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A Totally New Approach Towards Describing Gravity and hence Quantum Gravity

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Abstract: What is gravity? Is it curving of spacetime due to the presence of energy, momentum? In order to make a quantum mechanical model of gravity we need to change our thoughts about what gravity. We need to forget about spacetime for a moment. We need to empty ourselves in order to grasp the information I am about to give you right know.

Gravity can be explained simply by the volume of the space occupied by the object for example Earth.

Now let's imagine that the earth is hollow. We know that there will be space inside as well as outside the Earth since there is no matter present either inside or outside. Now I fill the volume of the Earth. What will happen? The matter that will be filled inside the hollow Earth will occupy the space inside and hence the volume of space that is within the Earth will be forced to come out. Now because the space is pushed out, it will take the position of the space just present outside the Earth and hence the space which is just above the Earth's surface will be replaced by the space which was once inside the Earth. Now there is one thing to be noted and that is the space that comes out of the Earth has the same volume as of Earth.

The Earth has a volume of 1.0831 x 10^{12} ***km***^{3} ***and this is the space-volume or the volume of space that will be released when the Earth is filled. Now to contain this amount of space-volume in a sphere its radius should be nearly 6370 km. But in this case we will calculate what should be the radius of the sphere to contain twice the volume of the Earth since one is the volume of Earth itself and the other is the space-volume of Earth which was once inside the Earth and is now surrounding it and therefore we can say that,***

$4\pi r^3/3 = 2V_E$ ***(***V_E ***is the volume of Earth)***

And hence the calculations reveal that the radius of the sphere should be 8027 km and now we need to subtract the radius of the Earth to get the height in which the volume of Earth can accommodate above the surface of the Earth and the answer comes out to be 1656 km.

Now the volume of space which was surrounding the Earth during the time Earth was hollow will now get displaced as its position has been now accommodated by the space-volume of Earth itself.

Now we can calculate the radius for thrice the volume of Earth and subtract 8027 km from it and the result is 1161 km. That means now the volume of Earth can be contained in a height of 1161 km above 8027 km.

In the similar manner this chain of displacing space-volume will continue and every time the space is displaced it will have the same space-volume as Earth does and hence each displacement would be smaller compared to the previous one as we saw in the above example. Finally the chain will come to an end when the space will get displaced by Planck Length marking the G_{SOI} ***of the Earth since the space will not be able to displace itself after that, assuming it to be the cosmic limit of length. Hence the volume of space at that point will be twice the volume of Earth since one is the space-volume of Earth that is already present whereas the other one is the displaced space-volume of Earth. Therefore we can see that this part of space has 6 dimensions.***

I. THIS MEANS THAT THERE ARE 6 DIMENSIONS AT THE POINT WHERE THE G_{SOI} OF ANY OBJECT ENDS

Now that we have understood the concept of space-volume displacement we can now derive an equation for the radius of G_{SOI} for Earth or any object.

Now as I said earlier the space will be displaced by Planck Length in its final displacement and hence we can say that the radius for the G_{SOI} for Earth will be the subtraction of the smaller volume from the greater volume in which we know that the radius of the greater volume will be just a Planck Length greater than the radius of the smaller volume. The resulting difference should be of the volume of Earth. By doing this we can convert both the radii in terms of the smaller radii and hence we can find the radius of G_{SOI}. Therefore,

$$4 . \pi . (r + 1.6e - 35)^3 /3 - 4 . \pi . (r)^3/3 = V_E$$

$$4 . \pi/3 [(r + 1.6e - 35)^3 - (r)^3] = V_E$$

$$= (r + 1.6e - 35)^3 - (r)^3 = V_E . 3/4\pi$$

$$= r^3 + (3r^2 . 1.6e - 35) + [3r . (1.6e - 35)^2] + (1.6e - 35)^3 - r^3 = V_E . 3/4\pi$$

$$= (3r^2 . 1.6e - 35) + [3r . (1.6e - 35)^2] + (1.6e - 35)^3 = V_E . 3/4\pi$$

$$= 3r(1.6e - 35) [(r + 1.6e - 35)] + (1.6e - 35)^3 = V_E . 3/4\pi$$

$$= r (r + 1.6e - 35) + (1.6e - 35)^3 = V_E . 3/ 3\pi 4(1.6e - 35)$$

$$= r (r + 1.6e - 35) + (1.6e - 35)^3 = V_E / \pi 4(1.6e - 35)$$

Now here $(1.6e - 35)^3$ will give us an infinitesimally small number and hence can be considered as zero. So the result will be a quadratic equation,

$$= \quad r^2 + 1.6e^{-35} r - \frac{V_0}{4\pi(1.6e^{-35})} = 0 \text{ ……….. (i)}$$

Using this equation any objects G_{SOI} can be easily calculated.
The image below gives an idea about how the space displaces.

