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The Correction of law Redshift Hubble and of the Method of "Standard Candle"

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The astrophysics' concept of the structure, properties and existence of the Universe is based on the laws of physics obtained in terrestrial conditions, as well as on signals in the form of light and other electromagnetic radiation from stars and distant galaxies. It is now believed that the Universe was formed as a result of the Big Bang, which actually gave rise to the matter of which all the bodies of the Universe, as well as space and time are composed. What exploded, science does not know. It is believed that there was darkness around and that after the explosion the Universe is continuously expanding, also apparently into this very darkness. The Big Bang theory is based on the Hubble and Doppler laws. Hubble's law established from observations that the redshift in the spectra of distant galaxies is directly proportional to the distance to these galaxies. The farther a galaxy, the greater the redshift.

$$\frac{\Delta\lambda}{\lambda} = H \cdot L, \qquad (1)$$

where H=10^{-26} [1/m]=3.10^{-18} [1/s] is the Hubble constant. L-distance from the Earth to the galaxy. This law was associated with Doppler's law, which related the redshift in the spectra to the rate of removal of the emitting object V from the receiver of these emissions (light) in comparison with the speed of light. This law was obtained in earthly conditions.

$$\frac{\Delta\lambda}{\lambda} = \frac{V}{a}. \qquad (2)$$

The logic behind this is clear. The greater the redshift in the spectra, the faster the emitting object moves away from the receiver of these radiations. Further the human imagination had painted of the Big Bang like the explosion of an atomic bomb.

It was later discovered that the redshift at very large distances from the Earth increases faster than predicted by Hubble's law. From this observation, it was concluded that near the edge of the universe it is expanding much faster than previously thought.

I will emphasize the main thing in this article. All the conclusions mentioned above were made before astrophysics discovered the presence of dark matter uniformly filling the cosmos. This means that light does not propagate in a void, but in an environment of dark matter. How dark matter affects light during its long journey from distant galaxies to Earth is unknown. Within the framework of our theory of the interaction of dark matter with the bodies of the Universe, including photons of light, we will present our version of the structure and existence of the Universe, as well as clarify some of the laws and methods of astrophysics that underlie today's concepts [1, 2].

The Updated Hubble's Law:

The astrophysics does not know what happens to a quantum of light during its long motion, measured in billions of light years, from a distant star to an observer on Earth through space filled with gaseous dark matter. The knowledge gap allows for various interpretations of this phenomenon, including those discussed earlier. Now in physics and cosmology, it is believed that the atoms of baryonic matter were formed as a result of the Big Bang. Since then and to this day, these atoms have survived unchanged in their original form. In contrast to these ideas, we have a different point of view on this phenomenon of nature. **Our ideas are based on the idea that baryonic bodies, up to the smallest ones, constantly absorb dark matter from the surrounding space and, as a result, increase their mass, in accordance with our earlier obtained in the law [1, 2]:**

$$m = m_o \cdot e^{\frac{\alpha \cdot t}{k}}. \qquad (3)$$

The quantity is the mass of the body at a point in time , i.e. at the beginning of the countdown. We omit the minus sign on the right side, because the direction of the velocity to the center of the body is specified in words.

The magnitude $\frac{\alpha}{k} = 2{,}97 \cdot 10^{-18} [c^{-1}]$. It was obtained by us from the analysis of changes in the motion of the Moon that have taken place over the centuries and has nothing to do with the ideas of the expansion of the Universe [1, 2]. Nevertheless, it turned out to be equal in magnitude to the Hubble redshift constant $H = \frac{\alpha}{k}$.

Expression (3) defines the law of increase in the masses of all bodies in the Universe with increasing time, including photons of light.

Those. we believe that the Universe is not as static as astrophysicists currently think about it. Over time, not only living beings, plants, bacteria, viruses, etc. change. Non-living matter, for example stars, planets, moons, meteorites, up to atoms and elementary particles also change over time. The reason for these changes lies in the interaction of all these bodies with dark matter. The knowing this opens up additional opportunities for understanding the dynamics of the world around us.

