Rotating space of the Universe, as a source of dark energy and dark matter

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Abstract

Sources and physical nature of dark energy and dark matter can be explained, to find and to determine if it is assumed that after the Big Bang expanding spherical space of the Universe revolves around one of their central axes. Under this condition, loses its meaning and the concept of dark energy, and the imaginary phenomenon of divergence of the objects of the Universe, which is registered as a redshift based on the Doppler effect due to the increase of the linear velocity of these objects with increasing distances from the observer in a rotating spherical space of the Universe. The kinetic energy of the rotating Universe may be the source of dark matter. The energy of the accelerated expansion of the Universe by the pressure of the vacuum does not depend on the absolute value of the vacuum pressure, but it depends on the relative value. Relative value vacuum pressure is equal to the difference between the values of vacuum pressure at the boundary of the Universe to expand and beyond. Since this difference is equal to zero, then does not exist of dark energy.

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1 Introduction

Based on the experimental data, scientists have proved that the space of the Universe revolves. For example, Professor Michael Longo (University of Michigan in Ann Arbor), having studied [1,2] in the framework of Sloan Digital Sky Survey (SDSS) database project SDSS DR5, which contains about 40,000 galaxies (of them - more than 15,000 spiral galaxies), for where the value of redshift $z < 0.04$, came to the conclusion that left twisted spiral galaxies is much larger than spiral galaxies swirling right. Conclusions of professor Michael Longo confirmed a group of scientists led by Professor Lior Shamir (Lawrence Technological University) [3]. Was investigated about 250 thousand spiral galaxies, for which the value of redshift $z < 0.3$. Professor Lior Shamir also found that galaxies left more than right. Symmetry breaking between the right- and left - twisted spiral galaxies is about seven percent, but the probability that is a

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cosmic accident is very low - claims Professor Michael Longo. The results of research professors Michael Longo and Lior Shamir contradict the notion that the Universe is homogeneous and symmetric. Scientists believe that the asymmetry of the Universe emerged in the Big Bang at the expense of the initial rotation of the Universe space counterclockwise. This means, firstly, that the space of the Universe could have existed before the Big Bang, and secondly, as claims Professor Michael Longo Universe revolves now. The Universe conditionally can be divided into two parts: part 1 - the observable Universe, part 2 - the rest of the Universe. Vacuum pressure at each point of the Universe is constant. This means that if p_1 - is the vacuum pressure in the observable Universe, and p_2 - is the vacuum pressure in the rest of the Universe, then on the position of the boundary between the parts of the Universe under the influence of energy vacuum pressure can not affect, as $p_1 = p_2$. To change the position of the boundary between the parts of the Universe by the action of the vacuum energy is necessary that the pressure of the vacuum in the different parts of the Universe should have different values. That is a formula of energy for the accelerated expansion of the Universe under the influence of the vacuum energy E_V: $E_V = -p\Delta V$, where p - is the vacuum pressure at every point of the Universe, ΔV - the increment volume of space observable Universe under the influence of energy vacuum pressure, should not be based on the absolute value of the vacuum pressure p, and the increment of pressure $\Delta p = p_2 - p_1$, that is $E_V = -\Delta p\Delta V$, since $\Delta p = 0$, $E_V = 0$. This means that does not exist of dark energy. In the proposed model of a rotating space of the Universe, due to the absence of dark energy, the total energy of the Universe is the sum of the potential energy of the baryonic mass of the Universe, the kinetic energy of a rotating Universe and the relativistic energy of the radiation.

2 The model of the expanding and the rotating Universe

Imagine expanding after the Big Bang, and rotating with angular velocity ω Universe as a sphere of radius R and having a mass M. Equation of motion (without Coriolis acceleration) of a particle of unit mass of substance on the surface of a sphere:

$$\frac{d^2R}{dt^2} = -\frac{GM}{R^2} - \omega^2 R, \tag{1}$$

where G - is the gravitational constant.

