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Density of Physical Vacuum

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Introduction

Applying the wave model of gravity, the density is calculated the physical vacuum. An unusually high virtual density is obtained states of physical vacuum.

Following the wave model of gravity, protons A and B re-emit the gravitational energy of the cosmos into the surrounding space (Figure 1).

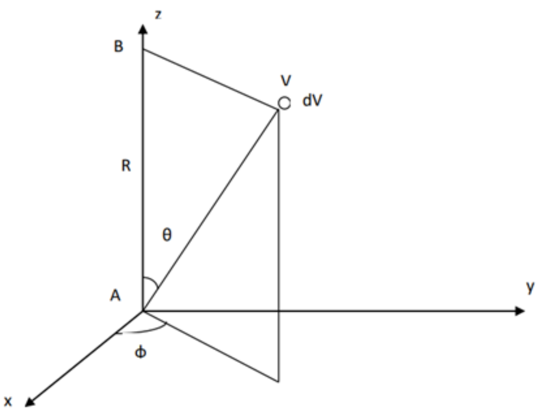

Figure 1. The gravitational energy of the cosmos into the surrounding space.

Is represented (for convenience of calculations) a physical vacuum consisting of virtual protons, so that in at any given time, there are n protons in the elementary volume of the dV vacuum.

Description

Then the density of the physical vacuum $\rho = \frac{m*n}{dV}$ where m is the mass of the proton. Suppose that virtual protons re-emit gravitational energy in a similar way to real ones protons. It is natural to assume that the physical vacuum increases the coefficient gravity in the law of universal gravitation. In Figure 1 at points A and B at distance R real protons are located (one at each point). According to the wave model the force of attraction between protons was obtained. $F = \frac{3}{4}\gamma\frac{mm}{R}$ where γ is the gravitational constant; r is the distance between protons. Let's assume that the coefficient of gravity 1/4γ is the contribution of the physical vacuum to the force of attraction between the protons. Let's use this property to calculate the density the physical vacuum. Suppose that at some point in time the rf wavefronts gravitational waves from protons A and B fall inside the volume dv. Gravity energy entering the interior of the volume from protons A and B for a certain period time is calculated by the formula:

$$\varepsilon_V = \frac{\varepsilon n\pi rr}{4\pi AV*AV} + \frac{\varepsilon n\pi rr}{4\pi BV*BV} = \frac{\varepsilon\rho rr}{4m}\left(\frac{1}{AV*AV} + \frac{1}{BV*BV}\right)dV$$

where ε is the energy of a gravitational wave coming from space and absorbed by a proton A or B ; π=3.14; AV – distance between proton A and volume dV; BV – distance between proton B and volume dV; r is the radius of the proton. The energy εv is re-emitted in the surrounding space and part of it falls on protons A and B. On proton A falls energy.

$$\varepsilon_A = \frac{Ev\pi rr}{4\pi AV*AV} = \frac{\varepsilon\rho rr}{16mAV*AV}\left(\frac{1}{AV*AV} + \frac{1}{BV*BV}\right)dV$$

According to figure 1, BV 2=AV*AV+ R2 – 2AV*R cos θ ; dV=AV*AV sin θ*dθ dφ d(AV)

0 ≤ θ ≤ π ; 0 ≤ φ ≤ 2π; r ≤ AV ≤ ∞ ; we haveSubstituting dv, we get

$$\varepsilon_A = \frac{\varepsilon\rho rrr}{16m}\left(\frac{1}{AV*AV} + \frac{1}{BV*BV}\right)\sin\theta * d\theta d\phi d\left(AV\right)$$

Let G be the tension the gravitational field created by the volume dv at point A. Has to be equal εA=kG ; where k is the proportionality coefficient; εA=kG is the energy of the gravitational wave created by the volume dv at point A and absorbed by the proton A. The energy of the gravitational waves coming from space and absorbed by a proton A or B can be expressed as ε=2kg; where g is the intensity of the gravitational field from the infinite space half-space (see the article "Shielding the gravitational field in space"). k is the same proportionality coefficient. In this article, it was obtained $2g = 3\gamma\frac{m}{rr}$ There is a place to be $\frac{\varepsilon_A}{\varepsilon} = \frac{G}{2g}$ From here

$$G = 2g\frac{\varepsilon_A}{\varepsilon} = \frac{3}{16}\gamma\rho rr\left(\frac{1}{AV*AV} + \frac{1}{BV*BV}\right)\sin\theta*\cos\theta*d\theta d\phi d\left(AV\right)$$

Projection on the OZ axis of force the attraction of proton A to the volume dv is equal to

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$$mG\cos\theta = dF = \frac{3}{16}\gamma m\rho rr\left(\frac{1}{AV*AV}+\frac{1}{BV*BV}\right)\sin\theta*\cos\theta*d\theta d\phi d\left(AV\right)$$

Let's make an equality :

$$\frac{1}{4}\gamma\frac{mm}{R}=\frac{3}{16}\gamma m\rho rr\iiint 1\left(\frac{1}{AV*AV}+\frac{1}{BV*BV}\right)\sin\theta*\cos\theta*d\theta d\varphi d\left(AV\right)$$

To simplify the calculations, we take R=1m

$$\frac{4}{3}\frac{m}{\rho rr}=\iiint 1\left(\frac{1}{AV*AV}+\frac{1}{BV*BV}\right)\sin\theta*\cos\theta*d\theta d\phi d\left(AV\right)$$

Conclusion

After calculation of the triple integral we obtain

$$\rho=\frac{1}{3}\frac{m}{\pi rrr}$$

After substituting the values, we get ρ=5.25*1016 kg/m3; the number of protons in a cubic meter is 5.25*1016 /1.67*10-27=3*1043 ; Let one proton be in a cubic cell. then the number of cells is equal to the number of protons in a cubic meter. The volume of the cell $V_p=\frac{1}{3}*10^{-43}=0.318*10^{-43}$ Or α=3.17*10-15 m; proton diameter 3*10-15m. It follows that protons are dense 3 packed inside a physical vacuum (practically touching each other).