

# "Dark" energy and "dark" matter of the Universe

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As the foreword we will address to works of known Russian scientists on the nature of "dark" energy. It is impossible to tell then better citations from literary references.

« Dark energy - a surprising phenomenon of the nature - for the first time has been found out in observations of the supernova stars flashing very far from us, halfway to horizon of the world. It creates "the world antigravitation" which is shown in the accelerated expansion of the universe as the whole. On this global effect dark energy also was open by two international groups of space-observers in 1998-99.[1] »

« What are properties of a dark matter and dark energy? What the space-observations data testify to their existence? About what it speaks from the point of view of physics of a microcosm? What prospects of studying of a dark matter and dark energy in terrestrial conditions?

The universe *extends*: galaxies leave from each other. The space is stretched in all sides, and the further from us there is this or that galaxy, the faster leaves from us. Today rate of this expansion is insignificant: all distances will be doubled approximately for 15 billion years, however earlier rate of expansion was much more. The density of substance in the universe decreases eventually, and in the future the universe will be more and more rarefied. On the contrary, earlier the universe was much denser, than now. "Reddening" light directly testifies to expansion of the universe, generated by the removed galaxies or bright stars: because of the general stretching of space the length of a wave of light increases for that time while it flies to us. This phenomenon has been established by E. Hubble in 1927 and has served as the observant proof of expansion of the universe predicted for three years prior to it by Alexander Fridman.

The essence of dark energy is a subject of disputes. It is known, that it is very in regular intervals distributed, has low density, and does not cooperate a little appreciably by means of known fundamental types of interaction - except for gravitation. [2] »

The main feature of "dark" energy which something can prompt us is surprising connection of energy of expansion of the universe with the phenomenon of gravitation. It is possible to refer to the known popular writer of physics of Poll Davis [3]:

«... If at the moment of time of a birth of the universe, corresponding 1 second... Speed of expansion would differ from the real value more than **on  $10^{-18}$** , it would be enough for full destruction of balance (gravitation and expansion, the author) ».

From higher told all three authors specified in references, only one follows, but *very rigid* conclusion: to know the nature of dark energy, it is necessary to know the nature essence gravitation which is investigated much more full and since Kepler's and Newton's times. The new sight at the nature of gravitation as it is not strange provides ability of light to be propagated in « physical vacuum ». Other vacuum does not exist. The term "vacuum" is very unsuccessful. We shall replace with its concept *of the environment* of the universe which just and is responsible and for **dark energy**, and for a **dark matter**.

In physics the phenomena of transformation of energy of "photon" in a pair of particles of substance and antiparticle are well-known. In particular, energy of gamma - quantum is more **1,022 MeV** goes on formation of an electron-positron. If is even more exact, energy should be not less  **$h\nu=1.031$  MeV** that an electron and a positron have safely scattered without the act of annihilation immediately and without participation of extraneous particles «for withdrawal of a pulse» of gamma - quantum. On this basis the electric structure *of environment* is logically deduced.

Most the general parameters of structure *of environment* are as a first approximation determined from the energy equations:

$$h\nu = e_0 E \Delta r_e \quad (1)$$

Here  **$h$**  – Planck's constant,  $\nu$  – frequency of gamma - quantum,  $e_0$  – an elementary charge,  **$E$**  – intensity of an electric field *of environment*,  $f = e_0 E$  – force,  $\Delta r_e$  – a path of moving of a charge *of environment* under influence of energy of gamma - quantum. We shall define intensity of an electric field, where  $N$  – unknown factor:

$$E = N\xi \frac{e_o}{r_e^2} \quad (2)$$

$r_e$  – Distance between charges (+) and (–) which at present is not known. At passage of a wave of gamma - quantum deformation **of environment** which value depends on cyclic frequency of a wave  $\omega = 2\pi\nu$  and time  $t_v$  of passage of distance between charges is formed:

$$\Delta r_e = 2\pi\nu r_e t_v \quad (3)$$

Let's substitute intensity from (2) and deformation from (3) in (1):

$$h = 2\pi N e_o^2 \xi \frac{1}{r_e / t_v} \quad (4)$$

It is possible to assume, that  $r_e / t_v = c = \sqrt{\eta \xi}$  - speed of light. We shall determine number N:

$$N = \frac{h}{2\pi e_o^2 \sqrt{\xi/\eta}} = \mathbf{137.035999815} = \alpha^{-1} \quad (5)$$

