# How we can apply Gravity into Quantum Mechanics

Aloysius Sebastian, Via Tremonti 26, Milazzo, Messina, Italy

**Abstract**

Our present concept about gravity is related with the mass and distance of the object. Still we are following the Newtonian concepts of gravity to measure the gravity of objects. Albert Einstein has made a great work on the concept of gravity, after Newton. But still we are trying to know more about gravity. According to me gravity is the property of energy. One must have to explain gravity on the basis of energy. I am agreeing that mass is also a form of energy. But I prefer to find gravity in accordance with the total energy of a system. Here I am making an attempt on this field. I am sure that I am on the right track. I am not placing any new equations here. I am using the existing equations in physics to find the gravity through my thoughts. The way which I am using these equations are may be strange. Sometimes I am thinking in reverse order, first I have found the gravity with the concept of energy. For that I am applying a constant *''A''* and I am getting the value of *''A''* from the last part of equations. Because the value of gravity is still with Newtonian concepts.

**Introduction**

To bring classical physics and Quantum theory in a same line we have to bring them under a same reference frame with certain measurements. We have to bring Classical Physics into microscopic level or Quantum Mechanics into macroscopic level or these two under a same reference frame. For that we have to think only with the concept of energy. I strongly believe that mas just as a property of energy. According to me microscopic or macroscopic dimensions are influencing the reference frames of the observer. Here I am trying to bring them under a same dimension in two different frames of an observer in a single frame. I think that it is possible if we bring Gravity as a main component in these two branches of physics. So I am trying to insert gravity in these two. Gravity is already described in Classical physics. So we can start from it.

Gravity of an independent system

We know that every objects has its own gravity. Gravity was mentioned clearly in Sir Isaac Newton's theory of universal gravitation. So here I am going to start from Newton and his theory of Gravity. We know that…..

$$F = \frac{Gm1m2}{r^2} \qquad (1)$$

Here F stands for force. This equation describe us the gravitational attraction between two systems (objects).

All we know that every objects with mass (Energy) show its own gravity. Now imagine an object at space. We can calculate its gravity by the equation

$$g = \frac{Gm}{r^2} \qquad (2)$$

Here we can found the gravity of an independent system.

Now we can bring this object into Earth's surface. At this time the gravitational attraction between earth and the system will be equation (1). But at the same time the objects own gravity will be equation (2). Anyhow we can work with the concept that the object is at the space for more clarity and the equation (2) as its gravity. So equation (2) states $g = Gm/r^2$. By this we can bring out mass {m} and write as

$$m = \frac{g\,r^2}{G} \qquad (3)$$

It is the time to think about the total energy of the object at rest. For that we can use mass energy equivalence principle by Einstein.

$$\mathbf{E = mc^2} \qquad (4)$$

We can hide the mass from equation (4) and insert equation (3) instead of mass. So we can write it as

$$E = \frac{g\,r^2}{G}c^2 \qquad (5)$$

This equation always states that $E = mc^2$. I just replace mass here.

We bring gravity, universal gravitational constant and radius of the object in equation (5) instead of mass. While we are bringing gravitational constant "G", the object is being a part of universal gravity. So it can be macroscopic or microscopic according to the distance between the object and the observer. The important thing is that the object is just become a part of the total gravity of the universe. Here the reference frame of the object and the observer is the total energy of the universe and its gravity at the whole volume of the universe.

Now we will go through Quantum Theory and try to insert gravity and universal constant of gravity in it. We can use Plank Einstein relation to combine these two theories.

$$f = \frac{E}{h} \qquad (6)$$

Here f stands for frequency, E is the energy and h is the planks constant.

By using Special Relativity, the equation (6) can be written as

$$f = \frac{\gamma m_0 c^2}{h} = \frac{m_0 c^2}{h} \Big/ \sqrt{1 - \frac{v^2}{c^2}} \qquad (7)$$

Here $m_0$ is the rest mass of the object.

Now we can bring equation (5) to equation (7) and it can be written as

$$f = \frac{\frac{g r^2}{G} c^2}{h} \Big/ \sqrt{1 - \frac{v^2}{c^2}} \qquad (8)$$

And we can say simply as

$$f = \frac{\frac{g r^2}{G} c^2}{h} \qquad (9)$$

By this we can bring the classical and quantum physics under a same preference frame.

According to me the fundamental of universe is the energy. It has its own properties and will not change even if it is macroscopic or microscopic object. And laws of motion is also unchangeable, I think that still we have to know more about the laws of motions. Our understanding about the laws of motion is incomplete.

