ISSN: 2754-4753

Journal of Physics & Optics Sciences

Review Article

Open Access

Vacuum in 3-Dimensional Time

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ABSTRACT

The proposed work presents a brief theory that unites 3-Dimensional time and vacuum into one inseparable unity. It is based on the hypothesis that the history of the origin of the Universe began with the contact of two chronowaves moving in a vacuum towards each other. This interaction led to the emergence of dynamic processes in the vacuum. It became active. The era of its inflationary expansion began. After its end, our Universe arose, filled with baryonic matter and other types of masses. This work is devoted to the scenario of how this could happen. The article is full of mathematical formulas. They define the exact formulation of processes that would require a large number of words to describe. All formulas are based on the author's theory of 3-dimensional time and the properties of vacuum, as well as the conclusions that follow from them, revealing the causes of certain phenomena and processes in our world.

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Received: March 12, 2025; **Accepted:** March 18, 2025; **Published:** March 26, 2025

Keywords: Vacuum, Time, Vacuum Energy, Acceleration, Universe

Introduction

In the article offered to the reader, the author continues the presentation of the material related to the theory of 3-dimensional time and proves its inseparable unity with vacuum. Vacuum is considered as a medium that has a variable mass and a variable gravitational constant, as well as a constant speed of light. Through these parameters, the proper times of space are determined, both in the horizontal and in the vertical hyperplane. Time itself is considered in a 3-dimensional system of rectangular chronocoordinates. Two coordinates belong to the proper times of spaces, and one - to the proper time. For the transition to metric quantities, a constant known as the speed of light is used. It retains its value in all three dimensions of time. In his work [1], the author already considered this topic. This article continues the analysis of this unity from another point of view, namely: from the general differential equation of tempos. The equation was derived in the previous article [2]. In it, the emphasis was placed on the derivation of the Friedmann equation, which describes the beginning of the Big Bang in modern theories of the origin of the Universe. The proposed article examines the sum of accelerations that occur when a direct and reverse chronowave contacts. In this case, the reverse chronowave undergoes an inversion, which results in the appearance of an inverted acceleration. The latter differs from the acceleration that occurs for a direct chronowave. The sum of both accelerations determines the process of vacuum excitation. It becomes active, which leads to a sharp increase in the vacuum mass and volume at a constant vacuum density. The specified topic is examined using mathematical calculations that are no more complex than the mathematics of a second-year student at a polytechnic institute. They are a consequence of the theory of time developed by the author. For a more understandable presentation of the material, the basic formulas for vacuum are first given, the derivation of which was previously presented in the author's articles. Then, the conclusions obtained on the basis of the differential equation of rates are given. When combined with vacuum dependencies, the obtained formulas allow us to arrive at the total mass of the vacuum after its activity ceases. This is the main direction of this work.

Fundamentals of Vacuum Theory

The main vacuum dependencies are taken from the author's works [1] and [3]. We will characterize the primary vacuum by its main parameters - 3-dimensional space, the maximum speed of signal propagation in space and the property of space to expand. In time theory, there are two types of spaces. The first type refers to the horizontal hyperplane and is characterized by the chronocoordinate ψ Multiplied by the speed of light , this coordinate is the radius of a 2-dimensional sphere, which in turn is a spatial 3-interval $l = c\psi = \pm\sqrt{x^2 + y^2 + z^2}$. The interval characterizes the size of the region that contains the vacuum particles. It can be expressed through the variable mass of these particles, which already contains the property of their interaction with each other due to the variable value of a certain coefficient. Its constant value is known in science as the Newtonian constant of gravitation.

$$\frac{m_V \tilde{G}}{c^3} = \psi \text{ или } \frac{m_V \tilde{G}}{l} = c^2 \quad (1)$$

where
G is the variable coefficient of interaction of vacuum particles;
m_v is the variable mass of the vacuum.

From (1) we find the mass and volume of the vacuum.

$$m_V = \frac{c^3\psi}{\tilde{G}} \quad V_V = \frac{4}{3}\pi l^3 = \frac{4}{3}\pi (c\psi)^3 \quad (2)$$

i.e. the volume of a vacuum is the 3-Dimensional volume of a sphere

Mass and volume are related through the constant density of a 3-Dimensional vacuum would be the formula

$$\rho_V = \frac{m_V}{\frac{4}{3}\pi l^3} = const \qquad (3)$$

Substituting the introduced expressions into formula (1) and transforming with respect to , we obtain:

$$\psi = \sqrt{\frac{1}{\frac{4}{3}\pi \tilde{G}\rho_V}} \qquad (4)$$

The density of the vacuum can be expressed through another spatial dimension of time. The conclusion follows from (3):

$$= \frac{m_V}{\frac{4}{3}\pi l^3} = \frac{m_V}{- \quad —} = \frac{m_V}{\frac{4}{3}\pi l \cdot l^{\,2}} \qquad (5)$$

where $\tilde{l} = \frac{l^3}{l_0^{\,2}} = \frac{l^2}{l_0}\cdot\frac{l}{l_0} = \frac{s \cdot l}{l_0}$ is a new dimension of vacuum; $s = c\tau = \frac{l^2}{l_0}$

is a parabolic dependence of proper time on the spatial coordinate.

