

# Upgrading of entropy of the Universe

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**Abstract.** The dynamic space is structured by three fundamental elements, namely length, elementary electric charges (units) and forces. A spherical deformity of the space has occurred, which has created an equality of the peripheral and radial cohesive forces (Universal symmetry). Close to the Universe center this equality is breached, thus causing the Genesis of the primary form of matter and the Universal antigravity force, whereby the Hubble's Law is proved. At the periphery of the Universe the dynamic formation of particles is turned back to the dynamic space and the vacuums of their cores end up into the vacuum-nonexistence, thus resulting the upgrading of entropy of the Universe. Actually, by the dissolution of the space deformations, the oriented forces (high entropy) are restored in the form of space cohesive forces (zero entropy). However, collisions of the charged particles take place onto the elastic membrane at the periphery of the Universe. The above membrane consequently oscillates and causes the acceleration of a residue of the charged particles towards the interior of the Universe and, since the charged particles arrive at the periphery of the Universe at the same centrifugal speed and are degraded by the same mechanism, they provoke a weak and constant Cosmic background radiation.

*Keywords:* Dynamic space; Universal symmetry; antigravity force; cohesive pressure.

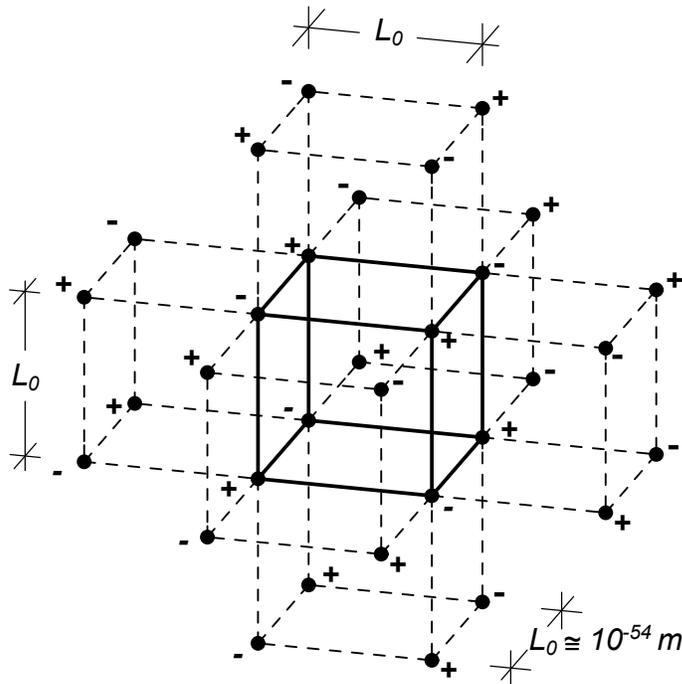
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## 1. Spherical deformation of dynamic space

The isotropic space is structured by the positive and negative units.<sup>1,2</sup> The units are located at the vertices of the cubic cells according to the model of bipolar compounds of  $N_aCl$ . The cubic cell is the elementary volume or the quantum of space, structured by the electric dipoles.<sup>3</sup>

The attraction forces exercised by the electric dipoles create cohesive pressure<sup>3</sup> on the seats of the cells. These forces are neutralized mutually between adjacent units, with result the creation of the isotropic space at the form of a cubic grid of infinite dimensions as a sole existence (Fig. 1).

However, the physical space (the Universe) is not infinite. At the limits of Universe and beyond, where the vacuum (non units-nonexistence) “extends”, the external units of space are attracted only by the underlying zone of units.



**Figure 1.** The cubic cell as an elementary volume-quantum of isotropic space, which has the form of an infinite dimensional cubic grid as a sole existence

At the limits of Universe, wherein the space-existence is separated from the vacuum-nonexistence, the maximum opposition (the principle of antithesis<sup>4</sup>) applies between existence and nonexistence, with result the mutual attraction from the vacuum-nonexistence to the space-existence. The vacuum-nonexistence attracts the existence of the units (Fig. 2).

Finally, because of this mutual attraction between nonexistence of vacuum and existence of space, a spherical deformity of space occurred, under the influence of surface tension, such as the surface tension on a mercury drop. Thus, the isotropic space from a unique existence of infinite dimensions (Fig. 1) is transformed into a spherical deformation of dynamic space, of finite dimensions (the Universe).