## Quantum Gravity

According to me gravity is the property of energy. We already know how to calculate the gravity of an object with its mass (2). An object with mass m has the total energy in it is $mc^2$. So I would like to bring out gravity in the equations of energy and my logics leads me to this equation.

$$\frac{E}{A} = g \qquad (10)$$

Here A is a constant, E is energy and g is the Quantum gravity. The value of ''A'' cannot find now, because gravity ''g'' is calculating with distance from the center of the system. Here we have the amount of energy in the system only and we don't know about the volume of the system. So equation (10) is to describe the gravity of energy which can have at $mc^2$ amount of energy.

We can write the eq (10) as this way, but still we have to find the value of A from another equation.

$$A = \frac{E}{g} \qquad (11)$$

This equation leads us to…….

$$Ag = mc^2 \qquad (12)$$

Now we will go through Quantum mechanics. The equation for the energy of a photon is,

$$E = hf \tag{13}$$

E is the energy, h is planks constant and f is the frequency.

Here also we can bring the equation (10) because a massless photon also show its own gravity. This leads me to create this idea. Even a photon doesn't show mass, it has its own energy. And that energy shows gravity. So we can write as……

$$Ag = hf \tag{14}$$

Now we can bring energy of a photon as the measurement of energy. Even it doesn't show the mass, the energy of a photon can add some mass if it is absorbed by a particle or a system. Imagine that photoelectric effect is occurring in a plate. Here we can imagine that 1000 electrons are absorbing 1000 photons at the same time. So an energy or a mass is going to add to the plate by the photons. So the total energy E of the plate at this time is…….

$$E = m_0 c^2 + m_1 c^2 \tag{15}$$

Here the added mass or energy of the system is……

$$n(hf) = m_1 c^2 \tag{16}$$

n is the number of photons.

Now we can calculate the additional gravity gained on the system by the photons.

$$\frac{n(hf)}{A} = g = \frac{m_1 c^2}{A} \tag{17}$$

While bringing equation (3) here, we can write it as….

$$\frac{n(hf)}{A} = \frac{Gm}{r^2} = \frac{m_1 c^2}{A} \tag{18}$$

We can find the gravity on the quantum concepts as…..

$$\frac{n(hf)}{A} = \frac{mc^2}{A} = g \tag{19}$$

Total energy of a particle or an object we can write as……..

$$n(hf) = mc^2 \tag{20}$$

## Gravity of a System

Now eq (20) is the gravity of any energy ie; the gravity of "***n(hf)***'' amount of energy or ''$mc^2$'' amount of energy. Here we can see that $n(hf) = mc^2$. At this time these two equations will not mention any physical systems. It only represents the amount of energy. We all knows that gravity is directly proportional to mass and inversely proportional to the square of its distance from the center. If we follow the above stated equations, we can never reach with this concept. For that we can imagine an experiment. Imagine that we have two balloons *(A & B)* with us. Balloon ''*A*'' is more elastic than ''*B*''. Now we can imagine that we are filling these two balloons with 10 Kg of gas on each. Naturally the balloon ''*A*'' will expand more and what will be the gravity of each balloons. Here we can think about the energy density on each balloons.

$$\rho = \frac{m}{V} \quad , \quad m = \rho V \tag{21}$$

Here $\rho$ is the mass per unit volume, $V$ is the volume of the mass itself and m is the mass

So in this system (Balloons) we can write

$$n(hf) = mc^2 = \rho V c^2 \tag{22}$$

So gravity of any system at a volume is

$$g = \frac{\rho V c^2}{A} \tag{23}$$

Here we can notice that when we are measuring the gravity while increasing the volume,

$$\frac{n(hf)}{A} = \frac{mc^2}{A} \neq \frac{\rho V c^2}{A} \tag{24}$$

$n(hf) / A$ or $mc^2 / A$ is not equal to $\rho Vc^2 / A$ , because gravity is variying according to the distance.

Now only we can define the value of the constant A because still we don't have any idea about the gravity of energy. Up to now we only know to define the gravity with the newton's equations {eq (2)}.

So we can write

$$\frac{Gm}{r^2} = \frac{\rho V c^2}{A} \quad (25)$$

Here $Gm/r^2$ is the gravity of the independent system at $\rho Vc^2$ volume.

The value of A we can define as.....

$$A = \frac{\rho V c^2 r^2}{Gm} \quad (26)$$

## Conclusions

Any form of energy (even with mass or without mass) has its own gravity. Gravity is the basic property of energy. Energy can add a mass to any system when it is absorbed by the system and mass is also a property of energy.


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## References


[1] Structure of relatively accelerating universe, 10.4236/ijaa.2014.41015

This work leads me to think more about gravity and the concepts of gravity to relate with the energy.

[2] The theory of gravity by Sir Isaak Newton and many other articles related to this theory.

[3] Max Plank, theory of blackbody radiation and the energy of a photon. Many other articles related to this theory.

[4] Albert Einstein, his spacial theory if relativity, mass energy equivalent principle, general relativity theory and many other articles related to these theories.