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# Transition to 5-Dimensional Hyperreality

**Romanenko Vladimir Alekseevich**[1*]

[1]Independent researcher, Graduated from the Murom Institute, Russia.

[*]**Correspondence:**

Romanenko Vladimir Alekseevich
Independent researcher, Graduated from the Murom Institute, Russia.

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**Abstract**

This article presents an approach proving the possibility of the existence of hyperreality in the form of a 5-dimensional sphere. It is a continuation of article, which deduced the equation of forces describing 4-dimensional reality. The issues of the transition of 4-dimensional reality into the baryon time of 3-dimensional space and into the proper time of 5-dimensional space are considered separately. In both cases, a simple mathematical apparatus is used that is easy to understand. A reference is given to the author's work, in which the mechanism of Newtonian gravity in 3-dimensional space is explained in terms of the resultant force arising in 4-dimensional space. The use of this approach makes it possible to derive the equation of energy density in a 5-dimensional sphere and go from it to the derivation of a formula for a 5-dimensional spherical volume depending on its proper time.

**Keywords:** Time flows, hyperreality, differential equation, baryonic time, proper time, Weinberg angle, interaction constants

## 1. Introduction

The article continues the topic of the context of our Metagalaxy. This problem was first considered in[1] the meeting of chronowaves as the emergence of conditions for the formation of the metagalaxy. The equation used there indicated that space could have five dimensions. The idea of using a 5-dimensional space is far from new. Back in 1919, the German mathematician Theodor Kaluza sent Einstein an article in which he proposed a field theory that unites gravity and electromagnetism in a 5-dimensional space. The idea of unifying these interactions based on a fifth dimension caused a stir in the scientific world. However, after the advent of quantum mechanics in 1925, this excitement subsided. The reason is that Kaluza proposed considering the fifth coordinate as a circle with a radius equal to the Planck length. This dimension cannot be experimentally verified, as an unimaginable amount of energy is required to detect it. Scientists agree that the familiar 3-dimensional continuum introduced by Einstein is more suitable for experiments than the 5-dimensional Kaluza-Klein space.

The author disagrees with this point of view. The concept of 3-dimensional space and 1-dimensional time has existed for over a hundred years and has not undergone significant changes. Everyone is satisfied with everything, and no one wants to seriously address the problem of time. Yet, it is precisely in solving this problem that the next scientific breakthrough in understanding the world around us lies. The world, as physics understands it, is structured simply. It contains matter, which is located in space and exists in time. Matter creates a gravitational attraction by curving spacetime. It has been established that the gravitational effect on spacetime leads to its expansion. This concept developed on the basis of the gravitational equation of general relativity, proposed by Freidman over a hundred years ago. Since then, it has been the sacred cow of physics, preventing any other way of viewing the world around us.

The theory of 3-dimensional time, developed by the author in his works, allows us to go beyond our 3+1-dimensional reality into other hyperrealities and understand the connection between our world and them.

In[1] a 4-dimensional hyperreality was considered. However, the resulting force equation in this reality indicated its additional interaction with some other, higher-order reality. The emergence of this hyperreality follows from the author's work.[2] This work is devoted to its study.

## 2. Antigravity force expanding the primary vacuum

Previously, in the article,2 parabolic functions were derived that describe the shape of the forward and reverse time flows. They have the form:

reverse flow of proper time

$$s = -\frac{l^2}{P} \tag{1}$$

direct flow of one's own time

$$s = \frac{l^2}{\frac{P}{\phi}} \tag{2}$$

Where $s = c\tau$ - metric coordinate of the proper time of duration τ; $c$ - speed of light; $l = c\psi$ - metric coordinate of the proper time of space $\psi$; $P$ - the length of the reverse flow, equal to the graviton wavelength; $\phi = 9/128\pi^2 \cdot \alpha_e$ - constant.

These flows interact with each other and form a four-dimensional reality, creating the conditions for the formation of our Metagalaxy. However, for this to occur, a primary impetus must be given, leading to its development.

The shape of 4-dimensional reality is described by a formula that takes into account the interaction of parabolic flows, which is obtained by multiplying the squares of their proper times. It has the form

$$s^2 = (-\frac{l^2}{P}) \cdot \frac{l^2}{\frac{P}{\phi}} = -\frac{l^4}{\frac{P^2}{\phi}} \tag{3}$$

The resulting equation describes the interaction of flows in a horizontal hyperplane. For proof, the Compton wavelength of the graviton is considered as the gravitational radius of the entire graviton mass.

$$\lambdabar_g = \frac{\hbar}{\mu_{гр} c} = P = \frac{M_P G}{c^2}$$

This can be done because the graviton wavelength is expressed in terms of the Planck length, represented as the gravitational radius[3]

$$P = \ell_0 \alpha_e^2 n_e^3 = \frac{m_0 G}{c^2} \alpha_e^2 n_e^3 = \frac{M_P G}{c^2} \tag{4a}$$

Where $M_P = m_0 \alpha_e^2 n_e^3$ - graviton mass, which creates the gravitational radius; $n_e = m_0 / m_e$ - number of electrons in the Planck mass; $\alpha_e = 1/137{,}036$ - electromagnetic constant.

The wavelength determines the condition:

$$\hbar c = m_0^2 G = \mu_{гр} M_P G$$

The mass of the graviton follows from this:

$$\mu_{гр} = \frac{m_0^2 G}{M_P G} = \frac{m_0^2 G}{m_0 \alpha_e^2 n_e^3 G} = \frac{m_0}{\alpha_e^2 n_e^3} = 2{,}99 \cdot 10^{-68} г \tag{4b}$$

The formula of 4-dimensional reality (3) was investigated in the work работе.[1] The results of the study made it possible to establish the fact that in the specified reality, in addition to time τ existing in N-dimensional space, baryon time $t_6$ also arises, existing in a 3-dimensional gravitational volume.

In time τ, the energy density obeys the equation of state of hyperreality:

$$\frac{3}{32\pi G\tau^2}=-\frac{\pi(P\alpha_{GU})^2}{M_H{}^2G}\cdot\frac{M_P\alpha_e\cdot M_P}{\frac{4}{3}\pi l^4}c^2 \tag{5a}$$

Where: $M_H=\frac{3M_P\alpha_{GU}}{4\sqrt{\pi}}$ - Hubble vacuum mass.

From the formula, it is clear that there is a gravitational interaction between the masses $M_P$ and $M_P\alpha_e$, placed in 5-dimensional space. However, these masses do not belong to baryonic matter. They are associated with the masses of the interacting vacua arising in the primordial vacuum. However, the baryonic matter formed during the interaction of chronowaves is present in the first relation. The formula reduces to the form:

$$\frac{3}{32\pi G\tau^2}=-\frac{M_P\alpha_e\cdot M_P}{l^4}\cdot(\frac{9}{2}M_б G)\cdot\frac{4\sqrt{\pi}G}{ct_Hc^4} \tag{5b}$$

The formula includes the Hubble time $t_H$ expressed in terms of the Hubble mass $M_H$.

$$ct_H=\frac{M_HG}{c^2}=\frac{3M_P\alpha_{GU}G}{4\sqrt{\pi}c^2}=\frac{3}{4\sqrt{\pi}}\cdot P\alpha_{GU} \tag{6a}$$

Where: $ct_H=2{,}99792458\cdot10^{10}\cdot4{,}24552662\cdot10^{17}=1{,}272776861\cdot10^{28}\,см$ - Hubble radius;
$t_H=4{,}24552662\cdot10^{17}\,сек=13{,}4535498\cdot10^9\,years$ - Hubble time.

