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The living forces debate

Abstract

In the article, I pointed out factors that determine "life principle" in the evolution of the Universe. The participation of quantum vacuum (dark matter) in all interactions causes a rejection of the paradigm of the evolution of a closed Universe and requires a review of all conservation laws and symmetries. Only new physics can add to our scientific knowledge indication of the Living Forces.

Keywords: life principle, dark matter, quantum vacuum, open Universe

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Introduction

In our scientific knowledge there is no indication of a "life principle" that provides the evolution of the Universe and resists the "thermal death" of Clausius associated with the growth of entropy. Dr. Stefano Veneroni, the Catholic University of the Sacred Heart invited me to take part in a debate about the vital forces of the universe, as a result of which I wrote this article.

The N.A. Kozyrev's flow of time as a source of life or the dark matter as a source of baryonic matter in an open Universe

Firstly, I want to draw your attention to the work of Professor N.A. Kozyrev at the Pulkovo Observatory. He represented the Universe as an open system, the source of updating of which is the flow of time. Professor N. A. Kozyrev described the active impact on the system from the outside, from the side of the stream of space time, as "a life principle that is not in our scientific knowledge".[1] In his well-known work *The Causal Mechanics,* he wrote, "It is amazing that even such a specific question as why the Sun and the Stars shine, i.e. why they are in a thermal equilibrium with the surrounding space, cannot be solved within the framework of known physical laws. This conclusion follows an analysis of astronomical data. Degraded conditions of systems would have to prevail, whereas they almost never occur. A challenge is to understand why certain systems and celestial bodies themselves keep existing despite their short relaxation time?" A further research led N. Kozyrev to a conclusion that a cause for the evolution of natural space systems is an energy, inflowing "from the outside." N. Kozyrev was the first scientist to evaluate in amount a contribution of the active impact of the environment into a progress of non-integrable, irreversible processes. Herewith, scientists did not only hold experiments on a global scale (gyroscopes, telescopes with bridges to measure currents, arising under an influence of an unknown superluminal radiation), but also recorded a change to the inertial mass in the context of an inelastic collision of two bodies or bodies heating.[1]

N. Kozyrev considered those effects as especially clear evidence saying that the cosmic environment (time, according to Kozyrev) had existing active properties. Here's how he described those properties, "Our multiple laboratory experiments have shown that the environment (time, according to Kozyrev) besides passive properties, also possesses active properties, i.e. the motion directivity and the density that determine an extent of its activity. As a result, the environment (time, according to Kozyrev) does not only provide a chance for a progress of processes, but also can influence them and a state of the matter as a kind of physical reality." However, today it is established that space and time are Phantoms of the material world.[2] Let us recall the famous report of Minkowski made on September 21, 1908, at the 80th meeting of German naturalists in Cologne: "Gracious gentlemen! The view on space and time that I intend to develop before you has arisen on an experimental physical basis. This is their strength. From now on, space in itself and time in itself must turn into fiction, and only a certain kind of combination of both should remain independent".[3] How true were these predictions of Minkowski?

In fact, at the beginning of the 20th century, as a mathematical model of space-time SRT, Einstein declared a geometric space of a special kind. It received the name "Minkowski space." But it turned out that in Minkowski's space the production of particles cannot be (the Wheeler – DeWitt Equation). The resonant theory of particle creation in the Universe implies that the Universe is filled with quantum vacuum (dark matter). Really, according to the results of Planck's astronomical telescope Universe is composed of:

- Dark energy (68.3%);

- Dark matter (26.8%);

- "Ordinary" (baryonic) matter (4.9%)[4]

The quantum vacuum (dark matter) is a global field of oscillators' super-positions with the continuum of frequencies. When the quantum vacuum of the Universe is excited by cosmic radiation or relativistic particles, the resonances accompanying the birth of new particles will occur whenever the frequency of external cosmic radiation and particle coincide. The evolution of dynamical systems (particles) to self-organizing matter depends on the resonances between the degrees of freedom in a quantum vacuum (dark matter). I. Prigogine wrote, "If the systems are independent, then for coherence and self-actualization, there would be simply no place as all dynamic movements would essentially be isomorphic movements of free (non-interacting) particles."[5] Proved by Poincare, the non-integrable dynamical systems and the theory of resonant trajectories by Kolmogorov-

