The Quantization of General Relativity: Photon Mediates Gravitation

Azzam AlMosallami
The Science Center for Studies and Research
Zurich, Switzerland
EMAIL: a.almosallami71@gmail.com

Abstract
In this paper I propose a quantization of General relativity of Einstein which leads to photon mediates gravitation. My quantization of GR depends on the modified special relativity MSRT which introduces a new interpretation to the Lorentz transformation equations depending on quantum theory (Copenhagen school) [25-27]. My new interpretation to the Lorentz transformation leads to the Lorentz transformation is vacuum energy dependent instead of the relative velocity in Einstein's interpretation to the Lorentz transformation in the SRT. Furthermore my new interpretation leads to the wave-particle duality as in quantum theory, and thus agrees with Heisenberg uncertainty principle. In my proposed quantized force, the force is given as a function of frequency [1]. Where, in this paper I defined the relativistic momentum as a function of frequency equivalent to the relativistic kinetic energy held by a body and time, and then the quantized force is given as the first derivative of the momentum with respect to time. Subsequently I introduce in section (2) Newton's second law as it is relativistic quantized force, and in section (3) I introduce the relativistic quantized inertial force, and then the relativistic quantized gravitational force, and the quantized gravitational time dilation.

Theory

1- The Lorentz Transformation Equations According to the MSRT

In my papers [25-27] I have reached to a new interpretation to the Lorentz transformation equations depending on the concepts, principles and laws of quantum theory (Copenhagen School). In our new interpretation we have found that the Lorentz transformation is vacuum energy dependent, and there is an equivalence between the Lorentz factor and the refractive index in optics. At the same time I have reached in my new interpretation to the wave-particle duality in my MSRT and thus an agreement with the Heisenberg uncertainty principle. In my new interpretation to the Lorentz transformation, it is disappeared in special relativity all the paradoxes; the Twin paradox, Ehrenfest paradox, Ladder paradox and Bell's spaceship paradox. Furthermore, I could reconcile and interpret the experimental results of quantum tunneling and entanglement (spooky action), —Casimir effect, Hartman effect— with the SRT in this paper [25-27].

In order to understand my new interpretation to the Lorentz transformation in my MSRT, let's study this thought experiment; suppose both the earth observer and the observer of the moving train will perform this thought experiment. As in fig. (1), at pylon A the train started at rest to move with constant speed v, and at this moment the observer stationary on the moving train sent a ray of light from back to front the train, and also at this time the observer on the ground sent a ray of light from pylon A to pylon B. The two rays of light are sent along the direction of the velocity of the moving train.

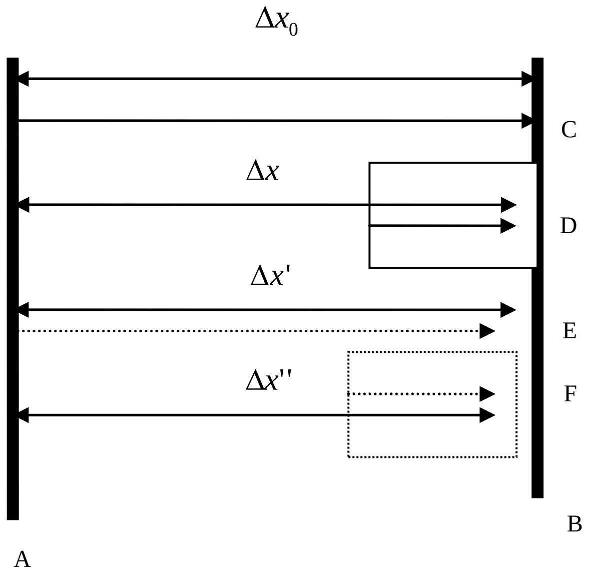

Fig. (1): at the moment that the train started at rest to move with speed v from pylon A to B, a ray of light was sent from pylon A to pylon B and at the same time a ray of light was sent inside the moving train from back to front. The distance between the two pylon is Δx_0.

According to my new Lorentz transformation equations, if the observer on the ground sees the front of the moving train arrives to pylon B and passed the distance Δx_0 between the two pylons, at this moment he sees the light beam which sent from back to front does not arrive to the front, where if the length of the moving train is ΔL, then the light beam is at a distance $\Delta L'$ from the back of the moving train -at point D in fig. (1)- where $\Delta L' = \sqrt{1 - \frac{v^2}{c^2}} \Delta L$.