The Hubble constant is equal to:

$$H=\frac{1}{t_H}=\frac{1}{4{,}24552662\cdot10^{17}}=2{,}355420398\cdot10^{-18}c^{-1}\cdot3{,}0842208\cdot10^{19}\frac{км}{Мпк}=72{,}64636584\frac{км}{c\cdot Мпк} \tag{6b}$$

Experimental significance: $H=73\pm1км/c\cdot Мпк$[4]

$$M_б=\frac{M_P\alpha_{GU}}{18}=0{,}05555M_P\alpha_{GU}=5{,}6\%(M_P\alpha_{GU}) \tag{6c}$$

is a baryonic mass of the Metagalaxy.

From (5b) it follows that the baryon mass appears in time τ. But on the other hand, it should be considered as a mass that creates gravitational acceleration. In this case, it should be enclosed in a 3-dimensional gravitational volume. Let us isolate this volume in (5b), writing the equation as follows:

$$\frac{1}{l^3}\cdot(\frac{9}{2}\frac{M_P\alpha_{GU}G}{18})t_б^2\frac{\tau^2}{t_б^2}=-\frac{3l}{32\pi\cdot\frac{4\sqrt{\pi}}{ct_H}\frac{M_P\alpha_eG\cdot M_P}{c^4}G}=-\frac{9}{128\pi^2\alpha_e\cdot\frac{4\pi\cdot4}{P\alpha_{GU}}\frac{P\cdot P}{l}}=-\frac{l}{\frac{16\pi}{\alpha_{GU}}\frac{\cdot P}{\phi}}=-\frac{l}{\frac{24\pi^3\sqrt{\pi}}{\alpha_e}\cdot(\frac{ct_H}{\phi^2})}$$

Having compared the 3-dimensional gravitational volume, the square of the baryon time $t_б^2$, we write it as a unit ratio:

$$\frac{\frac{9}{2}\frac{M_P\alpha_{GU}G}{18}t_б^2}{l^3}=1=-\frac{l}{\frac{24\pi^3\sqrt{\pi}}{\alpha_e}\cdot(\frac{ct_H}{\phi^2})}\frac{t_б^2}{\tau^2} \tag{7}$$

It follows from this that the negative square of proper time $s=c\tau$ is connected with an additional spatial dimension

$$-s^2=\frac{l}{ct_H}\cdot\frac{c^2}{\frac{24\pi^3\sqrt{\pi}}{\phi^2\alpha_e}}\cdot t_б^2=\frac{l}{ct_H}\cdot v_{б.х.в.}^2\cdot t_б^2 \tag{8a}$$

Where: $v_{б.х.в.}^2=\frac{c^2}{\frac{24\pi^3\sqrt{\pi}}{\phi^2\alpha_e}}$

The numerical value of the passage of time:

$$v_{б.х.в.} = \sqrt{\frac{\frac{c^2}{24\pi^3\sqrt{\pi}}}{\phi^2\alpha_e}} = \frac{c\phi}{2\pi}\sqrt{\frac{\alpha_e}{6\pi\sqrt{\pi}}} = \frac{c\phi}{2\pi}\sqrt{2,18418423\cdot 10^{-4}} = 2,296318939\cdot 10^{-3}c \tag{8b}$$

The resulting value of the time course is related to the helical motion, in which it is present as absolute velocity. The equation for the equality of accelerations in helical motion is:

$$\frac{v^2_{б.х.в.}}{ct_H} = -\frac{1}{t^2_б}\cdot\frac{s^2}{l} = -\frac{1}{t^2_б}\cdot\frac{1}{l}\left(-\frac{l^4}{\frac{P^2}{\phi}}\right) = \frac{1}{t^2_б}\cdot\left(\frac{l^3}{\frac{P^2}{\phi}}\right) = \frac{1}{t^2_б}\cdot\left(\frac{1}{\frac{P^2}{\phi}}\frac{9}{2}\frac{M_P\alpha_{GU}G}{18}t^2_б\right) =$$
$$= \left(\frac{1}{\frac{P^2}{\phi}}\frac{9}{2}\frac{M_P\alpha_{GU}G}{18}\right) = \left(\frac{\phi c^2}{P^2}\frac{M_P\alpha_{GU}G}{4c^2}\right) = \frac{\phi c^2}{P^2}\cdot\frac{M_{т.м.}G}{c^2} = \frac{\phi c^2}{P^2}\cdot P_{т.м.} \tag{9}$$

In this formula $v_{б.х.в.} = v_{абс}$ there is an absolute speed of screw motion; $ct_H$ there is a radius of curvature; $P_{т.М}$ is the radius of the cylinder;

$\frac{c^2}{P\cdot\frac{P}{\phi}} = \frac{\phi c^2}{P^2} = \Omega^2_P$ is the square of the angular velocity.

The helical flow is an external flow of time in 4-dimensional reality, which arises due to the presence of a mass of dark matter in it, which has a gravitational radius $P_{т.М}$. The flow is independent of both the proper and baryon time. Its angular velocity arises from the interaction of the lengths of the forward and reverse flows. As can be seen from the formula, the angular velocity of the flow is very small. It is generated by a field with a large Weinberg angle, which is determined from the square of the sine of the inclination angle of the radius of curvature and is determined by the formula for the relationship between this radius and the radius of a cylinder, which follows from the properties of a helix:

$$\sin^2\gamma_W = \frac{P_{т.м.}}{ct_H} = \frac{P\alpha_{GU}}{4\frac{3P\alpha_{GU}}{4\sqrt{\pi}}} = \frac{\sqrt{\pi}}{3} = 0,59081795;\ \sin\gamma = 0,76864683;\ \gamma_W = 50,23253045°$$

The left side of the acceleration equality (9) is included in the 4-volume formula obtained in[1] and has the form

$$l^4 = \frac{v^2_{б.х.в.}t^2_б}{ct_H}\frac{P^2}{\phi}\cdot l = \tilde{l}\cdot l\frac{P^2}{\phi} = \frac{P^2}{\phi}\cdot\frac{v^2_{б.х.в.}}{ct_H}\sqrt[3]{P_{т.м}c^2}\cdot t_б^{\frac{8}{3}} \tag{10a}$$

Where: $\tilde{l} = \frac{l^3}{\frac{P^2}{\phi}} = \frac{v^2_{б.х.в.}t^2_б}{ct_H} = \frac{sl}{P} = -\frac{s^2}{l}$ is the spatial coordinate of the vertical hyperplane.

From formula (10a) follows the inverse relationship:

$$\frac{1}{\tilde{l}\cdot l} = \frac{P^2}{l^4\phi} \tag{10b}$$

The denominator on the left side is the product of the spatial coordinates of the vertical and horizontal hyperplanes of 3-dimensional time. This relationship expresses gravitational dependencies in 5-dimensional space. However, this space must be connected to the 5-dimensional reality in which the interacting forward and backward flows of time are located. In the author's work,[2] a polar equation was obtained for a single chronological line describing the expanded space-time of the tunnel.

$$ct = \frac{P}{\sin^2\alpha} \tag{11a}$$

The overall picture is shown in Fig. 1

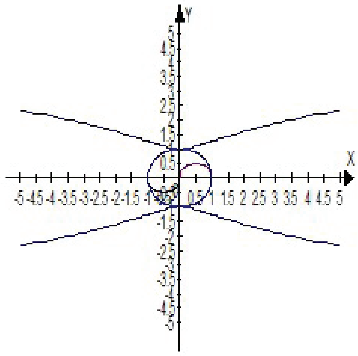

Fig. 1. 5-dimensional sphere in hyperspace.

