Universe expansion - Black holes - Nuclear forces

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Abstract. The accelerated expansion of Universe is caused by the Universal antigravity force, with which the Hubble's Law is proved. The black holes are sustainable matter forms of the dynamic space that cannot disappear, because of the particulate antigravity force that prevents the further gravitational collapse. The inverse electric-nuclear field causes the nuclear forces, namely the strong nuclear force and the nuclear antigravity one, on which the architecture of the nuclei model is based.

Keywords: Inverse electric field; antigravity forces; nuclear forces.

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1. Universal antigravity force

The unified theory of dynamic space[1,2] describes the Universal antigravity force,[3] because of which the galaxies follow an accelerated centrifugal motion.[4,5] The dynamics of Universe[6] with a constant radius R_0[1,2] gives the cohesive pressure P_{0x}[1,2] of a region at a distance x from the Universe center equal to[6]

$$P_{0x} = P_{0p}\frac{x^2}{R_0^2}, \tag{1}$$

where P_{0p} is the constant cohesive pressure at the Universe periphery.[1,2] The change of the above cohesive pressure causes a potential difference of pressure (Fig. 1)

$$\Delta P = P_5 - P_1 \tag{2}$$

onto the volume V of a particle core vacuum,[7] with result the creation of buoyancy conditions on the bodies and the creation of the antigravity force F_a.

So, the matter acquires centrifugal accelerated motion with radial direction to the periphery of Universe.

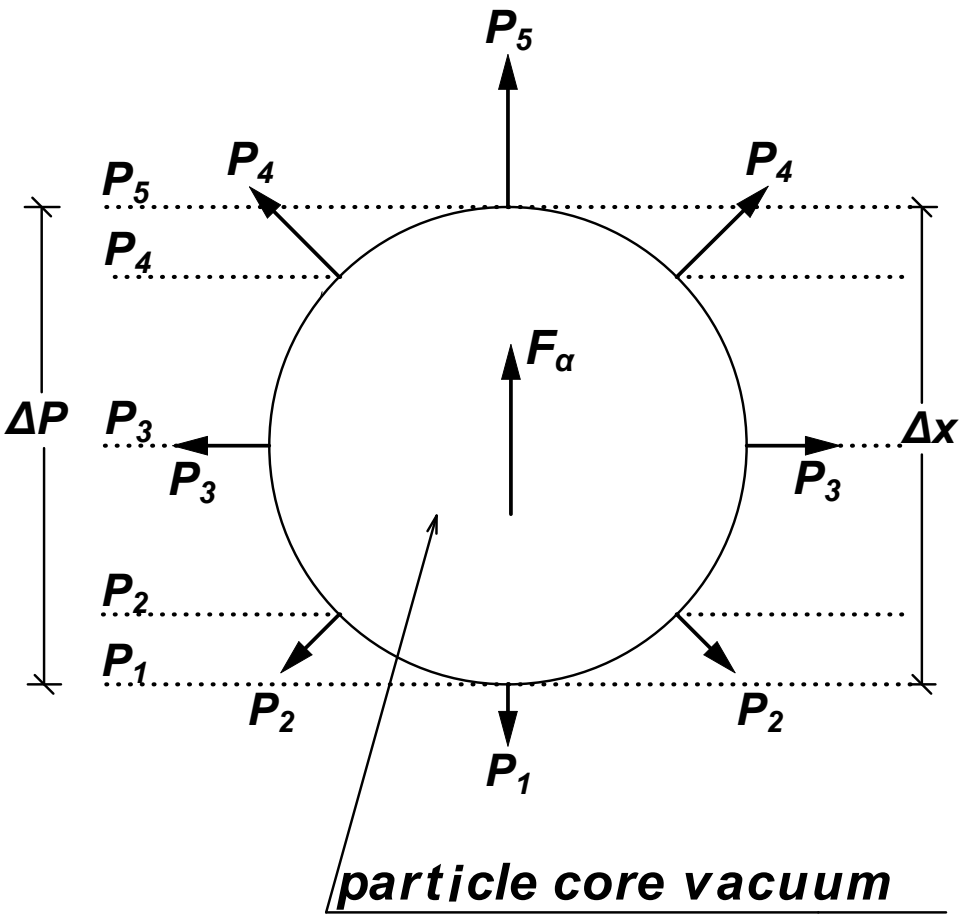

Figure 1. The buoyancy in the dynamic space creates the Universal antigravity force F_a, which causes the accelerated expansion of Universe and has a direction towards the greater cohesive pressure P_5 and to the periphery of Universe ($P_1 < P_2 < P_3 < P_4 < P_5$, $F_a = V\Delta P/\Delta x$, $\Delta P = P_5 - P_1$, V is the volume of bubble vacuum and Δx is its diameter)

