frequencies $\rightarrow f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma \cdot \bar{B}}{8 r^2}$** and for a damping-cave $\rightarrow r(t) = r(t + w)$, with min-Damping =1 and Unit-Energy-Quantity W_u , (critical-energy unit) in-min r , is **Gravity g** .

Photon during Motion in [MFMF] Chaos , collides with other Photons , by means of Vectors-Cross-Product , and produces a constant Work which is stored into the Only-Four Energy-Geometrical- Shapes , of the motion . The Interior motion is kept in its Wavelength-Tank $2r = n \lambda$, and the Linear motion is continued by the inner surplus-produced-energy and which is the outer Propagating Electromagnetic Wave , the conveyer of tank $r = n \lambda / 2$.

Newton`s second law states that where there is acceleration , there must be a force. Since either a change in the , *Magnitude* or the *Direction* , of the velocity-vector , constitutes an acceleration , and according to 2nd law *there is a force* that acts at every point on the orbit . From $E = h \cdot f \rightarrow f = E / h =$ Energy per Planck`s length .

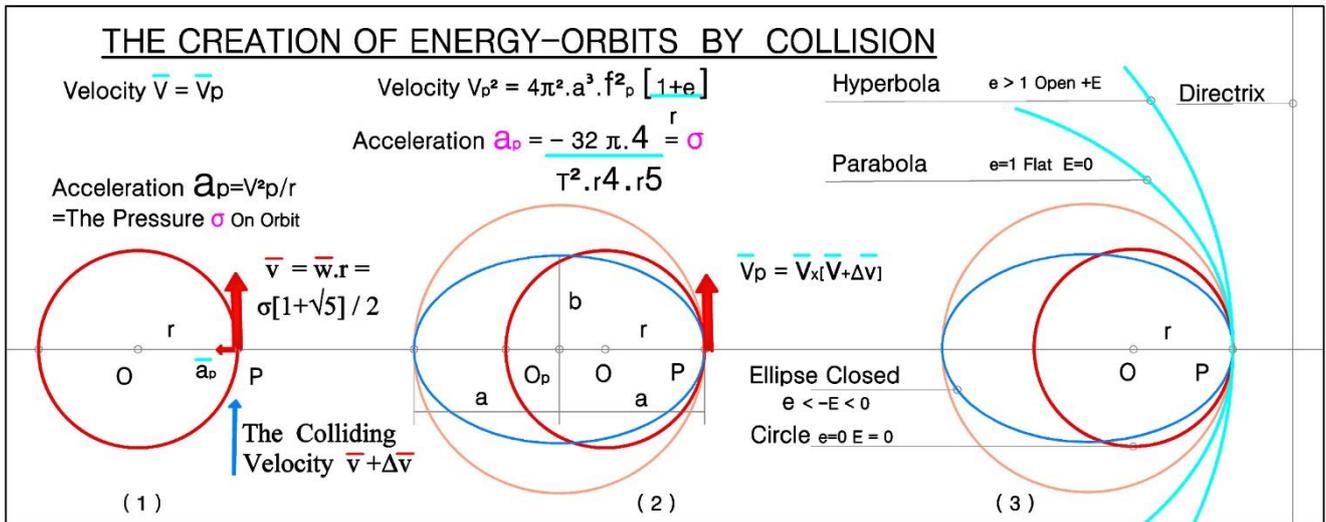


Figure-6. Velocities and Accelerations on , Planar and Atom , Orbits after Collision.

In (1) is presented the Circular motion where the constant velocity is equal to $v = v_p = \omega r$ and the Centripetal-acceleration $a_p = \frac{v^2}{r}$.

In (2) is presented the Elliptical motion after collision , where the acceleration is increased , the velocity is equal to $v_p^2 = 4 \pi^2 a^3 \cdot f_p^2 \cdot \left[\frac{1+e}{r} \right]$ and the Centripetal –

$$\text{acceleration } \mathbf{a}_p = -\frac{32C^2a^2}{r^5} = -\frac{32\pi a^4 [1]}{T^2 r^4 [r^5]}, \text{ and for } r = a \rightarrow a_p = -\frac{32\pi}{T^2 r^5},$$

where $C = \frac{dS}{dt} = r^2 d\phi/2 = \text{constant} = \text{Area covered in equal times}$.

In (3) are presented the Circular, Elliptical, Parabola, Hyperbola motion after collision, where acceleration is increased. The velocity is equal to

$$\mathbf{v}_p^2 = 4\pi^2 \frac{a^3}{T^2} \left[\frac{1+e}{r} \right] = 4\pi^2 a^3 f_p^2 \left[\frac{1+e}{r} \right] = k \left[\frac{2}{r} - \frac{1-e^2}{p} \right] \text{ and the Centripetal-acceleration}$$

$$\mathbf{a}_p = \frac{d^2r}{dt^2} - \frac{4c^2}{z^3}, \text{ where } k = \frac{4C^2}{p} = \text{constant}, \frac{d^2r}{dt^2} = \text{The Natural acceleration}$$

5.. The Conservative System, Mechanical-Energy and Shapes :

In a Conservative System, the total energy is constant and the differential equation of motion can also be established by the principle of conservation of energy and for the free vibration of an undamped system, the energy is Party-kinetic and Party-potential. The kinetic energy K_E is stored in the mass by virtue of its velocity, where as the potential energy P_E is stored in the form of strain energy in elastic deformation or work done in a force field such as gravity. Since Total energy $E = K_E + P_E = \text{constant}$

its range of change is zero and $\frac{d}{dt}(K_E + P_E) = 0$. From the principle of conservation of energy can be written $E = K_1 + P_1 = K_2 + P_2$, where 1, 2, represent two instances of time. If at time 2, is the time corresponding to the max-displacement of the mass then velocity of the mass is zero and $K_2 = 0$, where $K_1 + 0 = 0 + P_2$.

If the System is undergoing harmonic motion, the motion is repeated in equal intervals of time, t , and $x(t) = x(t + w)$, then K_1 and P_2 are maximum values and issues $K_{\max} = P_{\max}$. Summing the Kinetic and Potential energy we have

$$\dot{x}^2/2 + P(x) = E = \text{constant} \dots(1) \text{ and solving for } \dot{x} = y \text{ the ordinate of the}$$

phase plane is equation $y = \dot{x} = \pm \sqrt{2[E - P(x)]} \dots(2)$ where trajectories must be

symmetric about the x-axis, and the differential equation of motion for a conservative system is $\ddot{x} = f(x) \dots(3)$ or because $\ddot{x} = \dot{x} (d\dot{x}/dx) = f(x)$ equation (3) is written

$$\dot{x} \cdot d\dot{x} - f(x) \cdot dx = 0 \dots(4), \text{ and Integrating } \frac{\dot{x}^2}{2} - \int_0^x f(x) dx = E \text{ and by comparison}$$

with (1) then $P(x) = - \int_0^x f(x) dx$ and $f(x) = - dP/dx$ i.e. for a conservative System the Force is equal to the negative-gradient of the Potential-energy, and is as equation

$$\frac{dy}{dx} = \frac{f(x)}{y} \dots(5). \text{ Equations note that, at the equilibrium points the slope of the}$$

potential energy curve $P(x) = 0$. It can be shown that the minima of $P(x)$ are stable equilibrium while, positions corresponding to the maxima of $P(x)$ and are positions

of unstable equilibrium . Since the trajectories maybe closed curves as this happens in orbitals , then the period associated with them is

$$T = 2 \int_{x_1}^{x_2} dx / \sqrt{2[E - P(x)]} \dots\dots\dots(6) \quad \text{where } x_1, x_2, \text{ are extreme points of the trajectory on x-axis.}$$

In E – Figure - 5 , On a Planet of mass m_1 , orbiting mass m , where , r , is their distance between their centers , the corresponding **Gravitational Potential-energy** is

$$P_G (r) = \int F(r) dr = - G \frac{m.m_1}{r} \dots\dots\dots (7)$$

The Spring like central-force from point of mass m , on an attached mass m_1 , is $F = - k.r.\bar{r}_o = - k.r \bar{r}$, which has a three dimensional **Spring-Potential-energy** as

$$P_G (r) = \int F(r) dr = \frac{1}{2} k r^2 \dots\dots\dots (8)$$

The Coulomb force $F = \frac{q_1 q_2}{4\pi \epsilon_0 r^2} \bar{r}$, on a charge q_2 , due to a central charge q_1 ,

$$\text{has a } \mathbf{Coulomb-Potential-energy} \quad P_G (r) = - \int F(r) dr = \frac{q_1 q_2}{4\pi \epsilon_0 . r} \dots\dots\dots (9)$$

In Figure - 6, mass m , at point P , is orbiting with velocity vector \bar{v} , analyzed into the radial \bar{v}_1 , and the tangential \bar{v}_2 , both perpendicular to PF_1 , PF_2 . Since $PF_1 + PF_2 = 2a = \text{constant}$, therefore $v_1 + v_2 = 0$, and $v_1 = - v_2$, i.e. the two velocities are of equal magnitude and opposite sign and , velocity on tangent at P , is the external bisector of PF_1 , PF_2 vectors .

The Kinetic energy breaks into two parts as $K_E = mv_1^2/2 + mv_2^2/2 \dots\dots (a)$, and the magnitude of the Angular-momentum $L = r m v_2$, and in terms of L , then

$$K_E = \frac{1}{2} m v_1^2 + \frac{L^2}{2mr^2} \quad \text{and adding the Negative Potential energy } P_E = G \frac{Mm}{r} \quad \text{then}$$

$$\text{Total energy } E = K_E + P_E = \frac{1}{2} m v_1^2 + \frac{L^2}{2mr^2} - G \frac{Mm}{r} \dots\dots\dots(b)$$

Turning points , r_p perihelion , r_a aphelion , are the distances of closest approach and further recession , where $v_1 = 0$, $v_2 = 0$, and (b) becomes $\frac{L^2}{2mr^2} - G \frac{Mm}{r} = E$

$$\text{or } \rightarrow E = r^2 + G \frac{Mm}{E} r - \frac{L^2}{2mE} = 0 , \text{ an equation with the two roots } r_p \text{ and } r_a ,$$

$$\text{as } (r - r_p).(r - r_a) = 0 \quad , \quad \text{or } r^2 - (r_p + r_a).r + (r_p r_a) = 0 \quad \text{where is the}$$

$$\text{Sum of roots } [r_p + r_a] = - G \frac{Mm}{E} = 2a \quad \text{from where } \frac{2E}{m} = \frac{GM}{a} \quad , \quad \text{and}$$

$$\text{Product of roots } [r_p.r_a] = - \frac{L^2}{2mE} \text{ from where } L = r.m.v \quad , \quad v = L/r.m \quad , \quad E = \frac{1}{2} m \left[\frac{L}{rm} \right]^2 = \frac{L^2}{2mr^2}$$

The turning points are related to the axes of the ellipse by $r_p + r_a = 2a$, and

$$r_p \cdot r_a = b^2 = - \frac{L^2}{2mE} \text{ so , } \mathbf{Energy\ on\ Orbit} \quad E = \frac{GMm}{2a} \text{ , and } \frac{2E}{m} = \frac{GM}{r}$$

$$\text{Angular-momentum} \quad L^2 = - 2m.E.b^2 \quad \dots\dots\dots(c)$$

From Kepler laws , the area ,S, swept out by the line $PF_1=r$ is $dS = r^2.d\theta/2$ and

$$\text{the rate of swept is } \frac{dS}{dt} = (r^2/2).(d\theta/dt) = \frac{1}{2} r^2 w = \frac{1}{2} r (r w) = \frac{L}{2m} \text{ , since } r w = v$$

and $m r^2 w = L . f_n^2$. Since also , L is a constant , according to Kepler second law radius r , sweeps out equal areas during equal intervals of time and for the total area

$$\rightarrow \pi ab = S = \int \frac{L}{2m} dt = \frac{LT}{2m} \text{ , and } T \text{ is the period of rotation.}$$

$$\text{From above} \quad S^2 = \frac{L^2 T^2}{4m^2} = \pi^2 a^2 [b = \pi a(\frac{L^2}{2mE})] \text{ , or } \frac{T^2}{a^2} = \frac{4\pi^2 m}{2E} = \frac{4\pi^2}{2E/m} = \frac{4\pi^2 a}{GM} \text{ and}$$

$$\rightarrow \frac{T^2}{a^3} = \frac{4\pi^2}{GM} = \text{constant} . \text{ From relation } \frac{T^2}{a^3} = \frac{4\pi^2}{GM} = k = \frac{1}{f_n^2 a^3} \text{ becomes } \rightarrow$$

$$1 = k . f_n^2 . a^3 = [\frac{4\pi^2}{GM}] . f_n^2 . a^3 \quad \dots\dots(d) \text{ existing in microcosm and macrocosm .}$$

$$\text{From Web} \quad r^2(\theta) = [\frac{L^2 / m}{E \pm \sqrt{E^2 - kL^2/m} \sin 2(\theta - \theta_0)}] \quad \dots\dots(e) \text{ which is an ellipse .}$$

Equation (e) denotes Ellipses and circle , having a constant Energy-Shape when are given the Geometrical parameters related to the Physical parameters , Angular momentum (L) , Total energy (E) .

For a central gravitational force , the Potential-energy $P_E = - GMm/r$ and ,

$$\theta(r) = \int d\theta = \pm \frac{l}{\sqrt{2m}} \int_0^r \frac{dr/r^2}{\sqrt{E r^2 + GMmr - L^2/2m}} \quad \dots\dots\dots(f) \quad \text{Placing ,}$$

$$a = - L^2/2m , b = GMm , c = E \text{ , then } \int_0^r \frac{dr/r}{\sqrt{a+ br+ c r^2}} = \frac{1}{\sqrt{-a}} . \sin^{-1} \left(\frac{br+2a}{r\sqrt{b^2 - 4ac}} \right) \quad \dots(f1)$$

$$\text{and } \theta - \theta_0 = \pm \sin^{-1} \left(\frac{GMm^2 - L^2}{GMm^2 r} \right) \text{ and eccentricity } e = \sqrt{1 + 2EL^2/G^2M^2m^3} \quad \dots(f2)$$

$$\text{where } \theta_0 \text{ is a constant of integration. Solving for } r \text{ then } r = \frac{L^2/GMm^2}{1 \pm e \sin(\theta - \theta_0)} = \frac{L^2/GMm^2}{1 + e \cdot \cos \theta}$$

at periapsis ..(f3) creates only one Energy-Rim . Velocity Related to the distance [r] of the Planet [the Orbiter] , to the Sun [the Focus] , is from Figure -6 , the velocity

$$\text{equation in a Central motion is } v^2 = 4C^2 . [\frac{e^2 \sin^2 \phi}{p} + \frac{1}{r^2}] \dots\dots(f4) \text{ where constant}$$

$$C = \frac{\pi ab}{T} = \pi ab f_p = \frac{dS}{dt} = r^2 d\phi/2 = \text{The covered orbiting area per time second ,}$$

and $\frac{d(1/r)}{d\varphi} = -\frac{e \sin \varphi}{p}$. From a(1) $r = \frac{p}{1+e \cos \varphi}$ and velocity is ,

$$v^2 = 4C^2 \cdot \left[\frac{e^2 \sin^2 \varphi}{p^2} + \frac{1+e^2 \cos^2 \varphi + 2e \cos \varphi}{p^2} \right] = \frac{4C^2}{p^2} [e^2 + 1 + 2e \cos \varphi] = \frac{4C^2}{p} \left[\frac{e^2 + 1}{p} + \frac{2}{r} - \frac{2}{p} \right] =$$

$$\frac{4C^2}{p} \left[\frac{2}{r} - \frac{1-e^2}{p} \right] \dots (f5) , \text{ and for ellipse issuing } 2a = r_{\varphi=0} + r_{\varphi=\pi} = \frac{p}{1+e} + \frac{p}{1-e} = \frac{2p}{1-e^2}$$

$$\text{therefore , } v^2 = \frac{4C^2}{p} \left[\frac{2}{r} - \frac{1-e^2}{p} \right] = \frac{4C^2}{p} \left[\frac{2}{r} - \frac{1}{a} \right] \dots (f6)$$

From (f6) , when Planet is at Perihelion near the Sun $\frac{1}{r} = \frac{1+e}{p}$, then velocity is

$$v^2 = \frac{4C^2}{p} \left[\frac{2}{r} - \frac{1-e^2}{p} \right] = \frac{4C^2}{p} \left[\frac{2}{r} - \frac{1-e}{r} \right] = \frac{4C^2}{p} \left[\frac{1+e}{r} \right] , \text{ where } \frac{4C^2}{p} = \frac{4(\pi ab/T)^2}{b^2/a} = 4\pi^2 \frac{a^3}{T^2} ,$$

which is Kepler constant , and

$$v^2 = 4\pi^2 \frac{a^3}{T^2} \left[\frac{1+e}{r} \right] = [4\pi^2 a^3 \cdot f_p^2] \cdot \left[\frac{1+e}{r} \right] = K \left[\frac{1+e}{r} \right] \dots (f6a) ,$$

The velocity at Perihelion for eccentricity $e < 1 \rightarrow v^2 = K \left[\frac{1+e}{r} \right] < K \frac{2}{r}$ and

Planet follows Elliptic Orbit .

For eccentricity $e = 1 \rightarrow v^2 = K \left[\frac{1+e}{r} \right] = K \frac{2}{r}$ and Planet follows Parabolic-Orbit

For eccentricity $e > 1 \rightarrow v^2 = K \left[\frac{1+e}{r} \right] > K \frac{2}{r}$ and Planet follows Hyperbolic-Orbit

In a circular motion is shown that , velocity is proportional to the inverse square of radius r , and Newton –force , acceleration , the fifth , where

$$C = \frac{\pi ab}{T} = \frac{\pi a}{T} \left[\frac{1}{r^2} \right] = \frac{\pi a}{T r^2} , \text{ From relation } r = 2a \cdot \cos \varphi \text{ is , } \cos \varphi = \frac{r}{2a} \text{ and}$$

$$\frac{1}{r} = \frac{1}{2a \cos \varphi} \text{ also } \frac{d(1/r)}{d\varphi} = \frac{1}{r} \tan \varphi , \text{ and (f4) is } v^2 = 4C^2 \cdot [\tan^2 \varphi + 1] = \frac{4C^2}{r^2} \frac{1}{\cos^2 \varphi} =$$

$$\frac{16C^2 a^2}{r^4} \text{ and velocity becomes } v = \frac{4Ca}{r^2} \dots (f7)$$

Centripetal -acceleration $a_p = \frac{v^2}{r} = -\frac{16C^2 a^2}{r^4} \frac{1}{a} = -\frac{16C^2 a}{r^4}$ and equal to $\frac{a_p}{\cos \varphi}$, so

$$\text{Centripetal-acceleration } a_p = -\frac{32C^2 a^2}{r^5} = -\frac{32\pi a^4 [1]}{T^2 r^4 [r^5]} , \text{ and for } r = a \text{ then } a_p = -\frac{32\pi}{T^2 r^5} \dots (f8)$$

6.. Orbital - Geometry and Orbital – Physics :

The Geometrical elements in orbit is the semimajor axis a , and eccentricity e .

For radius r , issues $\frac{2E}{m} = \frac{GM}{a}$ and solving for $a = \frac{GMm}{2E}$, and

$$e = \sqrt{1 + 2EL^2/G^2M^2m^3} \dots(g)$$

For $r_p (1 + e) = L^2 / GMm^2$ radius of Planet $r_p = \frac{L^2}{(1+e)GMm^2} \dots\dots(g1)$

The Physical parameters in orbit is Total energy $E = K_E + P_E$, and Angular-momentum $L = \bar{r} m \bar{v}$.

From above Total $E = -\frac{GMm}{2a}$ and $L = \sqrt{(1 - e^2).GMm^2.a} \dots(p)$

Energy in Orbit $E = -\frac{GMm}{2r_p}(e - 1)$ and $L = \sqrt{(1 + e).GMm^2.r_p} \dots(p1)$

For $e = 1$, issues for Parabolas and Hyperbolas where $r_p(1 + e) = L^2 / GMm^2$.

3. Conclusion :

1.. Orbits : In Orbits issues the **Piezoelectric-effect**, as this is used in a, **Lattice-Disk** (Orbits, Caves, Material-Points, Particles, Atoms, Molecule, Crystals, Microchips, etc.) where is **Converted the Mechanical Energy which is Work, into Electricity**, (Electrical Potential as a Voltage), across the sides of the Disk or vice versa, i.e. **When on a Lattice-Disk, is Put a Voltage across the Disk, so thus its Inside-content is subjecting to an electrical-Pressure, Inside-content has to move to rebalance**, and thus deformed. This motion is the Work produced as in Figure 7.

2.. Gravity : **Gravity is Potential - energy with binder the Energy-Field** $\{ [\nabla i] = [\pm s^2]$ a constituent in MFMF Field, the called Gravity force without Vibration but only local rotation $\}$, becoming, **from Energy -Vectors occurring in the Material-Points** $[\oplus \cup \cup \ominus]$ of the Gravity-field, and this because are axially on their Spin-Vector \bar{B} as $\bar{B} \equiv Spin \equiv Rotational - Energy$, and which **Energy -Vectors $\equiv Spin$, is the Inside content** of the infinite M-Points of Gravity-field.

The **Dot-product** happens for interactions between Similar dimensions, while the **Cross-product** between Different-dimensions. Cross-product of two vectors \bar{a} , \bar{b} is $\bar{a} \times \bar{b} = |\bar{a}|.|\bar{b}| \sin \theta .\bar{n}$ and for $\bar{a} = \bar{b}$ and $\theta = 90^\circ$ then $\bar{a} \times \bar{a} = \bar{a}^2$, and for Quaternion, s , which performs the Work of rotating the one vector around the other is $\rightarrow Work = \bar{a} \times \bar{a} = \bar{a}^2 .\bar{r}$, and for $\bar{a} = \bar{v}$ then $\rightarrow Work = \bar{v}^2 .\bar{r} = |\bar{v}|.|\bar{v}|.\bar{r} = v^2 . r . \bar{n} = (wr)^2 r . \bar{n}$, or $Work = (wr)^2 r . \bar{n} = (2\pi r/T)^2 \bar{n} = (4\pi^2 r^2 / T^2) . r . \bar{n} = \frac{4\pi^2 r^3}{T^2} . \bar{n} \leftarrow$

$W = 4\pi^2 . \frac{r^3}{T^2} . \bar{n} = 4\pi^2 . r^3 . f_p^2 . \bar{n}$ i.e. **Kepler constant celestial law for microcosm**.

Kinetic Energy, motion, in Orbits becomes from the, **Piezoelectric-effect**, where Orbit is subject to a Mechanical-stress, $\sigma = \pm \frac{4\pi r}{(1+\sqrt{5})} . \mathbf{f}_p$, becoming from the **Centripetal-acceleration** \bar{a}_p of the Planet and thus is appeared a Positive charge at the **Nucleus** and a Negative-charge at the Planet, so is created an electric-signal with a given frequency f_p . The two faces at **N** and **P** are connected by the in-between

Energy-Vectors $\bar{B} \equiv Spin$, of the oriented Gravity-field $[\nabla i] = [\oplus \cup \cup \ominus]$

In Orbits which are Negative - Energy - Rims, with binder Energy the attraction between the two opposite forces $P_N \leftrightarrow P_P$ at points Focus **N** and Planet **P**, is created the Central motion where, **Orbital-Resonance** is the Plane Surfaces, representing a Constant-Energy-Rim following the Celestial Kepler Laws and say this as an **Plane Energy-Resonance**, because happens in-Plane and on Energy-Field-vectors of Spins \bar{B} .

In Figure -3,6- are shown the Ellipse-Orbits , $1 = c.f_n^2.r^3$, with their content which is The Spin-Field-vectors \bar{B} in all area πab of MFMF field . During orbiting centripetal acceleration $\bar{a}_p = \sigma = \pm \frac{4\pi r}{(1+\sqrt{5})} \cdot \mathbf{f}$ is directed to Focus N , i.e.

Orbit is subject to a Mechanical-stress σ , becoming from a Centripetal-acceleration \bar{a}_p , and so is appeared the Piezoelectric-effect with Positive-charge at the Nucleus and Negative-charge at the Planet \equiv A linear-Material-point $|P\ominus \leftrightarrow \oplus N|$.

3.. Resonance : The two faces at N , P **are connected by the in-between Gravity-field** $[\bar{V}_i] = [\pm s^2]$ in [MFMF] Field **and flows Current** , motion is realized by the orientation of the infinite Spin-Energy-vectors , **which is the Resonance on Orbit** , and the Gravity Force , **g** . In the **Inverse** Piezoelectric-effect on Orbit , **when a voltage is applied across its opposite** faces at N , P , becoming from the $[\oplus \leftrightarrow \ominus]$ stretching , then Orbit becomes mechanically stressed , **Deformed in Shape by the Resonance at N and P** . **Further is seen , Orbit** or , a **Negative – Energy - Rim** , is the Stable and Stationary Granular-lattice Energy-Disk , **which is kept in the Plane-Orbit of motion , Ellipse area πab , in Gravity – field** , and in a way it is **Opposite** to that which **follows the Central motion** . The entire Orbit is Scanned , **swept** , by this linear-Material-Sector PN $\equiv |P\ominus \leftrightarrow \oplus N|$ with the minimum $\bar{a}_p = \sigma$, i.e. either for macrocosm or microcosm , Gravity-Force-Vectors $\bar{B} \equiv$ Spin , of Material-points as Spin $[\oplus \cup \ominus]$ is packet into **the Orbit-Rim as Energy-conveyer for the interactions between , the Nucleus N , and the orbiting object , the Planet P** , and consists the energy – quanta , **the minimum constant energy** , for motion $\rightarrow [\oplus \cup \ominus] \leftarrow$ **in the monad Atom-Rim** .

