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ON ENERGY CONSUMPTION IN THE SYNTHESIS PROCESSES

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ABSTRACT

In this article, based on the easily provable dialectical "principle of dichotomy" of nonequilibrium processes, it is shown that the processes of hot and cold nuclear fusion, transmutation of chemical elements, and the phenomenon of "excess" energy release in various kinds of "fuel-free generators" and "over-unit" devices are due to the consumption of free energy released in the process of continuous condensation of the "hidden" mass of the Universe. The presence of its vibrational part of gravitational energy is substantiated and its value is found. It is shown that it is the transformation of this energy that is the cause of all evolutionary phenomena in nature. The specificity of these phenomena, their accompanying radiation losses, and the consequences of these processes in terms of the circulation of matter and energy in the Universe are discussed.

Keywords: cold and hot nuclear fusion, ether condensation, excess energy release, gravitational waves, evolution, stellar fuel

INTRODUCTION

Exciting interest in the mysterious phenomena of "excess" energy release in energy conversion processes arose after M. Fleischman and S. Pons in March 1989 reported at a press conference about their discovery of a new phenomenon in science, now known as a cold nuclear fusion [1]. However, the very phenomenon of heat release for energy spent from a well-studied source was noticed much earlier. This was the electrolysis of heavy and ordinary water (N. Sluginov, 1881; F. Latchinov, 1888; V. Filimonenko, 1957; R. Mills, 1986 [2].

Although M. Fleishman and S. Pons essentially only reproduced the results of the works of I.S. Filimonenko on the electrolysis of heavy water with a palladium cathode, it was their experiments that were followed by an avalanche of articles and a lot of theoretical models explaining this phenomenon. The absence of hard radiation typical for nuclear reactions and poor reproducibility of the results caused a sharp rejection of their concept by many physicists.

At the same time, continued experiments revealed excess energy release in many other processes: during polarization reversal of nonlinear dielectrics and magnets (N. Zaev, 1991); in vortex heat generators (Yu. Potapov, 1992); during hydrogen recombination (W. Line, 1996; A. Frolov, 1998; J. Naudin, 1999); with plasma and plasma chemical dialysis (F. Kanarev, 2001), with "sonoluminescence" (R. Taleyarkhan, 2002), etc. [3]. Many of the processes were accompanied, in addition to excessive heat release, by other "side" phenomena: the emergence of streams of an unknown gaseous substance of a milky color, flowing over the conductors in the N. Tesla transformer and called by him "cold electricity" [4], the synthesis of small amounts of various metals when exposed to plasma or during the "electric explosion" of a thin titanium foil, the appearance of a strange biologically active radiation that affects the rate of beta decay and leaves tracks on the photo emulsion, etc. [5].

Particularly impressive in this respect were the E-Cat units by A. Rossi (US patent, 2015), in which a small amount (1 g) of nickel powder in a hydrogen atmosphere reacted after heating to a temperature of 1100 -1200 ° C and the formation of negligible amounts copper and other elements and the release of up to 10 times the amount of heat in comparison with the consumed electrical power [6]. The installation was repeatedly proved and tested by specialists during 2011… 2015. The latter was forced to admit that they could not explain the processes

occurring in the reactor, although the absence of hard radiation does not allow them to be attributed to nuclear and even more so to chemical reactions that use internal energy.

This situation can be explained by the fact that at present all nuclear fusion reactions are interpreted as spontaneous processes of conversion of mass into energy caused by a mass defect (the difference in the masses of particles in an unbound and bound state). In this case, the source of "excess" heat is the energy of light elements, previously stored in the form of their intranuclear energy Uc. However, the use of communication energy as "nuclear fuel" is inevitably accompanied by radiation. This raises doubts about the reality of cold fusion processes or any other "low-energy" nuclear transformations that are not accompanied by such radiation.

Meanwhile, in nature, a fundamentally different way of synthesis is possible, carried out in real-time during the condensation of "non-baryonic" (hidden) matter of the Universe, which was previously called ether. This "primary" form of matter ("premature"), continuously densifying, can form various structural elements of matter, ranging from elementary particles and nuclei of future chemical elements to galaxies and their clusters. In this case, the formation of nuclei of chemical elements with an ever-increasing atomic number proceeds continuously, bypassing the unnatural stage of formation of "fragments" with a mass greater than that of nuclei. In this case, the excess heat release in the processes of nuclear fusion can be explained not by a mass defect, but by the radiation of a part of the condensation heat that was not consumed for the structuring of the "baryonic" substance. In this case, nuclear transformations are practically absent, and ether becomes the source of energy, which does not contradict the law of conservation of energy.