It is clear from this that the circle of radius inscribed in the chronoline is the region that interacts with the semicircles of curvature of both parabolas. The region between the branches of the single chronoline is a 5-dimensional hyperreality described by the polar radius the duration vector . Its geometry acts on the central circle, which in 3-dimensional time acts on the semicircles of curvature of 4-dimensional reality, which are part of the parabolic forward and reverse flow of time. The proof of such a complex statement follows from the expression of the duration vector in (11a) through the spatial coordinate. $l = ct \sin \alpha$. After transformation, the formula takes the form:

$$ct = \frac{l^2}{P} \tag{11b}$$

We square the formula and write it in reverse form:

$$\frac{P^2}{l^4} = \frac{1}{(ct)^2} \tag{11c}$$

Comparing with (10b), we see that they are equal provided:

$$\frac{P^2}{l^4} = \frac{\phi}{\tilde{l} \cdot l} = \frac{1}{(ct)^2} \tag{11d}$$

Then the product of spatial coordinates is equal to:

$$\tilde{l} \cdot l = (ct)^2 \phi = \frac{l^2}{\sin^2 \alpha} \phi \tag{11e}$$

Let us check the obtained formula through the representation $\tilde{l}$ in the form (see 10a): $\tilde{l} = \frac{ls}{P} = \frac{l}{\sin^2 \alpha} \phi$

From it we find $s = \frac{P}{\sin^2 \alpha} \phi = \frac{l^2}{P} \phi$

From the resulting equation, we find $l^2$:

$$l^2 = \frac{P^2}{\sin^2 \alpha}$$

Taking the square root, we find $l$:

$$l = \frac{P}{\sin \alpha} = ct \cdot \sin \alpha$$

From the resulting equation we again arrive at the polar formula (11a) for $ct$:

$$ct = \frac{P}{\sin^2 \alpha}$$

The transformations performed indicate a connection between hyperrealities and durational time. To understand what we're talking about, let's apply the acceleration equation for 4-dimensional hyperreality, obtained in,[1] which has the form:

$$M_P\ddot{l} = M_P\frac{d\dot{l}}{d\tau} = \frac{M_{т.м}c^2}{\tilde{l}} = \frac{M_{т.м}c^2}{\frac{l^3}{\frac{P^2}{\phi}}} = \frac{M_{т.м}c^2}{l^3}\frac{P^2}{\phi} = \frac{M_{т.м}c^2}{\frac{v^2_{б.х.в.}t^2_б}{ct_H}} = \frac{M_{т.м}c^2\cdot ct_H}{v^2_{б.х.в.}t^2_б} = \frac{M_{т.м}\cdot M_H G}{v^2_{б.х.в.}t^2_б} \tag{12a}$$

It is clear from this that the right-hand side of the equation represents an antigravitational force, very similar to Newton's law of gravitation. However, the denominator of the formula contains the square of a product that expresses some as-yet-unknown metric segment. To determine the identity of this product, consider formula (11c), transforming it to form (12):

$$M_P\ddot{l} = M_{т.м}\cdot M_H G\frac{P^2}{l^4} = \frac{M_{т.м}\cdot M_H G}{(ct)^2} = M_P\ddot{l} \tag{12b}$$

In this form the meaning becomes clear $v^2_{б.х.в.}t^2_б = (ct)^2$.
Then (12b) should be considered as two forces belonging to different hyperrealities

$$M_P\ddot{l} = M_P\frac{udu}{dl} = M_{т.м}\cdot M_H G\frac{P^2}{l^4} = \frac{M_{т.м}\cdot M_H G}{(ct)^2} = \frac{M_{т.м}\cdot M_H\sin^2\alpha_{01}\cdot G}{l^2} \tag{13a}$$

$$M_P\ddot{l} = M_P\frac{d^2l}{d\tau^2} = \frac{M_{т.м}\cdot M_H G}{(ct)^2} = \frac{M_{т.м}\cdot M_H\sin^2\alpha_0\cdot G}{l^2} \tag{13b}$$

If we consider the right-hand side of (13a), then, according to Ehrenfest's gravitational formula for multidimensional spaces, the first force arises in a 5-dimensional reality. The second force arises in a 4-dimensional space, but describes a force that, being positive, acts on the 3-dimensional space located within it. The difference in forces for the right-hand sides is in the angle of inclination for the duration vector, determined by the general relation formula: $ct = l / \sin\alpha$.

Let us consider the solution of equation (13a) with respect to the velocity $u = \dot{l} = dl / d\tau$, arising in 5-dimensional reality. We separate the variables and reduce the equation to the form:

$$udu = \frac{M_{т.м}\cdot M_H GP^2}{M_P l^4}dl = \frac{M_{т.м}\cdot M_H G}{M_P}\frac{M_P G}{c^2}P\frac{dl}{l^4} = \frac{G}{c^2}\frac{M_{т.м}\cdot M_H G}{c^2}c^2P\frac{dl}{l^4} = P_{т.м}\cdot ct_H c^2Pl^{-4}dl$$

We integrate under the initial conditions: $u(0) = 0$ и $l(0) = l_я$

As a result, we arrive at the formula for the square of speed:

$$u^2 = -\frac{2P_{т.м.}ct_H c^2P}{3}\frac{1}{l_я^{\,3}}(1-\frac{l_я^{\,3}}{l^3}) \tag{14a}$$

In the resulting formula, the sign depends on whether the value of the accepted initial $l$ condition is greater or less $l_я$, which is the radius of the nucleus during attraction or repulsion of masses. If $l > l_я$, then there is a minus sign. If $l < l_я$, then there is a plus sign.

If we apply the formula for a 5-dimensional sphere with a radius $l_я = P$, we obtain that the specific energy that is spent on creating the interaction between the masses is positive, since $l < P$:

$$u^2 = -\frac{2P_{т.м.}ct_H P}{3}\frac{c^2}{l_я^{\,3}}(1-\frac{l_я^{\,3}}{l^3}) = -\frac{2P_{т.м.}ct_H}{3l_я^{\,2}}c^2(1-\frac{l_я^{\,3}}{l^3}) = \frac{2P_{т.м.}ct_H}{3l_я^{\,2}}c^2(\frac{l_я^{\,3}}{l^3}-1) \tag{14b}$$

The found formula for the square of velocity (14a) is the cause of the formation of the resultant force, which is associated with Newton's gravitational force in 3-dimensional space. The formula for such a force was derived by the author in[5] and has the form:

$$F_p = \frac{2}{3}l_я^2(\rho_{пр}-\rho_я)c^2 = -\frac{M_{пр}M_{гр}G}{2\pi l_я^{\,2}}(1-\frac{l_я^3}{l^3}) = -\frac{M_{пр}M_{гр}G}{2\pi l_я^{\,2}}\frac{1}{l^2}(l^2-\frac{l_я^3}{l}) = \frac{F_{гр}}{2\pi l_я^{\,2}}(\frac{l^3-l_я^3}{l}) \tag{15a}$$

The formula for the resulting force is gravitational, since the distance between gravitating bodies in three-space is always greater than the radius of the core generating this force. As can be seen from the formula, Newton's gravitational force $F_{2p}$ can be easily found from it and its mechanism of attraction can be explained.