The cohesive forces that are developed from this first Universal deformation always are directed to the space-existence. It is obvious that this spherical deformity of space has distorted the cubic cells. So, the dipoles lengthen more, away from the center to the Universe periphery, resulting to develop stronger cohesive forces. This is because the force<sup>4</sup>

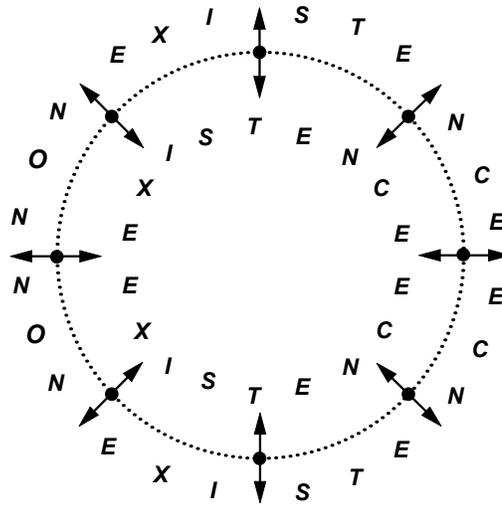
$$F = kL_0 \tag{1}$$

of the electric dipole is proportional to the distance  $L_0$  between the units, where  $k$  a constant ratio. In our region the force  $F$  of the electric dipole is measured at the amazing value<sup>5</sup>

$$F = F_x = 0,242 \cdot 10^{43} N \quad (2)$$

and is, of course, the cause of the space cohesiveness. Therefore, the cohesive pressure  $P_0$ , developed by forces of the electric dipoles, is altered and increases from the center to the Universe periphery the same way as the distance of the units increases, that in our region has been calculated equal to<sup>5</sup>

$$L_0 = 0,558 \cdot 10^{-54} m. \quad (3)$$



**Figure 2.** At the limits of Universe, the nonexistence of vacuum attracts the existence of units

The result of this first deformation of the Universal space is the development of the local cohesive pressure<sup>5</sup>

$$P_0 = 0,7777 \cdot 10^{151} N/m^2 \quad (4)$$

in our region.

Thus, the dynamic space is a vast storehouse of energy, in which the fundamental cause of the force is the electric one between positive and negative units. This vast energy comes from the dynamic energy  $E_0$  of the spherical deformation of Universal space of a constant radius<sup>6</sup>  $R_0 \approx 10^{26} m$ , that is

$$E_0 = P_0 V = \frac{P_0 4\pi R_0^3}{3} \Rightarrow E_0 = \frac{P_0 4\pi R_0^3}{3}. \quad (5)$$

Substituting, into Eq. 5 the  $R_0 \approx 10^{26} m$  and  $P_0 \approx 10^{151} N/m^2$  (Eq. 4), we found

$$E_0 \approx \frac{4\pi \cdot 10^{151} \cdot (10^{26})^3}{3} \approx 10^{230} \text{ Joule} \Rightarrow E_0 \approx 10^{230} \text{ Joule}. \quad (6)$$

This huge Cosmic energy adequately covers the energy and material needs of the Universe and so, the search for so-called dark matter and energy<sup>7</sup> is no longer required.

## 2. Dynamics of Universe

Using the mechanical analog of a maximum circle of Universe section and by studying the dynamics of the elastic stretched circular membrane, the cohesive pressure of a region at a distance  $x$  from the Universe center with a constant radius  $R_0$  is calculated as<sup>8</sup>

$$P_{0x} = \frac{P_{0p}x^2}{R_0^2}, \quad (7)$$

where  $P_{0p}$  the constant cohesive pressure at the Universe periphery. Specifically, the radial force is found<sup>9</sup>

$$F_{rx} = \frac{Fx^2}{R_0^2}, \quad (8)$$

where  $F_{rx} = kL_{0x}$  (Eq. 1) is the force of electric dipole in a region,  $F$  the maximum external force of the electric dipole on the Universe periphery of constant radius  $R_0$  and  $x$  is the distance of a region from the Universe center. So, it is