The long-term (over many billions of years) and practically stationary radiation of the Sun and other stars is evidence of just such a "mechanism" for feeding fusion reactions, for which the reserves of "fuel" (light elements acquired by them at the dawn of their formation) are clearly insufficient. This is showed by the firmly established fact of continuous accretion of matter in the Universe onto planets and stars. Finally, this is evidenced by the processes mentioned above, as well as the existence of many "over-unit" devices, the energy release at the output of which exceeds the measurable amount of energy consumed.

In this regard, it is of great interest to show that this concept of the evolution of the baryonic part of the matter of the Universe does not contradict the known laws, if we abandon some of the established dogmatic concepts, and consider this issue from the standpoint of a new discipline - energy dynamics [8], which in the classification of A. Einstein can be classified as a "theory of principles."

DICHOTOMY OF MATTER IN THE UNIVERSE

The modern paradigm divides matter into matter and field, which is not entirely satisfactory since fields (scalar, vector, and tensor) are also present in matter. More general principles of the classification of matter in the Universe can be established if we take into account that any extensive parameter of the continuous medium Θ can be represented by the integral of its local $\rho = d\Theta/dV$ and average $\bar{\rho} = \Theta/V$ density by the expression $\Theta = \int \rho dV = \int \bar{\rho}\, dV$. Hence it follows that:

$$\int [d(\rho - \bar{\rho})/dt] dV = 0. \qquad (1)$$

When $d(\rho - \bar{\rho})/dt \neq 0$, that is, when any processes occur in the system, integral (1) vanishes only if the integrand has an opposite sign in different volume elements dV and is mutually compensated. This provision, which is the content of one of the original laws of energy dynamics, can be called the principle of dichotomy for brevity (from the Greek "Διχοτομία" - duality). In its generality and significance, this principle is not inferior to the well-known dialectical law of "unity and struggle of opposites" and can serve as its mathematical expression.

Applied to the Universe as a whole, this principle states that if we find in any part of it the course of evolutionary processes leading to

its complication, the emergence of new properties (degrees of freedom), etc., then we should not look for antimatter and antiparticles with opposite properties, and oppositely directed processes of involution. In particular, if it is known that nuclear fission reactions are energy-producing, then the opposite nuclear fusion reactions must be energy-consuming. This directly concerns the prospects for the development of controlled thermonuclear fusion, on which the scientific world still has high hopes in terms of preventing an energy crisis.

This principle is just as directly related to the very matter of the Universe, which is confirmed by the latest discoveries in the field of astronomy and astrophysics. As they showed, the share of the ordinary (observable) part of the matter in the Universe, usually called baryonic matter (that is, consisting of protons, neutrons, etc.), is no more than 5% of its mass, while the rest is " hidden "(unobservable) and detectable only by indirect signs [8]. This matter is called "physical vacuum", "field", "dark matter", "dark energy", "quintessence", etc. Due to the uncertainty of their physical models, we prefer to call this primary form of matter "non-baryonic", and from the point of view of evolution matter - "(premature)".

Despite the unobservability of the precursor, some of its properties are still known. First, it has the property of "all-pervasiveness". This means not only the absence of means of screening from its impact (which is characteristic only of gravity) but also makes it an indispensable part of any material system. It is known, further, that the pre-substance is unobservable because it does not take part in electromagnetic interactions. Since this form of interaction appeared after the formation of structures with a charge, only gravitational interaction is characteristic of the pre-substance. Further, the structure of the pre-substance is also unknown, so we are forced to consider it from a phenomenological standpoint as a continual medium. The latter means that all other forms of energy (nuclear, atomic, molecular (chemical), thermal, deformation (mechanical), electric, magnetic, etc.) arose in its transformation into the baryonic matter. Finally, it is also known from astrophysics that the density of this "primary" form of matter ranges from 10^{-27}-10^{-28} g/cm^3 in "voids" (regions free of baryonic matter) to 10^{18} g/cm^3 and more instars of the "white dwarf" type, ie. is distributed in the space of the Universe extremely unevenly. The latter means that the density of the pre-matter is a function of spatial coordinates (radius vector r of the field point) and time t: $\rho = \rho(\boldsymbol{r}, t)$. In this case, the total change in this density in time includes the local $(\partial\rho/\partial t)_{\boldsymbol{r}}$ and convective $(\boldsymbol{v}\,\nabla)\rho$ components:

