Explanation of Dark Matter and Dark Energy Phenomena

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GJSFR-A Classification : FOR Code: 020199

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Strictly as per the compliance and regulations of :

Explanation of Dark Matter and Dark Energy Phenomena

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I. Introduction

In order to explicate the statement that dark matter and dark energy testify to the existence of other universes, in addition to ours, that form the existent Multiverse, let us start with explaining what kind of Multiverse is in question.

The Multiverse is understood as any hypothetical set of all parallel universes. The universes are referred to as parallel because, despite their boundlessness, they never intersect. Numerous hypotheses about the Multiverse have been suggested by physicists, mathematicians, astronomers, engineers, philosophers and science fiction writers. Some of these hypotheses are outlined in [1] – [11], from which it can be seen that those suggested by scientists are even more extraordinary than the ones suggested by science fiction writers.

They are so extraordinary that, as stated in [12], all the hypotheses about other universes, except for the one discussed in this article, will never be verified experimentally. In other words, the Multiverse they describe is actually non-existent for us.

However, [13] – [17] suggest a different concept of the Multiverse. This concept is that the Multiverse actually exists and consists of a set of parallel universes that comply with the similarity principle. That is, the concept states that the laws of nature governing these parallel universes have much in common.

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Therefore, other parallel universes are accessible for the inhabitants of these universes to visit. These visits can prove the reality of this Multiverse. However, many inhabitants of these universes, including the earthlings, believe these parallel universes to be non-existent, because by their physical nature they are transparent and, due to this, are not observable for the inhabitants of other parallel universes. Therefore, this Multiverse can be referred to as hidden.

II. The Discovery and Investigation of Imaginary Numbers

The history of the Multiverse hypothesis discussed in this paper starts with the discovery of an imaginary unit $i = \sqrt{-1}$ by Scipione del Ferro (1465 – 1525), Niccolò Fontana Tartaglia (1499 – 1557), Gerolamo Cardano (1501 – 1576), Lodovico Ferrari (1522 – 1565) and Rafael Bombelli (1526 – 1572) [18]. The discovery may have been made even earlier by Paolo Valmes (d.1486), who was sentenced to death at the stake by the Spanish inquisitor Tomás de Torquemada (1420 – 1498) [19].

Now, with the works of prominent mathematicians such as Abraham de Moivre (1667 – 1754), Leonhard Euler (1707 – 1783), Jean Le Rond D'Alembert (1717 – 1783), Caspar Wessel (1745 – 1818), Pierre-Simon de Laplace (1749 – 1827), Jean-Robert Argand (1768 – 1822), Johann Carl Friedrich Gauss (1777 – 1856), Augustin Louis Cauchy (1789 – 1857), Karl Theodor Wilhelm Weierstrass (1815 – 1897), William Rowan Hamilton (1805 – 1865), Pierre Alphonse Laurent (1813 – 1854), Georg Friedrich Bernhard Riemann (1826 – 1866), Oliver Heaviside (1850 – 1925), Jan Mikusiński (1913 – 1987) and many others, a consistent theory of the functions of a complex variable has been developed. However, this theory does not explain the physical meaning of imaginary and complex numbers.

In 1826, Felix Savary (1797 – 1841) discovered the alternating electric current [20]. Charles Proteus Steinmetz (1865 – 1923) suggested using the symbolic method to describe it [21], thus introducing the notion of complex frequency into electrical circuit theory. However, textbooks on the electric circuit theory do not explain its meaning.

Imaginary and complex numbers are now widely used in other exact sciences as well – in optics, hydraulics, mechanics, acoustics, and so on. However, these sciences do not explain the physical meaning of imaginary and complex numbers, either.

In the early twentieth century, Joseph Larmor (1857 – 1942), the Nobel Prize winner Hendrik Antoon Lorentz (1853 – 1928), Jules Henri Poincaré (1854 – 1912), the Nobel Prize winner Albert Einstein (1879 – 1955) and other prominent scientists developed the special theory of relativity (STR). Its formulae describing relativistic effects at superluminal speeds used imaginary numbers. However, no one has been able to explain the physical meaning of those numbers, either at that time or at the present time. Therefore, one of the formulations of the second postulate of the STR states that imaginary numbers do not have any physical meaning [22].