$$kL_{0x} = \frac{Fx^2}{R_0^2} \quad (9)$$

and

$$L_{0x} = F \frac{x^2}{kR_0^2}. \quad (10)$$

The constant force density<sup>10</sup> of space is

$$d_f = \frac{F_x}{V}, \quad (11)$$

where  $F = F_x = 0,242 \cdot 10^{43}$ N (Eq. 2) is the force of the electric dipole in our region and  $V = L_0^3$  the volume of the cubic cell with edge  $L_0 = 0,558 \cdot 10^{-54}$ m (Eq. 3) in our region, i.e. it is

$$d_f = 1,393 \cdot 10^{205} N/m^3. \quad (12)$$

The constant mass density<sup>10</sup> of space is

$$d_m = \frac{m}{V}, \quad (13)$$

where  $m = E/C_0^2 = F_x L_0 / C_0^2$  (Eq. 18) and  $C_0$  is the light speed, then

$$d_m = \frac{F_x L_0}{C_0^2 V} \quad (14)$$

and for  $d_f = F_x / V$ , it is

$$d_m = d_f \frac{L_0}{C_0^2}. \quad (15)$$

It is noted, that the mass-energy equivalence ( $E = mC_0^2$ ) is calculated from the accumulated force<sup>11</sup> at the dynamic autonomous motion formation<sup>12</sup> of the E/M wave.‡

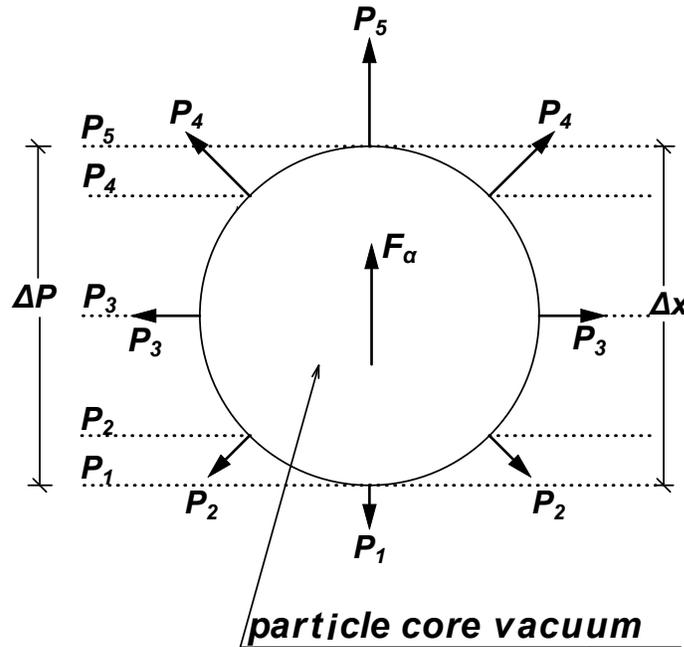
‡  $F_f^2 = F_0^2 + F_s^2$ , where for the E/M wave applies  $F_0 = 0$ , therefore  $F_f = F_s$ , namely the final force  $F_f$  of the formation is equal to the accumulated force  $F_s$ , where  $F_f = E/L_0$  represents the energy of the E/M wave and  $F_s = pC_0/L_0$  represents its momentum. Substituting in the above  $F_f = F_s$  we have  $E/L_0 = pC_0/L_0$ , where  $p = mC_0$  is the momentum of the formation, so  $E = mC_0^2$ .

Substituting in Eq. (15) the values  $C_0 = 3 \cdot 10^8 \text{m/sec}$ ,  $d_f = 1,393 \cdot 10^{205} \text{N/m}^3$  (Eq. 12) and  $L_0 = 0,558 \cdot 10^{-54} \text{m}$  (Eq. 3), the mass density of space is calculated as

$$d_m = 0,864 \cdot 10^{134} \text{Kg/m}^3. \quad (16)$$

### 3. Universal antigravity force

Throughout the Universe there is an equality (Universal symmetry) of peripheral and radial forces.<sup>8</sup> This equality does not apply in the area close to the Universe center, where the curvature of space is great. This is the beginning of the Genesis of the particle-neutron,<sup>13</sup> the primary form of matter as a vacuum bubble, that is a reaction to the first space deformation (the Universal spherical deformity), due to the breaking of Universal symmetry in the area close to the Universe center.