4.. The Permissible-Permeable-Path for transferring Energy in Orbits is proved to be the Electromagnetic current which is created on Stationary-Pointy-Material points with Spin S , which is Oriented and Reoriented by Gravity acceleration **g** , which is a Pressure on Pointy-Spins , on which the Gravitation force **G** , is affecting . i.e. the Permeable Path of force **G** , **or the Golden-ratio-frequency as pressure passes through Gravity-pressure g** , from Planet P on orbit to Nucleus on center N through pressure this **g** , which is the gravity acceleration on orbit . This path-way through the series of the infinite spins S , **Oriented and Reoriented Spins** , of two types Material-Points , shows the way that Planet P and Nucleus N , continually communicate each other .

Perhaps this remark for Energy-Pressure-transportation is useful for future research From Centripetal-acceleration (f8) related to that of M-Point is seen that Particles are extended in the Physical reality so , **Neutrons are useful for future research**.

Since constant $k = \frac{T^2}{a^3} = 9,808$ and $1 = k.f_n^2.a^3$, is easy to calculate , a cave ,

$$a = \sqrt[3]{\frac{1}{9,808.f_n^2}} \dots\dots(e2)$$

- 1.. Hydrogen Z=1 electron is of frequency $f_H = 1,3.10^{17}/\text{sec}$ and $f_H^2 = 1,69. 10^{34}$, so a_H cave is $a_H = \sqrt[3]{\frac{1}{9,808.1,69.10^{34}}} = \sqrt[3]{6,0329928. 10^{-36}} = 1,0820445.10^{-12}$ m
- 2.. Uranium Z=92 electron is of frequency $f_U = 1,1.10^{21}/\text{sec}$ and $f_U^2 = 1,21. 10^{42}$, so a_U cave is $a_U = \sqrt[3]{\frac{1}{9,808.1,21.10^{42}}} = \sqrt[3]{84,262462. 10^{-45}} = 4,3840830.10^{-15}$ m
i.e. caves are energy-circuits.

3.. Constant k , becoming from the microcosm by measuring the energy of a cave or Atom-orbit and the semi-major axis , or from the macrocosm be measuring the energy of Planetary system and the axis of orbiting , gives the same result.

c.. *The minimum Energy RIM* :

1.. From orbiting equation $\frac{T^2}{a^3} = \frac{4\pi^2 m}{2E} = \frac{4\pi^2}{2E/m} = \frac{4\pi^2 a}{GM}$ then $\frac{T^2}{a^3} = \frac{4\pi^2}{GM} = \text{constant } k = \frac{1}{f^2 \cdot n \cdot a^3}$

or $1 = k \cdot f^2 \cdot n \cdot a^3 = \left[\frac{4\pi^2}{GM} \right] \cdot f^2 \cdot n \cdot a^3$, the constant Work $1/k = f_n^2 \cdot a^3$ and the constant Energy E , *in Orbit* , is $k = E = \frac{T^2}{a^3}$

It was shown that the maximum Energy in Hydrogen atom is $E = hf = -13,6 \text{ eV} = -13,6 \times 1,6 \cdot 10^{-19} = 2,176 \cdot 10^{-18} \text{ Joule}$, and the frequency is $f = E/h$ or , $f = 2,176 \cdot 10^{-18} \text{ J} / 6,6262 \cdot 10^{-34} \text{ J.s} = 3,28393 \cdot 10^{15} / \text{s}$, and therefore Period in Orbit , $T = f^{-1} = 3,04513 \cdot 10^{-16} \text{ s}$.

The motion of all moving Energy-tanks is Sinusoidal as equation $\rightarrow \{ [\epsilon E^2 + \mu B^2] = 2 \cdot \lambda c \cdot \sin 2\phi \} \leftarrow \dots (e1)$ and the work produced is stored in their Sine-curve-area of x, y , coordinate axis as $\int_0^\pi \sin x \, dx = 2$ as equation (e1) .

Simultaneously Unit-Work = Sine integral $= \int_0^t \frac{\sin t}{t} dt = 1$, at Critical-Energy-point where point is such that $\text{Si}(x=1)$ becomes equal to monad 1 , and this critical-energy unit happens at the point $x = 1,0572508754$, or at axis $\rightarrow a = 2x = 2,1145016 \text{ m}$.

From relation $(4\pi a^3/3)^3 = 1,616229 \cdot 10^{-35}$, $a = 5,447 \cdot 10^{-11}$, or semi-major axis in Hydrogen cave is $a = 10^{-11} \text{ m}$, and the Unit-coefficient $[2\text{Si}(1)]$, is the constant $a = 2x = 2,1145016 \cdot 10^{-11} \text{ m}$. Placing in Hydrogen-Rim the Period T , and the prior

Semi-major axis a , then $k = \frac{T^2}{a^3} = \frac{[3,04513 \cdot 10^{-16}]^2}{[2,1145016 \cdot 10^{-11}]^3} = \frac{9,272817 \cdot 10^{-32}}{9,4541768 \cdot 10^{-33}} = \mathbf{9,808238}$

$\frac{s^2}{m^3} = \frac{N}{Kg}$, *agreeing with Gravity constant* g , *measured* .

i.e. The Minimum-Work $\rightarrow W = 4\pi^2 \frac{r^3}{T^2} \cdot \bar{n} = 4\pi^2 \cdot r^3 \cdot f_p^2 \cdot \bar{n} \leftarrow$ *in an Negative - Elliptic-energy-field-Disk as this is PNS , is stored as a Voltage* $[N \equiv \oplus \leftrightarrow \ominus \equiv P]$ across the Disk between the rotating Planet P , and Nucleus N , **Produced from the pressure , σ , of the frequency f_p and of the semi-major axis a_p of the Planet .** *Motion is Kept ,is quantized as Unit-work* $\rightarrow W = 1 = k \equiv [\nabla i] \cdot [\pm s^2] \equiv$ **MFMF Field** \leftarrow *in the Orbit-area , πab ,upon the Spin \bar{B} Orientation of the Pointy-Material-points $[\pm s^2]$. Orientation of Spin becomes from the Energy in the sinusoidal gravity-fields in orbit , created by the motion of oscillation of the material points $[\oplus \cup \cup \ominus]$.*

Any *Interaction* between this *Oriented-Energy Disk-Rim* and a *Body-Planet* creates disturbances in Disk and **Reorientation of Spin $\bar{B} \equiv$ motion \equiv work $\equiv k = \text{constant} = \text{quanta}$ and transformed as ,*The Gravity-Force in Disk* , and which Energy is equal to the Gravity acceleration g , and this because $g = \text{force}$, as equation $g = F/m$. **Bodies produce Gravity** { *the change of Spin-direction of M-P-Dipole $[\oplus s^2 \cup \cup \ominus s^2]$ in MFMF field* } **from stationary force** $[\nabla i] = \pm s^2$, and because Gravity \equiv acceleration and not change of velocity vector , **it is by changing the direction** of the above dipole . **It is later seen that Gravitation as an external force G to masses , is affecting bodies through this Gravity-bedding-Layer , g , created by the Bodies .****

d.. The Linear and Rotational motion in all displacements \mathbf{r} :

It was shown before that , since Motion presupposes velocity vector $\bar{\mathbf{v}}$ which , when it is in motion collides with other velocity vectors and creates Constant work , k . then Motion may be Linear or Rotational for any displacement , r ,where then is created a Constant-Work $W = \mathbf{k} = \bar{\mathbf{v}}\mathbf{x}\bar{\mathbf{v}}. \bar{\mathbf{r}} = v^2.r. \bar{\mathbf{n}}$. i.e.

$$\text{Constant-Work} = k = v^2. r = (wr)^2.r = \left[\frac{2\pi}{T}\right]^2.r = \frac{4\pi^2 r^2}{T^2}. r = \frac{4\pi^2 r^3}{T^2} = 4\pi^2. \frac{r^3}{T^2} = 4\pi^2.r^3.f^2_p$$

Because Gravity-Force F_G becomes from the in-storages acceleration $a = v^2/r$ of the infinite-material-points in MFMF field , and force $[\nabla i]$ is stationary because from the pointy rotation $[-s^2\cup\cup+s^2]$ of MP-Spin , then for Planck length is ,

$$\text{Gravity force } [\nabla i] \equiv F_G \equiv m_G g = g. \nabla \left[\frac{\sigma}{c^2} \right]^2. r = m_G \frac{v^2}{r} = Jw^2.g_G = \left[\frac{\pi r^4}{2} \right] w^2. \frac{v^2}{r} = \frac{v^2}{r} \left[\frac{\pi r^4}{2} \right] \frac{v^2}{r^2} = \left[\frac{\pi r v^4}{2} \right] \dots (b) \text{ and from relation , Spin } S = \bar{\mathbf{B}} = \frac{h\sqrt{3}}{4\pi} \text{ then ,}$$

$$\text{Gravity-force} \rightarrow F_G \equiv \left[\frac{\pi v^4}{2} \right] \frac{n\pi}{2h(1+\sqrt{5})} \bar{\mathbf{B}} = \left[\frac{n\pi^2}{4h(1+\sqrt{5})} \right] \bar{\mathbf{B}}v^4 \text{ and so}$$

$$F_G \equiv \frac{n\pi\sqrt{3}}{16(1+\sqrt{5})} v^4 = \frac{n\sqrt{3}\pi}{(1+\sqrt{5})} \left(\frac{v}{2}\right)^4 , \text{ and it is the Black-hole-gravity-equation}$$

which is related to the Inner velocity v , and to its n lobes .

$$\text{Gravity-Acceleration is } g_G = s \left[\frac{\pi r v^4}{2} \right] = \left[\frac{3,1415926([\sqrt{5}+1].\sqrt[4]{2}.10^{-35}).(299793458)^4}{2} \right]. e^3 =$$

$$6,044981.10^{-35}.80,776078.10^{32}.20,085536 = g_G = \mathbf{9,8075633} \quad (5) , \text{ where}$$

$1/m_G = s = \text{mass-coefficient } [\sqrt{5}+1].\sqrt[4]{2}. e^3$, because the constant tensor T_z is the length of vector , $\mathbf{z} \equiv \mathbf{m}$, in Euclidean coordinates and which magnitude is

$$k = T_z = \sqrt{y_1^2 + y_2^2 + y_3^2 + y_n^2} , \text{ denoting the Energy-Space relation .}$$

From above the dimensionless coefficient of work W is $[\sqrt{5}+1]$ for any Material cave , r , coefficient for the Unity-Plane - Quaternion is $\sqrt[2]{\sqrt{2}} = \sqrt[4]{2}$, or the same

$$\overleftarrow{i \perp j} \equiv \sqrt{2} + \overleftarrow{k \perp \sqrt{2}} \equiv \sqrt[2]{\sqrt{2}} = \sqrt[4]{2} \text{ and for the Three dimensions Euler Rotation System number is } e . e . e = e^3 .$$

As in Binary system $[1, 0]$, where one kilobyte = $2.8^3 = 1024$ bytes is eight times than a Kilobit = $2.4^3 = 128$ bytes [1byte = $2^3 = 8$ bits , **1bit** = a = **1 or 0**] , similarly are above dimensions as Units mass .

Bodies produce Gravity , which is pressure happening from , *the change of the Spins direction on Stationary M-P-Dipole* $[\oplus \leftrightarrow \ominus]$ due **from stationary forces** $[\nabla i] = \pm s^2$, **as dipole** and because Gravity \equiv acceleration , this happens not by the change of the velocity vector But , **by the changing of direction** of above dipole $[\oplus s^2 \cup \cup s^2]$. This Work \equiv Gravity \equiv Energy \equiv a Constant , which becomes from the eternal-motion of Opposites in Material-point either on Orbit of any Planet either on Focus of the Planetary-Systems such in microcosm as in macrocosm . of MFMF field .

Remark :

Equation (5) denotes that **Kinetic-Energy** \mathbf{K}_E , { The Unit-work in $[\nabla i].[\pm s^2] \equiv$ **MFMF Field** produced from the Quantized velocity-vector , \mathbf{c} , of Planck`s Undamped System } **is stored in mass** which is the **Material - Point \equiv Photon** , by virtue of its velocity \mathbf{c} , and the **Potential Energy** \mathbf{P}_E { the Energy in the sinusoidal gravity-fields in orbit } in **Gravity-Stress** \mathbf{g} and because $G = \text{constant}$ the System is conservative and the energy is conserved as , $\mathbf{G} \rightarrow \mathbf{K}_{EG} \equiv [\text{Photon , Velocity-vector } \mathbf{c}] + \mathbf{P}_{EG} \equiv [\text{Gravity field } \equiv \mathbf{g}]$ i.e. **The Work** produced from the Gravitational-force \mathbf{G} , { Force \mathbf{G} , is constant in

all universe therefore becomes from an Conservative –System} **in the Undamped Planck`s- Conservative -System , IS** for free vibration →[Party-Kinetic-energy ≡ K_E and Party Potential-Energy ≡ P_E]← The Kinetic-energy ≡ K_E **is stored in** the Mass ≡ The-Energy-moving-storage ≡ **Photons** , by virtue of its velocity-vector , c , whereas the Potential-Energy ≡ P_E **is stored in** the form of Strain-energy in Elastic Deformation which is the **Material-Points , or Work-done in a force field** such as **Gravity-field g_F** . The Why , c , is such in [39-78]

Since **Stress σ** , eternally exists in Material point and **is of the Golden-ratio-pattern Φ** , therefore microcosm and sequence all macrocosm follows , **the Stress σ , Property** of the Golden-ratio-pattern Φ . This was proofed as an Geometry problem and when applied for the two possible cases of motion , then Gravity acceleration is produced and Spin is linearly Oriented to the Gravity force G .Gravity acceleration g , is the minimum Energy which is Quantized from energy cave , r , while Speed of light is the minimum Energy-linear-Plane-Volume for Speed in Planck`s scale as , $v \equiv n.\pi.c$. because for $n=1$ then , $v \equiv \pi.c$, for each direction which is **the , π , Physical perception** . 7 / 7 / 2018.

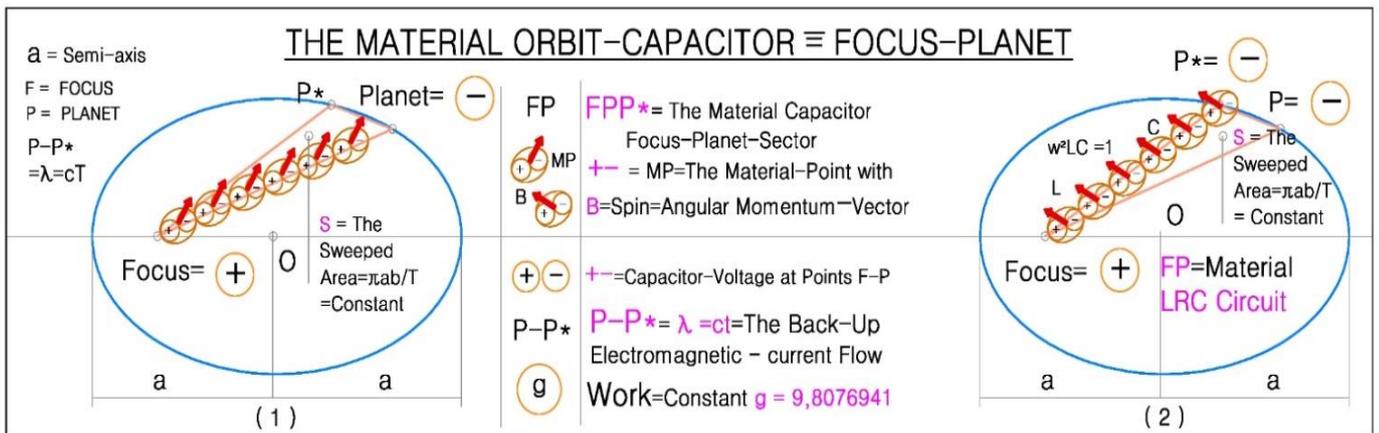


Figure-7 . The Material , LRC Circuit on Orbit , on Focus-Planet-Sector [F↔P]
In (1). Force g , as wave , is directed to the center of rotation F , and is proportional to the distance $PF \equiv$ Focus-Planet .The Gravitational Potential-Energy $g_G = 9,8076941$ is stored in → Focus-Planet-Sector ≡ FP ← which is The Material-Capacitor Stores-charge , as that of Material-LRC-circuit , and Inductors . Because of the chains of Spins and of their Periodic excitation [\leftrightarrow] , is thus created a Magnetic field due to LRC-circuit and which is tuning to the critical Quantum-critical-State g_G .The chains of Spin are pointy vibrating with their characteristic frequencies $f = \frac{(1+\sqrt{5}) \cdot \sigma}{4\pi r} B$. Since Inner-stresses $\sigma_{1,2} = \sigma_1/2 \pm (\frac{1}{2})\sqrt{\sigma_1^2 + 4 \cdot \sigma_1^2} = \sigma_1/2 [1 \pm \sqrt{5}]$ follow the **golden ratio on stresses** then this Quantum-energy g_G produced ,is the State causing them to Magnetically- Resonate .In Material-point-chain of caves $r = \lambda/2$, and since $\dot{x} = w.r \rightarrow w = \dot{x}/r$ then **Golden ratio Damping-Force** is the Work produced with Unit Damping-ratio $\zeta=1$. Since $\dot{x} = v$ then exists ,

$$F_d = c \cdot \dot{x} = 1m.w_n \cdot \dot{x} = 1 \cdot [(\pi r^2/2) v^2] \cdot \frac{\dot{x}^2}{r} = \left[\frac{\pi r v^4}{2} \right] = g = \frac{2}{r} [\sigma (1+\sqrt{5})]^2 = \frac{4\sigma^2}{r} [3+\sqrt{5}] .$$

This dissipation of energy is determined under conditions of cyclic oscillations , and dependent on Glue-bond σ , and r , cave . Since r , is in denominator then for the very small caves , *the under Planck`s caves*, Damping-Force becomes infinite independently of Glue-bond . This may be considered as a type which happens in **Black holes** as this happens in algebra inverse fractions also .

In (2) is presented the Back-Up Electromagnetic current flowing in opposite direction FP , by changing the Spin direction of the Sector-Material-Points such that work $W = g$. From Kepler`s 2nd law the , **Area S** , swept by any **Focus-Planet-Sector** \equiv **FP** is a constant **k** , and equal to,

$$S^2 = \frac{L^2 T^2}{4m^2} = \pi^2 a^2 \cdot [b = \pi a \left(\frac{L^2}{2mE} \right)] , \text{ or } \frac{T^2}{a^2} = \frac{4\pi^2 m}{2E} = \frac{4\pi^2}{2E/m} = \frac{4\pi^2 a}{GM} \text{ and } \rightarrow \frac{T^2}{a^3} = \frac{4\pi^2}{GM} =$$

$$\mathbf{k} = \frac{1}{\mathbf{f}_n^2 \cdot \mathbf{a}^3} , \text{ from which } \rightarrow \mathbf{1} = \mathbf{k} \cdot \mathbf{f}_n^2 \cdot \mathbf{a}^3 \text{ and } , \mathbf{k} = \frac{4\pi^2}{GM} \text{ where}$$

Is seen that , Resonance between Focus-Planet exists through , Space **a** and Energy **f** .

From the Second-order differential equation excited by a Harmonic external force ,

$$F_t \cdot \sin wt , \text{ and is as } , m \frac{d^2x}{dt^2} + c \frac{dx}{dt} + k \cdot x = F_t \cdot \sin wt$$

corresponds Physically to the free damped vibration , where x = the displacement , $dx / dt =$ the velocity and , $d^2x / dt^2 =$ the acceleration of monad , m, c, k constants , with the general solution given by the equation

$$x = A \cdot e^{s1.t} + B \cdot e^{s2.t} + X \sin(wt-\phi) \dots\dots(1)$$

$$\text{Equation } \rightarrow L \frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{1}{C} q = E_t \cdot \sin wt .$$

Corresponds physically to the free damped vibration , where Charge $q =$ is the physical property of matter that causes it to experience a force which can be positive or negative , $dq / dt =$ the least quantized amount of charge and $d^2q / dt^2 =$ the space distribution of charge , and L, R, C Inductance , Resistance , Elasticity constants with general solution given by the equation $q = A \cdot e^{s1.t} + B \cdot e^{s2.t} + X \sin(wt-\phi) \dots(2)$

Equations (1) and (2) give the analogic relation of the **Classical mechanics** [Space position , x ,] and the **Electromagnetism** [Quanta of energy , q ,] of **Storing and Removing of energy in Energy-Space** cosmos .

The distributed force is as $L_1 - L_2 = L (di/dt)$, $R_1 - R_2 = R \cdot i$, $C_1 - C_2 = q / C$, respectively , showing the Identification of the Mechanical and Physical laws .

The way that **Potential-Energy is stored** , is that of **Material-LRC-Circuit** , which is for the Gravitational-Potential-Energy the **Material-Capacitor** or the \rightarrow **Focus-Planet-Sector-Stores-change** \leftarrow which develop a voltage in response to that charge .The coil of wire is the infinite Stationary-Dipole-Spinning Material-Points of this \rightarrow **Focus - Planet-Sector** \leftarrow which develops the back-em-f. ,when current through them changes .

In-Box exist two motions , **Revolving and Periodic** , the acceleration of Gravity $g \equiv \pm \sigma$ exists for the First Box-**B_R** ,while **Local-Extreme-case** for the Second Box-**B_P** .In this Gravity $g \equiv \pm \sigma$, is Locally altering **S** , by changing the Principal-stress σ with Local uniform Pressure $g_L \equiv g k_E = g \cdot [\text{Force/Area}] = G$, i.e. is proved that the minimum Local-Energy acceleration is the known , **Universal Gravitational-constant G** = $g k = k_E g = k_L \sigma = g \cdot g_L k_L$, such for *Macrocosm as for Microcosm* , and for both cases Obeying Newton`s Laws of motion .

F.. THE GRAVITATIONAL AND GRAVITY CONSTANT :

In Mechanics Work \equiv Energy \equiv motion is Force (x)Displacement and is conserved. In order that **Motion** is **Conserved as Displacement** in all directions , then this Displacement must be kept , **Quantized** , in a Finite Space differently is annihilated . In Mechanics the only-possible motion in a Finite Space , is the Periodic excitation [\leftrightarrow] **Reciprocating**, and the Revolving motion [$\oplus \cup \cup \ominus$] defining the quality of particles .

Periodic excitation between Space \oplus and Anti-Space \ominus may exist only as **Collision of Opposite** , and because of the equal and opposite Point-charges that are infinitely close together create Coulomb Electric dipole moment $p = q \cdot ds = \oplus[\leftrightarrow] \ominus$ in an Electric-field . Energy is captured in a Box $\mathbf{B}_p \equiv$ **Conductor** , containing these three elements as [(\oplus) , [\leftrightarrow] , (\ominus)] . Dipole is Stationary without any inner acceleration \equiv Gravity g , but is the Material-extreme-case of acceleration as this is case [$\rightarrow \leftarrow$] $\equiv 0$ with a Stationary constant Dipole-moment \bar{p} .

Revolving motion may exist between Space \oplus and Anti-Space \ominus so the Revolving of Two-Points $A\oplus$ and $B\ominus$ consist the **Material-Point** as Segment , *magnitude* $|AB|$, and as Vector , *direction* \mathbf{AB} , and as this is the **Quaternion** $\mathbf{AB} \equiv$ Box \mathbf{B}_R carries the Principal stress σ between , $A\oplus$, $B\ominus$, which stress σ as Centripetal acceleration is the Centripetal-force and the minimum energy becoming from the in-storage $[AB]$ acceleration and is proved to be equal to the *Gravity* g .

Since motion \equiv work \equiv energy and is continually produced in The Material-point , therefore is stored in it as the **Golden-ratio-frequency** \equiv **the motion** , not eternally but Partially and the rest superfluous motion is launched out the Box as an **Propagating Electromagnetic-Wave** which out-wave carry the Box $AB \equiv \mathbf{B}_R$.

Because of the two different motions , *the Revolving and the Excitation* , acceleration of Gravity $g \equiv \pm \sigma$ and this *because are both pressures* , exists in the First motion in the Box- \mathbf{B}_R only while in the Second Box- \mathbf{B}_p is followed the Local- Extreme -case of the Dipole-moment \bar{p} .

i.e. The External-stress , g , of Box- \mathbf{B}_R , acts on the Internal-Spin , $S=\bar{p}$, of Box- \mathbf{B}_p . This **acceleration of Gravity** $g \equiv \pm \sigma$ **is altered Locally by changing the Principal stress σ , from an \rightarrow Local-Uniform-Pressure $g_L \cdot k_L \equiv g k = g \cdot [\text{Force/Area}] = \mathbf{G}$, i.e. it is , the minimum Local-energy .** Photon`s Box- \mathbf{B}_p travelling with the constant light velocity c , creates EM-Wave which exerts a force on other charges .

The above property of the Periodic-Excitation motion issues in Material Geometry .