Figure 1

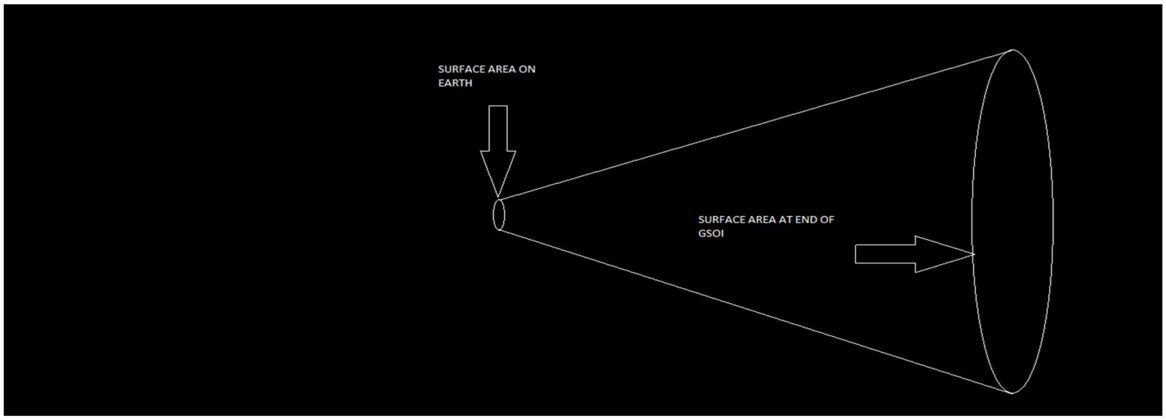

Figure 2

So how do the objects understand this displacement of space? We know that it is due to the gravitons. Gravitons can be thought of as higher dimensional particles. They create the illusion of gravity in our 3rd dimension and then leave to the higher dimension at the end of the sphere of influence as mentioned earlier that, it is a 6th dimensional portal. This is the reason that gravity is not felt as a strong force because the gravitons leak to the higher dimensions because they are particles of higher dimensions.
Therefore it can be considered that there is a compromise between G_{SOI} and the force of attraction of the body on the surface. If the radius of the body is less hence the volume is less and hence the G_{SOI} is less but the magnitude of the force of attraction on the surface is more. If the radius of the body is increased its volume increases therefore G_{SOI} increases but the magnitude of force of attraction on the surface decreases. If the density is equal to the golden density then all the space inside the body will be displaced but if it is less than golden density then the object's density needs to be divided by the golden density and multiplied by the objects original volume.

$$\boldsymbol{V_r = \frac{\rho_b}{\rho_g} x\, V_o} \quad \text{........ (ii)}$$

(V_r = real volume of space displaced, V_o = original volume, ρ_b = density of body, ρ_g = golden density)

Using the equation number (i) I calculated the G_{SOI} of Earth and found it to be $2.3210836327\, e^{27}$ m. It can further be deduced that the G_{SOI} of Earth or in that case any planet is bigger than the observable universe which is the reason universe or space is still expanding at the speed of light.
The expansion of universe is due to the fact that all matter occupies space and hence each and every object be it anything, displaces space and hence the chain of displacing space volume is continuously going on in the universe. There are planets, stars, galaxies having tremendous masses and volumes and all this objects have occupied space and therefore the space is getting continuously bigger due to its displacement. Now that we have understood that the extent of gravity is not infinite therefore the graviton must have some mass and some initial energy when it starts its journey from the body's surface.
The matter needs to communicate with space for the displacement and it does that with the help of gravitons. The gravitons might be entering our dimension from the Calabi-Yau. The manifold is present on every particle no matter how small it is. We know that the manifold exists nearly around the Planck length scale and hence there is no possibility that any piece of matter no matter how small should be devoid of manifolds. We know that a manifold could possibly have 11 dimensions but for now we only need 6 of its dimensions to explain gravity. All the things mentioned above are now going to make sense. First of all the gravitons enter our third dimensional universe from the manifold from the sixth dimension. The gravitons traverse the whole length of the G_{SOI} having some energy and some mass which we will calculate below. After traversing the whole length of the universe the gravitons again return to their sixth dimension from the end of the G_{SOI} of influence as we already know that there is a sixth dimensional spherical entity at the end of the G_{SOI}.
It is extremely beautiful to understand that how the gravitons come from the manifold from a higher dimension and again return to their dimension but from a totally different path. Since the gravitons are sixth dimensional particles they also effect time which is a fourth dimensional entity.

