On the Origin of Gravity and Inverse Gravity

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Abstract

We derived the gravity through the quantum form of force and shown, it will not have Planck constants in this scenario. We found an expression to relate the mass of body to its corresponding gravitational wave's wavelength, which leads us a new expression for force which is just inverse of classical gravity. Inverse in the sense, force is directly proportional to square of distance and inversely proportional to square of mass. It has been shown that this inverse gravity is responsible for Hawking radiation and particle creations by black holes, probably this force leads to the explosions of black holes.

Key words: gravity, inverse gravity, Hawking Temperature, black hole, gravitational wave,

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1. Introduction

There are four fundamental forces in nature namely strong nuclear force, weak force, electrostatic and the gravity[1], which is most fundamental force of nature[1] and regulate the universe[2]. It is actually long range force although it is tested for some millimeter range. It is well defined by classical mechanics but its origin is still to be revealed. Newton proposed this force empirically so the physics behind its origin is not clear. Physicists are trying to find the origin of this force but none got success, its origin is still a mystery, however, other alternative theories has been proposed[3]. Recently, the thermodynamic aspect of gravity comes in light and suggested that gravity is emergent in its nature[4],[5].

This work is also devote to explore the origin of gravity but, we follow different route, it has been shown that, quantum form of force is a function of mass and space[6], however, we made an assumption that is there any possibility of some kind of new form of force which may be function of both mass and space simultaneously, and this assumption leads us to derivation of new expression of force which is recognized later as Newton's gravity. Surprisingly, it has been found that, we used quantum form of force which has Planck constants to derive the gravity but the derived expression for force is free from this constant, and work suggest it can not be quantized at all. In this manuscript first we discussed about the quantum form of force and later gravity has been derived.

2. Origin of Gravity

As it has been shown[6] that two photon are placed in R distance apart to each other thus the force *(F)* between these photons will be,

$$F = \frac{\hbar c}{R^2} \tag{1}$$

where all constants are holding its usual meanings. This shows the force is only function of distance or space thus if we substitute the Compton's equation $R = \frac{\hbar}{mc}$ where $\lambda = 2\pi R$, we will get another expression for force in term of mass, that is,

$$F = \frac{m^2 c^3}{\hbar} \tag{2}$$

This shows the force depends on mass just and it is quantized as well. This expression is for a force which is arises due to quantum mass exchange.

From these two equations its clear that force is either function of mass ($\boldsymbol{m}$) or space ($\boldsymbol{R}$), however, we assume that, are there any kind of force which depends on both $\boldsymbol{m}$ and $\boldsymbol{R}$ simultaneously or free from these variables? These can be derived if we multiply and divide the eq. (2) by a factor R^2 therefore by separating the constants and variables; we will get following equation,

$$F = \frac{m^2}{R^2} \times \frac{c^3 R^2}{\hbar} \tag{3}$$

here we assume the second part of this equation is a constant G, of course it will be recognized as universal gravitational constant later, however, it will be as followings,

$$G = \frac{c^3 R^2}{\hbar} \tag{4}$$

thus eq. (3) is a expression for Newton's universal gravitational force itself,

$$F = G\frac{m^2}{R^2} \tag{5}$$

we restored the classical gravity and one can say that this force arises due to joint effect of mass and space simultaneously therefore by substitute eq. (4) in eq. (1) there is another expressions for force which is,

$$F = \frac{c^4}{G} \tag{6}$$

this shows the force is constant since it is independent of any variable, this expression also comes in Einstein Tensor. It is constant force of nature and by product of gravity.

Now it is clear, we have four types of expression for forces and all are different to each other. The eq. (1) that is only function of distance or space, the eq. (2) that is only function of mass and eq. (5) is function of both mass and distance while eq. (6) is function of none and a constant just. These forces can be shown in a diagram with respect to its dependency on variables ***R*** and ***m*** to explain and understand it easily, thus

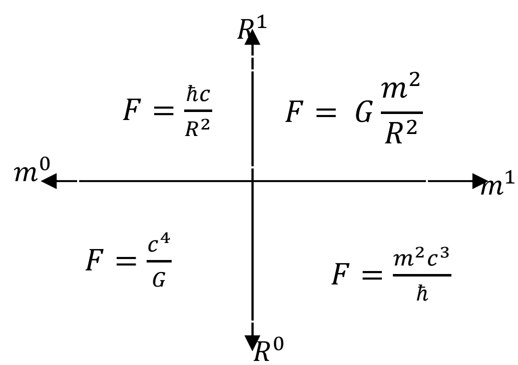

Fig. 1: expressions of force in *m* and *R* coordinates, the m^o means mass absent and m^1 for presence and similar explanation for *R*

3. The Gravity and strengths

Here one can notice that the gravity dependents on both mass and distance or space thus one oblivious question arise, why the gravitational force has both ***m*** and ***R*** term? There are three points to justify it; first, it has been shown that force is either a function of either ***m*** or ***R*** as shown in eq. (1) and (2) thus it may be depend on both simultaneously. Second argument comes from a mathematical expression $F = \frac{E}{R}$, if $E = mc^2$, it leads us to a relation, $F \propto \frac{m}{R}$. The last argument is that, if we multiply eq. (1) and (2) each other we will get the a equation as written below,

$$F^2 = \frac{m^2c^3}{\hbar} \times \frac{\hbar c}{R^2} \tag{7}$$

if we separate variables and constant and applying a universal constant G, we will get

$$F^2 = G\frac{m^2}{R^2} \times \frac{c^4}{G} \tag{8}$$

this is just equal to an equation what can be generated if we multiply eq. (5) and (6) each other, however, these are mathematically equivalent and both of these equations shows mathematically $F \propto \frac{m^2}{R^2}$ this leads us to existence of some kind of new force which is of course, gravitational force.