For Newton , **every Point-mass attracts every other Point-mass with a Force \mathbf{G} , that is proportional to the Product of the Point-masses and inversely proportional to the square of the distance between them.**

This force G was later called Gravitational constant and is directly related to the acceleration g , where g was proved to be the minimum-energy quanta in a cave ,

Force \mathbf{P} , in Material body appears as **Kinetic energy** , In an Elastic surface is appearing as **Principal and Shear stress** , In a Material line or segment as **Tension** , in Euclid line becomes **velocity on line** or , a **Free Velocity moving Line - Segment** , or a moving **Vector** (quaternion \equiv monad) , In-Particles as an **Electromagnetic wave** in cave $r = \lambda/2$, Out- Particles as an system $S \equiv$ **Electromagnetic-Radiation with n , frequencies in**

λ_N as { $[S \equiv B_p \equiv \mathbf{EM-R} \equiv f_{1=N} , f_2 , f_3 , f_D , , f_n]$ and $\lambda_N = \frac{8 \cdot r \cdot c}{n \sigma^2 \cdot (1 + \sqrt{5})} = \frac{8 r^2 c}{n \sigma B}$] }.

A force \mathbf{F} , is a Vector with Properties *Magnitude* and the *Direction* . A force is acting on a surface A , when is spread in the surface differently is acting on a Point of this Surface . Two Equal or Unequal and Opposite forces acting on the same Point of a straight line can move across this line **Penetrating** each other , and continue to **move forever** on opposite directions , $\leftarrow \rightarrow$, of line .

Question ??? How can Two Opposite and equal forces can continuously act

each other without moving .

The answer is that , → is Needed a Small - Surface , a Layer , in which Work as Energy Produced can be Spread and Stay.

Stress σ , is the Unit-Force spread on the surface A , called *Bedding-Layer* , where issues $F = \sigma A$. From Newton`s second Law of motion , force $F = m g$, where , m , is the mass of an object on which force is applied , and g is the acceleration of the mass . The small Surface is not Zero , but a Quantum as a Material-point is .

The above notation agrees with Euler - Cauchy Stress Principle Stress-Vector where each *Surface-force* σ , and *Body-force* G , formulate a Tensor-field where σ denotes the Normal to the Surface and so ,

Body-Force → is Spread-Out in a Layer → Surface-Force or ,

Force G -Over-area- A → $\{m * d\sigma \equiv \text{Surface-force}\} \rightarrow \sigma \equiv \text{Stress}$

where , $m \equiv$ *is the meter of the Reaction to the motion at a Point* \equiv The center mass
The distance r , becoming from a UNIT velocity-vector magnitude \bar{v} , and the Scalar time T , consists the two vectors equal each other , or $\bar{v} = \bar{r}$,

The Work produced during motion is Stored into the Surfaces , A_1, A_2 , *the Layers* in order that the System of - *Forces-Displacement* - is Stationary , differently IF-Not and Stored in force F , System would be in motion . The total Kinetic Energy is as

$$E = \frac{1}{2} \cdot m_1 \cdot v_1^2 + \frac{1}{2} \cdot m_2 \cdot v_2^2 \quad , \text{ and because } v_1 = v_2 = v , \text{ then } E = \frac{v^2}{2} [m_1 + m_2]$$

and since $m_1 = \frac{F}{g_1}$, $m_2 = \frac{F}{g_2}$, $\bar{v} = \bar{r}$, and Unit Work $E = 1$, then becomes ,

$$E = \frac{v^2}{2} [m_1 + m_2] = \frac{r^2}{2} \left[\frac{F}{g_1} + \frac{F}{g_2} \right] = \frac{F \cdot r^2}{2} \left[\frac{1}{g_1} + \frac{1}{g_2} \right] = \frac{F \cdot r^2}{2} \left[\frac{g_1 + g_2}{g_1 \cdot g_2} \right] = \frac{F \cdot r^2}{2} \left[\frac{2 \cdot g}{g^2} \right] = \frac{F \cdot r^2}{g} = 1 \dots, \text{i.e.}$$

The Unit force F , between Two masses of constant Distance r , is Proportional to a Constant and Minimum Acceleration g , where $g \equiv 9, 8076941$, and is inverse square to the distance as , $F = \frac{g}{r^2}$, and thus *Gravitational-Constant Force* $\equiv G$, is Spread on a *minimum-Surface that of Stress, g , the Layer of masses becoming from the M-Points-centripetal-acceleration , and is acting on all masses of the universe . Gravity constant g was proved to be The minimum Granular-Quantized Energy , The force G becomes the Stress g , which acts through masses-Stress k , to masses becoming from the Gravity-frequency f_g , and is the frequency representing the Basic-Quantum-Raw material of the Energy structures .*

It was shown that the Momentum vector \mathbf{B} , and because it is following the Stationary Wave - Nodes Principle in Material -Point , creates the minimum quantized Energy which is conserved in lobes . This Property is extended also to the Number of lobes as well as to , π , number which is the min-Unit-Number relating Lines and Surfaces . From above is defined that → $G = g \cdot k$ and $g = G / k$ (1) , where , k , is a *Unit-proportional-coefficient* issuing for any Energy-System cave .

Since also acceleration in a Material-point (*Centrifugal-Centripetal*) becomes from the *Principal stresses* $\pm \sigma$, therefore constant $g \cong \sigma = \frac{\text{Force}}{\text{Area}} = \frac{\text{Mass}}{\text{Area}} = \frac{G}{k}$ and

$$\text{for Unit-G} \rightarrow k = \frac{\text{System Area}}{\text{System Mass}} G \quad \text{where} \rightarrow \frac{1}{g} = \frac{k}{G} = \frac{\text{System Area}}{\text{System Mass}} \dots\dots(2)$$

From (2) is seen that at **Relative - Systems** Specific-Unit-proportional-coefficient k_R , is always constant and related to the Universal constant gravity g . Taking **[1/g]-Earth-Unit-coefficient**, k_E as monad, then the Relative coefficient $k_R = K_E/g_R$ is for any other System **the Gravity of the System** and applied as follows

Numerical value $g_G = 9,8076941$, of Equation (5) is Universal, and issues for all Systems of Granular universe, while the values of Unit k , k_R depends on location and issues for any System separately, and this because of the Periodic Excitation. With this logic, Newtonian constant G also, issues for Coulomb-Dipole Systems and is in these Systems as above related to g_G as $\rightarrow G = k_E g = g \cdot k_R g_R$

Instances :

For Earth-System mass $M_E = 5,9723 \cdot 10^{24}$ Kg and for Area \rightarrow Radius 6378,137 Km = $6,378 \cdot 10^6$ m then Earth-constant $k_E = \frac{[6,378 \cdot 10^6]^2}{5,9723 \cdot 10^{24}} = 6,811551810^{-12}$ and

$$G = g k_E = 9,8076941 * 6,8115518 \cdot 10^{-12} = \mathbf{6,6805616 * 10^{-11}}$$

i.e. **Gravitational-constant G becomes from g , k_E** , and is

$$G = 6,6805616 \cdot 10^{-11} \text{ m}^3 / \text{N} \cdot \text{s}^2 \dots\dots(7)$$

For Moon-System mass $M_{Mo} = 7,3477 \cdot 10^{22}$ Kg and for the Area is Radius 1737 Km = $1,737 \cdot 10^6$ m then ,

$$\text{Moon-constant } k_{Mo} = \frac{[1,737 \cdot 10^6]^2}{7,35 \cdot 10^{22}} = 41,06276 \cdot 10^{-12} \text{ and } \rightarrow$$

$$g_{Mo} = \frac{k_E}{k_{Mo}} = 6,81155 / 41,06276 = \mathbf{0,165} \cdot g_E$$

i.e. For Earth-Unit-coefficient $k_E = 6,81155 \cdot 10^{-12} \rightarrow$ Moon-Unit-coefficient

$$k_m = 41,1063 \cdot 10^{-12} \text{ m}^2/\text{Kg}$$

For Mars-System mass $M_{Ma} = 6,41693 \cdot 10^{23}$ Kg and for the Area Radius 3390 Km = $3,39 \cdot 10^6$ m then ,

$$\text{Mars-constant } k_{Ma} = \frac{[3,39 \cdot 10^6]^2}{6,417 \cdot 10^{23}} = 17,909 \cdot 10^{-12} \text{ and}$$

$$g_{Ma} = \frac{k_E}{k_{Ma}} = 6,81155 / 17,909 = \mathbf{0,380} \cdot g_E$$

i.e. For Earth-Unit-coefficient $k_E = 6,81155 \cdot 10^{-12} \rightarrow$ Mars-Unit-coefficient

$$k_{Ma} = 41,106 \cdot 10^{-12} \text{ m}^2/\text{Kg}$$

For Mercury-System mass $M_{Me} = 3,3 \cdot 10^{23}$ Kg and for Area Radius 2440 Km = $2,440 \cdot 10^6$ m then , Mercury-constant $k_{Me} = \frac{[2,44 \cdot 10^6]^2}{3,3 \cdot 10^{23}} = 18,041212 \cdot 10^{-12}$ and

$$g_{Me} = \frac{k_E}{k_{Me}} = 6,81155 / 18,0412 = \mathbf{0,377} \cdot g_E$$

i.e. For Earth-Unit-coefficient $k_E = 6,81155 \cdot 10^{-12} \rightarrow$ Mercury-Unit-coefficient

$$k_{Me} = 18,04 \cdot 10^{-12} \text{ m}^2/\text{Kg}$$

For Venus-System mass $M_{Ve} = 4,8675 \cdot 10^{24}$ Kg and for Area Radius 6073 Km = $6,073 \cdot 10^6$ m then , Venus-constant $k_{Ve} = \frac{[6,073 \cdot 10^6]^2}{4,867 \cdot 10^{24}} = 7,5778362 \cdot 10^{-12}$ and

$$g_{Ve} = \frac{k_E}{k_{Ve}} = 6,81155 / 7,577836 = \mathbf{0,899} \cdot g_E$$

i.e. For Earth-Unit-coefficient $k_E = 6,81155.10^{-12} \rightarrow$ Venus-Unit-coefficient
 $k_{Ve} = 41,1063.10^{-12} \text{ m}^2/\text{Kg}$

For Milky-Way-System mass $M_{MW} = 1,42.10^{42} \text{ Kg}$ and for this Area Radius =
 $= 2,4.10^{15} \text{ m}$ then , Milky-constant $k_{Mw} = \frac{[2,4.10^{15}]^2}{1,6.10^{42}} = 3,6.10^{-12}$ and

$$g_{Mw} = \frac{k_E}{k_{Mw}} = 6,81155.10^{-12} / 3,6.10^{-12} = \mathbf{1,892. g_E}$$

i.e. For Earth-Unit-coefficient $k_E = 6,81155.10^{-12} \rightarrow$ Milky-Unit-coefficient
 $k_{Mw} = 3,6.10^{-12} \text{ m}^2/\text{Kg}$

and Gravity acceleration of Milky-Way is $\rightarrow g_{Mw} = \mathbf{1,892. g_E}$

i.e. nearly twice that of earth .

For Andromeda-Galaxy-System mass $M_{AG} = 3,4.10^{38} \text{ Kg}$ and for the Area
 Black-hole Radius $5..10^{11} \text{ m}$, then

Andromeda-constant $k_{AG} = \frac{[5.10^{11}]^2}{3,4.10^{38}} = 7,352941.10^{-16}$ and

$$g_{AG} = \frac{k_E}{k_{AG}} = 6,81155.10^{-12} / 7,353.10^{-12} = \mathbf{9, 264.10^3 g_E = 9264.g_E}$$
 i.e.

For Earth-Unit-coefficient $k_E = 6,81155.10^{-12}$ and the Andromeda-Unit
 coefficient $k_{AG} = 7,353.10^{-12} \text{ m}^2/\text{Kg}$ and Gravity acceleration of
 Andromeda-Galaxy is $\rightarrow g_{AG} = \mathbf{9264.g_E}$

For Newton-Star-System mass $M_{NS} = 2,8.10^{30} \text{ Kg}$ and for this Area

Radius $4,2.10^3 \text{ m}$, then Newton-Star-constant $k_{NS} = \frac{[4,2.10^3]^2}{2,8.10^{30}} = 6,3.10^{-24}$ and

$$g_{NS} = \frac{k_E}{k_{NS}} = 6,81155.10^{-12} / 6,3.10^{-24} = \mathbf{1, 0812.10^{12}. g_E} \rightarrow$$
 i.e.

For Earth-Unit-coefficient $k_E = 6,81155.10^{-12} \rightarrow$ Newton-Star-Unit coefficient

$k_{NS} = 6,3.10^{-24} \text{ m}^2/\text{Kg}$ and Gravity acceleration of Newton-Star is

$$g_{NS} = \mathbf{1,0812.10^{12}. g_E}$$

For Black-Holes-System mass $M_{BH} = 4,0.10^{52} \text{ Kg}$ and for the Area

Radius $3,08.10^{25} \text{ m}$, then Black-Hole-constant $k_{BH} = \frac{[3,08.10^{25}]^2}{4,0.10^{52}} = 2,3716.10^{-2}$

$$g_{BH} = \frac{k_E}{k_{BH}} = 6,81155.10^{-12} / 2,3716.10^{-2} = \mathbf{2, 872.10^{-10}. g_E} \rightarrow$$
 i.e.

For Earth-Unit-coefficient $k_E = 6,81155.10^{-12} \rightarrow$ Black-Hole –Unit-coefficient

$k_{BH} = 2,3716.10^{-2} \text{ m}^2/\text{Kg}$, and Gravity acceleration of a Black-Hole is as ,

$$g_{BH} = \mathbf{2,872.10^{-10} g_E}$$
 , an expected explanation .

For all Planes issues $G = k_E g = g \cdot k_L g_L$, and for Black-holes also where ,

$$G = g \cdot k_{BH} \cdot g_{BH} = 9,8076941 * 2,3716.10^{-2} * 2,872.10^{-10} = \mathbf{6,6805616 * 10^{-11}}$$

Meaning that Gravitational constant is the Same for all Systems .

Remarks :

- 1.. Since (2) denotes *Area* , (1) denotes *Acceleration* \equiv *Force* \equiv *Energy* , and , are equal and same , *so* The area Swept-out by a vector radius is , $2.dS = \text{constant} = k = \bar{r} \times d\bar{r}$ and *Energy is Stored into its area* .

Since Photon is Particle as $[\bar{v} = \bar{c} = \lambda f]$, then *Energy* \equiv *Work* produced in motion

is stored into its , **Velocity-vector** $\equiv \bar{c} = \lambda f \equiv \mathbf{f}_R = [\mathbf{B}_{PH} \equiv \mathbf{f}_{1=N} , \mathbf{f}_2 , \mathbf{f}_3 , \mathbf{f}_R] \equiv [E^2 + H^2] = 2(2r).c.\sin 2\varphi$, where $\mathbf{f}_R \equiv \mathbf{f}_N$ and consists the moving Storage of Photon . **The carrier of Body \mathbf{B}_{PH} is the Outward $\bar{c} = \lambda f$ Electromagnetic-Wave** $\rightarrow \{[\varepsilon E^2 + \mu B^2] = 2.\lambda c.\sin.2\varphi\} \leftarrow$ and the Resonance for communication with other .

- 2.. From above , the **Photon during Motion in [MFMF] Chaos collides with other Photons** , by means of Cross- Product and produces a constant Work which is stored into the **Only-Four Energy - Geometrical -Shapes** , of the motion , the **Conic-sections** , and kept in its **Wavelength-Tank $2r = n \lambda$** , the **Linear motion** , continued by the **Propagating Electromagnetic-Wave \equiv The conveyer of storage.**
- 3.. Since Gravity force results to Gravity-acceleration $g = 9,8076941$ m/s and to the Gravitational-constant $G = 6,671684.10^{-11}$ N.m² / Kg² , then it was proved becomes as acceleration of the Material point i.e. from the first mass . In order that Force G act on masses is needed to create a pressure coefficient k_E in order that is $G \rightarrow g.k_R g_R = g_G = s[\frac{\pi r v^4}{2}]$ of Material-point in [MFMF] Chaos and , **therefore , g , Is The only one Universal minimum quantized Energy-Stress-Quantity** , The Energy Quanta as the Layer Granular-Row-material , **a Constant in all the Rotating and Periodic Excitation Systems** , while **G which is related to g , is the Universal Force acting on all masses of Universe** , and the between them , **through the local and Constant manifestation Stress on masses** , g , a Unit-Force quantity, g , the Stress , **in all moving and Stationary Systems as equation $G = g . k_E = g . k_R g_R$**

G.. THE ENERGY - SPACE - UNIVERSE AS A MONAD :

In [39] was shown that Universe is consisted of two fundamental elements , that of **Space** , i.e. **A point** without existence and another **point B** without existence also but not coinciding because if differently should not be a Two-Points-Vector segment, which is property of point . Point B is the **Anti-Space** , and this to exist at a distance AB from point A , is done a motion . This motion in Mechanics is called Energy and , In order that **Motion is Conserved as Displacement** in all directions , then this Displacement must be kept , **Quantized** , in a Finite Space differently is annihilated. In Mechanics the only-possible continuous motion in a Finite Space is the Periodic excitation [\leftrightarrow] and the Revolving motion [(+) \cup (-)].

Revolving motion may exist between Space (+) and Anti-Space (-) so the Revolving of Two-Points A(+) and B(-) consist the **Material-Point** as Segment , magnitude |AB|, and as Vector, direction **AB** and as **Quaternion $AB \equiv \text{Box } B_R$** carrying the Principal stress σ between A(+), B(-) , which σ as Centripetal acceleration is the minimum energy becoming from the in-storage AB acceleration and is equal to the **Gravity $g = \sigma$** . Periodic excitation between Space (+) and Anti-Space (-) may exist only as collision of opposite , so energy is captured in Box **B_P** containing the three elements [(+) , [\leftrightarrow] , (-)] without the inner acceleration \equiv Gravity g , but the Material-extreme-case of the Periodic acceleration [$\rightarrow \leftarrow$] = 0 and which is the , **Reciprocating motion** .

Since motion \equiv work \equiv energy and is continually produced in The Material-point , therefore is stored in it as the \rightarrow **Golden-ratio-frequency \equiv motion** , not stored eternally but Partially and the rest superfluous - motion is launched out the Box as a **Propagating Electromagnetic-Wave** which carries the Box **B_R** .

Because of the two different motions , **The Revolving and Excitation motion** , the acceleration of Gravity $g \equiv \pm \sigma$ exists in the First Box-**B_R** only , while in the Second Box-**B_P** is followed the Local-Extreme-case . This acceleration of the

Gravity $g \equiv \pm \sigma$ is altered Locally by changing the Principal-stress σ with an Inverse-Local-uniform-Pressure $\mathbf{g}_L \equiv g k = g \sigma = g \cdot [\text{Force / Area}] = G$, i.e. G is the minimum Locally manifested *force on masses*, which is the known as the \rightarrow **Universal Gravitational constant** $G = g k = g k_E = g \cdot [g_L k_L] = k_L \sigma \leftarrow$

i.e. The External-stress, g , of Box- \mathbf{B}_R , acts on the Internal-Spin, $S=\bar{\mathbf{p}}$, of Box- \mathbf{B}_P .

So far, this Universal Gravitational constant (the known Newtonian constant of gravitation) denoted by, G , is an **empirical-physical-constant** with many variations, while present article shows the theoretical origin of G .

In Newton's law, G , is the proportionality constant connecting the gravitational force between two bodies, with the product of their masses, and the inverse square of their distance.

The Einstein field equations quantify the relation between the geometry of space time and the Energy Momentum Tensor.

In Markos-Material-Geometry, the standard Universal gravity Stress-constant g , was theoretically proved to be the Granular-Layer-acceleration $g \equiv 9,8076941 \text{ m/s}^2$ as the **minimum quantized-Work** and **Stress** in Material point of any, r , cave. [72] Constant $G = k_E g$, is a Force **acting through** g and as a **Stress**, $g \rightarrow$ is acting on Monads \equiv [Quaternion \equiv Reaction to motions \equiv masses], which interference g , is the centripetal acceleration of the **Rotation** of Positive \oplus to the Negative \ominus constituent created in M-Point and not the Static Periodic motion [$\rightarrow \leftarrow$] of Box- \mathbf{B}_L . The Work produced from the **Golden-ratio-frequency** of **Photons** \equiv **M-P** is continuously **Kicked by** G , to Start *everything in this world*.

i.e. The External-stress, g , of Box- \mathbf{B}_R , acts on the Internal-Spin, $S=\bar{\mathbf{p}}$, of Box- \mathbf{B}_P .
markos 30/12/2018

a.. The Numerical-values of Energy-constants :

Moreover this acceleration is equal to the principal stresses $\pm \sigma$ applied between the two constituents and $g = \sigma = \text{Force/Area} = \text{stress} \pm \sigma = [\text{mass/area}] = G / k$, or $G = g k = k_L g = \sigma$ and also inversely $1/g = k/G = \mathbf{g}_L / G$, or System area / System mass, where k , is a Unit-proportional-coefficient.

For System-Earth $k_E = r^2_E / m_E = 6,8115518 \cdot 10^{-12} \text{ m}^3 / \text{N.s}^2$ and Gravity $g = 9,8076941 \rightarrow$ is The Universal Gravity-Constant, issuing from microcosm to macrocosm. In the finite-Space *cave* r of the Material-point *is stored the Work* \equiv *motion*, *the acceleration* Gravity, g , which is the minimum energy becoming from the in-storages acceleration $a = v^2/r \equiv 9,8076941$.

Gravitational constant $G = g k = 6,6805616 \cdot 10^{-11} \text{ m}^3/\text{N.s}^2$, is a force **becoming from** g, k **of each Relative-System** k_E **only**.

Material Points, Segments etc. consist the Physical Structures of universe. In the finite-Space *cave* r , of the Material-point *is stored the Work, the motion*, produced by the eternal rotation of opposites, which Work becomes from **Angular-Momentum Vector** $\bar{\mathbf{B}}$, and which is equal to the **Golden-ratio-Spin** and stored in the r cave fix-ends, as a **r -Stationary Wave** with the infinite **Golden ratio-frequencies** $f_n, f_{PH}, [f_1..f_n \rightarrow f_\infty] \equiv B_{PH} \equiv$ The Box $B_{PH} \equiv$ is called **The Moving-Energy-Storage**.

The Golden ratio frequencies are $\rightarrow f_n = (\frac{n\sigma}{8r^2}) \cdot \bar{\mathbf{B}} \equiv \frac{(1+\sqrt{5}) \cdot \sigma}{4\pi r} \equiv \frac{E}{h}$, and $E = h \cdot f_n$

Gravity g , is the minimum energy Becoming from the in-storages angular velocity acceleration $a = v^2/r \equiv 9,8076941$ in Material-point. [72]

Photon is a *Material-point*, Box B_R , with fix-ends **Inward-cave** r , and which is the

Energy Storage B_R , Outward-cave-r is an **Electromagnetic-Radiation** on wavelength $\lambda = c T = c / f_p$ which EM-Radiation, carries the Box B_R .

Universal Gravitational constant $G = g k$ related to g, k_R , is a Force and through the **Static g** becomes the Principal stress $\pm \sigma$, or frequency f_R which exists in nature as motion in the minimum **Resonance Golden-ratio-frequencies** $f_R = f_{n=1}$, and this because of the Periodic motion, in **Excitation**, where issues the Coulomb-Dipole law and which Coulomb inverse law is as,

$$F = k_c [q_1 \cdot q_2 / r^2] = k_c [\oplus \rightarrow \leftarrow \ominus] / r^2 = \frac{8}{\pi r(1+\sqrt{5})} \left[\frac{B}{r^2} \right], \text{ and Coulomb constant } k_c = 9.10^9 \text{ Nm}^2/\text{C}^2 \text{ , i.e.}$$

Because of the Periodic excitation between, Space (+) and Anti-Space (-), $[\oplus \rightarrow \leftarrow \ominus]$, exists only collision of opposite, where the inner acceleration is equal to zero Gravity g , and this because of the Material extreme-case of the Periodic acceleration $\{[\rightarrow \leftarrow] = 0\}$ which is zero, the Net force vanishes, issues the Coulomb

Dipole-law where Static - Stress g , becomes from the Stationary constant Dipole moment $\bar{p} \equiv \bar{B} \equiv$ as momentum which is the analogous in the Revolving motion where then issues $\rightarrow G = g k = k_E g = g \cdot k_R g_R = \bar{p} \cdot g_c = \sigma = \frac{\text{Force}}{\text{Area}} = \frac{\text{Mass}}{\text{Area}}$

For Earth-System mass $M_E = 5,9723 \cdot 10^{24}$ Kg, Radius $R_E = 6378,137$ Km = $6,378 \cdot 10^6$ m, then Earth-constant $k_E = \frac{R_E^2}{M_E} = \frac{[6,378 \cdot 10^6]^2}{5,98 \cdot 10^{24}} = 6,811551810^{-12}$ and $G = g k_E = [9,8076941] \cdot 6,8116 \cdot 10^{-12} = 6,68056 \cdot 10^{-11} \text{ m}^3/\text{N} \cdot \text{s}^2$ becoming from g, k_E only, i.e. G as force pushes $\rightarrow g$ as Stress energy in $\rightarrow k_E$.

