The Classical Theory of Gravitation

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Abstract: ***This theory says that gravitational field which is created for the universe smallest particle gravitons. It proves the existence of gravitons and antigravitons and find the cause of week gravity. It also connected Newton's 3rd law of motion and quantum gravity. It is the theory which can able to describe the gravity on quantum scale and large scale.***

Keywords: graviton, antigraviton, linearized gravity, gravity, electromagnetism, week force, strong force, beata decay, space time

1. Introduction/ Overview

1.1 Motivation for the General Theory of Gravitation

Presently we understand that the physics can be described by for force: gravity, electromagnetism, the week force, responsible for beta decay and the strong force which is bind the quarks into protons and neutrons. We, that is most physicists or mathematician, believe that we understand all of those forces except for gravity. Hear we use the world "understand" loosely, in the sense that we know what the Lagrangian is which describe how these forces induce dynamics on matter, and at least in the principle we know how to calculate using this Lagrangian to make well defend predictions. But gravity we only understand partially. Clearly, we understand gravity classically (meaning in the $\hbar$=0 limit). As long as we don't ask question about how its beaves describeat any shot distance or quantum level.

The sad part about this is all the really interesting ask about gravity, e.g., what's the "big bang", what's happens at the singularity of a black hole, are left unanswered. What is it, exactly, that goes to wrong with gravity at the quantum label? this is really technical question which needs to be discussed with in context quantum field theory, but we can gain a very simple intuitive understanding from classical electromagnetism. So, the total energy of electron is given by

$$E_{total} \sim \int r dr \frac{e^2}{\Lambda} \tag{1.1}$$

Now, this integral diverges at the lower endpoint of r = 0. We can reconcile this divergence by cutting it off at some scale Λ and when were done well see if can take the limit where the cut-off goes to zero. So our results for the total energy of an electron is now given by

$$E_{total} \sim m + \frac{e^2}{\Lambda} C \tag{1.2}$$

Clearly the second term dominates in the limit we are interested in. So apparently even classical electrodynamics is sick. Well not really, the point is that have been rather sloppy. When we write m what do we mean? Naively we mean what we call the mass of the electron which we could measure would say, by looking at the deflection of a moving electron in a magnetic field. But we don't measure m, we measure E_{total}, that is the inertial mass should include the electromagnetic self-energy. Thus what really happens is that the physical mass M is given by the sum of the bare mass m and the electrons field energy. This means that the "bare" mass is "infinite" in the limit were interested in. Note that we must make a measurement to fix the bare mass. We can't predict the electron mass.

Now what happens with gravity (GR)? What goes wrong with this type of renormalization procedure? The answer is nothing really. In fact, as mentioned above we That is we have two huge numbers which cancel each other extremely precisely! To understand this better, note that it is natural to assume that the cut-off should be, by dimensional analysis, the Planck length (note: this is just a guess). Which in turn means that the self field energy is of order the Planck mass. So the bare mass must have a value which cancels the field energy to within at the level of the twenty second have a value which cancels the field energy to within at the level of the twenty second "hierarchy problem". This process of absorbing divergences in masses or couplings (an analogous argument can be made for the charge e) is called "renormalization".

Now what happens with gravity (GR)? What goes wrong with this type of renormalization procedure? The answer is nothing really. In fact, as mentioned above we can calculate quantum corrections to gravity quite well as long as we are at energies below the Planck mass. The problem is that when we study processes at energies of below the Planck mass. The problem is that when we study processes at energies of order the Planck mass we need more and more parameters to absorb the infinities that occur in the theory. In fact we need an infinite number of parameters to renormalize the theory at these scales. Remember that for each parameter that gets renormalized the theory at these scales so, GR is pretty useless or incomplete.

How classical theories of gravitation (CTG) solve these problems? The answer is quite simple, we prove the existence of graviton mathematically and also proves that how it behave and introduce a new field equation.

Author contribution:

- We defined how gravity is act on the quantum level.
- We defined universe smallest particle graviton which is responsible for gravitational field.
- We also explain why we don't detect graviton.
- The cause week gravity.
- We also describe the properties of gravitons and antigraviton.
- We find what is the connection between the Newton's 3rd low of motion and quantum gravity.