However, not all scientists found the current version of the STR sufficiently convincing. So far, several hundred scientific works criticizing different aspects of the STR have been published; among the latest, [23] – [26] can be cited.

In the twenty-first century, the MINOS and OPERA experiments were performed; they attempted to refute the fundamental principle of the STR – the unbreakable barrier of the speed of light – and, thus, to prove the physical reality of imaginary numbers. However, the physics community believed these experiments to be insufficiently reliable.

III. The Principle of the Physical Reality of Imaginary and Complex Numbers Interpretation

Nevertheless, [27] – [32] present the results of other research that proves the physical reality of imaginary and complex numbers, both theoretically and experimentally. The evidence was obtained by investigating oscillation processes in linear electrical circuits, which allows the validity of the experiments to be verified in any radio electronics laboratory. Therefore, the results of these experiments are presumably reliable.

These publications also demonstrate that the physical reality of imaginary and complex numbers explains the existence of shock oscillations in nature. Otherwise, tsunami, percussion instruments and many other natural phenomena would not exist.

However, nature is consistent. Therefore, science that tries to understand and explain the laws of nature must be integral and consistent. Separate scientific disciplines – the special and general theory of relativity, quantum mechanics, mathematics, radio electronics, optics, and so on – that exist only because of people's limited intellectual potential, must harmonize their theories and hypotheses.

The understanding and use of mathematics in all other sciences must be even more consistent. Consequently, the mathematical principle of the physical reality of imaginary and complex numbers, regardless of the branch of science to which it belongs, is universally true and applicable not only to electrical circuit theory [27] – [32], but also to the STR [33], quantum mechanics [34], [35], optics, and all other sciences.

IV. Adjustment of the Special Theory of Relativity

Therefore, theories that have been developed on the basis of the above erroneous statement of the STR, which denies the physical reality of imaginary numbers, must now be revised and adjusted accordingly.

Let us demonstrate how this can be done, for example, in the STR.

To solve the problem, it is obviously necessary to explain the meaning of the relativistic formulae at superluminal speeds, and for that, it is enough to consider any one of them. For example, let us take the formula:

$$m = \frac{m_0}{\sqrt{1 - (v/c)^2}} \tag{1}$$

$$\Delta t = \Delta t_0 \sqrt{1 - (v/c)^2} \tag{2}$$

where m_0 is the rest mass of a moving body (e.g., of an elementary particle);

m is the relativistic mass of a moving body;

Δt_0 is the rest time of a moving body;

Δt is the relativistic time of a moving body;

v is the velocity of the body; and

c is the speed of light.

As can be seen, according to formula (1), at subluminal speeds at $v < c$ the mass of the elementary particles, referred to as tardyons (or bradyons), is measured with real numbers, and at superluminal speeds at $v > c$ the mass of the elementary particles, referred to as tachyons, is measured with imaginary numbers. At the same time, tachyons cannot be detected in our universe (let us call it the tardyon universe for convenience), because they are located elsewhere: this other place can be referred to as the tachyon universe. According to formula (2), time in the tardyon universe is measured with real numbers, and in the tachyon universe it is measured with imaginary numbers.

It is very likely that inhabitants of the tachyon universe (or inhabitants of other, more remote universes) have somehow been visiting the Earth. In order for

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inhabitants of different universes to visit the planet Earth, those other universes must comply with the 'similarity principle', i.e. the fundamental physical, chemical, biological, and other laws in them must be identical or have much in common.