Where  $\eta = \frac{1}{\mu} = 1,00000000 \cdot 10^7 [a^2 m^{-1} kg^{-1} s^2]$  - a magnetic constant **of environment**,

$\xi = \frac{1}{\varepsilon} = 8,98755179 \cdot 10^9 [a^{-2} m^3 kg \cdot s^{-4}]$  - An electric constant **of environment**. The unknown number appeared return value of a constant of thin structure. The equation of energy of a photon for frequency conditional « red border »  $h\nu_{rb}$  and potential electric energy of pair an electron – a positron:

$$w = \xi \frac{e_o^2}{r_e} = 2\pi \alpha^{-1} e_o^2 \nu_{rb} \sqrt{\xi/\eta} = \mathbf{1.64936940 \cdot 10^{-13}} \quad (7)$$

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Frequency of gamma - quantum for « red border » pays off on (7) and it appears, that  $\nu_{rb} = \mathbf{2.489213 \cdot 10^{20}} \text{ Hz}$ . Electric intensity **of environment** between charges (+) and (–) is  $E = \mathbf{1.008552 \cdot 10^{23}} \text{ V/m}$ . From (7) we find the value of a structural element **of environment**, from (1, 2) limiting deformation **of environment**:

$$r_e = \frac{c}{2\pi \alpha^{-1} \nu_{rb}} = \mathbf{1.3987631 \cdot 10^{-15}} \quad (8)$$

meter

$$\Delta r_{rb} = \frac{h\nu_{rb} r_e^2 \alpha}{e_o^2 \xi} = \mathbf{1.020726744 \cdot 10^{-17}}$$

meter

**The environment** having electromagnetic structure can be a source of gravitation and inertia. It is enough to assume, that **environment** has surplus of a charge with is familiar (+) or (–). The charged **environment** with the help of Faraday induction is capable to polarize any material bodies and to draw the polarized bodies to each other. The opportunity of it is proved to that the electrified subject draws **not charged** objects. It is possible to assume, that the charge **of environment** is formed by infringement of symmetry in amounts of an electricity of charges (+) and (–). Probably, the difference of values of charges is defined from equality of forces of Newton and Coulomb at equal distances for mass of electron:

$$\sqrt{\xi} \Delta e^{\pm} = \sqrt{G} m_e^{\pm}; \quad \Delta e^{\pm} = \sqrt{\frac{G}{\xi}} m_e^{\pm} = \mathbf{7.8490194 \cdot 10^{-41}} \quad (10)$$

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At lack at the universe of material objects, Coulomb forces of the charged **environment** create «negative pressure», responsible for expansion of the universe (**dark energy**). The attention pays to itself that the relation of forces of gravitation is less than forces of electricity approximately in  $10^{40}$  times. It can be determined precisely, substituting in the equation of a charge (10) electron charge. The difference in values of charges (+) and (–) results in equal to difference of a charges of electron and positron in 21 sign.

The structure possesses ability to polarization which and is the reason of an attraction of all bodies having masses. The formula of gravitation of Newton gets as:

$$F = G \frac{M_1 M_2}{R^2} = \xi (4\pi R)^2 \sigma_{12} \sigma_{21} \quad \text{Or} \quad F = \xi (4\pi R)^2 S^2 (\Delta r_{12})^2 (\Delta r_{21})^2 \quad (11)$$

Polarization  $\sigma_{12}$  is created by the first mass in a point of the second mass, and polarization  $\sigma_{21}$  is created by the second mass in a point of the first. Deformation **of environment**  $\Delta r_{12}$  is created by the first mass in the center of the second mass, and deformation **of environment**  $\Delta r_{21}$  is created by the second mass in the center of the first mass.

