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RESEARCH ARTICLE

In a Biocentric Universe, there is no such thing as "Dark Matter." The Plasma and Mind of the Biocentric Universe

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Abstract

The so-called "dark matter" problem arose in physics half a century ago and is linked to the discovery of anomalous behavior in the velocities of stars participating in the rotational motion of spiral galaxies. An alternative explanation for the apparent anomalous rotation of spiral galaxies has been proposed. This became possible within the framework of our developing concept of a complex-valued (biocentric) Universe.

Today we know that life is based on carbon, and some speculate that silicon-based life might exist, but the latest research suggests that life could also be based on plasma. The universe is 99% plasma (stars, nebulae, solar wind)—could it be a giant mind?

1. Introduction

The biocentric theory of the universe was proposed by biologist Robert Lanza [1,2]. Biocentrism asserts that current theories of the material world do not work and cannot succeed until they include life and consciousness within their scope. Life creates the universe, not the other way around. This theory essentially generalizes the ideas of panpsychism [3]. Biocentric ethics calls for a rethinking of the relationship between humans and nature. It is proclaimed that nature exists not only to be used or consumed by humans, but that humans themselves should be merely one of its many species.

2. On the "Dark Matter" problem

The so-called "dark matter" problem arose in physics half a century ago and is linked to the discovery of anomalous behavior in the velocities of stars participating in the rotational motion of spiral galaxies.

To describe a star's motion relative to the center of the galaxy, it is acceptable to apply Newtonian physics by equating the centripetal force acting on the star to the gravitational pull exerted by the galaxy.

$$\frac{mv^2}{R} = \gamma \frac{mM}{R^2}, \tag{1}$$

where

$$v^2 = \gamma \frac{M}{R}. \tag{2}$$

Here, m is the mass of the star, M is the mass of the galaxy, R is the distance from the center of the galaxy, v is the velocity of the star, and γ is the gravitational constant.

The square of the velocity is inversely proportional to the distance and, as the distance approaches infinity, should tend to zero. It should, but it does not. The first evidence of anomalous behavior in rotation curves was obtained as early as the 1930s. In 1939, Babcock published data for the Andromeda Galaxy (M31). Experimental rotation curves of spiral galaxies are graphs showing how the orbital velocities of stars or gas in a galaxy depend on their radial distance from the center. Further studies showed that as the distance increases, the velocity of a star approaches a constant value, which is unique to each galaxy. Various solutions to this problem have been proposed, but the concept of "dark matter" has gained

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the most traction. It is hypothesized that galaxies are surrounded by massive halos of invisible (dark) matter, which gravitationally influences the motion of stars and gas. The carefully chosen spatial distribution of this matter allows the observed rotation curves to be reproduced. "Dark matter" does not emit light, but manifests itself through gravitational interaction. Physicists are now fascinated by trying to deduce the properties and structure of this mysterious matter. However, another explanation for the apparent anomalous rotation of spiral galaxies can be proposed. This is possible within the framework of our developing concept of a complex-valued universe. In [4–6], the idea of complexifying physics is proposed. Complexification, in essence, consists of the assumption that the quantities appearing in all physical laws are complex. We consider the real parts of these quantities to be measurable. It is possible that the imaginary part is unobservable, but at the same time it is inherently part of the physical quantity, acting as a sort of hidden parameter, and manifests itself only indirectly, causing the system to move along one path or another. In other words, the imaginary part of a quantity is its "soul," causing the system to move in different directions under identical external conditions depending on the content of this "soul." In this sense, one can say that Nature is a living being. That is, complex-valued physics can be developed as a mathematical model of a living, intelligent Universe. In this regard, let's hold complexification of expression (2).

$$(\mathrm{Re}\,v + i\cdot Jmv)^2 = (\mathrm{Re}\,\gamma + i\cdot Jm\gamma)\frac{\mathrm{Re}\,M + i\cdot JmM}{\mathrm{Re}\,R + i\cdot JmR} = C + i\cdot D. \quad (3)$$

Here

$$A = \mathrm{Re}\,M\cdot\mathrm{Re}\,R + JmM\cdot JmR, \quad (4)$$

$$B = JmM\cdot\mathrm{Re}\,R - \mathrm{Re}\,M\cdot JmR. \quad (5)$$

$$C = \frac{\mathrm{Re}\,\gamma\cdot A - Jm\gamma\cdot B}{(\mathrm{Re}\,R)^2 + (JmR)^2}, \quad (6)$$

$$D = \frac{\mathrm{Re}\,\gamma\cdot B + Jm\gamma\cdot A}{(\mathrm{Re}\,R)^2 + (JmR)^2}, \quad (7)$$

