The balance in the six dimensions of space-time description of quantum mechanics phenomena and nature of time

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Abstract: This study presents a theory with a six-dimensional space-time structure, R^6, in order to describe quantum mechanics phenomena, the time arrow and quantum gravity. The interpretation of quantum world phenomena using four-dimensional space-time would be a very complicated and indescribable task. The dual wave-particle behavior, entanglement, quantum corridors, etc., represent the complex space-time structure. Previous studies indicate that complicated behaviors of particles in quantum mechanics are basically considered as the inherent behavior of those particles. The theoretical framework of the balance is the transformation of imaginary dimensions into geometric dimensions and the description of quantum mechanical phenomena using external Euclidean geometry. The six-dimensional space-time structure consists of three space and three time dimensions $R^6 = \{x, y, z, t_{-}, t, t_{+}\}$ and the time arrow is the result of the impossibility of the existence of matter in six space-time dimensions, and the direction of the arrow is aligned with the expansion of the universe.

Keywords: six-dimensional space-time, time arrow, quantum mechanics.

1. Introduction

The quantum mechanics phenomena have no classic similarities within the macroscopic world. Yet these phenomena are so complex that they are sometimes referred to as mysteries of quantum mechanics. Among these behaviors are the dual wave-particle behavior, quantum entanglement, quantum corridors, etc.

It sometimes happens in the quantum world that a particle simultaneously passes through multiple gates, or two entangled particles instantly affect each other from long distances (Horodecki et al., 1968).

Because quantum mechanics phenomena have no classic consistency, one can consider hidden variables. According to Albert Einstein, a theory must be able to predict natural phenomena with total certainty based on the reality (Einstein et al., 1935).

Different theories have been stated to interpret these phenomena through the increase in space- time dimensions, among which are the 5-dimensional (Mei, 2019), and 6-dimensional space-time theories, etc. Moreover, different theories have been proposed to explain the time arrow, including the time arrow (Coveney and Highfield, 1991), the time arrow and space-time nature (Ellis, 2013), etc.

The theory of the balance, evaluates the geometrical structure of space-time in the quantum mechanics, and defines time as past, present and future in the macroscopic world perspective, as three orthogonal dimensions of (t_-, t, t_+) and investigates the quantum mechanics phenomena in six dimensions of the R^6space-time. In fact, the statement of the time nature theory, creates a logical relation between the theory of relativity and quantum mechanics by providing a description of the six-dimensional space-time, time arrow and the structural differences of the six-dimensional space-time structure in two macroscopic and microscopic spaces.

2. Definitions

2.1. Six-dimensional space-time

The 3 × 3 six-dimensional space-time is a Euclidean curvature space comprised of three space dimensions, (x, y, z), and three time dimensions, (t_-, t, t_+), where the phenomena occur in this mixed space. Therefore, past, present, and future are three imaginary dimensions from the perspective of the three-dimensional world (2.1).

$$\|x\| = (\textstyle\sum_{i=1}^{6} x_i^2)^{1/2} x, t \to (x, y, z, t_-, t\ , t_+) \in \mathbb{R}^6 \quad (2.1).$$

The t dimensions do not refer to time and are merely dimensions of this space. Therefore, the definition of the six-dimensional space-time, will be a flat space in the absence of matter, and the curved space-time is specific to the material world. The relationship between these two spaces will be investigated in this study. Additionally, this space is an expanding space (2.2).

$$r^2 = x^2 + y^2 + z^2 + t_-{}^2 + t^2 + t_+{}^2 \Rightarrow$$
$$ds^2 = dx^2 + dy^2 + dz^2 + dt_-{}^2 + dt^2 - dc^2t^2 \quad (2.2.)$$

Polar coordinates in six dimensional space time and distance and metric:

$$S^3 \Rightarrow x_1 = rcos\theta\ x_2 = rsin\theta cos\phi\ x_3 = rsin\theta sin\varphi sin\tau$$
$$ds^2 = r^2 d\theta^2 + r^2 sin^2\theta d\phi^2 + r^2 sin^2\theta sin^2\phi d\theta^2$$
$$a_{\mu v} = \begin{pmatrix} r^2 & 0 & 0 \\ 0 & r^2 sin^2\theta & 0 \\ 0 & 0 & r^2 sin^2\theta sin^2\phi \end{pmatrix} \Rightarrow$$
$$t_-, t_+ \in \mathrm{t} \Rightarrow \Delta t^2 i^2 = -c^2 d\theta^2 + c^2 cos^2\theta d\phi^2 + c^2 cos^2\theta cos^2\phi d\theta^2$$

c = 1

$$g_{\mu v} = \begin{pmatrix} cos^2\theta cos^2\phi & 0 & 0 & 0 & 0 & 0 \\ 0 & cos^2\theta & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & sin^2\theta & 0 \\ 0 & 0 & 0 & 0 & 0 & sin^2\theta sin^2\phi \end{pmatrix}$$

2.2. The space-time structure

Based on the holographic principle (Bousso, 2002) and geometric equations, the circumference of a two- dimensional circle will comprise a one-dimensional space, while the surface of a three-dimensional sphere is a two-dimensional space, and the surface of a six-dimensional sphere results into a five- dimensional space. Table 1.

Table 1: The important issue is the curvature of surfaces with lower dimensions in order to become present in a space with higher dimensions. Creating this natural balance is proportional to the number π.

Dimension	1D	2D	3D	4D	5D	6D
volume	2r	πr^2	$\frac{4}{3}\pi r^3$	$\frac{1}{2}\pi^2 r^4$	$\frac{8}{15}\pi^2 r^5$	$\frac{1}{6}\pi^3 r^6$
Boundig area	2	$2\pi r$	$4\pi r^2$	$2\pi^2 r^3$	$\frac{8}{3}\pi^2 r^4$	$\pi^3 r^5$

From the perspective of a two-dimensional space, the surface of a three-dimensional sphere is not only imaginary, but also arrow-like, and every displacement with respect to the z-axis, has a relative relationship (eccentric equation) with other points located on the surface of the sphere with respect to the arrow-like z-axis (2.3). Figs 1 and 2 illustrate the z-axis, an imaginary and arrow- like dimension from the perspective of a two-dimensional mobile body located on an expanding three-dimensional sphere, and the movement of the mobile body on the surface of the ball is in a curved path with respect to the z-axis.

The arrow-like movement of the z-axis, is tangible for the two-dimensional points on the surface of the sphere, only through the expansion of the two-dimensional space.

$$\sqrt{1-\frac{v^2}{c^2}} = sin\left(cos^{-1}\left(\frac{v}{c}\right)\right) = \eta \qquad v = \frac{\partial x'}{\partial t} \qquad c = \frac{\partial x}{\partial t} \Rightarrow \sqrt{1-\frac{\left(\frac{\partial x'}{\partial t}\right)^2}{(c)^2}} \Rightarrow \sqrt{1-\frac{\partial x\prime^2}{c^2}} = sin\left(cos^{-1}\left(\frac{\Delta x\prime}{c}\right)\right)$$

$$(x, y, izr)\ \ r = \frac{\partial x'}{\partial t}\ \ s^2 = x^2 + y^2 - r^2 z^2\ \ icz = ict\ \ r \equiv c \tag{2.3}$$

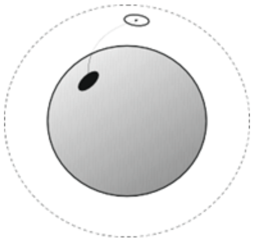

Figure 1. Every motion on the surface of an expanding sphere, has a relative motion with regards to the z-axis, and the path of the movable in the three-dimensional space is a curved path.