If we assumed *F = 1*(as we assumed in our previous article to derive the theoretical mass of proton [1]) then through eq. (8) one can understand easily why the gravity is so weak since the second term of RHS of this equation is constant and its numerical amount is order of $\sim 10^{42}$ thus eq. (8) will be equal to unit, however, the gravity must be the order of $\sim 10^{-42}$, clearly it is numerically very weak respect to strong nuclear force[6].

4. Gravity and gravitational wave – mass relation

Now the point is, the eq. (1) and (2) gives us the relation between the mass and its corresponding wave's wavelength, the Compton's relation thus we believe, there must also be a certain kind of relation which relates the eq. (5) and (6) and this can be derived it if we compare these both equations i.e.,

$$G\frac{m^2}{R^2} = \frac{c^4}{G} \tag{9}$$

if we simplify we will get,

$$\frac{m}{R} = \frac{c^2}{G} \tag{10}$$

on analogy to Compton's relation, we can say, the eq. (10) shows the relation between the mass of body and its corresponding gravitational wave's wavelengths. If this analogy will follow then we can determine the mass of massive black hole once we have measured its gravitational wave's wavelength.

Another important aspect of this equation is that, if we insert $R = \frac{\hbar}{mc}$ in this equation we will get the Planck mass and Planck length thus we can conclude that at the Planck scale the wavelength of electromagnetic wave will be equal to its gravitational wave's wavelengths. This will change the explanation and perspective of Planck length and Planck mass[7].

5. Hawking radiation

Hawking shown that, black hole emits radiation and it has certain temperature, however, the Hawking's radiation power[8] can be derived if we substitute the eq. (10) in eq. (1), therefore, one can get following equation,

$$F = \frac{\hbar c^5}{G^2 m^2} \tag{11}$$

this gives the power of radiation if we substitute $\langle P \rangle = Fc$, it is a very simple method to deduce the Hawking's radiation for black holes, but question is what this radiation is? Is it an electromagnetic wave or gravitational wave? We assumed that, eq. (10) stands for relation between gravitational wave's wavelength and mass of body, and we derived the eq. (11) through it thus we can say that, this show the power of gravitational wave. It needs further clarifications.

6. Reversal of gravity – a strange form of gravity

We skip this issue whether black hole emits electromagnetic radiation or not, if we assume it emits particle as per Hawking's speculation, however, the force to hold the particles inside the black hole can be shown by the eq. (11) it is clear that if the mass is high the force will be less ($F \propto \frac{1}{m^2}$) this is just opposite to Newton's gravitational force prediction, therefore particle can be easily escape from black holes. If we understand, this force is reversal of eq. (2) so that there might another kind of expression for force which will be inverse of eq. (1) this can be derived if we substitute eq. (10) in eq. (1) and we will get,

$$F = \frac{r^2 c^7}{G^2 \hbar} \tag{12}$$

since eq. (11) is already accept as source of Hawking radiations so we believe this is also possible but need clarification about its significance and importance in physics.

Now, the idea is, since eq. (1) and (2) which are consistence with the prediction of Newton's gravity and it gives the mathematical expression for gravity thus the eq. (11) and (12) which are inverse of these two expression i.e. inverse of eq. (1) and (2) in the sense, the dependency of force on variables as mass and space, therefore, these two gives a new expression of force which is inverse of Newton's gravity and can be written as given below,

$$F = \frac{r^2 c^8}{m^2 G^3} \tag{13}$$

this shows the force is directly proportional to distance or space and inversely proportional to the mass, however, we concluded that when the mass of black hole is increased and size is decreased the force will be weak and particle can be escape from classical black hole. In other word, the force which holds together the particles inside the black hole will be weaken when black hole becomes very massive and smaller in size. It may be possible, after a certain or critical mass and size of body the gravity inversed and force is weakened thus there is an explosions of black hole as predicted by Hawking, however, this predication is consistence by Hawking's particle creation by classical black hole. Probably this is the reason for the big bang.

7. Conclusions

The final conclusion is that the gravity can be derived through the quantum form of force yet it does not have the Planck constant. There is a certain relation between the mass of body and its corresponding gravitational wave's wavelength, this relation helps us to restore the expression for Hawking's radiations. Further, this relation leads us to derivation of inverse gravity. This suggested that when a black hole becomes smaller and massive, the classical gravity inversed and particle can escape from it and black hole explode itself.

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