While, at this moment the observer on the ground sees the ray of light that was sent from pylon A arrives to pylon B at point C at a time separation Δt_0 according to his clock on the ground, where

$$\Delta t_0 = \frac{\Delta x_0}{c} \qquad (1.1)$$

Where c is the speed of light in vacuum. At this moment for the observer on the moving train during the motion, the front of the moving train does not arrive pylon B, but it is still approaching to it, where he sees the front of his moving train is at a distance $\Delta x'$ from pylon A, The dotted line of the train in fig. (1) illustrates the location of the moving train for the rider at the moment of the observer on the ground sees the front of the moving train arrives pylon B, where

$$\Delta x' = \sqrt{1 - \frac{v^2}{c^2}} \Delta x_0 \qquad (1.2)$$

And at this moment for the rider on the moving train, his clock on the moving train registers the time separation $\Delta t'$ where

$$\Delta t' = \sqrt{1 - \frac{v^2}{c^2}} \Delta t_0 \qquad (1.3)$$

Also at this moment the rider sees the light beam which sent from back does not reach the front, where it is still at distance $\Delta L' = \sqrt{1 - \frac{v^2}{c^2}} \Delta L$ from the back (point F in fig, (1)), and he sees at this moment the light beam which sent from pylon A is moving with the same time with light beam which sent from the back (point E in fig (1).

Since the light beam that was sent from back to front is sent in the same direction of the velocity of the moving train, thus for the observer on the ground and from fig. (1) we have

$$\Delta x = \Delta x_0 - v\Delta t_0$$

Since the light speed on the moving train is c the speed of light in vacuum locally for the rider of the moving train, thus from eqs. (1.2) &(1.3) we get

$$\Delta x = \frac{\Delta x'}{\sqrt{1-\frac{v^2}{c^2}}} - \frac{v\Delta t'}{\sqrt{1-\frac{v^2}{c^2}}} \qquad (1.4)$$

And

$$\Delta t = \Delta t_0 - \frac{v\Delta x_0}{c^2}$$

Thus

$$\Delta t = \frac{\Delta t'}{\sqrt{1-\frac{v^2}{c^2}}} - \frac{v\Delta x'}{c^2\sqrt{1-\frac{v^2}{c^2}}} \qquad (1.5)$$

In our new interpretation to the Lorentz transformation in the case of y and z axis we have

$$\Delta y = \frac{\Delta y'}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\Delta z = \frac{\Delta z'}{\sqrt{1-\frac{v^2}{c^2}}}$$

The change in y and z coordinates in my transformation leads to illustrate the negative result in the Michelson-Morley experiment.

This transformation which we adopted illustrated that the Lorentz transformation is vacuum energy dependent. We have seen in my paper [1] that both the rider on the moving train and the observer on the ground will be agreed at the measured length of the moving train to be ΔL same if the train is stationary, and at the same time they will be agreed at the length between the two pylons to be Δx_0 during the motion.

For the rider of the moving train, when he sees the front of his moving train arrives pylon B, he sees also at this moment the light beam which sent from back arrives the front of his moving train and the passed distance at this moment for him is $\Delta x' = \Delta x_0$ in a time separation $\Delta t' = \Delta t_0$ according to his clock on the moving train. And at the same time he sees the light beam which sent from pylon A arrives pylon B, where the light beam which sent from pylon A moves at the same time with the light beam which sent from back to front. At this moment- during the motion- the observer on the ground sees the moving train passed pylon B and it is at a distance $\Delta x = \frac{\Delta x_0}{\sqrt{1-\frac{v^2}{c^2}}}$ from pylon A, and his clock on the ground registered a time separation $\Delta t = \frac{\Delta t_0}{\sqrt{1-\frac{v^2}{c^2}}}$, where at this time the observer on the ground sees the light which sent from back arrives the front of the moving train. According to our interpretation to the

Lorentz transformation, it is impossible during the motion that both observer on the ground and the rider of the moving train agree that the train arrived pylon B at the same time. This is the core of the Heisenberg uncertainty principle when we deal with the four vectors in my new interpretation to the Lorentz transformation.

Now let's propose another thought experiment. Suppose the train moves from pylon A to pylon B and the ray of light is sent from pylon B to pylon A in the opposite direction of the velocity, and at the same time a ray of light is sent inside the moving train from front to back as in fig. (2). According to my MSRT interpretation to the Lorentz transformation, and according to fig. (2), when the train front arrives to pylon B relative to the observer stationary on the ground, at this moment he sees the light beam does not arrive the back of the moving train. If the length of the moving train is ΔL, where ΔL is the same length if the train is stationary for the observer on the ground, then the light beam is at a distance $\Delta L'$ from the front where $\Delta L' = \sqrt{1-\frac{v^2}{c^2}}\Delta L$ (point D in fig. (2)), while he sees at this moment the light beam which sent from pylon B arrives pylon A (point C in fig. (2)). Now, since the light beam is sent in the apposite direction of the velocity of the moving train inside the moving train, then we have

$$\Delta x = \Delta x_0 + v\Delta t_0$$

$$\Delta t = \Delta t_0 + \frac{v\Delta x_0}{c^2}$$

And thus from eqs. (1.2) &(1.3) we get

$$\Delta x = \frac{\Delta x'}{\sqrt{1-\frac{v^2}{c^2}}} + \frac{v\Delta t'}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\Delta t = \frac{\Delta t'}{\sqrt{1-\frac{v^2}{c^2}}} + \frac{v\Delta x'}{c^2\sqrt{1-\frac{v^2}{c^2}}}$$