For gravitation essential property **of environment** is small distinction in values of charges (+) and (–). It results in such rough schematic of gravitational interaction:

$$\dots + - (+\text{mass1 } +) - + - (\text{environment}) - + - + - (+\text{mass2 } +) - \dots$$

It is evidently shown, as **the charged environment** is a more of charge (–) carries out an attraction of masses. In absence of masses or at the unloaded space of the universe it is carried out Coulomb pushing away or expansion of the universe which can be named **the "dark" energy** opened in astrophysics. For real electric charges which value in  $10^{41}$  times more differences of value in charges (+) and (–) **environments**, interaction occurs under the circuit:

$\dots + - (+\text{charge } +) - + - (\text{environment}) + - + - (+\text{charge } +) - \dots$  Is a pushing away of charges of one sign (minuses between charges of more plusses),

$\dots - + (-\text{charge } -) + - + - (\text{environment}) + - + - (+\text{charge } +) - \dots$  Is an attraction of charges of a different sign (minuses and plusses between charges equal quantity).

**Thus, electric and gravitational interactions are carried out only with the help of the environment which are taking place between objects of interaction.**

Instead of virtual particles of diagrams after R. Feynman the physical structure of vacuum is entered.

## **Current of displacement for light propagation at the environment**

It is standard that propagation of any physical fields recognized as material, can occur in absolute emptiness. Any physical field is born by material carriers (electric charges, movement of charges and masses). To find out any physical field it is possible only with the help of the listed carriers. **And be distributed physical fields can in absolute emptiness!** Such representation of XX century concerns to light propagation and any electromagnetic waves. Here the simple logic of physics is broken.

Carriers of light can be only electric charges, both in substance, and in **the environment**. In substance charges are in continuous movement, in fluctuations. Therefore there is a dispersion of light, and also the mass of charges possessing inertia reduces speed of light. In **the environment** electric charges occupy a hard space, do not move and do not change with the big amplitude, have no appreciable inertia. Therefore light in **the environment** not dispersed, and speed of light has the maximal value. At propagation of light electric charges have displacements which are accompanied by Maxwell displacement currents. The current of displacement is obligatory for connection of amplitudes **E** and **H** of light wave.

Let's find connection between amplitudes  $E$  and  $H$  with currents of displacement at propagation of light in *the environment*. At fluctuations of material charges there is an involving in movement of charges *of environment* under Coulomb law which forms the phenomenon of light. Amplitude of a current of

displacement:  $j_a = \frac{e_o}{\Delta r_a} \left[ \frac{d(\Delta r)}{dt} \right]_a$ , formed by displacement of an elementary charge (+) or (-)  $e_o$  on distance  $\Delta r_a$  with a speed  $\left[ \frac{d(\Delta r)}{dt} \right]_a$ .

Amplitude of speed of displacement of a charge is:  $\left[ \frac{d(\Delta r)}{dt} \right]_a = 2\pi \nu \Delta r_a$ , which is defined from sine wave character of light  $\Delta r = \Delta r_a \sin(2\pi \nu \cdot t)$ . A current of displacement after substitution of amplitude of speed:

$j_a = 2\pi \Delta r_a \nu \frac{e_o}{\Delta r_a} = 2\pi e_o \nu$ . In a result, the current of displacement depends only on an elementary charge and frequency of light.

Probably, to a current of displacement it is possible to apply the law of the Ohm:  $U_a = j_a R$ . At other side we have:  $U_a = E_a \Delta r_a$ . From here we find, that electric intensity of a wave of light is equal:

$$E_a = j_a \frac{R_{wave}}{\Delta r_a} \text{ V/m.}$$

Here the only resistance is a wave resistance of "vacuum" (an impedance of "vacuum")  $R_{wave} = \sqrt{\frac{\xi}{\eta}} = \frac{E}{H} = 29,9792458 \text{ [Om]}$ .