**Figure 3.** The buoyancy in the dynamic space creates the Universal antigravity force  $F_a = V\Delta P/\Delta x$ , which causes the accelerated expansion of Universe and has a direction towards the greater cohesive pressure  $P_5$  and to the periphery of Universe ( $P_1 < P_2 < P_3 < P_4 < P_5$ ,  $\Delta P = P_5 - P_1$ ,  $V$  is the volume of bubble vacuum,  $\Delta x$  is the diameter of bubble vacuum and  $\Delta P/\Delta x$  is the Universal pressure gradient)

The gravity force<sup>14</sup>  $F_0$  of this vacuum bubble (particle core vacuum) balances the attractive forces of the space cohesive pressure  $P_0$ . Therefore, it is

$$F_0 = P_0 4\pi r^2 \quad (17)$$

and so the dynamic energy of the core vacuum, due to Eq. 17, is

$$E = P_0 V = \frac{P_0 4\pi r^3}{3} = \frac{(P_0 4\pi r^2)r}{3} = \frac{F_0 r}{3} = F_0 L_0 \Rightarrow r = 3L_0, \quad (18)$$

where  $r = r_x = 3L_{0x}$  (Eq. 18) is the radius of the particle core vacuum.

The change of cohesive pressure  $P_{0x} = P_{0p}x^2/R_0^2$  (Eq. 7) causes a pressure difference  $\Delta P$  (Fig. 3), onto the volume  $V$  of a particle core vacuum, with result the creation of buoyancy conditions on the bodies.

This buoyancy creates the Universal antigravity force as the first force of Nature

$$F_a = \frac{\Delta P}{\Delta x}V, \quad (19)$$

where  $\Delta P/\Delta x$  the Universal pressure gradient and  $V$  the volume of vacuum bubble.

Specifically, the antigravity force has been calculated<sup>15</sup> as

$$F_a = 2xV \frac{P_{0p}}{R_0^2}. \quad (20)$$

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

Also, we calculated that all galaxies have a constant timeless speed<sup>16</sup>

$$u_a = 0,6 \quad (21)$$

in their Universal centrifugal motion. The speed of our galaxy is then

$$u = u_a C_0 = 0,6C_0 \Rightarrow u = 0,6C_0, \quad (22)$$

namely the speeds  $u$  and  $C_0$  are uniformly increased at the accelerated centrifugal motion of our galaxy towards the Universe periphery.

The Universal antigravity force is very weak, as it is exerted on the small volume of the particle core vacuum by a very small difference  $\Delta P$  of cohesive pressure. However, the results of the antigravity force, although they evolve at a slow pace, are grand in the Universe. Indeed, our galaxy is moving towards the Universe periphery at the inconceivable speed (Eq. 22)

$$u = 0,6C_0 = 0,6 \cdot 3 \cdot 10^8 m/sec \Rightarrow u = 180.000 km/sec, \quad (23)$$

resulting from the constant timeless speed  $u_a = 0,6$  (Eq. 21), with which the Cosmic journey of galaxies takes place, at the centrifugal motion of antigravity. It is reminded that the light speed

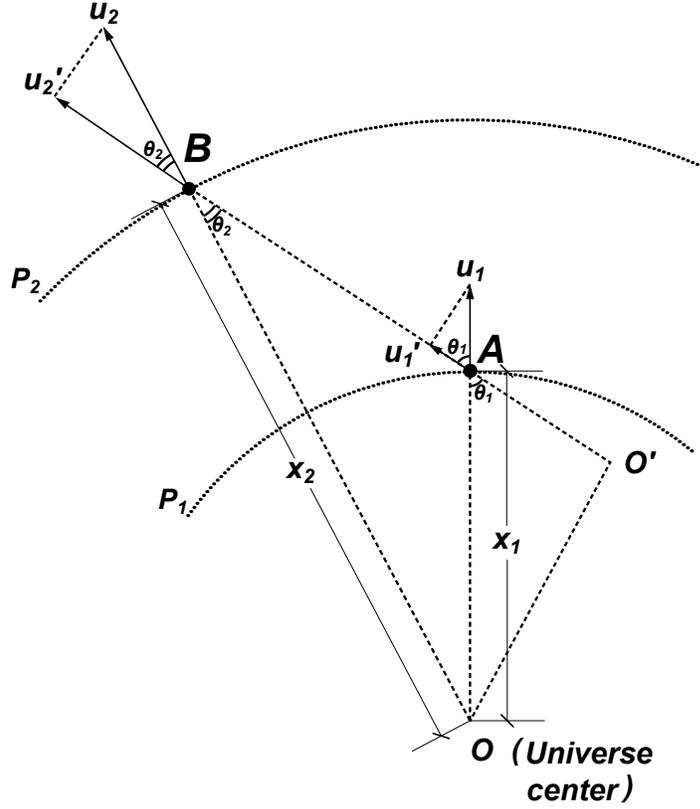
$$C_0 = 3 \cdot 10^8 m/sec \quad (24)$$

shall be considered as a local constant.