And

$$\Delta y = \frac{\Delta y'}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\Delta z = \frac{\Delta z'}{\sqrt{1-\frac{v^2}{c^2}}}$$

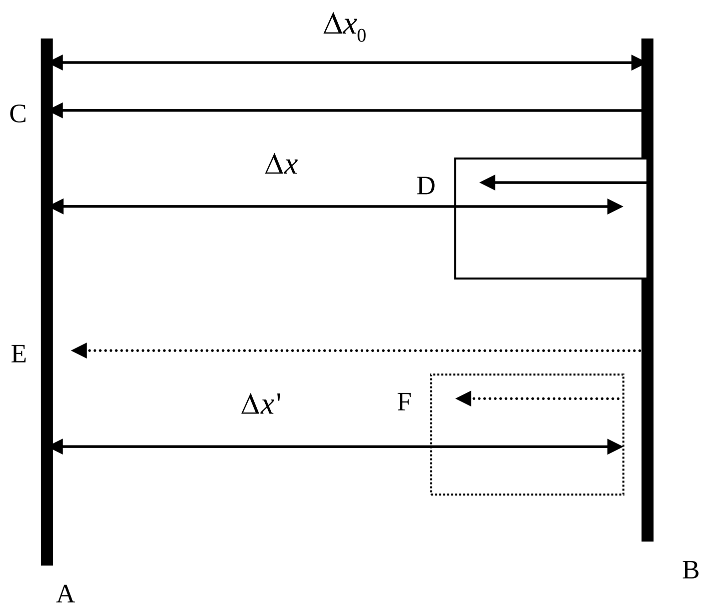

Fig. (2): The train started at rest to move from pylon A to Pylon B. At this moment a light beam was sent from front to back in the opposite direction of the velocity. Also a light beam was sent from pylon B to pylon A.

In my new interpretation to the Lorentz transformation we keep on the consistency of the speed of light locally to be the speed of light in vacuum. In my proposition, I adopted the principle of quantum theory (Copenhagen school) that the observer has the main formation of the phenomenon. And I refuse in my proposition the principle of the objective existence of the phenomenon that is existed in Einstein's SRT and then his interpretation to Lorentz transformation equations [25-27]. In my proposition, both the observer on the ground and the rider of the moving train will agree at the measured length of the moving train to be ΔL same if the train was stationary and then at the measured distance between the two pylons, where each observer creates his own picture about the location of the moving train and the time separation. According to my proposition in my modified relativity I predicted also the rider of the moving train will see the clock of the observer on the ground is moving in a similar rate of his clock motion on the moving train, that means the rider of the moving train sees the events on the ground in his present which are considered as past relative to the observer on the ground.

According to my new interpretation to the Lorentz transformation, we have seen for the observer on the ground, according to his clock, when the light beam is sent from pylon A to pylon B, it takes less time separation than when the light beam is sent from back of the moving train to the front in the same direction of the velocity. Also when the light beam is sent from pylon B to pylon A it takes less time separation than when the light beam is sent from front to back inside the moving in the opposite direction of the velocity of the moving train. In this case we have seen for the observer on the ground the time separation for the light beam to pass the length of the moving train from back to front in the same direction of the velocity is the same time separation for the light beam to pass the length of the moving train from front to back in the opposite direction of the velocity of the moving train according to the clock of the observer on the ground. Thus according to my new interpretation to the Lorentz transformation we have get if the light beam is sent inside the moving in any direction in the x, y, or z, then the measured speed of light c' for the observer on the ground according to his clock is independent on the direction of the velocity of the moving, and thus we get

$$c' = \sqrt{c^2 - v^2} \tag{1.6}$$

Since my new interpretation to the Lorentz transformation leads to the wave-particle duality, thus if the rider inside the moving train is sent a particle of velocity v_p locally which is equivalent to the relativistic kinetic energy E_k, in this case the measured speed of the particle for the observer on the ground inside the moving train according to his clock is v'_p

$$v'_p = \sqrt{1 - \frac{v^2}{c^2}}\ v_p \tag{1.7}$$

Where according to the eq. (1.7) for the observer on the ground the measured velocity of the moving particle inside the moving train is independent of the direction of the velocity of the train same as in the case of the light beam, and it is less than the equivalent velocity of the kinetic energy of the particle.