It is noted that the neutron core vacuum[7] is created at the Universe center, where it occurs a breaking of Universe symmetry.[6] So, the Universal antigravity force will be then[3]

$$F_a = \frac{\Delta P}{\Delta x} V, \tag{3}$$

where

$$\frac{\Delta P}{\Delta x} = 2x \frac{P_{0p}}{R_0^2} \tag{4}$$

is the pressure gradient of the Universal antigravity.[3]

The Universal antigravity force is very weak, as it is exerted on the small volume of the particle core vacuum (vacuum bubble) by a very small difference ΔP of cohesive pressure. However, the results of the antigravity force, although they evolve at a slow

pace, are grand in the Universe. It is also noted, that our galaxy is moving towards the periphery of Universe at the inconceivable speed calculated[5] as

$$u = u_a C_0 = 0,6 \cdot 3 \cdot 10^8 m/sec \Rightarrow u = 180.000 km/sec, \tag{5}$$

where

$$u_a = \frac{u}{C_0} = 0,6 \Rightarrow u_a = 0,6 \tag{6}$$

is the constant timeless speed,[8] with which the Cosmic journey[5] of galaxies takes place, at the centrifugal motion of antigravity. It is noted that the light speed[9] shall be considered as constant ($C_0 = 3 \cdot 10^8$m/sec) in regions of our galaxy.

2. Expansion of Universe and Hubble's Law

The Universal antigravity force (section 1) has been described, because of which the particles and the galaxies consisting of them obey on an accelerated centrifugal motion.

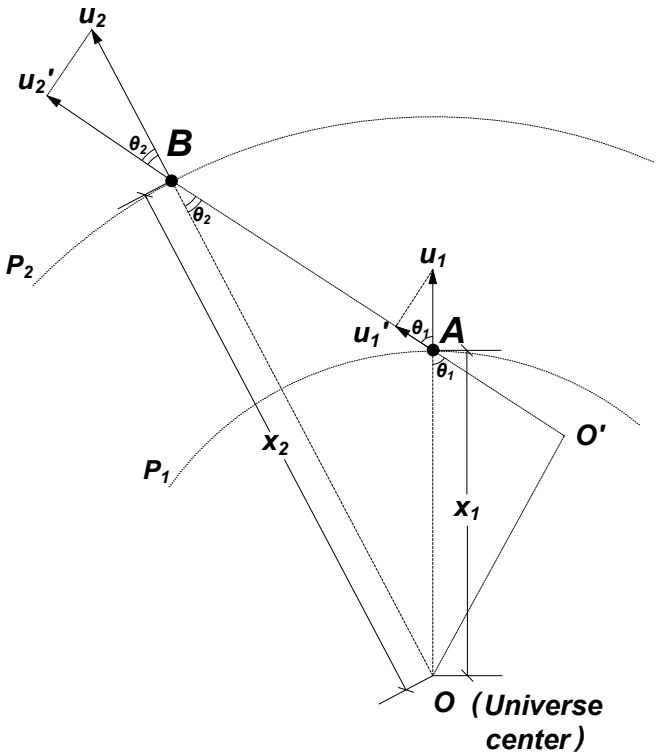

Figure 2. The relative motion of galaxies as expansion of Universe, where A is our own galaxy, B is the galaxy observed by Hubble, P_1 is the cohesive pressure in our region, P_2 is the cohesive pressure in region of galaxy B and x_1, x_2 are the distances of galaxies A and B from the Universe center O

Therefore, what Hubble had observed is not due to the expansion of the Universe as a result of the Big Bang, but it is the relative motion of galaxies A and B (Fig. 2). As galaxies A and B move centrifugally from the Universe center O towards the periphery, at speeds u_1 and u_2 respectively ($u_1 < u_2$), the distance AB between them increases, since their components $u\acute{}_1$ and $u\acute{}_2$ are unequal ($u\acute{}_1 < u\acute{}_2$).

So, the empirical Hubble's formula has been concluded as[4]

$$u = H(AB), \tag{7}$$

where

$$H = \frac{1}{R_0}\sqrt{\frac{P_{0p}}{2d_m}} \tag{8}$$

is the Universal Hubble's constant,[4] R_0 the constant radius of Universe, P_{0p} the constant cohesive pressure at the Universe periphery and d_m the constant mass density[10] of dynamic space. Using the approximate values $P_{0p} \approx 10^{151}\mathrm{N/m^2}$,[11] $R_0 \approx 10^{26}\mathrm{m}$,[12] $d_m \approx 10^{134}\mathrm{Kg/m^3}$,[10] and substituting in Eq. 8, we verify the size class of the Hubble's constant equal to

$$H \approx 10^{-18} sec^{-1}. \tag{9}$$

Also, the upgrade of entropy[4] and the Cosmic background radiation[4] at the Universe limits are interpreted.