$$d\rho/dt = (\partial\rho/\partial t)_{\boldsymbol{r}} + (\boldsymbol{v}\,\nabla)\rho, \qquad (2)$$

This expression is the "kinematic" equation of the wave in its so-called "one-wave" approximation [9]. The latter becomes more obvious if the value $d\rho/dt$ is taken as the "damping function" of the wave $\Phi(\rho,t)$ and the case of stationary forced oscillations of the system arising in the process of "condensation" of the primary matter is considered. In this case, equation (9) takes a closer waveform:

$$(\partial\rho/\partial\boldsymbol{r}) + \boldsymbol{v}^{-1}\,(\partial\rho/\partial t) = 0. \qquad (3)$$

In contrast to the "dynamic" equations of the 2nd degree, this expression characterizes a wave propagating in one direction from the source. It follows from it that the density wave of the pre-substance ρ is formed by the transfer of a certain amount of it M from the position with the radius vector $\boldsymbol{r}'$ to the position $\boldsymbol{r}''$, that is, the displacement of the center of mass by the half-wavelength λ/2 (Figure. 1). The speed of this displacement $\boldsymbol{v}$ changes from zero at the antinode of the wave to the maximum at its nodes. Therefore, the process of formation of standing waves is inextricably linked with overcoming Newtonian forces of inertia $\boldsymbol{F} = -d\boldsymbol{P}/dt$ and with the performance of work:

$$dW = \boldsymbol{F}\cdot d\boldsymbol{r} = \boldsymbol{v}\cdot d\boldsymbol{P}, \qquad (4)$$

where $\boldsymbol{P} = M\boldsymbol{\upsilon}$ is the impulse of the pre-substance involved in the oscillatory motion.

To find this work, and after it - the energy of vibrational motion, we find its average speed :

$\bar{\boldsymbol{\upsilon}}$ as a quotient of dividing the modulus of the displacement vector $|\boldsymbol{r}'' - \boldsymbol{r}'|$, equal to the half-wavelength λ/2, by the half-period of the wave $\tau/2 = (2\nu)^{-1}$

$$\bar{\boldsymbol{\upsilon}} = \lambda\nu. \tag{5}$$

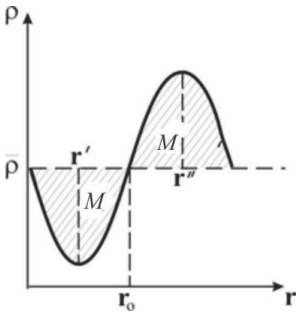

Figure 1. Wave formation

The product λν determines, as is known, the velocity c_g of propagation of oscillations in the medium under consideration ($\bar{\boldsymbol{\upsilon}} = c_g$) [9]. In the absence of variance of the latter ($c_g \neq c_g(\nu)$) and constancy of c_g, the required work W_k is calculated especially simply:

$$U_g = \int \bar{\boldsymbol{\upsilon}} \cdot dM\,\bar{\boldsymbol{\upsilon}} = \int c_g^2 dM = Mc_g^2 + U_{go}, \tag{6}$$

where U_{go} is the constant of integration, which has the meaning of the energy of the pre-matter at and ν = 0, i.e., its potential energy.

This expression testifies to the presence of a pre-substance in a motionless along with the kinetic energy of oscillatory motion, which is not considered in any of the fundamental disciplines. This motion is due to the local displacement of the mass *M* within a quarter of the wave, and this differs from the ordered motion with a speed υ. However, since this energy is kinetic in its form, and gravitational in its origin, we called it "gravidynamic". On the scale of the universe as a whole, this energy is disordered since foresight stays stationary. However, since there are waves of any length λ among the oscillations, for the representatives of the macro and especially the microworld, the shift of mass by a quarter of a wave can be perceived as quite ordered. This is what decides the easy transformation of gravidynamic energy into any other forms in the formation of baryonic matter. Thus, taking into account the inhomogeneity of the density distribution of matter in the Universe leads to the conclusion that self-oscillations are inevitable in it, which excludes the possibility of considering the gravitational field as purely potential with all the ensuing consequences.