Let us show the derivation of this force from formula (14b), which is the basis for its occurrence under any values of the initial conditions.

$$\frac{u^2}{\frac{4\pi}{3}}\frac{l_я}{P} = -\frac{P_{т.м.}ct_H}{2\pi l_я^{\,2}}(1-\frac{l_я^{\,3}}{l^3}) = -\frac{M_{т.м.}M_H G}{2\pi l_я^{\,2}}\cdot\frac{G}{c^4}(1-\frac{l_я^{\,3}}{l^3}) = -\frac{M_{т.м.}M_H G}{2\pi l_я^{\,2}}\cdot\frac{1}{F_0}(\frac{l_я^{\,3}}{l^3}-1)$$

Then the force formula will take the form:

$$\bar{F}_{4p} = \frac{F_0}{c^2}\frac{u^2}{\frac{4\pi}{3}}\cdot\frac{l_я}{P} = -\frac{M_{т.м.}M_H G}{2\pi l_я^{\,2}}\cdot(1-\frac{l_я^{\,3}}{l^3}) = -\frac{M_{т.м.}M_H G}{2\pi l_я^{\,2} l^2}\cdot(l^2-\frac{l_я^{\,3}}{l}) = -\frac{M_{т.м.}M_H G}{l^2}\cdot(\frac{l^3-l_я^{\,3}}{2\pi l_я^{\,2} l}) \quad (15b)$$

Where: $F_{4p} = F_0\frac{u^2}{\frac{4\pi}{3}}\cdot\frac{l_я}{c^2 P} = \frac{c^4}{G}\frac{u^2}{\frac{4\pi}{3}}\cdot\frac{l_я}{c^2 P} = \frac{c^2}{G}u^2\frac{3}{4\pi}\cdot\frac{l_я}{P}$ (15c)

is a force that arises in 4-dimensional reality

As we can see, it is based on the square of the speed $u^2$. Let's consider what creates this force..
To do this, we transform formula (15c) to the form:

$$\frac{u^2}{P} = \frac{4\pi F_{4p}}{3 l_я F_0}c^2 = \frac{4\pi F_{4p}}{3F_0}\frac{c^2}{l_я^{\,2}}l_я = \Omega_0^2 l_я$$

Where: $\frac{4\pi F_{4p}}{3F_0}\frac{c^2}{l_я^{\,2}} = \Omega_0^2$ is the square of the angular velocity.

If the speed $u = v_{абс}$ is a constant value, then we have an equation for the equality of accelerations in a helical line with a radius of curvature equal to and a radius of a cylinder equal to $l_я$.

Angular velocity arises precisely because of the constancy of gravitational force. Motion along a helical line creates a negative acceleration directed inward. This acceleration is the gravitational acceleration.

The emergence of gravity marks the transition to a new time. This time is directly linked to baryonic matter and is called baryon time. Gravity is, as it were, "frozen" in it, but continues to participate indirectly in all processes of matter formation. The question of the variable velocity will be explored below.

## 3. Transition of matter into baryon time

The transition to baryon time is accompanied by a change in the dark energy mass and time τ. This can be calculated using the force equation (13b).

To do this, it must be expressed in terms of the distance $l$. This can be done by applying the coupling formula for the coordinate $l = ct \sin\alpha$ to the denominator.

$$M_P\frac{d^2 l}{d\tau^2} = \frac{M_{т.м}\cdot M_H G}{(ct)^2} = \frac{M_{т.м}\cdot M_H \sin^2\alpha G}{l^2} \quad (16a)$$

The transition to baryon time is associated with the emergence of a baryon mass acting on the Hubble mass. In this case, the Hubble mass becomes a test mass, and in baryon time, it experiences gravitational acceleration.

$$M_P\frac{d^2 l}{d\tau^2} = \frac{M_{т.м}\cdot M_H \sin^2\alpha G}{l^2} = \frac{9M_б\cdot M_H\sin^2\alpha G}{2l^2} = \frac{M_б\cdot M_H\sin^2\alpha\cdot G}{\frac{2}{9}l^2} \quad (16b)$$

Where: $M_{т.м} = \frac{9M_б}{2} = \frac{9}{2}\frac{M_P\alpha_{GU}}{18} = \frac{M_P\alpha_{GU}}{4}$ there is a transition from dark matter mass to baryonic mass.

The interaction force between the baryon mass and the Hubble mass in baryon time takes the form:

$$\frac{2}{9}M_P\frac{d^2l}{\sin^2\alpha\cdot d\tau^2}=\frac{2}{9}M_P\frac{d^2l}{dt_б{}^2}=\frac{2}{9}M_P\frac{d^2l}{\frac{c^2dt_б{}^2}{v_{кр}{}^2}}=\frac{2}{9}M_P\frac{v_{кр}{}^2}{c^2}\frac{d^2l}{dt_б{}^2}=M_H\frac{d^2l}{dt_б{}^2}=\frac{M_б\cdot M_HG}{l^2} \tag{16c}$$

Since the force must act in baryon time, a transition to the differential $dt_á$ is made in the denominator by replacing:

$$\sin^2\alpha d\tau^2=dt_б^2 \tag{16d}$$

The sine is expressed in terms of the critical transition velocity

$$\frac{v_{кр}}{c}=\sin\alpha$$

By equating the constant terms in front of the derivatives, we obtain the expression

$$\frac{2}{9}M_P\frac{v_{кр}{}^2}{c^2}=M_H$$

It follows from this that the law of transition from dark energy to the mass-energy of the Hubble vacuum is fulfilled.

$$\frac{2}{9}M_Pv_{кр}{}^2=M_Hc^2 \tag{16e}$$

We find the square of the critical speed:

$$v_{кр}{}^2=\frac{M_Hc^2}{\frac{2}{9}M_P}=\frac{3}{4\sqrt{\pi}}\frac{M_P\alpha_{GU}c^2}{\frac{2}{9}M_P}=\frac{3}{4\sqrt{\pi}}\frac{\alpha_{GU}c^2}{\frac{2}{9}}=\frac{27\alpha_{GU}c^2}{8\sqrt{\pi}} \tag{17a}$$

Let us express the square of the velocity through constants:

$$v_{кр}{}^2=\frac{27\alpha_{GU}c^2}{8\sqrt{\pi}}=\frac{3\cdot 9}{32\pi^2\sqrt{\pi}}c^2=\frac{3}{32\pi^2}\cdot\frac{9}{\sqrt{\pi}}c^2=\alpha_e(q)\cdot\frac{4\cdot 3\cdot 3}{4\sqrt{\pi}}c^2=\alpha_e(q)\cdot\frac{3}{4\sqrt{\pi}}12c^2=12\alpha_e(q)\cdot\alpha_Hc^2$$

We find the magnitude of the speed:

$$v_{кр}=\sqrt{\alpha_e(q)\cdot\alpha_H12c^2}=\sqrt{\frac{27}{32\pi^2\sqrt{\pi}}c^2}=0,219618819c\simeq c\sin^2\theta_W \tag{17b}$$

As can be seen from the formula, the velocity is very close to the square of the sine of the Weinberg angle for the electroweak field (EWF). Then the vacuum mass energy equation (16e) can be written as

$$M_Hc^2=M_P\frac{2}{9}\cdot v_{кр}{}^2=M_P\cdot 0,222222222\cdot 0,219618819^2c^2=M_P\cdot 0,010718316c^2=M_Pc^2\sin^6\theta_W$$

Due to the proximity of the quantities being multiplied, a common notation for the sine of the Weinberg angle was introduced for the ESP to the sixth power. After extracting its cube root, we obtain the square of the sine of the Weinberg angle, equal to

$$\sin^2\theta_W=\sqrt[3]{0,010718316}=0,220483213$$

We determine the size of an angle $\sin\alpha_W=0.46985564$ and the corner itself $\theta_W=28,024926222°$, which in the Weinberg-Salam theory of electroweak interaction is called the weak interaction mixing angle.