Summary :

- 1.. Gravitational Force, G , is the Force which every Object in the Universe exerts on every other, whether small or big and is equal to $F_{\text{grav}} = \frac{G \cdot M \cdot m}{d^2} = \frac{g \cdot R_E^2 \cdot M \cdot m}{M d^2} = \frac{g \cdot R_E^2 \cdot m}{d^2} = \frac{m g R_E^2}{d^2}$, and $G = \frac{g \cdot R_E^2 \cdot M \cdot m \cdot d^2}{M d^2} = \frac{g \cdot [R_E^2]}{M} = g \cdot k_E$ where $k_E = \frac{g \cdot [R_E^2]}{M}$
 $g =$ The minimum Quantized work as acceleration $\equiv 9,8076941 \text{ m/s}^2$
 $k_E =$ The Earth Local-coefficient between the two constants g, G .
 For Earth (E) $\rightarrow k_E = r^2_E / m_E$, For Bodies (B) $\rightarrow k_B = r^2_B / m_B$,
 For any Body \rightarrow Local Gravity $g_L = k_E / k_L$
- 2.. Coulomb Electrical Force, $F_{\text{elect}} = k_c \frac{Q_1 \cdot Q_2}{d^2} = \frac{[\oplus \rightarrow \leftarrow \ominus]}{d^2} = \frac{8}{\pi r(1+\sqrt{5})} \left[\frac{B}{r^2} \right]$, where Coulomb constant $k_c = 9.10^9 \text{ Nm}^2/\text{C}^2$
- 3.. The Work done by the Electric field to rotate the dipole is $W = F_{\text{electron}} \cdot E_{\text{Field}}$.
- 4.. The Work done in Material points, needs a Path to exit from Box $f_R = [B_{PH}] \equiv [f_{1=N}, f_2, f_3, f_R = w^2_N] \equiv [E^2 + H^2]$, and from where is then Propagated.

Resonance-Path happens as the Force, EM-Radiation in **Two directions**, which can travel in any closed **System**, and for solids through Cauchy-stress-tensor where the two Conveyers $E \perp B \perp r \equiv \sigma_1 \perp \sigma_2 \perp \sigma_3$, can carry the **Energy Storage r** , in

System , and change the Inner-Structure of this System to another or destroy it.

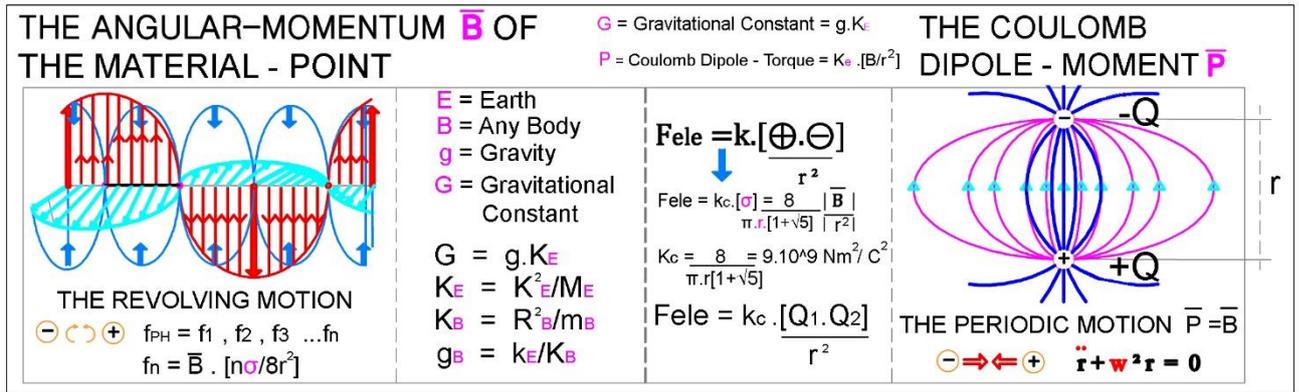


Figure – 8 .

The Two types of motions , for The Space \oplus and Antispace \ominus , to form , g and G .
 In (1) , is shown how Centripetal acceleration , $\bar{a} = v^2/r$, creates in cave r , Spin S , Gravity g , and Newtonian constant of Gravitation G .
 In (2) , is shown How acceleration is created in Electric field and Newton Universal Gravitation G . Electrons-equation of motion of $\oplus \rightarrow \ominus$ is $\ddot{\mathbf{r}} + \omega^2 \mathbf{r} = \mathbf{0}$ and the solution of equation is $\rightarrow 4\pi \cdot f_e^2 \cdot m_e = g$, which is *The Electron equation* .

b.. The Golden-ratio – frequency Φ .

In the next Figure – 9 is shown the Way that Universe is formulated by following the basic Internal *Material-Point-eternal-motion* as *Growing-Golden-ratio-Frequency* ,
 $f_n \equiv [\frac{1+\sqrt{5}}{2}] \frac{\sigma}{2\pi r}$ ← from Photons to Atoms , to Molecules , to Crystals , to ,,,, or to the all Planetary-System obeying Newton`s equations of motion , such in microcosm as in macrocosm and to the expanding universe. Analysis of the Growing-First-kick-start of this cosmos is given at the end .

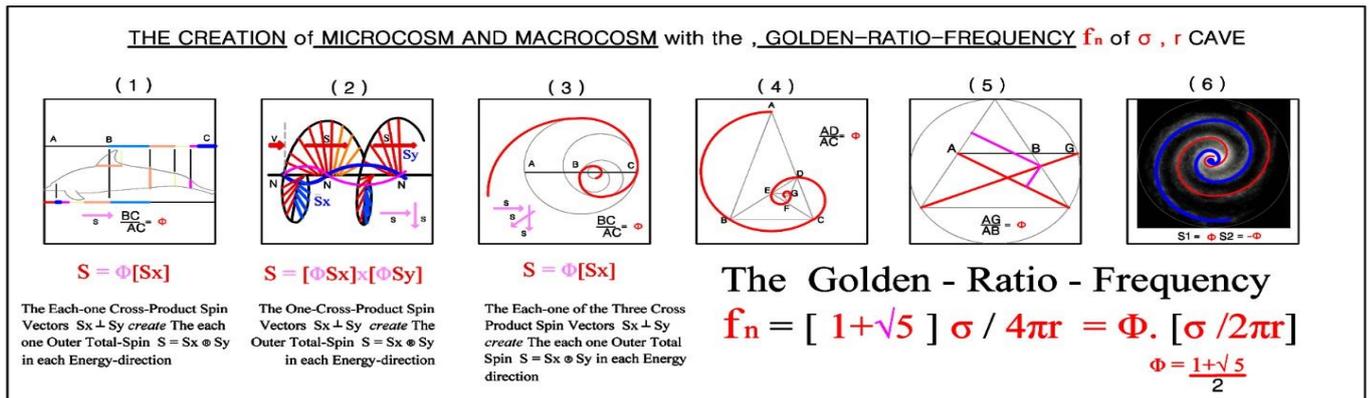
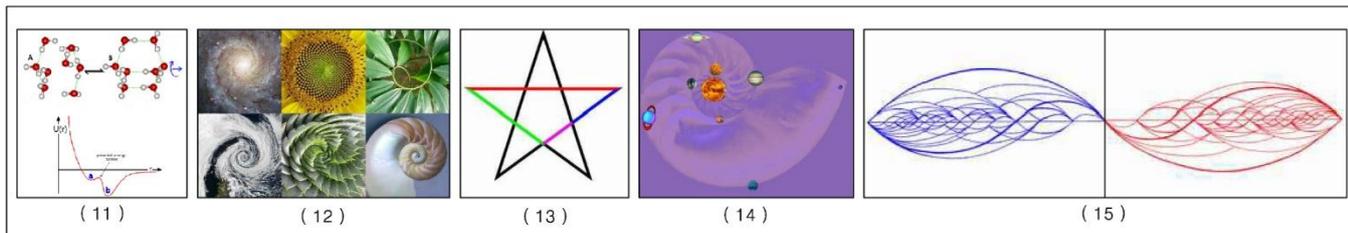


Figure-9. The How Golden-ratio-frequency is kicking microcosm and macrocosm.



In F- 9 , Universe is formulated by the **basic Golden-ratio-frequency** $f_n \equiv \left[\frac{1+\sqrt{5}}{2} \right] \frac{\sigma}{2\pi r}$ **Electromagnetic fields undulate within fields in the Universal Electromagnetic process of Dipole** $[\pm s^2] \equiv [\oplus \cup \cup \ominus]$, in **[MFMF] \equiv The Chaos** as base for all motions ,**for the Centripetal-Centrifugal forces.**

- (1) One-Vector \rightarrow From velocity vectors , to Animals , to comets to all expanding universe
- (2) Two-Vectors \rightarrow From Photons , to Pine-cone , Plants , to Galaxies , to expanding universe ...
- (3) Three-Vectors \rightarrow From Sub-atomic particles , to DNA molecules , to Inorganic Chemistry, to Elliptical Galaxies , to expanding universe
- (4) Three -Vectors \rightarrow From Elements ,molecules ,Fruits , to Milky-Wave , Galaxies , Galaxies-Cluster to
- (5) Tree –Vectors in a Circle \rightarrow From Elements , molecules , to Fruits , to Milky-Wave Galaxies , to all caves and to expanding universe ...
- (6) N–Vectors in a Circle \rightarrow From Sub atomic particles , Elements , molecules , all Organic and Inorganic elements , all types of Galaxies , to expanding universe

Since **Frequency in Material-point** of cave 10^{-62} m exists as **Golden-ratio pattern**, is seen that **exists also in the Structure and the motion of the Atoms and Molecules** within the materials , **and in all Universe** .

- (11) From Web , Water molecules-structure follows the **golden-ratio-frequency** f_n
- (12) From Web , Animals and Plant-structures follows the **golden-ratio-frequency** f_n
- (13) From Web ,Geometrical Pentagon-structure follows **golden-ratio-frequency** f_n
- (14) From Web , the Planetary Position-structure follows **golden-ratio-frequency** f_n
- (15) From Web , the **Space Anti-space Electromagnetic-fields** in [MFMF] Chaos follow the **Golden-ratio-frequency** f_n for the **Centripetal-Centrifugal forces** .

Since also **Stress σ** eternally exists in Material point and **is of the Golden-ratio-pattern** Φ , therefore microcosm and sequence all macrocosm follows, **the Stress σ Property** ,of the Golden-ratio-pattern Φ . The How and Why this happens is an Geometry problem because **Stress presupposes area** and **Electromagnetic wave two Inverse Plane waves** .

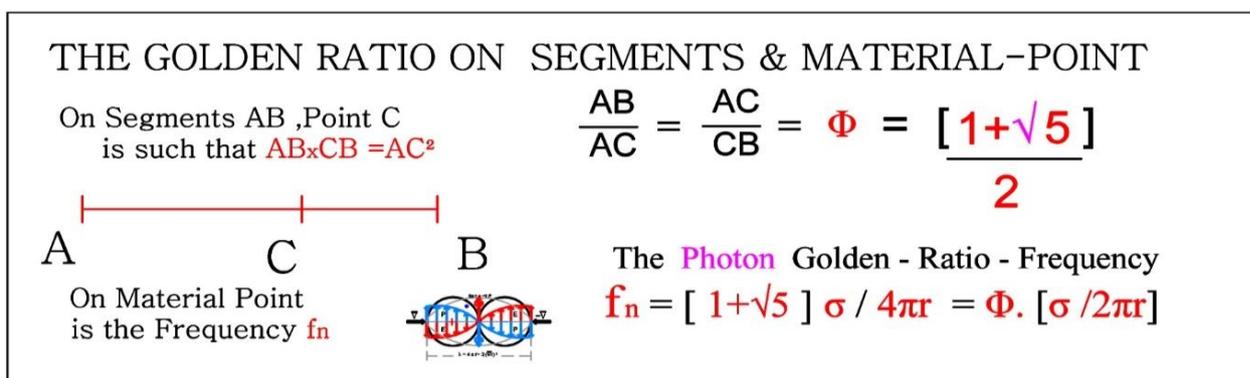


Figure - 10 . The Golden ratio Φ on Segment AB , is at point C , while on the

Material point $[\oplus \cup \cup \ominus]$ is on Principal Stress σ , as frequency $f_n \equiv \left[\frac{1+\sqrt{5}}{2} \right] \frac{\sigma}{2\pi r} \equiv \left[\frac{n\sigma}{8r^2} \right] \cdot \bar{B} \equiv \frac{E}{h}$ i.e. Frequency f_n , or σ in Material-point and cave 10^{-62} m exists as *The-Golden-ratio pattern*.

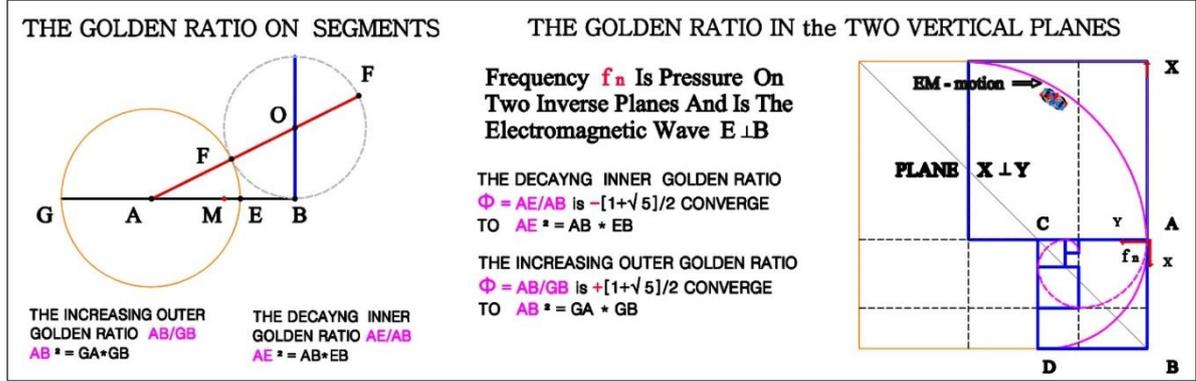


Figure - 11 . The Golden ratio Φ on Segment AB , and on Perpendicular-Planes .

c.. The Extreme and Geometric-Mean ratio :

In figure - 11 , AB Sector is divided by point C such that $AC = \frac{AB}{2} [\sqrt{5}+1]$ (1)

Proof :

According to the definition of Mean ratio exists $AB / AC = AC / CB$, or $AC^2 = AB.CB = AB.[AB-AC] = AC^2 = - AC.(AB) + AB^2 \rightarrow AC^2 + AC (AB) - AB^2 = 0$ (2)

Solving the second degree equation (2)

then $AC = \frac{AB}{2} [\sqrt{5}+1]$, i.e. Point C on AB sector , is such that issues (1) .

The Physical meaning is from Mechanics where ,when a force P acting on a surface S of a differential volume ds^3 , then Principal stresses σ_1, σ_2 , Shear stresses τ_{12} are as equation $\sigma = \sqrt{(\sigma_1 - \sigma_2)^2 + 4 \tau_{12}^2}$, and

$$\sigma_{1,2} = (\sigma_1 + \sigma_2) / 2 \pm (\frac{1}{2}) \sqrt{(\sigma_1 - \sigma_2)^2 + 4 \tau_{yz}^2}$$
 , where $\rightarrow \tan\theta = 2. \tau_{12} / (\sigma_1 - \sigma_2)$.. (3)

When the surface becomes a point [This is the Extreme case where surface is interchanged as line or line- segment , it is the same as the infinite small ,ds , in Calculus] , then $\sigma_2 = 0$ and τ_{12} is very small i.e.

It is a type of vanishing-shear due to layers laterally shifted . Since force P is a vector then as in cross-product to a right-handed coordinate system , where exists $\sigma_2 = 0$ and $\tau_{12} = \sigma_1$, then equation (3) becomes ,

$$\rightarrow \sigma_{1,2} = \sigma_1 / 2 \pm (\frac{1}{2}) \cdot \sqrt{\sigma_1^2 + 4. \sigma_1^2} = \frac{\sigma_1}{2} \cdot [1 \pm (\sqrt{5})] = \frac{\sigma}{2} \cdot [1 \pm (\sqrt{5})]$$
 (4)

Equation (4) denotes the way that Stresses $\sigma_{1,2}$ are shaped on any Volume according to the Principal Stress σ , and which is **the Golden-ratio** $\Phi = \frac{1}{2} [1 \pm (\sqrt{5})]$ of Stress σ . Since also **Stress σ** eternally exists in Material point and is of **the Golden-ratio-pattern** Φ , therefore microcosm and sequence all macrocosm follows , **the Stress σ , Property** , of the \rightarrow Growing-Golden-ratio-pattern Φ as this is in ,

- 1.. Stress with Golden ratio Property
- 2.. Centripetal acceleration due to Stress
- 3.. Gravity = Stress = Centrifugal acceleration
- 4.. Gravitation constant G stressing , g .

All above related vectors , of frequency f_n , occupying the Growing - Golden-ratio pattern Φ , give the analogous strength to enter caves , and incidentally in satiation Systems to follow the Split-Property as this happened to Organic - Chemistry.

d.. The Φ Properties :

To show that $\Phi = 1 + \frac{1}{\Phi} = 1, 6180339887$: Proof ,

It is holding $\rightarrow 1 + \frac{1}{\Phi} = 1 + \frac{1}{\frac{1+\sqrt{5}}{2}} = 1 + \frac{2}{1+\sqrt{5}} = \frac{2[\sqrt{5}-1]}{[\sqrt{5}+1][\sqrt{5}-1]}$ or ,
 $1 + \frac{1}{\Phi} = 1 + \frac{2[\sqrt{5}-1]}{4} = 1 + \frac{[\sqrt{5}-1]}{2} = \frac{2+\sqrt{5}-1}{2} = \frac{[\sqrt{5}+1]}{2} = \Phi$, **therefore** , $\Phi = 1 + \frac{1}{\Phi} \dots(5)$

Equation (5) is a very Special property of the Golden ratio because is that , **it can be defined in terms of itself** , i.e. of unit 1 equal to a new Φ which defines **the Space** , and of $\frac{1}{\Phi}$ defining **the Anti-Space** ,

and as continuous fraction , $\Phi = 1 + [\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \dots}}}] \dots (6)$

Because number Φ , multiplied with its Reciprocal number $\frac{1}{\Phi}$, is process of Addition, and equal to unit 1, so

$\rightarrow \Phi * \frac{1}{\Phi} = [1 + \frac{1}{\Phi}] \frac{1}{\Phi} = 1$ or $\rightarrow \frac{1}{\Phi} + \frac{1}{\Phi^2} = 1$ and $\Phi + 1 = \Phi^2$ or $\Phi^2 = \Phi + 1 \dots(7)$

Equation (7) is written $\Phi^2 - \Phi - 1 = 0$ and the roots of the second degree equation is

$x = + \frac{\Phi}{2} \pm \frac{[\sqrt{(\Phi^2+4\Phi^2)}]}{2} = \frac{[\sqrt{5}+1]}{2} . \Phi = \Phi * \Phi$ i.e. Golden-Ratio Property is continuously increasing by its self , a *Self-Growing Property of frequency f_n in Material-point*.

Equation (7) is also a very Special property of the Golden ratio because , according to Euclid , A straight line AB is said to have been cut in Extreme and Mean ratio when as the whole line is to the greater segment AB / AC , so is the greater to the lesser AC / CB , and according to Markos , Since frequency in Material-point is \rightarrow

$f_n = (\frac{n\sigma}{8r^2}) . \bar{B} \equiv [\frac{1+\sqrt{5}}{2}] \frac{\sigma}{2\pi r} \equiv [\frac{n\sigma}{8r^2}] . \bar{B} \equiv [\frac{1+\sqrt{5}}{2}] \frac{\text{Stress}}{\text{Perimeter}} \equiv [\frac{1+\sqrt{5}}{2}] \frac{\text{Force [N]}}{\text{Area} * L[m^3]} \equiv \frac{E}{h}$,

then occupies the Property of the Golden-ratio pattern Φ , and equation (7) defines that Material Point of frequency f_n , when collide with another Material Point , or with another Particle or particles then Produces another monad as $\rightarrow \mathbf{1} \equiv \text{New Quaternion}$ and the first continuous to be of the same Identity , **frequency f_n** , as before and from Euler`s , rigid body dynamics work $W = 2L = \bar{B} . \bar{w} = J . w^2 \equiv h . f_n \leftarrow$ i.e.

The Frequency of Photon , embodied with the \rightarrow Growing-Golden-ratio-pattern Φ Uses the Vibrating Physical Structures , the Granular Material-Instruments , to Kick Start all of them and everything in this world . The How is in Figure - 9.

Logarithms is a method of multiplication and simultaneously the basic Growing-mode.

Terminology of , \mathbf{b}^n , is \rightarrow Base , \mathbf{b} , to the n th power or , The times , n , for Base , \mathbf{b} , to be repeated in multiplication i.e. $\mathbf{b}^n = \mathbf{b.b.b.b.....b}$, n times = \mathbf{c} or as ,

Logarithm of , \mathbf{c} , on base , \mathbf{b} , is , n , or denoted as $\rightarrow \log_b c = n$, meaning $\log_b c = n \rightarrow$ To find the n , Repetitions of Base \mathbf{b} , to give the Result \mathbf{c} .

$\log_2 16 = 4 \rightarrow$ Base $\mathbf{2}$, to be repeated in multiplication $\mathbf{4}$ times 2.2.2.2 and be equal 16

The number of Repetitions , or times , means the *Frequency executed on the Base* .

The unknown is to be found , this Base such that its logarithm to be Unit .This Base

called Natural logarithm was found the constant , \mathbf{e} , and notated as $\rightarrow \ln e = 1$

and then for any number \mathbf{x} , is $\ln x = [\log_{10} x] / [\log_{10} e]$ and , $[\log_{10} x] = \ln x / \ln 10$

For a complex number $\bar{z} = x+i.y$ issues $\rightarrow \ln \bar{z} = \ln r + i.\theta = \ln |\sqrt{x^2 + y^2}| + i.\text{atan2}(y/x)$

From logarithm Property $\log(z^{-1}) = \ln(1/z) = - \ln z$, and angular velocity $w = 2\pi.f$

issues , $\log([-1]^{-1}) = - \ln[-1] + 2\pi.i = - \pi.i + 2\pi.i = \pi.i = \ln[-1] = \frac{w}{2f}$ (8)

From relation $x = e^{\ln(x)}$ then $x^n = e^{\ln(x).n}$ a Growing of Base x , by repetition as index n , times .

Relation (8) reveal the relation of frequency and Natural-logarithm-Base \mathbf{e} .

The Geometrical construction of the Mean-ratio of \mathbf{AB} Segment , defines Two-Points

Point , \mathbf{E} , in between and point , \mathbf{G} , the outwards \mathbf{A} , \mathbf{B} , such that $\mathbf{AE}^2 = \mathbf{AB.EB}$ and

$\mathbf{AB}^2 = \mathbf{GA.GB}$ (8)

Relations (8) defines that the symmetric to \mathbf{E} point \mathbf{G} , related to centre \mathbf{A} of circle (\mathbf{A},\mathbf{AE}) transforms magnitude \mathbf{AE} to \mathbf{AB} , or \mathbf{AE} magnitude is converted to \mathbf{AB} , i.e.

The In-between-magnitude \mathbf{AE} , the Part , \rightarrow *becomes the Outer \mathbf{AB}* , as the Whole.

This Augmentation-Property , the Geometrical-Growth , *of the Part-to-Whole* , of

of the two Golden-ratios , *exists in the Material-point and on Frequency \mathbf{f}_n* , which

motion \equiv Growth , *is Spread in the Two-Closed-Transverse-Planes as an* ,

Propagating - Electromagnetic -Wave $\mathbf{E}\perp\mathbf{H}$. Since above Property exists also in

Photon which is a self-Propagating Particle ,therefore Photon in this cosmos is the

Kick - Start - Mechanism of the **Augmented-Golden-ratio-pattern Φ** .

Remarks :

1.. From relation $\mathbf{G} = \mathbf{g} \mathbf{k}_E = 9,8076941.6,8116.10^{-12} = \mathbf{6,68056.10^{-11} m^3 / N.s^2}$

and from relation $\mathbf{1} = \mathbf{c} . \mathbf{r}^3 . \mathbf{f}_p^2 \rightarrow \mathbf{f}_p = \sqrt{1/cr^3}$ and from $f = E/h$ then $\frac{E}{h} = \sqrt{1/cr^3}$

or $\rightarrow E = h.\sqrt{1/c.r^3}$, $\frac{E^2}{h^2} = \frac{1}{cr^3} \rightarrow E^2 = \frac{h^2}{c r^3}$, an Energy relation between \mathbf{c} , \mathbf{r}

2.. From relation $E = h f = h.f_n \equiv \left[\frac{1+\sqrt{5}}{2}\right] \frac{h\sigma}{2\pi r}$ is seen the way that **Golden-ratio**

frequency influences on other material points and bodies .

Golden-Ratio Property belongs to Geometry and is Followed by nature in all extend of microcosm and macrocosm because Geometry is the Stationary-Space-Part .

In the same way , *Negative frequency* , $-\mathbf{f}$, lags the imaginary part of a quaternion and

Planck's constant, h , describes the behavior of particles and waves on the atomic scale
 The Gravity acceleration, g , describes the bedding-unit-Layer of force G , on the local
 Resistance coefficient k_E , in all scales of Nature. Analogous issues and for stresses σ .
 Since the **Medium-Field-Material-Fragment** $\{[\pm s^2] \equiv [MFMF] \equiv \text{The Chaos}\}$, is the
 Ocean of Material-points and the base for all motions, in-where **Stress** σ eternally exist
 and produces the minimum Quantum-Gravity g , **exercises a Local-Uniform-Pressure**
 $g_L \equiv k_L \sigma \equiv k_L g$, on any other Object, Body, where local constant $k_L = \frac{\text{System Area}}{\text{System Mass}} G$
 Gravity g is of the **Golden-ratio-pattern** Φ .