We believe that when leaving the emitting atom at a speed of $C = 3.10^8$ m / s, the photons of the light wave carry away the momentum *J*. This momentum is equal to the product of the mass of photons m_o and the speed of light *C*, and it persists until meeting with the observer

$$J = m_o C = m \cdot C' = Const\,. \tag{4}$$

During the movement of a light wave from a radiation source to an observer on Earth, the mass of photons, like all other baryonic bodies, increases with time due to the absorption of dark matter from the surrounding space according to the revealed law (3). With increasing mass, the speed of light *C*' decreases, because the amount of movement remains constant

$$C' = \frac{m_o C}{m} = \frac{m_o C}{m_o e^{\frac{\alpha}{k}t}} = \frac{C}{e^{\frac{\alpha}{k}t}} \tag{5}$$

Here $C = 3.10^8$ $[m/s]$ is the speed of light at a moment t=0. It is the same as that of light in earthly conditions.

The value $\frac{\alpha}{k} = 2{,}97 \cdot 10^{-18} s^{-1}$ is very small. It was obtained by us

from the analysis of changes in the motion of the moon, occurring during a long time of observations of this space object.

The number of waves passing by the observer's device in one second will be determined by the expression

$$\nu' = \frac{C'}{\lambda} = \frac{C}{e^{\frac{\alpha}{k}t} \cdot \lambda} = \frac{C}{\lambda'}\,. \tag{6}$$

The new wavelength λ' after the expiration of time *t* will be

$$\lambda' = e^{\frac{\alpha}{k}t} \cdot \lambda\,. \tag{7}$$

The wavelength in the path from the radiation source to the observer on Earth will increase by an amount

$$\Delta\lambda = \lambda' - \lambda = e^{\frac{\alpha}{k}t} \cdot \lambda - \lambda = \lambda(e^{\frac{\alpha}{k}t} - 1)\,. \tag{8}$$

Hubble's law for the increment of the wavelength of the light wave in this case can be written as

$$\frac{\Delta\lambda}{\lambda} = e^{\frac{\alpha}{k}t} - 1 = e^{H^* L} - 1\,. \tag{9}$$

This new version of the Hubble law more correctly reflects the realities of the world around us than the known original version of this law. It should be noted that Hubble's law for very large distances and, consequently, the time of motion of a light wave, it is more correct to write down without resorting to a series expansion of the quantity $e^{\frac{\alpha}{k}t}$, i.e. as

$$\Delta\lambda/\lambda = e^{\frac{\alpha}{k}t} - 1 = e^{H \cdot t} - 1 = e^{\frac{H}{C}L} - 1\,. \tag{10}$$

As can be seen from formula (10), the redshift in the spectra of galaxies increases exponentially with distance. The value $\frac{\Delta\lambda}{\lambda}$ is determined from the lines of the Balmer series in the spectra of the observed objects.

Objects have already been discovered, for which $\frac{\Delta\lambda}{\lambda}$ tends to 6 and whose velocities of distance from the Earth approach the speed of light [3, 4, 5]. In accordance with formulas (1) and (9), these offsets are obtained differently. The calculation using the Hubble formula, without any tweaks, contradicts the modern estimate of the size of the investigated part of the universe, approximately equal to 15 light years. For example, let's perform a calculation using these formulas for $\frac{\Delta\lambda}{\lambda}$ =3. We will get

$$L_{habbl} = \frac{\Delta\lambda/\lambda}{H^*} = \frac{3}{10^{-26}} = 3 \cdot 10^{26}[m] = 32 \text{ billion light-years.}$$