According to the theory of oscillations, the velocity cg depends on the density of the medium of wave propagation, i.e., $c_g = c_g(\rho)$. This also applies to the speed of light, which has many experimental confirmations and is considered by the refractive indices. Naturally, when $\rho \to 0$, the speed cg becomes constant, which, from the point of view of the corpuscular theory, gives reason to speak of the constancy of the "speed of light in emptiness" *c*. In this case, expression (6) takes the form $U_o = M_o c^2$, which in the system of units, where $c^2 = 1$, is interpreted as the principle of equivalence of the mass M_o and the rest energy U_o of A. Einstein. However, since in this case, we were talking about the acquisition of additional kinetic energy by the mass M, this principle of equivalence can in no way be interpreted as the transformation of the mass into an equivalent amount of energy. This principle does not give any reason to assert the speed limit with. On the contrary, according to (5), this velocity is equal to the average velocity of mass displacement in a single wave, which is less than its maximum value at its nodes. Therefore, we can with good reason assert only the proportionality of the local density of gravitational energy ρg to the local density of the medium itself ρ:

$$\rho_g = c_g^2 \rho, \quad (7)$$

where $c_g(\rho)$ is the coefficient of proportionality depending on the density of the medium ρ.

Expression (7) allows one to determine the local potential of the gravitational field $\psi_g = \partial U_g / \partial M_g = \partial \rho_g / \partial \rho = c_g^2$ and its strength $\boldsymbol{X}_g = -\nabla \rho_g$, which, due to the constancy of the local velocity ($c_g = const$), is:

$$\boldsymbol{X}_g = - c_g^2 \nabla \rho. \quad (8)$$

This expression was obtained by us earlier in the form of the dependence of the acceleration $\boldsymbol{g} = -\boldsymbol{X}_g/\rho = c^2 \nabla\rho/\rho$ and is called the binary law of gravity [10]. This name is dictated by the fact that the volumetric gravitational force $\boldsymbol{X}_g$ emanating from the gravitational field with a density gradient ∇ρ has a different sign depending on the sign of ∇ρ in each region of space. This law implies the existence of both gravitational and repulsive forces in the gravitational field, which makes it unnecessary to use the concept of "dark" energy to explain the accelerated expansion of the Universe in those regions where $\nabla\rho < 0$. It expresses the gravitational acceleration at any point in space through local parameters of the field and therefore is a short-range version of Newton's law. This law does not imply the action of gravity at a distance and the infinite speed of its propagation. It is irreplaceable where it is impossible to distinguish between "field-forming" and "trial" bodies. At the same time, it does not contradict this law since it can also be given the form (8) [10].

The binary law of gravity (8) sheds new light on the origin of gravitational forces as a result of the uneven distribution of the density of matter in space and testifies to the independence of gravitational forces from the composition of the system and its structural features. This is the main distinguishing feature of gravitational forces. On the other hand, this law does not have any signs that allow to draw the line between "strong" or "weak" gravity and distinguish nuclear interactions from the gravitation of large and small celestial bodies. In particular, if we use the averaged gradient for the nuclei of a hydrogen atom with a density of 3.21810^{18} kg m-3 and a radius of $R \approx 5 \cdot 10^{-16}$ m., The gravitational force is $\boldsymbol{X}_g \approx 0.5 \cdot 10^{48}$ N m-3, which does not exclude their purely gravitational nature ... At the same time, this law also explains the relative weakness of the long-range Newtonian gravitational forces, the result of which is close to zero under conditions of large-scale homogeneity of the Universe. The presence of gravitational forces of attraction and repulsion in the Universe also makes it superfluous to postulate the existence of "dark energy" responsible for the accelerated recession of galaxies. At the same time, from a practical point of view, it is fundamentally important to be able to judge the behavior of the pre-matter by the density of distribution and the motion of galaxies, stars, nebulae, etc. in it, since the formation of the latter occurs only upon reaching a certain density of it (as in other phase transitions). In particular, if the density of a cluster of stars or galaxies decreases towards its periphery, then the gravitational forces acting both in the baryonic matter and in the foreground have the character of gravitational forces towards their center. Further, the reason for the formation of cosmological singularities in one or another region of the Universe becomes clear, since only heating caused by compression can reverse the spontaneously arising permanent compaction of baryonic matter. It also becomes clear that "black holes" actually arise in the early stages of galaxies' development, and remain invisible until the processes of formation of baryonic matter begin in them, the excess of which is ejected by it in the form of "jets". This "scenario" of the evolution of the Universe differs from the standard cosmological model in that, in accordance with the principle of counter-directionality, it predicts the existence of many singularities, ending with a "big bang" and subsequent "recession" of galaxies, but leaving the Universe the opportunity to exist indefinitely. A reflection of this kind of cataclysms is the very gravitational waves that were repeatedly discovered by the LIGO and VIRGO collaborations and were artificially attributed to "fluctuations of the space-time metric" [11].