In the literature of relativity, space-time coordinates and the energy/momentum of a particle are often expressed in four-vector form. They are defined so that the length of a four-vector is invariant under a coordinate transformation. This invariance is associated with physical ideas. The invariance of the space-time four-vector is associated with the fact that the speed of light is a constant. The invariance of the energy-momentum four-vector is associated with the fact that the rest mass of a particle is invariant under coordinate transformations. In our previous thought experiments we proposed a null vector or lightlike. In our previous examples, the null vector for the observer stationary on the moving train according to his coordinates system $c^2\Delta t'^2 - \Delta x'^2 - \Delta y'^2 - \Delta z'^2 = 0$, and then by the Lorentz transformation equations we have also relative to the observer on the ground $c^2\Delta t^2 - \Delta x^2 - \Delta y^2 - \Delta z^2 = 0$. We have seen previously, Lorentz transformation is applied during the motion, and as we have seen in our previous examples, when the observer on the ground sees the front of the moving train arrives to pylon B, at this moment it is impossible that the observer on the moving train sees the front of the moving train arrives pylon B, both of them are not agreed that the front of the moving train arrives to pylon B, and this is the main difference between my MSRT and the SRT of Einstein. According to my MSRT when the observer on the moving train looks at the clock stationary on the ground, he will see the clock on the ground is moving in a similar rate of his clock motion, and since his clock is considered stationary on the moving train, then he will confirm that the clock on ground is stationary also same as his clock on the moving train. From that also he will agree with the observer on the ground on the measured rest mass of the clock. When the clock on the ground moves with speed v on the ground, in this case both the observer on the ground and the observer on the moving train are agreed at measured speed of the moving clock and then the relative measured mass, and the kinetic energy and the momentum, and the clock is moving slower than their clocks and they will agree at the slowing rate. Furthermore according to my MSRT, it is disappeared the Twin paradox, Ehrenfest paradox, Ladder paradox and Bell's spaceship paradox in the special relativity as we have seen in my transformation [25-27].

According to my Lorentz transformation it is possible measuring the velocity of a particle to be faster than light without violation causality [25-27], for example, suppose a plane started at rest to fly from Paris to London, in a speed 0.87c. According to my Lorentz transformation if the observer in London airport sees the plane arrives London airport, then for the pilots and the riders in the plane, they have not arrived London yet, they are still in the middle distance between Paris and London. Now if the observer in London airport could let the plane to be landed and stopped it in the airport of London. Then for the pilots and riders of the plane, they transformed from the middle distance between Paris and London to London airport suddenly at a zero time separation. And if we divided the distance between Paris and London on the time separation according to the clock on the plane we get the plane passed this distance in a speed 1.74c which is faster than light in vacuum. But according to the clock in the airport of London, the plane was not moved in a speed faster than light in vacuum locally. Locally it is impossible exceeding the light speed in vacuum.

The dependence of my transformation on the vacuum energy can be illustrated from the measured relativistic volume of the moving train, where from my Lorentz transformation the measured relativistic volume of the moving train for the observer on the ground is given as

$$V = \Delta x \Delta y \Delta z = \frac{\Delta x' \Delta y' \Delta z'}{\left(1-\frac{v^2}{c^2}\right)^{3/2}} \pm \frac{\Delta y' \Delta z' v \Delta t'}{\left(1-\frac{v^2}{c^2}\right)^{3/2}}$$

Thus

$$V = \frac{V'}{\left(1-\frac{v^2}{c^2}\right)^{3/2}} \pm \frac{A' v \Delta t'}{\left(1-\frac{v^2}{c^2}\right)^{3/2}}$$

Here V is the relativistic volume of the moving train for the observer on the ground, V' is the measured volume locally for the rider of the moving train, and A' is the area of the front or the back of the train Locally for the rider. Since both of the observer on the ground and the rider of the moving train are agreed at the lengths of the moving train in x, y and z direction, thus, the equation above illustrating the increase of the vacuum energy of the moving train for the observer on the ground, and that leads to the Lorentz factor is equivalent to the refractive in optics or the potential in Schrödinger equation in quantum.

My interpretation of the Lorentz transformation illustrates what is the wave-function of Heisenberg who defined it as “it is a mixture between two things, the first is the reality and the second our knowledge to this reality” [1]. My paper “The Comalogical Theory” [29,30] illustrates the philosophical aspects of my modified relativity and how it is related to the Copenhagen school in quantum theory. What I proposed in my Lorentz transformation illustrates what is the interference and diffraction in optics which led to discovering the wave mechanics in quantum theory.

2- Newton’s Second Law in Quantum
The Relativistic Quantized Force

Newton’s Second Law of motion defined that the force acts on a body equals to the product of the rest mass of the body with its acceleration [9], and the acceleration is given as the second derivative for a distance with respect to time. When Einstein reached to his special theory of relativity in 1905, he reached to the measuring of the relativistic mass, which indicates that the mass of the body increased with increasing the speed of the body [4,7,15]. Einstein depends on his relativistic equations derivation on the classical physical conceptions, which depend on the determinism, causality and continuity [11,12], and also depend on the possibility of measuring the velocity and the positionof the particle simultaneously, where the velocity according to Einstein derivation equals to the distance first derivative with respect to time [4,7,11,12,15]. But Heisenberg uncertainty principle assures the impossibility of measuring the velocity and the position simultaneously, and then our dependence that the speed equals to distance first derivative with respect to time is not correct according to the simultaneous measurement for both velocity and position [1,2,5,12,14]. We conclude from that, for measuring the velocity or momentum for any body, we should know the energy equivalent to the relativistic kinetic energy held by this body, or the equivalent frequency for this energy. Since, according to the uncertainty principle, it is possible measuring the momentum and the energy simultaneously, therefore it is possible expressing the momentum in terms of the equivalent frequency of this energy to this body [1,2,5,12,14]. The force that affected on a body is given through the momentum first derivative with respect to time. Subsequently, we can express the momentum of the body in terms of frequency and time, and then we can get the applied force as the first derivative of the momentum with respect of time. Then we get the applied force in terms of equivalent frequency to the energy which coring by the body.