In value an impedance of "vacuum"  $4\pi$  is removed which breaks all fundamental constants in the international system of units, including Planck's constant. Therefore wave resistance *of environment* in  $4\pi$  times is less, that accepted in physics.

Substitution in the formula for electric intensity gives:

$$E_a = \frac{2\pi e_o}{\Delta r_a} \nu \sqrt{\frac{\xi}{\eta}} = \frac{e_o c}{r_e^2} R_{wave} = 7.359755 \cdot 10^{20} \text{ V/m.}$$

Intensity appears a constant for all frequencies of light and depends on speed of light which value is defined by gravitation. Magnetic intensity of light, in view of expression for wave resistance, will be:

$$H_a = \sqrt{\frac{\eta}{\xi}} E_a = j_a \frac{R_{wave}}{\Delta r_a} \sqrt{\frac{\eta}{\xi}} = \frac{e_o c}{r_e^2} = 2.45495006 \cdot 10^{19} \text{ A/m.}$$

The huge amplitudes  $E$  and  $H$  can surprise. It is necessary to remember, that all electromagnetic waves are generated by electric charges and, basically, by electrons. Electric intensity electron itself:

$$E_e = \xi \frac{e_o}{r_e^2} = 7.3597584 \cdot 10^{20} \text{ V/m.}$$

This value coincides with electric intensity. The relation of electric

intensities of lights and intensity of environment is:  $\frac{E_a}{E} = \alpha$ .

## The capacitor

The capacitor is capable to carry out an alternating current. How there are such physical phenomena? Usually between conducting plates of the capacitor placed a dielectric. In the elementary case simply air is in an air capacitor. How dielectric differs from a conductor? That in it there are no free charges. There are only connected charges in the structure of dielectric. How it is possible to explain the phenomena in the capacitor? Only with the help of currents the displacement for the first time entered into theory by Maxwell. The current of displacement speaks for itself: it is formed at turns and displacement connected in atoms, molecules of electric charges. Therefore the capacitor keeps an electric charge. It is necessary to close plates as the charge there and then induced on plates from free charges, forming a natural current, unloads the capacitor, and electromagnetic forces return the displaced charges in a condition of initial balance. Presence of the connected charges in vacuum proves to be true simple experience. The usual "air" condenser continues to be the capacitor in "absolute" vacuum and to carry out in a circuit an alternating current.

The conclusion – without the connected charges and the currents of displacement formed by these charges, the capacitor is impossible. From here there is only one conclusion: any vacuum has the connected charges, capable to form currents of displacement.

## Conclusions

1. The current of displacement of elementary charges of structure *of environment* is necessary for maintenance electric and magnetic amplitudes of light.
2. The relation electric and magnetic amplitudes of light are constant and also do not depend on a condition of structure *of environment*. It is equal to wave resistance of vacuum.
3. Amplitudes of light do not depend on frequency.

The full stream of a magnetic induction behind a surface  $s$  in the form of a vector  $\vec{B}$  is not equal to zero only in that case when the mass continuum exist in *the environment*, limiting speed of light by its inertia. The structural element *of environment* in 37832 times is less than radius of atom of hydrogen. Therefore light in substance passes the most part of a way between particles of substance and only the part of a way of light in substance "is supported" by charges of electrons and nucleus which possess appreciable inert properties. Inertness of substance reduces speed of propagation of light. In a result effective speed of light in substance is lower than speed in *the environment*. It proves to be true on experience, and also is observed in experience when « the partial hobby of ether » is found out at movement of substance. Light actually is fond of elements of substance. And *environment* remains motionless.

Besides, the justification for ignoring *the environment* of propagation of light by results of experiences of **M.-M.** was found. These experiences could reveal only displacement of light by a principle of "a star aberration" for a cross-section component of interferometer. Longitudinal a component of installation could not notice movement on air owing by summing of equal Doppler effects, but with return signs at movement of light forward and back in interferometer. Rotation of installation of **M.-M.** shows small constant displacement interfered strips which was accepted for a regular mistake. Actually this effect only is confirmed by well known experiments.