II. THEREFORE TIME DILATION CAN ALSO BE UNDERSTOOD AS THE GRAVITONS CAN ALSO AFFECT THE FOURTH DIMENSION.

It should be noted here that I have tried to explain gravity without taking gravitational time dilation in consideration as it will just make the things more complex. But as mentioned before time dilation will occur.
Since the space has been displaced it would have required some energy which depends upon the space constant at that particular point. You may recall from the image above. Basically displaced space behaves like a spring and has a space constant just how a spring has a spring constant. Therefore the magnitude of the force can be calculated by multiplying the space constant at that point by the displacement from its mean or initial position. The space behaves as a spring because we have given space energy and that energy cannot just disappear somewhere. Therefore the space is displaced by using the energy of the gravitons.

$$\boldsymbol{F = kx} \qquad \text{……. (vi)}$$

Here k is the space constant and x is the displacement.
Now as the first displacement is the radius of earth itself and the value of gravitational acceleration at height R above the Earth's surface is GM/R^2

$$kx_0 = \frac{GM}{R_0^2} \quad .....(vii)$$

(Here x_0 is equal to the radius of Earth)

$$(k°)x_1 = \frac{GM}{R^2} \quad ......(viii)$$

(x_1 is the displacement of space from its mean position which can be calculated by the volume analysis)

Dividing equation (vii) by (viii) we get,

$$\frac{kx_o}{(k°)x_1} = \frac{R^2}{R_0^2} \quad .... \quad (ix)$$

Let's try an example:

Let's calculate the gravitational acceleration at 1656km from the Earth's surface because we know it's the second displacement and therefore x_1 = 1656km and x_0 = R_0 and the value of gravitational force on the Earth's surface is 9.8m/s^2 we find that the value of k as

1.5382e-6 and the equation simplifies as:

$$\frac{kR_0^3}{R^2} = (k°)x_1$$

1.5382e-6 x $(6371000)^3/8027000^2$

(R = radius of Earth + 1st displacement of space)

Solving the values we have 6.18 = $(k°)x_1$ which is the gravitational acceleration at 1656 km above Earth's surface.

In order to maintain the displacement of space we need to constantly give energy to space. It is similar to holding a spring out stretched. You need to hold the spring constantly that is you supply energy to the spring constantly. In the same way Earth is constantly releasing gravitons that help to maintain the space displacement.

I hope you will understand because the things are going to get really complicated.

Now let's put a test mass anywhere near the Earth. We assume that our test mass is made up of matter and therefore has manifolds present all over its surface. Therefore the manifolds on its surface will absorb the incoming gravitons from Earth and hence the gravitons will be lost from that part of space and the space will contract with a force equal to kx where k is the space constant at that point and x is the displacement. But at the same time the momentum the gravitons possessed will be given to the object and hence the object will move with the same force away from the Earth in the direction of emitted gravitons. As a result there is no net movement of the object. Since there is no movement whatsoever the Earth at that particular instant will move to conserve the momentum in the directions of the gravitons which were absorbed by the test mass.

It is to be noted that the body will move away from the Earth at that instant but the space in which the body is contained itself is moving towards the Earth at that particular instant with the same momentum hence they cancel out. Now as the gravitons travel through the length of the body (test mass) layer by layer it will push them towards the Earth after coming out from the other side and it will be like firing bullets from a gun, also they again stretch out the space which earlier contracted due to their absence. But in the place of the gun we have the test mass and in place of bullets there are gravitons giving a momentum to the object towards the Earth. If an object is kept on the surface of Earth then that object will also attract other objects at 9.8ms^{-2} since the gravitons coming out of Earth's surface will now enter the object kept on the surface's and then come out of that object.

