

Hidden Multiverse: Explanation of Dark Matter and Dark Energy Phenomena

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Abstract It is demonstrated that parallel universes forming the multiverse, according to the hypothesis suggested herein, actually exist and are accessible for people to visit, because they comply with the similarity principle. According to this principle, laws of nature governing different universes are identical or similar, but certain differences are also possible. For example, time in them can flow in any directions with respect to the time in our universe. The suggested hypothesis of the multiverse is based on the adjusted special theory of relativity, where statements on an unbreakable light speed barrier and lack of physical meaning of imaginary numbers are removed from the second postulate. Furthermore, the principle of physical reality of imaginary numbers is proven both theoretically and experimentally. In line with this principle, all the relativistic formulae of the special theory of relativity are adjusted accordingly. The reality of this multiverse is confirmed by the existence of dark matter and dark energy.

Keywords: *multiverse, parallel universes, complex numbers, imaginary numbers, special theory of relativity, dark matter, dark energy*

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1. Introduction

The term ‘Multiverse’ was introduced first in fiction, then in academic literature a little over 100 years ago. However, the hypotheses of the Multiverse suggested over time [1-7], turned out to be so extraordinary that they left behind even science fiction writers. Thus, there is an opinion that these Multiverses will not be accessible for people to visit even in the most distant future [8,9]. Consequently, the inhabitants of other, more developed, civilizations would not be able to visit the planet Earth, either. This circumstance raises doubts in the adequacy of these Multiverse hypotheses.

The above-mentioned Multiverse hypotheses have another significant drawback – they do not explain what dark matter and dark energy have to do with our material world, although they account for over 95% of the Multiverse (not the monoverse, as is commonly stated) matter-energy. Thus, in order to understand the nature of dark matter and dark energy, physics will, obviously, have to make a revision of its basic concepts, just as cardinal as the one made when the theory of relativity and quantum mechanics were developed. At the same time, many universally recognized concepts that were found to be incorrect would inevitably have to be discarded, and, on the contrary, some new principles – both mathematical and physical – would have to be recognized as true.

2. Mathematical Principles of the Hidden Multiverse

Since it is necessary to revise the old and to find the new principles that allow accounting for the nature of dark matter and dark energy, it is appropriate to recollect the opinion of Karl Raimund Popper [10], the author of the open society concept, who wrote that a clash of opinions is an indispensable condition for the advancement of science.

Scientists specializing in astrophysics, astronomy and cosmology base their hypotheses on the special theory of relativity (STR) and the general theory of relativity (GTR), whose adherents have been defending their views over the twentieth century in a persistent struggle with numerous scientific opponents, including Nobel Prize winners Albert Abraham Michelson, Wilhelm Friedrich Ostwald, Joseph John Thomson, Philipp Eduard Anton von Lennard, Alvar Gullstrand, Wilhelm Win, Ernest Rutherford, Johannes Stark, Frederick Soddy, Percy Williams Bridgman, Edwin Mattison McMillan, Hideki Yukawa, Hannes Olof Gösta Alfvén.

Therefore, at present scientists are persistent in their intention to find the explanation of dark matter and dark energy phenomena that would fit into the Procrustean bed of the theory of relativity. However, the task of explaining something that really exists, but at the same time, does not even consist of the known chemical elements, is extremely complicated. This is the hardest task Nature has prepared for science.

Therefore, in order to solve this super-task, some conventional principles of modern science may have to be violated. Let us start to violate them with the second STR postulate, which is often interpreted in an extensive way,

i.e., it even has three different formulations [11]. All of them are assumed to be identical, and are supposed to define and explain the same thing from different viewpoints. In fact, this is not so, because only one of the three formulations of the second postulate has been confirmed experimentally – the principle of light speed invariance. The other two (mathematically equivalent) – the principle of an unbreakable light speed barrier and denial of the physical reality of imaginary numbers turned out to be incorrect [11]. Therefore, the false allegation on imaginary numbers having no physical meaning has become a mistake of the STR; its correction will be helpful not only for the STR, but also for science in general.