**The dark matter** concerns to structure *of environment* in quality not enough the investigated mass continuum. It is responsible for delivery of "material" for formation of masses of all particles of substance and antistubstance, for restriction of speed of light by inertia of a continuum in a free space with the help of indissoluble connection of a charge and mass *of environment*.

Till this moment in physics are unknown the nature of an electric charge and mass of elementary particles. The further progress in knowledge of the Nature cannot be without finding-out of essence of mass and its inertia. Here we shall try to find connections of parameters *of environment* with value of mass of electron which we shall accept for elementary mass.

Easily from formulas of Newton and Coulomb it is possible to receive the following parities for elementary mass:

$$m_e^{\pm} = \frac{\Phi^2}{2(r_e + \Delta r_{rb})\xi} = 9.1093818850 \cdot 10^{-31} [kg]$$

$$m_e^\pm = \frac{e_o^2}{2(r_e + \Delta r_{rb})\eta} = 9.1093818845 \cdot 10^{-31} [kg]$$

$$m_e^\pm = \frac{e_o^\pm \Phi^\pm}{2(r_e + \Delta r_{rb})c} = 9.1093818861 \cdot 10^{-31} [kg]$$

$$m_e^\pm = \frac{h}{2\pi c \alpha^{-1} 2(r_e + \Delta r_{rb})} = \frac{h}{2\pi R_e c \alpha^{-1}} = 9.109381889 \cdot 10^{-31} [kg]$$

$$\frac{\Phi^2}{e_o^2} = \frac{\xi}{\eta} = 8.987551790 \cdot 10^2 [\Omega^2]$$

– Defines an elementary stream of a magnetic induction which is connected to the quantum of stream  $\Phi_q$  accepted in physics under the formula:

$$\Phi = \Phi_q / \alpha^{-1} \pi = 4.8032042 \cdot 10^{-18} \text{ Weber.}$$

$$h = 2\pi e_o^2 \alpha^{-1} \sqrt{\frac{\xi}{\eta}} = 2\pi e_o^2 \alpha^{-1} \frac{\Phi}{e_o} = 2\pi e_o \Phi \alpha^{-1}$$

Thus, Planck's constant is strongly connected through an elementary charge and quantum of a stream of a magnetic induction, and through them and to elementary mass.

It is probable, that all subject stated here testifies to necessity of a recognition of structure **of environment** as a source of a **dark matter and dark energy**, and also as a source of gravitation known to us and the structure necessary for propagation of light.

Let's determine speed of light from dependence of relations of squares of a stream of a magnetic induction and

an elementary charge:  $\eta^2 \frac{\Phi^2}{e_o^2} = \eta \xi = c^2$ . Speed of light:  $c = \eta \frac{\Phi}{e_o} = \sqrt{\frac{b_{cros}}{p}}$ , where  $b_{cros} [kg \cdot m^{-1} \cdot s^{-2}]$  – the

$$p = \frac{b_{cros} e_o^2}{\eta^2 \Phi^2}$$

module of shift **of environment**. We can determine density: . It is necessary to find out the module of shift. It is determined from the maximal force for a stretching of structure of **environment** at limited value:

$$f_{\max} = b_{cros} r_e (\Delta r_{\max}) = \xi \frac{e_o^2}{r_e^2} \varphi = 117.888954 \cdot \varphi$$

**Newton**. The corner  $\varphi$  is received from an inclination of a

$$\varphi = \frac{2\Delta r_{\max}}{\alpha^{-1} r_e} = 1.0650271 \cdot 10^{-4}$$

quarter of a sinusoid of maximum “**red boudoir**” wave. **radian**. From here we

receive the module of shift:  $b_{cros} = 8.79591 \cdot 10^{29}$ . Density of the **environment** of space:

$p = 9.786769 \cdot 10^{12} kg \cdot m^{-3}$ . This density of a “**dark**” matter which does not correspond to our representations about density of substance. It is possible so to define: it is **analogue** of density of substance which **inertness** limits speed of light in a free space.

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