Let us express it from density as follows:

$$\tilde{l} = \frac{m_V}{\frac{4}{3}\pi\rho_V \cdot l_0^{\,2}} = \frac{m_V l_0}{\frac{4}{3}\pi\rho_V \cdot l_0^{\,3}} = \frac{m_V \frac{\tilde{m}_0 G}{c^2}}{\frac{4}{3}\pi\rho_V \cdot l_0^{\,3}} = \frac{m_V G}{c^2}\frac{m_{0V}}{\frac{4}{3}\pi\rho_V \cdot l_0^{\,3}} = \frac{m_V G}{c^2} \qquad (6)$$

where $m_{0V} = \frac{4}{3}\pi\rho_V l_0^{\,3}$ is a constant vacuum mass included in a 3-dimensional spherical volume; $l_0 = \frac{m_{0V} G}{c^2}$ is a constant parameter of the parabola, expressed through Newton's constant coefficient of gravitation.

The variability of the coefficient follows from its dimension in the CGS system [4, p. 217]

$$[G] = \frac{см^3}{г \cdot сек^2}$$

It can be represented as the following quantities:

$$[G] = \frac{см^3}{г \cdot сек^2} = \frac{1}{\frac{г}{см^3}\cdot сек^2} = \frac{1}{\rho\tau^2} \qquad (7)$$

where ρ is the density; τ is the proper time.

If $G = const$ then density and time are also constants.
But logically, time is not a constant. Hence and

$$\frac{1}{\tilde{G}} = \rho_{вак}\tau^2 = \frac{m_{вак}}{\psi c^3}$$

From this we find the mass of the vacuum:

$$m_{вак} = \rho_{вак}\tau^2\psi c^3 = \rho_{вак}\cdot\frac{4}{3}\pi(c\psi)^3$$

After transformation we arrive at the expression:

$$c\tau = l\sqrt{\frac{4}{3}\pi} \qquad (8)$$

If we use the formula for the relationship between and from the theory of time, we obtain the value of the cotangent of the angle:

$$ctg\alpha = \sqrt{\frac{4}{3}\pi} = 2,046653416$$

We find the tangent of the angle:

$$tg\alpha = \sqrt{\frac{3}{4\pi}} = \frac{1}{2,046653416} = 0,488602511 \qquad (9)$$

The angle corresponding to it is:

$$\alpha = arctg\,0,488602511 = 26,04025081°$$

The sine of an angle is:

$$\sin 26,04025081° = 0,439002449$$

The square of sine is a quantity equal to:

$$\sin^2(26,04025081°) = 0,19272315 \approx \sin^2\alpha_W \qquad (10)$$

In its value, it is close to the square of the sine of the Weinberg angle for the Electroweak Field (EWF). Thus, the spherical vacuum should be considered as a field in which the direction of the time-duration vector is characterized by the Weinberg angle. From (4) follows the equation of the primary vacuum state

$$\varepsilon_{вак} = \rho_{3вак}c^2 = \frac{3c^2}{4\pi\tilde{G}\psi^2} = \frac{3c^4}{4\pi\tilde{G}l^2} = \frac{3c^4}{4\pi G\frac{\tilde{G}}{G}l^2} = \frac{3F_0}{\frac{\tilde{G}}{G}4\pi l^2} = -p_V \qquad (11)$$

where G is Newton's gravitational constant; $F_0 = c^4/G$ is Planck's force; $(-P_V)$ is negative vacuum pressure $\varepsilon_{вак}$ is vacuum energy density.

From the equation it is clear that the primary vacuum state coincides with the Einstein-Gliner vacuum state formula [5].

For the vacuum density to remain constant, it is necessary that and be variables. Variability occurs when the vacuum changes its parameters in another dimension of time, different from ψ and $\tilde{G}$ Variability $\tilde{G}$ occurs when the vacuum changes its parameters in another dimension of time, different from ψ

The change in parameters is associated with the emergence of dynamic activity of the vacuum Then the speed and acceleration caused by the movement of vacuum particles arise in it. The definition of these parameters is based on the application of mathematical analysis methods to study the function (4) and is presented in the work [3]. The dependence is also obtained there:

$$\ln\frac{\psi}{\psi_0} = -\frac{1}{2}\ln\frac{\tilde{G}}{G} = \ln\left(\frac{\tilde{G}}{G}\right)^{-\frac{1}{2}} = \ln\left(\sqrt{\frac{G}{\tilde{G}}}\right) \qquad (12)$$

It follows from this:

$$\psi^2\tilde{G} = \psi_0^{\,2}G = \frac{3}{4\pi\rho_{3вак}} \qquad (13)$$

The basic equation obtained from the analysis is the antigravity acceleration in a vacuum:

$$a_{вак} = \frac{dv_\psi}{d\psi} = -\frac{c}{2\tilde{G}}\frac{d\tilde{G}}{d\psi} = \frac{m_V \tilde{G}}{l^2} \qquad (14)$$

where v_ψ is the speed that determines the activity of the vacuum.

The speed function v_ψ is found from the obtained equation and has the form:

$$v_\psi = -\frac{c}{2}\ln\frac{\tilde{G}}{G} \qquad (15)$$

Using (12), the speed formula is transformed to the form:

$$v_\psi = -\frac{c}{2}\ln\frac{\tilde{G}}{G} = -\frac{c}{2}\ln\frac{{\psi_0}^2}{\psi^2} = -\frac{2c}{2}\ln\frac{\psi_0}{\psi} = c\ln\frac{\psi}{\psi_0} \qquad (16)$$

It follows from this:

$$\tilde{G} = Ge^{-\frac{2v_\psi}{c}} \quad (17) \qquad \psi = \psi_0 e^{\frac{v_\psi}{c}} \qquad (18)$$

where $\psi_0 = \sqrt{\frac{3}{4\pi\rho_{3вак}G}}$ is the initial time radius of space.