Imaginary numbers were discovered over 500 years ago. Since then, due to the efforts of distinguished mathematicians, such as Abraham de Moivre, Leonhard Euler, Jean Le Rond D'Alembert, Caspar Wessel, Pierre-Simon de Laplace, Jean-Robert Argand, Johann Carl Friedrich Gauss, Augustin Louis Cauchy, Karl Theodor

Wilhelm Weierstrass, William Rowan Hamilton, Pierre Alphonse Laurent, Georg Friedrich Bernhard Riemann, Oliver Heaviside, Jan Mikusiński and many others, a consistent theory of functions of a complex variable has been developed.

Almost 200 years ago, Felix Savary [12] discovered the alternating electric current; Charles Proteus Steinmetz [13] suggested using imaginary and complex numbers to describe it. Imaginary and complex numbers are currently widely used not only in radio-electronics, but also in optics, mechanics, acoustics, hydraulics, as well as in other engineering sciences.

Even in the school course of algebra, quadratic equations are now solved using imaginary and complex numbers.

However, despite the wide use of imaginary and complex numbers, no science explains what they actually are, or, to put it simply, how we can see, touch or feel them. Unfortunately, we cannot – people do not have such senses, nor do they have the devices to register them.

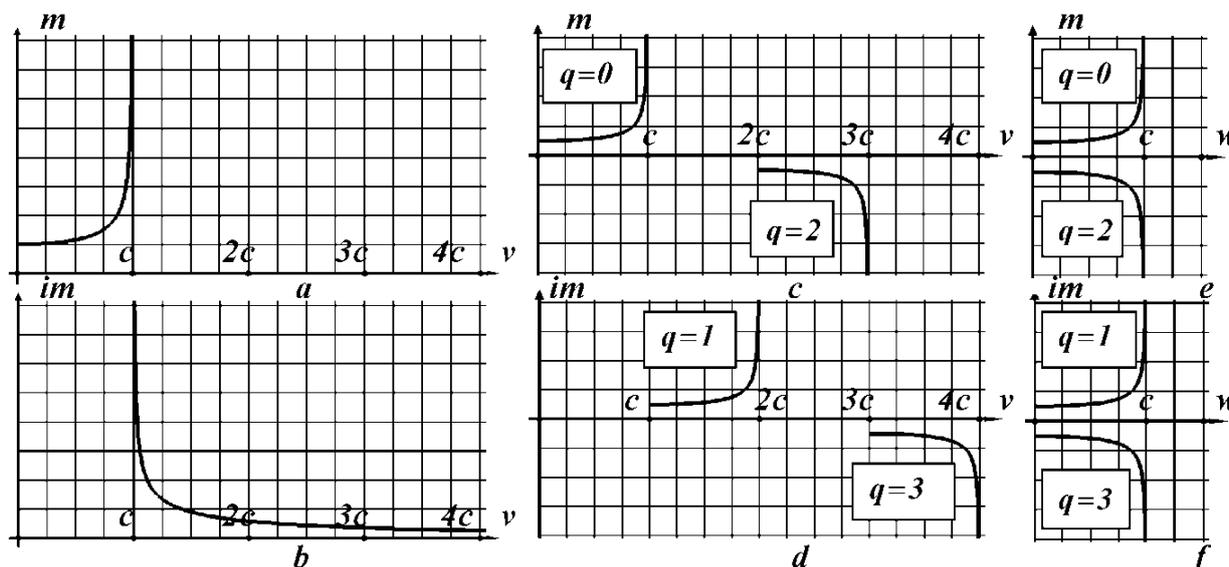


Figure 1. Graphs of functions (1) and (2)

However, people do not have the senses to register X-rays, the magnetic field, infra-low-frequency sounds, people cannot see or touch atoms or elementary particles. As for the devices to register all these phenomena, people invented them quite recently. Therefore, engineers and mathematicians, being unable to solve the problem of understanding the physical meaning of imaginary and complex numbers, left the question unsettled.

However, theoretical physicists chose to act differently: they simply decided to close the question, and supplemented the second STR postulate with an allegation on imaginary numbers having no physical meaning (this may seem reasonable, because scientists have been unable to prove the physical reality of imaginary numbers for over 500 years).