DISSIPATION OF ENERGY IN CONDENSATION OF PRE-SUBSTANCE

According to (8), the acceleration g in the gravitational field is always codirectional to the density gradient of matter ∇ρ. This means that the condensation of the proto-message, having spontaneously arisen in any region of the Universe, only intensifies over time, which, at a certain value, leads to condensation. This process consists of the further transformation of the wave structure, which has arisen in the depths of the pre-substance, into particle-like structures such as nuclei of matter, protons, electrons, neutrons, etc. These processes are more conveniently described from the standpoint of the wave theory of the structure of matter [12]. Here it is more important to emphasize that these processes of structure formation lead to the removal of the baryonic substance from the equilibrium state and, therefore, require the expenditure of a certain work W_g from the external environment (pre-substance):

$$dU_g = - dW_g = c_g^2\, dM. \qquad (9)$$

If we consider an isolated Universe as a whole, then the transformation of a pre-matter into a baryonic one appears as a phase transition. This process, like any other, is accompanied by losses. They are primarily associated with overcoming the scattering forces that cause heating and radiation of the system. The "mechanism" of the appearance of radiation becomes more understandable if we take the displacement $|\boldsymbol{r}'' - \boldsymbol{r}'| = \lambda_k/2$ in Fig. 1 for half the amplitude of the longitudinal wave A_ν at the frequency ν. Then the well-known expression for the kinetic energy density $\rho_\nu = \rho\,\bar{\boldsymbol{\upsilon}}^{\,2}/2$ takes the type of energy density of a traveling wave [9]:

$$\rho_\nu = \rho A_\nu^2 \nu^2/2,\ \text{Дж}\cdot\text{м}^{-3}. \qquad (10)$$

Thus, vibrations of the structural elements of baryonic matter excite spherical longitudinal waves in the environment, propagating in it with the velocity c_g characteristic of the medium. The power of this radiation $d\rho_\nu/dt$ in the stationary state of the emitter can be calculated based on expression (10), according to which the power emitted by a unit of its volume can be represented by the product of a certain "radiation" force $\boldsymbol{X_r} = -\nabla(A_\nu \nu)$ by the pulse flux density excited in the environment waves $\boldsymbol{j_r} = \rho A_\nu \nu \boldsymbol{c_g}$ [13]:

$$d\rho_\nu/dt = \boldsymbol{X_r}\cdot\boldsymbol{j_r}. \qquad (11)$$

Hence it follows that the process of radiation transfer by traveling waves obeys the same laws as the processes of heat conduction, electrical conductivity, diffusion, etc.:

$$\boldsymbol{j_r} = L_r \boldsymbol{X_r}, \qquad (12)$$

where L_r is the proportionality coefficient characterizing the "transparency" of the intergalactic medium and deciding that part of the "redshift", which is due to the scattering of radiant energy.

