

PHYSICAL SCIENCES

EXPERIMENTALLY PROVED AND ACTUALLY PHYSICALLY EXISTING IMAGINARY NUMBERS AS A TOOL TO EXPLAIN THE PRINCIPLE OF RELATIVISM IN SRT¹

Antonov A.

PhD, HonDSc, H.Prof.Sci

Independent researcher, Kiev, Ukraine

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Abstract

The article explains that the special theory of relativity (SRT), created in the early twentieth century, which is an outstanding scientific achievement, was ahead of its time, because in physics at that time lacked some knowledge necessary for its creation – physical reality of imaginary numbers was not proved and the its physical meaning was not explained, dark matter and dark energy were not discovered, discrete mathematics and hyper-complex numbers were not used, and WMAP and Planck space-crafts were not launched into space yet. Therefore absence of the mentioned knowledge was justifiably replaced by postulates. But not everything was guessed. And present now in the version of SRT studied in all physics textbooks, the postulate called the principle of non-exceeding the speed of light turned out to be incorrect. Therefore the corrected version of SRT in which this postulate is replaced by the experimentally proved principle of physical reality of imaginary numbers is offered. In this corrected version of SRT also offered a experimental proof of the existence of mutually invisible parallel universes astronomical observations in portals invisible outside the portals of constellations. And it is explained, why the principle of non-exceeding of speed of light not disproved so far by physical experiments is incorrect. And why the incorrect version of SRT, studied in all physics textbooks, is still in demand.

Keywords: special theory of relativity, principle of non-exceeding the speed of light, principle of physical reality of imaginary numbers, relativistic formulas, dark matter, dark energy, universes, anti-universes, Multiverse, portals, anomalous zones.

1.Introduction

In the 20th century, physics, having changed the thousand-year-old tradition of creating theories on the basis of reliable experiments, began to call hypotheses that were interesting but not experimentally confirmed theories, including the special theory of relativity (SRT).

But what's even worse is that as a result of the struggle for survival, SRT was canonized - in the community of relativistic physicists and in public opinion, a conviction was formed about its infallibility, about the inadmissibility of its criticism and any subsequent corrections. Therefore, for example, in the USSR it was forbidden to criticize the SRT even three times - in 1934 by the decree of the Central Committee of the All-Union Communist Party (Bolsheviks) on the discussion of relativism, in 1942 by the decree of the Presidium of the Academy of Sciences of the Soviet Union on the theory of relativity and in 1964 by a secret decree of the Presidium of the Academy of Sciences of the Soviet Union, which prohibited any criticism of Albert Einstein's theory. And reviewers of some good journals have now started writing in their reviews "*I will not allow criticism of Einstein*".

Unfortunately, the ban on criticism of scientific theories is not a new phenomenon. For example, Nikolai Copernicus, who spent 40 years in the 16th century creating the heliocentric system of the world, wisely

published his theory "*On the Revolutions of the Celestial Spheres*", which refuted the geocentric system of the world of Claudius Ptolemy after his own death, not wanting to end up in the Inquisition. And Giordano Bruno and Galileo Galilei, who carelessly supported Copernicus' theory, had to deal with the Inquisition. Giordano Bruno was even burned alive at the stake. Therefore, the corresponding to common sense process of creating scientific theories by identifying in them as a result of experimental studies of certain shortcomings and their subsequent correction was not always smooth.

And although created in the early XX century by Joseph Larmor [1], Nobel Prize winner Hendrik Antoon Lorentz [2], Jules Henri Poincaré [3], Nobel Prize winner Albert Einstein [4] and other outstanding scientists STR [5]-[7], rightly recognized as a great scientific achievement, due to the lack of the necessary experimental knowledge at that time, which was forced to be replaced by postulates, as it turned out in the 21st century, nevertheless turned out to be incorrect [8]-[48], because:

- its relativistic formulas were incorrect;
- the relativistic formulas obtained in it were incorrectly explained using the incorrect principle of non-exceeding the speed of light;
- from these incorrect relativistic formulas were made incorrect conclusions about physical unreality of imaginary numbers discovered 400 years before the creation of SRT and about the existence in nature of our

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only visible universe, in which everything is measured only by real numbers.

