The Balance of the Quantum Density of a Medium in Dynamics

Professor Vladimir Leonov

Abstract. The balance of the quantum density in dynamics is describing the state of a dynamic particle (body) in the entire range of speeds including the speed of light. The equations of dynamics are including the normalized relativistic factor. In the region of relativistic speeds, we observe a decrease in the quantum density of the medium around the particle (body) and the formation of a deeper gravitational well. Inside a particle (body) we observe an increase in the quantum density of the medium. Upon reaching the speed of light, the particle has the state of a black micro-hole. In this case, we will see that inside of the particle the quantum density doubles, and outside it there is a drop in the quantum density to zero [1-8].

Keywords: balance, quantum density, normalized relativistic factor, speed of light.

The gravitational state of a particle (body) is characterized by four parameters of the quantum density of the medium inside the quantized space-time:

$$\rho_o,\ \rho_1,\ \rho_2,\ \rho_n \tag{1}$$

where ρ_o is quantum density of undeformed quantized space-time, q/m^3;

ρ_1 is quantum density of deformed quantized space-time outside of the particle (body), q/m^3;

ρ_2 is quantum density of deformed quantized space-time inside a particle (body), q/m^3;

ρ_n is imaginary quantum density of the quantized space-time, q/m^3;

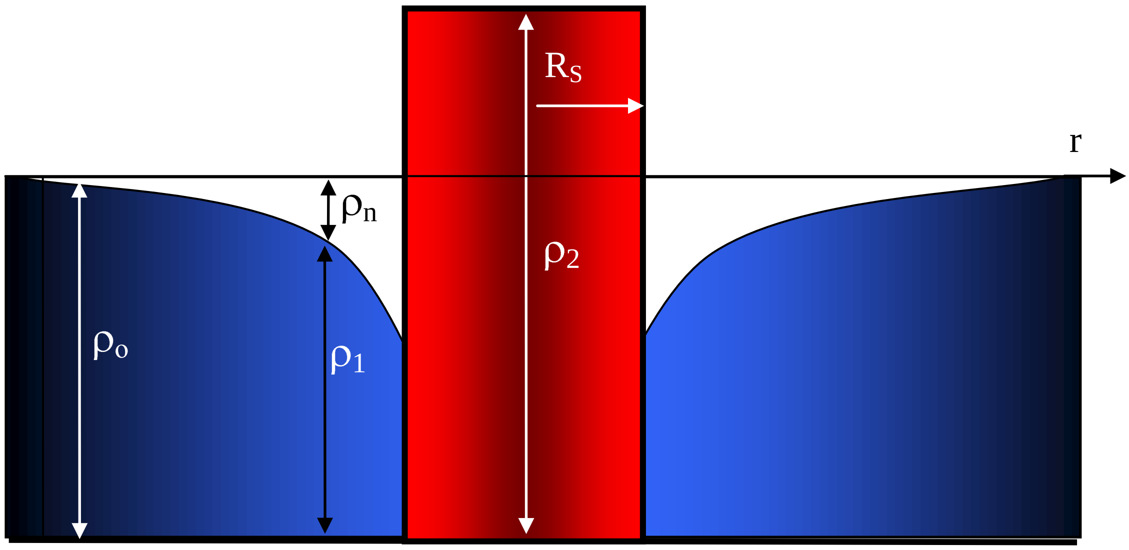

Fig. 1. Gravitational diagram of the distribution of the quantum density of the medium (ρ_1, $\rho_{2,}$ $\rho_{0,}$ ρ_n) of the particle (body); ρ_2 is the region of compression of the medium, ρ_1 is the region of stretching of the medium.

Figure 1 shows **g**ravitational diagram of the distribution of the quantum density of the medium (ρ_1, ρ_2, ρ_0, ρ_n) of the particle (body). The region of stretching of the medium is $\rho_1 = f(r)$, where r is the radius. The region of compression of the medium is ρ_2.

In the theory of Superunification, we describe the state of the particle (body) inside quantized space-time using the dynamic Poisson's equation for the quantum density ρ of a medium [1-7]:

$$\operatorname{div}(\operatorname{grad}(\rho_0 - \gamma_n \rho_n) = k_o \rho_m \quad (2)$$

where k_0 is the proportionality coefficient;

ρ_m is the density of matter, kg/m^3;

γ_n is the normalized relativistic factor.