We believe that the ratio of imaginary parts to real parts is the same for all quantities

$$\beta = \frac{Jm}{\mathrm{Re}}, \quad (8)$$

then expressions (4), (5), (6), and (7) will take the following form

$$A = (1+\beta^2)\cdot\mathrm{Re}\,M\cdot\mathrm{Re}\,R, \quad (9)$$

$$B = 0, \quad (10)$$

$$C = \frac{\mathrm{Re}\,\gamma\cdot\mathrm{Re}\,M}{\mathrm{Re}\,R}, \quad (11)$$

$$D = \beta\frac{\mathrm{Re}\,\gamma\cdot\mathrm{Re}\,M}{\mathrm{Re}\,R}. \quad (12)$$

Taking into account equations (9), (10), (11), and (12), we obtain from (3)

$$(1-\beta^2)(\mathrm{Re}\,v)^2 - C + i\cdot[2\beta(\mathrm{Re}\,v)^2 - D] = 0. \quad (13)$$

Solving this equation with respect to $\mathrm{Re}\,v$ will yield a complex value. This contradicts the initial condition: all quantities are defined as complex, and the magnitudes of their real and imaginary parts, as well as their ratios, must be real. Therefore, we determine $\mathrm{Re}\,v$ from the real part of equation (13).

$$(\mathrm{Re}\,v)^2 = \frac{C}{(1-\beta^2)} = \frac{1}{(1-\beta^2)}\frac{\mathrm{Re}\,\gamma\cdot\mathrm{Re}\,M}{\mathrm{Re}\,R} \quad (14)$$

Given the currently dominant view that the World and the Universe are truly real-valued, the last formula (14), under the condition that $\beta = 0$, reduces to the well-known relation (2).

It seems that the founders of the "dark matter" concept came up with the idea while looking at equation (2). The increase in the distance R in the denominator can be compensated for by an assumed increase in the mass M of the galaxy in the numerator, if it is invisible. Then, given a certain distribution of this mass, the star's velocity can be reduced to a constant.

In the complex-valued universe we are considering, the increase in distance can be compensated for by a factor $(1-\beta^2)$ that tends to zero as R increases; see (14). Let us perform the corresponding calculations.

Equation (14) makes it easy to determine at what value β the real part of the star's velocity converges to a constant. For our calculations, we will choose the Andromeda Galaxy, also known as M 31 or NGC 224 [7].

The radius of the galaxy = 23.5 kps = 72.5 × 10^{22} m;

Mass of the galaxy = 1.99×10^{42} kg;

Star velocity = 250 km/s = 2.5 ×10^5 m/s.

Hence, for our complexified universe:

Real part of the radius (ReR) = 23.5 kps = 72.5 ×10^{22} m;

Real part of mass (ReM) = 1.99×10^{42} kg;

Real part of velocity (Rev) = 250 km/s = 2.5 ×10^5 m/s;

Real part of the gravitational constant $(\mathrm{Re}\,\gamma) = 6.67 \times 10^{-11}$ N·m²/kg²

The star's velocity is taken from the experimental rotation curve of the Andromeda Galaxy [8].

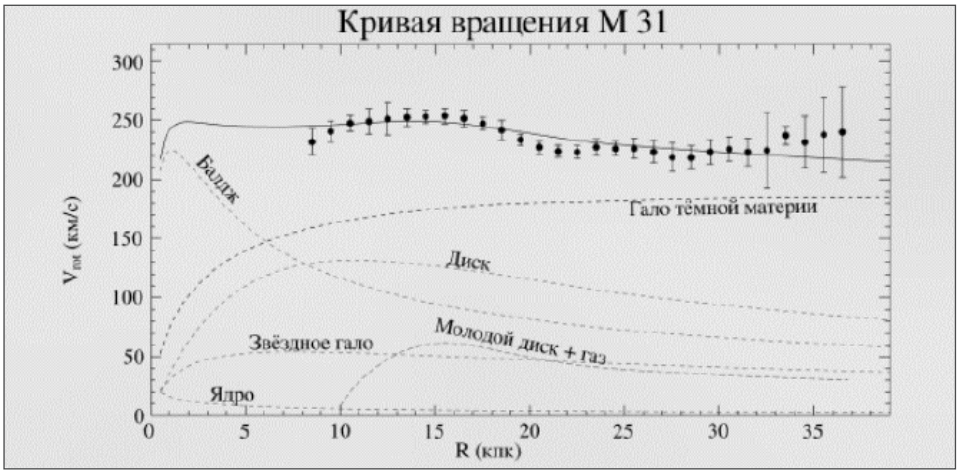

Figure 1. *The rotation curve of M 31*

Equation (14) allows us to determine the value of the parameter β:

$$\beta_{1,2} = \pm\left(1 - \frac{\mathrm{Re}\,\gamma \cdot \mathrm{Re}\,M}{(\mathrm{Re}\,v)^2 \cdot \mathrm{Re}\,R}\right)^{\frac{1}{2}}, \quad (15)$$