Using the functions found, we determine the vacuum mass from formula (2):

$$m_V = c^3\frac{\psi}{\tilde{G}} = \frac{c^3\psi_0 e^{\frac{v_\psi}{c}}}{Ge^{-\frac{2v_\psi}{c}}} = c^2\frac{l_0 e^{\frac{3v_\psi}{c}}}{G} = m_{0V}e^{\frac{3v_\psi}{c}} \qquad (19)$$

where $m_{0V} = c^2\frac{l_0}{G}$ is the initial mass of the vacuum.

We will represent formula (13) for the initial radius in the form:

$$\Lambda_{0V} = \frac{4\pi\rho_{3вак}G}{c^2} = \frac{3}{c^2\psi_0^2} = \frac{3}{l_0^2} \qquad (20)$$

where Λ_{0V} is the initial cosmological constant of the 3-vacuum [4, p.195].

A New Approach to Studying the Differential Equation of Vacuum Acceleration

When presenting the vacuum theory, it was concluded that vacuum can behave as a dynamically active object. But the reason for such behavior was not named. In this section, it will be shown that the reason for its excitation is the meeting of the direct and reverse chronowave. As a result of their contact, the reverse chronowave inverts and its direction begins to coincide with the direction of the direct one. This scenario was considered in the article [2], based on the solution of the general differential equation of acceleration for the direct flow. As a result, the Einstein-Friedmann-Lemaitre equation was obtained. It is the main equation of cosmology, describing the beginning of the Big Bang.

According to the author, this equation is insufficient to describe the reason why the process of expansion of the 5-dimensional sphere began. Therefore, a new approach to studying the differential equation of vacuum acceleration was considered, namely: along with the first acceleration arising in the direct flow of time, the acceleration arising in the invested flow was considered together. The formulas of vacuum theory were applied to the sum of the obtained accelerations, and the result exceeded all expectations. The picture was formed. To describe it, let us consider the formula for the sum of acceleration analogues, derived in [2].

$$\frac{c^2(1-\dot{\psi}_{пр}^2)}{c\psi} = c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр} \qquad (21)$$

Here:

$c\ddot{\psi}_{пр} = -\frac{c^2{\dot{\psi}_{пр}}^2}{c\psi}$ - acceleration from direct tempo in direct time flow;

$c\ddot{\psi}_{инв} = -\frac{\ddot{\psi}_{пр}}{{\dot{\psi}_{пр}}^2} = \frac{c^2}{c\psi}$ - acceleration from inverted tempo in inverted time flow;

$\dot{\psi}_{пр} = \frac{l_0}{l}$ is a function of direct tempo; $l = c\psi$ is a metric coordinate for proper time of space in horizontal hyperpla

Taking into account the direct tempo function, the acceleration of tempos will take the following forms:

$$c\ddot{\psi}_{пр} = -c^2\frac{{\dot{\psi}_{пр}}^2}{l} = -c^2\frac{l_0^2}{l^3} \qquad (22a)$$

$$c\ddot{\psi}_{инв} = \frac{c^2}{c\psi} = \frac{c^2}{l} \qquad (22b)$$

Let's consider the sum of accelerations from two types of chronowaves:

$$c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр} = \frac{c^2}{l} - c^2\frac{l_0^2}{l^3} \qquad (23)$$

We compare the acceleration in the inverted flow with the acceleration in a vacuum (14):

$$a_V = \frac{dv_\psi}{d\psi} = \frac{m_V\tilde{G}}{l^2} = \frac{m_V c^2\tilde{G}}{c^2 l^2} = \frac{lc^2}{l^2} = \frac{c^2}{l} = c\ddot{\psi}_{инв} \qquad (24)$$

We see that the acceleration from the invested rate is the acceleration of the vacuum.

Thus, it can be stated that the cause of vacuum activity is the acceleration from the inverted rate, which occurs after the contact of two chronowaves. Then what effect does the acceleration from the direct rate in the direct flow have on the vacuum? It turns out to be direct. It can also be expressed through the mass of the vacuum, based on formula (6):

$$c\ddot{\psi}_{пр} = -c^2\frac{l_0^2}{l^3} = -\frac{c^2}{\frac{l^3}{l_0^2}} = -\frac{c^2}{\tilde{l}} = -\frac{c^2}{\frac{m_V G}{c^2}} = -\frac{c^4}{m_V G} = -\frac{F_0}{m_V} \quad (25)$$

As we see, the acceleration in the direct flow, solved by the Friedman method, occurs in a 5-dimensional sphere. If we apply the theory of 3-dimensional time, then it occurs in a vertical hyperplane and is expressed through the variable mass of the vacuum, significantly simplifying the understanding of the processes.