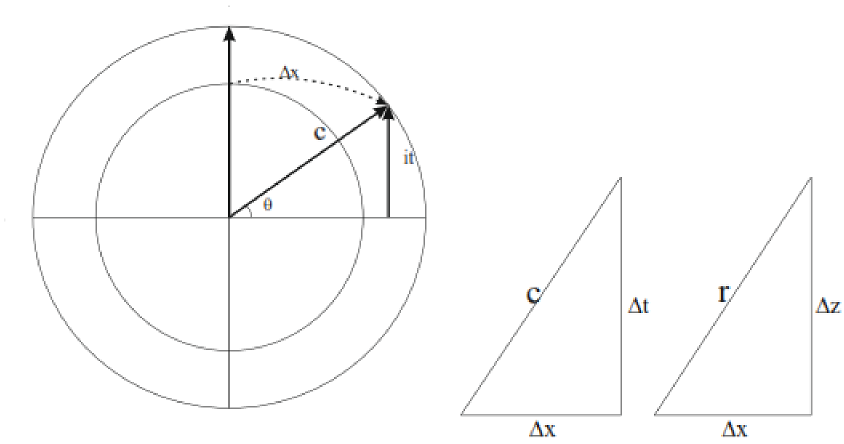

Figure 2. If r is considered as the speed of light and x denotes the speed of the mobile body, the z dimension represents the imaginary dimension of time for all points on the surface of the sphere, and the sine of the angle θ, represents the amount of the mobile's eccentricity from the time arrow axis.

The distance traveled by the shadow on the surface of the sphere in the third dimension, is a real distance in space, but from the view of a two-dimensional observer on the surface of the sphere, this distance will be imaginary (2.4).

$$Intrinsic\ geometry \quad s^2 = x^2 + y^2 - z^2r^2 \tag{2.4}$$

Where r resembles the speed of expansion .

3. The Principle of Motion

Whenever an object does not move, it experiences an imperceptible motion in the time dimension from the perspective of the three-dimensional world. Therefore, the amount of displacement in the time dimension can be calculated based on Figure 2 and considering the limit speed of light (3.1).

$$\left(sin\left(cos^{-1}\left(\frac{\Delta t}{c}\right)\right)\right) = \mu \ \ (cos(\theta)) = \left(\frac{\Delta x}{c}\right) = \eta$$

$$\big(rcos(\theta) + irsin(\theta)\big)\big(rcos(\theta) - irsin(\theta)\big) = r^2$$

$$\Rightarrow \eta c = \Delta t \ \ \mu c = \Delta x \Rightarrow \Delta x^2 + \Delta t^2 = c^2$$

$$\Rightarrow ds^2 = r^2 d\theta^2 + r^2 sin^2\theta d\phi^2 + r^2 sin^2\theta sin^2\phi d\theta^2$$

$$t_-, t_+ \in t \Rightarrow \Delta t^2 i^2 = -r^2 d\theta^2 + r^2 cos^2\theta d\phi^2 + r^2 cos^2\theta cos^2\phi d\theta^2$$

$$\Rightarrow g_{\mu v} = \begin{pmatrix} cos^2\theta cos^2\phi & 0 & 0 & 0 & 0 & 0 \\ 0 & cos^2\theta & 0 & 0 & 0 & 0 \\ 0 & 0 & -r & 0 & 0 & 0 \\ 0 & 0 & 0 & r & 0 & 0 \\ 0 & 0 & 0 & 0 & sin^2\theta & 0 \\ 0 & 0 & 0 & 0 & 0 & sin^2\theta sin^2\phi \end{pmatrix} \tag{3.1}$$

Just as no object in space cannot reach the speed of light, particles with very little mass will experience greater displacements in time compared to heavier objects. This is similar to the notion of gravitational expansion of time in a gravitational field. Consequently, the mass (m_x) is created with the object's movement in space, and the object's mass (m^t) is created with movement in time. (3.2) The upper and lower indices are used merely to differentiate the nature of the two masses.

$sin(90) = 0 \Rightarrow \mathrm{x, t} \neq \mathrm{c} \quad t = \frac{t_0}{\eta} \quad x = \frac{x_0}{\mu} \quad m = \frac{m_0}{\eta}$

$$t = \frac{t_0}{\sqrt{1 - \frac{2GM}{rc^2}}} \Rightarrow \mathrm{m}' = \frac{hv}{c^2} \quad (m' + m_x) = \frac{m'}{\eta} \quad \rho = \left(\frac{m'}{2\pi^2 r^3}\right) \Rightarrow (\rho c)^{\frac{1}{2}} = \Delta x \quad \left(\frac{1}{\rho} c\right)^{\frac{1}{2}} = \Delta t$$

$$\Rightarrow T_{\mu v} = \begin{pmatrix} -\rho & & & & & \\ & -\rho & & & & \\ & & \rho & & & \\ & & & P & & \\ & & & & P & \\ & & & & & P \end{pmatrix} \tag{3.2}$$

There thus exists a deep relationship between relative mass and gravitational mass of the object, as well as a direct relationship between force and energy, which must be derived from the definition of the work done in space and time by the impact of expansion forces (3.3). Moreover, impulse in space and impulse in time, along with other physical concepts, can also be defined only if the definition of velocity and energy, as well as force, are time independent (3.3).

$$F = m.\left(\frac{\partial^2 x}{\partial t^2}\right) = m\left(\frac{(\Delta x)^2}{r}\right) \quad E = m.(\Delta x^2 + \Delta t^2) \quad W_x = F.d_x \quad W^t = F.d^t$$

$$\frac{1}{\lambda} = (\Delta t^2) \quad \frac{mv}{h} = c^2 - (\Delta x)^2 \tag{3.3}$$

Just as the surface of an expanding sphere exerts a force on points on the surface of the sphere and moves them in space, so the surface of a sphere exerts a force on inhomogeneous points in space, such as mass, and moves them on the surface.The sum of these forces propels objects in space. An important issue is the rotation of the coordinate frame attached to the object on the surface of the sphere. Figure 3

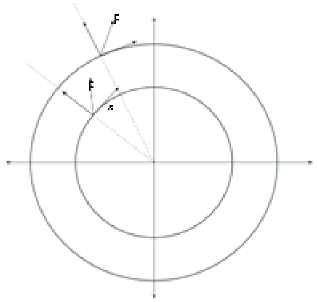

Figure 3. Summation of the forces applied to two-dimensional objects result in a rotation about the center of the expanding sphere.

The acceleration obtained from the change in the direction of the velocity vector of the moving object on the two-dimensional surface of the sphere and oscillation of the object about the center of the sphere, result in creation of mass. Moreover, the passage of time is in direct relationship with the object's mass in space and time. $c2$ denotes two orthogonal vectors, while h represents the work done in four dimensions of the space (3.4).

$$\frac{hv}{c^2} = m' \ \frac{F}{\mathrm{a}} = m_x \ \ h = \frac{W^t}{c^4} \ \Rightarrow \mathrm{m}' = \frac{W'v}{c^6} \tag{3.4}$$

In order to understand the nature of Planck constant, the resultant force obtained from the expansion must be calculated. The work performed for displacement on the surface of the sphere can be calculated from the resultant of the force vectors (3.5).

$$\vec{F} = \vec{F}_x + \vec{F}_y = r \Rightarrow \mathrm{W} = \mathrm{F.d} \Rightarrow \mathrm{F} = \mathrm{m.}\left(\frac{v^2}{r}\right) \Rightarrow \mathrm{W} = \mathrm{F.}\Delta\mathrm{L} \Rightarrow \mathrm{L} = \left({}^{\theta}/_{360}\right)2\pi r$$

$$\text{if } F = 1_N \Rightarrow \vec{F} = 1\big(cos(\theta) + sin(\theta)\big) \Rightarrow cos(\theta) + isin(\theta) = 1e^{i\theta} \tag{3.5}$$