It follows from the experimental rotation curve (see Fig. 1) that:

for ReR = 10 kps: $\beta_{1,2} = \pm 0{,}997,$ (16)

for ReR = 23,5 kps: $\beta_{1,2} = \pm 0{,}998,$ (17)

for ReR = 30 kps: $\beta_{1,2} = \pm 0{,}999.$ (18)

For all these values of the parameter β, the real component of the star's velocity (14) lies on the experimental curve in Fig. 1. The ratio of the $\beta_{1,2}$ imaginary components of the quantities to the real components is a function of distance β=β (ReR). Since the tangential velocities of the planets in the Solar System do not exhibit anomalous behavior and decrease with increasing distance from the Sun, it can be concluded that in this region of space the imaginary parts of the quantities, and thus the parameter β, are small or close to zero. And in the Andromeda Galaxy, at least in the region 10 kps < ReR < 30 kps, the parameter β increases slightly, approaching unity.

The logic of our interpretation is in no way weaker than the logic behind the introduction of "dark matter." Adherents of "dark matter," being rationalists and, at the very least, spontaneous materialists, when confronted with the unknown, propose to fill it once again with matter, albeit with unknown properties, and thus remain in the realm of inanimate nature, in a dead world. Since we believe that the complex-valued Universe is a model of a living, intelligent Universe, we can probably assume that the imaginary components of all quantities, accessible only to the Supreme Mind, are one of the tools for controlling reality. From a formal, or scientific, philosophical point of view, this is the eternal clarification of the relationship between materialism and idealism. But, in essence, it is a correction of our view of Nature, the Supreme Power, God.

How, then, can we approach the description and study of such a living and intelligent, i.e., biocentric, Universe?

3. Plasma and the Mind of the Universe

3.1 Results of Research on the Current Sheet of the Magnetosphere

The theory of polarization in non-magnetized plasma was developed by Debye in the 1920s. In the plasma surrounding an ion of a given charge, ions of the opposite charge cluster due to electrical interactions. The presence of a cloud of oppositely charged ions around a given ion leads to the weakening (shielding) of that ion's field. Therefore, the potential of the shielded field near the ion decreases more rapidly than the Coulomb potential.

Plasma is a quasi-neutral medium on characteristic scales larger than the Debye radius L >> D_e or characteristictimes $t >> 1/\omega_{Le}$. Atshorttimes $t < 1/\omega_{Le}$ and short distances $L < D_e$, the quasi-neutrality of plasma is violated. Here, the electron Debye radius is $D_e = \sqrt{\frac{\varepsilon_0 Te}{e^2 N_e}}$, and the electron Langmuir frequency is $\omega_{Le} = \sqrt{\frac{e^2 N_e}{\varepsilon_0 m}}$. However, in cosmic or, more generally,

collisionless magnetically active plasma, the situation is significantly different.

In the middle of the last century, issues related to sharply inhomogeneous, collisionless, magnetically driven plasma came to the forefront (the characteristic thickness of the plasma layer is much smaller than the Larmor radii of its components). In the USSR and the USA, the idea of magnetic confinement of plasma in thermonuclear fusion was proposed simultaneously. The problem of equilibrium and stability of the boundary layer between the plasma and the magnetic field arose. This same problem became relevant in space plasma as well, during the study of the flow of solar wind plasma around the Earth's magnetic field. Due to the difference in the masses of plasma components, ions tend to penetrate deeper into the magnetic field region than electrons. An electrostatic interaction occurs between regions of plasma with an excess of electrons and ions, which tends to eliminate the charge separation.

Among the various challenges facing the theory of the transition layer, the most significant is the study of the polarization process of the magnetically active plasma in the transition layer. Satellite measurements in the magnetopause region indicate the presence of both steady-state and varying components of the electric field in this region of space. The variable component is associated with variations in the geomagnetic field, while attempts are being made to interpret the constant component based on the phenomenon of magnetically active plasma polarization.

Our study of the polarization effect in highly inhomogeneous structures of collisionless magnetically active plasma is based on the sequential solution of the kinetic equation, first to investigate the equilibrium state and then to examine the stability of these structures [9]. We investigated the equilibrium and stability of the magnetopause and the current sheet of the magnetospheric tail. The electromagnetic properties of the medium are modeled by a dielectric permittivity tensor calculated for each of these structures.