From relation $\rightarrow g_L = k_E / k_L = [g/G] / [k_L]$, issues $\rightarrow g \cdot g_L \cdot k_L = G$, i.e.

Newtonian Constant of Gravitation is equal to the Product of Gravity and Local-gravity
 or $\rightarrow g \cdot g_L \cdot k_L = G \rightarrow \text{Gravity} \times \text{Local-gravity} \times \text{Local constant}$ where
The-Local-Gravity g_L , is the **ratio of Earth-constant** k_E **to the Local-constant** k_L .

Local-Constant $k_L = \frac{\text{Local System Area}}{\text{Local System Mass}}$, is the **ratio of Local-area** R_L^2
to the Local-mass m_L .

3.. From relations $g = \frac{T^2}{a^3}$, $G = g \cdot g_L \cdot k_L$, $f_P \equiv [\frac{1+\sqrt{5}}{2}] \frac{\sigma}{2\pi r} = \sqrt{1/cr^3}$, $T_P = \sqrt{cr^3}$, $T_P^2 = c r^3$
 issues $G = g \cdot k_E = g \cdot [g_L k_L] = [\frac{T_P^2}{a^3}] \cdot [g_L k_L] = [\frac{c \cdot r^3}{a^3}] \cdot [g_L k_L] \dots\dots\dots(G)$

and because exists $\rightarrow \text{Force} = \text{Mass} \cdot \text{Acceleration}$ then,

$$\{ G \equiv \text{Force} \}, \{ [g_L k_L] \equiv \text{Mass} \}, \{ g = \frac{T^2}{a^3} = \frac{c \cdot r^3}{a^3} \} \equiv \text{Acceleration}$$

e.. The Acceleration Growth in Material point :

1). The Equations of motion In Material point related to the Inner motion was
 referred before where, The In-between-magnitude AE , *The Part*, becomes the Outer
 AB as the, **Whole or the Self-Growth**. This Augmentation-Property, of these two
 Golden-ratios, exists in the Material-point and on Frequency f_n , which motion \equiv
 Growth, is Spread in Two-Closed-Transverse-Planes as Propagating Electromagnetic
 Wave $E \perp H$.

From equations $E = h \cdot f_n \equiv [\frac{1+\sqrt{5}}{2}] \frac{h\sigma}{2\pi r} = [\frac{n\sigma}{8r^2}] \cdot \bar{B}$, $f_R \equiv [f_{1=N}, f_2, f_3, f_R = w^2_N]$,

Euler's $e^{-i.A(\frac{\pi+2k\pi}{2}) \cdot b} = e^{-i.A(\frac{\pi+4k\pi}{2}) \cdot b} = A \cdot \cos[\frac{\pi+4k\pi}{2}] \cdot b - i.A \sin[\frac{\pi+4k\pi}{2}] \cdot b$, $L = [\bar{B}/2] \cdot w$

Then $w = \sqrt{2\pi f_R} = 2L / \bar{B}$ and Wave Equation is $y = 2A \cdot \sin(\frac{2\pi \cdot x}{\lambda}) \cdot \cos wt \dots\dots(a)$

Equation (a) is the equation of the Inner Electromagnetic wave denoting that the
 vertical motion, v_y , is related to the position, x , and is defined on the Sinus curve
 while the horizontal motion, $v_x = 0$, frequency w , is on the Cosines curve and is,
 $w = \frac{2\pi}{T} = 2\pi \cdot f_N \equiv [\frac{1+\sqrt{5}}{2}] \frac{\sigma}{2\pi r}$, and follows the **Growth-Golden-Ratio-Pattern**.

The same happens to the Outer Electromagnetic wave which equations are,

$$\bar{E} = v_x \cdot E_0 \cdot \cos(kz - wt + \varphi), \quad \bar{B} = v_y \cdot [\frac{E_0}{c}] \cdot \cos(kz - wt + \varphi) \dots\dots(b)$$

Equation (b) is the equation of the Outer Electromagnetic wave, denoting that the

Electric field travels with light velocity $c \rightarrow$ directed to \vec{k} . Magnetic field travels with light velocity also , $c \rightarrow$ directed to \vec{k} , and is in phase with Electric field .

For both , Outer Electromagnetic fields the frequency , ω , is that of inner motion i.e.

$\omega = \frac{2\pi}{T} = 2\pi \cdot f_N \equiv \left[\frac{1+\sqrt{5}}{2}\right] \frac{\sigma}{2\pi r}$, which continuous to follow **Growth-Golden-Ratio-Pattern** Photon also occupies above property of the Material point and the Growth-Pattern . In this way Photon`s frequency $\rightarrow f_p = 1 / T_p$ Kick-Start , everything found on its-way.

From relation , constant $k = \frac{1}{f_n^2 \cdot a^3} \rightarrow$ or $1 = k \cdot f_n^2 \cdot a^3$ then cave-Semi-major-axis

$$a = \sqrt[3]{T^2 / k} = \sqrt[3]{\frac{1}{g \cdot f^2}} = \sqrt[3]{\frac{16 \cdot \pi^2 \cdot r^2}{(6+2\sqrt{5}) \cdot g \cdot \sigma^2}} = \sqrt[3]{\frac{8 \cdot \pi^2 \cdot r^2}{(3+\sqrt{5}) \cdot g \cdot \sigma^2}} , \text{ and } f_R = \frac{\omega}{2\pi} = \sqrt[2]{\frac{1}{g \cdot a^3}} \dots (c)$$

From (c) is seen that Resonance-frequency f_R follows the ,

Growth-Golden-Ratio-Pattern .

2). Work \equiv motion , is produced in Material-point as the frequencies f_N ,

$$f_N [S \equiv f_{1=n}, f_2, f_3, f_R = \omega^2] = n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma \cdot \bar{B}}{8r^2} \leftarrow \text{the meter of Stationary motion .}$$

H.. THE NUMERIC LENGTH OF SPACES - CAVES . [26 - 29]

a). **The Planck`s length L_p :**

Why Rotational energy $\bar{\Lambda} \equiv$ **Angular momentum vector** , is Elastically damped in monad $\lambda_2=10^{-35}$ m as \rightarrow mass m , velocity \bar{v} , angular velocity $\bar{\omega}$, and finally as a **Constant Frequency** , f , which is dissipated in the fundamental particles (Fermions and Bosons) by altering the two variables , velocity \bar{v} and wavelength λ , only ???

Since monad (\overline{AB}) = **quaternion** = \bar{z} and the , ω , Spaces and , $1/\omega = \omega^{-1}$, Sub-spaces are monads in ω , power and , ω^{-1} , the root which represent the Regular Circumscribed and the Regular Inscribed Polygons in monad \overline{AB} , then quaternion $z^\omega = \bar{z}^\omega = [s + \bar{v}]^\omega = [s + \bar{v} \cdot i]^\omega = [s + (v_1 + v_2 + v_3) \cdot \nabla i]^\omega = s + \bar{v} \nabla i$, where s = the Scalar part , and $\bar{v} = [v_1 + v_2 + v_3]$ the Imaginary part of it , equal to $\bar{v} \nabla i$ as $z^\omega = (s + \bar{v} \nabla i)^\omega = [z_0(\cos \varphi + i \sin \varphi)]^\omega = |z_0|^\omega \cdot (\cos \omega \varphi + \varepsilon \cdot \sin \omega \varphi) = |z_0|^\omega \cdot e^{i \cdot \omega \varphi}$

where $\rightarrow |z_0| = \sqrt{s^2 + v_1^2 + v_2^2 + v_3^2}$, and

$$\varepsilon = [v_1 \cdot i + v_2 \cdot j + v_3 \cdot k] / [\sqrt{v_1^2 + v_2^2 + v_3^2}] , \quad \cos \varphi = \frac{s}{|z_0|} \dots (1) \text{ and } z^{1/\omega} = [s + \bar{v} \nabla i]^{1/\omega} = |z_0|^{-\omega} \cos(\varphi + 2k\pi)/\omega + i \cdot \sin(\varphi + 2k\pi/\omega) = |z_0|^{-\omega} \cdot e^{-i \cdot (\varphi + 2k\pi) \cdot \omega}$$

where $z^\omega =$ The Space , and $z^{1/\omega} = z^{-\omega}$ The Anti-space of Monad \equiv Quaternion \overline{AB} **Above equations define the Wave-nature of monads in all Levels or Sub-levels .**

From above monads ($s + \bar{v} \nabla i$) $^{1/\omega} = |z_0|^{-\omega} \cdot e^{-i \cdot (\varphi + 2k\pi) \cdot \omega}$, where $\cos \varphi = s / |z_0|$ and for **the Rotated Energy case** , where $s = 0$ and $\cos \varphi = 0$, exists for angle $\varphi = \pi / 2$

quaternion ($s + \bar{v} \nabla i$) $^{1/\omega}$ **as dimension power** $\rightarrow \omega = b \leftarrow$ and for $k = 1$ becomes , $e^{-i \cdot (\pi/2 + 2k\pi) \cdot \omega} = e^{-i \cdot (\pi/2 + 2k\pi) \cdot b} = e^{-i \cdot (5\pi/2) \cdot b} = e^{-i \cdot (5\pi/2) \cdot 10} \dots (2)$

Equation (2) fits , **as minimum** , in the Planck length and is $L_p = e^{-i \cdot (5\pi/2) \cdot 10} \dots (3)$

Equation (3) is the smallest **Energy-Unit of Space** ,and this because of $s = 0$ and $k = 1$ meaning that $k = 1$ is the Primary Energy-Unit and $s = 0$ the Zero-Space-meter π . It was shown [31] that **Space and Energy is quantized** and measured on the two Constant and Natural numbers e, π , where for base the natural logarithm e , and exponent the decimal base $b = 10$.

$$\text{From } \rightarrow z^{1/w} = (s + \bar{v} \nabla i)^{1/w} = |zo|^{-w} \cdot [\cos.(\varphi + k\pi)/w + i.\sin.(\varphi + k\pi)/w] = |zo|^{-w} \cdot e^{-i.(\varphi+k\pi).w}$$

for $\cos.(\varphi+k\pi)/w = 0$ then exists only the Imaginary part of monad $(\bar{v} \nabla i) \neq 0$, where $\varphi = \pi/2$ then ,

$$z^{1/w} = |zo|^{-w} \cdot e^{i.(\varphi+k\pi)/w} = e^{-i.(\frac{\pi}{2}+k\pi)}.10 \text{ and it is the } \mathbf{Diffraction Energy mechanism}$$

for all Space Levels of quantization which are **Energy Particles only** i.e.

The Energy particles in Stationary caves as

$$z^{1/w} = |zo|^{-w} \cdot Lv = \text{Energy Monads} .$$

Extending quantization of Energy according to exponential formula ,

$$L_v = e^{-i.(5\pi/2)}.10 \text{ , on the decimal base } b = 10 \text{ then for } k = \pm 0 \rightarrow \pm \infty ,$$

are found the Energy caves as

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (13,8155) = 1 \cdot 10^{-6} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 0 \text{ } L_v = e^{\wedge} i.(\pm \pi/2)b \text{ then } e^{\wedge} \mathbf{(-15,7079)} = \mathbf{1,78118 \cdot 10^{-7} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (16,1181) = 1 \cdot 10^{-7} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (46,0517) = 1 \cdot 10^{-20} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 1 \text{ } L_v = e^{\wedge} i.(\mathbf{-3.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-47,12389)} = \mathbf{5,344 \cdot 10^{-21} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (48,3543) = 1 \cdot 10^{-21} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (78,2879) = 1 \cdot 10^{-34} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 2 \text{ } L_v = e^{\wedge} i.(\mathbf{-5.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-78,5398)} = \mathbf{8,906 \cdot 10^{-35} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (80,5905) = 1 \cdot 10^{-35} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (108,221499) = 1 \cdot 10^{-47} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 3 \text{ } L_v = e^{\wedge} i.(\mathbf{-7.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-109,9956)} = \mathbf{2,295 \cdot 10^{-48} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (110,524085) = 1 \cdot 10^{-48} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (140,457691) = 1 \cdot 10^{-61} \text{ m}$$

$$\text{For base } \mathbf{e = 2,71828} \text{ and } k = 4 \text{ } L_v = e^{\wedge} i.(\mathbf{-9.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-141,372)} = \mathbf{3,969 \cdot 10^{-62} m}$$

Which is the Gravity length .

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (142,760276) = 1 \cdot 10^{-62} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (172,693882) = 1 \cdot 10^{-75} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 5 \text{ } L_v = e^{\wedge} i.(\mathbf{-11.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-172,7876)} = \mathbf{9,593 \cdot 10^{-76} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (174,996467) = 1 \cdot 10^{-76} \text{ m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (202,627488) = 1 \cdot 10^{-88} \text{ m}$$

$$\text{For base } \mathbf{e=2,71828} \text{ and } k = 6 \text{ } L_v = e^{\wedge} i.(\mathbf{-13.\pi/2})b \text{ then } e^{\wedge} \mathbf{(-204,204)} = \mathbf{7,155 \cdot 10^{-89} m}$$

$$\text{For base } e = 2,71828 \text{ and base } b = 10 \text{ then } e^{\wedge} - (204,930073) = 1 \cdot 10^{-89} \text{ m}$$

$$\mathbf{Planck's Length } L_p = e^{-i.(\frac{\pi}{2}+2k\pi)}.b = e^{i.(-5\pi/2)}.10 = e^{i.(-5\pi/2)}.10 = e^{-78,5398} = \mathbf{8,906 \cdot 10^{-35} m}$$

For base $e = 2,71828$ and base $b = 10$ then $e^{-78,2879} = 1.10^{-34}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-78,5398} = 1.10^{-34} = \mathbf{8,906} .10^{-35}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-80,5905} = 1 .10^{-35}$ m

Since cave is a versor then **Planck's Length** [$\mathbf{8,906} .10^{-35}$] is divided by $\pi.\sqrt{3}$ and is $=1,616199.10^{-35}$ m and Planck's cave $L_p = e^{i(\frac{\pi}{2}+2k\pi).b} = e^{-i(\frac{5\pi}{2}).b} = e^{i(-\frac{5\pi}{2}).10} = e^{-(78,5398)} = \mathbf{8,906} .10^{-35}$ m = { $\sqrt{3}.\pi. \mathbf{1,616199} .10^{-35}$ m } $\equiv L_p =$ Planck's Length .

Extending quantization of Space and Energy according to exponential formula for min-acceleration then **Planck's Length** $L_s = e^{-i(-\pi+k\pi).b} = e^{-i.\pi.(k-1).10} \rightarrow e^{-(29,933606)}$

For base $e = 2,71828$ and base $b = 10$, then $e^{-(29,933606)} = 1.10^{-13}$ m *Particles*

For base $e = \mathbf{2,71828}$ and $k = \mathbf{0}$ then exists the minimum energy cave as ,

$$L_s = e^{i(-\pi).b} = e^{-i(-31,41593)} = \mathbf{3,56237} . 10^{-14} \text{ m}$$

For base $e = 2,71828$ and base $b = 10$ then $e^{-(32,236191)} = 1 .10^{-14}$ m *length.*

For base $e = 2,71828$ and base $b = 10$ then $e^{-(92,103404)} = 1 .10^{-27}$ m *length*

For base $e = 2,71828$ and $k = \mathbf{1}$,then $L_s = e^{i(-2\pi).b} = e^{-i(-62,83185)} = \mathbf{9,31289} .10^{-28}$

For base $e = 2,71828$ and base $b = 10$ then $e^{-(94,405989)} = 1 .10^{-28}$ m *length*

Minimum Acceleration happens for Particles in , **Cave \equiv Recession \equiv Wavelength**, and

Energy $E_a = \frac{1,24}{3,56237.10^{-14+6}} = 3,481.10^7$ eV = $5,576 . 10^{-10}$ Joules , while Redshift

Energy happens $E_R = \frac{1,24}{0,7495} = 1,6542$ eV = $2,65 . 10^{-19}$ Joules [Kg.m²/s²]. [31]

Extending quantization of the Massive Part according to the above exponential formula

$L_s = e^{i(-\pi \pm k\pi).b}$ on the decimal base $b = 10$ then for $\rightarrow k = \pm 0 \rightarrow \pm \infty$ becomes ,
 $L_s = e^{-i(\pi \pm k\pi).b} = e^{-i.\pi(1 \pm k\pi).b} = e^{-i.\pi(1 \pm k\pi).10}$ and then ,

For base $e = 2,71828$ and base $b = 10$ then $e^{-(29,933606)} = 1.10^{-13}$ m

Particles length

For base $e = 2,71828$ and $k = 0$ $L_s = e^{i(-\pi).b}$ then $e^{(-31,41593)} = 3,56237 . 10^{-14}$ m

Proton

For base $e = 2,71828$ and base $b = 10$ then $e^{-(32,236191)} = 1.10^{-14}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(92,103404)} = 1.10^{-27}$ m

For base $e = 2,71828$ and $k = 1$ $L_s = e^{i(-2\pi).b}$ then $e^{(-62,83185)} = 9,31289 . 10^{-28}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(94,405989)} = 1.10^{-28}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(156,575786)} = 1.10^{-40}$ m

For base $e = 2,71828$ and $k = 2$ $L_s = e^{i(-3\pi).b}$ then $e^{(-94,24778)} = 7,81183 . 10^{-41}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(158,878371)} = 1.10^{-41}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(218,745584)} = 1.10^{-54}$ m

For base $e = 2,71828$ and $k = 3$ $L_s = e^{i(-4\pi).b}$ then $e^{(-125,6637)} = 4,93666 . 10^{-55}$ m

For base $e = 2,71828$ and base $b = 10$ then $e^{-(221,048169)} = 1.10^{-55}$ m

For base $e = 2,71828$ and $k = 4$ $L_s = e^{i \cdot (-5 \cdot \pi) \cdot b}$ then $e^{(-157,07963)} = 7,8118 \cdot 10^{-69}$ m
 For base $e = 2,71828$ and $k = 5$ $L_s = e^{i \cdot (-6 \cdot \pi) \cdot b}$ then $e^{(-188,49555)} = 1,3742 \cdot 10^{-82}$ m
 For base $e = 2,71828$ and $k = 6$ $L_s = e^{i \cdot (-7 \cdot \pi) \cdot b}$ then $e^{(-219,91148)} = 4,9365 \cdot 10^{-96}$ m
 For base $e = 2,71828$ and $k = 4$ $L_s = e^{i \cdot (-8 \cdot \pi) \cdot b}$ then $e^{(-251,32740)} = 8,4989 \cdot 10^{-110}$ m
 For base $e = 2,71828$ and $k = 5$ $L_s = e^{i \cdot (-9 \cdot \pi) \cdot b}$ then $e^{(-282,74333)} = 2,0613 \cdot 10^{-123}$ m
 For base $e = 2,71828$ and $k = 4$ $L_s = e^{i \cdot (-10 \cdot \pi) \cdot b}$ then $e^{(-314,15926)} = 5,6236 \cdot 10^{-137}$ m
 For base $e = 2,71828$ and $k = 5$ $L_s = e^{i \cdot (-11 \cdot \pi) \cdot b}$ then $e^{(-345,57518)} = 9,1860 \cdot 10^{-151}$ m

i.e. on the Natural base ,e, and decimal base $b = 10$, the Total Energy $[z^{-1/w} = |z_0|^{-w} \cdot L_0]$ Stored in the quantized Space $L_0 = 3,56 \cdot 10^{-14}$ m, is then passing through the Regulating Valves , massive – energy , the $3,56 \cdot 10^{-14}$ and $9,31 \cdot 10^{-28}$ m, is quantized as , $2 \cdot 3^2 = 18$, Particles (the Fermions and Bosons) in the Planck's length $L_p = 8,906 \cdot 10^{-35}$ m. which create all others . On the same Sub-Spaces and on the same exponential base exist also the infinite Spaces Anti-spaces and Sub-spaces , i.e. the infinite monads in one monad . The How Diffraction , Massive – Energy , and Mechanism in [29] .

In future , Planck`s length may be useful for redefinition of the New Kilogram .

b).. The Minimum Energy Quantization :

From space equation ,

$$z^w = (s + \bar{v} \nabla i)^w = [z_0 (\cos \varphi + i \sin \varphi)]^w = |z_0|^w (\cos w \varphi + \varepsilon \cdot \sin w \varphi) = |z_0|^w \cdot e^{i \cdot (\varphi + k\pi)w}$$

and Anti-Space \rightarrow

$$z^{1/w} = (s + \bar{v} \nabla i)^{1/w} = |z_0|^{-w} \cdot [\cos \cdot (\varphi + k\pi)/w + i \cdot \sin \cdot (\varphi + k\pi)/w] = |z_0|^{-w} \cdot e^{-i \cdot (\varphi + k\pi)w}$$

is seen that for $\varphi = 0$ and , $k = -\infty$ to 0 , then $z = 0 \rightarrow 1$ | for $\varphi = 0$ and , $k = \pm 0$ to ∞ , then $z = 1 \rightarrow \infty$ for $\varphi = \pi/2$ and $k = -\infty$ to 0 , then $z = 0 \rightarrow 1$ | for $\varphi = \pi/2$ and $k = \pm 0$ to ∞ , then $z = 1 \rightarrow \infty$

i.e. Quantum zero oscillations of the gravitational field **Do-Not Distort** the Euclidean spaces . Although Gravity field is consisted of infinite Stationary-Material-points , producing both motions , $|\oplus \cup \cup \ominus|$, $|\ominus \leftrightarrow \oplus|$ and performs Zero-point oscillations from the Material-Geometry associated with it , and this because of the chains of Spins , is thus created a Magnetic field due to LRC-circuit of infinite Spins , and which is tuning to the critical Quantum-critical-State \mathbf{g}_G .

The chains of Spins are pointy vibrating with their characteristic frequencies.

Minimum Acceleration happens for Particles in , **Cave \equiv Recession \equiv Wavelength**, and Energy $E_a = \frac{1,24}{3,56237 \cdot 10^{-14+6}} = 3,481 \cdot 10^7$ eV = $5,576 \cdot 10^{-10}$ Joules , while Redshift

Energy happens $E_R = \frac{1,24}{0,7495} = 1,6542$ eV = $2,65 \cdot 10^{-19}$ Joules [Kg.m²/s²]. [31]

Electrons-equation , $\oplus \rightarrow \ominus$, of motion in Planck`s length $r = 1 \cdot 10^{-35}$ is $\ddot{\mathbf{r}} + \mathbf{w}^2 \mathbf{r} = \mathbf{0}$ the solution of which is $\rightarrow 4\pi \cdot \mathbf{f}_e^2 \cdot \mathbf{m}_e = \mathbf{g} \leftarrow$ which is **The Electron equation** .

Oscillations with $r < 1 \cdot 10^{-33}$ happen to Material-Points and to other Energy-Quanta.

c). **Numeric Analysis :**

Planck constant , $h = 6,62606957 \cdot 10^{-34}$ joules , $1 \text{ eV} = 1,60218 \cdot 10^{-19} \text{ J}$

Light velocity $c = 2,998 \cdot 10^8 \text{ m/s}$, $1 \text{ THz} = 10^{12} \text{ Hz}$, $1 \text{ nm} = 10^{-9} \text{ m}$, $1 \mu\text{m} = 10^{-6} \text{ m}$

$$\text{Total-Energy } E = h \cdot f = \frac{hc}{\lambda} = \frac{6,62606957 \cdot 10^{-34} \cdot 2,998 \cdot 10^8}{\lambda} = 1,99 \cdot 10^{-25} \text{ m} \cdot (10^6 \mu\text{m}/\text{m}) = \frac{1,2398}{\lambda(\mu\text{m})} \text{ (eV)}$$

and for redshift $\rightarrow f = 400 \text{ THz} = 400 \cdot 10^{12} \text{ Hz} = 4 \cdot 10^{14} \text{ Hz}$ then corresponds a light's wavelength $\lambda = \frac{c}{f} = \frac{2,998 \cdot 10^8 \text{ m/s}}{4 \cdot 10^{14} \text{ Hz}} = 7,495 \cdot 10^{-7} \text{ m} \cdot (10^6 \mu\text{m}) = 0,07495 \mu\text{m}$ and

$$\text{Total-Energy } E = \frac{1,24}{\lambda(\mu\text{m})} \text{ (eV)} \dots\dots\dots(a)$$

$$E_R = \frac{1,24}{0,7495} = 1,6542 \text{ eV} = 2,65 \cdot 10^{-19} \text{ Joules} . \text{ Where } 1 \text{ eV} = 1,6022 \cdot 10^{-19} \text{ Joules} .$$

Because Photon may have any wavelength and also that of Planck cave $1,616 \cdot 10^{-35} \text{ m}$, then its energy is ,

$$\text{Energy } E_P = \frac{1,24}{1,616 \cdot 10^{-35+6}} = 7,673 \cdot 10^{28} \text{ eV} = 1,229 \cdot 10^{21} \text{ Joules} . \text{ The difference in}$$

$$\text{Energy is } E = E_P - E_R = 7,673 \cdot 10^{28} \text{ eV} = 1,229 \cdot 10^{21} \text{ Joules} , \rightarrow \text{ zero } i.e$$

The Energy - Stores of Photon are always full of Energy \equiv The Up - Down Motion in Lobes , following on wavelength , λ , The Stationary Wave - Nodes Principle .

Considering the wavelength equal to Planck's length $r = 4,453 \cdot 10^{-35}$ then to observe this length we need the wavelength to be smaller than this cave r , being viewed .