3. Particulate antigravity force and black holes

The Universal antigravity force is complemented by the nuclear antigravity force (section 4) and the particulate antigravity force, which will be explained below.

The gravitational field difference[13] of a particle creates the difference of cohesive pressure (Fig. 3) at the proximal space equal to

$$\Delta P = P_2 - P_1, \tag{10}$$

resulting to create conditions of buoyancy on a second particle, which found immersed in the proximal area of the above particle. So, the pressure gradient of particulate antigravity is[14]

$$\frac{\Delta P}{\Delta x} = 2P_{0x}\frac{r^2}{x^3}, \tag{11}$$

while the corresponding Universal pressure gradient is $\Delta P/\Delta x = 2xP_{0p}/R_0^2$ (Eq. 4).

It is reminded that x in the Universal pressure gradient (Eq. 4) is the distance from the center of Universe (of radius R_0), while x in the pressure gradient of particulate antigravity (Eq. 11) is the distance from the particle (radius[11] r of its core vacuum[7]), P_{0x} is the space cohesive pressure of a region and P_{0p} the cohesive pressure at the periphery of Universe.

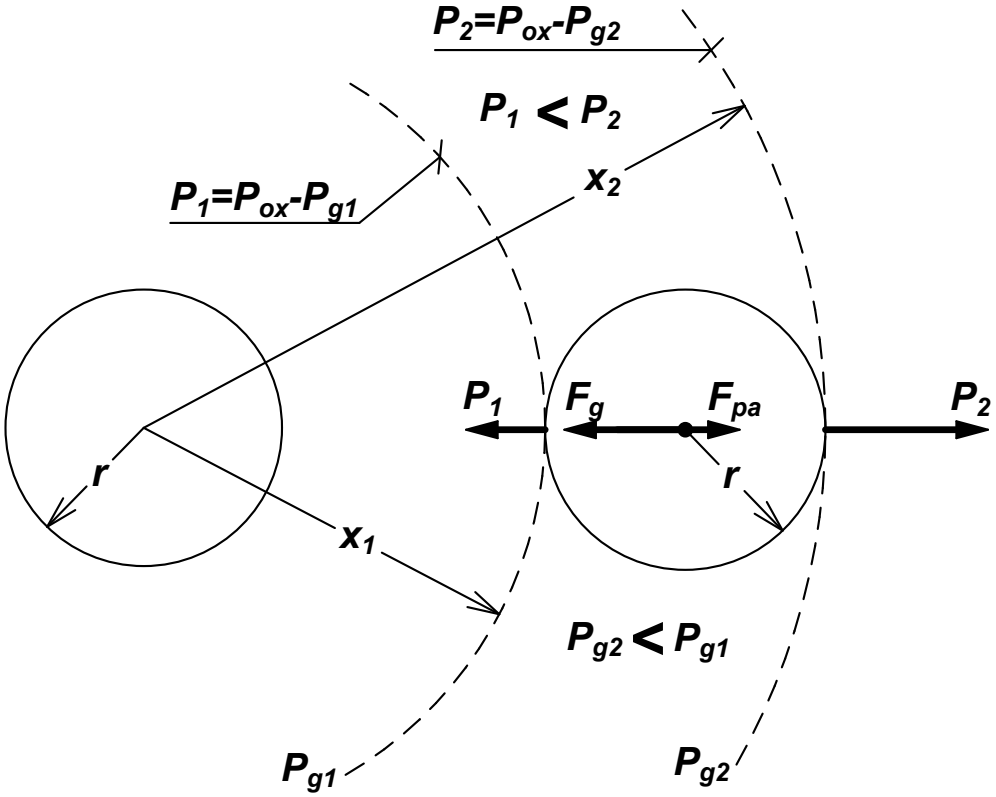

Figure 3. The inequality of gravity pressures $P_{g2} < P_{g1}$ of the left particle implies the inequality of cohesive pressures $P_1 < P_2$ in its proximal area, causing repulsive antigravity force F_{pa}, onto the right particle, opposite to the gravitational attraction force F_g

The particulate pressure gradient causes repulsive force of antigravity on a same particle (neutron) of a bubble volume $V = 4\pi r^3/3$ and due to Eq. 11 is equal to (see the identical Eq. 3)

$$F_{pa} = \frac{\Delta P}{\Delta x} V \Rightarrow F_{pa} = \frac{8\pi r^5 P_{0x}}{3x^3}. \tag{12}$$