If, for convenience, we consider a unit-volume emitter as an object of study (system), then in the general case of its non-stationary state, the power absorbed by it $N_g = dU_g/dt$ will be proportional, according to (9), to the amount of pre-matter condensing in it $d\rho_g/dt = dM_g/dt$. The work done in this case dW_g/dt is also more conveniently expressed in terms of the force $\boldsymbol{X}_g$ and the flux $\boldsymbol{j}_g$. For this, it is sufficient to represent the power of the process $N_i = dW_g/dt$ in the form of the product of the gravitational force $\boldsymbol{X}_g$ and the density of the accretion flow of the pre-matter $\boldsymbol{j}_g = = \rho_g \boldsymbol{\upsilon}_g$, which has the meaning of its momentum:

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$$N_i = \boldsymbol{X}_g \cdot \boldsymbol{j}_g \qquad (13)$$

A part of this power minus radiation losses $N_j = \boldsymbol{X}_g \cdot \boldsymbol{j}_g - \boldsymbol{X}_r \cdot \boldsymbol{j}_r$ can be spent, for example, on the process of thermonuclear fusion, as it happens on the Sun. In this case, its efficiency as a thermonuclear reactor can be found by the ratio of the power at the output N_j and the input of the facility $N_i = N_g$, which is obviously less than unity:

$$\eta_{ij} \equiv N_j/N_i = 1 - \boldsymbol{X}_r \cdot \boldsymbol{j}_r/\boldsymbol{X}_g \cdot \boldsymbol{j}_g < 1 \qquad (14)$$

Unlike thermal efficiency in thermodynamics, such efficiency belongs to the class of relative efficiency, which is used by most fundamental disciplines. In the general case, when several types of energy are supplied to the converter ($N_i = \Sigma_i \boldsymbol{X}_i \boldsymbol{j}_i$), and several types of useful work are performed ($N_j = \Sigma_j \boldsymbol{X}_j \boldsymbol{j}_j$), this efficiency is expressed by the relation [14]:

$$\eta_{ij} = \Sigma_j \boldsymbol{X}_j \boldsymbol{j}_j/\Sigma_i \boldsymbol{X}_i \boldsymbol{j}_i. \qquad (15)$$

In energodynamics, they are called power, since they are expressed by the ratio of powers, and not work. Their peculiarity is that they are expressed in terms of flows and forces and therefore vanish twice: at idle speed ($\boldsymbol{j}_j = 0$) and in the "short circuit" mode "($\boldsymbol{X}_j = 0$). Therefore, they are more informative, allowing you to detect and find the modes with the maximum efficiency for each installation. In addition, they apply to any (thermal and non-thermal, cyclic, and non-cyclic, direct, and reverse, single-purpose and multi-purpose, power and technological) installations. Such efficiency cannot exceed unity, even if we consider all types of products and all forms of energy as useful power at the output of the converter. At the same time, it becomes obvious that obtaining "over-unit" efficiency is the result of erroneous attribution of losses to the useful product of the installation and neglect of the energy flow from the environment for the sole reason that it cannot be taken into account by existing means.

CONDITIONS FOR THE OCCURRENCE AND CONSEQUENCES OF THE PROCESSES OF CONDENSATION OF THE PRE-SUBSTANCE

According to expression (9), the specific bond energy $u_g = dU_g/dM$ of the pre-substance released during its condensation is equal to c_g^2. This energy is so much higher than the specific binding energy of nucleons in the nucleus, which is determined by the mass defect ΔM and amounts to ~ 8 MeV per nucleon for most nuclei, that it is enough not only for the processes of structure formation of baryonic matter, that is, the synthesis of new, more and more "heavy" Chemical elements, but also to make up for losses with radiation and to participate in work« against equilibrium »performed by any energy converter. This position radically changes the existing ideas not only about the "self-freedom" of synthesis processes and the possibility of creating "over-unit" devices but also about the energy source of the Sun itself and other stars. As you know, at present, such a source is considered the processes of thermonuclear fusion occurring in their depths, 99% of the energy of which is released due to the "proton-proton chain", in which hydrogen merges with helium. Thus, hydrogen and helium are considered as "fuel" stored by stars at the stage of their origin. In this case, the thermonuclear fusion reaction itself is assumed to be exothermic, carried out due to a mass defect. However, the relative size of the mass defect $\Delta M/M$ is only fractions of a percent, while the condensation of the pre-matter and the accretion of ordinary matter onto the surface of the Sun proceed continuously throughout the entire period of the star's "life". This makes the amounts of energy released due to thermonuclear reactions and condensation of pre-matter incomparable.