Based on the definition of the six-dimensional space and considering the forces exerted on the two-dimensional surface of the sphere from its third dimension, it can be concluded that in a curved five-dimensional space, there exist two imaginary time vectors for the four-dimensional world. Figure 4

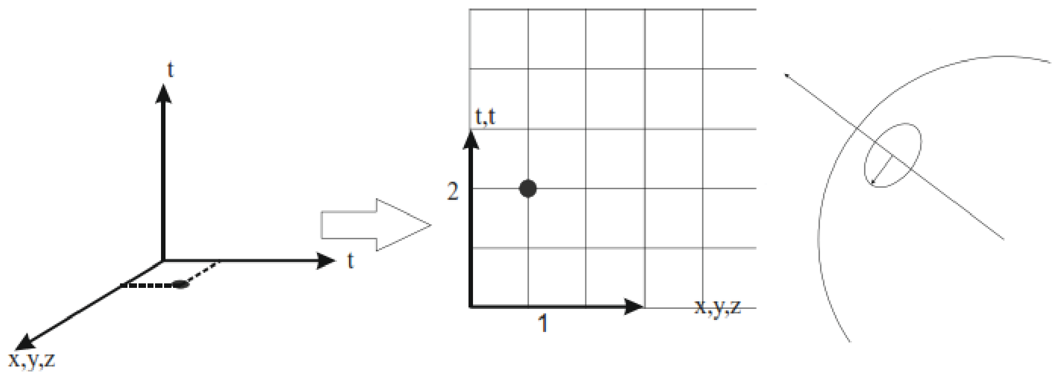

Figure 4. The two orthogonal imaginary dimensions from the perspective of the real world are aligned and in one direction.

And based on the force applied by the two time vectors, the calculation can be conducted by aggregating the two time vectors into one, from the perspective of the three dimensional space, using the golden fixed number ratio, and thus the golden ratio is the main key to solving the equations in this article (3.6). Figure 5.

$$\left(\frac{1+\sqrt{5}}{2}\right) = \left(\frac{\vec{F}_x + c}{\vec{F}_t}\right) = \varphi \Rightarrow tan^{-1}(2) = 63.4349488$$

$$2\vec{F}_x = \vec{F}_t \Rightarrow \vec{F}_t = \hbar e^{i\pi}, \vec{F}_x = Ge^{\varphi} \tag{3.6}$$

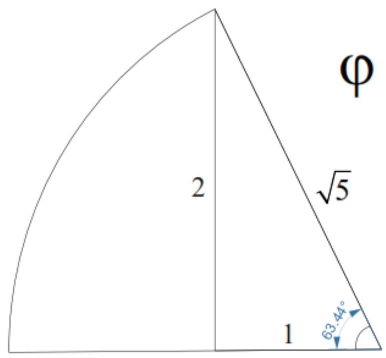

Figure 5. The correlation between the golden constant and the doubling of the force resulting from higher dimension stress in an expanding space can be abundantly found in nature.

Based on this and considering the displacement of the three-dimensional matter in space and time with higher dimensions, the exact value of the Planck constant can be calculated. If the object is fixed in space, the issue above indicates the movement of the object in time (3.7).

$$\left(\frac{\vec{F}_x + c}{\vec{F}_t}\right) = \varphi \Rightarrow tan^{-1}(2) = 63.4349488$$

if $F = 1_N \;\; \vec{F} = \vec{F}_x + \vec{F}_y = \vec{F}\big(cos(\theta) + sin(\theta)\big) \Rightarrow \mathrm{W} = \mathrm{F.d} \Rightarrow$

$\mathrm{F}\big(cos(63.43) + sin(63.43)\big)d$

90 – 63.43 = 26.57 = α

$$\frac{F^2.d^3}{c^4} = h \Rightarrow \left(\frac{\left(\left(cos\left(tan^{-1}(2)\right) + sin\left(tan^{-1}(2)\right)\right)^3 d^3\right)}{c^4}\right) = h \Rightarrow$$

$\mathrm{d} = \cot(37.4878661351)$

37.48 – 26.57 = 10.91 $\;d = cos(45) \Rightarrow \hbar\;$ 63.34 – 45 = 18.34

$$\frac{F^2.d^3}{c} = G \Rightarrow \left(\frac{\left(\left(cos\left(tan^{-1}(2)\right) + sin\left(tan^{-1}(2)\right)\right)^3 d^3\right)}{c}\right) = G \Rightarrow \mathrm{d} = \cos(78.32)$$

78.32 – 63.34 = 14.89 (3.7)

The Planck constant is equal to the displacement of a three-dimensional object in four dimensions and the gravity constant is defined as the resistance of a material with lower dimensions against the universe's radius of expansion.

The inconsistencies in equations (3.7) indicate the curvature of space, which causes the resultant vector to deviate. As a result of these equations, the Planck constant and the gravity constant are the result of creating higher dimensional space-time stress on the three-dimensional material. Figure 6.

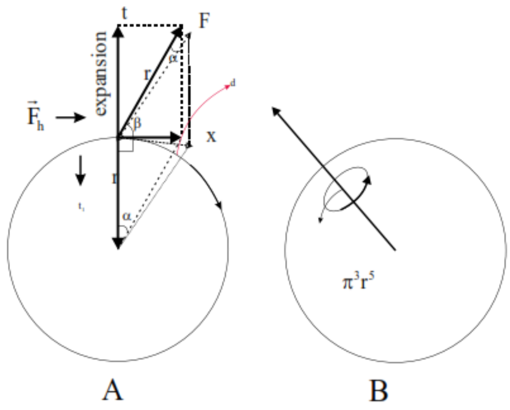

Figure 6. The summation of the forces on the surface of the sphere and the resistance force of the expanding sphere result in the rotation of two-dimensional spots of the sphere surface about the center of the sphere. B: In the six- dimensional space, three imaginary vectors exist for the three-dimensional world on the surface of curved four-dimensional world embedded in the curved five-dimensional space, where these vectors are observed as aligned from the perspective of the three-dimensional world.

As a result of accepting rotation in time dimensions, in Figure 7, if the velocity of the movable relative to the speed of light is assumed constant, two time-vectors exist for the movable, one aligned with the motion of the movable, and the other perpendicular to that motion, and as a result of the object's motion in space and time with higher dimensions, the path of the object's motion is curved.

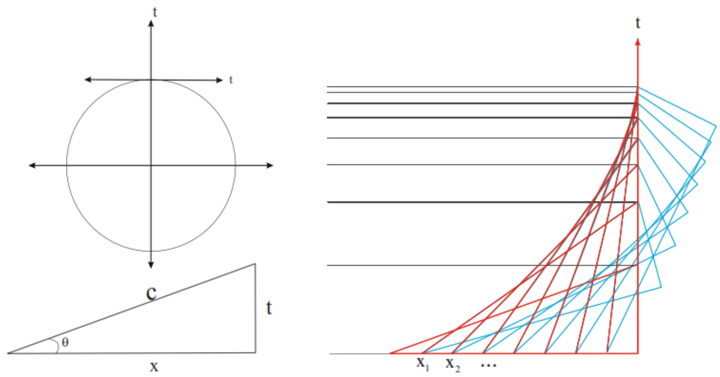

Figure 7. For the points on the surface of the sphere, the passage of time is dependent on the expansion of the two- dimensional circumference of the sphere and during the motion, the movable rotates about an imaginary sphere in a higher dimension. Assuming the velocity of the movable and the speed of light to be constant, the path of the movement would be a curved path in the time dimension and the existence of the golden ratio becomes apparent, and since the passage of time is also constant, thus the golden ratio reflects itself in the material in form of stress.