However, not all scientists agreed to this simple solution of a complicated centuries-old problem. This is why experimental physicists tried to improve the situation by performing long-term experimental research – MINOS at the American Tevatron Collider and OPERA at the European Large Hadron Collider. These experiments aimed at refuting the principle of an unbreakable light

speed barrier. However, theoretical physicists challenged the results of the research, alleging that the results of the MINOS experiment are not reliable enough, and the results of the OPERA experiment are erroneous.

Nevertheless, in the 21st century, other experiments [14,15,16,17] were performed, and they proved the physical reality of imaginary and complex numbers (in particular, complex frequency of oscillations $-\sigma \pm i\omega$), and, thus, refuted the erroneous statement of the STR. Moreover, if the MINOS and OPERA experiments are quite difficult to reproduce, because they require unique and very expensive equipment, the alternative experiments deal with investigation of oscillation processes in the electric circuit theory and, thus, can be reproduced and verified in any radio-electronic laboratory. Consequently, their results are indisputably true.

Besides, the above-mentioned publications demonstrate that the STR statement on imaginary numbers is refuted even by the existence of such natural oscillation processes as tsunami, church bells tolling and a kid's swing swinging if pushed [18].

3. Physical Principles of the Hidden Multiverse

Nature is consistent; thus, Science describing its operation mechanisms must be consistent as well. Physics, radio-electronics, computer sciences, mathematics and all other branches of science are divided only because of the limited intellectual potential of people. Therefore, scientific theories and hypotheses in various sciences must be mutually consistent.

Consequently, since the physical reality of imaginary numbers has been proven by radio-electronics [14,15,16,17], now this scientific truth must be recognized by physics and other sciences, and the corresponding theories must be adjusted.

Let us demonstrate how this can be done on the example of the STR [19]. Since imaginary numbers in the STR appear in formulae describing relativistic effects and superluminal speeds, the corresponding physical situations must be explained.

The reasoning can be as follows. Since real, imaginary, and complex numbers turned to actually exist, all of them measure something. For example, real numbers – 3 meters, 5 kilos, 2 cars, USD 100 – measure quite understandable tangible objects. Imaginary numbers also measure something that physically exists, but is not understandable. Thus, using a term already well known in physics, they can be referred to as the dark (the term ‘dark’ is used here in the same sense as in the terms ‘dark matter’ and ‘dark energy’, that is, it is the synonym of the words ‘transparent’, ‘invisible’, ‘obscure’) extra dimensions. Complex numbers, therefore, are used to measure certain tangible physical objects or phenomena that are a composite of real (i.e., understandable) and imaginary (i.e., not understandable) components.

Now, let us look at any formula describing relativistic effects, for example, at the Lorentz-Einstein formula

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

where m_0 is rest mass of a moving body (for example, an elementary particle);

m is relativistic mass of a moving body;

v is the velocity of the body;

c is the light speed.

As can be seen (see Fig. 1a,b), at $v < c$ the mass of a moving body is measured with a real number, and at $v > c$ – with an imaginary number, therefore, it belongs to the dark dimensions.

In this case, it is possible to explain the nature of the dark dimensions. Let us recall that tangible elementary particles of our universe that have subluminal speeds are usually referred to as tardyons (or bradyons); elementary particles having superluminal speeds and found elsewhere, are referred to as tachyons. Tachyons definitely exist beyond our universe (let us call it the tardyon universe for clarity) and cannot be detected from it. Thus, let us refer to the universe where tachyons are found as the tachyon universe, to fix the idea.

However, having made the assumption on the existence of two (and why only two?) universes, in fact, we are stating that the Multiverse also exists. Therefore, certain

basic principles defining its structure (at least, supposedly) must be named [20,21,22].

Contrary to other hypotheses of the Multiverse mentioned above, in terms of the actually existing Multiverse discussed hereinafter, is admissible to assume that these universes must comply with the similarity principle, i.e., the fundamental physical, chemical, biological and other laws in different universes must have much in common.