Substituting (24) and (25) into (23), we obtain the sum of the accelerations that occur in a vacuum:

$$c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр} = \frac{m_V\tilde{G}}{l^2} - \frac{F_0}{m_V} = \frac{m_V^2\tilde{G} - F_0 l^2}{m_V l^2} \quad (26)$$

where:

$$m_V(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = \frac{m_V^2\tilde{G}}{l^2} - F_0 = \frac{m_V^2\tilde{G}}{\frac{m_V^2\tilde{G}^2}{c^4}} - F_0 = \frac{c^4}{\tilde{G}} - F_0 = \tilde{F}_0 - F_0 \quad (27)$$

where:

$$\tilde{F}_0 = \frac{c^4}{\tilde{G}} = \frac{c^4}{Ge^{-\frac{2v_\psi}{c}}} = F_0 e^{\frac{2v_\psi}{c}} = F_0\frac{l^2}{l_0} = F_0\frac{s}{l_0} \quad \text{(sm.(5) и(17))}$$

Then

$$m_V(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = \tilde{F}_0 - F_0 = F_0(e^{\frac{2v_\psi}{c}} - 1) = 2F_0 e^{\frac{v_\psi}{c}}\left(\frac{e^{\frac{v_\psi}{c}} - e^{-\frac{v_\psi}{c}}}{2}\right) = 2F_0 e^{\frac{v_\psi}{c}} sh(\frac{v_\psi}{c}) = 2F_0\frac{l}{l_0}sh(\frac{v_\psi}{c})$$

We find the vacuum energy:

$$W_V = m_V l_0(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = 2F_0 l\cdot sh(\frac{v_\psi}{c}) = 2F_0\hat{s} \quad (28)$$

where $\hat{s} = l\cdot sh(\frac{v_\psi}{c}) = l\cdot\frac{\mathring{a}^{\frac{v_\psi}{c}} - \mathring{a}^{-\frac{v_\psi}{c}}}{2} = l\cdot\frac{\frac{l}{l_0} - \frac{l_0}{l}}{2} = \frac{l}{2}\cdot\frac{l^2 - l_0^2}{l\cdot l_0} = \frac{l^2 - l_0^2}{2l_0}$

is the coordinate of the proper time of the falling vector.

Substituting, we get:

$$W_V = 2F_0\hat{s} = 2F_0\frac{l^2 - l_0^2}{2l_0} = F_0(\frac{l^2}{l_0} - l_0) = F_0(s - l_0) = F_0 s - m_{0V}c^2 \quad (28a)$$

where $F_0 l_0 = m_{0V}c^2 = \frac{m_{0V}^2 G}{l_0} = \frac{\hbar c}{l_0} = \hbar\omega_{0V}$

Thus, the vacuum energy is the difference between the energy directed along the proper time axis and the total initial vacuum energy. This representation allows us to study the vacuum energy from a quantum point of view.

where $$\frac{W_V}{2m_{0V}c^2} + \frac{1}{2} = \frac{l^2}{2l_0^2}$$

We introduce the designation of the number of energy levels in a vacuum:

$$\frac{W_V}{2m_{0V}c^2} = n = 0,1,2,3...$$

It follows from this:

$$W_V = 2m_{0V}c^2 n = 2\hbar\omega_{0V}n = 2\frac{h}{2\pi}\frac{2\pi}{T_{0V}}n = 2\frac{h}{T_{0V}}n = 2\frac{hc}{cT_{0V}}n = 2\frac{hc}{\lambda_{0V}}n \quad (29)$$

where $\lambda_{0V} = \frac{h}{m_{0V}c}$ is the wavelength of the initial vacuum mass.

Then we get:

$$n + \frac{1}{2} = \frac{l^2}{2l_0^2} = \frac{c\hat{t}_{5u}}{l_0} \quad (30)$$

where $\hat{t}_{5u}$ is the radiation time arising in the 5-dimensional sphere when deriving the gravitational acceleration [2].

Multiplying by $F_0 l_0 = m_{0V}c^2$ both parts, we arrive at a formula that describes the radiation energy in a 5-dimensional sphere:

$$E_{изл} = F_0 l_0(n + \frac{1}{2}) = \hbar\omega_{0V}(n + \frac{1}{2}) = F_0 l_0\frac{l^2}{2l_0^2} = F_0 c\hat{t}_{5u} \quad (31)$$

Let's connect the radiation energy with the vacuum energy:

$$\frac{E_{изл}}{\hbar\omega_{0V}} = n + \frac{1}{2} = \frac{W_{вак}}{2m_{0V}c^2} + \frac{1}{2}$$

We find the radiation energy:

$$E_{изл} = \hbar\omega_{0V}\frac{W_{вак}}{2m_{0V}c^2} + \frac{\hbar\omega_{0V}}{2} = m_{0V}c^2\frac{W_{вак}}{2m_{0V}c^2} + \frac{m_{0V}c^2}{2} = \frac{W_{вак}}{2} + \frac{m_{0V}c^2}{2} = \frac{W_{вак}}{2} + \frac{\hbar\omega_{0V}}{2} \quad (32)$$

Formula (31) allows us to combine the principal quantum number with the vacuum expansion function. To prove this, we use the formula describing the exponential expansion of the spatial coordinate associated with the vacuum by formula (18).

Then we obtain:

$$E_{изл} = F_0 l_0(n + \frac{1}{2}) = F_0\frac{l^2}{2l_0} = \frac{F_0 l_0}{2}e^{\frac{2v_\psi}{c}}$$

We express from it taking into account (28a):

$$n = \frac{e^{\frac{2v_\psi}{c}} - 1}{2} = \frac{e^{\frac{v_\psi}{c}}(e^{\frac{v_\psi}{c}} - e^{-\frac{v_\psi}{c}})}{2} = e^{\frac{v_\psi}{c}}sh(\frac{v_\psi}{c}) = \frac{l}{l_0}sh(\frac{v_\psi}{c}) = \frac{\hat{s}}{l_0} \quad (33)$$

It is clear from the formula that the quantum number takes place under the condition of quantization of the proper time for the falling time vector.