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2. Geometry of space time & introduction of gravitational wave: we know gravity is the geometry of space time (GR). So, geometry of space time is described by linearized gravity (LG) and gravitational waves are the disturbance in space time. The formula of LG is given by

$$g_{uv} = \eta_{uv} + h_{uv} \qquad (2.1.1)$$

where $|h_{uv}| \ll 1$ is a small perturbation and η_{uv} is denoted the flat space time.

$$g_{uv} \to \eta_{uv} = \begin{bmatrix} +1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -1 \end{bmatrix}.$$ We detect the gravitational wave and also prof. by mathematically. So, the formula is given by

$$\nabla^2 \tilde{h}_{uv} = \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\tilde{h}_{uv}$$

Hear, $h_{uv} \to \tilde{h}_{uv}$

So, we get $g \equiv \tilde{h}_{uv}$, g is the gravitational acceleration or we also say that is gravitational field according to the previous theory of gravitation $\nabla . g = 4\pi\rho G$ and $\nabla \times g = 0$ so we also written that $\nabla . c\tilde{h}_{uv} = 4\pi\rho G$ and $\nabla \times c\tilde{h}_{uv} = 0$ (c is the constant) that are the two equations which describe total gravity. So, we also written that

$$\nabla^2 g = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} g \qquad (2.1.2)$$

2.1. Gravitational equation in the terms of gravitational potential

The equations are:

$$\nabla . g = 4\pi\rho G \qquad (2.1.3)$$
$$\nabla \times g = 0 \qquad (2.1.4)$$

We know that $\nabla \cdot \nabla \times f$ where f is the vector potential

So, $\nabla \cdot \nabla \times f = \nabla \times g$

$$\nabla \cdot \iint_S \nabla \times f \, ds = \iint_S \nabla \times g ds$$
$$\oint_c \nabla . f \, dl = \oint_c g \, dl$$
$$\nabla . f = g \qquad (2.2.1)$$

That the relation between gravitational potential and gravitational field. Hear the scalar potential is denoted by φ and $\nabla\nabla \times \varphi = 0$.

$$\nabla\nabla \times \varphi = \nabla \times g$$
$$\nabla \varphi = g$$
$$So\ \nabla . f = \nabla \varphi = g \qquad (2.2.2)$$

2.2 Gravitational Wave (GW) in Quantum label

Let describe the behavior of gravitational wave in the quantum label so, we also written this

$$g = g_0 e^{i(kr - \omega t)} \qquad (2.2.3)$$

Hear $(\tilde{h}_{uv})'$ are the gravitational strength and r denoted the r axis. Now let put (2.2.2) in the (2.1.2)

$$\nabla^2 g_0 e^{i(kr-\omega t)} = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} g_0 e^{i(kr-\omega t)}$$
$$-k^2 g_0 e^{i(kr-\omega t)} = -\frac{1}{c^2} g_0 e^{i(kr-\omega t)} \omega^2$$
$$\omega = kc$$

We know that $k = \frac{2\pi}{\Lambda}$ and $\omega = \frac{E}{h}$. Hear skin depth = 0

2.3. Gravitational field in term of vector and scalar potential

To find this equation we use (2.1.2)

$$\nabla^2 g = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} g$$

Let put equation (2.2.1) in the equation (2.1.2)

$$\nabla^2 \nabla . f = \frac{1}{c^2}\frac{\partial^2}{\partial t^2} \nabla . f$$
$$\nabla^2 f = 0 \qquad (2.2.4)$$

As same in scalar potential field is given by

$$\nabla^2 \varphi = 0 \qquad (2.2.5)$$

2.4 Gravitational field equation

Hear the gravitational field is denoted by s_{uv}. So let tack the coordinate in 4dimension so that is $f_{uv} \equiv (f_1, f_2, f_3, f_4) \equiv (f, k\,\varphi)$ hear $k\varphi$ denote the time coordinate

$$g_1 = -\frac{\partial}{\partial x_1}\varphi - \frac{\partial f}{\partial t}$$
$$g_1 = -\frac{\partial}{\partial x_1}\varphi_1 - \frac{\partial f_1}{\partial t}$$
$$Kg_1 = -K\frac{\partial}{\partial x_1}\varphi_1 - K\frac{\partial f_1}{\partial t}$$
$$Kg_1 = -\frac{\partial}{\partial x_1}K\varphi_1 - K\frac{\partial f_1}{\partial t}$$
$$Kg_1 = -\frac{\partial}{\partial x_1} f_4 + \frac{\partial f_1}{\partial Kt}$$
$$Kg_1 = -\frac{\partial}{\partial x_1} f_4 + \frac{\partial f_1}{\partial x_4}$$

So we get a equation

$$Kg_u = -\frac{\partial}{\partial x_u} f_v + \frac{\partial f_u}{\partial x_v} \qquad (2.4.1)$$