As a result of the motion of the three-dimensional world about the four-dimensional sphere and the motion of the four-dimensional world on the surface of the curved five-dimensional space, as well as the relationship of mass with oscillation and rotation, the oscillation radius can be calculated for one moving electron. The result obtained is greater than Bohr radius, since the impact of the electromagnetic forces is not considered in calculations (3.8).

$W_1 = m\left(\frac{\Delta x^2}{r}\right)\Delta x \;\; W_2 = m\left(\frac{\Delta x^2}{r}\right)\Delta t' \;\; W_3 = m\left(\frac{\Delta t^2}{r}\right)\Delta x \;\; W_4 = m\left(\frac{\Delta t^2}{r}\right)\Delta t$

quantum world → $W_x = m\left(\frac{\Delta x^2}{r}\right)\Delta x' \;\; W^t = m\left(\frac{\Delta t^2}{r}\right)\Delta t \;\; W_q = 5.35227995 \Rightarrow$

$\mathrm{v} = \frac{mc^2}{h} = \frac{mc^6}{W}$

$m_c = 9 \times 10^{-31} \Rightarrow$ if $\mathrm{x} = \mathrm{v} = 2.8\times10^{8} \Rightarrow \Delta\mathrm{t} = \mathrm{c}\eta \;\; \Delta x = c\mu$

$\mathrm{r} = 2.067103055\times10^{-7} \Rightarrow r\rangle a_0$

$$\mathrm{a}_0 = \frac{4\pi\varepsilon_0\hbar^2}{me^2} \tag{3.8}$$

The oscillation radius in higher dimensions is different for each mass and when an object gains velocity, this radius becomes real and smaller. Figure 8.

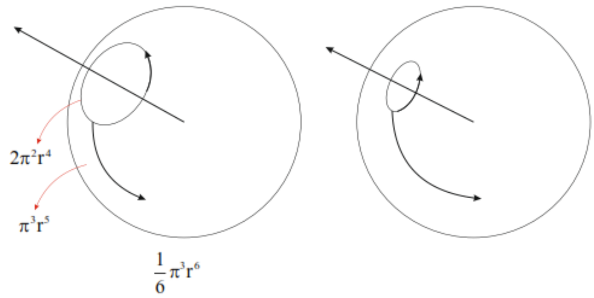

Figure 8. When a mass gains velocity, the oscillation radius becomes smaller in higher dimensions.

The oscillation radius in space dimensions and the oscillation radius in time dimensions are approximately equal for an electron. As a result, the particle is specifically present in the six dimensions of space and time. Figure 9. This radius is completely imaginary for large masses and therefore complex behaviors of particles are not observed in the macroscopic world.

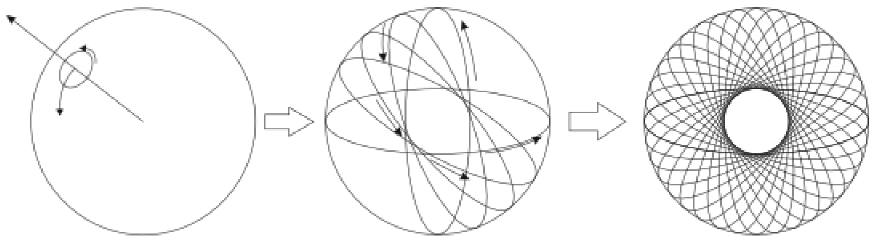

Figure 9. High velocities and electron oscillations allow the particle to be discretely present in higher dimensions.

In figure 9, since the velocity of electron is constant relative to the speed of light, it remains in a constant radius in the six-dimensional space. Therefore, after passing the five-dimensional space the surface of the six-dimensional sphere enters the other dimension wherein time has passed from the perspective of the four- and five-dimensional spaces, and it can also provide an impact on its past.

4. Wave Function

Considering the imaginary dimension of time, the passage of time for an object without any movement in space, indicates that the object is moving in time, and if we are capable of observing the temporal movement of the object in a specific time interval, we will observe a continuous length in time where each point has a fixed coordinate length in space. Now, if we can observe an entire phenomenon, such as the motion of a moving object in space, in one time instant, again a continuous image of the object can be observed wherein the location of the object is not clear (Figure 10). There exist past, future and present for both cases. If the two aforementioned cases are considered together, we can define a wave function for this spatial-temporal phenomenon.

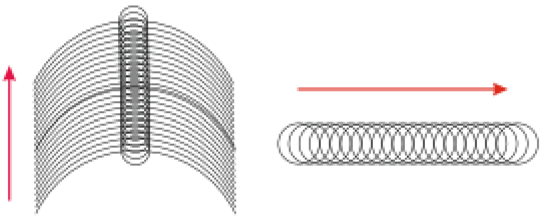

Figure 10. The observation of all instances of a phenomenon in a specific temporal and spatial interval, is a continuous image wherein the location of the object is not clear, and this image is in fact a vector in the mixed space and a type of wave function.

Observing the entire phenomenon means that we have stopped the time and are thus capable of observing the whole phenomenon in past and present. According to previous discussions, time is equivalent to space and another dimension of a Euclidean space, which is an imaginary dimension in the space of complex numbers from the material perspective. (4.1) and thus if the image under study is not illustrating the movement of a movable, it is the image of an object present in the space of n-dimensional complex numbers, where as a result of defining time as a geometrical dimension, different cases in the space of complex numbers can be considered as repetitions of different cases in limited dimensions.

$$s^2 = ({x_1}^2 + {x_2}^2 + {x_3}^2) - \left(c^2{t_4}^2 + c^2{t_5}^2 + c^2{t_6}^2\right)$$

$$s^2 = {x_1}^2 + {x_2}^2 + {x_3}^2 - {x_4}^2 - {x_5}^2$$

$$\Rightarrow \vec{\mu} = \sum_{i=1}^{n} b_i|x_i\rangle \quad \mathrm{b_i = x + ti} \quad \int_{x}^{x_1}\int_{-t}^{+t}|\psi(x,t)|^2\, dtdx = 1$$

$$\Rightarrow |\psi\rangle = b_1|x_1\rangle + b_2|x_2\rangle + \cdots + b_n|x_n\rangle \tag{4.1}$$

According to the six-dimensional space-time, if a wave function is considered for figure 10, it is comprised of small vectors each including six unit-vectors. Since a particle has a six-dimensional nature in the microscopic world, and these dimensions are imaginary and aligned from the perspective of the three-dimensional world, therefore the probability of observing a particle is dependent on the rotation of the coordinate frame, and each location can be defined using two complex numbers (4.2). Of course, the double nature of the time vector from the view of the four- dimensional world in the temporal position must also be taken into consideration.