#### 4. Expansion of Universe and Hubble's Law

The first force of Nature (the Universal antigravity) has been described (see section 3), because of which the particles and the galaxies consisting of them obey on an accelerated centrifugal motion. 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. 4). 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 increase, since their components  $u'_1$  and  $u'_2$  are unequal ( $u'_1 < u'_2$ ).



**Figure 4.** 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 0

The radius of the particle core vacuum (Fig. 3) is  $r_x = 3L_{0x}$  (Eq. 18), where  $L_{0x} = Fx^2/kR_0^2$  (Eq. 10) is the quantum length of dipole and hence it is

$$r_x = \frac{3F}{kR_0^2}x^2 \Rightarrow r = ax^2, \quad (25)$$

namely it is proportional to the square of distance  $x$  from the Universe center, wherein  $a = 3F/kR_0^2$  is a constant ratio. If

$$V = \frac{4\pi r^3}{3} \quad (26)$$

is the spherical volume of the bubble, then, due to Eq. (25), we have

$$V = \frac{4}{3}\pi a^3 x^6. \quad (27)$$

Substituting the Eq. 27 into the antigravity force  $F = F_a = 2xVP_{0p}/R_0^2$  (Eq. 20), we found

$$F = F_a = \frac{8\pi a^3 P_{0p}}{3R_0^2}x^7. \quad (28)$$

Hence, the Work, accomplished until position  $x$ , is

$$W = \int_0^x F dx = \int_0^x \frac{8\pi a^3 P_{0p}}{3R_0^2} x^7 dx \Rightarrow W = \frac{\pi a^3 P_{0p}}{3R_0^2} x^8. \quad (29)$$

This Work is converted into kinetic energy

$$E_k = \frac{mu^2}{2}, \quad (30)$$

where  $m = Vd_m$  and  $d_m = 0,864 \cdot 10^{134} \text{ Kg/m}^3$  (Eq. 16) is the constant mass density of space and  $u$  is the centrifugal speed of a galaxy. Thus,

$$E_k = \frac{Vd_mu^2}{2} \quad (31)$$

and substituting therein the Eq. 27 we found

$$E_k = \frac{2\pi a^3 d_m u^2 x^6}{3}. \quad (32)$$

Therefore, because  $E_k = W$  (Eqs 29, 32), we have

$$\frac{2\pi a^3 d_m u^2 x^6}{3} = \frac{\pi a^3 P_{0p} x^8}{3R_0^2}, \quad (33)$$

namely

$$u = \frac{x}{R_0} \sqrt{\frac{P_{0p}}{2d_m}} \Rightarrow b = \frac{1}{R_0} \sqrt{\frac{P_{0p}}{2d_m}} \Rightarrow u = bx. \quad (34)$$

Hence (Fig. 4), the centrifugal speeds  $u_1$  and  $u_2$  (Eq. 34) of galaxy A is

$$u_1 = bx_1 \quad (35)$$

and of galaxy B is

$$u_2 = bx_2. \quad (36)$$

So, the galaxy B moving away with relative speed

$$u_r = u'_2 - u'_1, \quad (37)$$

where  $u'_1 = u_1 \cos \theta_1$  and  $u'_2 = u_2 \cos \theta_2$ , i.e. it is

$$u_r = u_2 \cos \theta_2 - u_1 \cos \theta_1 \quad (38)$$

and, due to Eqs 35 and 36, we have

$$u_r = bx_2 \cos \theta_2 - bx_1 \cos \theta_1. \quad (39)$$

So, by substituting into Eq. 39 the  $(O'B) = x_2 \cos \theta_2$  and  $(O'A) = x_1 \cos \theta_1$  and due to  $(O'B) - (O'A) = (AB)$ , we have

$$u_r = b(O'B) - b(O'A) = b(AB) \Rightarrow u_r = b(AB) \quad (40)$$

and, due to  $b = (P_{0p}/2d_m)^{1/2}/R_0$  (Eq. 34), it is

$$u_r = b(AB) = \frac{1}{R_0} \sqrt{\frac{P_{0p}}{2d_m}} (AB) \Rightarrow u = H(AB). \quad (41)$$

Consequently, Eq. 41 is identical with the empirical Hubbles formula, that he concluded by observing the shift of the spectral lines towards the red in the galaxies spectrum, namely

$$H = \frac{1}{R_0} \sqrt{\frac{P_{0p}}{2d_m}} \quad (42)$$

is the Universal Hubble's constant.