The cycle number of a standing electromagnetic wave in terms of time[8] is given by the relation

$$n = \nu\ t \qquad (2.1)$$

Where n is the cycle number at a time t, and ν is the wave frequency[8]. The time t in eq. (2.1) is defined by the relation

$$t = N\left(\frac{1}{2\nu}\right) \qquad (2.2)$$

where

$$N = 1,\ 2,\ 3,\ \ldots.,\ \frac{2\nu}{\nu_u}$$

Where ν_u is the frequency unit, where $\nu_u = \frac{1}{t_u}$, and t_u is the time unit. From the eqs. (2.1) and (2.2) we get

$$n = \frac{N}{2} \qquad (2.3)$$

We find from eq. (2.3) that n takes the values $\frac{1}{2},\ 1,\ \frac{3}{2},\ 2,\ \ldots..,\ \frac{\nu}{\nu_u}$. Since the frequency is defined as the number in the unit of time, subsequently, when $t = t_u$ in eq. (2.2) we get

$$N = 2\ \nu\ t_u \qquad (2.4)$$

and from this we get

$$n = \frac{\nu}{\nu_u} \qquad (2.5)$$

The energy of the electromagnetic wave is defined by the relation

$$E = h\nu \qquad (2.6)$$

Where E is the energy and h is Plank's constant [5,6], and from eqs. (2.4) and (2.5) we get

$$E = \frac{N}{2}\ h\nu_u = nh\nu_u$$

And by putting $H = h\nu_u$, we get

$$E = N\frac{H}{2} \qquad (2.7)$$

And also

$$E = nH \qquad (2.8)$$

Equation (2.7) indicates that, the energy of the standing electromagnetic wave takes integral value of $\frac{H}{2}$, and from that we can get the minimum energy $E_{\min}$ for the stating electromagnetic wave, and that when $N = 1$, where we get

$$E_{\min} = \frac{H}{2}$$

when the energy value equals to H, it is called $H-energy$, where $H=6.626\times10^{-34}$ joule, and the equivalent mass to the $H-energy$ is given by

$$m_H=\frac{H}{c^2} \tag{2.9}$$

Where m_H is the equivalent mass for $H-energy$, and the equivalent mass is called $H-particle$. The relativistic kinetic energy E_k [15] for a body moving with constant velocity V is given by

$$E_k=\frac{m_0c^2}{\sqrt{1-\frac{V^2}{c^2}}}-m_0c^2$$

And by substituting the value $E_k=nH$ in the last equation we get

$$nH=\frac{n_0H}{\sqrt{1-\frac{V^2}{c^2}}}-n_0H \tag{2.10}$$

And from equation (2.10), we get

$$\frac{n_0}{\sqrt{1-\frac{V^2}{c^2}}}=n_0+n \tag{2.11}$$

multiplying both sides of equation (2.11) by m_H, we get

$$\frac{n_0m_H}{\sqrt{1-\frac{V^2}{c^2}}}=m_H\left(n_0+n\right) \tag{2.12}$$

and from eq. (2.12) $m=\frac{n_0m_H}{\sqrt{1-\frac{V^2}{c^2}}}$, where m is a relativistic mass of the moving body, therefore we get

$$m=m_H\left(n_0+n\right) \tag{2.13}$$

and by solving eq. (2.11) in terms of the velocity, we get

$$V=\pm\sqrt{\frac{n^2+2nn_0}{\left(n+n_0\right)^2}}\;c \tag{2.14}$$

Now, when a body absorbs energy with frequency ν so the velocity of this body in terms of time is given by substituting the value of n from eq. (2.1) in the eq. (2.14), we get

$$V=\pm\left[\frac{\left(\nu\ t\right)^2+2\left(\nu\ t\right)n_0}{[(\nu\ t)+n_0]^2}\right]^{\frac{1}{2}}c \tag{2.15}$$

and also we can express eq. (2.13) in terms of time, where we get

$$m=m_H\,(n_0+\nu\ t) \tag{2.16}$$

The relativistic momentum [21] for a body moving with constant velocity V is given by the relation

$$P=mV$$

where P is the momentum, and from eqs. (2.15) and (2.16) we can get the momentum in terms of time, where we have

$$P = \pm\ m_H\ c\sqrt{(\nu\ t)^2 + (\nu\ t)n_0} \qquad (2.17)$$

Newton's second law of motion is given by the relation

$$F = \frac{dP}{dt}$$

where F is the force. and by a deriving eq. (2.7) with respect of time, we get

$$F = \pm m_H c\left[\frac{\nu^2 t + \nu\ n_0}{\sqrt{(\nu\ t)^2 + 2(\nu\ t)n_0}}\right] \qquad (2.18)$$