Let:

$$\frac{dR}{dt} = HR, \tag{2}$$

$$M = \frac{4}{3}\pi\rho R^3,$$

where ρ - mass density. Based on (2) for rotating sphere:

$$\omega = H. \tag{3}$$

Multiply by $\frac{dR}{dt}$ and integrate equation (1), then with (3):

$$\frac{1}{2}\left(\frac{dR}{dt}\right)^2 - \frac{GM}{R} + \frac{1}{2}H^2R^2 = A. \tag{4}$$

We assume known values of H_0, R_0, ρ_0 at the time t_0, then:

$$M = \frac{4}{3}\pi\rho_0 R_0^3,$$

$$\left(\frac{dR}{dt}\right)_{t=t_0} = H_0 R_0.$$

We can determine the value of the constant A in the right-hand side of equation (4):

$$A = \frac{1}{2}\left(\frac{dR}{dt}\right)^2_{t=t_0} - \frac{4}{3}\pi G\frac{\rho_0 R_0^3}{R_0} + \frac{1}{2}H_0^2 R_0^2,$$

$$A = \frac{1}{2}H_0^2 R_0^2 - \frac{4}{3}\pi G\rho_0 R_0^2 + \frac{1}{2}H_0^2 R_0^2 = H_0^2 R_0^2 - \frac{4}{3}\pi G\rho_0 R_0^2.$$

Then:

$$\frac{1}{2}\left(\frac{dR}{dt}\right)^2 - \frac{GM}{R} + \frac{1}{2}H^2 R^2 = H_0^2 R_0^2 - \frac{4}{3}\pi G\rho_0 R_0^2.$$

Or:

$$\left(\frac{dR}{dt}\right)^2 = \frac{8}{3}\pi G\rho R^2 - H^2 R^2 + 2H_0^2 R_0^2 - \frac{8}{3}\pi G\rho_0 R_0^2,$$

$$\left(\frac{dR}{dt}\right)^2 = \frac{8}{3}\pi G R^2\left(\rho - \frac{3H^2}{8\pi G}\right) - \frac{8}{3}\pi G R_0^2\left(\rho_0 - \frac{3H_0^2}{4\pi G}\right). \quad (5)$$

In the right-hand side of (5) is variable:

$$\frac{8}{3}\pi G R^2\left(\rho - \frac{3H^2}{8\pi G}\right),$$

which characterizes the dynamics of the process of expansion of the rotating Universe and constant:

$$\frac{8}{3}\pi G R_0^2\left(\rho_0 - \frac{3H_0^2}{4\pi G}\right),$$

which is equal to the square of the speed of expansion of the Universe at any given time t_0.

We show that at the present time expansion of the Universe is missing. Based on the model of a mathematical pendulum we can define the gravity factor g and a mass M of the Universe:

$$g = \frac{4\pi^2 R_0}{T_0^2},$$

where T_0 - is the period of rotation of the spherical space of the Universe:

$$T_0 = \frac{2\pi}{\omega} = \frac{2\pi}{H_0},$$

where H_0 and R_0 - is the Hubble constant and the radius of the spherical space of the Universe in present time. Obviously:

$$R_0 = \frac{c}{H_0},$$

where c - the speed of light, then:

$$g = cH_0,$$

$$M = \frac{gR_0^2}{G} = \frac{c^2 R_0}{G}.$$

Baryon mass density of the Universe is:

$$\rho_0 = \frac{M}{\frac{4}{3}\pi R_0^3} = \frac{3M}{4\pi R_0^3} = \frac{3c^2}{4\pi G R_0^2} = \frac{3H_0^2 R_0^2}{4\pi G R_0^2} = \frac{3H_0^2}{4\pi G}. \quad (6)$$