$$
\begin{aligned}
&|\tilde{\psi}\rangle = b_1|x_1\rangle + b_2|x_2\rangle + b_3|x_3\rangle + b_4|x_4\rangle + b_5|x_5\rangle + b_6|x_6\rangle \\
&b_j = x_j + ti \quad x_i = (x_1, x_2, x_3, x_4, x_5) \Rightarrow b_j {b_j}^* = \left(\tfrac{1}{3}\right) \\
&\int_0^{2\pi} |\psi(x,t)|^2 dx = 1 \Rightarrow {}^{2\pi}/_{6} \Rightarrow \left(\tfrac{\pi}{3}\right), \left(\tfrac{2\pi}{3}\right), (\pi), \left(\tfrac{4\pi}{3}\right), \left(\tfrac{5\pi}{3}\right), (2\pi) \qquad (4.2) \\
&b_1 = \left(\tfrac{\pi}{3}\right) + i\left(\tfrac{2\pi}{3}\right) \dots \\
&b.b^* = \left(\left(\tfrac{\pi}{3}\right) + i\left(\tfrac{2\pi}{3}\right)\right)\left(\left(\tfrac{\pi}{3}\right) - i\left(\tfrac{2\pi}{3}\right)\right) = \left(\tfrac{\pi}{3}\right)^2 + \left(\tfrac{2\pi}{3}\right)^2 = \pi^2 \equiv 2\pi^2 r^3 \\
&\Rightarrow A_1 = \left(\tfrac{\pi}{3}\right), A_2 = \left(\tfrac{2\pi}{3}\right), A_3 = (\pi), A_4 = \left(\tfrac{4\pi}{3}\right), A_5 = \left(\tfrac{5\pi}{3}\right), A_6 = (2\pi),
\end{aligned}
$$

The small vector of the wave function has a length equal to the wavelength. Using the law of rotation of a rigid expanding body with higher dimensions as well as the double length of the time vector from the perspective of the four-dimensional world, the states and locations of material particles in the complex space can be predicted. This provides an explanation on the quantized nature of microscopic phenomena. Figure 11

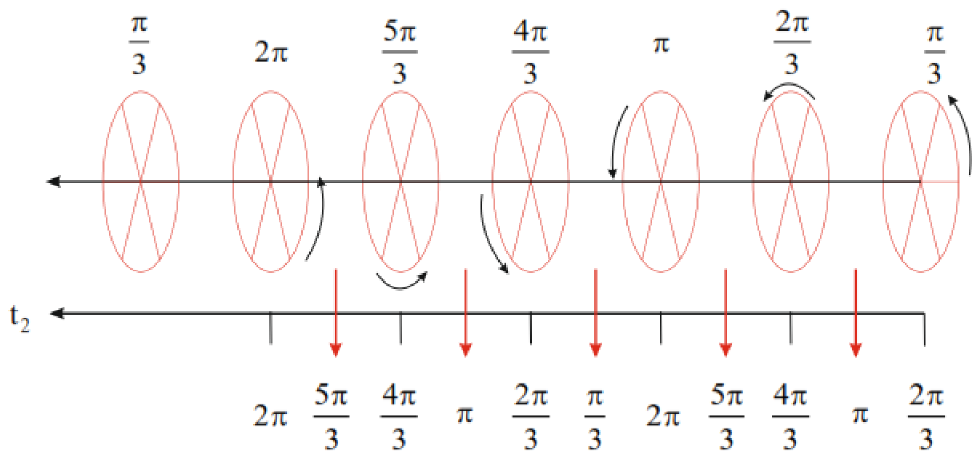

Figure 11. A stressed particle is moving in the three-dimensional space about a four-dimensional sphere, in curved and expanding rotary five-dimensional space and along the time arrow in the six-dimensional space. Due to the rotation and existence of higher-order dimensions, the particle is quantized and the wavelength and oscillation radius of the particle have an inverse relationship with each other.

Of course, in Figure 11, each packet of wave is a complex motion made of the particle motion in higher dimensions and Figure 11 illustrates the smallest part of the wave packet in space and time and the quantized formation of the wave packets is due to the special motions of particle in higher orders. By repeating different states of particle in space and time the entanglement phenomenon can be described, and in essence the interactions of entangled particles over long distances are the result of particles following the states arisen in space and time. In reality, operators affect the entire system by reducing the dimensions of phenomena in the microscopic world. Entanglement is similar to Einstein's glove experiment on EPR.

When two particles interact with each other, their positions and states are compatible with each other in time. This is similar to the interaction of the spins of two particles close to each other with different directions in space. When these two particles separated from each other, they still have the same position with respect to each other in the time dimension and the entanglement will continue if their velocities with respect to each other do not change.

In fact, all particles with identical load, mass and velocity, are entangled to each other in the time dimension through natural states, and observing the four-dimensional world could provide an impact on all homological particles. To put it more deeply, two particles far apart can be entangled without any interactions, if entanglement for both particles occur instantly with both coordinate frames having identical conditions.

By accepting the principle of stress applied to the three-dimensional matter by higher dimensions in the expanding space and the principle of two spatial and temporal natures for matter, the spin of the particles can be described as the interaction of stress of expanding dimensions in form of rotation in space and rotation in time.

The most important issue present in space and time, is stating the differences in properties of particles in time and space. To put it more clearly, as the relative mass of the particle results from the particle's movement in space and the particle's mass results from its movement in time, the electrical charge, spin and polarity of particle, in the six-dimensional space also have two different states. The reason for creation of positron after gaining energy can be explained based on the complete presence of electron in the six-dimensional space, the increase in the relative mass equal to the particle itself, the generation of an electron with temporal nature and characteristics, and finally a particle that transforms into energy after interaction with the electron's added mass. Figure 12

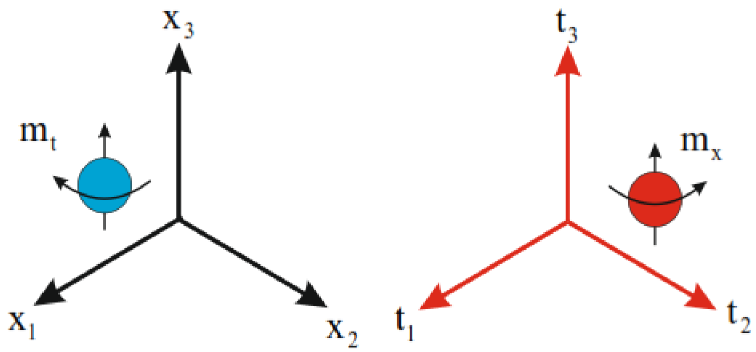

Figure 12. The relative mass is created from motion in space, while the particle's mass is due to motion in time. The particles' characteristics other than mass, including spin, load and Polarization have two different states in space and time, as well.

The spin of the particles in the superposition state is such that it can have different directions in the six-dimensional space simultaneously. The reason for this is the rotation of particles about the center of a five-dimensional sphere as well as the impact of the particle's spin on itself. Figure 13

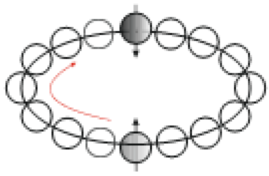

Figure 13. If a particle with a spin along the z-axis rotates about the center of circle with a high velocity, the particle's spin due to its own magnetic field, creates different cases in different points of the circle with respect to the z-axis.

A one-dimensional line oscillates in two dimensions, and a two-dimensional surface oscillates in three dimensions. Consequently, a three-dimensional object oscillates in four dimensions, and this also holds for higher dimensions. The wavelength is in fact the statement of a distance in space, and conceiving this wavelength in the six-dimensional space requires a second look at physical concepts. Figure 14

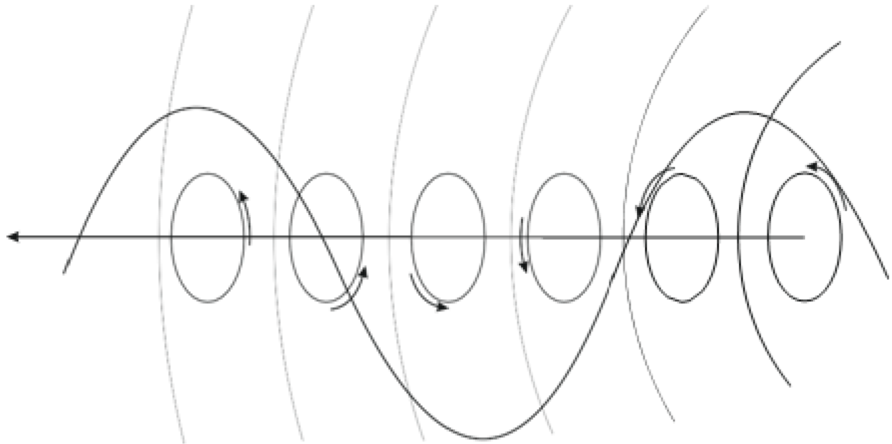

Figure 14. An object is moving in space and time in a four-dimensional space (the circumference of a small circle). With the expansion of the five-dimensional sphere and the displacement of the object in the space-time, a wave is created the wavelength of which is equal to the wave attributed to the matter.

