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A Theory on Repulsive Nature of Gravity

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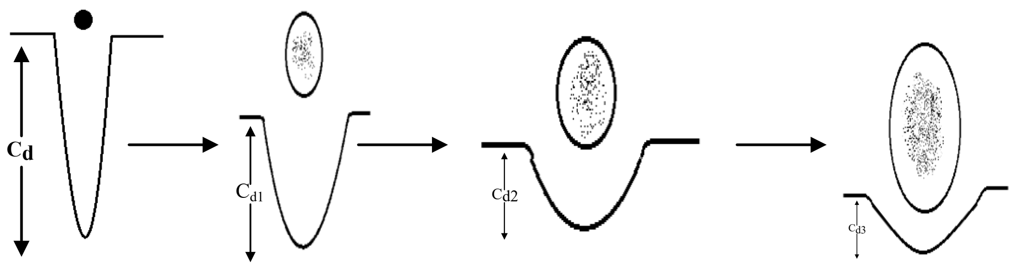
Introduction

The first fundamental force of the universe is gravity. We more or less know that gravity is an attractive force. It cannot be a repulsive force in any way. But according to my calculations gravity is a repulsive force. At least on a large or "cosmic distance" scale. How? Let's see! Gravity is "The Curvature of Space Time" according to Einstein's General Relativity. But before knowing curvature, we need to understand what density is. I think the denser an object is, the more deeply it curves the space time fabric of the universe. Now what is density? We know that density equals mass divided by volume.

That is, the amount of mass concentrated in a unit volume of an object is called the density of that object. Now the sun has a fixed volume and a fixed mass. So it will have specific density. It will slightly curve space-time. But suppose the sun is somehow compressed and turned into a marble. In this case its mass will remain unchanged. But as the volume is greatly reduced, its density will be severe. It will curve space-time very deeply. I see a relationship between density and curvature. High-density objects curve space much more deeply than any normal low-density object. That is, we can observe a new feature, which I have named as Curvature Depth. This curvature depth Cd is proportional to density. That is, the greater the curvature depth Cd, the higher the density of that system or object. Now let's go back to the universe. It has a radius and Time. The universe is 13.8 billion years old and has a radius of about 46.5 billion light years. It contains about 2 trillion galaxies and more than 10 million superclusters. And they are gravitationally bound to each other. From a distance, these vast networks of galaxies appear very compact. So from a distance we can perceive them as a unit system whose combined gravity is curving the space-time fabric of the universe. That is, there will be a definite curvature depth Cd. Now another thing is the expanding universe. The distance between galaxies and galaxy clusters increases gradually. That is, as the distance increases, the galaxies within the supercluster structure are moving away from each other. As a result, the density of galaxy clusters decreases. You can think of it this way, suppose a box contains some amount of gas. If you increase the volume of the box. Then increase the volume a little more. As a result the density of the gas in the box will gradually decrease. The same is true for our universe. As the universe expands, the density of galaxy superclusters will decrease (due to the galaxies moving away from each other). As the density decreases, the curvature depth of the galaxy supercluster decreases (as the density decreases). The present expansion rate of the universe is 70 $Kmsec^{-1}Mpc^{-1}$. Here Mpc stands for Megapersec. Here 1 Mpc is equals to 10^6 Pc. We express this expansion by the Hubble Expansion Rate or H, which is proportional to the Curvature Depth. That is, the higher the expansion rate, the more the density of galaxy superclusters in the universe will decrease. Since they are working as a unit system, the depth of curvature we get for them will also decrease.

Mathematically we can draw all these features and relate them to each other. After some calculations I found that my equation represented a special case. This means my equation is pretty accurate for the present and the future. As the universe expands, repulsive gravity will become stronger as the time of the universe increases. And the faster the universe will expand. But my equation doesn't say why the expansion rate of the universe is increasing. It just says that as time and space increase, the repulsive gravity becomes stronger. Now only quantum field theory is able to answer which object carries repulsive gravity. Many say dark energy or vacuum energy. The present universe is dominated by vacuum energy. Our universe has been carrying dark energy from about 9.5 billion years after the Big Bang to the present. Most physicists believe that this dark energy alone can explain the expans-

-ion of the universe. From the initial 380 thousand years to 9 billion years our universe was dominated by matter. And from the beginning of the Big Bang, the universe was dominated by radiation for 380,000 years. Also my equation becomes meaningless for the initial state of the universe. Because according to the inflation theory the repulsive gravity was so high in the beginning that an exponential expansion of the universe took place between 10^{-36} and 10^{-33} seconds. Then the universe turned from a drawing of an atom into a marble. So this does not satisfy my equation. Because both the time and radius of the universe were small in the beginning, how does repulsive gravity play such a strong or effective role? This created a paradox for me. After some time of inflation, the expansion rate of the universe decreases. The combined gravity of matter, mainly in the matter-dominated case, slows down the expansion rate of the universe. But anyway, this little classical and cosmological equation of mine is able to explain the current and future state of the universe very well. One of the predictions of this equation is "The Big Freez" because as the universe expands, its temperature also decreases. So there will come a moment when everything in the universe will freeze out.



