The speed of light, the Big Bang and the expansion of the Universe.

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Abstract: It is shown that both the redshift and, therefore, the recession of galaxies is the effect of an observer who is located in the center of the cosmological ball on planet Earth. This effect is a consequence of the gravitational time dilation in accordance with Einstein's STR. That is, there is no real recession of galaxies, which means there is no Big Bang. Galaxies in the Universe are subject to the usual chaotic motion, but due to the indicated effects, we observe the scattering of galaxies.

Keywords: speed of light, recession of galaxies, redshift, Hubble-Lemaitre law, cosmological ball, Big Bang.

INTRODUCTION.

The main postulate of the Big Bang theory is the expansion of the Universe. Moreover, this is an observable fact! This phenomenon was discovered by Edwin Hubble in 1929 [1], when Hubble formulated his law, now known as the Hubble-Lemaitre law:

the farther a galaxy is from us, the more speed it has.

The Hubble-Lemaitre law can be mathematically written as follows:

$$V = H * L$$

where H - is the Hubble-Lemaitre constant,

L - is the distance to the galaxy,

V - is the speed of the galaxy.

Edwin Hubble discovered his law experimentally, working on a telescope, he measured the redshift of galaxies. Georges Lemaitre, having familiarized himself with the results of Hubble, published in 1927 a work "Univers homogene de masse constante et de rayon croissant rendant compte de la vitesse radiale des nebuleuses extra-galactiques" [2]. In this work, Lemaitre for the first time clearly stated that it is the galaxies that are receding (and not the stars). Moreover, the coefficient of proportionality between speed and distance, obtained by Lemaitre, was close to that found by E. Hubble in 1929.

Thus, the expanding dynamic Universe has received a very good rationale. Moreover, then, the observed expansion was in good agreement with the theory. Further, this model was developed, and other important and fundamental discoveries were made. Ultimately, this led to the modern cosmological model, that is, to the Big Bang theory, which at the moment most fully describes the observable Universe.

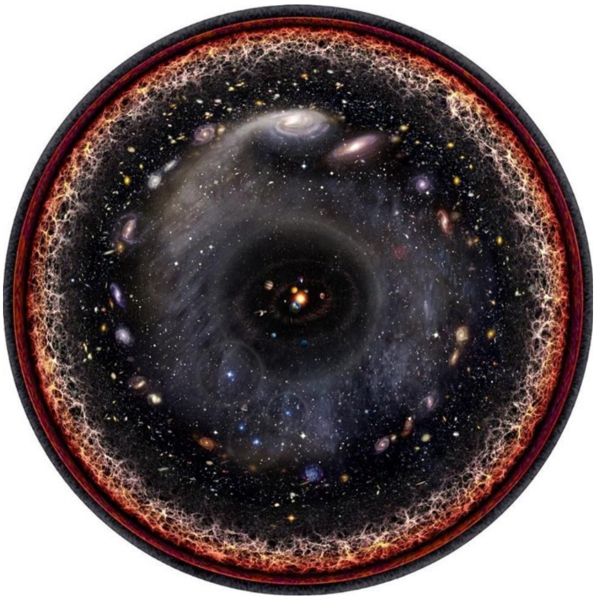
If we take into account the fact of the scattering of galaxies, then the idea of the Big Bang is simple: if galaxies scatter, then earlier in time, they were closer to each other. And this means that some time ago, all galaxies were at the same point. All further theory is simply an interpretation of this postulate. Just as in geocentrism the whole theory comes down to the postulate that the Earth is the center of the world, so in the Big Bang theory it all comes down to the postulate that if galaxies are scattering, then there was a Big Bang. Therefore, the interpretation of the recession of galaxies, and the redshift itself, is of fundamental importance. The scattering of galaxies is precisely the fact that determines the worldview and on the basis of which the modern picture of the Universe is built. Let's analyze this in more detail.

RESULTS AND DISCUSSION.

To begin with, let's consider two frames of reference according to Einstein's STR. Let us assume that the frame of reference 1 moves relative to the frame of reference 2, with a certain speed v. It is absolutely obvious that the passage of time in these frames of reference will be different, since they move relative to each other. That is, if we have two frames of reference in which time flows in the same way, then these frames of reference move relative to each other with a speed that is equal to zero. This is an obvious fact of Einstein's theory of relativity: if time in frames of reference flows in different ways, then these frames of reference move relative to each other at a certain speed.

$$\Delta t = \Delta t0 * (1 - (v/c)^2)^(-0.5)$$

Let us analyze on the basis of this fact the recession of galaxies in the Universe. But, we will also remember that the speed of light in a vacuum is limiting. Therefore, an observer on Earth is an observer who is in the center of a cosmological sphere of a certain radius [3]. Moreover, the distribution of matter in this ball is isotropic and homogeneous. With distance from the center, that is, from the Earth, the speed of galaxies will increase. On the border of this sphere, the speed of galaxies will be equal to the speed of light in a vacuum. The galaxies outside the sphere are invisible to us and not available for registration. That is, galaxies outside the sphere will not interact with the center of the sphere in any way [4].