Let us move from quanta to continuous functions, transforming the vacuum acceleration equation (28a) to the form:

$$W_V = m_V l_0 (c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = 2F_0 \hat{s} = 2F_0 l_0 \frac{\hat{s}}{l_0}$$

Let's take the ratio:

$$\frac{W_V}{l_0 \hat{s}} = \frac{m_V}{\hat{s}}(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = \frac{2F_0}{l_0}$$

Let's multiply both parts by $\frac{l}{m_{0V}}$ taking into account that $c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр} = \frac{c^2}{l} - c^2 \frac{l_0^2}{l^3}$:

Then we have:

$$\frac{W_{вак}}{l_0 \hat{s}} \frac{l}{m_{0V}} = \frac{m_{вак}}{m_{0V}\hat{s}} l(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) = \frac{m_V l}{m_{0V}\hat{s}}\left(\frac{c^2}{l} - c^2 \frac{l_0^2}{l^3}\right) = \frac{m_V l}{m_{0V}\hat{s}} \cdot \frac{c^2}{l} - \frac{m_V l}{m_{0V}\hat{s}} c^2 \frac{l_0^2}{l^3} = \frac{m_V c^2}{m_{0V}\hat{s}} - \frac{m_V c^2}{m_{0V}\hat{s}} \frac{l_0^2}{l^2} = \frac{m_V c^2}{m_{0V}\hat{s}}\left(1 - \frac{l_0^2}{l^2}\right)$$

Since (see (28a)), then substituting, we obtain the acceleration equation, which expands the vacuum of the universe:

$$\frac{W_V}{l_0 \hat{s}} \frac{l}{m_{0V}} = \frac{2F_0}{l_0} \frac{l}{m_{0V}} = \frac{m_V c^2}{m_{0V}\hat{s}}\left(1 - \frac{l_0^2}{l^2}\right) = \frac{m_V c^2}{m_{0V}\hat{s}} \frac{2 l_0 \hat{s}}{l^2} = \frac{m_V c^2}{m_{0V}} \frac{2l_0}{l^2} = \frac{m_V c^2}{m_{0V}} \frac{2l_0}{\frac{m_{вак}\tilde{G}}{c^2} l} = \frac{c^4}{m_{0V}\tilde{G}} \frac{2l_0}{l} =$$

$$= \frac{c^4}{m_{0V}\tilde{G}} \frac{2m_{0V}G}{c^2 l} = c^2 \frac{2G}{\tilde{G} l} = c^2 \frac{2G}{Ge^{-\frac{2v_\psi}{c}} l} = \frac{2c^2 e^{\frac{2v_\psi}{c}}}{l} = \frac{2c^2 \frac{l^2}{l_0^2}}{l} = 2c^2 \frac{l}{l_0^2} = \bar{\omega}_{05}^2 l = \frac{2\Lambda_{0V} c^2 l}{3}$$

where $\bar{\omega}_{05}^2 = \frac{2c^2}{l_0^2} = 2\omega_{0V}^2 = \frac{2\Lambda_{0V}c^2}{3} = \frac{8\pi\rho_V G}{3c^2} = \frac{\Lambda_э c^2}{3}$ is the square of the frequency expressed through the cosmological constant (see (20)); $\Lambda_э = 2\Lambda_{0V} = \frac{8\pi\rho_V G}{c^2}$ is the cosmological constant according to Einstein [4, p.249] for a 5-dimensional sphere.

Equating it to the derivative for the acceleration of the falling vector over time, we obtain a second-order differential equation:

$$\frac{vdv}{dl} = \frac{\Lambda_э c^2 l}{3} = (c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) \frac{m_{вак}}{m_{0V}} \frac{l}{\hat{s}} = \frac{m_{вак}}{m_{0V}}(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) \cdot tg\varphi \quad (34)$$

The solution for the velocity function follows from the equation:

$$v = \frac{dl}{d\hat{t}} = \sqrt{\frac{\Lambda_э c^2}{3}} l = \bar{\omega}_{05} l = \frac{\sqrt{2}c}{l_0} l$$

As we see, the speed is proportional to the inverted tempo function. Solving it with respect to , we arrive at a function changing exponentially:

$$l = l_0 e^{\sqrt{\frac{\Lambda_э}{3}} c(\hat{t} - t_0)} = l_0 e^{\sqrt{\frac{\Lambda_э}{3}} c\hat{\tau}} \quad (35)$$

Find the speed: $v_\psi = c\sqrt{\frac{\Lambda_э c^2}{3}} \hat{\tau} = \bar{\omega}_{05} c\hat{\tau} = \bar{\omega}_{05}\hat{s}$

As we see, its movement is connected with the direction of the proper time axis for the falling vector. It occurs in the space of a 5-dimensional sphere. But we considered the variant of a 3-dimensional vacuum. It differs from the 5-dimensional by the presence of another time in it, namely: the time of the scale factor. The transition to it is carried out by replacing the frequency $\bar{\omega}_{05}$ with the frequency ω_{0V}

$$v_\psi = c\sqrt{\frac{\Lambda_Э c^2}{3}}\hat{\tau} = \bar{\omega}_{05} c\hat{\tau} = \frac{\sqrt{2}c}{l_0} c\hat{\tau} = \frac{c}{l_0} c\sqrt{2}\hat{\tau} = \omega_{0V} ct_\phi = \sqrt{\frac{\Lambda_{0V} c^2}{3}} ct_\phi \quad (36)$$

where $\sqrt{2}\hat{\tau} = t_\phi$ is the scale factor time in a 3-dimensional vacuum.