and by multiplying equation (18) by $\frac{c}{c}$ we get

$$F = \pm\ m_H c^2\left[\frac{(\nu\ t) + n_0}{\sqrt{(\nu\ t)^2 + 2(\nu\ t)n_0}}\right]\frac{1}{c} \qquad (2.19)$$

and from eq. (2.15) we have $\frac{1}{V} = \left[\frac{(\nu\ t) + n_0}{\sqrt{(\nu\ t)^2 + 2(\nu\ t)n_0}}\right]\frac{1}{c}$, and from eq. (2.9), we have $H = m_H c^2$. Now by substituting these value in (2.19) we get

$$F = \pm\frac{H\nu}{V} \qquad (2.20)$$

Equation (2.20) expresses about the affected force on a body, when the body changes its velocity from zero to V , when it absorbs a photon with frequency ν, and we find the dimension of eq. (2.20) is MLT^{-2} which means force, and by taking the positive value of eq. (2.20), we get

$$F = \frac{H\nu}{V} \qquad (2.21)$$

Equation (2.21) agrees with the equation of describing the momentum of the photon in quantum theory, where the momentum of a photon is $P = \frac{h\nu}{c}$, and this agrees with the core of wave-particle duality.

Now suppose a body starts at rest $(V = 0)$, and after it absorbed a photon with frequency ν_1, its velocity became V_1, and according to the eq. (2.21), the force affected on the body is F_1 , where $F_1 = \frac{H\nu_1}{V_1}$ and then after it absorbed another photon with frequency ν_2 therefore the body should move with a total velocity V (because of the absorption the two photons ν_1 and ν_2). So the total force affected on the body is $F = \frac{H(\nu_1 + \nu_2)}{V}$. The affected force on the body as a result of the absorption of the second photon ν_2 is F_2 where

$$F_2 = F - F_1 \qquad (2.22)$$

3- The Relativistic Quantized Inertial Force, The Relativistic Quantized gravitational Force

3.*1 The relativistic Quantized Inertail Force*

As we know from the Quantum Theory that the energy is photons having a rest mass equals to zero [1,2,5,12,14]. We can express the photon energy by the relation

$$E = h\nu \tag{3.1}$$

Where E is the photon energy, h is plank's constant and ν is the wave frequency [5,6]. And from the equivalent of mass and energy, we can get the equivalent mass m to a photon having energy E as

$$m = \frac{h\nu}{c^2} \tag{3.2}$$

Now suppose a train moving with constant velocity V (we use in this section and the others V-capital letter to define the velocity, and ν to define to the frequency), as we have from the special relativity theory of Einstein the clock motion of this train should be slower than the clock motion of the earth observer according to reference frame of the earth surface which agrees with my Lorentz transformation, whereas if the earth observer measured the time interval Δt via his earth clock, then he will measure the time interval $\Delta t'$ via the clock of moving train, where $\Delta t' = \sqrt{1-\frac{V^2}{c^2}}\ \Delta t$ [16]. And the wave frequency is defined as the cycle number in a unit of time, subsequently the wave frequency which exists on the earth surface according to the earth observer is given by the relation

$$\nu = \frac{1}{\Delta t_0} \tag{3.3}$$

And now if this wave entered inside the moving train, then, the wave frequency becomes ν' according to the earth observer, where

$$\nu' = \frac{1}{\Delta t} = \frac{\sqrt{1-\frac{V^2}{c^2}}}{\Delta t_0}$$

And from that we get

$$\nu' = \sqrt{1-\frac{V^2}{c^2}}\ \nu \tag{3.4}$$

Equation (3.4) indicates that the wave frequency inside the moving train should be less than outside the train on the earth surface by the factor of $\sqrt{1-\frac{V^2}{c^2}}$. Subsequently the endured energy E' through this photon inside the train is given by

$$E' = h\nu' = \sqrt{1-\frac{V^2}{c^2}}\ h\nu$$

And from equation (3.1), we get

$$E' = \sqrt{1-\frac{V^2}{c^2}}\; E \tag{3.5}$$

Equation (3.5) represents the endured energy inside the frame of the moving train according to the reference frame of the earth surface in terms of the photon energy E. The difference of the endured energy ΔE of the moving train from its rest on the earth surface and its motion with constant velocity V is given by the relation

$$\Delta E = E\left[1-\sqrt{1-\frac{V^2}{c^2}}\right] \tag{3.6}$$

We have reached in section 2 to a new formula for understanding the quantization of force, where the force acts on the body when its velocity changes from zero to V is given by the relation $F = \frac{H\nu}{V}$