Thus, the transition to baryon time is associated with the emergence of the ESP. It is also associated with the emergence of a resultant force, which is the cause of the gravitational force in three-dimensional space. Therefore, the calculated value of the force (16c) should be equated with a force proportional to the resultant force $\bar{F}_p$, which follows from formula (15b) obtained above.

$$\bar{F}_p=\frac{F_0}{c^2}\frac{u^2}{\frac{4\pi}{3}}\cdot\frac{l_я}{P}=-\frac{M_{т.м.}M_HG}{l^2}\cdot\left(\frac{l^3-l_я{}^3}{2\pi l_я{}^2l}\right)=-\frac{M_бM_HG}{\frac{2}{9}l^2}\cdot\left(\frac{l^3-l_я{}^3}{2\pi l_я{}^2l}\right)$$

From this follows the desired resulting force:

$$F_p = \frac{2}{9}\bar{F}_p = \frac{2}{9}\cdot\frac{F_0}{c^2}\frac{u^2}{\frac{4\pi}{3}}\cdot\frac{l_я}{P} = \frac{F_0}{c^2}\frac{u^2}{6\pi}\cdot\frac{l_я}{P} = -\frac{M_б M_H G}{l^2}\cdot\left(\frac{l^3 - l_я^{\ 3}}{2\pi l_я^{\ 2} l}\right) \quad (18a)$$

Then the equation of forces for a 4-dimensional reality, taking into account their positive sign, which is possible when the condition is met $l_я > l$ , will take the form:

$$M_H\frac{d^2 l}{dt_б^{\ 2}} = \frac{M_б\cdot M_H G}{l^2} = F_p = \frac{M_б M_H G}{l^2}\cdot\left(\frac{l_я^{\ 3} - l^3}{2\pi l_я^{\ 2} l}\right) \quad (18b)$$

The resulting equation should be viewed in two ways. Formally, it describes antigravity in the 3-dimensional space between the baryon mass and the Hubble vacuum mass. In fact, this force arises in a 4-dimensional reality and is the cause of a similar force in 3-dimensional space, which is immersed in 4-dimensional space. The solution to this ambiguity lies in the existence of a 5-dimensional hyperreality, in which both realities are immersed. The transition to this hyperreality will be demonstrated in Section 5.

## 4. Application of the theory of time to the study of the transition of matter into baryon time

Let us consider the relationship between the proper time and the duration time based on (16e), which can be written in terms of the critical speed in the form

$$dt_б = \sin\alpha\cdot d\tau = \frac{v_{кр}}{c}d\tau$$

After integration, we have an equality taking into account the found speed $v_{кр}$

$$ct_б = v_{кр}\tau = \frac{v_{кр}}{c}c\tau = \sin^2\theta_W c\tau \quad (19a)$$

As we see, it is proportional to the square of the Weinberg angle for the ESP. Based on the determination of the square of the sine of this angle; a diagram was obtained showing the emergence of baryon time (see Fig. 2). Indeed, formula (19a) can be written as:

$$ct_б = v_{кр}\tau = \frac{v_{кр}}{c}c\tau = \sin^2\theta_W c\tau = (\sin\theta_W c\tau)\sin\theta_W = h\sin\theta_W = bp\cdot\cos\theta_W = bd \quad (19b)$$

The figure shows a diagram used in the theory of electroweak interaction. It shows in parentheses the charges of the electroweak field, which are projections of the total charge Q, directed along the time axis of duration *op* = *t*. As can be seen from the diagram, the directions of these charges coincide with the directions of the time and space coordinates. This raises the suspicion that baryon time is connected to the electroweak field underlying it. This suspicion is reinforced by the fact that the segment can be compared to a portion of the total time interval, denoted as: $bp = \Delta t$.

Then (19b) can be written as:

$$ct_б = v_{кр}\tau = \sin^2\theta_W c\tau = c\Delta t\cdot\cos\theta_W = bd \quad (19c)$$

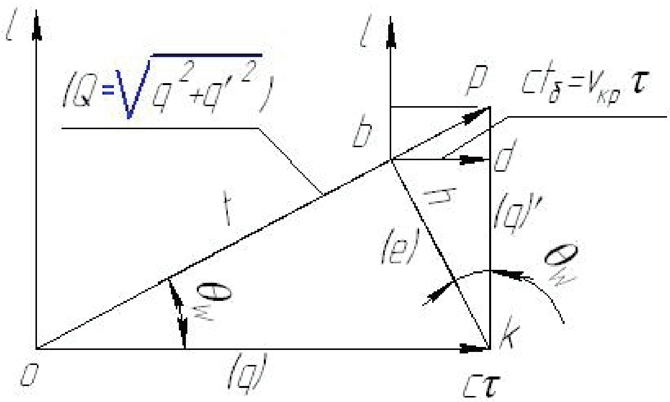


Fig. 2. Diagram of the formation of baryon time

With this approach, baryon time arises due to the reflection of part of the electromagnetic energy (charge $e$) from the future, characterized by a point $k$ on the segment ok, into the past, starting at the point $b$ and moving into the future, coinciding with the spatial axis $l$, parallel to the axis $\tau$.

But if we consider the process from the perspective of time theory, a different picture emerges. Let us apply the formula describing the wave part for a directly falling time vector, which has the form[6]:

$$c\hat{t} = \hat{s} + l \cdot \dot{\psi}_{np} = \hat{s} + l \cdot tg\theta_W$$

The equation is reduced to the form

$$\hat{s}' = c\hat{t}\cos\theta_W = \hat{s}\cos\theta_W + l \cdot \sin\theta_W$$

The resulting formula is the first formula for the rotation of a coordinate system.

Let's represent the equation graphically, introducing the following notation:

$$c\hat{t} = ok\,;\ \hat{s} = s' = on\,;\ nk = l \cdot tg\theta_W$$

Let us look at Fig. 3. It depicts an osculating circle, which should be viewed as a wave describing space-time. The diagram from Fig. 2 is inscribed within the circle. Then the meaning of the part of the triangle *obk* inscribed in this circle becomes clear. For this, the segment $ob = ct'$ should be considered as an energy flow that reaches the surface of the circle at the Weinberg angle at the point $b$. As a result, part of the energy is reflected to a point $k$ at an angle $90^0$. The second part of the energy is refracted outside the circle at an angle $0^0$ in the form of a vector *bp*. We place a new coordinate system *lbd* at the point $b$, the axes of which are parallel to the directions of the axes in the previously adopted coordinate system *loτ*. In this system, the refracted vector *bp* forms a projection onto the horizontal axis in the form of metric baryon time $bd = ct_6$.