Hear $Kg_u = s_{uv}$

$$s_{uv} = -\frac{\partial f_v}{\partial x_u} + \frac{\partial f_u}{\partial x_v} \qquad (2.4.1)$$

$$s_{uv} = -s_{vu} \qquad (2.4.2)$$

So that the field equation which describe the gravity

So, $g^u = \frac{dv^u}{d\tau}$

$= \frac{d}{d\tau}(\frac{d}{d\tau}\varkappa^u)$

$= \gamma(\frac{d}{dt}\gamma, \gamma\frac{dv}{dt} + v\frac{d\gamma}{dt})$

So we get $k\varphi = \gamma\frac{dv}{dt} + v\frac{d\gamma}{dt}$

3. Gravitational effect in quantum level

To understand the gravitational effect in quantum level what the Newton's 3rd law says and that is the key to understand QG. Newton's 3rd law of motion: If an object A exerts a force on object B, then object B must exert a force of equal magnitude and opposite direction back on object A.

Know the question is why A act on the same force in B? So, the answer is quite simple if we watch the phenomenon in the microscopic level. We know the phenomenon is observable in neutral objects or neutrons. So, when we

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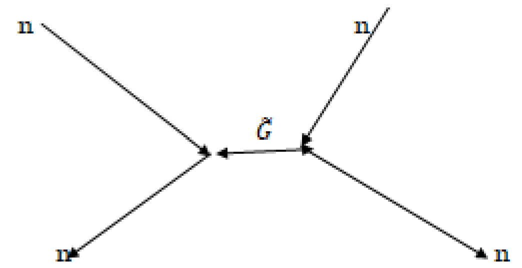
interact two neutrons the what happened? so the answer is they comes each other and repel each other or some time they collided. So, know let understand how they repel or how they collide. To understand this let understand how Feynman diagram for gravity



(Feynman diagram of antigraviton)

That the cause newton's 3ed law is act for $\tilde{G}$. When two neutral objects comes each, other it try repel each other and give a backward force and $\tilde{G}$ is responsible for this backward force and gravitons are attract each other in a certain limit. So, antigravitons are more, stronger than gravitons when we deal with neutrons or neutral objects and gravitons are more, stronger than antigraviton when we deal with the antineutrons. And antigravitons are is more, stronger than graviton in quantum level where our gravity is negligible and if deal with big objects, then the antigravity is negligible. Know let convert the diagram in equation

Object	Symbol
Incoming particle	L
Outgoing particle	R
Antigraviton	$\tilde{G}$
Vertex	$ie\gamma^u$, $ie\gamma^v$

So, the coming equation is given by
$(R_1 ie\gamma^u l_1)(\widetilde{G})(R_2\ ie\gamma^u l_2)$(3.1.1.)

3.1.2 Properties of antigraviton

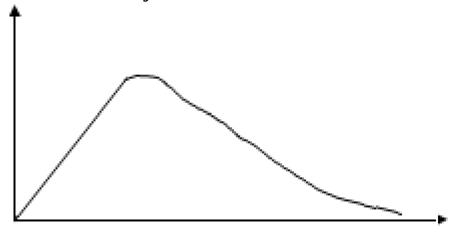
1) $\tilde{G}$are the electricly uncharge particle
2) Speed of $\tilde{G}$ is 29979245 m/s (speed of light)
3) Mass of $\tilde{G}$ is zero
4) IT repel the neutral particle and attract antineutrons
5) Volume of antigravitons $\approx 4.227\times\ 10^{-105}m^3$(for this cause the antigravitons are not detectable
6) Antigraviton is the smallest fundamental particle in the universe.
7) If we deal with neutral object in a small distance then the antigravity is more power full than gravity. If we give some energy then it don't follows this rule.

Existence of graviton proof.
According to Dirac hole theory if antigraviton is exist, then graviton is exist denoted by G

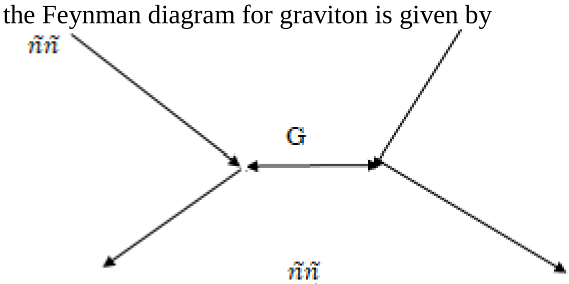
Properties of gravitons
1) G are the un charged particle
2) speed of G is 29979245 m/s (speed of light)
3) Mass of G is zero
4) IT attract neutrals particle and repel antineutron
5) Volume of gravitons $\approx 4.227\times\ 10^{-105}m^3$ (for this caus the anit gravitons are not detectable)
6) G is the smallest fundamental particle in the univerce
7) The force applied by gravitons depends on the object nature.
8) If we deal with antineutral object in a small distance then the gravity is more power full than antigravity. But in large scale gravitons are more power full then antigraviton in all cases.