Let us continue studying the acceleration equation (34), transforming it into a force equation:

$$m_{0V}\frac{vdv}{dl} = m_{0V}\frac{\Lambda_Э c^2 l}{3} = m_{вак}(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр})\cdot tg\varphi \quad (37a)$$

We introduce the designation of forces:

in space l: $F(l) = m_{0V}\frac{vdv}{dl} = m_{0V}\frac{\Lambda_Э c^2 l}{3} = m_{0V}\bar{\omega}_{05}^2 l = \frac{2c^2}{l_0^2} l$

in time $\hat{s}$ $F(\hat{s}) = m_{вак}(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр})$

Then the general force equation can be written as a ratio:

$$\frac{F(l)}{F(\hat{s})} = tg\varphi = \frac{l}{\hat{s}} \quad (37b)$$

From it we find the force $F(\hat{s})$

$$F(\hat{t}) = \sqrt{F(l)^2 + F(\hat{s})^2} = m_{0V}\bar{\omega}_p^2\sqrt{l^2 + \hat{s}^2} = m_{0V}\bar{\omega}_p^2 c\hat{t} = m_{0V}\frac{2\Lambda_{0V}c^2}{3}c\hat{t}$$

.

Both forces are components of a single force acting on the falling time vector, which is equal to:

$$F(\hat{t}) = \sqrt{F(l)^2 + F(\hat{s})^2} = m_{0V}\bar{\omega}_p^2\sqrt{l^2 + \hat{s}^2} = m_{0V}\bar{\omega}_p^2 c\hat{t} = m_{0V}\frac{2\Lambda_{0V}c^2}{3}c\hat{t} \quad (38a)$$

Because $c\hat{t} = \frac{l_0}{2} + \frac{l^2}{2l_0}$ then, substituting, we get:

$$F(\hat{t}) = m_{0V}\bar{\omega}_{05}^2\left(\frac{l_0}{2} + \frac{l^2}{2l_0}\right) = m_{0V}\omega_{0V}^2 l_0 + m_{0V}\omega_{0V}^2\frac{l^2}{l_0} = m_{0V}\omega_{0V}^2(l_0 + s) \quad (38b)$$

From the formula it is clear that the single force acts both inside the 5-dimensional sphere with frequency $\bar{\omega}_{05}$ and inside the 3-dimensional vacuum, which has frequency ω_{0V} From the equality of forces follows the dependence for the falling vector:

$$c\hat{t} = \frac{l_0 + s}{2} \quad (39)$$

Formation of Baryonic Matter from a 3-Dimensional Vacuum

Let us consider the general force equation of the Universe (37b), moving from the trigonometric function to the hyperbolic sine.

$$\frac{F(l)}{F(\hat{s})} = tg\varphi = \frac{l}{\hat{s}} = \frac{l}{l\cdot sh(\frac{v_\psi}{c})} = \frac{1}{sh(\frac{v_\psi}{c})}$$

Then the equation will take the form:

$$F(l)\cdot sh(\frac{v_\psi}{c}) = m_{0V}\cdot sh(\frac{v_\psi}{c})\cdot\frac{vdv}{dl} = F(\hat{s}) = m_V(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр}) \quad (40)$$

Let us determine the mass of the vacuum from it, taking into account (6):

$$m_V = \frac{l^3}{l_0^2}\frac{c^2}{G} = \frac{m_{0V} sh(\frac{v_\psi}{c})\frac{vdv}{dl}}{(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр})}$$

We find the 3-dimensional volume function:

$$l^3 = m_{0V}\frac{G}{c^2} sh(\frac{v_\psi}{c}) l_0^2\cdot\frac{\frac{vdv}{dl}}{(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр})} \quad (41a)$$

We assume that the ratio of accelerations is equal to:

$$\frac{\frac{vdv}{dl}}{(c\ddot{\psi}_{инв} + c\ddot{\psi}_{пр})} = \frac{s^2}{l_0^2} \quad (41b)$$

In the case of maximum expansion of the vacuum at $e^{\frac{v_\psi}{c}} = n_{\max} = \alpha_e^2 n_e^3$

we have the value

$$sh(\frac{v_\psi}{c}) = \frac{e^{\frac{v_\psi}{c}} - e^{-\frac{v_\psi}{c}}}{2} = \frac{n_{\max} - \frac{1}{n_{\max}}}{2} \approx \frac{n_{\max}}{2} \quad (42)$$

And the 3-dimensional volume function will take the form $m_{0V} = m_0\alpha_{GU}$

$$l^3 = m_{0V}\frac{G}{c^2} sh(\frac{v_\psi}{c}) s^2 = \frac{m_{0V} n_{\max}}{2}\frac{G}{c^2} s^2 = \frac{M_P\alpha_{GU}G}{2}\tau^2 \quad (43)$$

where $\alpha_{GU} = 1/4\pi^2 = 0,025330295$ is the air defense constant·

The resulting value of the 3-dimensional volume contains the baryon mass, which creates gravitational acceleration according to Newton's law of universal gravitation:

$$l^3 = \frac{M_P\alpha_{GU}G}{2}\tau^2 = \frac{9}{2}\cdot\frac{M_P\alpha_{GU}G}{4}\frac{2}{9}\cdot 2\tau^2 = \frac{9}{2}\cdot\frac{M_P\alpha_{GU}G}{18}t_б^2 = \frac{9}{2}M_б G\cdot t_б^2$$

$$\grave{I}_{\acute{a}} = \frac{M_P\alpha_{GU}}{18} = 0,05555M_P\alpha_{GU} \qquad (44)$$

where $\grave{I}_{\acute{a}} = \frac{M_P\alpha_{GU}}{18} = 0,05555M_P\alpha_{GU}$ is the baryon mass, which occupies 5.6% of the total mass $M_P\alpha_{GU}$ generated by the vacuum; $t_{\acute{a}} = \sqrt{2}\tau$ is the baryon time in which the baryon mass Along with the baryonic mass, the mass of dark matter also arises. It is equal to exists.