The frequency is as $f_P = c/\lambda = (3 \cdot 10^8 \text{ m/s}) / (4,453 \cdot 10^{-35} \text{ m}) = 6,73 \cdot 10^{42} \text{ s}^{-1}$ corresponding to an Energy $E = h \cdot f_P = [6,6260696 \cdot 10^{-34} \text{ Js}] \cdot [6,73 \cdot 10^{42} \text{ s}^{-1}] = 4,459 \cdot 10^9 \text{ J} = 2,783 \cdot 10^{28} \text{ eV}$.

Planck's constant h , is the ratio of a Quantum of Energy to its frequency and equal to $h = [6,6260696 \cdot 10^{-34} \text{ Js}]$ where $\rightarrow 1 \text{ eV} = 1,6022 \cdot 10^{-19} \text{ Joules} \rightarrow 1 \text{ J} = 6,24141 \cdot 10^{18} \text{ eV}$

The relation of wavelengths and colors , *energy* , is given from equations $\lambda = hc / E$ and $\lambda f = c$. The seven light-colors are as below with wavelength in $\text{nm} = 1 \cdot 10^{-9} \text{ m}$, and energy in eV as ,

Red $\rightarrow 700$, **Orange** $\rightarrow 620$, **Yellow** $\rightarrow 580$, **Green** $\rightarrow 530$, **Blue** $\rightarrow 475$, **Indico** $\rightarrow 450$, **Violet** $\rightarrow 400 \text{ nm}$,
 $f = 4,29 \cdot 10^{14}$, $f = 4,84 \cdot 10^{14}$, $f = 5,17 \cdot 10^{14}$, $f = 5,66 \cdot 10^{14}$, $f = 6,32 \cdot 10^{14}$, $f = 6,67 \cdot 10^{14}$, $f = 7,50 \cdot 10^{14} \cdot \text{s}^{-1}$
 $E = 1,77 \cdot 10^0$, $E = 2,00 \cdot \text{eV}$, $E = 2,14 \cdot \text{eV}$, $E = 2,34 \cdot \text{eV}$, $E = 2,64 \cdot \text{eV}$, $E = 2,76 \text{ eV}$, $E = 3,10 \cdot \text{eV}$.
 From above is seen the large size of energy difference .

The Three **Energy-Space** constants in Nature :

$$L_P \equiv e^{-i \cdot (\frac{\pi}{2} + 2k\pi)} \cdot b \equiv e^{i \cdot (-5\pi/2)} \cdot 10 \equiv e^{i \cdot (-5\pi/2)} \cdot 10 \equiv \{ \sqrt{3} \cdot \pi \cdot 1,616199 \cdot 10^{-35} \text{ m} \} \rightarrow$$

The Planck's length cave ,

$$g \equiv \frac{T^2}{a^3} \equiv \frac{1}{f_n^2 \cdot a^3} \equiv 9,8076941 \rightarrow \text{The minimum Granular Quantized Energy , from the gravity frequency } f_g , \text{ represents the Quantum-Stress-material-Layer of force } G , \text{ on all Energy structures. Raw is such because is acceleration .}$$

$$G \equiv g \cdot k_E \equiv g \cdot [g_L k_L] \equiv [\frac{T^2_P}{a^3}] \cdot [g_L k_L] \equiv 9,8076941 * 6,8116 \cdot 10^{-12} \equiv 6,68056 \cdot 10^{-11} \text{ m}^3 / \text{N} \cdot \text{s}^2 \text{ Which is The Attracting and Cohesive Bond , Force on all Quantized-Energy-Structures , of all Spaces through } g .$$

$$f_n \equiv \{ [S \equiv B_P \equiv \mathbf{EM-R} \equiv f_{1=N}, f_2, f_3, f_D, f_n] \equiv n \frac{(1+\sqrt{5})\sigma}{4\pi r} = \frac{n\sigma\bar{B}}{8r^2} \text{ and}$$

$$\lambda_N = \frac{8rc}{n\sigma^2(1+\sqrt{5})} = \frac{8r^2c}{n\sigma\bar{B}}] \}, \text{ *The Amount, the meter of motion as frequency,*$$

in the Augmented-Golden-Ratio-Pattern Φ .

I.. THE KICK-START FORCES OF UNIVERSE :

a.. *The Gravitation Force G, and Kick-Start :*

The G - Kick-Start, on frequency $\rightarrow f_P = 1 / T_P = \frac{w}{2\pi} = \sqrt[2]{\frac{1}{g \cdot a^3}}$, in this world is,

the How this frequency can *Enter, Format and cohesive, the first or any other Energy-Rim in Planck's length*, from relation $1 = g \cdot f_n^2 \cdot a^3 = \left[\frac{4\pi^2}{GM} \right] \cdot f_n^2 \cdot a^3$.

It was shown that, *An Energy-Rim*, is a Plane - Surface, *an orbit*, representing a Constant Energy becoming from the squared Frequency f_n^2 , *represents the Imaginary Part of monad*, and r_n^3 , representing the Real-Space-Part of monad as $1 = k \cdot f_n^2 \cdot r^3$. Stationary-Energy is spread in one Plane as this happens in Stationary-waves in caves, while in Propagating-Energy in two, as the Electromagnetic Transverse waves.

All these Energy-Rims consist the Quantized-Plane-curves. The two different motions of Space \oplus , Anti-space \ominus , in any cave r , and in a Finite Space, *The Revolving and Periodic Excitation* create an Eternal frequency which influence all other Spaces, *caves*. The minimum quantized-energy is stored in the Gravity-Layer g , becoming from the Unit energy of the sinus orbit. From equation $g = T^2 / a^3$ then period is,

$$T = \sqrt{g \cdot a^3} = \sqrt{9,80769411 \cdot (2,1145016)^3} = 3,04513 \cdot 10^{-16} \text{ s}, \text{ since for}$$

Unit-Work = sine Integral $= \int_0^t \frac{\sin t}{t} dt = 1$. and the semi-major axis, a , is,

$a = 2,1145016 \cdot 10^{-16} \text{ m}$, and frequency $T^{-1} = f_P = 3,28393 \cdot 10^{15} / \text{s}$, which corresponds to a loop in Planck's scale $(4/3) \cdot \pi \cdot r^3 = 3,96 \cdot 10^{-32} \text{ m}$, and then

the Energy in this Planck's loop is the minimum quantized.

$$\text{Energy } E = h \cdot f_P = [6,6262 \cdot 10^{-34} \text{ J.s}] \cdot [3,28393 \cdot 10^{15} / \text{s}] = 2,176 \cdot 10^{-18} \text{ J},$$

$$\text{and in eV} \rightarrow [2,176 \cdot 10^{-18}] / [1,6 \cdot 10^{-19}] = 13,6 \text{ eV},$$

Above quantity of energy consist the *Hydrogen minimum Energy-Rim*, becoming

$$\text{from equation } a = \sqrt[3]{T^2/g} = \sqrt[3]{\frac{[3,04513 \cdot 10^{-16}]^2}{9,80769411}} = 2,1145016 \cdot 10^{-16} \text{ m}, \text{ for unit}$$

energy quantity. From Newtonian Constant of Gravitation relation,

$$G = E = h \cdot f_n = \left[\frac{c \cdot r^3}{a^3} \right] \cdot [g_L k_L] = g \cdot k_E = g \cdot [g_L k_L]$$

and since for the **First Chemical-Neutral-material-cave**, r , constants g_L, k_L are equal to unity *i.e.* $g_L = k_L = 1$, then above Energy of $E = 13,6 \text{ eV}$ in Hydrogen-Plane-orbit corresponds to the **minimum-energy-cave** \rightarrow *The Phys-Quantized-Energy-Structure*.

Since G Pushes $\rightarrow g$, on the Earth-Unit-coefficient, k_E , and because is the *Starting for first time begins*, of this *Mechanism* then from $G = g \cdot [g_L k_L] \equiv g \cdot [1 * 1] \equiv \rightarrow g$, or $G = g$, meaning that in Earth System of gravity, the Newton's Gravitational constant G , and Gravity g are equal, while in all other relative Systems are equal to the proportionality of their Local-constant k_L .

Now is proved that **Constant G** ,is the mechanism , mould , for the **First-kick-Start** upon this Unit-Granular-Energy-Stress-Layer , **g** , to formulate in that orbit , **a** , into Planck`s cave the lightest and the less-energy mass Particle of this universe , which is the Hydrogen with the minimum **Quantized-energy** of **13,6 eV** .

1.. For a frequency $f = 3.10^9 < 3.10^{15}$ then from Energy $E = h.f$,

$$E = [6,6262.10^{-34}J.s].[3,10^9 / s] = 1,98786.10^{-24}J / 1,6.10^{-19} = 1,2424124.10^{-5} eV$$

Semi major axis **a** , the cave **r** , is $a = \sqrt[3]{\frac{1}{g.f^2}} = \sqrt[3]{\frac{1}{9,80769411.9.10^{18}}} = 2,245986.10^{-6} m$

i.e. is a cave 10^{10} times greater than , the critical , to Unit-energy-cave 10^{-16} .

2.. For a frequency $f = 3.10^{21} > 3.10^{15}$ then from Energy $E = h.f$,

$$E = [6,6262.10^{-34}J.s].[3,10^{21}/s] = 1,98786.10^{-12}J / 1,6.10^{-19} = 1,2424124.10^{+7} eV$$

Semi major axis **a** , the cave **r** , is $a = \sqrt[3]{\frac{1}{g.f^2}} = \sqrt[3]{\frac{1}{9,80769411.9.10^{42}}} = 2,245986.10^{-14} m$

and is a cave 10^2 times greater than , the critical , to Unit-energy-cave $10^{-16} m$.

i.e. exists the **critical-Space-cave** $a = 2,1145016.10^{-16} m$, in which is **kicked** the minimum Energy , while in other caves any quantity . From $\rightarrow G = k_E g = g . k_L g_L \leftarrow$

Constant g , was proved to be the acceleration of the inner motion in Material-Point and it is , its Outer and minimum-quantized-force , the Unit-Granular-Energy-monad in Planck`s length , or Planck`s cave P_l .

b).. The Orbital - Geometry and Orbital - Physics :

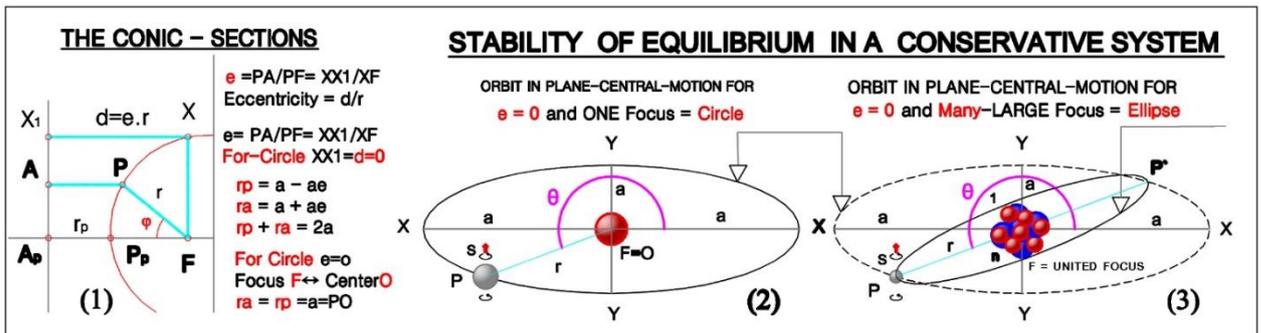


Figure-12 The Two Points Problem Stability of Equilibrium with One-Two Planets.

In (1) is presented the Mechanism of the Conic-sections .

In (2) is presented the Plane Central-motion , where for eccentricity $e = 0$

The Shape of the Orbit is a Circle .

In (3) is presented the Plane Central-motion , where for eccentricity $e = 0$ and

the Shape of the Orbit is a Circle , and for Large - Unity of Heavy-mass-Focus

$e < 0$, the Shape of the Orbit is an ellipse with the same constant energy .

c.. The Two-Body-Problem F-12.(2-3) :

It was shown before that *in Conservative Systems* of Central-Force *the Shapes of the Orbits* are the four Conic-sections , the Circle , the Ellipse , the Parabola and the Hyperbola in the Plane Focus-Planet Velocity-vector .

At periapsis .. (f3) $r = \frac{L^2/GMm^2}{1+e.\cos\theta}$, simultaneously from geometry , $r = \frac{a(1-e^2)}{1+e.\cos\theta}$
 From relation $a(1-e^2) = a(1-e).(1+e) = [a(1-e) = r_p].(1+e) = r_p.(1+e)$, where $r_p = a(1-e) = a - ae$ is ,*the periapsis* ,the closest point of the orbit in terms of ,a , e
 then above equations become $r = \frac{a(1-e^2)}{1+e.\cos\theta} = \frac{r_p(1+e)}{1+e.\cos\theta}$ (f3a)

The Geometrical elements in orbit is the semimajor axis **a** , and eccentricity **e** .

It was proved that \rightarrow **Energy on Orbit** $E = \frac{GMm}{2a}$, or and $\frac{2E}{m} = \frac{GM}{a}$

For Circle-radius $r = a$, issues $\frac{2E}{m} = \frac{GM}{r}$ and solving for , a , e then

$$a = \frac{GMm}{2E} , \text{ and } e = \sqrt{1 + 2EL^2/G^2M^2m^3} \quad \dots\dots\dots(g)$$

$$\text{For } r_p(1+e) = L^2/GMm^2 \text{ the radius of Planet } r_p = \frac{L^2}{(1+e)GMm^2} \quad \dots\dots\dots(g1)$$

Equations (f3) , (f3a) , (g) , (g1) give the allowed *Shapes of Orbits* in a Central Gravitational Field dependent on radius , **r** , semi-major axis **a** , and eccentricity **e**.

The Physical parameters in orbit is Total energy $E = K_E + P_E$, where for *Circle* $e = 0$, *Ellipse* $0 < e < 1$, and Angular-momentum $L = \bar{r} m \bar{v}$.

$$\text{From above Total } E = -\frac{GMm}{2a} \text{ and } L = \sqrt{(1-e^2).GMm^2.a} \quad \dots\dots(e)$$

$$\text{Energy in Orbit } E = -\frac{GMm}{2r_p}(e-1) \text{ and } L = \sqrt{(1+e).GMm^2.r_p} \quad \dots\dots(e1)$$

For $e = 1$, issues for *Parabolas* and $e > 1$ for *Hyperbolas* ,

$$\text{Radius } r_p = L^2 / [(1+e).GMm^2] \text{ and } e = \sqrt{1 + 2EL^2/G^2M^2m^3} \quad \dots\dots(p)$$

$$\text{Energy in Orbit } E = -\frac{GMm}{2r_p}(e-1) \text{ and } L = \sqrt{(1+e).GMm^2.r_p} \quad \dots\dots(p1)$$

The simple Method of the Two-points Problem :

From *classical-mechanics* and for Two bodies of mass m_1, m_2 , of Polar radius r_1, r_2 , from a Center of mass coordinate system lying on line 1 – 2 , exist ,

a.. The interacting via a Gravitational force , is mathematically equivalent to the single body motion and has the absolute value $F = k(m_1 \cdot m_2) / (r_1 + r_2)^2$ (1)
 where $k =$ a constant

$$\text{b.. By setting } m'_1 = \left[\frac{m_1}{(1+m_2/m_1)^2} \right] , \text{ then } F_{21} = k \frac{m'_1 \cdot m_2}{r_2^2} \quad \dots\dots(2)$$

$$\text{c.. By setting } m'_2 = \left[\frac{m_2}{(1+m_1/m_2)^2} \right] , \text{ then } F_{12} = k \frac{m'_2 \cdot m_1}{r_1^2} \quad \dots\dots(3) \text{ i.e.}$$

motion is exactly as , An attractive force m'_1 exists at the center of mass , and mass m_2 is revolving in elliptic trajectory around this point of mass .

From the mass proportion is seen that , the center of mass is on line (1-2) and very close to the big mass a property of the Central - Rotation of masses issuing in our Solar-system .

d.. If motion of any point P is expressed in orthogonal coordinates as $x = a \cos ft$,
 $y = b \sin ft$, to show the Orbit of P , where a, b, f , are constants .

From relation $\cos ft = \frac{x}{a}$, $\sin ft = \frac{y}{b}$, using Pythagoras theorem gives ellipse

$$\cos^2 ft + \sin^2 ft = 1 = \frac{x^2}{a^2} + \frac{y^2}{b^2} . \text{ If } X, Y \text{ are the components of forces then ,}$$

$$X = m \frac{d^2x}{dt^2} = -m.af^2 \cos ft = -mf^2.x \quad \text{and}$$

$$Y = m \frac{d^2y}{dt^2} = -m.bf^2 \sin ft = -m.f^2.y \quad \text{and by division}$$

$X : Y = x : y$ ***i.e. the Force is directed to the center of rotation and is proportional to the distance .***

For rotational motion after t' , moment of time mass is at the same position issuing ,
 $\cos f't' = \cos ft$ and $\sin f't' = \sin ft$, so $t' - t = k \frac{2\pi}{f} = T$, where k is an
integer and $T = \frac{2\pi}{f}$, which is the Period of the rotation . In times t , radius r , sweeps
out the same area S_n and , $S_n = \pi ab / T = \pi ab f / 2\pi = (ab / 2) \cdot f \rightarrow$ ***is constant*** since
 $f = (2 \cdot S_n) / ab$, ***is constant , Kepler Law.***

d.. The Unique-Three-Body-Problem and Electron F-13.(3) :

Orbital Shapes and Physics is analogous to Energy-Space Material Geometry of the
four Dimensions namely , Energy and the three coordinates of the Material-Point \equiv
Quaternion in Space . Material Geometry issues in all levels of classical Mechanics ,
D'Alembert , Euler , Lagrange , either that of microcosm or of macrocosm .

It was shown before that ***in Conservative Systems*** of Central-Force , Total energy E
is conserved and at periapsis energy $E = \frac{GMm}{2a}$ and $e = \sqrt{1 + 2EL^2 / G^2M^2m^3}$ and
for $e = 0$ $E = -\frac{G^2M^2m^3}{2L^2}$, i.e. energy is always Negative .

In order that Energy becomes positive , then velocity and force must be zero ,
or ***velocity and acceleration are zero*** . Question ? , where this can happen ??

Because in Cartesian-coordinates this Energy-Rim is a ***Phase-Plane*** of $x, \dot{x} = y$ which
represents a point on the Phase-Plane , its trajectory with state speed is $V^2 = \dot{x}^2 + \dot{y}^2$.

In this way , $\frac{\text{acceleration}}{\text{velocity}} = \frac{dy}{dx}$ for the Phase-Plane , and a State of equilibrium exists

for $\dot{x} = y = 0$ and $\ddot{x} = \dot{y} = 0$. For a single DOF oscillator where $\rightarrow \ddot{x} + w^2 x = 0$..(1)

the two first-order equations are $\dot{y} = -w^2.x$, $\dot{x} = y$ and \rightarrow slope $dy / dx = -\frac{w^2.x}{y}$

By integration $y^2 + w^2x^2 = C = \text{constant}$ or $[y^2 / C] + [w^2x^2 / C] = 1$ (2)
Equation (2) is a series of ellipses , the size of which is determined by C ,

For M-Point frequency $f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r}$, and so $w = 2\pi.f_N = n \frac{(1+\sqrt{5})\sigma}{2r} = \left| \frac{n}{r} \right| \cdot \frac{(1+\sqrt{5})\sigma}{2}$

The ***Spring-like central-force*** from a fix point , ***the Source*** , on an attached, ***probe***, mass
is $F = -k r = -k r \cdot \bar{r}$ as equation (1) $\ddot{x} + w^2 x = 0$ with a general solution $x = A \sin w_n t$
 $+ B \cos w_n t$, where A , B are constants and evaluated from initial conditions and which
become $x = [\dot{x}(0) / w_n] \cdot \sin w_n t + x(0) \cdot \cos w_n t$ (3) .

The Natural-frequency in Planck's length for the **Primary particle** occupying the less *Negative-charge--frequency* , is the **Electron** , and is as equation (3) with solution as ,

$$\frac{w_n}{2\pi} = f_e = \frac{1}{2\pi} \sqrt{\frac{k}{m}} , \text{ or } 4 \pi^2 f_e^2 \cdot m_e = k = \pi g \text{ and } \rightarrow m_e = \frac{g}{4 \pi f_e^2} \dots(4)$$

where $k = \text{Unit-Spring-Force} \equiv [\text{area} - \text{meter}].[\text{force} - \text{meter} \equiv \text{stress}] \equiv \pi g \dots(4a)$

From Planck's equation $f_e = E / h = [-13,6 \times 1,6 \cdot 10^{-19} = 2,176 \cdot 10^{-18} \text{ Joule}] / [6,6262 \cdot 10^{-34} \text{ J.s}] = 3, 28393 \cdot 10^{15} / \text{s}$,where Hydrogen atom is $E = hf = -13,6 \text{ eV}$
 Substituting all the *minimum-meters of Planck's scale* then , **Electron mass is** ,

$$m_e = \frac{g}{4 \pi f_e^2} = \frac{9,80769411}{4 \cdot \pi \cdot [3,28393 \cdot 10^{15}]^2} = -2, 3766 \cdot 10^{-31} \text{ kg} \dots\dots\dots(4b)$$

$$f_e = 3, 28393 \cdot 10^{15} / \text{s} , \text{ and } L_e = 7, 804588 \cdot 10^{-16} \text{ m} \dots\dots\dots(4c)$$

Collision of Primary Forces :

Force $F_1 = A_1 \sin(wt + \varphi)$ colliding with another rest-force $F_2 = A_2 \sin(wt)$, by *cross product* , gives Power . Power is $D = F_1 F_2 = A_1 \sin (wt + \varphi) \cdot A_2 \sin (wt) = A_1 A_2 [\sin (wt + \varphi) \cdot \sin (wt)]$ and by using Trigonometry , the Power

$$D = A_1 A_2 [\cos (2wt + \varphi) \cdot \cos \varphi] = A_1 A_2 / 2 [-\cos (2wt + \varphi) + \cos(-\varphi)] = [A_1 A_2 / 2] \cdot [\cos(-\varphi) - 2\cos \frac{2wt + \varphi}{2} \cdot \cos \frac{-\varphi}{2}] = \frac{A_1 A_2}{2} [-\cos(\varphi) + 2 \cos^2 \frac{\varphi}{2}] , \text{ and by analyzing Power } D = \frac{A_1 A_2}{2} [-\cos^2 \frac{\varphi}{2} + \sin^2 \frac{\varphi}{2} + 2\cos^2 \frac{\varphi}{2}] = \frac{A_1 A_2}{2} [\sin^2 \frac{\varphi}{2} + \cos^2 \frac{\varphi}{2}] = \frac{A_1 A_2}{2} ,$$

and since wave is twice of the frequency this represents the fluctuating component of Power , meaning that the average value of which is zero , and are ,

$$D = - \frac{A_1 A_2}{2} [\cos (2wt + \varphi) + \cos(\varphi)] , \text{ and at } t = 0 , D = - A_1 A_2 [\cos \varphi] \text{ i.e.}$$

By collision at perihelion r_p , with another object of velocity v , then velocity becomes v_p^2 , or $v_p^2 = 4\pi^2 \frac{a^3}{T^2} [\frac{1+e}{r}] = 4 \pi^2 a^3 \cdot f_p^2 [\frac{1+e}{r}]$,

$$\text{acceleration } a_p = - \frac{32 \pi}{T^2 r^5} , \text{ and } L = 0 , e = 1 , D = - A_1 A_2 \dots\dots\dots(pe)$$

From Energy-State-equations (pe) is transparent that ,

Any moving Particle when is Tangentially-colliding with Any Material-Point , P , executing Circular motion on a circle of radius , r , then the Total Energy , E , is Negative , and the Particle follows constant Elliptical – Energy - Orbits on the same semimajor axis , and of the same constant Energy .

If the New Orbit is of eccentricity $e = 0$, and Zero Total Energy , then is a Circle , If it is $0 < e < 1$, and Zero Total Energy , then is the Ellipse , If it is $e = 1$, and Zero Total Energy , is a Parabola and If it is $e > 1$, and Positive Total Energy , is the Hyperbola .

So all Planets move in this way either in Atoms , or in Planetary-System , obeying Newton's equations of motion , such in microcosm as in macrocosm .

$$\text{From equations (f3a) radius } r , \text{ at perihelion is } r = \frac{a(1-e^2)}{1+e \cdot \cos\theta} = \frac{r_p(1+e)}{1+e \cdot \cos\theta}$$

1.. For the Two-Body problem for $e = 0$ the shape is Circle as Fig-12.[1-2] .

- 2.. For the Three-Body problem for $e = 0$ the Shape is Near-Ellipse because $r_p \neq a$ and this because Forces $F_{1 \rightarrow 2}$ and $F_{1 \rightarrow 3}$ do not coincide and radius $r_{p2} = r_{p3}$ meaning that orbit follows the resultant of radius and $\cos \theta \neq 0$ as Fig-13.[3] .
 i.e. **The Three-Body problem \equiv The Two-Body problem with Slit-Focus .**
 3.. For the Two-Body problem for $e = 1$ the shape is a Parabola as Fig-12.[1] .
 4.. For the Two-Body problem for $e > 1$ the shape is a Hyperbola as Fig-12.[1] .