The results of the study show that the Debye polarization theory, previously developed for non-magnetically active plasma, is not applicable to sharply inhomogeneous, collisionless magnetically active plasma (this refers to the magnetic wall in the context of controlled nuclear fusion, the magnetopause and the current sheet of the magnetospheric tail in near-Earth space physics). In this case, a steady-state polarization electric field exists at distances far exceeding the Debye ionic radius $\Delta >> D_i$ and over timescales longer than the characteristic Debye time $t >> 1/\omega_{Le}$. This field significantly affects the physical processes occurring in such configurations. For example, the charge of the magnetopause can ensure the transfer of momentum and energy from the solar wind into the magnetosphere without the reconnection of the magnetic field lines of the solar wind and the magnetosphere [10]. It is precisely the influence of this charge that leads to a unique dynamo effect: the acceleration of the internal plasma due to a portion of the kinetic energy of the external solar wind flow. The results of the study lead to the conclusion that a long-lived structure of space plasma possessing an integral electric charge arises in near-Earth space.

3.2 Alfvén on the Cellular Structure of Outer Space

Nobel Prize laureate H. Alfvén wrote about this in his time: "The most striking fact is that the current layers turned out to be surprisingly long-lived (one might say stable) structures." He further developed his idea: "The presence of such boundary current layers indicates that outer space (both interstellar and intergalactic) has a cellular structure everywhere" [11, p. 56].

This contradicts the generally accepted postulate that, over time, a closed system tends toward thermal equilibrium and its entropy increases. However, life processes within the system can lead to the formation of structures and a decrease in entropy.

3.3 Experiment on the ISS

In 2001, the Russian-German "Plasma Crystal" experiment was launched on the International Space Station (ISS). As early as 2003, the research team reported that plasma in zero-gravity acquires the structure of a crystal lattice [12]. The experiment on the ISS was held in a special vacuum chamber. Plasma was generated there, into which micron-sized dust particles were introduced. The final data were processed on powerful computers. It turned out that the plasma forms swirls that exactly mirror the structure of our galaxy. In addition, it was discovered that if the plasma is cooled, a replica of the DNA molecule's structure is produced.

3.4 Interpretation of the Experiment on the ISS

However, a truly interesting discovery was made in 2004, when the group was led by Professor V. Tsytovich of the Russian Academy of Sciences. Mathematical analysis of the dynamics unfolding in a "complex" dust plasma among charged dust particles

showed that in some cases, when two charged dust particles approach each other, they enter into a spiral motion, creating a plasma crystal. They discovered that this involves not only self-organization into spirals that persist for a long time, but also that these structures undergo more complex processes similar to those exhibited by living organisms.

Professor Tsytovich and his colleagues discovered that spiral crystals develop and grow over time after being "powered" by energy they absorb from plasma flows (particles that have not attached themselves to dust particles) in their surrounding environment. The researchers hypothesized that, much like the DNA spiral, which stores information, these spirals may also store information in their various sections.

Another remarkable phenomenon they discovered is that when such a spiral splits, its two separate parts acquire the unique structure of the original spiral. Thus, the scientists argue, much like the process that occurs in bacteria or human cells, these DNA-like spirals are also capable of reproducing and passing on their characteristics to the "next generation."

Thus, the researchers conclude that these DNA-like spirals represent a form of life. "Complex plasma structures that organize themselves independently possess all the necessary characteristics to be classified as an inorganic form of life existing in space," they write in their article [13].

3.5 Cosmic Plasma—The Brain of the Universe?

If these processes are confirmed by further experiments, it could revolutionize our understanding of what "life" is, as well as our concepts of mind and consciousness. Today we know that our life is based on carbon, and some suggest that life based on silicon exists, but the latest research shows that life may also be based on plasma. The universe is 99% plasma (stars, nebulae, solar wind)—could it be a gigantic mind?

Forms of life can apparently transform into one another. Cosmic intelligent Life creates all local forms of life and directs their evolution. Thus, our Universe was already alive and intelligent at the very moment of its birth. Life and intelligence do not arise independently from some cold oceans on planets; they are inherently part of the Cosmos. The Cosmos is saturated with various forms of life; thus, the living plasma of the Sun generates, through photosynthesis, the protein-nucleic life familiar to us on Earth [14]. Plasma is considered the fourth state of matter. But apparently, plasma is also the fifth state—not of matter, but of the spirit, the mind of the Universe.

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