$$M_{т.м.} = \frac{M_P\alpha_{GU}}{4} = 0,25M_P\alpha_{GU} \qquad (45a)$$

That is, it makes up 25% of the total mass of the vacuum.
The composition of dark matter is determined by the equality

$$M_{т.м.} = \frac{M_P\alpha_{GU}}{4} = M_P\alpha_{GU}\cos 2\alpha_{GU} = M_P\alpha_{GU}(\cos^2\alpha_{GU} - \sin^2\alpha_{GU}) \qquad (45b)$$

where $\cos 2\alpha_{GU} = 1/4$ is the cosine of the double Weinberg angle for the grand unification field (GUF).

Its value is:

$$\cos 2\alpha_{GU} = \arccos\frac{1}{4} = 75,52248781° = 2\cdot 37,76124391°$$

Here: $\alpha_{GU} = 37,76124391° = \arcsin(\sin\alpha_{GU}) = \arcsin\sqrt{\frac{3}{8}}$ there is an air defense angle.

Then the baryon mass can be written in terms of the dark matter mass as:

$$M_б = \frac{M_P\alpha_{GU}G}{4}\cdot\frac{2}{9} = M_{т.м.}\sin^2\alpha_W \qquad (45b)$$

where $\sin^2\alpha_W = \frac{2}{9} = 0,2222$ is the square of the sine of the Weinberg angle for the electroweak field.

It was said earlier (see (10)) that a 3-dimensional spherical vacuum should be considered not as a void, but as an electroweak field. As we can see, during the formation of baryonic matter in a spherical volume, this field slightly changed its angle and became the basis for the formation of matter in the Universe. But this same field also affects dark energy. It is defined as the difference between the total mass-energy of the vacuum that arose during expansion and the sum of the energies of dark and baryonic matter:

$$M_{т.э.}c^2 = M_P\alpha_{GU}c^2 - M_{т.м.}c^2 - M_б c^2 = M_P\alpha_{GU}c^2(1 - \frac{1}{4} - \frac{1}{18}) = \frac{25}{36}M_P\alpha_{GU}c^2 = M_P\alpha_{GU}\sin^2 2\alpha_W \quad (45г)$$

where $\sin^2 2\alpha_W = \frac{25}{36}$ is the square of the sine of the double Weinberg angle for the ESP.

where: $\sin 2\alpha_W = \frac{5}{6}$ $2\alpha_W = arc\sin\frac{5}{6} = 56,44269024° = 2\cdot 28,22134512°$

$\alpha_W = 28,22134512°$ $\sin\alpha_W = \sin 28,22134512° = 0,472879055$

$$\sin^2\alpha_W = \frac{6-\sqrt{11}}{12} = 0,2236146°$$

Let us now consider the reason for the dominance of 3-dimensional space. It lies in the in the acceleration ratio (41б). Let us write it in the following form, substituting their functions instead of accelerations:

$$\frac{s^2}{l_0^2} = \frac{\frac{vdv}{dl}}{(c\ddot{\psi}_{инв} + c\ddot{\psi}_{тр})} = \frac{\frac{2c^2}{l_0^2}l}{\frac{c^2}{l} - c^2\frac{l_0^2}{l^3}} = \frac{\frac{2c^2}{l_0^2}l}{\frac{c^2}{l}(1 - \frac{l_0^2}{l^2})} = \frac{2l^2}{l_0^2(1 - \frac{l_0^2}{l^2})} = \frac{2l^4}{l_0^2(l^2 - l_0^2)} \qquad (46)$$

The general function takes the form:

$$s = \pm\sqrt{\frac{2l^4}{(l^2 - l_0^2)}} = \frac{\sqrt{2}l^2}{\sqrt{l^2 - l_0^2}} \qquad (47)$$

Its graph is shown in Figure 1.

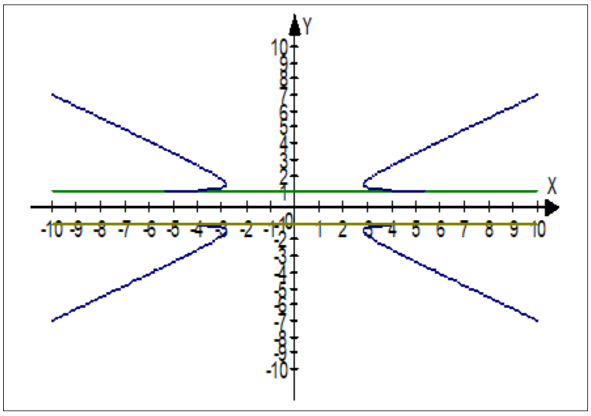

Figure 1: Tunnel in Proper Time of Duration.