This means that the constant in the right-hand side of formula (5) is zero. Substituting the values of H_0 and R_0 in the variable part of the formula (5) leads to the result:

$$\left(\frac{dR}{dt}\right)^2_{t=t_0} = H_0^2 R_0^2 = c^2.$$

This means that the particle substance unit mass which is on the boundary of the sphere of the Universe moves along a circle with the linear velocity c. Therefore, the Universe is not expanding now. From (6) it follows that the density of the baryonic mass of the Universe is twice higher than its critical density, it means [4] that the process of expansion of the Universe will change its compression. It is proved, that the model (5) of a rotating Universe excludes the presence of dark energy in it. Here is another proof (by contradiction) the true model (5). Let the Universe under the force of dark energy is expanding, and let the rotation of the Universe is missing. Then on a particle of unit mass of matter, which is on the boundary of the expanding sphere in the Universe, there are two mutually opposing forces: the force of dark energy and the force of gravitational attraction of the Universe. The equation of motion in this case [4], a traditional form:

$$\frac{d^2R}{dt^2} = -\frac{GM}{R^2}.$$

Or, after integration, multiplication by $\frac{dR}{dt}$ and determine the constant of integration:

$$\left(\frac{dR}{dt}\right)^2 = \frac{8}{3}\pi\rho_0 G\frac{R_0^3}{R} - \frac{8}{3}\pi G R_0^2\left(\rho_0 - \frac{3H_0^2}{8\pi G}\right). \quad (7)$$

Substituting the values of H_0, R_0 and ρ_0 in the formula (7) gives the result:

$$\left(\frac{dR}{dt}\right)^2_{t=t_0} = H_0^2 R_0^2 = c^2. \quad (8)$$

This means that a particle of unit mass of matter, which is on the surface of the sphere of the space of the Universe is in motion with velocity c, which is confirmed by the red shift in the emission from distant objects in the Universe. Determine the nature of this movement. For this we define the acceleration of the force of gravitational attraction of the Universe and the acceleration of the forces of dark energy. Obviously, the acceleration due to the force of gravitational attraction of the Universe is gravity factor and is:

$$g = cH_0,$$

If the Universe is expanding with acceleration, then the time of its expansion on the value of $\Delta R = 1Mpc$ is equal to: $t = \frac{1}{H_0}$, then acceleration under the force of dark energy is equal to:

$$a = \frac{c}{t} = cH_0.$$

This means that the force of dark energy is balanced by the force of gravitational attraction of the Universe, it also means that the extension is not currently available. But according to (8) is a movement of unit mass with velocity c. The nature of this movement - only circumferentially. That is proved that the Universe revolves, and it is proved, that the model (5) of a rotating Universe excludes the presence of dark energy in it.

3 Source of dark matter

The source of the dark matter may be the kinetic energy of a rotating Universe. If imagine the Universe as a rotating with angular velocity H_0 a sphere of radius R_0 and mass M, then its kinetic energy of rotation is:

$$E_k = \frac{LH_0^2}{2},$$

where L - is the moment of inertia:

$$L = \frac{2}{5}MR_0^2,$$

then:

$$E_k = \frac{LH_0^2}{2} = \frac{1}{5}MR_0^2H_0^2,$$

but: $R_0^2H_0^2 = c^2$,
then:

$$E_k = \frac{1}{5}Mc^2.$$

That is, the kinetic energy of the Universe is 20% of its potential energy. On the part of the substance which moves after the Big Bang at an angle to the axis of rotation of the Coriolis force. Then the equation of motion has the form:

$$\frac{1}{2}\left(\frac{dR}{dt}\right)^2 - \frac{GM}{R} + \frac{1}{2}H^2R^2 + H^2R^2\sin(\Theta) = A. \tag{9}$$

Where Θ - is integral (effective) angle between of vectors the linear and angular velocity of objects of the Universe that are moving at an angles to the axis of rotation. According to the Planck mission [5] for the 2013 share of dark matter in the overall energy balance of the Universe is 26.8%. i.e. on the basis of (9) and assuming that the relative kinetic energy E_{kr} is equal to:

$$E_{kr} = \frac{E_k}{E},$$

where E - is the total energy of the Universe, then the total relative kinetic energy of the Universe is equal to:

$$E_{kr} + 2E_{kr}\sin(\Theta) = 0.268. \tag{10}$$

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This means that the angle $\Theta = 9,79°$. It is proved, that the kinetic energy (10) of rotation of the Universe may be the source of dark matter. Note: The value of the angle Θ is close to the neutrino mixing angle Θ_{13}.

4 Conclusions

The model of a rotating Universe excludes the presence of dark energy in it. The kinetic energy of rotation of the Universe may be the source of dark matter.

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