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A New Approach to Quantum Gravity Based on Classical Gravitational Red Shift using String Theory

Babak Dion, M.D.,

Canadian Iranian Amateur Physicist, Toronto, Canada

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Abstract: This paper is my approach to Gravity in the Quantum World, and it is based on a new explanation for Classical Gravitational Red Shift, considering a role for strings in space-time. Gravity in the quantum world comes out to be a frictional force, weight of elementary particles driven from the quantum mechanical wave function, along with quantum potential is obtained. Einstein's Tensor is linked to string dynamics and the quantum world. Space-time appears not to be a Super-Conductor of gravitons and the range of gravity becomes dependent on the inverse of space density, which corrects Sir Newton's Law of General Gravity. It is also shown that it is safer to pass through more massive blackhole singularities than lower mass blackholes. A Modified Pound-Rebka experiment will prove this theory.

Keywords: Quantum Gravity, Range of Gravity, Weight of Photons

INTRODUCTION

A new description for Classical Gravitational Red Shift is to propose that the non-relative energy shift the photon experiences in this phenomenon is used to overcome the quantum friction of the first superstring of space-time at the surface of the sun. I name this new non-relative phenomenon "Quantum Frictional Red Shift" (QFRS).

2. QUANTUM FRICTIONAL RED SHIFT (QFRS)

The energy (φ) the photon (electromagnetic wave) loses in this phenomenon is proportional to the superstring energy (e), cosine of the angle (θ) between the photon and string and the inverse of the photon wavelength (λ).

$$\varphi \propto \frac{e\cos(\theta)}{\lambda} \quad \ldots (1)$$

The proportional constant must have length dimension, so I suppose it is the sun's radius (R).

$$\varphi = \frac{Re\cos(\theta)}{\lambda} \quad \ldots (2)$$

Frictional force (F_f) is the gradient of frictional energy so:

$$F_f = -\nabla\varphi = -\frac{d\varphi}{dR} = -\frac{e\cos(\theta)}{\lambda} \quad \ldots (3)$$

According to de Broglie's [1] equation for the photon wavelength:

$$\lambda = \frac{\hbar}{mc} \quad \ldots (4)$$

$$F_f = -\frac{emc\cos(\theta)}{\hbar} \quad \ldots (5)$$

"e" could be replaced by Covariant Hamiltonian in String Theory [2]:

$$F_f = \frac{T_0 mc\cos(\theta)}{2\hbar}\int_0^{\pi} d\sigma\left(\dot{X}^2 + X'^2\right) \quad \ldots (6)$$

X = string world sheet coordinates

σ = spatial coordinates

. = proper time τ differential "dτ"

` = spatial σ differential "dσ"

For string length (ℓ) and Tension (T_0) [2]:

$$T_0 = \frac{\hbar c}{2\pi\ell^2} \quad \ldots (7)$$

$$F_f = \frac{mc^2 \cos(\theta)}{4\pi \ell^2} \int_0^{\pi} d\sigma \left(\dot{X}^2 + X'^2 \right) \quad \text{... (8)}$$

"F_f" is the frictional force in this effect and "mc^2" is the energy of the photon in friction with the superstring.

In classical physics consider the equation for frictional force and friction coefficient:

$$F_f = \mu F_N \quad \text{... (9)}$$

I shall consider that the same equation holds for quantum friction in string theory and quantum mechanics.

Classical Friction coefficient should be replaced by a quantum coefficient (μ_Q):

$$F_f = \mu_Q F_N \quad \text{... (10)}$$

Considering equation (5):

$$\frac{emc\cos(\theta)}{\hbar} = mg\,\mu_Q \quad \text{... (11)}$$

For $\theta = 0^\circ$, $\cos 0^\circ = 1$:

$$\mu_Q = \frac{ec}{g\hbar} \quad \text{... (12)}$$

μ_Q = Quantum Friction Coefficient of the string

g = Gravitational acceleration at the surface of the sun.

e = Vibrating energy of the string in friction.

The normal force F_N is the weight of the object in classical physics and is equivalent to the weight of the photon or non-charged particle, the Quantum Gravity "F_Q" we are seeking is obtained by dividing F_f by μ_Q:

$$F_N = F_Q = \frac{F_f}{\mu_Q} = -\frac{m\,c^2 \cos(\theta)}{4\pi\ell^2} \frac{1}{\mu_Q} \int_0^{\pi} d\sigma \left(\dot{X}^2 + X'^2 \right) \quad \text{... (13)}$$

$$F_Q = -\frac{mcg\hbar\cos(\theta)}{4\pi \ell^3 T_0} \int_0^{\pi} d\sigma \left(\dot{X}^2 + X'^2 \right) \quad \text{... (14)}$$

Consider momentum operator [1]: $mc = P = -i\hbar\nabla$

$$F_Q = \frac{ig\,\hbar\cos(\theta)}{2\,c\,\lambda}\nabla\psi\int_0^{\pi} d\sigma\left(\dot{X}^2 + X'^2\right) \quad \ldots (15)$$

λ = wavelength of the photon

ψ = quantum mechanical wave function of the photon or particle

g = gravitational acceleration of star or planet which is 9.8 m/s^2 for Earth.