In (2), we introduced the normalized relativistic factor γ_n:

$$\gamma_n = \frac{1}{\sqrt{1 - \left(1 - \frac{R_g^2}{R_S^2}\right)\frac{v^2}{C_o^2}}} \quad (3)$$

where $C_o^2 = 9 \cdot 10^{16}$ J/kg is gravitational potential of undeformed quantized space-time;

v is particle speed, m/s;

R_S is radius of the gravitational boundery (the interface) between the regions of tension and compression (radius of the particle, body), m;

r is distance, m;

R_g is gravitational radius (without multiplier 2), m:

$$R_g = \frac{Gm}{C_o^2} \quad (4)$$

The dynamic Poisson's equation (2) has a two-component solution in the form of a system of equations for the regions of gravitational extension ρ_1 and compression ρ_2 of quantized space-time as a result of its spherical deformation during the formation of the mass of a particle (body) taking into account the normalized relativistic factor γ_n (3) [1-6]:

$$\begin{cases} \rho_1 = \rho_o\left(1 - \frac{\gamma_n R_g}{r}\right) \text{ at } r \ge R_S \\ \rho_2 = \rho_o\left(1 + \frac{\gamma_n R_g}{R_S}\right) \end{cases} \quad (5)$$

where R_S is radius of the gravitational boundery (the interface) between the regions of tension and compression (radius of the particle, body), m;

R_g is gravitational radius (without multiplier 2), m:

$$R_g = \frac{Gm}{C_o^2} \tag{6}$$

where $G = 6.67 \cdot 10^{-11}$ Nm^2/kg^2 is gravitational constant;

m is mass, kg;

$C_o^2 = 9 \cdot 10^{16}$ J/kg is gravitational potential of undeformed quantized space-time.

From (5) we find the dynamic balance of the quantum density of the medium for the particle (body) inside the quantized space-time:

$$\rho_1 = \rho_o\left(1 - \frac{\gamma_n R_g}{r}\right) = \rho_o - \rho_o \frac{\gamma_n R_g}{r} \tag{7}$$

or:

$$\rho_o = \rho_1 + \rho_o \frac{\gamma_n R_g}{r} = \rho_1 + \gamma_n \rho_n \tag{8}$$

The gravitational state of a particle (body) is characterized by balance of the quantum density (8) in dynamic which is a constant:

$$\rho_o = \rho_1 + \gamma_n \rho_n = \text{Const} \tag{9}$$

The implementation of balance (8) we see on the **g**ravitational diagram (Fig.1). We also see that there is an imaginary ρ_n is imaginary quantum density of the quantized space-time [1-7].

In the region of relativistic speeds, we observe a decrease in the quantum density of the medium around the particle (body) and the formation of a deeper gravitational well. Inside a particle (body) we observe an increase in the quantum density of the medium. Upon reaching the speed of light, the particle has the state of a black micro-hole. In this case, we will see that inside of the particle the quantum density doubles, and outside it there is a drop in the quantum density to zero [8].

References:

[1] V. S. Leonov. Quantum Energetics. Volume 1. Theory of Superunification. Cambridge International Science Publishing, 2010, 745 pgs.

[2] Download free. Leonov V. S. Quantum Energetics. Volume 1. Theory of Superunification, 2010. http://leonov-leonovstheories.blogspot.com/2018/04/download-free-leonov-v-s-quantum.html [Date accessed April 30, 2018].

[3] Vladimir Leonov. Unification of Electromagnetism and Gravitation. Antigravitation.
viXra:1910.0300 *submitted on 2019-10-17*.
[4] Vladimir Leonov. Two-Component Solution of the Poisson Gravitational Equation.
viXra:1910.0533 *submitted on 2019-10-26*.
[6] Vladimir Leonov. Gravitational Diagram of a Nucleon for Quantum Density of a Medium.
viXra:1910.0610 *submitted on 2019-10-29*.
[7] Vladimir Leonov. Quantum Gravity Inside of the Gravitational Well.
viXra:1911.0039 *submitted on 2019-11-03*
[8] Vladimir Leonov. Gravitational Diagram of an Ideal Black Hole.
viXra:1910.0651 *submitted on 2019-10-31*.