Using the approximate values  $P_{0p} \approx 10^{151} \text{N/m}^2$  (Eq. 4),  $R_0 \approx 10^{26} \text{m}^6$  and  $d_m \approx 10^{134} \text{Kg/m}^3$  (Eq. 16) by substituting in Eq. 42, we verify the size class of the Hubble's constant

$$H \approx \frac{1}{10^{26}} \sqrt{\frac{10^{151}}{2 \cdot 10^{134}}} \approx 10^{-18} \text{sec}^{-1} \Rightarrow H \approx 10^{-18} \text{sec}^{-1}. \quad (43)$$

## 5. Upgrading of entropy of the Universe

At the end of the Cosmic journey, the particles of the galaxies will disappear, as defined by the antithesis principle<sup>4</sup> (that is the Genesis of matter in the area close to the Universe center and the disappearance of matter at the Universe periphery). This disappearance of matter is contrary to the prevailing principle of conservation of matter and energy, which has now been replaced by the most valid principle of conservation of forces, representing matter and energy. From the Theory of Dynamic Space, however, matter was defined differently, as a deformation of space, while energy is the ability of displacement of force and, along with the extent (length), are the structural elements of space.

In reality, the dynamic space is the elastic mosaic Being. The Being's deformations, matter and motion, as formations of forces,<sup>11</sup> flow and move under the action of antigravity force, too. Therefore, there is shift of the space deformations, shift of matter and motion.

During the accelerated centrifugal motion of the dynamic formations (matter and motion) towards the periphery of Universe, there happens a continuous increase of entropy. Therefore, we assume that the Universe ends to thermal death.

However, we will give also an etymological interpretation for entropy. The word comes from the Greek verb  $\varepsilon\nu\tau\rho\acute{\epsilon}\pi\omega$  ( $\varepsilon\nu + \tau\rho\acute{\epsilon}\pi\omega$ ), meaning to restrict. Thus, entropy means the restriction of the energy action at direction and extent. Therefore, for stronger restriction, an increase of entropy happens. So, the definition of the energy, as the ability of the force displacement, can be for the entropy the restriction of the force displacement at direction. Following this restriction of force displacement, forms of lower quality energy are generated, namely of increased entropy.

At the periphery of Universe, the dynamics of particle structure and of motion (as well as of autonomous motion of E/M waves)<sup>12</sup> will be retrieved to the space as incorruptible forces, while the core vacuum of particle will be given away to the vacuum (non units-nonexistence). By this retrieval of the dynamics of particle structure and motion to the space, the cohesive pressure of space is restored.

Therefore, since at the periphery of the Universe the dynamic formation of particles return to the dynamic space and the vacuums of their cores in the vacuum-nonexistence, the entropy of the Universe is upgraded to zero entropy (and of better energy quality) of the cohesive forces of space. Hence, the entropy of Universe remains constant, since it is upgraded at its periphery. Actually, with the dissolution of the space deformations, the oriented forces (high entropy) are restored into the form of space cohesive forces (zero entropy).

## 6. Cosmic background radiation

In the process of degradation of the moving particle, the degradation of motion formation comes first. Therefore, the particles are decelerated prior to their degradation, with result the charged particles to create E/M waves towards the periphery of the Universe, where they are finally degraded. However, collisions of the charged particles take place onto the elastic membrane at the periphery of the Universe. The above membrane is pulsing, resulting in the acceleration of a residue of the charged particle towards the interior of the Universe, causing a weak radiation. This is the Cosmic background radiation, which has been detected by Arno Penzias and Robert Wilson.

The Cosmic background radiation is constant, since the charged particles arrive at the periphery of Universe at the same centrifugal speed and are degraded by the same mechanism.

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