By connecting the points $p$ and $k$, we obtain the second part of the triangle *opk* taken into consideration. The vector has a constant value on the segment *bp*. After this, it begins to describe the trajectory in the form of function (19b), shown in Fig. 1

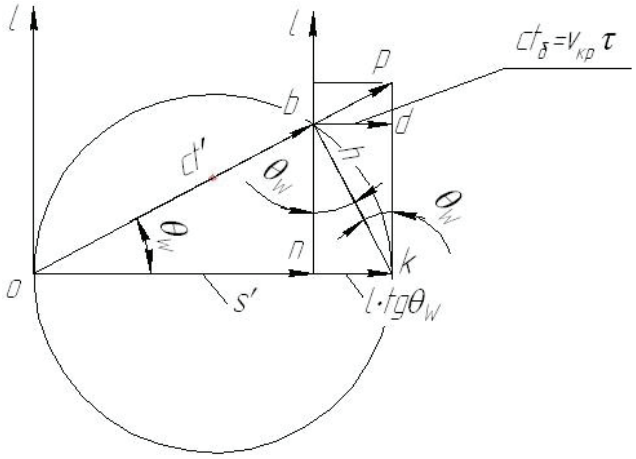


Fig. 3. Diagram of the formation of baryonic time from the perspective of the wave component of the incident vector.

The above scheme can be applied to calculating the onset of baryon time. A calculation variant was presented in[1] that yielded a radiation time interval that characterizes the transition to the baryon era and agrees very well with observational data. It was determined by the formula:

$$\tau_{\max}{}^2 = \frac{3c^2}{32\pi G \dfrac{216\alpha_e}{\alpha_e(q)\alpha_{GU}} \dfrac{c}{v_{б.х.в.}} \rho_{0б}c^2} = \frac{\alpha_e(q)\alpha_{GU} v_{б.х.в.}}{32\pi G \cdot 72\alpha_e c \dfrac{c^2}{\frac{4}{3}\pi P_б^2 \cdot G}} = 4{,}381622289 \cdot 10^{-8}\frac{P_б^2}{c^2} \tag{20a}$$

Let us apply it to determine the baryon time interval in which baryonic matter began to develop. The calculation condition is formula (19a). To do this, we write (20a) as:

$$\tau_{\max}{}^2 = \frac{\alpha_e(q)\alpha_{GU} v_{б.х.в.}}{32\pi G \cdot 72\alpha_e c \dfrac{c^2}{\frac{4}{3}\pi P_б^2}} \cdot \frac{v_{кр}^2}{v_{кр}^2}$$

It follows from this:

$$\tau_{\max}^2 v_{кр}^2 = \frac{\alpha_e(q)\alpha_{GU} v_{б.х.в.}}{32\pi G \cdot 72\alpha_e c \dfrac{c^2}{\frac{4}{3}\pi P_б^2 \cdot G}} \cdot v_{кр}^2 = c^2 t_{б\min}^2$$

We find $ct_{б\min}$ it through constants by substituting the critical speed formula (17b):

$$ct_{б\min} = \sqrt{\frac{\alpha_e(q)\alpha_{GU} v_{б.х.в.}}{32\pi \cdot 72\alpha_e c \dfrac{c^2}{\frac{4}{3}\pi P_б^2}} \cdot v_{кр}^2} = P_б \sqrt{\frac{\alpha_e(q)\alpha_{GU}}{8 \cdot 72\alpha_e} \cdot \frac{v_{б.х.в.}}{c} \frac{9}{32\pi^2\sqrt{\pi}}} = P_б \sqrt{\frac{\alpha_e^2(q)\alpha_{GU}}{2 \cdot 72\alpha_e} \cdot \frac{v_{б.х.в.}}{c} \alpha_H} = \frac{P_б}{12} \sqrt{\frac{\alpha_e^2(q)\alpha_{GU}}{\alpha_e} \cdot \frac{v_{б.х.в.}}{c} \alpha_H} \quad (20b)$$

We find the numerical value through $P_б$:

$$\tau_{\max} v_{кр} = ct_{б\min} = \frac{P_б}{12}\sqrt{3{,}043242306 \cdot 10^{-7}} = 4{,}597132489 \cdot 10^{-5} P_б$$

We find the numerical value in years:

$$t_{б\min} = \frac{4{,}597132489 \cdot 10^{-5} P_б}{c} = 6{,}035707543 \cdot 10^{-6} t_H = 6{,}035707543 \cdot 10^{-6} \cdot 4{,}24552662 \cdot 10^{17} =$$
$$= 2{,}562475705 \cdot 10^{12}\ \sec = \frac{2{,}562475705 \cdot 10^{12}}{3{,}1556925 \cdot 10^{7}} = 81201{,}69201\, years$$

As we can see, the transition interval associated with the beginning of the influence of baryon time on matter turns out to be approximately 4.5 times shorter than the proper time interval $\tau_{\max} = 369739{,}2254\, years$. That is, this interval is formed in a three-dimensional space, placed within a space in which proper time changes. The appearance of this space is discussed in the next section.

## 5. Transition of proper time into the hyperspace of a 5-dimensional ball

The calculations carried out above concerned the process of transition to baryon time and obeyed equation (17b).

Let us now consider the processes occurring in proper time and obeying equation (13a). To do this, we transform formula (9) into an equation expressed in terms of duration time $v_{б.х.в.} t_б = ct$ (see (12b)):

$$\frac{v_{б.х.в.}^2 t_б^2}{ct_H} = \frac{(ct)^2}{ct_H} = \left(\frac{1}{\frac{P^2}{\phi}} \frac{9}{2} \frac{M_P \alpha_{GU} G}{18} t_б^2\right) = \left(\frac{1}{\frac{P^2}{\phi}} P_{т.м.} c^2 t_б^2\right) = \frac{l^3}{\frac{P^2}{\phi}} \quad (21a)$$

From this follows the relation:

$$\frac{P^2}{c^2 t_б^2 \phi} = \frac{ct_H \cdot P_{т.м.}}{(ct)^2} = \frac{M_H G}{(ct)^2} \frac{9}{2} \frac{M_б G}{c^4} = \frac{M_б \cdot M_H G}{(ct)^2} \frac{1}{\frac{2}{9}\frac{c^4}{G}} = \frac{M_б \cdot M_H G}{(ct)^2} \frac{1}{\frac{2}{9} F_0}$$

Multiplying by the value $2F_0/9$, we arrive at the equation of equality of forces:

$$F_{пр} = \frac{2}{9} F_0 \frac{P^2}{c^2 t_б^2 \phi} = \frac{M_б \cdot M_H G}{(ct)^2} = \frac{(M_б \cdot M_H \sin^2 \alpha_{01}) G}{l^2} = \frac{(M_б \cdot M_H \kappa) G}{l^2} \quad (21b)$$

Formula (16a) shows that the right side of the equation can be balanced by acceleration over time τ. Its further transformations are connected precisel with this time. Previously sin $\alpha_0$ it was used to translate the obtained equation into baryon time, where the angle was a constant value. A similar approach is applied to the resulting equation, in which the notation is introduced $\sin^2 \alpha = const = k$. In it, the square of the sine is not equal to the square of the sine found earlier and expressed in terms of the critical velocity. This is the difference between the force arising in proper time and the force in duration time, as mentioned above. The presence of the square of the sine in the numerator indicates that the resulting force is related to the force expressed in terms of the velocity, which is determined by formula (17a). We multiply this force by the constant value of the square of the sine.