However, as can be seen (see Fig. 1a and 1c), the graphs of formulae (1) and (2) at $v < c$ and at $v > c$ look different, i.e. they do not comply with the similarity principle. Therefore, formulae (1) and (2) must be adjusted; this can be done as follows
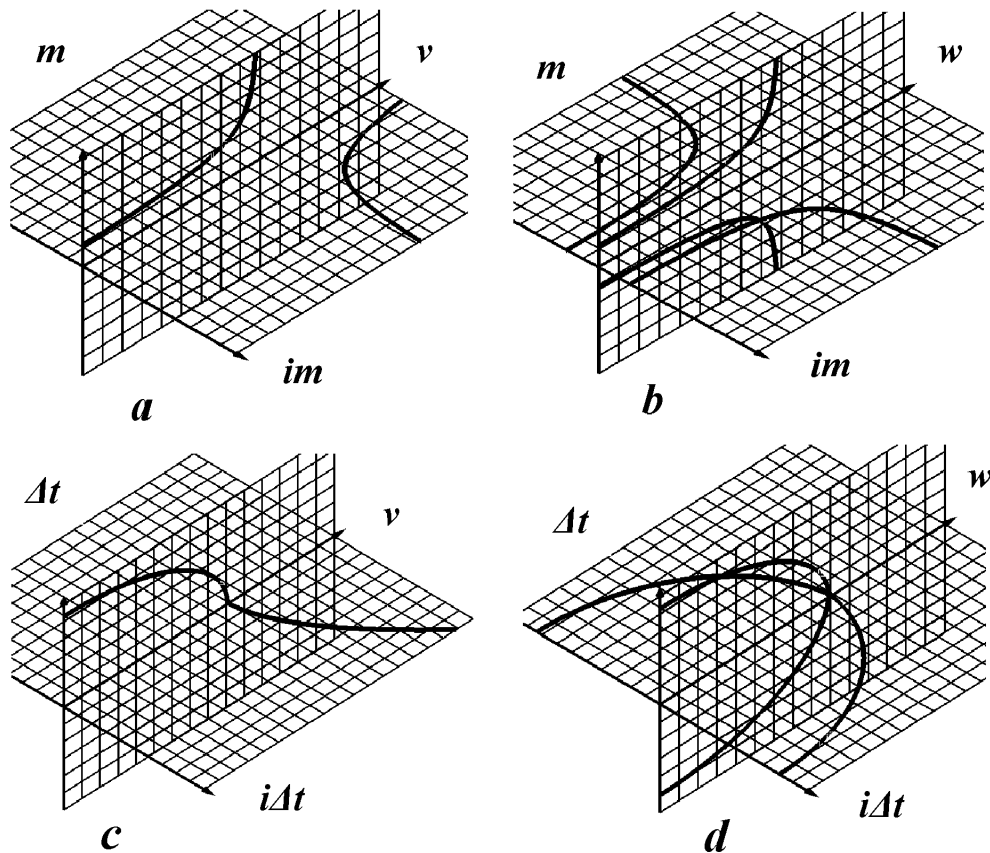

Figure 1 : Graphs of functions (1) – (4)

$$m = \frac{(i)^q m_0}{\sqrt{1-(v/c - q)^2}} = \frac{(i)^q m_0}{\sqrt{1-(w/c)^2}} \qquad (3)$$

$$\Delta t = (i)^q \Delta t_0 \sqrt{1-(v/c - q)^2} =$$
$$= (i)^q \Delta t_0 \sqrt{1-(w/c)^2} \qquad (4)$$

where $k = \lfloor v/c \rfloor$ is the discreet floor function of the argument v/c;

$w = v - qc$ is the local velocity, for each universe, which can take values only in the range $0 \le w < c$;

v is the velocity measured from our tardyon universe, which, hence, can be referred to as the tardyon velocity.

Naturally, other relativistic formulae of the STR have the same shortcomings and can be adjusted in a similar way.

V. Dark Matter and Dark Energy

As can be seen (Fig. 1b and 1d), in formulae (3) and (4) the value $q = 0$ corresponds to the tardyon universe, and the value $q = 1$ to the tachyon universe. It can be seen from Fig. 1b and 1d that the Multiverse must have at least two more parallel universes that correspond to $q = 2$ and $q = 3$. It is logical to refer to them as the tardyon antiverse and the tachyon antiverse, because they correspond to the values of mass, time and other quantities determined with the relativistic formulae of the STR, measured with negative real numbers and negative imaginary numbers.

Let us note, at the same time, that in the Multiverse structure described in this article, the tardyon universe and the tardyon antiverse are never adjacent, but they are separated by the tachyon universe and the tachyon antiverse. Similarly, the tachyon universe and the tachyon antiverse are never adjacent, because they are separated by the tardyon universe and the tardyon

antiverse. Thus, annihilation of the corresponding universes and antiverses is prevented.

Further, the value $q = 4$ in formulae (3) and (4) once again corresponds to the tardyon universe. However, this can be either our own universe or another tardyon universe. The form of the structure of the Multiverse depends on this, as well as on other yet unknown circumstances. Furher research will reveal what this form actually is.