In Figure 14, the motion about the center of the five-dimensional sphere is not taken into consideration and as a result of the three movements of the object in time dimensions, a spiral path will be formed. Figure 15

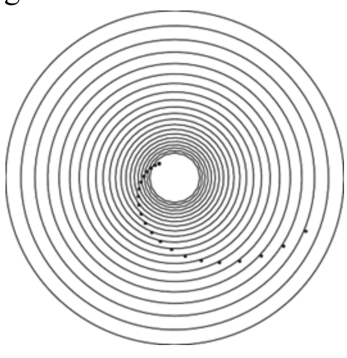

Figure 15. The movement of objects in the time dimension in form of logarithmic spiral based on the golden ratio.

5. The Principle of Mass

All material objects are moving in time and movement in time results in the creation of mass in the object. Therefore, the object's mass can be defined as length. For instance, for a spherical object with a mass of 5 kilograms, an equivalent length and density exist in the space, and the curvature of the space can be approximately calculated (5.1). As a result of the space-time stress, the golden constant, which indicates the space and time stress in the mater, can be calculated using the obtained curvature ratio and the radius of the curvature bottom in the four-dimensional space and time. In example (5.1) the obtained result is smaller than the golden constant due to the low mass of the object under study.

$\frac{wv}{c^6} = m \Rightarrow w = 5.3522801095 \;\; \rho c = \Delta x^2$

$h = 6.626069934\times10^{-34} \Rightarrow$

$m = 5$ kg $V = 10^3$ cm $\Rightarrow \left(\frac{5}{2\pi^2 r^3}\right) \;\; \Delta x = 8714.25939073$ m

$\Delta t = 299792457.87334853$

$\sqrt[3]{\Delta x} = 44.33467144721$ $m = V_L$ $V_m = 10^3$ cm $\Rightarrow \left(\frac{V_m}{V_L}\right) = 0.20578331593$

$\rho^x = \frac{m}{\sqrt[3]{x}} = 0.01127785509 \;\; \rho = \frac{m}{V_m} = 0.5$

$G \div \left(\frac{\rho^x}{\rho}\right) = \varepsilon = 2.9589328144987683 \times 10^{-9} \Rightarrow$

$\frac{\left(\frac{1}{2\pi}\right)^3 \varepsilon}{\left(\frac{1}{6}\right)\pi^3} = 2.30832593678 \times 10^{-12}$

$$\kappa = \frac{|r'||r''|}{|r'|^3} \Rightarrow R = \frac{1}{\kappa} \Rightarrow R = (c^2 - x^2)^{\frac{1}{2}} \Rightarrow \kappa = 3.3356409521224393 \times 10^{-9} \tag{5.1}$$

$\frac{\varepsilon}{\kappa} = 0.88706573856\langle\varphi$

With the definition of mass in form of length in space and time, an angle can be defined for each object with respect to the time axis, for which time passage is slower for heavy objects as well as objects with high velocity. Figure 16

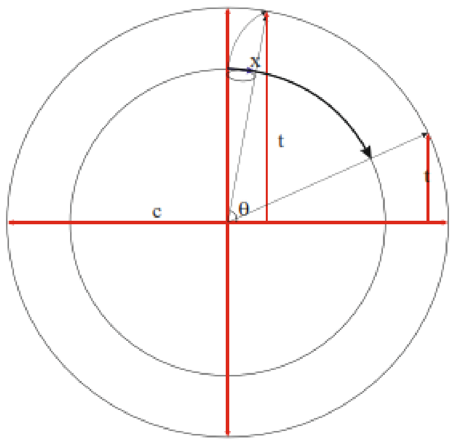

Figure 16. Each mass can be defined equivalent to a distance in space, which experiences temporal expansion for expanding spaces based on its mass and density.

The Schwarzschild radius is defined as follows, and in expanding spaces, the space curvature caused by heavy objects, creates a field using the density value wherein the time passage is much slower (5.2). Figure 17

if $m = \frac{hv}{c^2} \Rightarrow \frac{2GM}{c^2} = \frac{2Ghv}{c^4} \Rightarrow r_s.2\pi = \frac{4\pi Ghv}{c^4}$

$$\Rightarrow \mathrm{a} = \frac{v^2}{r}, v = \Delta x = L = \left(\frac{1}{2\pi}\right),$$
$$\mathrm{a}=\left(\frac{1}{2\pi}\right)^2 \div \left(\frac{4\pi G h v}{c^4}\right) = \frac{c^4}{8\pi^2 G h v} \Rightarrow \mathrm{F} = \mathrm{m.a} \Rightarrow \left(\frac{c^4}{8\pi^2 G h v}\right)\left(\frac{hv}{c^2}\right) = \frac{c^2}{8\pi^2 G}$$
$$L = \frac{360}{360} 2\pi r \Rightarrow \mathrm{W} = \mathrm{F.L} = \left(\frac{c^2}{8\pi^2 G}\right)\left(\frac{8\pi^2 G h v}{c^4}\right) = \frac{hv}{c^2}$$
$$v^t = 1 \Rightarrow \left(\frac{8\pi^2 G h}{c^4}\right) \tag{5.2}$$

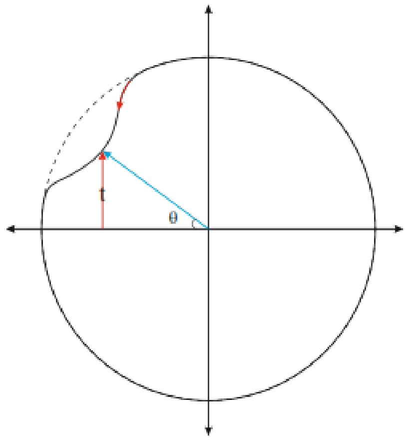

Figure 17. Each mass can be considered equivalent to a length in space and time and density causes a curvature in expanding space-time and thus time passes slower in the gravitational field.

While falling in the gravitational field, objects with different masses have equal instant velocities, the reason for which is the identical passage of time within the gravitational field.

There are infinite possibilities for the future of an occurrence and more importantly, a material object with a three-dimensional nature can only exist in the present, while its past is definite.

Mass is the result of the object's movement in time and the important issue is the opposite nature of the characteristics of velocity in space compared to velocity in time and as a result of creating the object's mass (mt) and creating the gravitational field, in free fall within the gravitational field, the direction of the movement along the expansion, has a path opposite to the direction of the world's expansion, thus the mass of a falling object is equal to zero.

6. Geometric Equations of Space-time:

A flexible one-dimensional space, experiences a 90 degrees rotation and curvature in the expanding two-dimensional space, and it applies stress to materials with one-dimensional nature. The geometric equations of these stresses will be presented in the following. Similarly, the natural balance of a two-dimensional flexible plain has a curved structure in the three-dimensional space.