Arnold-Moser allowed Prigogine to conclude that the mechanism of resonance interaction of particles in large-scale Poincare systems (LPS) was "essentially" mandatory (the probabilistic outcome is 1) so the particle (quantum of matter) and the Universe (five-dimensional continuum containing three spatial dimensions and two temporal) are is always interconnected by resonances.[5]

The Ilya Prigogine's open universe and the Albert Einstein's closed universe

Nobel Prize winner I. Prigogine, exploring the dynamics of systems development and in particular the growth of entropy, established inconsistency in the Clausius statement on the "heat death of the Universe."[5] He wondered: "Is the Universe a closed system in terms of thermodynamics?" Answering to this question, I. Prigogine concluded that an assumption about the cosmic evolution adiabaticity was wrong saying that between the environment and the elementary volume there had been no heat exchange:

$$dQ = 0, \tag{1}$$

Albert Einstein put that assumption as the basis for the standard model of the closed Universe. In general relativity, Einstein irreversible processes are absent, the entropy of the universe remains constant. In the standard cosmological model ΛCDM total energy of the universe is assumed to be zero. It can therefore be assumed that H=0. Therefore, considering the wave function of the universe, from the Schrodinger equation:

$$\mathrm{H}\Psi = ih\frac{d\Psi}{dt} \tag{2}$$

It follows that $d\Psi / dt = 0;$ the wave function does not depend on the time (equation $\mathrm{H}\Psi = 0$ equation is often called the Wheeler – DeWitt Equation). This is a paradox. The cosmological time is excluded from consideration in the flat Minkowski space. With the General Relativity Theory (GRT), Einstein proposed a new interpretation for acceleration. The acceleration, explained by Newtonian physics in terms of the gravitational interaction, is considered within the GRT as a result of the curved space-time, whereas the inertial motion meets a case of the "flat" space-time. Herewith, the true cosmic time, included into the Newton's Second Law, disappeared from consideration. To remove this paradox, I. Prigogine proposed corrections to the Einstein's equation, inserting an additional term, the entropy. He wrote, "Proposed by us modification to the Einstein's equation that takes into account the matter birth, represents non-equivalence of the matter and the space-time. In our expression, the Einstein's equation does not only establish a relationship between the space-time and matter, but also the entropy."[5] Einstein's universe is a closed universe with constant entropy since in such a universe there are no irreversible processes.

For a description of the birth of matter in Einstein's general relativity is necessary to be considered variations in the density of matter due to the production of particles. This leads to disruption in time symmetry. Prigogine proposed to add the number of variables included in the standard model (the pressure P, the mass-energy density σ and the radius of the universe R(t)) an additional variable n - the density of the particles and an additional equation, which would tie the Hubble function of radius of the universe R(t) and the birth of particles n. In the case of the universe, consisting of particles of the same type of mass M, when the mass-energy density is simply equal to σ, and the pressure P - vanishes, Prigogine offers a simple equation that takes into account the creation of particles:

$$\alpha H^2 = \frac{1}{R^2}\frac{\partial nR^3}{\partial t} \tag{3}$$

where α - kinetic constant equal to zero or positive.