However, relativistic formulae of the current interpretation of the STR do not comply with the similarity principle. Indeed, as seen in Fig. 1a,b, which presents the graph of the Lorentz-Einstein formula (1) it looks completely different at subluminal and superluminal speeds.

Therefore, the Lorentz-Einstein formula must be adjusted as follows

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

where $q = \lfloor v/c \rfloor$ is the discrete ‘floor’ function of argument v/c ; $w = v - qc$ is the local, for each universe, velocity which can take values only in the range $0 \leq w < c$; v is the velocity measured from our tardyon universe, which, hence, can be referred to as the tardyon velocity.

For the same reasons, naturally, all other relativistic formulae of the STR are incorrect and can be adjusted in a similar way.

The graph corresponding to the adjusted Lorentz-Einstein formula (4), presented in Fig. 1c,d,e,f, already corresponds to the similarity principle. Therefore, adjusted relativist formulae provide for the correction of the STR.

In this graph, the value $q=0$ corresponds to the tardyon universe, and the value $q=1$ – to the tachyon universe. It is also seen from the graph that this Multiverse must have two more universes corresponding to $q=2$ and $q=3$. Let us refer to the universe corresponding to $q=2$ as the tardyon antiverse, and the universe corresponding to $q=3$ as the tachyon antiverse. Therefore, under any circumstances, the tardyon universe and the tachyon antiverse, as well as the tachyon universe and the tachyon antiverse, due to their mutual location (alternating) cannot annihilate each other.

Then, the value $q=4$ once again corresponds to the tardyon universe. However, this can be either our universe, or another tardyon universe. In the former case, the Multiverse will have a ringed structure that consists of four different parallel universes – one tardyon universe and antiverse, and one tachyon universe and antiverse. In the latter case, the Multiverse will have a helical structure that has several quartets of different parallel universes.

We can assume that dark matter and dark energy is information about other parallel universes forming the Multiverse that has somehow got into our tardyon universe. These other parallel universes do not emit, reflect or absorb any type of electromagnetic radiation, that is, they are completely unobservable and transparent for us. Therefore, we will refer to this Multiverse as hidden, because it consists of mutually unobservable parallel universes. It is easy to see that parallel universes

of the hidden Multiverse fully comply with the major characteristics of dark matter and dark energy – they are unobservable and impossible to register. We can even estimate how many quartets of parallel universes from this hidden Multiverse. Thus, presumably, our tardyon universe accounts for less than 4,5% of the total Multiverse matter-energy; then, the total number of quartets will slightly exceed $q > (100\%/4,5\%) = 22,2$, that is, most likely, there are 5 or 6 quartets (for the reason that different parallel universes can have slightly different matter-energy).

At the same time, it is obvious that these universes are parallel, i.e., despite their infinity, they never intersect. However, floating in extra-spatial dimensions, they sometimes partially touch each other and even penetrate into each other. Then, at these places, transition areas or portals occur, enabling inhabitants of this or that universe to get to other parallel universes.

Furthermore, since theoretical and experimental research of oscillation processes in electric circuits has proven the physical reality of not only imaginary, but complex numbers, as well, in portals, the parameter q can take non-integer values and gradually change its magnitude from one integer value corresponding to one of the adjacent parallel universes to another integer value that corresponds to another adjacent universe. This circumstance makes it possible to make transitions from one parallel universe into another (similar to the transition from air into water and backwards during sea bathing).

The existence of portals also fully explains why there is no need, in accordance with the relativistic formulae of the STR, to break the light speed barrier to get from one parallel universe into another (similar to the way you do not have to break through the wall to get from one room of your apartment into another, because there are doors intended for the purpose).

Finally, we do not rule out that hyper-complex numbers are physically real, as well [23]. Their physical reality, obviously, can be proven by performing similar research of resonance and shock oscillations in cavity resonators. Then the relativistic formulae and the structure of the hidden Multiverse will be even more complicated. However, it is difficult to elaborate on the statement without any experimental data available.