Due to the spherically symmetric distribution of matter in such a cosmological ball, the gravity in the center of the ball will be determined only by the gravity of the Earth (the ball's mass has no effect). Remember that our Earth is our first frame of reference. Moreover, the Earth is stationary in the center of the ball. Now, let's say we have a different frame of reference. And let this other frame of reference also be associated with a planet whose mass is equal to the mass of the Earth. Let's place this other frame of reference, in some galaxy, in our sphere. The distance to such a galaxy is R1. For convenience of consideration, we will place the planet (frame of reference 2) on the cosmological ball of the radius R1. Obviously, the entire mass of the cosmological ball of radius R1 will already affect the gravity of the frame of reference 2. Since the frame of reference 2 is located on the ball, and not inside it. Therefore, the flow of time in frame 2 will be much slower than in our frame of reference 1 (on Earth). It is obvious.

In a frame of reference that is related to the Earth, only the Earth's gravity (the center of the ball) affects time. If we place the frame of reference (with the planet) in the galaxy, at a distance R1, then in addition to the mass of the planet, this frame of reference will be influenced by the entire mass of the cosmological ball with radius R1. Remember that we have placed the planet on a ball of radius R1. Therefore, the flow of time in such a frame of reference (R1) will be much slower than in the frame of reference associated with the Earth. That is, the flow of time in the 1st frame of reference and in the 2nd frame of reference will be different. And in accordance with Einstein's STR, this means that our frames of reference move relative to each other. But, since the 1st frame of reference (planet Earth) is stationary in the center of the ball, the 2nd frame of reference (R1, galaxy) will move relative to the first at a certain speed. Naturally, the 2nd frame of reference will have a redshift, which was fixed by Edwin Hubble! Moreover, this displacement will be the greater, the further the galaxy is from us, since the radius of the cosmological ball R1 will be larger.

Let us explain why when emitting light from the 2nd frame of reference (R1, galaxy), and when registering light in the 1st frame of reference (Earth, the center of the ball), we will register the redshift. This follows from the well-known fact that the gravitational potential at the center of a homogeneous ball in one and a half times more than on its surface (this is a strict solution to the problem when the potential of a ball at an interior point is considered, and it is given in textbooks, for example see [5]). Therefore, if we consider a cosmological ball of radius R1, then when light is emitted on its surface, and when recorded in the center of the ball, redshift will always be observed, since the gravitational potential at the center is always greater. That is, everything happens in accordance with the Hubble-Lemaitre law. With the classic Hubble-Lemaitre law. Let's show the calculation.

Let's say that a planet of mass M1 is located in a galaxy at a distance of R1. That is, our planet is located on a cosmological ball of radius R1, which has a mass M2. Suppose that due to the gravitational attraction to the ball, our planet (together with the galaxy) moves in a circular orbit of radius R1, around the center of the ball. Then the following equations can be written.

$$F = M1 * a = (G * M1 * M2) / R1^2$$

$$(M1 * V^2) / R1 = (G * M1 * M2) / R1^2$$

$$V^2 = (G * M2) / R1$$

Expressing the mass of the cosmological ball through its volume, we obtain the classical Hubble-Lemaitre law.

$$M2 = \rho * (4/3) * \pi * R1^3$$

$$V^2 = (G * \rho * (4/3) * \pi * R1^3) / R1$$

$$V^2 = G * \rho * (4/3) * \pi * R1^2$$

$$H = (G * \rho * (4/3) * \pi)^{0.5}$$

$$V = H * R1$$

where H - is the Hubble-Lemaitre constant,

V - galaxy speed,

R1 - distance to the galaxy,

G - is the gravitational constant,

ρ - is the density of matter in the cosmological ball.

In fact, the Hubble-Lemaitre law, taking into account the above, expresses the fact that the force of attraction of an internal material point from the side of the masses of a spherical body increases linearly in absolute value, with distance from the center of the ball and directed towards its center.

$$F = G * (4/3) * \pi * r$$

Compare the last equation with the formulation of the Hubble-Lemaitre law: the farther a galaxy is from us, the more speed it has. That is, the greater the force of attraction to the center of the cosmological ball, the greater the speed of the galaxy (naturally, taking into account Einstein's STR).

Note that according to the obtained equation ($V = H * R1$), the Hubble-Lemaitre law will be well fulfilled when the density of matter (ρ) in the Universe is constant (in the whole Universe). That is, only on a cosmological scale, which is actually observed. If the Universe, on a certain scale, is not homogeneous and isotropic, then there will be deviations from the law, since the mass density in the Universe will be different. It is also obvious that depending on the distance (since the density of matter will be different), the Hubble-Lemaitre constant will change its value. And only on a cosmological scale will it become a real constant. Moreover, in the classical formulation of the law.

CONCLUSION.

Considering the above, it can be argued that both the redshift and, consequently, the recession of galaxies is essentially the effect of an observer who is located in the center of the cosmological ball (planet Earth). This effect is a consequence of the gravitational time dilation in accordance with Einstein's STR. Consequently, there is no real recession of galaxies, just as there is no Big Bang. Since, moving the center of the ball to another point, will lead to the fact that for an observer from the center, the speed of a particular galaxy will change (since the gravitational component will change). In the Universe, there is the usual chaotic movement of galaxies. There is also a constant speed of light. And then there are various effects of A. Einstein's theory of relativity... And nothing more!

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