It is noted, that the gravitational attraction force[13] $F_g = \pi P_{0x} r_1^2 r_2^2 / R^2$ between these two neutrons for $r_1 = r_2 = r$ and $R = x$ is

$$F_g = \pi P_{0x} \frac{r^4}{x^2}. \tag{13}$$

Therefore, due to Eqs 12 and 13, the corrected Law of gravitation can be written

$$F = F_g - F_{pa} = (1 - \frac{8r}{3x})\pi P_{0x} \frac{r^4}{x^2} \Rightarrow F = (1 - \frac{8r}{3x})\pi P_{0x} \frac{r^4}{x^2}. \tag{14}$$

Respectively, the corrected Newton's Law of gravitation can be written

$$F = (1 - \frac{8r}{3x}) G \frac{m^2}{x^2}. \tag{15}$$

For $x = 2r$ (the minimum distance between two neutrons) the reduction factor of gravity $k = 1 - 8r/3x$ (Eq. 14) becomes

$$k = 1 - \frac{8r}{3x} = 1 - \frac{8r}{3 \cdot 2r} = 1 - \frac{4}{3} < 0 \Rightarrow k < 0. \tag{16}$$

This negative reduction factor of gravity means resultant $F < 0$ (Eq. 14). Therefore, the neutrons at the distance $x = 2r$ (i.e."in contact") are repelled, because the particulate antigravity force prevails ($F_g < F_{pa}$, Eq. 14).

For

$$k = 1 - \frac{8r}{3x} = 0 \Rightarrow x = \frac{8r}{3} \tag{17}$$

the resultant is $F = 0$ ($F_g = F_{pa}$, Eq. 14). Hence, for

$$2r < x < \frac{8r}{3} \tag{18}$$

the particulate antigravity force prevails and the neutrons are repelled, while for

$$\frac{8r}{3} < x \tag{19}$$

the force of gravity prevails and they are attracted.

These conditions apply in black holes, which are constructed from the core vacuum (vacuum bubble) of neutrons.

Consequently, the particulate antigravity force prevents the further gravitational collapse and destruction of these bubbles. So, the black holes are sustainable matter forms of the dynamic space that cannot disappear.

4. Nuclear antigravity force and architecture of nuclei model

The change of relative density ρ of the inverse electric-nuclear field[16] affects directly the cohesive pressure of proximal space, since it depends on the number of pairs of electrically opposite elementary units,[1,2] which have remained in the electric field and caused from tensions ($F = kL_0$) of the electric dipoles[1,2] between these electric units. Accordingly, the remaining cohesive pressure P is proportional to these number of pairs of electrically opposite units, which have remained in the electric field and especially in the lower[17] one, where this change happens rapidly. Therefore, if ρ is the relative density at a position of the inverse electric field, then the absolute electric density $\rho_0 - \rho$ is proportional to the number of the above pairs of units, the attractive forces of which create the remaining cohesive pressure P at this position. Consequently, the cohesive pressures P_0 and P are respectively proportional to ρ_0 and $\rho_0 - \rho$, that is

$$\frac{P}{P_0} = \frac{\rho_0 - \rho}{\rho_0} \Rightarrow P = P_0 \frac{\rho_0 - \rho}{\rho_0}. \tag{20}$$

Thus, in the upper[17] inverse nuclear field (Fig. 4), we expect a change of the space cohesive pressure P as a function of the relative electric density ρ of the units and substituting in Eq. 20 $\rho = \rho_1$, $\rho = \rho_2$ and due to $\rho_2 < \rho_1$, we have

$$P_1 = P_0 \frac{\rho_0 - \rho_1}{\rho_0} \Rightarrow P_2 = P_0 \frac{\rho_0 - \rho_2}{\rho_0} \Rightarrow P_1 < P_2 \Rightarrow \Delta P = P_2 - P_1. \tag{21}$$

This pressure difference $\Delta P = P_2 - P_1$ creates buoyancy conditions for the particles entering into the nuclear field and so an attractive antigravity force $F'_a = V\Delta P/\Delta x$ (Eq. 3). Consequently, in the upper nuclear field both the antigravity force F'_a and the resultant[16] $F_1 - F_2$ of the electric forces are attractive forces.