4. Conclusion

Thus, the structure of the complex physical world suggested based on the adjusted interpretation of the STR, may well prove to be physically real. The conclusive experiment aimed at verifying this hypothesis is very simple – it is necessary to detect a portal and get (even on foot) into an adjacent parallel universe, and then come back. However, it is necessary to bear in mind that this is dangerous.

Exploration of resources of parallel universes would definitely facilitate the intellectual and economic advancement of humanity [22].

At last, the human civilization will be able to escape in the hidden Multiverse in case of any threat to its existence.

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References

- [1] Lewis D. 1986. *On the Plurality of Worlds*. Basil Blackwell, Oxford.
- [2] Green B. (2004). *The Elegant Universe: Superstrings. Hidden Dimensions and the Quest for the Ultimate Theory*. W. W. Norton & Company. NY.
- [3] Deutsch D. 2002. The structure of the multiverse. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*. 458, 2911-2923
- [4] Tegmark M. 2003. Parallel Universes. *Scientific American*. 288 (5), 40-51
- [5] Ellis G.F.R., Kirchner U., Stoeger W.R. 2004. Multiverses and physical cosmology. *Monthly Notices of the Royal Astronomical Society*. 347 (3), 921-936
- [6] Carr B. ed. (2009). *Universe or Multiverse?* Cambridge Univ. Press. Cambridge.
- [7] Greene B. (2011). *The Hidden Reality: Parallel Universes and the Deep Laws of the Cosmos*. Knopf. NY.
- [8] Conley A., Carlberg R.G., Guy J., Howell D.A., Jha S., Riess A.G. and Sullivan M. 2007. Is There Evidence for a Hubble Bubble? The Nature of Type Ia Supernova Colors and Dust in External Galaxies. *The Astrophysical Journal*. 664 (1), L13-L16
- [9] Ellis G.F.R. 2011. Does the Multiverse Really Exist? *Scientific American*. 305, 38-43
- [10] Popper K.R. (2002). *Conjectures and Refutations. The Growth of Scientific Knowledge*. Routledge. London.
- [11] Antonov A.A. 2014. Verification of the second postulate of the special relativity theory. *Global Journal of Science Frontier Research A: Physics and Space Science*. 14 (3). 51-59.
- [12] Blanchard Ju. 1941. The History of Electrical Resonance. *Bell System Technical Journal*. 20 (4), 415-433
- [13] Steinmetz C.P., Berg E.J. 1900. Theory and calculation of alternating current phenomena. *Electrical World and Engineer Inc.*, NY.
- [14] Antonov A.A. and Buzhev V.M. 1970. Means of rising deflecting currents for spiral beam sweep on the CRT screen. Patent of USSR # 433650.
- [15] Antonov A.A. 2008. Physical Reality of Resonance on Complex Frequencies. *European Journal of Scientific Research*. 21 (4). 627-641.
- [16] Antonov A.A. 2009. Resonance on Real and Complex Frequencies. *European Journal of Scientific Research*. 28 (2). 193-204.
- [17] Antonov A.A. 2010. Oscillation Processes as a Tool of Physics Cognition. *American Journal of Scientific and Industrial Research*. 1 (2). 342-349.
- [18] Antonov A.A. 2010. Solution of Algebraic Quadratic Equations Taking into Account Transitional Processes in Oscillation Systems. *General Mathematics Notes*. 1 (2), 11-16.
- [19] Antonov A.A. 2014. Correction of the special theory of relativity: physical reality and nature of imaginary and complex numbers. *American Journal of Scientific and Industrial Research*. 5 (2). 40-52.
- [20] Antonov A.A. 2011. Structure of the Multiverse. *British Journal of Science*. 2 (2), 51-60.
- [21] Antonov A.A. 2012. Earth. Portals. Parallel Universes. *American Journal of Scientific and Industrial Research*, 3 (6). 464-473.
- [22] Antonov A.A. 2013. Cognition of the Multiverse as a factor facilitating the development of humanity. *Russian Physical Thought Journal*. 1 (12). 6-77.
- [23] Kantor I.L. and Solodovnikov A.S. (1989). *Hypercomplex numbers*. Springer Verlag. Berlin.