3.1 Graph of gravitational limit

Graviton strength
Distance between 2 object



So the Feynman diagram for graviton is given by



(Feynman diagram graviton)

Object	Symbol
Incoming particle	L
Outgoing particle	R
Antigraviton	G
Vertex	$ie\gamma^u$, $ie\gamma^v$

So the coming equation is given by
$(R_1 ie\gamma^u l_1)(G)R_2\ ie\gamma^u l_2)$

Equation for gravitons and antigravitons

To pro this let at first proof. $F = \frac{f}{\sqrt{1-\frac{v^2}{c^2}}}$

when F is the relativistic frequency and f is the rest frequency of gravitons and antigravitons

Let a mass less particle move A to B so the $\Delta f = F - \Delta f$in the frame of S and in the $s^{'}$ frame of refrence

$$\Delta f' = F^{'} - f'$$

So when we applied Lorentz transformation we get

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

$$\Delta f = \frac{F - \frac{xv}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}} - \frac{F' - \frac{xv}{c^2}}{\sqrt{1-\frac{v^2}{c^2}}}$$

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

So we also say that $f = \frac{F}{\sqrt{1-\frac{v^2}{c^2}}}$ (4.1)

Graviton and antigraviton is mass less particles so the total energy is given by

$$E = hf (4.2)$$

Let put equation (4.1) in (4.2) so we get

$$E = h\frac{F}{\sqrt{1-\frac{v^2}{c^2}}}$$

Hear $\dot{x}^2 + \dot{y}^2 + \dot{z}^2 = v$ and potential energy is

$P^2 = (p_1)^2 + (p_2)^2 + (p_3)^2$,

$p_1 = \frac{h\dot{x}}{\lambda}$, $p_2 = \frac{h}{\lambda}\dot{y}$,$p_3 = \frac{h}{\lambda}\dot{Z}$

$$p_1 = \frac{hFc}{\sqrt{1-\frac{v^2}{c^2}}}\dot{x} p_2 = \frac{hFc}{\sqrt{1-\frac{v^2}{c^2}}}\dot{y}, p_3 = \frac{hFc}{\sqrt{1-\frac{v^2}{c^2}}}\dot{Z}$$

So,

$$P^2 = \frac{h^2F^2c^2}{1-\frac{v^2}{c^2}}\dot{x}^2 + \frac{h^2F^2c^2}{1-\frac{v^2}{c^2}}\dot{y}^2 + \frac{h^2F^2c^2}{1-\frac{v^2}{c^2}}\dot{z}^2$$

$$P^2 = \frac{h^2F^2c^2}{1-\frac{v^2}{c^2}}v$$

Let take $\frac{v}{c} = B$

So,

$$P^2 = \frac{h^2F^2c^2}{1-B^2}v = \frac{h^2F^2B^2vc^4}{1-B^2}$$

Let A= $hFvc^2$

So,

$$P^2 = \frac{A^2B^2c^2}{1-B^2}$$

$$P^2 = A^2B^2\left(\frac{1}{1-B^2} - 1\right)$$

$$P^2 = \frac{A^2B^2}{1-B^2} - A^2B^2$$

$$P^2 = vc^2\left(\frac{E^2}{h^2} - Ev^2c\right)$$

Hear the graviton and antigraviton speed = c so the equation is given by

$$P^2 = c^3\left(\frac{E^2}{h^2} - Ec^2\right)$$

$$-\hbar\nabla^2\psi = c^3\left(-\frac{\hbar^2}{h^2}\frac{\partial^2\psi}{\partial t^2} - i\hbar c^2\frac{\partial\psi}{\partial t}\right)$$

$$\nabla^2\psi = \frac{c^3}{h^2}\frac{\partial^2\psi}{\partial t^2} + ic^5\frac{\partial\psi}{\partial t}$$

$$\nabla^2|\psi\rangle = ih^2c^5\frac{\partial}{\partial t}|\psi\rangle$$

4. Cause of Week Gravity

Hear, is a basically 2 regen for week gravity:

1) If we see the gravitational field formula $c\tilde{h}_{uv} = g$ when $|\tilde{h}_{uv}| \ll 1$
2) Another is for antigravitational field although the antigravitational field is so week and that is for gravitation

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