$$F_{пр} = F_p \sin^2 \alpha_{01} = \frac{2}{9} \overline{F}_p \sin^2 \alpha_{01} = \frac{2}{9} \cdot \frac{F_0}{c^2} \frac{u^2}{\frac{4\pi}{3}} \cdot \frac{l_я \sin^2 \alpha_{01}}{P} = \frac{F_0}{c^2} \frac{u^2}{6\pi} \cdot \frac{l_я \sin^2 \alpha_{01}}{P} = -\frac{M_б M_H \sin^2 \alpha_{01} G}{l^2} \cdot \left(\frac{l^3 - l_я^{\ 3}}{2\pi l_я^{\ 2} l}\right) \tag{21c}$$

We equate the resulting projection to (21b). As a result, we obtain the following force equality equation

$$F_{пр} = \frac{2}{9} F_0 \frac{P^2}{c^2 t_б^2 \phi} = \frac{M_б \cdot M_H \sin^2 \alpha_{01} G}{l^2} = \frac{2}{9} \cdot \frac{F_0}{c^2} \frac{u^2}{\frac{4\pi}{3}} \cdot \frac{l_я \sin^2 \alpha_{01}}{P} = \frac{2}{9} \cdot \frac{F_0}{c^2} \frac{u^2}{\frac{4\pi}{3}} \cdot \frac{l_{я1}}{P} \tag{21d}$$

Where: $l_{я1} = l_я \sin^2 \alpha_{01}$ - new value of the core radius.

From the obtained formulas, the relationship for the square of the sine follows in the form:

$$\sin^2 \alpha_{01} = \frac{F_{пр}}{F_p} = \frac{l_{я1}}{l_я}$$

Which leads to equality of expended energies:

$$F_{пр} l_я = F_p l_{я1} \tag{21e}$$

The indicated dependencies obey the scheme shown in Fig. 3. This means that they can be interpreted from the standpoint of time theory for a known angle $\alpha_{01}$.

From (21d) we find the square of the velocity and express it through the gravitational radius of the new nucleus

$$u^2 = \frac{4\pi}{3} \frac{P^3}{\phi l_{я1}} \frac{1}{t_б^2} = \frac{4\pi}{3} \frac{P^3}{\phi M_{я1} G} \frac{c^2}{t_б^2}$$

Let's transform it to the energy density of the nucleus arising in a 3-dimensional volume:

$$\varepsilon_{я1} = \frac{M_{я1} u^2}{\frac{8\pi^2}{3} P^3} = \frac{c^2}{2\pi \phi G t_б^2} = \frac{c^2 v_{б.х.в.}^2}{2\pi G \phi \cdot v_{б.х.в.}^2 t_б^2} = \frac{c^2 v_{б.х.в.}^2}{2\pi G \phi \cdot c^2 t^2} \tag{21f}$$

We express   from (21a)

$$(ct)^2 = \frac{\phi c t_H l^3}{P^2}$$

Substituting into the formula, we obtain the energy density of the nucleus in the form:

$$\varepsilon_{я1} = \frac{M_{я1} u^2}{\frac{8\pi^2}{3} P^3} = \frac{c^2 v_{б.х.в.}^2}{2\pi G \cdot \frac{\phi^2 \cdot c t_H l^3}{P^2}} = \frac{c^2 v_{б.х.в.}^2}{2\pi G \cdot l^3} \frac{P^2}{\phi^2 c t_H} = \frac{c^2 v_{б.х.в.}^2}{2\pi G \cdot l^3} \frac{M_P G}{c^2} \frac{P}{\phi^2 c t_H} = \frac{M_P v_{б.х.в.}^2}{2\pi \cdot l^3} \frac{P}{\phi^2 c t_H} \tag{22a}$$

Multiplying both parts by the value $ct_H / P$, we arrive at the desired equation of energy density in 5-dimensional reality:

$$\varepsilon_5 = \frac{M_{я1} u^2}{\frac{8\pi^2}{3} P^3} \frac{c t_H}{P} = \frac{M_{я1} \sin^2 \alpha_{01} \cdot M_H G}{\frac{8\pi^2}{3} P^4} \frac{u^2}{c^2} = \frac{M_P v_{б.х.в.}^2}{2\pi \phi^2 \cdot l^3} \tag{22b}$$

Where: $S_5 = \frac{8\pi^2}{3} P^4$ is the surface area of a 5-dimensional sphere.

Let us transform the right side of the formula

$$\varepsilon_5 = \frac{M_P v_{б.х.в.}^2}{2\pi \phi^2 \cdot l^3} = \frac{M_P}{2\pi \phi^2 \cdot l^3} \cdot \frac{c^2 \phi^2 \alpha_e}{24\pi^3 \sqrt{\pi}} = \frac{M_P}{2\pi \cdot l^3 \frac{2}{3}} \cdot \frac{2}{3} \frac{c^2 \alpha_e}{24\pi^3 \sqrt{\pi}} = \frac{M_P}{\frac{4\pi}{3} \cdot l^3} \cdot \frac{c^2 \alpha_e}{36\pi^3 \sqrt{\pi}} =$$

$$= \frac{M_P}{\frac{4\pi}{3} \cdot l^3} \cdot \frac{c^2 \alpha_e}{9 \cdot 4\pi^2 \pi \sqrt{\pi}} = \frac{M_P \alpha_{GU}}{\frac{4\pi}{3} \cdot l^3} \cdot \frac{c^2 \alpha_e}{9\pi \sqrt{\pi}} = \frac{M_P \alpha_{GU}}{\frac{4\pi}{3} \cdot l^3} \frac{1}{18} \cdot \frac{2 c^2 \alpha_e}{\pi \sqrt{\pi}} = \frac{M_б c^2}{\frac{4\pi}{3} \cdot l^3} \cdot \frac{2}{\pi} \frac{\cdot \alpha_e}{\sqrt{\pi}} = \frac{M_б v_{0б}^{\ 2}}{\frac{4\pi}{3} \cdot l^3} \tag{22c}$$

Where: $v^2_{б.х.в.}$ см. (8а); ${v_{0б}}^2 = \frac{2}{\pi}\frac{\alpha_e}{\sqrt{\pi}}c^2$ is the square of the velocity of motion of baryonic matter in 3-dimensional space.

Let us express ${v_{0б}}^2$ it through the masses by writing (22b) and (22c) as an equation:

$$\varepsilon_5 = \frac{M_P v^2_{б.х.в.}}{2\pi\phi^2 \cdot l^3} = \frac{M_б {v_{0б}}^2}{\frac{4\pi}{3}\cdot l^3} = \frac{v^2_{б.х.в.}}{2\pi G\phi \cdot t^2} \tag{22d}$$

Where:

$${v_{0б}}^2 = \frac{2}{\pi}\frac{\alpha_e}{\sqrt{\pi}}c^2 = \frac{2}{3}\frac{M_P v^2_{б.х.в.}}{M_б \phi^2} \tag{23a}$$

Let's express it through the square of the course of time $v^2_{б.х.в.}$ :

$$v^2_{б.х.в.} = \frac{c^2\phi^2\alpha_e}{24\pi^3\sqrt{\pi}} = \frac{c^2\phi^2}{48\pi^2}\cdot\frac{2\alpha_e}{\pi\sqrt{\pi}} = \frac{c^2\phi^2}{48\pi^2}\cdot {v_{0б}}^2 = \frac{c^2\phi^2}{12\cdot 4\pi^2}\cdot {v_{0б}}^2 \tag{23b}$$

Let us combine the energy density formulas (22b) and (22c) into one equation.

$$\varepsilon_5 = \frac{M_{я1}u^2}{\frac{8\pi^2}{3}P^4}ct_H = \frac{M_б {v_{0б}}^2}{\frac{4\pi}{3}\cdot l^3} \tag{24}$$

It takes place in a 5-dimensional space in which proper time τ exists.