However, it continues to be studied all over the world today uncorrected in all educational institutions, even the most prestigious ones.

2. Unsuccessful refutations of the version of the special theory of relativity presented in all physics textbooks

Why? Let's figure out why it happened this way. The relativistic formulas obtained by the creators of STR:

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

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

$$l = l_0 \sqrt{1 - (\frac{v}{c})^2} \quad (3)$$

in which m_0 – rest mass of a moving body;

m – relativistic mass of a moving body;

Δt_0 – rest time of a moving body;

Δt – relativistic time of a moving body;

l_0 – rest length of a moving body;

l – relativistic length of a moving body;

v – speed of motion of a body;

c – speed of light;

were explainable only in the range of subluminal speeds $v < c$, in which the quantities m , Δt and l took on values measured by real numbers. But in the range of superluminal speeds $v > c$ these quantities m , Δt and l already took on values measured by imaginary numbers discovered by Scipione Del Ferro, Niccolò Fontana Tartaglia, Gerolamo Cardano, Lodovico Ferrari and Rafael Bombelli [49] 400 years before the creation of the STR, the physical meaning of which, however, was not explained by them. But, perhaps, even earlier than them, imaginary numbers were discovered by Paolo Valmes [50], who for this was burned alive at the stake by the sentence of the mercilessly cruel inquisitor Thomas de Torquemada. Even Isaac Newton², in order to avoid trouble, preferred not to use imaginary numbers at that time. The creators of the STR also did not know how to explain them. And the physical meaning of imaginary numbers in physics textbooks has not been explained to this day. Moreover, the graph of the function $m(v)$ in the range of velocities $v > c$ (see Fig. 1a) corresponds to a physically unstable process that cannot exist in nature at all.

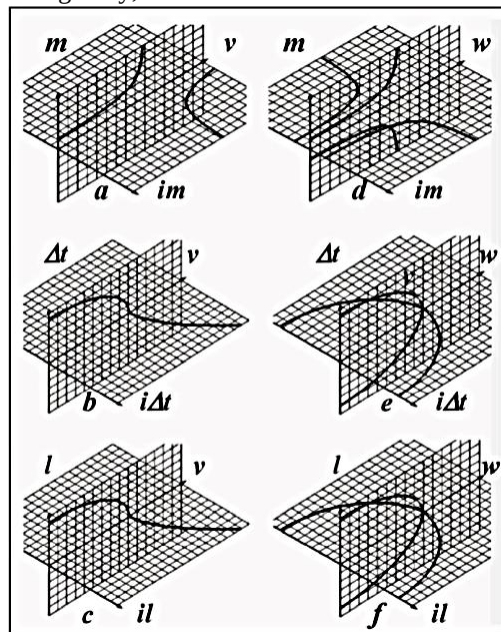


Fig. 1. Graphs of functions $m(v)$, $\Delta t(v)$ and $l(v)$ corresponding to the existing and the corrected versions of the STR in the subluminal $v < c$ and superluminal $v > c$ ranges

But such a theory, which even its creators could not explain, was naturally of no use to anyone. And therefore, at that time, a postulate called the principle of not exceeding the speed of light was justifiably introduced into the STR, the essence of which is clear from its name. And according to this postulate, formulas (1)-(3) in the range of speeds $v > c$ no longer needed

to be explained, since the functions $m(v)$, $\Delta t(v)$, $l(v)$ allegedly do not correspond to any existing processes in nature in this range. And this was very close to the truth. In any case, at the time this postulate appeared in the STR, such processes were unknown on earth.

Therefore, from formulas (1)-(3) it was quite logical to conclude that imaginary numbers are physically

² And his friend William Whitson, in an atmosphere of the omnipotence of the Inquisition, was stripped of his professorship and expelled from Oxford University for some of his careless statements.

unreal and that in nature there is only one visible universe. And in this form STR is still presented in all physics textbooks.