Therefore, for a 90 degrees angle, there exists an arc equal to one quarter of a circle's circumference which is slightly longer than the radius of the desired circle. (6.1)

$$sin\left(cos^{-1}\frac{\partial x/\partial time}{c}\right) \neq 1 \Rightarrow \mathrm{x,t} \neq \mathrm{c} \Rightarrow \frac{\partial x}{\partial t_i} \neq 0 \Rightarrow \mathrm{F} = \frac{M.m}{r^2}(constant),$$

$$E = n\ (nonstant)v, \ldots$$

$$L = \left({}^{\theta}/_{360}\right)2\pi r \quad \theta = 90 \Rightarrow \mathrm{L} = \left(\frac{1}{4}\right)2\pi r \Rightarrow \left(\frac{1}{2\pi}\right) = \left(\frac{180/\pi}{360}\right) = 1rad$$

$$\left(\frac{90-180/\pi}{360}\right) = \left(\frac{1}{4}\right) - 1rad = \left(\frac{\pi-2}{4\pi}\right) \Rightarrow \left(\frac{\pi-2}{4\pi}\right) + \left(\frac{1}{2\pi}\right) = \left(\frac{1}{4}\right) \tag{6.1}$$

In fact, the one-dimensional space has a rotation of $\frac{\pi}{4}$ radians in an expanding two-dimensional space.

Based on the 90 degrees rotation, the curvature of a two-dimensional space can be generalized for higher dimensions. The generalizations of this rotation up to the curved five-dimensional space in the six-dimensional space, are as illustrated below (6.2).

$$\left(\frac{1}{2}\right)^2 2\pi r \quad \left(\frac{1}{2}\right)^3 4\pi r^2 \quad \left(\frac{1}{2}\right)^4 2\pi^2 r^3 \quad \left(\frac{1}{2}\right)^5 \frac{8}{3}\pi^2 r^4 \quad \left(\frac{1}{2}\right)^6 \pi^3 r^5$$

$$\Delta t^2 i^2 = -r^2 d\theta^2 + r^2 cos^2\theta d\phi^2 + r^2 cos^2\theta cos^2\phi d\theta^2$$

$$|\mathrm{g}_{\mu v}| \Rightarrow cos^2(60)cos^2(120)cos^2(60) = \left(\frac{1}{2}\right)^6 \tag{6.2}$$

The fourth dimension is imaginary with regards to matter and energy and as a result of the nonexistence of matter in the six-dimensional space, relations can be found between nature's frequent numbers such as φ and e, and the surface of a five-dimensional sphere (6.3).

$$\left(\frac{1}{2}\right)^6 \pi^3 \geq ln(\varphi) \Rightarrow e^{\left(\frac{1}{2}\right)^6 \pi^3} \approx \varphi \quad \left(\frac{1+\sqrt{5}}{2}\right) = \varphi \tag{6.3}$$

A rigid one-dimensional object exists in expanding two-dimensional space, in curved one- dimensional space and in rotary state. A three-dimensional object is present in the curved three- dimensional space in a four-dimensional space. Similarly, curved four-dimensional space is present in a curved five-dimensional space (6.4).

$$r \to \left(\frac{1}{2\pi}\right) \quad r^3 \to \left(\frac{1}{2\pi}\right)^3 \quad \left(\frac{1}{2\pi}\right)^3, \left(\frac{1}{6}\pi^3\right) \tag{6.4}$$

$$\left(\frac{1}{2\pi}\right)^3 2\pi^2 = \left(\frac{1}{8\pi^3}\right)2\pi^2 = \frac{1}{4\pi}, \ldots \left(\frac{1}{2\pi}\right)^3 \pi^3 = \frac{1}{8}$$

Using the equations of the nonexistence of a rigid object in higher dimensions, as well as the stress created due to expansion, the gravity constant can be approximately calculated (6.5).

$$\left(\frac{\left(\frac{\pi-2}{4\pi}\right)^3\left(\frac{1}{6}\pi^3\right)e^{\left(\frac{1+\sqrt{5}}{2}\right)}}{c}\right) = 6.5175564525 \times 10^{-11} \approx G$$

$$\left(\frac{\left(\frac{1}{2\pi}\right)^3\left(\frac{1}{6}\right)\pi^3}{c}\right) = 6.94925 \times 10^{-11} \geq G$$

$$\left(\left(\frac{\pi-2}{4\pi}\right)2\pi\right)^6\left(\frac{he}{c}\right) = \frac{8\pi G}{c^4} \Rightarrow \left(\left(\frac{\pi-2}{2}\right)\right)^6 \simeq \frac{8\pi G}{c^3 he} \tag{6.5}$$

Almost all shapes of matter follow fractals [8] and the golden relativity. Moreover, golden relativity and fractal have a deep relationship with the number π and Napier's constant. The more important issue is to state the fact that the difference between the dimensions of fractal geometry and Euclidean geometry and lack of mass calculations, result in the creation of a difference in the aforementioned equations.

The main source of the abovementioned difference in these equations, is the difference between the golden ratio and the arc of the circle's circumference equal to its radius. The factor creating the golden ratio, is the existence of a rigid object in the expanding space, which eventually results in eccentricity in the expanding circle and turns it into an ellipsoid, and thus by applying this problem, the gravity constant can be calculated with a higher precision (6.6).

$$\left(\left(\frac{tan^{-1}(\varphi)-\left({}^{180}/_{\pi}\right)}{2\pi}\right)^{3}\left(\frac{1}{6}\right)\pi^{3}/c\right) = 6.6765834 \times 10^{-11} = G \tag{6.6}$$

An approximation of the Planck's constant can also be derived from the geometrical equations of the six-dimensional space (6.7).

$$\frac{\left(\left(\frac{1}{2\pi}\right)^{3}+\left(\frac{1}{2}\right)^{6}\pi^{3}e^{\varphi}\right)^{2}}{c^{4}} = 7.4147232292 \times 10^{-34}$$

$$\frac{\left(\left(\frac{3\pi-6}{2\pi}\right)\left(\frac{\pi\varphi}{3}\right)\right)^{2}}{c^{4}} = 1.05597784887 \times 10^{-34} \quad \left(\frac{90-(180/\pi)}{1\div 6} \div 360\right) = \left(\frac{3\pi-6}{2\pi}\right)$$

$$\frac{\left(\left(\frac{\pi}{2}-1\right)\left(\frac{1+\sqrt{5}}{2}\right)\right)^{2}}{c^{4}} = 1.05593348511 \times 10^{-34} \quad \frac{\left(\frac{\pi-2}{4\pi}\right)}{\left(\frac{1}{2\pi}\right)^{6}\times 1dyn} = 0.00000217337$$

$$\sqrt[6]{\hbar} = 0.0000021736 \quad 1\text{dyn} = 10^{-5}\ \text{N} \tag{6.7}$$

Therefore, the Planck's constant can be calculated with higher precision (6.8).

$$\left(\left(\frac{1}{2}\right)^{6}\pi^{3}e^{1.563454746}\right)^{2}/c^{4} = 6.62606991869 \times 10^{-34}$$

$$tan^{-1}(1.563454746) = 57.39664555$$

$$tan\left(\frac{180}{\pi}\right) = 1.557407724 \quad \left(\frac{180}{\pi}\right) = 57.2955795 \tag{6.8}$$

$$\left(\left(\frac{1}{2\pi}\right)^{3}+\left(\frac{1}{2}\right)^{6}\pi^{3}e^{\left(tan\left(\frac{180}{\pi}\right)\right)}\right)^{2}/c^{4} = 6.5693903027 \times 10^{-34}$$

Accordingly, the Schwarzschild radius can be rewritten based on six-dimensional geometric equations of space and time (6.9).