Calculation by the refined formula of the theory of dark matter (10) gives a more correct result. For example for

$$\frac{\Delta\lambda}{\lambda} = 3$$

$$L = \frac{\ln\left(\frac{\Delta\lambda}{\lambda} + 1\right)}{H^*} = \frac{1{,}38}{10^{-26}} = 1{,}38 \cdot 10^{26}[m] = 14{,}6 \text{ billion light-years.}$$

Where $1Gyr = 10^{16} s$

The redshift, formed as a result of the long motion of a wave of light through a space filled with dark matter, is called the cosmological redshift in the scientific literature. In addition, as the light wave moves away from a massive body, a gravitational redshift is observed. We believe that the redshift $\Delta\lambda/\lambda \approx 6$ is the sum of the cosmological and gravitational redshifts obtained from the radiation of quasars.

The correction of the method of "standard candles"

A very important place in the concept of the Universe is occupied by the correct determination of distances to stars. In addition to the Hubble method, the "standard candle" method is used for this. **The interpretation of the spectra of distant stars that showed large redshifts were interpreted on the basis of this method as a more accelerated expansion of space near the edge of the Universe in comparison with the linear Hubble law. There is no explanation for this; nevertheless, a Nobel Prize was awarded for this research**.

Let me remind you that in 2011 the Nobel Prize in Physics was awarded for the discovery of the acceleration with time of the expansion of the Universe to the Americans Saul Perlmutter from the University of California at Berkeley (headed the Supernovae for Cosmology observational project) and Adam Reyes from Johns Hopkins University in Baltimore (the Search supernovae at large redshifts "). And also to Brian Schmidt of the Australian National University (project "Search for supernovae at large redshifts").

The essence of their research, as I understand it, was that supernova explosions were observed with large redshifts in the spectra. In this case, two methods were used to determine the distances to these objects:

- the first one made it possible to determine these distances from the redshift in the spectra based on the Hubble law

$$L = \frac{\Delta\lambda/\lambda}{H}, \tag{13}$$

where $H = 10^{-28}$ 1/sm is the redshift constant (Hubble constant).

- the second consisted to observe the luminosity of La-type supernovae, which have the property of a "standard candle", ie. have approximately the same luminosity, wherever they are. Then, by observing the brightness, the distances to them can be determined. To the surprise of the researchers, these methods gave different distances for the same stars. The discrepancies were so great that they could not be attributed to measurement errors. As a result of the analysis of the data obtained, these researchers came to the conclusion that at very large distances, the Universe is expanding much faster than predicted by Hubble's law.

This solution was also supported by the fact that, thanks to the acceleration of the expansion of the Universe, the relativists were able to introduce the λ-term into Einstein's equations anew. λ-term was introduced by A. Einstein into his equations in order to make the Universe stationary (he himself later admitted this as his biggest mistake). Now it bears the name "cosmological constant" and is a physical constant, which, according to relativists, characterizes the properties of the vacuum. From our point of view, this conclusion is erroneous.

The "standard candle" method used to determine the distance between an observer on Earth and a star uses the property of stars of the type *LA* to have approximately the same luminosity J_m, wherever they are. The apparent brightness of the star depends on the luminosity. It is known that the brightness of stars decreases in inverse proportion to the square of the distance from the star to the observer. Therefore, this method uses the relationship between the apparent brightness J_m of a star and its distance *D* from the Earth.

$$\frac{j_M}{j_m} = \frac{D^2}{D_o^2}, \tag{14}$$

where D_o is the distance corresponding to the absolute value of brightness J_M . The closer a star of the type *LA* is to Earth, the brighter it is. The further it is, the duller it looks. To compare the true brightness of the stars, it is necessary to calculate what brightness they would have if all were at the same distance. According to international agreement, 10 parsecs are taken for such a distance. (Parsec is short for parallax - second. This distance to a star is approximately $3{,}1 \cdot 10^{13}$ $[km]$. Light travels one parsec every 3.26 years). The absolute brightness of the type stars *LA* is known. If the brightness of a star visible from Earth J_m is measured, then using the formula (14), you can calculate the distance to a star of the type *LA* and other stars from this constellation.