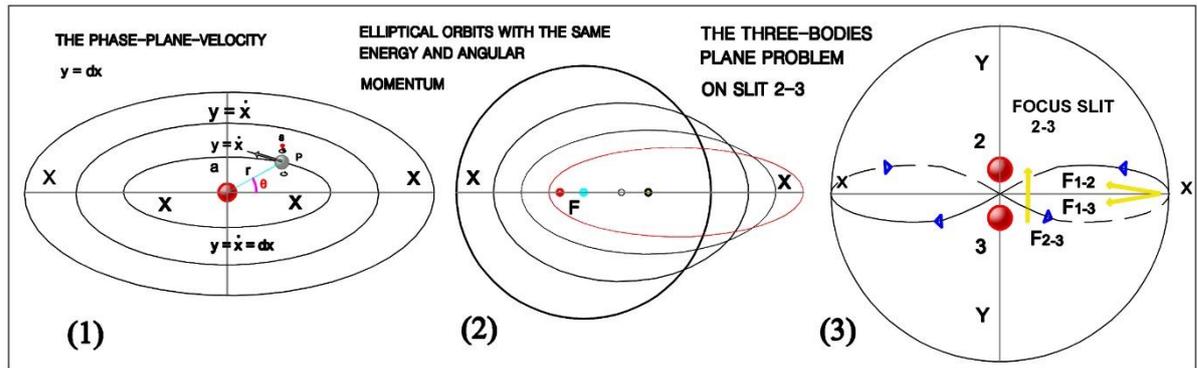


Figure-13 The Two , Points-Problem with Stability of Equilibrium the Slit-Focus. .

In (1) is presented the Phase-Plane and the plot appears as ellipse . When y / w is plotted in place of , $y = \dot{x}$, the ellipse reduces to circle .

In (2) is presented the Circular and the Elliptical motion , where the constant Total-Energy E , maybe on the same diameter $r_p + r_p = a(1-e) + a + ae = 2a$.

In (3) is presented the Three-Points Plane-problem where the Two points are very near each other . Planet passes through the , **SLIT of the two Focus** .

1.. The Phase-Plane is a velocity-Vector-Cartesian System , $x \perp \dot{x}$, F-13.(1) :

The Total-energy for Unit-mass is $E = K_E + P_E = (\frac{1}{2}) \cdot \dot{x}^2 + U(x) = \text{constant} \dots(a)$ and solving for $y = \dot{x}$ this Ordinate of the Phase-Plane is given by the equation ,

$$y = \dot{x} = \pm \sqrt{2[E - U(x)]} \dots\dots(b)$$

denoting that trajectories of a Conservative-System are symmetric about , x , axis .

The differential equation of motion is of the form $\ddot{x} = f(x)$ and because $\ddot{x} = \dot{x} \cdot (d\dot{x}/dx)$ then $\dot{x} \cdot d\dot{x} - f(x)dx = 0 \dots\dots(c)$. By integrating , $\frac{\dot{x}^2}{2} - \int_0^x f(x)dx = E$, and from (a)

$U(x) = - \int_0^x f(x)dx$, and $f(x) = - \frac{dU}{dx}$, i.e. is equal to the Negative-Gradient of the

Potential-energy . Placing $y = \dot{x}$ from (c) then becomes , $\frac{dy}{dx} = \frac{f(x)}{y} \dots (d)$

Equation (d) denotes that equilibrium points occur at $y = \dot{x} = 0$, or is $f(x) = 0$.

2.. The Stability of Equilibrium :

By examining (b) the value of energy E , is determined by the initial-conditions of $x(0)$, and $\dot{x}(0)$ and if these are large , E will be also large and the Face-Plane plots are **open-loop** trajectories .

If $x(0)$, and $\dot{x}(0)$ are very small then , as this happens at Slit 2-3 , E is also small

and Face-Plane plots are *closed-loops single or jointed* trajectories as in F-13.(2-3).

Remarks :

- 1.. From equation on Orbit $E = -\frac{GMm}{2r_p}(e-1)$ and $r_p = -a(e-1)$, is seen that Circle and Ellipse *occupy the same Total-Orbital-energy E* on diameter **2a**. Because Hydrogen-atom, was proved to be *an Conservative Systems* of Central-Force therefore its Orbitals are *Circles* and *Ellipse also*. F-13.(2)
- 2.. The Shapes of the Orbits of Central-Forces, in the Conservative Systems, are the four Conic-sections. The Shape of the *Two-body problem is the Circle*, when its eccentricity $e = 0$, while *the Ellipse* when $0 < e < 1$, as F-12. (2-3), and this because **Radius $r_p = L^2 / [(1+e). GM m^2] \rightarrow 0$** , where $M = m_1 + m_2 + \dots + m_n$
- 3.. The Shapes of the Orbits for the *Three-Body Problem with SLIT-Focus* is a Plane Harmonics of, *Eight-Shape*, as ∞ . In F-13. (3) the Singular points, $x = 0, y = 0$, become from equation (d) corresponding to $f(x)=0$, and $y = \dot{x} = 0$, and as Energy when $P_E = U(x) = 0$, which are the stable-equilibrium minima - positions.

Orbitals are Plane-Rims which thickness is the Phase-Plane of a single DOF Oscillator.

J.. A NEW ENERGY – SPACE ATOM - MODEL :

- 1.. **The Work** produced from the Gravitational-force, **G**, { Force **G**, is constant in all universe therefore becomes from an Conservative –System} **in the Undamped Planck`s - Conservative -System, IS** for free vibration \rightarrow [Party-Kinetic-energy $\equiv K_E$ and Party Potential-Energy $\equiv P_E$] \leftarrow and The Kinetic-energy $\equiv K_E$ **is stored in** the Mass \equiv The-Energy-moving-storage \equiv **Photons**, by virtue of its velocity-vector **c**, whereas the Potential-Energy $\equiv P_E$ **is stored in** the form of Strain-energy in Elastic Deformation which is the **Material-Points**, or Work-done in a **Force field** such as **Gravity-field g_F** . **Constant G is a Force**, *the Mould*, for the **First-kick-Start** upon this **Unit-Stress** and Granular-Layer, **g, the mechanism**, to formulate in orbit **a**, of Planck`s cave, *The lightest and the less-mass Particle of this universe*, which is *The Hydrogen with The minimum Quantized - Energy of 13,6 eV*.
- 2.. Since the Total-Energy of, -13,6 eV, of Hydrogen cave is constant, *the Hydrogen Cave-System is Conservative*, and the differential equation of motion can also be established by the principle of conservation of energy and for the free vibration of this undamped-system-cave the energy is Party-kinetic and Party-potential. The Kinetic-energy **K_E** is stored in the mass by virtue of its outer velocity, where as the Potential - energy **P_E**, is stored in system-cave in the form of strain-energy in Elastic-deformation, or as **Work done into the Hydrogen-Force-field** in orbits or as Work \equiv Energy transported from orbit to orbit, in this less-mass Particle.
- 3.. In the Undamped **Planck`s - Conservative -System**, Total-Energy of, -13,6 eV, of Hydrogen, corresponds The Natural-frequency of the **Primary-Particle** with the less **Negative-charge-frequency**, **The electron** which mass and frequency follow **min g**. Electrons-equation of motion is $\ddot{x} + w^2 x = 0$ with solution $4 \pi f^2_e \cdot m_e = g$ where, *the Reaction to the Change of motion*, electron-mass $m_e = \frac{g}{4 \pi f^2_e}$ and The Primary equation of Electron is $\rightarrow w^2_e \cdot m_e = \pi g = \text{constant} \leftarrow \dots (m)$
- 4.. In the constant, **Hydrogen Conservative-Cave-System**, which creates only closed

Orbit-shapes as Circles , Ellipses and Eight-shape , ∞ , are placed the above ,
 $\pi g \equiv \text{Energy} \equiv [\text{area} - \text{meter} * \text{force-meter}] \equiv \text{Electrons on Orbits}$, and the
the **Unit - Space** $\equiv \text{Massive-United-Unit-Space} \equiv \rightarrow[+\bar{v}.s^2]\leftarrow$ jointed through
the Neutral Material-Points [(+) [\leftrightarrow] (-)] with the Strong-force $S_F = h . f_n$
 $\equiv h . \{ [S \equiv B_p \equiv \mathbf{EM-R} \equiv f_{1=N} , f_2 , f_3 , f_D , , f_n] \equiv h.n \frac{(1+\sqrt{5})\sigma}{4\pi r} \equiv h \frac{n\sigma.B}{8 r^2} \dots(\text{mg})$
Equations (m) , (mg) are the **Energy-Space-constituents** in Hydrogen-System .

a.. The Protons and the Nucleus Structure :

From above MP $\equiv [(+)\leftrightarrow(-)] \equiv \text{Neutral} = \mathbf{n}$, and

- a.. For 1 Proton $[(+)\leftrightarrow(-)]\leftrightarrow(+)$ $\equiv \text{Neutral} \rightarrow \begin{matrix} n = 1 & p = 1 \end{matrix}$
- b.. For 2 Proton $(+)\leftrightarrow[(-)\leftrightarrow(+)][(+)\leftrightarrow(-)]\leftrightarrow(+)$ $\equiv \text{Neutral} \rightarrow \begin{matrix} p & n \\ n & p \end{matrix}$
- c.. For 3 Proton $(+)\leftrightarrow[(-)(+)](+)[(-)(+)](+)[(-)(+)] \equiv \text{Neutral} \rightarrow \begin{matrix} n & p & n \\ p & n & p \end{matrix}$
- d.. For 4 Proton $(+)\leftrightarrow[(-)(+)](+)[(-)(+)](+)[(-)(+)](+)[(-)(+)] \rightarrow \begin{matrix} p & n & p \\ n & 0 & n \\ p & n & p \end{matrix}$
- h.. For **k** Proton $(\mathbf{k1})\leftrightarrow[(-)(+)](\mathbf{k2})[(-)(+)](+)[(-)(+)](+)[(-)(\mathbf{h_k})] \rightarrow \begin{matrix} kp & kn & kp \\ kn & 0 & kn \\ kp & kn & kp \end{matrix}$

Remarks :

In Fig-14. Are Placed Protons , **p** ,and Neutrons , **n** ,following Material-Geometry rules.

- 1..In (1) is shown One-Proton Fixed on One-Neutron on line $x = [+ (- +)]$. Electron , **e** , follows an Circular-Orbit ,and in Separation is Consistent to the parts Proton-Neutron
- 2..In (2) is shown the Two-Protons Fixed on Two-Neutron in Plane [++, (- +) ,(- +)] . Electron , **e** , follows an Circle-Orbit and Three Eight-Shape , and in Separation is Consistent to the two parts , and this because of the Slit-Focus which becomes a Bipolar system . The number of Neutrons determines the number of Isotopes .
- 3..In (3) is shown the Three-Protons Fixed on Three-Neutron in Plane $[3p\leftrightarrow 3n]$. Electron , **e** , follows One Circle-Orbit and Three Ellipse-Orbit , and in Separation is Not-Consistent to the two parts because of the Un-symmetric of the shape . The number of Neutrons determines the number of Isotopes .
- 4..In (4) is shown the Four-Protons Fixed on Four-Neutron in Space $[4p\leftrightarrow 4n]$. Electron , **e** , follows One Circle-Orbit , Three Eight-Shape , and in Separation is Consistent to the two parts , and this because of the Slit-Focus and because of the Symmetric shape .The number of Neutrons determines the number of Isotopes .
- 5..In (5) is shown the Five-Protons Fixed on Five-Neutron in Space $[5p\leftrightarrow 5n]$. Electron , **e** , follows One Circle-Orbit and Three Ellipse-Orbit , and in Separation

is Not-Consistent to the two parts because of the Un-symmetric of the shape .
 The number of Neutrons determines the number of Isotopes .

6.. In (6-7-8) is shown the Protons equal to Neutrons following that of (5) properties.
 k.. In (k) is shown the k-Protons Fixed on k-Neutron in Space $[kp \leftrightarrow kn]$. Electron , e ,
 follows One Circle-Orbit , $(k-2)/2$ - Ellipse-Orbit , and in Separation is Not-Consistent
 to the two parts because of the Un-symmetric of the shape , and from p obstacles .

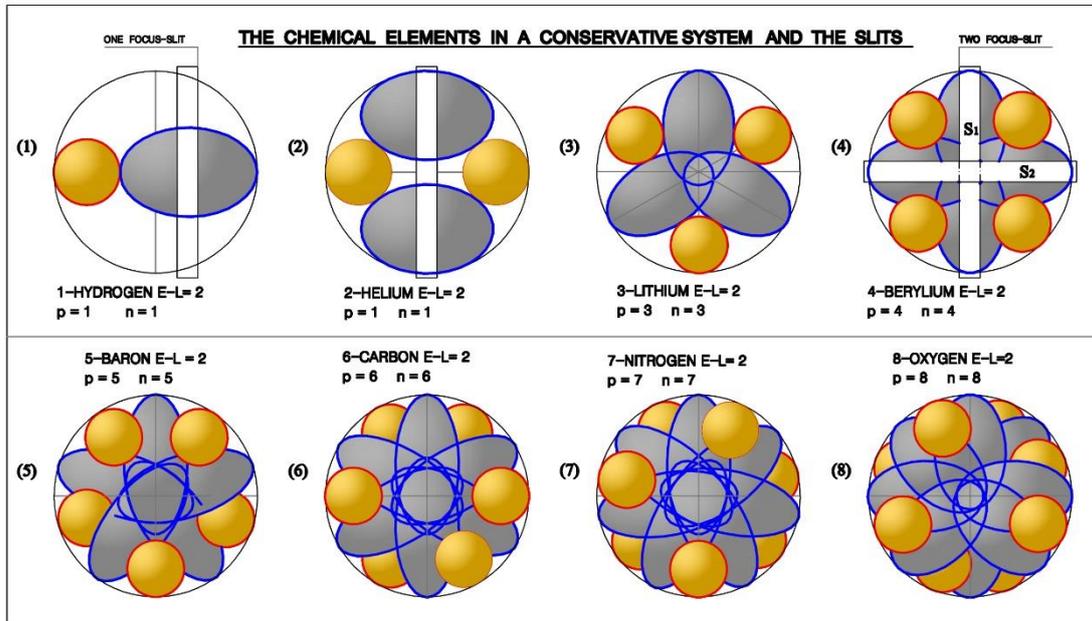


Figure – 14. The Energy-Space-Geometrical explanation of Atoms Structure .

In (1) is shown the One-Proton Fixed on One-Neutron on line $x = [p - n]$. Two
 Electrons , e , exist on each Orbit , symmetric to the center of mass , because of the
 Torsional-Stability . The first-Orbit is always a Circle , and in collision is Consistent
 to the parts Proton-Neutron . All Properties are dependent on , e , p , n , number .

In (2) is shown Two-Proton Fixed on Two-Neutron on Surface $[p-p] \perp [n-n]$. Slit $n-n$
 between Protons $p-p$, allows Electrons , e , to orbit through Slit in three coordinates.
 The first-Orbit is always a Circle , and in collision is Consistent to the parts , Proton –
 Neutron . All Properties and Configuration anomalies dependent on , e , p , n , number.

In (3-k) is shown k-Proton Fixed on k-Neutron on Surface $[kp-p] \perp [kn-n]$. Slit $n-n$
 between Protons $kp-p$ if exists , allows Electrons , e , to orbit through Slit in three
 coordinates. The first-Orbit is always a Circle , and in collision is Consistent to the
 parts , Proton – Neutron . All Properties and Configuration anomalies dependent on
 the , e , p , n , number of elements .

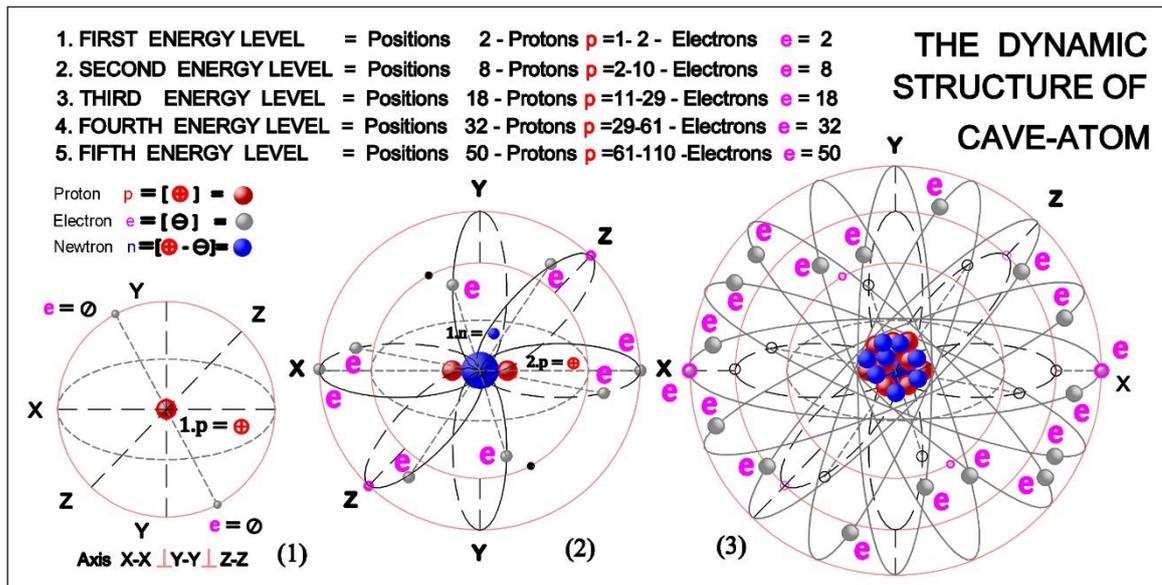


Figure-15 The New Energy-Atom-Cave Pattern ,with minimum Energy-Space e , p .

In (1) is presented Energy-Level , 1 , where the Phase-Plane and the Plot appears as Circle with One-Nucleus and One-Planet and for Stability of Equilibrium Two-Planets symmetric to Focus .

In (2) is presented Energy-Level , 2 , where the Phase-Planes and the Plot appears as Three-Ellipses which are perpendicular each other , and this for the Stability of Equilibrium of each orbit which has only Two-Planets symmetric to common Focus. In the three SLIT orbits exist $3 \times 2 = 6$ positions . Since each orbit occupies only Two Planets for the equilibrium of the orbit therefore the Two-Residuary positions are occupied by the First energy level which is the Unite-Nucleus for the Two-Planets.

In (3) is presented Energy-Level , 3 , where the Phase-Planes and the Plot appears as the Eight-Ellipse-Orbits which are perpendicular each other , and this for Stability of Equilibrium of each orbit which has only Two-Planets symmetric to their common Focus. The Two-Residuary positions from 18 are occupied by the First energy level which is the Unite-Nucleus for the Two-Planets.

In (4) is presented Energy-Level , 4 , where the Phase-Planes and the Plot appears as the Fifteenth-Ellipse-Orbits which are perpendicular each other on the vertices of a Regular-Fifteenth-Spherical shape , and this for Stability of Equilibrium of each orbit which has only Two-Planets symmetric to their common Focus.

Also the Two-Residuary positions from 32 are occupied by the First energy level which is the Unite-Nucleus for the Two-Planets.

In (5) is presented Energy-Level , 5 , where the Phase-Planes and the Plot appears as the Twenty-fourth-Ellipse-Orbits which are perpendicular each other on the vertices

of a Regular- Twenty-fourth -Spherical shape , and this for Stability of Equilibrium of each orbit which has only Two-Planets symmetric to their common Focus.

Also the Two-Residuary positions from 50 are occupied by the First energy level which is the Unite-Nucleus for the Two-Planets.

Euclidean's Geometry Quantized Spaces	Euclidean Geometry	Material Geometry	Material Dimensions	Permitted Units $\oplus\ominus$	MOULDS Permitted Positions	S L U The Full Orbital Units
1	2				3	4
1 Point			The First ONE Dimension Point - Space	2	2 P ²	
2 Line Segment			The First ONE Dimension Line - Space	4	1	
3 Plane Reg.3gon			The First TWO Dimension Plane - Space	6	2	
4 Volume Reg.4gon			The First THREE Dimension Volume - Space	8	8	
5 Space Reg.5gon			The First FOUR Dimension Volume -Space	10	18	
6 Space Reg.6gon			The First FIVE Dimension Volume - Space	12	32	
7 Space Reg.7gon			The First SIX Dimension Volume - Space	14	50	
8 Space Reg.8gon			The First SEVEN Dimension Volume - Space	16	72	
9 Space Reg.9gon			The First EIGHT Dimension Volume - Space	18	98	
10 Space Reg.10gon			The First NINE Dimension Volume - Space	20	128	P = Number of Positives = N-2 and N=Spaces = The Number of Points
N Space Reg.Ngon			The First N - 1 Dimension Volume - Space	2 N	162 2 N ²	

Figure-16. The Euclidean and *Material Geometry* in Particles and monads in Monad The Uniform Circular motion is the First Possible Position of Monads. The Number of Neutrons in Space represent Isotopes in Nucleus $\rightarrow [s + \bar{v} \bar{v}_i]$

In 1. Euclidean Geometry is defined on the Number of Points which can define a Space i.e. The Point is defined from one Point ,The Line Segment consisted of two Points The Triangle consisted of three Points , The regular Tetragon consisted of four Points in , The regular Pentagon consisted of five Points in Space and so on , represent the Steady , *Regular and stable* , formations of Geometry.

In 2. Are shown the Material-Points , Positives and Negatives on each Point which is Zero and can be added to any other Positives and Negatives , and which represent Protons and Electrons in Physics.

In 3. Are shown the Permitted number in Units and in Moulds , which represent Electron Positions.

In 4. Are shown the Number of Neutrons in Space and the satiation states of electrons $\pi \mathbf{g} = \mathbf{w}_e^2 \cdot \mathbf{m}_e$.From the definition of Work , **Work = Force x Displacement = Energy** results the where this Energy as , *Momentum Vector* $\bar{\mathbf{B}} \equiv \text{Spin} \equiv \text{Energy}$, is stored in \mathbf{r} , cave of $\text{KK}_1 = \bar{\mathbf{q}} = [\mathbf{s} + \bar{\mathbf{v}}\nabla\mathbf{i}] \equiv \text{Quaternion}$. Cave , \mathbf{r} , **IS** , *Outward a moving Stationary Box* , *Inward a Stationary Wave* , with infinite frequencies $f_1 \dots f_n \rightarrow f_\infty$ and with Energy , $E = h \cdot f_n = \frac{h(1+\sqrt{5})}{4\pi} \cdot \left[\frac{\sigma}{r} \right] = \left(\frac{n\sigma}{8r^2} \right) \cdot \bar{\mathbf{B}} = W_d = 8 \cdot k f_n A_r$.

$\pi \mathbf{g} \equiv \text{Energy} \equiv [\text{area} - \text{meter} * \text{force-meter} \equiv \text{stress}] \equiv \text{Electrons on Orbits}$, and the **Unit - Space** $\equiv \text{Massive-United-Unit-Space} \equiv \rightarrow[+\bar{\mathbf{v}} \cdot \mathbf{s}^2] \leftarrow$ jointed through the Neutral Material-Points [(+) [\leftrightarrow] (-)] $\equiv \mathbf{g}$, with the Strong-force

$$S_F = h \cdot f_n \equiv h \cdot \{ [S \equiv B_p \equiv \mathbf{EM} \cdot \mathbf{R} \equiv f_{1=N}, f_2, f_3, f_D, \dots, f_n] \equiv h \cdot n \frac{(1+\sqrt{5})\sigma}{4\pi r} \equiv h \frac{n\sigma \cdot \bar{\mathbf{B}}}{8r^2} \dots (\text{mg})$$

K.. CRITICISM , ON EPR , ARGUMENT :

A.. Quantization .

Quantization is the concept (*the Process*) that any , **Physical Quantity** \rightarrow **[PQ]** of the objective reality (*Matter , Energy or Both*) is mapping the Continuous Analogous , *are the points* , to only certain Discrete values . Quantization of Energy is done in Space-tanks , on the material points , tiny volumes and on points consisting the Equilibrium , *all the Opposite Twin* , of Space – Anti space .

In Geometry [PQ] are the Points, *which is nothing* only , and transformed into the \rightarrow Segments , Lines , Surfaces , Volumes and to any other Coordinate System such as (x , y , z) , (i , j , k) and which are all quantized .

Quantization of E-geometry is the way of Points to become as \rightarrow (Segments , Anti-segments = Monads = Anti-monads) , (Segments , Parallel-segments = Equal monads) , (Equal Segments and Perpendicular-segments = Plane Vectors) , (Un-equal Segments twice – Perpendicular -segments = The Space Vectors = Quaternion) . [46]

In Philosophy [PQ] are the concepts of Matter and of Spirit , or of Materialism and or of Idealism .

a).. Anaximander , claimed that non of the elements could be, *Arche* and proposed , *the apeiron* , an infinitive substance from which all things are born and to which all will return.

b).. Archimedes , is very clear regarding the definitions, that they say nothing as to whether the things defined exist or not , but they only require to be understood . Existence is only postulated in the case where [PQ] are the Points to Segments (magnitudes = quantization process) . In geometry we assume Point , Segment , Line , Surface and Volume , without proving their existence , and existence of everything else has to be proved . Euclid`s similar figures correspond to Eudoxus` theory of proportion .

c).. Zenon , claimed that , Belief in the existence of many things rather than , *only one thing* , leads to absurd conclusions and for , *Point and all its constituents will be continuous without magnitude*. Considering Points in space are a distinct place even if there are an infinity of points , defines the Presented in [44] idea of , *Material Point* .

d).. Materialism or and Physicalism , is a form of philosophical monism and holds that matter (*without defining what this substance is*) is the fundamental substance in nature and that all phenomena , *including mental phenomes and consciousness* , are identical with material interactions by incorporating notions of Physics such as space-time , physical energies and forces , dark matter and so on .

e).. Idealism , such as those of Hegel , *ipso facto* , is an argument against materialism (*the mind-independent properties can in turn be reduced to the subjective percepts*) as such the existence of matter can only be assumed from the apparent (*perceived*) stability of perceptions with no evidence in direct experience .