In this equation (3), the value of α and H are positive since we are talking only about the birth (and not destruction) of the particles. In Minkowski's space, where H=0, the production of particles cannot be (equation $H\psi = 0$ equation is often called the Wheeler – DeWitt Equation). Furthermore, in Einstein's Universe the total number nR^3 constant irrespective H values, α=0.[5] Further, Prigogine considering how the birth of the particles leads to a modification of Einstein's equations of general relativity in terms of the first and second laws of thermodynamics. The first expresses the beginning of the conservation of energy. But energy can take many different forms. For example, when we abruptly stop the engine, part of the kinetic energy is converted into heat energy inside. In cosmology, so it is necessary to distinguish between the two types of energy: gravity (it is negative) and "internal" associated with mass energy (it is positive). The internal energy can be created at the expense of gravitational energy. Prigogine writes: "This approach leads to a modification of Einstein's equations. In this equation, the term appears, which we, in comparison with Newtonian physics, we identify with the pressure. By normal pressure P, we add additional pressure P(add)., Due to the birth of the particles. Pressure is the sum of two terms, one of which corresponds to the usual thermodynamic equation of state, and the other has no analogue in ordinary physics, as relates to the conversion of gravitational energy into matter. Turning to the second law of thermodynamics, we note that the entropy associated with the internal energy, and not with other forms of energy. Since there is a source of internal energy, and there is a source of entropy. In the standard model entropy is conserved. In our model, we have the production of entropy, proportional to the velocity of particles."[5] The author of the evolutionary paradigm of the universe, Nobel laureate I.R. Prigogine found that "isolated closed systems turn into chaos, and open systems evolve into ever higher forms of complexity."[5] Thus, the closed of Einstein's Universe dooms the Universe to degradation.

In an open universe, an exchange of energy is allowed between quantum vacuum (dark matter) and baryonic matter. Professor I. Prigogine called this effect "an active influence on the system from the outside, with the transition of the system in a non equilibrium state." I. Prigogine clarifying Mach's Principle and came to the conclusion that in a steady condition, an active influence from the outside on the system is negligible, but it can become of major importance when the system goes into a non-equilibrium condition.[5] In the work "Time, Chaos, Quantum", he writes: "In a stable steady condition, an active influence from the outside on the system is negligible, but it can become of major importance when the system goes into a non-equilibrium condition. Herewith, the system becomes non-integrable, the time loses its invariance and its behavior is probabilistic in nature."[5]

Our Universe is a hologram of the collapse of a four-dimensional star into a black hole

According to many modern scientists and thinkers, the holographic model of the universe is one of the most promising pictures of reality at our disposal today. The authors of the new theory of the emergence

of the universe N. Anshordi, R. Mann and R. Purhasan suggested that our Universe could have been born as a result of the implosion (explosion inward) of a star from the four-dimensional predecessor of the universe.[6] Such an explosion could create a three-dimensional shell around a four-dimensional black hole, and thus the Universe is a hologram of the collapse of a four-dimensional star into a black hole. The singularity of the Big Bang is forever hidden from us by a three-dimensional horizon of events. " The proposed model solves the most important problems of cosmology: flatness and homogeneity. The flatness of our Universe is the result of the collapse of a very massive four-dimensional star. The larger the mass of the black hole, the larger flatness the tribranus will be. And the homogeneity is explained by the fact that in the four-dimensional embracing Universe, long before the appearance of our Universe, temperature equilibrium was to be established. Balk should be smooth enough and could transfer this property to our three-dimensional Universe. Here I would like to recall the statement of I. Prigogine that the "thermal death" of the Universe according to Clausius does not threaten us since all the entropy was developed even before the Big Bang.

The authors of the article believe that the considered holographic Big Bang model solves not only the cosmological problems of flatness and uniformity of the Universe without introducing the concept of "inflation", but also the problem of cosmological singularity, making it hidden. Matter located in the enclosing four-dimensional beam is gravitationally connected with the black hole that gave rise to our Universe. Temperature fluctuations in such matter can also create fluctuations in the ordinary three-dimensional matter of our world, which in turn create inhomogeneities in the background (relict) radiation. The presence of such inhomogeneities in the background radiation was discovered as a result of astronomical observations.[7] Another way to verify the existence of an external multidimensional Universe is based on the assumption that a four-dimensional black hole can rotate. In this case, our three-dimensional world on the brane should have slightly broken symmetry in different directions. This difference is also discovered.[7] Scientists from the Center for Astrophysical Research in the Fermi Laboratory (Fermilab) are now working on creating a Holometer device. With the help of the Golometer device, experts hope to prove or disprove the insane assumption that the three-dimensional Universe, as we know it, simply does not exist, being nothing more than a kind of hologram. In other words, the surrounding reality is an illusion and nothing more. According to the latest data, the interaction between neighboring Universes in the multiverse through wormholes is possible.[8] Physicists divide wormholes into passable and impassable. An impenetrable wormhole is destroyed faster than an object that has got into it manages to exit from the opposite end, therefore, it looks almost the same as an ordinary black hole. Passable wormholes can potentially connect different areas in the multiverse (Figure 1).[8]