$$r_s = \frac{2GM}{c^2}\sqrt{1-\frac{r_s}{r}} = \sqrt{1-\frac{2GM}{rc^2}}$$

$$\Rightarrow r_s = \frac{2GM}{c^2} \approx \frac{M}{24c^3}$$

$$r_s = \frac{M}{24.989c^3} = 1.4852139310 \times 10^{-27} \quad e^{\pi}+\varphi = 24.758726 \tag{6.9}$$

$$r_s = \frac{M}{\sqrt{\varphi}2\pi^2c^3} = \frac{h}{\sqrt{\varphi}2\pi^2c^3\lambda v} = \frac{2GM}{c^2}$$

$$\Rightarrow \text{m} = \left(\frac{h}{\sqrt{\varphi}2\pi^2c^3\lambda v}\right)\sqrt{\varphi}2\pi^2c^3 = \frac{h}{\lambda v} = r_s\left(\sqrt{\varphi}2\pi^2c^3\right)$$

$$h = \left(\sqrt{\varphi}2\pi^2c^3\lambda v\right)\left(\frac{m}{\sqrt{\varphi}2\pi^2c^3}\right) = mv\lambda$$

7. Matric

Metric space-time in hyperbolic polar coordinate system:

$$g_{\mu v} = \begin{pmatrix} cos^2\theta cos^2\phi & 0 & 0 & 0 & 0 & 0 \\ 0 & cos^2\theta & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & sin^2\theta' & 0 \\ 0 & 0 & 0 & 0 & 0 & sin^2\theta' sin^2\phi' \end{pmatrix}$$

$\theta = \frac{\pi}{3}$ $\phi = \frac{2\pi}{3}$ $\tau = \pi$ $\alpha = \frac{4\pi}{3}$ $\beta = \frac{5\pi}{3}$ $\iota = 2\pi$

$$g_{\mu v} = \begin{pmatrix} 0.0625 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0.25 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.75 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0.5625 \end{pmatrix}$$

$cos^2(60) \times cos^2(120) = 0.0625 = \left(\frac{1}{2}\right)^6$

$cos^2(60) = \left(\frac{1}{4}\right)$

Tensor of wave function:

$(\alpha^\circ, \alpha^{\circ\prime}) \to \frac{1}{4} Rad \Rightarrow sin(90), sin(270) \Rightarrow cos(0), cos(180)$

$$\Psi_{\mu v} = \begin{pmatrix} cos^2\theta cos^2\phi & 1 & 1 & 1 & 1 & 1 \\ -1 & cos^2\theta & 1 & 1 & 1 & 1 \\ -1 & -1 & e^{i\pi} & 1 & 1 & 1 \\ -1 & -1 & -1 & e^{\varphi} & 1 & 1 \\ -1 & -1 & -1 & -1 & r^2 sin^2\theta' & 1 \\ -1 & -1 & -1 & -1 & -1 & r^2 sin^2\theta' sin^2\phi' \end{pmatrix}$$

$\ell^2 = \Delta t^2 = (cos(\theta)c)^2.(cos(\phi)c)^2$

$r^2 = \Delta x^2 = (\rho c) = (sin(\theta)c)^2.(sin(\phi)c)^2$

Tensor of spiral Force:

$$K_{\mu v} = \begin{pmatrix} -c^2 & 0 & 0 & 0 & 0 & 0 \\ 0 & -c^2 & 0 & 0 & 0 & 0 \\ 0 & 0 & c^2\hbar e^{i\pi} & 0 & 0 & 0 \\ 0 & 0 & 0 & \hbar e^{i\varphi} & 0 & 0 \\ 0 & 0 & 0 & 0 & Ge^{\pi} & 0 \\ 0 & 0 & 0 & 0 & 0 & Ge^{\varphi} \end{pmatrix}$$

Tensor of energy momentum and geometry gap:

$$\mathrm{K}_{\mu v}=\begin{pmatrix}-\rho & 0 & 0 & 0 & 0 & 0\\ 0 & -\rho & 0 & 0 & 0 & 0\\ 0 & 0 & \rho & 0 & 0 & 0\\ 0 & 0 & 0 & P & 0 & 0\\ 0 & 0 & 0 & 0 & P & 0\\ 0 & 0 & 0 & 0 & 0 & P\end{pmatrix}$$

$$\left(\frac{\pi-2}{2}\right)=\Pi \quad \mathrm{P}_{\mu v}=\begin{pmatrix}\Pi & 0 & 0 & 0 & 0 & 0\\ 0 & \Pi & 0 & 0 & 0 & 0\\ 0 & 0 & \Pi & 0 & 0 & 0\\ 0 & 0 & 0 & \Pi & 0 & 0\\ 0 & 0 & 0 & 0 & \Pi & 0\\ 0 & 0 & 0 & 0 & 0 & \Pi\end{pmatrix}\Rightarrow=\left|P_{\mu v}\right|=\left(\frac{\pi-2}{2}\right)^{6}$$

General equation:

$$R_{\mu v}-\frac{1}{2}R\mathrm{g}_{\mu v}+\Lambda=\left(\frac{\pi-2}{2}\right)^{6}\left(\frac{he}{c}\right)T_{\mu v}$$

$$\Rightarrow \mu, v=0,1,2,3,4,5$$

$$\Psi_{\mu v}+\mathrm{R}_{\mu v}-\frac{1}{2}R\mathrm{g}_{\mu v}+\Lambda=\left(\frac{\pi-2}{2}\right)^{6}\left(\frac{he}{c}\right)T_{\mu v}+\mathrm{K}_{\mu v}$$

$$\Psi_{\mu v}+\mathrm{R}_{\mu v}-\frac{1}{2}R\mathrm{g}_{\mu v}+\mathrm{g}_{\mu v}\Lambda^{\mu v}=\mathrm{P}_{\mu v}\mathrm{g}^{\mu v}\left(\frac{he}{c}\right)T_{\mu v}+\mathrm{K}_{\mu v}$$

Quantum world equation:

$$T_{\mu v}\propto G_{\mu v} \quad K_{\mu v}\propto \Psi_{\mu v}$$

$$T_{\mu v}\propto \frac{1}{\Psi_{\mu v}} \quad G_{\mu v}\propto \frac{1}{\mathrm{K}_{\mu v}}$$

$$\mathrm{K}_{\mu v} \quad \Psi_{\mu v}\langle T_{\mu v} \quad G_{\mu v}\Rightarrow G_{\mu v}=T_{\mu v}\left(\frac{\pi-2}{2}\right)^{6}\left(\frac{he}{c}\right)$$

$$\mathrm{K}_{\mu v} \quad \Psi_{\mu v}\approx T_{\mu v} \quad G_{\mu v}\Rightarrow \Psi_{\mu v}+\mathrm{R}_{\mu v}-\frac{1}{2}R\mathrm{g}_{\mu v}+\Lambda=\left(\frac{\pi-2}{2}\right)^{6}\left(\frac{he}{c}\right)T_{\mu v}+\mathrm{K}_{\mu v}$$

$$\Rightarrow \mathrm{R}_{\mu v}-\frac{1}{2}R\mathrm{g}_{\mu v}+\Lambda\rightarrow 0\Rightarrow \lambda=\frac{h}{mv}$$

8. Conclusion

Space and time consist of six dimensions. Spatial nature and temporal nature are two states different from each other, similar to matter and anti-matter. Moreover, the triple dimensions of time, and the triple dimensions of space are imaginary from the perspective of the three- dimensional space and the three-dimensional world, respectively. As a result of this pattern, the phenomena in quantum mechanics, classic mechanics and general and special relativity, can be rewritten and described in a very simple framework.

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