It is clear from it that the ratio of accelerations creates a passage or tunnel along the axis of proper time of duration, due to the upper and lower asymptotes shown on the graph. Moreover, the movement in time can occur both to the right and to the left. This property allows the gravity curve in the form of Neil's parabola to have two symmetrical branches directed respectively to the right and to the left along the axis of proper time.
Let us consider what ensures the stability of the tunnel. To do this, we transform (46) to the form:

$$\frac{s^2}{l_0^2} = \frac{2l^4}{l_0^2(l^2 - l_0^2)} = \frac{2l^2}{l_0(l^2 - l_0^2)}\cdot\frac{l^2}{l_0} = \frac{2l^2}{l_0(l^2 - l_0^2)}\cdot s$$

As we can see, the square of the function under consideration contains an additional parabolic function that affects the stability of the tunnel. What happens if we reduce this function? Reducing by, we get:

$$s = \frac{2l_0l^2}{l^2 - l_0^2} \qquad (48a)$$

It describes a "black hole" in time. This is indicated by the graph of the function and the inverse transformation, which has the form:

$$l = \frac{l_0}{\sqrt{1 - \frac{2l_0}{s}}} \qquad (48b)$$

It shows that the "black hole" has a gravitational radius equal to and has microscopic dimensions.

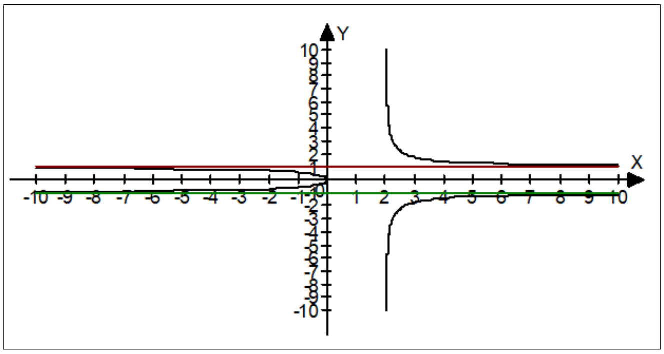

Figure 2: Graph of a Black Hole in its Own Time Duration

Thus, the stability of the tunnel is ensured by the presence of a duration parabola, the existence of which is directly related to the duration vector, which describes the specified curve.

Let us consider the condition for the formation of a 3-dimensional space from a 4-dimensional one. To do this, we substitute a function in the form (47) into the formula for the 3-dimensional s^2 volume (43):

$$l^3 = \frac{M_P \alpha_{GU} G}{2c^2} s^2 = \frac{P\alpha_{GU}}{2} \frac{2l^4}{(l^2 - l_0^2)} = P\alpha_{GU} \frac{l^4}{(l^2 - l_0^2)} = P\alpha_{GU} \frac{l^4}{2l_0 \hat{s}} \quad (49)$$

As we can see, a 4-dimensional volume is included in a 3-dimensional volume. After reduction, the remaining fourth dimension takes the form:

$$l = \frac{2l_0 \hat{s}}{P\alpha_{GU}}$$

From this follows the direct tempo function taking into account (33):

$$\dot{\psi}_{np} = \frac{l_0}{l} = \frac{P\alpha_{GU}}{2\hat{s}} = \frac{P\alpha_{GU}}{2l_0 n} = \frac{n_{\max}}{2n}$$

We will show that for a 3-dimensional volume contained in a 4-dimensional volume, the latter transforms into the square of the proper time of duration. We transform (49) to the form

$$l^3 = P\alpha_{GU} \frac{l^4}{2l_0 \hat{s}} = \frac{P\alpha_{GU}}{2} \cdot \frac{l^4}{l_0^2 n} = \frac{P\alpha_{GU}}{2n} \cdot s^2 = \frac{M_P \alpha_{GU} G}{2n} \frac{s^2}{c^2} \quad (50)$$

Comparing with formula (43), we see their difference in the presence of the main quantum number in (50). To arrive at (43), it is necessary that it be equal to one. From the point of view of quantum mechanics, this means that all atoms of matter must exist in a stationary orbit in order to be stable. This is observed in reality. From the point of view of time theory, the first energy level ensures the stability of the time tunnel and does not allow it to "collapse" into a "black hole".

Conclusion

The analysis shows the inextricable connection of 3-dimensional time with vacuum. The meeting of two chronowaves leads to the appearance of positive and negative acceleration. These accelerations contribute to the activation of dynamic processes in vacuum. Vacuum energy is released. It begins to expand the vacuum space of the 5-dimensional sphere in radiation time extremely quickly. Together with it, the 3-dimensional spherical vacuum begins to expand. This ball has a point of contact with the sphere and the same radius. The expansion ends suddenly. This leads to the fact that the energy of one of the dimensions of the sphere by "inertia" completely penetrates into the space of the ball through the point of contact. In this case, it loses speed and turns into mass. Thus, a 3-dimensional space filled with mass appears. This mass reacts with the ESP that takes place in the 3-dimensional vacuum. Under its action, it disintegrates into two types of mass. The first mass - baryon is at the first energy level of the vacuum. The second mass - the mass of dark matter is at the second energy level. The remaining mass-energy is dark energy and contributes to the accelerated expansion of the Universe. The four dimensions in which the 3-dimensional volume is formed turn into its own duration time. These three components and time determine the further structure and fate of the space-time of the Universe.

Acknowledgments: I would like to thank the editor of Physics & Optics Sciences, Matthew J. B., who suggested that I write this article

Conflict of Interest: This work was carried out by the author alone, at the request of the editors of the journal, based on personal scientific works: [1-3]. It uses literary sources from open databases, so permission for their publication is not required.

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