In particular, a stream of a field created by objects on opposite sides of a hole can pass through such a hole - therefore, objects will feel each other long before falling into the hole. Physicists from China and the United States appreciated how objects located on opposite sides of the wormhole interact. It turned out that due to the "gluing" of the fields at the border of "ours" and "other" spaces, observers feel the electric, scalar and gravitational fields of objects from the opposite edge of the hole.[8] Until the illusory nature of our world is proven, scientists have hope to understand the laws of the universe. At the same time, the physical world should not be limited to the framework of the now prevailing scientific paradigm. With the adoption of a new paradigm in theoretical physics, in the center of which there will be a quantum vacuum (dark energy and dark matter) participating in all interactions in nature, up to scientists will open new time horizons, new symmetries and conservation laws inherent in open systems. Then the illusory nature of the universe will be forgotten until a new crisis in the knowledge of the physics of the universe.

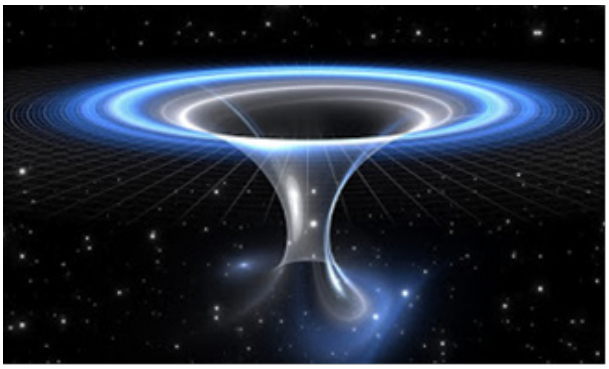

Figure 1 Black hole with a wormhole.

Conclusion

Skepticism and relativism have played a positive role in science by calling into question everything that has no rational justification. Doubt and criticism were aimed at overcoming dogmatism, absolutization of truths. However, extreme skepticism that prevails today in theoretical physics is connected with agnosticism. The reason for this is the crisis of the scientific paradigm that prevails today in physics. In order to overcome the crisis in theoretical physics, which was pointed out as far back as 2014 in his article by physicists of the Large Hadron Collider Joseph Likken and Maria Spiropula "Supersymmetry and the crisis in physics", a new physics is needed.[9] It should be noted that recognition of the polarization of quantum vacuum (dark matter) in theories of quantum electrodynamics (QED) and quantum chromodynamics (QCD) leads to the violation of symmetries, conservation laws, and prohibitions in the Standard Model. Each symmetry in the SM corresponds to its own conservation law (the famous Noether's theorem and its subsequent generalizations). For example, symmetries with respect to time shifts (that is, the fact that the laws of physics are the same at every moment of time) corresponds to the law of conservation of energy, symmetries relative to shifts in space correspond to the law of conservation of momentum, and symmetries about rotations in it (all directions in space are equal) - the law of conservation of angular momentum. Conservation laws can also be interpreted as prohibitions: symmetries prohibit changes in the energy, momentum, and angular momentum of a closed system during its evolution. The participation of quantum vacuum (dark matter) in all interactions causes a rejection of the paradigm of the evolution of a closed system and requires a review of all conservation laws and symmetries. Only new physics can add to our scientific knowledge indication of the "Living Forces" that provides the evolution of the Universe.

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Conflicts of interest

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