According to the law of gravitation (8), the process of compaction, which spontaneously arises in any region of space, does not stop until the sign of $\nabla\rho$ changes to the opposite. This means that the process of synthesis of baryonic matter on Earth and any other planets goes ahead permanently, increasing their mass along with accretion and giving rise to gradual heating. The same thing, but to a different

extent, happens with any other material bodies, the density of which exceeds the density of the environment. Therefore, their "feeding" with the energy of the pre-substance is carried out constantly. However, this becomes noticeable only when the intensity of this process increases significantly. Presumably, this happens when the oscillatory process in natural systems or technical devices is in resonance with the local oscillation frequency of the pre-matter. These conditions are difficult to reproduce, which explains the failure of many experimenters and the miscalculations of designers relying on the existing store of knowledge.

A convincing confirmation of this is the results of tests of the hydrogen "king - bomb" over "Novaya Zemlya" in 1961, when a blindingly bright explosion cloud rose into the stratosphere, reaching a diameter of 5 km and burning there for half an hour, exceeding the calculated heat release by 105 times [15]. This could only mean that combustion was supported from outside by the flow of pre-matter energy. The latter also applies to ball lightning, the glow of which can last for 15 minutes, and a powerful explosion does not leave "material" traces. The recognition of this and other obvious facts requires a serious revision of the existing paradigm. In any case, this excludes the possibility of classifying the so-called "super-unit" installations and "fuel-free" generators into the category of "perpetual motion machines" excluded by thermodynamics.

CONCLUSION

1. One of the hardest consequences of a rejection of the laws of dialectics and the expulsion of the ether from physics was the substitution of the concept of an oppositely directed process by a substance with opposite properties (an electron - a positron, a particle - an antiparticle, matter-antimatter, etc.).

2. The proof of the principle of dichotomy supplies a basis for the division of matter in the Universe into baryonic (structured) and non-baryonic (unstructured). The properties of the latter set up by observational astronomy are like those of the ether, which makes it possible to consider it simply the primary form of matter (pre-substance). The force field is non-material and reflects only the state of matter or pre-substance (their properties).

3. Spatial inhomogeneity in the distribution of matter in the Universe gives rise to its instability and makes the occurrence of self-oscillations is it inevitable. The presence of matter density gradients in each wave causes the appearance of inertial forces of both signs in the oscillating matter. The superposition of these forces creates the resulting gravitational field, the intensity of which is decided by the total density gradient of matter. In other words, gravity is generated not by the curvature of space, but by the inhomogeneous distribution of the density of matter in the Universe.
4. A consequence of the appearance of self-oscillations in the foreground is the appearance of an oscillatory (gravidynamic) part of energy in it. The latter is associated with the fluctuating mass by a ratio similar to the principle of equivalence of mass and energy, which makes the prediction an inexhaustible source of all other forms of matter and energy in the Universe, and gravidynamic forces are the cause of all the processes of synthesis of baryonic matter and its further evolution occurring in it.

5. The proportionality of the gravitational forces Fg to the density gradient of matter $\nabla\rho$ directly leads to the short-range form of Newton's law, which takes into account the presence of gravitational forces of both attraction and repulsion of masses. These forces do not depend on any other properties of matter and are large enough to ensure the stability of the nuclei of baryonic matter in the absence of particles with different signs of charge. This opens prospects for the transition from the corpuscular theory of the structure of matter to the wave theory.

6. The energy released during the condensation of the pre-substance is so great that it is enough not only for the processes of hot and cold fusion and the creation of reserves of "nuclear fuel", but also for the replenishment of losses with radiation, as well as for participation in work "against equilibrium" performed by various energy converters. This deprives the grounds of accusations against any of these processes in violation of the law of conservation of energy.

7. Extremely small changes in the mass of the substance and the lack of isolation from gravitational forces make it difficult to see the process of its condensation in real-time. However, this does not exclude the possibility of registering its long-term results and making sure that they are consistent with the laws of classical physics.

8. The permanent nature of the processes of condensation of the pre-matter opens up the possibility of creating "fuel-free" free energy generators, implementing N. Tesla's grandiose plan "to connect machines to the most primary source of energy in the environment" and to provide humanity with energy available anywhere in the world at any time of the year [15]. In this respect, the use of nuclear fuel in fusion and decay reactions appears to be the most dangerous and least productive way.

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