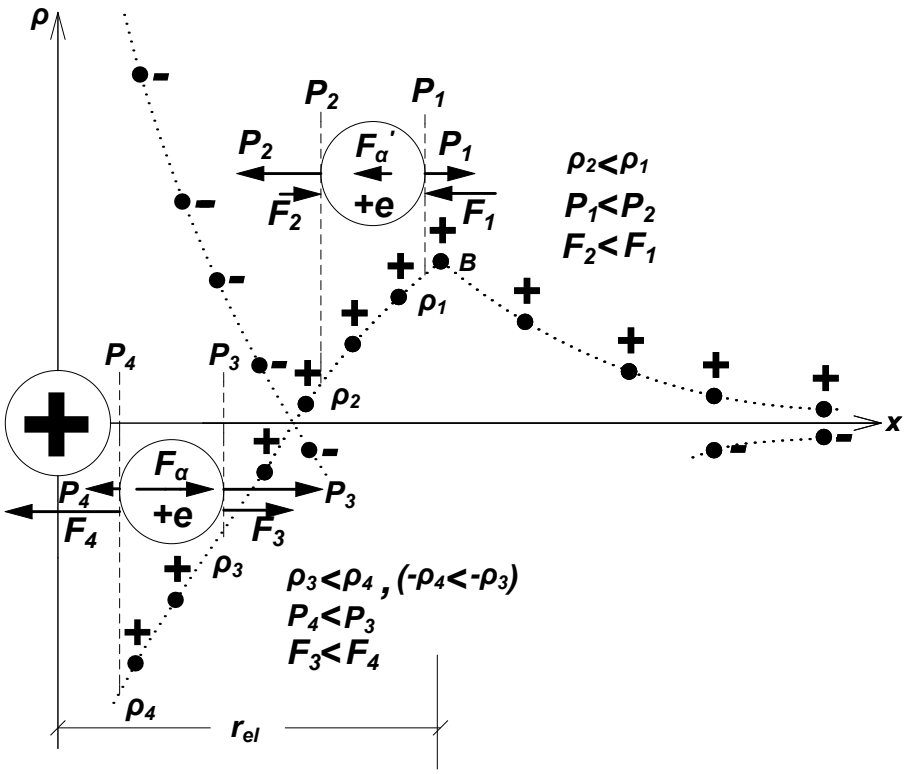

Figure 4. In the upper inverse nuclear field the antigravity force F'_a and the electric resultant $F_1 - F_2$ are attractive, while in the lower field a repulsive antigravity force F_a balances the attractive electric resultant $F_4 - F_3$

The opposite happens in the lower[17] inverse nuclear field, where the relative electric densities are $-\rho_4 < -\rho_3$ (or $\rho_3 < \rho_4$) and for $\rho = \rho_3$, $\rho = \rho_4$ the respective cohesive pressures P_3 and P_4 are

$$P_3 = P_0\frac{\rho_0 - \rho_3}{\rho_0} \Rightarrow P_4 = P_0\frac{\rho_0 - \rho_4}{\rho_0} \Rightarrow P_4 < P_3 \Rightarrow \Delta P = P_3 - P_4. \qquad (22)$$

So, the buoyancy conditions creates a repulsive antigravity force $F_a = V\Delta P/\Delta x$ (Eq. 3) in the lower inverse nuclear field (Fig. 4), that balances the attractive electric resultant[16] $F_4 - F_3$.

The neutron, macroscopically, is an electrically neutral particle. However, on the scale of the atom nucleus the negatively charged neutron[18]

$$q_n = -0,685e, \qquad (23)$$

with its inverse electric field of positive potential as a cloud of positive electrical units, behaves as a positively charged particle close to the nucleus region. So, the result is on one hand to affect the nuclear field and the cohesive pressure of the proximal space

and on the other hand its violent acceleration, while it repels the closest proton, which is now moving on a helical orbit emitting gamma radiation and is finally immobilized. This radiant energy of the proton transmitted by the neutron is measured as mass deficit Δm[19] and is equal to half of the kinetic energy of the neutron. Therefore, neutrons are those that move into the nuclei, with the remaining half of their kinetic energy, moving on circular orbits around immobilized protons that have spin only.[19]

The antigravity force of the lower inverse nuclear field is much stronger than the weak Universal antigravity force. This happens because of the strong pressure difference ΔP created in the lower inverse field and corresponds to the core vacuum of a particle entering in this field. The role, therefore, of the nuclear antigravity force is to not allow the approaching of nucleons, a very important property for the nuclei structure.[19]

Consequently, with this nuclear antigravity force (as well as with the particulate one) it is proved that the electric dipole length[11] ($L = L_{0x} = 0,558 \cdot 10^{-54}$m) maintains the role of the first structural element of the Universe at the very foundations of Nature, as a physical entity that cannot become zero.

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