Now suppose a static train on the earth surface and a rider is living inside it, Now if this train absorbs an energy of frequency ν, then the speed of this train will change from $0 \; to \; V$, thus, the affected force on this train is given by the relation $F = \frac{H\nu}{V}$ according to the static earth observer, in this case there is a force affected on the rider push him to the opposite direction of the train speed. This force is called "inertial force". Subsequently, according to this force the rider speed should be changed from $0 \; to \; V_r$, whereas in this case V_r should be equal to V (the speed of the train). We can get this change of the velocity of the train rider from $0 \; to \; V_r$ under the affect of inertial force whereas V_r should be equal to V by applying the two conditions

1- The kinetic energy E_k that is equivalent to the rider's speed V_r is given as

$$E_k = E_0(1-\gamma^{-1})$$

Where $\gamma^{-1} = \sqrt{1-\frac{V^2}{c^2}}$, and E_0 is the equivalent energy of the rider rest mass, where $E_0 = m_0 c^2$. We can express the kinetic energy in the last equation in the terms of the number of $H-energy$, where we have

$$n = n_0(1-\gamma^{-1}) \tag{3.7}$$

Where n is the number of $H-energy$ which is equivalent to the kinetic energy, and n_0 is the number of $H-particle$ or the number of the $H-energy$ which equivalent to the rider rest mass.

2- The endured rest mass inside the train in terms of the rider's rest mass is m_0' given according to eq. (3.5), where we have

$$m_0' = \gamma^{-1} m_0$$

And we can express the last equation in terms of $H-particle$ or $H-energy$, where we have

$$n_0' = \gamma^{-1} n_0$$

Where n_0 is the number of $H-particle$ or the number of $H-energy$ which is equivalent to the endured rest mass , thus, from eq. (3.7) we can write the last equation as

$$n_0' = n_0 - n$$

Now according to these two conditions, we can get the measured speed V_r of a rider under the affect of the inertial force according to the observer inside the train by equation (2.14), where we have

$$V_r = \sqrt{\frac{n^2 + 2nn_0'}{(n+n_0')^2}}\ c = \sqrt{\frac{n^2 + 2n(n_0 - n)}{[n+(n_0 - n)]^2}}\ c$$

by substituting $n_0' = n_0 - n$, we get

$$V_r = \sqrt{\frac{2nn_0 - n^2}{n_0^{\ 2}}}\ c = \sqrt{\frac{2n}{n_0} - \frac{n^2}{n_0^{\ 2}}}\ c$$

And from eq. (3.7) we get

$$V_r = \sqrt{\frac{2n_0(1-\gamma^{-1})}{n_0} - \frac{n_0^{\ 2}(1-\gamma^{-1})^2}{n_0^{\ 2}}}\ c$$

And from that we get

$$V_r = \sqrt{1-\gamma^{-2}}\ c \tag{3.8}$$

And by substituting the value of $R^{-2} = 1 - \dfrac{V^2}{c^2}$ in the last equation we get

$$V_r = V \tag{3.9}$$

We get from eq. (3.9) that the change in the measurement of the train rider speed under the effect of the inertial force is from $0\ to\ V$ locally and it is the same change in the train speed but it in the opposite direction. Therefore we get the inertial force F_i which acts on the train rider locally, whereas from eq. (2.21) we have

$$F_i = \frac{H\nu}{V} = \frac{H\nu_0(1-\gamma^{-1})}{V} \tag{3.10}$$

Now for an observer if the change of the speed of the rider locally under the effect of the inertial is force is from $0\ to\ V$, then for the observer on the ground the change of the speed of the rider is from 0 to $\gamma^{-1}V$ as from eq. (1.7), thus the measured inertial force affected on the rider of the train is given as

$$F_i' = \frac{H\nu_0(1-\gamma^{-1})}{\gamma^{-1}V} \tag{3.11}$$

3.2 The Relativistic Quantized Gravitational Force and the Quantized Gravitational Time Dilation

The relativistic quantized inertial force locally is given according to the equation (3.10), where

$$F_i = \frac{H\nu_0(1-\gamma^{-1})}{V}$$

Now, according to the equivalence principle of Einstein [17,18], the gravitational force is equivalent to the inertial force, thus we can use equation (3.10) for computing the gravitational force. Here $V = V_{escape}$ locally as in eq. (3.8).

Now if a body is located at a gravitational field, thus the energy that is held by the body is E given by the eq. (3.6), where

$$E = m_0 c^2 (1 - \gamma^{-1}) \quad (3.12)$$

Now if we consider this energy is equal to the gravitation potential energy, from that we get

$$\frac{GMm_0}{r} = m_0 c^2 (1 - \gamma^{-1})$$

G is the gravitational constant
M is the mass of the gravitational field
m is the mass of the body
r is the distance between the body and the mass M

Thus we can solve the equation above to get the factor γ^{-1} of the gravity where

$$\gamma^{-1} = 1 - \frac{GM}{c^2 r} \quad (3.13)$$

From that we can get the gravitational time dilation, whereas if a clock is located at a distance r from the center of the mass M, thus the time that is measured by this clock is $\Delta t'$ compared to the time Δt of a clock located far a way from the mass M, whereas

$$\Delta t' = \gamma^{-1} \Delta t$$

Thus

$$\Delta t' = \left[1 - \frac{GM}{c^2 r} \right] \Delta t \quad (3.13)$$

Now if we consider $\gamma^{-1} = 0$, then we can compute the radius that the mass should be compressed to be transformed to a block hole. This radius is known as Schwarzschild radius. Thus

$$1 - \frac{GM}{c^2 r} = 0$$

Thus

$$r_s = \frac{GM}{c^2} \quad (3.14)$$

Whereas r_s is Schwarzschild radius[22].