Matter and Energy are necessary to explain the physical world but incapable of explaining mind and so results , *dualism* . The Reason determined in itself and its relation to the world creates the very old question as , *what is the ultimate purpose of the world* ?.

f).. Hegel's conceive for mind , *the Idea* , defines that , mind is *Arche* and it is returned to [PQ] the subjective percepts , while Materialism holds just the opposite .

IN PHYSICS [PQ] are The , Electrical charges , Energy , Light , Angular momentum , Matter which are all quantized on the microscopic level . They do not seem quantized in the macroscopic scale because the size of the steps between each possible value is so small .

a).. De Broglie found that , light and matter at subatomic level display characteristics of both waves and particles which move at specific speeds called Energy-levels .

b).. Max Planck found that , Energy and frequency of the Electromagnetic radiation is quantized as the relation $E = h \cdot f$ where h , is a constant and frequency only defines the Physical Quantity of microcosmic level .

In Mechanics , *Kinematics* describes the motion while , *Dynamics* , causes the motion.

c).. Bohr model for *Electrons in free-Atoms* is the Scaled Energy levels , for *Standing-Waves* is the constancy of Angular momentum , for *Centripetal-Force in electron orbit* , is the constancy of Electric Potential , for *the Electron orbit radii* , is the Energy level structure with the Associated electron wavelengths.

d).. Hesiod Hypothesis [PQ] is *Chaos* , i.e. *the Primary Point* from which is quantized to *Primary Anti-Point* . [From Chaos came forth **Erebus** , *the Space Anti-space* , and **Black Night** , *The [STPL] Mechanism* , but of Night were born **Aether** , *The Rest Gravity Dipole Field connected by the Gravity Force* , G , and **Day** , *Particles Anti-particles* , whom she conceived and **Bare** , *The Equilibrium between Particles Anti-particles* , in *Spaces Anti-spaces* , from union in love with Erebus] . [43-48]

e).. Zeno's Paradox and The nature of Points [PQ] . Zeno has set the Problem and Markos , gave the solution to <**Achilles and the Tortoise**> , <**The Arrow Paradox**> <**The dichotomy Paradox**> Solving thus the [PQ] of Euclidean-Geometry which is the Material-Geometry . [48]-[58]-[70]

The word , *quantization* , has to do with the discrete continuity , which describes the Physical reality through the Euclidean conceptual , for Points Straight lines , Planes , the Monads in Universe and the Dual Nature of Spaces as Discrete and Continuous . Euclidean Geometry is proved to be *the Model of Spaces* and *Material-Geometry the Model of Physical Reality* since it is Quantized as Complex numbers , which are such.

f).. The current method for Physical Quantity [PQ] .

[PQ] is the Material Geometry where Points , are the non-collided elements in Caves and are the two Positive and Negative breakages $\pm s^2 = (wr)^2$ and the Vector breakage $[\nabla i] = 2s^2 = 2.(wr)^2$. [22]

With these three elements is possible by following the Geometrical Rules (and those of Algebra , as *Commutation , Distribution , Expansion , Association , Absorption , Multiplication*) and Permutation and Repetition to build all Physical World as shown below. Point in E-geometry is considered , nothing , without Position and direction while in Material Geometry ,

- 1... **Point are both massive Opposite-Units** $+s^2$ and $-s^2$ and for
- 2... **Two Units , the Line-Sector , is the Dipole** $[s^2 \leftrightarrow -s^2]$, the Material-Point
The Infinite Series of $[s^2 s^2 s^2 s^2 \dots]$, $[-s^2 -s^2 -s^2 -s^2 \dots]$, consist the **Material-points in Lines** .
- 3... **Three Units** of $[s^2 s^2 s^2]$, $[-s^2 -s^2 -s^2]$ not coinciding consist the **Material Plane of the Infinite Lines** .
- 4... **Four Units** of $[s^2 s^2 s^2 s^2]$, $[-s^2 -s^2 -s^2 -s^2]$ not coinciding consist the **Material Volume of Infinite Planes** .
- 5... **Five Units** of $[s^2 s^2 s^2 s^2 s^2]$, $[-s^2 -s^2 -s^2 -s^2 -s^2]$ not coinciding consist the **Material Fifth - Space -Volume of Infinite Planes** .
- N... **Units** of $[s^2 s^2 s^2 \dots N]$, $[-s^2 -s^2 -s^2 \dots -N]$ not coinciding consist the **Material N-Space-Volume of Infinite Planes** .

Since Material-geometry follows E-geometry so , all laws of nature are also those of Geometry .i.e.

From a **Set of infinite rest Units** choosing two of them , is found the Mendeleev Periodic table in Planck's level 10^{-35} m (this Property issues in all geometrical caves and in a cave of 10^{-62} m which is the Gravity level in which Gravity-Field exists) , and also all models of the atom as follows ,

a.. **Moulds** {caves} \rightarrow The minimum Number of Points in each Level is

- | | | | | |
|----------|------------------------|---------------|-------------------------|-------------------|
| 1 | for Point , | \rightarrow | 2 | Negative Points , |
| 2 | for Line-sector , | \rightarrow | 8 | |
| 3 | for Plane , | \rightarrow | 18 | |
| 4 | for Volume , | \rightarrow | 32 | |
| m | for m , Spaces. | \rightarrow | 2. m² | |

b.. **Units** \rightarrow The maximum number of Units in a Point is **2** ,
[1 Positive \oplus and 1 Negative \ominus].

The possible Repetitive Permutations for moulds and Units are **Mould^{Units} = m²** , for every mould , so the Available Extrema Positions for each

Point , Line -sector , Plane , Volume , m -Space , **are as,**

- | | | | | | | | | | |
|--------------|---------------|-------|---------------|------------------|--------------------|---------|------------------|---------------|--------------------|
| Point | \rightarrow | m =1 | \rightarrow | 1 ² = | 1 x 2 | times = | 2 | \rightarrow | Material - Point |
| Line -sector | \rightarrow | m =2 | \rightarrow | 2 ² = | 4 x 2 | times = | 8 | \rightarrow | Line-vector |
| Plane | \rightarrow | m =3 | \rightarrow | 3 ² = | 9 x 2 | times = | 18 | \rightarrow | Plane |
| Volume | \rightarrow | m =4 | \rightarrow | 4 ² = | 16 x 2 | times = | 32 | \rightarrow | Volume |
| m -Space | \rightarrow | m = m | \rightarrow | m ² = | m ² x 2 | times = | 2.m ² | \rightarrow | Chemistry-m-Volume |

Photon is a Material-point in cave **r** , where its **Inner** is **the Stationary-Standing-wave** the Electromagnetic-Wave $[E^2+H^2] = 2(2r).c.\sin 2\phi$ with **n** Lobes representing the

Normal mode vibration with frequencies $f_n = n.f_1 = \frac{E}{h} = \frac{n.v}{4r} = \frac{n\sigma}{8r} [1+\sqrt{5}]$, and

Outward is the Propagating Electromagnetic-Wave $\rightarrow \{[\epsilon E^2 + \mu B^2] = 2.\lambda.c.\sin.2\phi\}$

where **Particle** $2r = n \lambda$, **Cave** r , is the **Electromagnetic-Energy-Storage**, and Electromagnetic-Radiation E, B is the **Wave Conveyer of Cave** r .

From a **Set of infinite rest Units** choosing two of them, is found the Mendeleev Periodic table in Planck's level 10^{-33} m (this Property issues in all geometrical caves and in a cave of 10^{-62} m which is the Gravity level in which Gravity-Field and also all models of the atom as follows

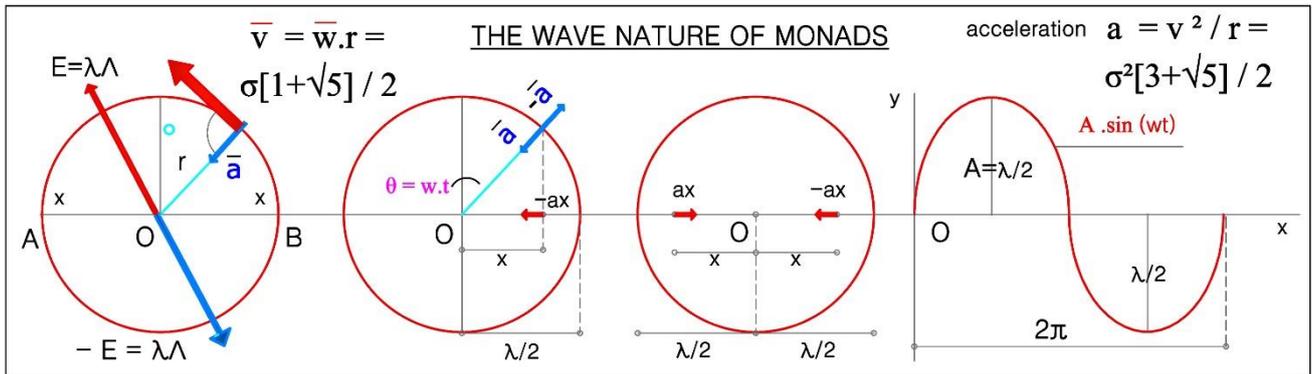


Figure-17. The Wave nature of the **Material-Point-Monad** AB .

In (1), are shown **Velocity**, $|\bar{v}| = w.2r = \frac{2\pi}{T}.r = 4\pi r.f = [\frac{\sigma}{2}].(1+\sqrt{5})$, **Angular velocity**

$|\bar{w}| = \frac{\sigma}{2r} [1 + \sqrt{5}]$, and the **Golden-ratio-Frequency** $f = \frac{(1+\sqrt{5}).\sigma}{4\pi r}$ in cave, $2r$.

In (2), are shown **Centripetal**, $\bar{a} = v^2/r$, **Centrifugal**, $-\bar{a} = v^2/r$, **acceleration in r, cave**.

In (3), are shown the **Projections** on AB axis of **Centripetal**, \bar{a}_x , and **Centrifugal** $-\bar{a}_x$ **acceleration in cave**, $2r = \lambda$. Note that **Waves transfer Energy but Not mass**.

In (4), is shown the **Sinusoidal - motion** of the **Centripetal**, \bar{a}_x , and **Centrifugal** $-\bar{a}_x$ **acceleration in cave**, $r = \lambda/2$.

In Planck's length $l_p = x = 10^{-33}$, For a single DOF oscillator where $\rightarrow \ddot{x} + w^2 x = 0$ the two first-order equations are $\dot{y} = -w^2.x$, $\dot{x} = y$ and \rightarrow slope $dy/dx = -\frac{w^2.x}{y}$

By integration $y^2 + w^2x^2 = C = \text{constant}$ or $[y^2/C] + [w^2x^2/C] = 1 \dots (1)$

Equation (1) is a series of ellipses, the size of which is determined by C ,

For M-Point frequency $f_N = n \frac{(1+\sqrt{5})\sigma}{4\pi r}$, and so $w = 2\pi.f_N = n \frac{(1+\sqrt{5})\sigma}{2r} = \left|\frac{n}{r}\right|. \frac{(1+\sqrt{5})\sigma}{2}$

The **Spring-like central-force** from a fix point, **the Source**, on an attached, **probe**, mass is $F = -k r = -k r.\bar{r}$ as equation $\ddot{x} + w^2 x = 0$ with a general solution

$x = A \sin w_n t + B \cos w_n t$, where A, B are constants and evaluated from initial conditions and which become $x = [\dot{x}(0)/w_n]. \sin w_n t + x(0). \cos w_n t \dots (2)$.

The **Natural-frequency** in Planck's length for the **Primary particle** occupying the less **Negative-charge--frequency**, is the **Electron**, and is as equation (2) with solution as,

$$\frac{w_n}{2\pi} = f_e = \frac{1}{2\pi} \sqrt{\frac{k}{m}}, \text{ or } 4\pi^2 f_e^2 \cdot m_e = k = \pi g \text{ and } \rightarrow m_e = \frac{g}{4\pi f_e^2} \dots(e)$$

where $k = \text{Unit-Spring-Force} \equiv [\text{area} - \text{meter}].[\text{force} - \text{meter} \equiv \text{stress}] \equiv \pi g \dots(ea)$

$$m_e = \frac{g}{4\pi f_e^2} = \frac{9,80769411}{4\pi.[3,28393.10^{15}]^2} = -2,3766.10^{-31} \text{ kg}$$

$$f_e = 3,28393.10^{15} /s, \text{ and } L_e = 7,804588.10^{-16} \text{ m}$$

Equations (e) , (ea) , interpret ate , that Physical Quantity → [PQ] in Planck`s length

cave is **Electron vibration** , and **Golden-Ratio-frequency** $|\bar{w}| = \frac{\sigma}{2x} [1 + \sqrt{5}]$.

B.. Criticism to ERP Argument :

The Fundamental Advances occur to the Part of science that Really needed or misleading . The same happens to ERP Argument which is ,

a.. **Can Quantum Mechanical description of Physical reality be considered Complete ?**

EPR Argument is exactly the same that of Idealist-Philosopher-Hegel`s , concerning *conceive for mind* , the Idea . For Hegel mind is Arche and it is returned to Physical Quantity , *the subjective percepts* , which is **the Objective reality** . For Materialism holds , Just the opposite which is the true , because all Ideas of the Objective reality Come from outside , Pass through our five Senses to our Brain . which is working as a Computer elaborating and creating minds , and which deposits them in caves.

The High-tree picture passes through our Eyes which turn the picture to electricity and electricity through nervous-conductors to Brain and deposited to a microchip. High-tree-Idea in microchip exists only if had come from outside and NOT the opposite because Human race could do **Infinite-Objective-realities** which is false. Because mind occupies the process , of less elaboration and thinking may use , the *High-tree picture* , as the Row material for complicated figures based on the initial, On this , Q.M is dialectically working on the Right-Direction for Completeness.

b.. **How many Parallels pass through a point P to a line AB ?**

For Euclidean-Geometry Only-one , while for all Non-Euclidean-Geometries , two and Infinite ones .

Because the set question existed for many centuries , about two centuries ago Mathematicians gave a temporary solution to this problem through the NON Euclidean-Geometries . **Unfortunately** , General-Relativity followed the temporary solution resulting to the confinement of Physics in Planck`s length and Big-Bang . **The Solution of the Unsolved Ancient-Greek-Problems** and that of Zenon Paradox gave the answer such for Physics and as Guidelines for Future – Basic - Advances . Nature cannot be described through infinite concepts , as this can happen in Algebra and values ,because are devoid of any meaning in our Objective - Reality , or the Physical World , or the Nature ,or the Cosmos . Solutions of geometric classification problems with moduli Spaces , and Algebraic geometry by giving a universal space of parameters for the problems , must follow the classical and dialectic logic of Geometry which exists in Objective reality and is reflected to the minds-recipient.

c.. **Bohr Rejection to EPR , and Entanglement .**

The Wave-Particle Duality of Photon , or The Principle of locality , comes out of Einstein work saying that < *The Energy of the Physical reality which are objectively*

possessed cannot be influenced instaneously at a distance > . Entanglement , as a < Physical phenomenon that occurs when pairs or groups of Particles are generated or interact in ways such that the Quanta-state of each Particle cannot be described independently – instead a Quantum-state may be given for the System as a whole >

From above attempt is seen that both Parts were trying to create local- Quantization to interpret at Wave-Particle Duality of Photon . The Non-Euclidean geometries did not help in the Right-direction but offer a **Trap** in where General Relativity was first captured , Ignoring that Nature cannot be described through infinite local concepts , as this can happen in Algebra and values .

The answer is that ,
 Photon **Particle** $\rightarrow 2r = n \lambda$, **Cave** , r , Is the **Electromagnetic-Energy-Storage** ,
 Photon **Wave** \rightarrow **E-B** Electromagnetic-Radiation ,and is the **Conveyer of Cave** r .

i.e. Photon , Is of the two consistent-Pattern

d.. The Light velocity , c , and Planck`s length.

1.. In article was proved that, *in Material Point* , the Eternal-Rotation of (+) Opposite around (-) Opposite , due to Centifugal and Centrifugal Glue-Bond Principal-stresses , $\pm \sigma$, **creates in Primary and in caves which are Standing waves as Resonance phenomenon** the Angular-momentum-Vector being Identical to the Spin of Particles , and which is trapped in caves`s loops always being in Phase with each other .

Their amplitude of Oscillation varies from Zero at Nodes to maxima at Antinodes .
 The **N loops are** , the **N** , **Sub - Stores** created in the **Main-Store** , r , and this because Energy Momentum vector , $\bar{\mathbf{B}}$, follows the Stationary-Wave -Nodes Principle in Material – point only.

2.. **From Inner-velocity** equation $v = \omega r = (2\pi/T).r = 2\pi.f_1.r$, and wavelength $\lambda = cT = c / f_1$, then cave $r = n.[\lambda/2]$, therefore $r = n.(c / 2f_1)$, and cave-velocity $v = 2\pi.f_1.[n.c / 2f_1] = n.\pi.c$ or $v = n.\pi.c$ (c)

showing that velocities in lobes are , $n.\pi$, times that of light ,

i.e. in Material-points exist velocities multi-times that of light .

Above equation (c) denotes that light velocity , c , is the Quanta of velocities in Planck`s length because differently could not be a measure of Space and Energy .

3.. Energy produced by Reference System $\{D_A- P_A\} \equiv [R](x', y', z', t')$ moves with an velocity \bar{v} , parallel , to $x-x'$, axis with respect to the fixed and Absolute System $\{D_A- O\} \equiv [S](x,y,z, t)$ and is conserved.

In General-Relativity is referred that Space - time is giving energy to matter or absorbed it from matter , and thus the Total energy is not conserved . Here are Not clarified what are the three Basic Quantities , **Energy , Matter and Time** .

It was prior proved [70] that **the Basic Quantity is only the Energy \rightarrow motion , while Matter is the Space** , { the Reaction to the Change of Energy \bar{v} or $d\bar{v}$ } , **in-where Energy is stored** , and **Time is the meter of changes in Space and in Energy**.

The Argument < Energy is not conserved but it changes because Space-time does > is the greatest – confusion for these magnitudes . In [31-36-39] was clarified that \rightarrow

a) Because of Zero acceleration of rotational velocity $\bar{\omega}$ in a cave , velocity $\bar{v}=\omega r$ is also constant , so thus GR failed **to explain the WHY speed of light is constant** , considering constancy of light as an axiom from which derived the rest of its theory .

b) For the reality of discrete monads , GR failed **to explain the WHY** → **Wave nature , is the Intrinsic Electromagnetic Wave of Particles** (Maxwell`s Displacement current) and speed of light is constant in a Stress-Strain System with (where Red-shift happens as low f and-Blue-shift , as high f) Photon to be as Particle and Wave also as above, but considering constancy of light as an axiom deriving theory .

Here and now is referred that , Since the mass is equal to $m = \frac{2}{c^2} (w\tau)^3 = \frac{h.w}{2\pi.c^2}$, analogous to Energy $w \rightarrow$ then **mass is a factor measuring energy magnitude only** ,

c) GR , by Appealing space-time a Priori is **accepting the two elements , Space and Time , as the fundamental elements of universe** without any proof for it , and so anybody can say that this argument **Stay on air without any proof** .

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 the *Principle of Virtual Displacement* .

d) GR , by Presenting Time as element of universe **could not perceive that , Time (t) is the conversion factor between the conventional units (second) and length units (meter) and by considering the moving monads (particles etc. in space) at the speed of light pass also through Time , this is an widely-agreeable-illusion . It was proved that Time is a meter , A simple number , measuring the alterations of Space concerning velocity and direction and nothing else** .

e) GR , by Presenting Space-Time universe **Becoming from Big Bang** is accepting Infinite priors . Euler-Savary equation of couple-curves is related to the Tangential and angular velocity from (Space , Path , Anti-space , Evolute) and it is , **The Rolling – Glue-Bond of Space , Anti-space** , which happens on the instaneous center of curvature by STPL line . [58] . Above explanation of Electron answers to the argument.

f) GR , is Presenting Space-Time as the essence of universe while is Just the **opposite**.

$$\text{Work} = \text{Total Energy} = \text{TE} = [\Lambda \nabla + \bar{\Lambda} \times \nabla] = \sqrt{[m.v_E^2]^2 + [\Lambda.v_B + \bar{\Lambda} \times v_E]^2} =$$

$$\sqrt{[m.v_E^2]^2 + T^2} = \sqrt{[m.v_E^2]^2 + |\sqrt{p_1 v_{B1}}|^2 + |\sqrt{p_2 v_{B2}}|^2 + |\sqrt{p_3 v_{B3}}|^2} =$$

$$L_{TW} \equiv (\bar{z}_0)^w = (\lambda, \Lambda \nabla i)^w = (\bar{z}_0)^w . e^{[\bar{v}.w\theta]} = (\bar{z}_0)^w . e^{\frac{[\bar{\Lambda} \nabla i / \sqrt{\Lambda} \bar{\Lambda} [\text{Arc Cos}(\frac{w|\lambda|}{2|\sqrt{z'}_0.z_0]}]}]} \quad (TW)$$

Nature has not any < meter > to measure quantized quantities (of Space and of Energy) except these of the Geometry constants, one of which is number , π , (Archimedes number π) so quantization of Points (λ) follows geometry constant (π) and for Energy W_d , which is the quantized Energy of the Quantity dissipated per cycle , [and this because monads follow sinusoidal oscillation on wavelength = monads as the w .th- power and the n .th-root of this monad where $w.n = 1$ as above on and in the same monad] and which energy is $\rightarrow W_d = [mw].\lambda^2/4 = [2m\pi f].\lambda^2/4 = [m\pi.\lambda^2/2].f = C.f$, i.e.

From above monads $(s + \bar{v} \nabla i)^{1/w} = |z_0|^{-w} . e^{-i.(\varphi+2k\pi).w}$, where $\cos \varphi = s / |z_0|$ and for Rotated Energy case where $s = 0$, and also $\cos \varphi = 0$ exists for angle $\varphi = \pi/2$ the quaternion $(s + \bar{v} \nabla i)^{1/w}$ as dimension power $\rightarrow w = b \leftarrow$ and for $k = 1$ above becomes , $e^{-i.(\pi/2+2k\pi).w} = e^{-i.(\pi/2+2k\pi).b} = e^{-i.(5\pi/2).b} = e^{-i.(5\pi/2).10}$ and is

for Planck length $L_p = e^{-i.(5\pi/2).10} \dots\dots (P_1)$

Equation (P₁), is the basic Geometrical interpretation of the < **Planck scale meter** > based On the two **Geometry constants** e, π where $k = 1$, and **base** $b = 10$, and this from logarithm properties with different bases on the same base e as this is , $e^w = [b^{\log_b(e)}]^w = b^{w.\log_b(e)}$ and because $\sqrt[w]{e} = e^{1/w} = e^{-w} = x^{1/w.\log_b(e)}$ which are monads in monads , and is therefore of **Wave motion** with angular velocity $w = 4 W_d / (\pi. C_o . \lambda^2)$, [5-4] i.e. Space and Energy is quantized and measured on the two Constant and Natural numbers e, π .where for base the natural logarithm e , and exponent the decimal base , $b = 10$, then is \rightarrow

For base $e = 2,71828$ and base $b = 10$ then $e^{-(78,2879)} = 1 . 10^{-34} \text{ m}$

For base $e = 2,71828$ and base $b = 10$ then $e^{-(78,5398)} = 8,906 . 10^{-35} \text{ m}$

For base $e = 2,71828$ and base $b = 10$ then $e^{-(80,5905)} = 1 . 10^{-35} \text{ m}$

$L_p = e^{i.(5\pi/2).10} = e^{-i.(5\pi/2).10} = e^{i.(-5\pi/2).10} = e^{-(78,5398)} = 8,906 . 10^{-35} \text{ m}$

$L_p \equiv \{ \sqrt{3} . \pi . 1,616199 . 10^{-35} \text{ m} \} \rightarrow \text{Planck's length .}$

GR , is confined in L_p **Chaos** ,without any connection with L_{TW} **Spaces** which begin from Zero $\equiv 0 \equiv \text{Nothing} \equiv -[\text{Nothing}] \equiv [+][-] \equiv [+]\leftrightarrow[-] \equiv [\oplus\leftrightarrow\ominus] \equiv \text{Material-Point}$ and this because followed the **False-Directions** given by NON - Euclidean Geometries. Referring only π , have to say that its *Physical-Interpretation* [75], is that which is the Euclidean-Geometry- Quantum and which **Regulates velocities** in caves and turbines , and from above Prior referred as the **Unit-meter of Spaces** .

Markos 20 / 3 / 2019

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Markos Georgallides comes from Cyprus and currently resides in the city of Larnaca , after being expelled from his home town Famagusta by the Barbaric Turks in August 1974 . He works as a consultant civil and architect engineer having his own business . He is also the author of numerous scholarly articles focusing on Euclidean and Material Geometry , and mathematical to physics related subjects . He obtained his degree from the Athens , National Technical , Polytechnic University [NATUA] and subsequently studied in Germany , Math theory of Photoelasticity.