$F_Q = 0$ if the Virasoro constraint $\dot{X}^2 + X'^2 = 0$ holds and gravity is defied.

Quantum Potential (V_Q):

$$V_Q = \int F_Q\, dR = \frac{ig\,\hbar\cos(\theta)}{2\,c\,\lambda}\psi\int_0^{\pi} d\sigma\left(\dot{X}^2 + X'^2\right) \quad \ldots (16)$$

New photon wavelength "λ_2" after QFRS:

$$\lambda_2 = \frac{\hbar c\lambda_1}{\hbar c - Re} \quad \ldots (17)$$

3. RELATIVISTIC DERIVATION OF THE QUANTUM GRAVITY EQUATION

In equation 13 instead of photon energy, I could insert the energy momentum tensor according to Einstein's field equation [3]:

$$mc^2 \rightarrow T_{ab} \quad \ldots (18)$$

$$G_{ab} = R_{ab} - \frac{1}{2}\,g_{ab}\,R \quad \ldots (19)$$

$$G_{ab} = k\,T_{ab} \quad \ldots (20)$$

$$R_{ab} - \frac{1}{2}\,g_{ab}R + \Lambda g_{ab} = \frac{16\pi\ell^3}{\lambda\int_0^{\pi}\left(\dot{X}^2 + X'^2\right)d\sigma\sqrt{1 - \frac{v_\perp^2}{c^2}}} \quad \ldots (21)$$

Λ= Cosmological Constant

R_{ab} =Ricci tensor

R= Ricci scalar

g_{ab}= Metric Tensor

ℓ = String length

λ = Photon Wavelength
$v_{\perp}$ = String end point velocity

This was Einstein's Dream!

4. SPACE-TIME IS NOT A SUPER-CONDUCTOR OF GRAVITY & GRAVITONS

As we know according to the Law of General Gravity the Range of Gravity is infinite, also based on the rest mass of the Graviton, which is zero, the gravitational range must be infinite. But space-time may not be a Super-Conductor of Gravitons. Let quantum frictional force be equal to classical frictional force considering quantum friction coefficient:

$$\frac{emc}{\hbar} = mg\,\mu_Q \qquad \text{... (22)}$$

$$\frac{ec}{\hbar} = \frac{GM\,\mu_Q}{R^2} \qquad \text{… (23)}$$

Space-time is assumed to be filled with a gas of open superstrings that are the remnants of the huge cosmic string when the big bang happened, and space density (ρ) is determined by the vibrating energy of each string according to the following equation:

$$e = \hbar\sqrt{G\pi\rho} \qquad \text{… (24)}$$

Considering equation 24, solving equation 23 for "R" we get the range of gravity, which the explanation comes after the simplification of the equation below:

$$R_{rog} = \sqrt{\frac{M\,\mu_Q}{c}}\ \sqrt[4]{\frac{G}{\pi\rho}} \qquad \text{... (25)}$$

R_{rog} = Range of Gravity for the Sun.

ρ = Superstring gas density which fills space-time.

μ_Q = Quantum Friction Coefficient of Space-String.

M = Solar Mass.

R= Solar Radius.

Please pay attention that in equation 25 the right-hand side root sign is a quad root.

Newtonian Potential for a photon:

$$\varphi = \frac{MG\hbar}{Rc\lambda} \quad \ldots (26)$$

Consider equation 2 and let it be equal to equation 26:

$$\varphi = \frac{Re}{\lambda} = \frac{GMh}{Rc\lambda} \quad \ldots (27)$$

Solve equation 27 for "e":

$$e = \frac{GM\hbar}{RcR'} \quad \ldots (28)$$

"e" is the vibrating energy of a single string at the distance R` from center of star or planet with mass "M" and radius "R". Considering equation 28, I could simplify equation 25 to equation 29 for the range of gravity.

$$R_{rog} = \frac{M}{Rc}\sqrt{\frac{G}{\pi\rho}} \quad \ldots (29)$$

Now I must convince you that "R_{rog}" is the Range of Gravity for a star with mass "M" surrounded by string gas with density (ρ).