Therefore without any complexity we have made the third law of Motion consistent with our model.

The concept of gravitational mass is also not a big deal to understand. How? We know that the gravitons are constantly pushing the body towards the Earth when they leave our test mass from the other side. But during the process the side of the body which is facing the Earth is also emitting gravitons which are which is giving a momentum to the body in the opposite direction that is away from the Earth. This is felt as a resistance in pushing the body towards the Earth and this gets add up to the inertial mass of the body. Therefore the gravitational mass will be ever so slightly greater than the inertial mass.

Here we can see that when an object around a heavier object is accepting gravitons, only that particular region of space contracts and not all the part of space because the rest of the part of space other than the space in the test mass is still receiving gravitons.
The total energy of a single graviton hence can be calculated as:
The force for a given point in space is given by $F = kx$
Let's say that we displace it by a distance dx. Therefore the net work done will be $F = kxdx$. Integrating this equation we have

$$\int_o^x kxdx = \frac{1kx^2}{2} \ldots\ldots (e)$$

Energy stored in that part of space is given by: $\frac{1kx^2}{2}$

Therefore every point of space needs to be displaced hence the energy equation of graviton needs to be sum of energy required to displace every point of space Hence,

$$E = \frac{1k_1x_1^2}{2} + \frac{1k_2x_2^2}{2} + \frac{1k_3x_3^2}{2} + \frac{1k_4x_4^2}{2} + \cdots + \frac{1k_nx_n^2}{2}$$

Since k is a function of the radius or distance by equation (ix)

$$\frac{1kx_oR_0^2x_1^2}{2R_1^2x_1} + \frac{1kx_oR_0^2x_2^2}{2R_2^2x_2} + \ldots\ldots \frac{1kx_oR_0^2x_n^2}{2R_n^2x_n}$$

Since we know $x_0 = R_0$ the equation can be reduced as follows:

$$\frac{1kR_0^3x_1}{2R_1^2} + \frac{1kR_0^3x_2}{2R_2^2} + \ldots\ldots \frac{1kR_0^3x_n}{2R_n^2} \ldots\ldots\ldots\ldots\ldots (x)$$

Here x represents displacement which can be calculated as

$$R_0\sqrt[3]{n} - R_0\sqrt[3]{n-1} \ldots\ldots\ldots (xi)$$

Here R_0 is the radius of the body in consideration, following is the derivation:

If the volume is n times the initial volume then,

$$\frac{n4\pi R_0^3}{3} = \frac{4\pi R_0^3}{3}$$

The radius of that volume is given by $\sqrt[3]{n}R_0$.
Let's assume that a point is on the surface of the Earth and then we fill the Earth and hence the volume of space will be forced to come out and hence we need to find a radius that will contain both the volume.
You may recall that we have done this at the very start of the paper but now instead of directly calculating the radius we can now write the radius to be $\sqrt[3]{2}R_0$ since the volume is two times the original.
Therefore the displacement will be the difference between the new radius and the radius of Earth which will be $\sqrt[3]{2}R_0 - \sqrt[2]{2-1}R_0$ which will give us the answer to be 1656km just as before. Therefore we can represent the displacement with the equation (xi).
Therefore the energy of a random point of space after displacement will be given by,

$$E = \frac{1kR_0^3(\sqrt[3]{n}R_0 - \sqrt[3]{n-1}R_0)}{2(\sqrt[3]{n}R_0)^2} \ldots\ldots\ldots\ldots\ldots \quad (xii)$$

But this is only for a single point but we need it for every point in the $G_{SOI.}$
(The result has been obtained by replacing the values of k, x, R as $\frac{kR_0^3}{Rx}$, $R_0\sqrt[3]{n} - R_0\sqrt[3]{n-1}$ and $\sqrt[3]{n}R_0$ respectively in the equation (e))

We know that the final displacement of the gravitational sphere of influence is of Planck length. Let's say the volume becomes n times the initial volume. Therefore,

$$R_0\left(\sqrt[3]{n}-\sqrt[3]{n-1}\right) = l_p$$

Therefore for calculating the upper limit of the summation we need to solve the above equation which surely is going to require a computer.