This method does not take into account the influence of dark matter in interstellar space on light waves on their way from a star to an observer on Earth. The property of a wave of light (quantum) discovered by us to decrease its speed while moving along the ray was not known to the developers of the "standard candle" method. Therefore, it was not taken into account in relation to the apparent brightness of a star and its distance from us.

However, it is clear that such an influence exists, since a decrease in the speed of light, occurring over vast distances measured in billions of light years, will decrease the kinetic energy of the mass of photons that make up any wave of light. In this case, the total energy will be conserved due to the growth of the internal energy of the increasing mass of photons. It is kinetic energy that determines the apparent brightness of a star. To make sure of this, we write down the kinetic energy of the mass of photons *m* that make up a light wave on the way from a star of the type *LA* to Earth in the following form

$$E = \frac{mC'^2}{2} = \frac{(mC')\cdot C'}{2} = \frac{I \cdot C'}{2}. \tag{15}$$

We have already noted that the momentum of the mass of photons that make up a wave of light remains unchanged along the beam of light *I* = *Const*. Therefore, relation (15) can be written, taking into account 14), in the form

$$E = Const \cdot C' = Const \cdot \frac{C}{e^{\frac{\alpha}{k}t}}. \tag{16}$$

It can be seen from this ratio that the kinetic energy of light quanta decreases with time, during which they are on their way from the star to the Earth. Consequently, the brightness of the star will decrease in comparison with the expected one calculated on the basis of expression (13). Based on the study, you can build a graph in Fig.1. This graph will clearly show the decrease in the apparent brightness of the observed star

$$\frac{E}{E_o} = \frac{1}{e^{\frac{\alpha}{k}t}}. \tag{17}$$

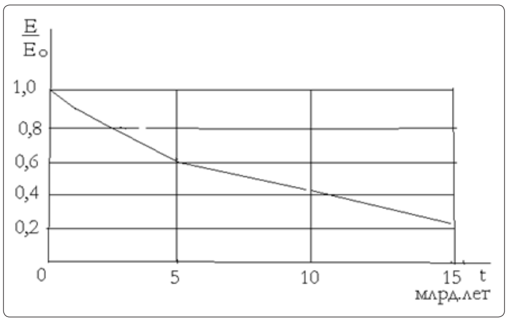

Figure 1

Depending on the residence time of the light wave (quantum) in the path within 1 [billion years] decrease in brightness compared to. with the expected less than 10%. But the longer the light is on its way, the dimmer than expected the star that emitted it will be. At the edge of the visible universe, the star will already be very dim, because its brightness will decrease by 3/4. This is a consequence of the interaction of photons of the light wave with dark matter.

Due to the decrease in the speed of light along the ray, the distance that light travels in time *t* turns out to be less than if it were moving at a constant speed *C*. Taking this circumstance into account, the distance *D* can be written as

$$D = \int_0^t C' dt = \frac{C}{\alpha/k}\left(1 - \frac{1}{e^{\frac{\alpha}{k}t}}\right). \tag{18}$$

Fig.2 shows how the distance traveled by a ray of light increases in reality, taking into account the influence of dark matter according to formula (18), and how this distance would increase if we assume that light travels at a constant speed in empty space.

From relation (18) we express the time t of motion of the light wave through the distance D that it travels during this time

$$t=\frac{1}{\alpha/k}\ln\left(\frac{1}{1-\frac{D\cdot\alpha/k}{C}}\right). \qquad (19)$$