For a point there is a quantity called curvature depth Cd. Next the point expand and turn into a certain volume {Cd,Cd_1,Cd_2,Cd_3 are the curvature depth}.

Here Cd>Cd_1>Cd_2>Cd_3

As the point expands the density may decrease and the curvature depth also decrease.

From the above theory at least we get two relationships.

First one is

$$Cd \propto \rho$$

And the second one is

$$Cd \propto 1/H$$

"Curvature depth" is not a real quantity. It’s a hypothetical quantity, we can’t measure it experimentally or observationally. But it associated with ρ, and H. You may say in that way, if there is mass, there is gravity. If there is gravity, there is curvature and curvature depth. So let’s do some calculation with this two relation.

$$\rho \propto Cd$$

or,

$$\rho = \kappa Cd$$

or,

$$M/V = \kappa Cd$$

As Density ρ=Mass/Volume; $\rho=M/V$ and for sphere $V=(4/3)\pi R^3$

So,

$$M/(4/3)\pi R^3 = \kappa Cd \quad (1)$$

Now, $Cd \propto 1/H$, or $Cd=\eta(1/H)$ Here η is constant, so put the value of Cd into the equation 1, we get:

$$M/(4/3)\pi R^3 = \kappa\eta(1/H)$$

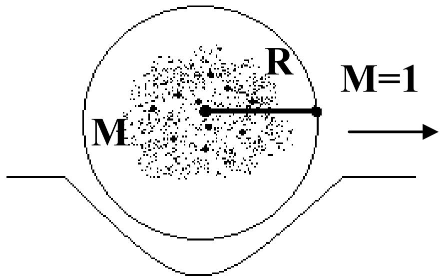
Now,

$$M/R^2 = (4/3)\pi\kappa\eta\ R/H$$

or,

$$GM/R^2=(4/3)\pi\kappa\eta G\ R/H$$

Multiply both side by G, and G is the Newtonian Gravitational Constant



This is a galaxy cluster, and total centered mass is “M”, each point represent a galaxy. Lets consider a galaxy mass “m=1”, at the edge on the sphere. So there is an attraction between mass M to (m=1), I called that force Fq.

The picture is a galaxy cluster, and total centered mass is "M", each point represent a galaxy. Let consider a galaxy mass "m"=1, at the edge on the sphere. So there is an attraction between mass M to mass m=1, I called that force as F(g).

So,

$$GM/R^2=\lambda R/H$$

Here $\lambda=(4/3)\pi\kappa\eta G$

So,

$$F(g)=\lambda R/H$$

According to the hubble law we know that; H hubble expansion rate is equals to $\dot{a}/a$, or

$$H=\dot{a}/a$$

Here a is the scale factor

$$V=HR$$

and

$$R=\Delta Xa$$

$$V=dR/dt=\Delta X(da/dt)=\Delta X\dot{a}$$

R is the physical distance,

ΔX=coordinate distance

So,

$$V/R=\Delta X\dot{a}/\Delta Xa=\dot{a}/a=H$$

or,

$$V=HR$$

$$F(g)=\lambda\ \Delta Xa^2/\dot{a}$$

or,

$$F(g)=\lambda\ \Delta X(dt/da)a^2$$

or,

$$\int da/a^2=[\lambda\ \Delta X/F(g)]\int dt$$

or,

$$a^{-2+1}/-2+1=[\lambda\ \Delta X/F(g)]t+\chi$$

Let

$$\chi=0$$

Then we get,

$$-1/a=[\lambda\ \Delta X/F(g)]t$$

or,

$$F(g)=-\lambda(\Delta Xa)t$$

or,

$$F(g)=-\lambda(R\times t)$$

As $\{R=\Delta Xa\}$

Here, λ is the repulsive Gravitation constant. This equation above says in our universe as the radius and time of it increased, the stronger the repulsive gravitation force might be. The negative sign on the right hand side represent its repulsive nature.