But since we need to calculate the energy of every point of space in the gravitational sphere of influence we just can't substitute integer values. For that we need to calculate what could be least number of times a volume can be greater than that of the body in consideration. We know that if a volume is greater than the concerned body then the least can be that its radius is just a Planck Length greater than the concerned body.

Then we have,

$$\left(R_0 + l_p\right) = \sqrt[3]{n}R_0 \quad \text{Therefore } n = \left(\frac{R_0+ƶl_p}{R_0}\right)^3$$

Here I have introduced a variable ƶ which can all the whole number values from zero to x, because the Planck length is quantized and can increase in integer values.

Therefore our equation (xi) becomes

$$E = \frac{kR_0^3}{2}\sum_{n=\left(\frac{R_0+ƶl_p}{R_0}\right)^3}^{\sqrt[3]{n}-\sqrt[3]{n-1}=\frac{l_p}{R_0}} \frac{R_0(\sqrt[3]{n}-\sqrt[3]{n-1})}{(\sqrt[3]{n}R_0)^2}$$

The reduced equation will be,

$$\frac{1mv^2}{2} = \frac{kR_0^2}{2}\sum_{n=\left(\frac{R_0+ƶlp}{R_0}\right)^3}^{\sqrt[3]{n}-\sqrt[3]{n-1}=\frac{lp}{R_0}} \frac{(\sqrt[3]{n}-\sqrt[3]{n-1})}{(\sqrt[3]{n})^2} \text{............ (xiii)}$$

The equation should have not only the integer values but all values of n which are possible after replacing the variable ƶ with every whole number up to the solution of $\sqrt[3]{n}-\sqrt[3]{n-1} = \frac{l_p}{R_0}$. The upper limit is still an equation because I couldn't find a feasible solution. But the equation needs to be replaced with the solution once it is found.

After this we just need to calculate the gravitons momentum. Let's try it out for Earth,

The momentum of the gravitons on the surface of Earth needs to be 9.8

$$v = 9.8$$

Substituting this value in the equation (xiii) we have

$$v = \frac{kR_0^2}{9.8}\sum_{n=\left(\frac{R_0+ƶl_p}{R_0}\right)^3}^{\sqrt[3]{n}-\sqrt[3]{n-1}=\frac{l_p}{R_0}} \frac{(\sqrt[3]{n}-\sqrt[3]{n-1})}{(\sqrt[3]{n})^2}$$

And the mass would then be,

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$$m = \frac{9.8}{\frac{kR_0^2}{9.8} \sum_{n=\left(\frac{R_0+zl_p}{R_0}\right)^3}^{\sqrt[3]{n}-\sqrt[3]{n-1}=\frac{l_p}{R_0}} \frac{\left(\sqrt[3]{n}-\sqrt[3]{n-1}\right)}{\left(\sqrt[3]{n}\right)^2}}$$

Therefore the velocity and mass both will be reduce as the gravitons makes its journey through space since the energy would be provided to space to keep the displacement constant.

I want to be really clear here time dilation as a factor is not considered here if we would have considered it in our model the value of the space constant would decrease since some of the acceleration would be accounted for by the time dilation. But none the less it still helps to develop a brilliant insight to what gravity looks at a quantum scale.

On final thoughts I really want to address that this model has helped to understand why the universe is expanding, the little difference which occurs between gravitational and inertial mass, how to make gravity consistent with the third law of motion on quantum scales, why does time dilation occur and also a possibility for new dimensions.

III. CONCLUSION

This paper basically introduces us to a different way of looking at gravity. It can be seen that even by changing our perspective from what gravity was according to general relativity, it does not affect anything majorly except introducing spacetime displacement instead of curvature and by doing this vital change the formulation of equations and understanding of Quantum Gravity can be made easy. Also by doing some minor changes we can understand the nature of gravity at quantum scales. This theory resembles string theory in having more than 4 dimensions and that the force of gravity is not infinite. The reason for the expansion of the universe, the reason for time dilation and consistency of Newton's third law can be seen in this theory of gravity.

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