Now we can compute r_s for the earth where

$$r_s = 0.00443184m$$

Schwarzschild's calculated gravitational radius according to GR differs from this result by a factor of 2 and is coincidently equal to the non-relativistic non-quantized escape expression velocity.

Whereas for the earth $\gamma^{-1} = 1 - \frac{GM}{C^2 R}$, where R is the radius of the earth, and M is its mass.

Thus by taken

$$M = 5.98 \times 10^{24} kg$$

$$G = 6.67 \times 10^{-11} N \ m^2 kg^{-2}$$

$$R = 6.38 \times 10^6 m$$

$$C = 3.0 \times 10^8 m/s$$

Then $\gamma^{-1} = 1 - (6.95 \times 10^{-10}) \approx 0.99999999305353$

From that we can get the gravitational time dilation of clock1 located on the earth surface comparing to clock2 located far a way from the earth gravity as in equation (2.3) whereas

$\Delta t' = 0.99999999\ 93053535\ \Delta t$

From that if the clock2 registered one second, at this moment clock1 will register 0.9999999993053535 second. In this case the difference of time is 6.946646×10^{-10} second. In our theory the time dilation of the clock on the earth surface is produced as the clock on the ground is moving with speed equals to the escape velocity, which is agreed completely with the core of the The Pound-Rebka Experiment. Proponents of the theory of General Relativity offer three different conflicting explanations of these results that are said to be equivalent to each other and therefore all equally correct. All make the claim that the results of the Pound-Rebka Experiment are “proof” of the Equivalence Principle even though nothing in these measurements suggests any need for the Equivalence Principle.

The relativistic escape velocity locally of a body to be free from the earth gravity is given by equation (3.8), where $V_{escape} = \sqrt{1-\gamma^{-2}}c$. Thus the relativistic escape velocity locally on the earth is $V_{escape} = 11182$ m/s. The force that is exerted on a body of mass 1 kg to move from 0 to V_{escape} locally is given by the equation (3.10) where $F = 5590.98$ newtons. This result is half the classical result. That refers to the relativistic quantized derivation of the momentum in my model [5,6] which leads to the group velocity is half the classical velocity. For an observer located faraway from the gravitational field, the measured escape velocity for an objected located on earth is less than the escape velocity locally by a factor of γ^{-1} as in eq. (1.7), where it is equal to

$$V'_{escape} = \gamma^{-1}\sqrt{1-\gamma^{-2}}c \qquad (3.14)$$

This equation can be derived by the Schwarzschild geometry in GR in the case of freely falling particle in weak gravity. Where, in the case of the Schwarzschild solution it is consistent in the case of weak gravitational field which is equivalent to non-relativistic change in speed. Where, eq. (3.14) can be approximated to the Schwarzschild solution in the case of weak gravitational field. My proposed solution to the exact solution of the Pioneer anomaly is a good prove to the success of my quantized gravitation force [28]. Furthermore in the Einstein’s solution of light bending by gravity depending on the Schwarzschild geometry illustrated the change of light speed by gravity, which agrees with my proposed interpretation of the Lorentz transformation as in eq. (1.6). Einstein believed the change of the speed of light in gravity, but he could not interpret that according to his interpretation to the Lorentz in SRT, which required the constancy of the speed of light.

Suppose a particle fell in a Schwarzschild radius, thus according to my equivalence principle, that is equivalent as the velocity of the moving train changes from 0 to c the speed of the light in vacuum, and thus the velocity of the rider will change locally from 0 to c also. Thus the applied force F_g on the particle locally in a Schwarzschild radius is given according to eq. (3.10) where

$$F_g = \frac{H\nu_0}{c}$$

Here ν_0 is the equivalent frequency of the rest mass energy of the particle. Where in the Schwarzschild radius from eq. (3.12) all the rest mass will change to photons, and thus the applied gravitational force locally on the particle equals to the force of light as in the equation above. Now, for an observer located faraway from the black hole, and from eqs. (1.6) &(1.7), if the inertial force let the velocity of rider of the train to change from 0 to c locally, then for the observer on the ground the change of the velocity of the rider under the effect of the inertial will be from 0 to $\sqrt{1-\frac{V^2}{c^2}}c = 0$.

Thus from eq. (3.11), the applied gravitational force on the particle located in the Schwarzschild radius is equal to infinity. The Schwarzschild radius in my theory is given in eq. (3.14). Finally, as we have seen in my proposed quantization of General relativity of Einstein, There is no graviton! photon mediates gravitation!

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