But in 1934, Pavel Alekseevich Cherenkov discovered a process called Cherenkov radiation [51], which refuted the version of STR presented in physics textbooks, since it was explained by the movement of electrically charged particles in a transparent medium with a refractive index $n > 1$ at a speed exceeding the phase velocity of light in this medium. For this discovery P. A. Cherenkov, I. E. Tamm and I. M. Frank even received the Nobel Prize in 1958. Nevertheless, STR withstood, specifying that the principle of not exceeding the speed of light refers to the speed of light only in a vacuum, i.e. in an optical medium with a refractive index $n = 1$.

The next attempt to refute the textbook version of STR was undertaken by the widely publicized OPERA experiment [52] at the Large Hadron Collider in 2011, in which approximately 200 physicists from 36 institutes in 13 countries took part. The goal of the experiment was to detect superluminal neutrinos, and thereby refute the principle of not exceeding the speed of light and the generally accepted version of STR. For which

the performers of this experiment expected to receive the Nobel Prize. And on September 23, 2011, an article by the OPERA collaboration appeared in the archive of electronic preprints, in which it was reported that such superluminal neutrinos had been detected by them. However, on March 15, 2012, a message was published about the ICARUS experiment [53] conducted at the same Large Hadron Collider, which refuted the OPERA experiment.

And that's it. No one other than the author³ of this article has offered any other physical refutations of the corrected principle of not exceeding the speed of light.

3. Successful refutation of the version of special theory of relativity presented in physics textbooks

So why then is it stated above that the version of the special theory of relativity presented in physics textbooks is incorrect?

Because there are other sciences besides physics. Including electrical engineering and radio engineering, which appeared before the STR, and whose very existence proves the physical reality of imaginary numbers and thereby refutes the version of the STR presented in physics textbooks.

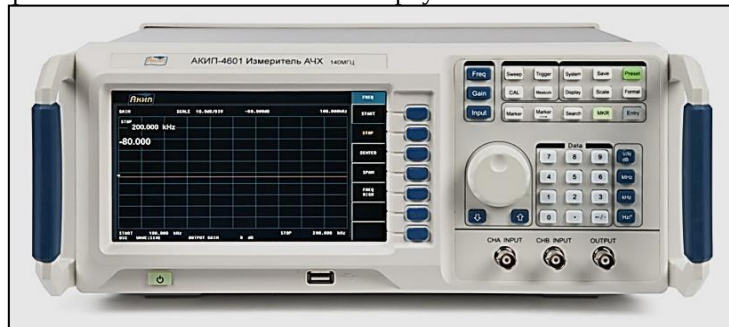


Fig. 2. In any radio-technical laboratory there are devices called frequency response meters, which prove the physical reality of imaginary and complex numbers by their mere existence

Indeed, in electrical engineering and radio engineering, the Ohm's law, as interpreted by Steinmetz [54], discovered in 1893, is fundamental. It is now used daily in practical work by millions of electrical and radio engineers all over the world. Thus, naturally, confirming that it is true. And according to this law, in linear electrical circuits of alternating current, the electrical resistances of capacitors and inductors (also called inductors) are measured by imaginary numbers of different polarities, and only the resistances of resistors are measured by real numbers. Note that the previous phrase states that the imaginary resistances of capacitors and inductors are measured. And indeed, in all electrical and radio engineering laboratories there are many devices (for example, see Fig. 1) that measure the imaginary parameters of electrical circuits. Even every radio amateur has such a simple device, called a tester.

And everything that is measured really physically exists. Physicists know this very well. And this is a fundamental position of any science. If people did not use devices in their activities, but relied on knowledge obtained only from their senses, then science would not exist. And since in electrical and radio engineering the

resistances of capacitors and inductors, once called imaginary, are in fact measured by existing devices, then they are not imaginary at all, but the most real physically existing. And the author of this article wrote about this back in 2008-2010 [55]-[59], i.e. before the publication of the results of the OPERA experiment, making it unnecessary. But the OPERA collaboration ignored these publications and carried out its own very expensive, but unsuccessful experiment. Relativistic physicists still ignore subsequent, including other, proofs of the principle of physical reality of imaginary numbers [60]-[66]. According to which the SRT is refuted by the existence of bell ringing, tsunamis and even suspended swings on playgrounds. Since it follows from the generally accepted version of the SRT that they should not be there. That is, the swing should not swing after a push from parents. But you know that they swing.