When I set my frictional gravity equation equal to classical friction, in fact I am pulling a test mass from two sides at "R" from the sun. One side is the Sun, and the other side is the center of Milky Way. At some unknown distance from the sun these two forces become equal, and the resultant becomes zero, so the test mass is released from the gravitational effect of the two sources of gravity. Even though the center of Milky Way has a known direction, since gravity in the Planck scale (One String Scale) is a scalar the test mass could be tricked not to know from which direction the force is coming from and this resultant of two forces could be assumed to be isotropic.

So, we have an egg-shaped field that at its borders, sun's gravitational pull becomes eliminated, and "R_{rog}" being the radius of this field since it is independent of the test mass, is the Gravity Range for the Sun. But truly this equation is telling me that the distance "R_{rog}" being the range is induced by an effect of space-time on the sun's gravitons and from the surface of the sun to the border of the range, gravitons from the sun are eliminated by space strings and this statistical effect eliminates %100 of sun's gravitons when they travel R_{rog}.

This space-time effect is a statistical knockout of gravitons. Just a reminder that in Frictional Red Shift for the photons there is a friction only between the photon and the first string at the sun's surface, because if the friction happened for other strings on the path, we would not receive sunlight and the sun would be dark. But for gravitons this or statistical knockout happens for many space strings and that is why gravitons do not reach infinity! The graviton range would be infinite only if ρ =0 which doesn't seem to be so! Light is a gas of open strings which based on this concept should block gravity but only if photons and gravitons travel in opposite directions, that is why sunlight does not block its gravity but light from other stars block Sun's gravity.

Classical gravity should be corrected as follows:

$$F_{Classic} = \frac{GMm}{R^2}\left[1 - \frac{Y}{R_{rog}}\right]^D \quad \text{... (30)}$$

R = distance in between the *center* of two masses

Y= distance in between the *surface* of two masses

D = gravity vector effective dimension =1

R_{rog} =Larger mass gravity range

When two masses are tangent (touching each other), Y=0 and "F" becomes Newtonian Gravity, also if space density is absolute zero Newtonian Gravity governs the universe, but space contains light which is a gas of open strings and space density cannot be absolute zero. So, the Newtonian Theory of Gravity fails.

Gravity is eliminated (F=0) when Y= R_{rog}.

The Sun is located 28000 lightyears away from the center of Milky Way galaxy, according to equation 29 space density in the Milky Way cannot be more than three times the critical density of the universe to satisfy Sir Newton's third law of motion!

5. THE BLACK HOLE EVENT HORIZON AND SINGULARITY MIGHT BE SAFE TO PASS THROUGH!

In General Relativity [3], Albert Einstein proves that the gravitational field of a black hole is intense which tears apart any object, but now we know that gravity is a frictional force between a space string and an object. The effective length of a string (ℓ) at the surface and event horizon of a black hole depends on the escape velocity according to equation 31:

$$\ell_{effective} = \ell_s \sqrt{1 - \frac{v^2}{c^2}} \quad \text{... (31)}$$

$v = \sqrt{2gR}$ *escape velocity*

For the event horizon $\ell_{effective} = 0$ and there are no strings in the event horizon and blackholes are hollow objects except for the singularity which has a string. If there are no strings, then there is no frictional force and an object at the event horizon will not experience force and can safely move to the singularity.

At the singularity there is a string with an energy of Mc^2 of blackhole. Passing through the singularity is difficult but possible, the frictional force is intense but if the singularity string oscillates on a flat disk, if we fall vertical to the disk then $\theta = 90^\circ$ and $\cos 90^\circ = 0$, so the immense force will be multiplied by zero and our traveler will not experience any force and pass safely through the singularity. Also, according to equation 32, the more massive the blackhole gets, the less its gravitational force at the singularity becomes!

The gravitational force at the singularity is:

$$F_{Singularity} = \frac{mc^4 \cos(\theta)}{4MG} \quad \text{... (32)}$$

If $\theta = 90^\circ$, then F = 0.

M = Blackhole mass

m = astronaut mass falling in to the blackhole.

c^4/G = Planck Force

6. CONCLUSION

This has been my derivation of Quantum Gravity, I am sure experiments will come to mind to prove QFRS, such as a ***Modified*** Pound-Rebka Experiment in which the detector and emitter of Gamma ray are brought close and made tangent (zero height) to eliminate Einstein's Red Shift, which will appear as a **first blue** shift. Then rotating the whole apparatus by $\theta=90^\circ$ to make the beam horizontal which eliminates QFRS and causes the **second blue** shift, if detected in this classical experiment it will prove the classical aspect of QFRS.

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*** Corresponding author: Babak Dion, M.D.,**

Canadian Iranian Amateur Physicist, Toronto, Canada

E-mail: babakdion@gmail.com

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