Let's find the speed $u$ and express it through the derivative with respect to τ:

$$u = \frac{dl}{d\tau} = \sqrt{\frac{M_б {v_{0б}}^2}{\frac{4\pi}{3}\cdot l^3}\frac{8\pi^2}{3}\frac{P^4}{M_{я1}ct_H}} = Pv_{0б}\sqrt{2\pi M_б\frac{P^2}{M_{я1}ct_H}}\cdot\frac{1}{l^{\frac{3}{2}}} \tag{25a}$$

Let's solve the differential equation by separating the variables:

$$l^{\frac{3}{2}}\cdot dl = Pv_{0б}\sqrt{2\pi M_б\frac{P^2}{M_{я1}ct_H}}\cdot d\tau$$

We integrate under the initial conditions $l(0) = l_0$ and $\tau(0) = \tau_0$ :

$$\int_{l_0}^{l} l^{\frac{3}{2}}\cdot dl = Pv_{0б}\sqrt{2\pi M_б\frac{P^2}{M_{я1}ct_H}}\cdot\int_{t_0}^{\tau} d\tau$$

We receive:

$$\frac{2}{5}(l^{\frac{5}{2}} - l_0^{\frac{5}{2}}) = Pv_{0б}\sqrt{2\pi M_б\frac{P^2}{M_{я1}ct_H}}\cdot(\tau - \tau_0)$$

Reducing by the initial terms, we have the function in general form:

$$\frac{2}{5}\cdot l^{\frac{5}{2}} = Pv_{0б}\sqrt{2\pi M_б\frac{P^2}{M_{я1}ct_H}}\cdot\tau$$

We square it and transform it into a 5-dimensional volume in proper time:

$$l^5 = \frac{25}{4}P^2 2\pi M_б\frac{P^2}{M_{я1}ct_H}\cdot({v_{0б}}^2\tau^2) = \frac{25}{2}\frac{\pi M_б}{M_{я1}}\frac{P^4}{ct_H}\cdot({v_{0б}}^2\tau^2) \tag{25b}$$

From the obtained result, we can conclude that, unlike baryon time, which is enclosed in a 3-dimensional gravitational volume, proper time forms a 5-dimensional volume, which includes, in addition to the baryon mass, the mass of the core and the gravitational radii of various vacuums.

We assume that (25b) forms the volume of a 5-dimensional ball.

$$V_{5ш}=\frac{8\pi^2}{15}l^5=\frac{8\pi^2}{15}\cdot\frac{25}{4}P^2 2\pi M_б\frac{P^2}{M_{я1}ct_H}\cdot({v_{0б}}^2\tau^2)=\frac{8\pi^2}{3}\frac{5}{2}\frac{\pi M_б}{M_{я1}}\frac{P^4}{ct_H}\cdot({v_{0б}}^2\tau^2) \quad (25c)$$

Let's transform it taking into account the formula for the square of velocity (23a):

$$\frac{8\pi^2}{15}l^5=\frac{8\pi^2}{3}\frac{5}{2}\frac{\pi M_б}{M_{я1}}\frac{P^4}{ct_H}\cdot({v_{0б}}^2\tau^2)=\frac{8\pi^2}{3}\frac{5}{2}\frac{\pi M_б}{M_{я1}}\frac{P^4}{ct_H}\cdot\frac{2}{3}\frac{M_P v^2_{б.х.в.}}{M_б\phi^2}\tau^2=$$
$$=\frac{8\pi^2}{3}\frac{5}{3}\frac{\pi M_б}{M_{я1}}\frac{P^4}{ct_H}\cdot\frac{v^2_{б.х.в.}}{\phi^2}\tau^2=\frac{8\pi^2}{3}\frac{5}{3}\frac{P}{l_{я1}}\frac{P^4}{ct_H}\cdot\frac{v^2_{б.х.в.}}{\phi^2}\tau^2=\frac{8\pi^2}{3}P^4\cdot\frac{5}{3}\frac{P}{l_{я1}}\frac{1}{ct_H\phi^2}\cdot v^2_{б.х.в.}\tau^2 \quad (25d)$$

As we can see, the right part of the volume includes the surface area of a 5-dimensional sphere with radius $P$.

Let's take the relation:

$$\frac{\frac{8\pi^2}{15}l^5}{\frac{8\pi^2}{3}P^5}=\frac{l^5}{5P^5}=\frac{5}{3}\frac{v^2_{б.х.в.}\tau^2}{l_я ct_H\phi^2} \quad (25e)$$

We determine our own time τ

$$\tau=\sqrt{\frac{3l^5}{25P^5}\frac{l_{я1}ct_H\phi^2}{v^2_{б.х.в.}}} \quad (25f)$$

Thus, the 5-dimensional reality turned out to be a 5-dimensional ball, the radius of which depends on its own time and vice versa.

## Conclusion

In concluding this article, the author would like to add that the derivation of the space of a 5-dimensional sphere obtained in it was achieved by solving only one second-order force differential equation, without resorting to the complex mathematical apparatus of tensor calculus. An external observer located within the sphere would hardly notice our Metagalaxy within it. They would see a complete void, representing a primordial vacuum. The author plans to discuss how moving baryonic matter can manifest itself from this "nothingness" in a subsequent article. The results obtained allow us to elucidate the influence of various vacuums on baryonic and antibaryonic matter, arising from the collision of two chronowaves.

Furthermore, he elucidated the structure of the primordial vacuum and calculated its main parameters, taking into account previous research.[7] He also developed a mechanism explaining how and why the expansion of the visible part of the universe, accessible to terrestrial observations, occurs.

## References


1. V. A. Romanenko, "The Meeting of Chronowaves as the Emergence of Conditions for the Formation of the Metagalaxy," *Phys. J. Theor. Exp. Stud*. 2(2), 1–21 (2026). https://doi.org/10.64978/pjtes.2026.0608008.
2. V. A. Romanenko, "Mathematical Model of the Meeting of Chronowaves," *J. Phys. Opt. Sci*. 8(3), 1–8 (2026). https://doi.org/10.47363/JPSOS/2026(8)364
3. V. A. Romanenko, "On the Vacuum and Its Dimensions," Problems of Science 1, 1–15 (2025). Available at https://scienceproblems.ru/images/PDF/2025/pn-1-88-.pdf
4. L. Sokolova, "New Value of the Hubble Constant: Why the Universe Is Expanding at an Accelerating Rate," Hi-News, 17 June 2022. Available at https://hi-news.ru/eto-interesno/novoe-znachenie-postoyannoj-xabbla-pochemu-vselennaya-rasshiryaetsya-s-uskoreniem.html
5. V. A. Romanenko, "On the Mechanism of Gravity in the Law of Universal Gravitation," J. Phys. Opt. Sci. 8(1), 1–5 (2026).

https://doi.org/10.47363/JPSOS/2026(8)353

6. V. A. Romanenko, "The Connection between the Theory of Time and the Causal Mechanics of N. A. Kozyrev," J. Phys. Opt. Sci. 7(12), 1–8 (2025). https://doi.org/10.47363/JPSOS/2025(7)345
7. V. A. Romanenko, "Vacuum in 3-Dimensional Time," J. Phys. Opt. Sci. 7(3), 1–10 (2025). https://doi.org/10.47363/JPSOS/2025(7)291