In the case the values $q = 0$ and $q = 4$ correspond to the same universe – our tardyon universe, the Multiverse has a ringed structure. It includes one tardyon, one tachyon, one anti-tardyon and one anti-tachyon universe. They adjoin each other in this particular order. Other parallel universes are not seen from any of the universes.

In the case the values $q = 0$ and $q = 4$ correspond to different tardyon universes, the Multiverse has a helical stricture. Then, it includes several tardyon, tachyon, anti-tardyon and anti-tachyon universes, once again, in this particular sequence. However, the total number of universes that form the helical Multiverse is likely to be limited and, eventually, a subsequent tardyon universe would coincide with our tardyon universe. This number must be a multiple of four. It can be estimated by comparing the mass of our universe and the total mass of dark matter and dark energy of other parallel universes. With this in mind, we can conclude that this number is, most likely, twenty-four. Then the structure of the Multiverse would take the form of a screw collar.

In the hidden Multiverse discussed in this publication, other parallel universes can not be observed from any of the parallel universes, although, certain indirect evidence of their existence can be registered. For example, this is dark matter and dark energy, where no traces of any known chemical elements or other signs of real matter can be found exactly for the reason that they are not in our universe. However, they can be detected, if we penetrate into these other universes from our universe. This can be done through portals.

Therefore, it is time to discuss portals. The matter is that, due to some unknown processes, the relative position of the universes forming the Multiverse is not locked. They float relative to each other in the extra spatial dimensions. Therefore, they sometimes touch, and even partially penetrate each other. Then, at points of these mutual penetrations, certain transition zones, or portals (these have nothing to do with the so-called 'wormholes' mentioned in other hypotheses of the Multiverse, because they operate in a different way), appear. These portals enable the inhabitants of adjacent parallel universes to visit each other. These portals, obviously, can be of different sizes. When they are small, we call them geopathic zones. When they are large (from hundreds meters to several kilometres and more), we refer to them as the anomalous zones.

In portals, the quantity q takes non-integral values and changes rapidly from an integral value corresponding to one of the adjacent parallel universes to the integral value corresponding to another adjacent parallel universe. It is not clear how people who get into portals would perceive these changes. If a human body can handle them, then people would be able to visit other parallel universes through portals.

It is noteworthy that all trans-portal areas of the adjacent (and, most likely, of all) parallel universes on the planet Earth are accessible for people to visit and are even habitable. Therefore, all parallel universes are most likely inhabited. Otherwise, if the trans-portal area of at least one of the numerous portals on the planet Earth turned to be, for instance, in the empty interplanetary space, then, according to the law of connected vessels, the planet Earth would have no air. The same is true for all other unfavourable border situations.

Now it is possible to explain how both elementary particles and other physical objects (possibly, even living beings) can make transitions from one parallel universe to another. It turns out that in the Multiverse, portals are used for this purpose. Therefore, there is no need to break the speed of light barrier in accordance with the relativistic formulae of the STR. This is similar to the fact that you do not have to break through a wall to move from one room of your apartment to another, because you can use a door.

Finally, we do not rule out that the Multiverse is even more complicated, because not only complex numbers are physically real, but hypercomplex numbers, as well [36]. Then the structure of the Multiverse becomes even more complex, as well as the formulae describing relativistic effects.

VI. CONCLUSION

Thus, the phenomenon of dark matter and dark energy is explained by the existence of the hidden Multiverse that has the structure described in this article, where parallel universes are not observable or anyhow registered from our universe. Other parallel universes cannot be seen from any other universe, either. Any parallel universe can be observed only from this same universe, certainly, on condition we get there.

Nevertheless, it turns out that the existence of these unobservable parallel universes is possible to detect based on some indirect physical indicators. These indicators have been named dark matter and dark energy, with the difference between the two being explained, possibly, by the fact that dark matter corresponds to the closer and dark energy – to the more remote parallel universes.

Therefore, the phenomenon of dark matter and dark energy proves the existence of the hidden Multiverse described in this article. The reality of this Multiverse will be confirmed incontestably and finally by people visiting other parallel universes through portals and by exploration of these universes.

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