Let us substitute this time into expression (17) for the luminosity ratio

$$\frac{E}{E_o}=\frac{1}{e^{\ln\frac{C}{C-D\cdot\alpha/k}}}. \qquad (20)$$

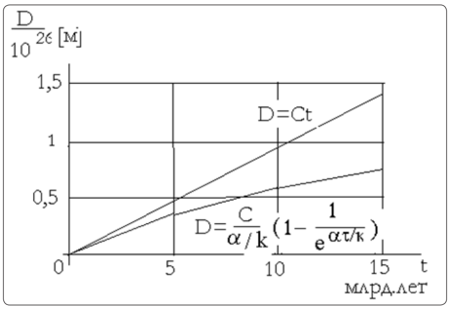

Figure 2

To obtain the final calculation formula in the "standard candle" method, taking into account the influence of dark matter on the apparent brightness of stars, you need to combine formulas (13) and (20)

$$\frac{J_m}{J_M}=\frac{D_o^2}{D^2}\cdot\frac{1}{e^{\lg\frac{C}{C-D\cdot\alpha/k}}}. \qquad (21)$$

The effect of dark matter on the apparent brightness of a star is determined by the second factor in this formula. This influence begins to affect very large distances from the emitting star, measured in billions of light years. The values of this factor are the correction to brightness, which astronomers currently take for the apparent brightness of a star.

From (21) it can be seen that stars (type *La*) near the visible boundary of the Universe will look much dimmer in comparison with the brightness expected on the basis of the law (13).
In the previous section, we showed that the lower observed brightness of stars compared to the expected is due to the influence of dark matter in interstellar space on the local speed of light. A decrease in this speed leads to a decrease in the kinetic energy of the mass of photons that make up the light wave (light quantum). This in turn reduces the apparent brightness of the stars.

It must be said that Hubble's law itself did not claim that the universe was expanding. He only established a connection between the distance from Earth to distant galaxies and the redshift in the spectra of light coming from these galaxies. The belief that the universe is expanding arose already during the interpretation of this law on the basis of Doppler's law. An analogy was drawn between the change in the wavelength of the light $\Delta\lambda$ wave and the intrinsic speed of removal of the light source from the observer V in accordance with the Doppler law

$$\frac{\Delta\lambda}{\lambda}=\frac{V}{a}, \qquad (22)$$

wich had been received of sound propagation in air. Here a is the speed of sound in calm air. This was a tribute to the misconception that light travels in space (even empty space) in the form of a wave, and not due to the movement of photons. With regard to the propagation of light, this law was rewritten to the form

$$\frac{\Delta\lambda}{\lambda}=\frac{V}{C}, \qquad (23)$$

where the speed of sound in air was replaced by the speed of light. This analogy suited astrophysics until the deciphering of spectra from distant galaxies began to give values $\frac{\Delta\lambda}{\lambda}$ significantly greater than unity. This meant speeding V over speed of light C. To avoid violating the postulate of the theory of relativity that it is impossible for emitting objects to exceed the speed of light in a vacuum, another formula was invented for the Doppler law

$$1+\frac{\Delta\lambda}{\lambda}=\frac{1-V/C}{\sqrt{1-V^2/C^2}}. \qquad (24)$$

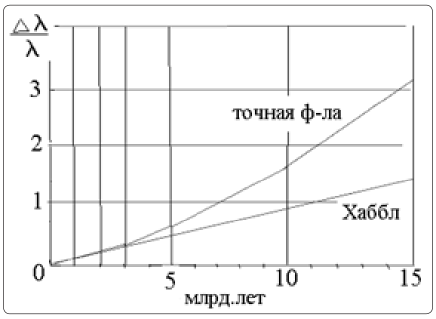

Figure 3

The graph (Fig. 3) clearly show that near the investigated edge of the Universe, the redshift $\Delta\lambda/\lambda$ is much larger than predicted by the linear Hubble's law, obtained without taking into account dark matter. Therefore, to correctly determine the distances by the "standard candle" method, you should use the formula (18.). Then there will be no idea about the accelerated expansion of the Universe near its edge. Not to mention the fact that there is no expansion of the Universe, but there is ignorance of all the properties of light and a misunderstanding that the space between cosmic bodies is filled with gaseous dark matter [6, 7].

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