Nevertheless, these publications prove in the most indisputable way that the named imaginary numbers, contrary to the postulate of the STR about not exceeding the speed of light, are physically real not only in electrical and radio engineering, but always and everywhere in all sciences. And therefore it is time to realize that mathematics cannot be one for Einstein, another for

³ See below for more information on them.

Steinmetz, and a third for someone else. Therefore, imaginary numbers are physically real in all sciences. Including physics. And textbooks on different sciences (primarily physics textbooks and radio engineering textbooks) should not contradict each other.

And since the statement following from the postulate of not exceeding the speed of light of the STR about the physical unreality of imaginary numbers turned out to be incorrect, it is obvious that this postulate itself is also incorrect. And therefore the generally accepted version of the STR itself is also incorrect [8]-[48].

And no experiments are ever refuted by postulates.

But how then can we explain the existence in physics of the physically unrefuted principle of not exceeding the speed of light?

4. Correction of relativistic formulas of STR taking into account the experimentally proven principle of physical reality of imaginary numbers

So, we need to think some more.

Since, as has just been proven, imaginary numbers are physically real, the relativistic formulas of STR,

taking this circumstance into account, must be explained. And for this, first of all, they must be corrected so that they correspond to physically realizable processes. For this, the relativistic formulas (1)-(3) in the ranges $-\infty \leq v < 0$ and $c \leq v < +\infty$ must be such that the graphs of the functions $m(v)$, $\Delta t(v)$, $l(v)$ (Fig. 1d,e,f) are similar to the graphs of the same functions $m(v)$, $\Delta t(v)$, $l(v)$ (Fig. 1a,b,c) in the range $0 \leq v < c$, i.e. have the form

$$m(q) = m_0 i_1^q / \sqrt{1 - (\frac{v}{c} - q)^2} \quad (4)$$

$$\Delta t(q) = \Delta t_0 i_1^q / \sqrt{1 - (\frac{v}{c} - q)^2} \quad (5)$$

$$l(q) = l_0 i_1^q / \sqrt{1 - (\frac{v}{c} - q)^2} \quad (6)$$

where $q(v) = [v/c]$ is the “floor” function of discrete mathematics of the argument v/c (its graph is shown in Fig. 3a), which is the fourth spatial dimension;

$w(v) = v - qc$ is the local velocity for each universe (its graph is shown in Fig. 3b).

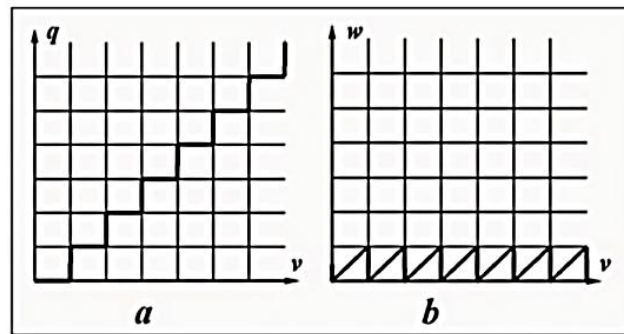


Fig. 3. Graphs of the functions $q(v)$ and $w(v)$, illustrating the meaning of the “floor” function of discrete mathematics

Moreover, this function i^q in formulas (4)-(6), defining the essence of each universe, for successive values of $q(v)$ equal to $0, 1, 2, 3, 4, 5, \dots$, takes values $+1, +i, -1, -i, +1, +i, \dots$. And the value $q(v)=0$ in formulas (1)-(3) for the range of speeds $V < C$ corresponds to our visible universe, which for definiteness we will call the tardion universe. To the value $q(v)=1$ in the superluminal velocity range corresponds some other invisible

universe, since it is beyond the event horizon. For definiteness, therefore, we will call it the tachyon universe. The value $q(v)=2$ will then correspond to the invisible tardion antiuniverse, the value $q(v)=3$ will correspond to the invisible tachyon antiuniverse, the value $q(v)=4$ will correspond to another (and therefore already invisible) tardion universe, the value $q(v)=5$ will correspond to another tachyon universe. And so on.

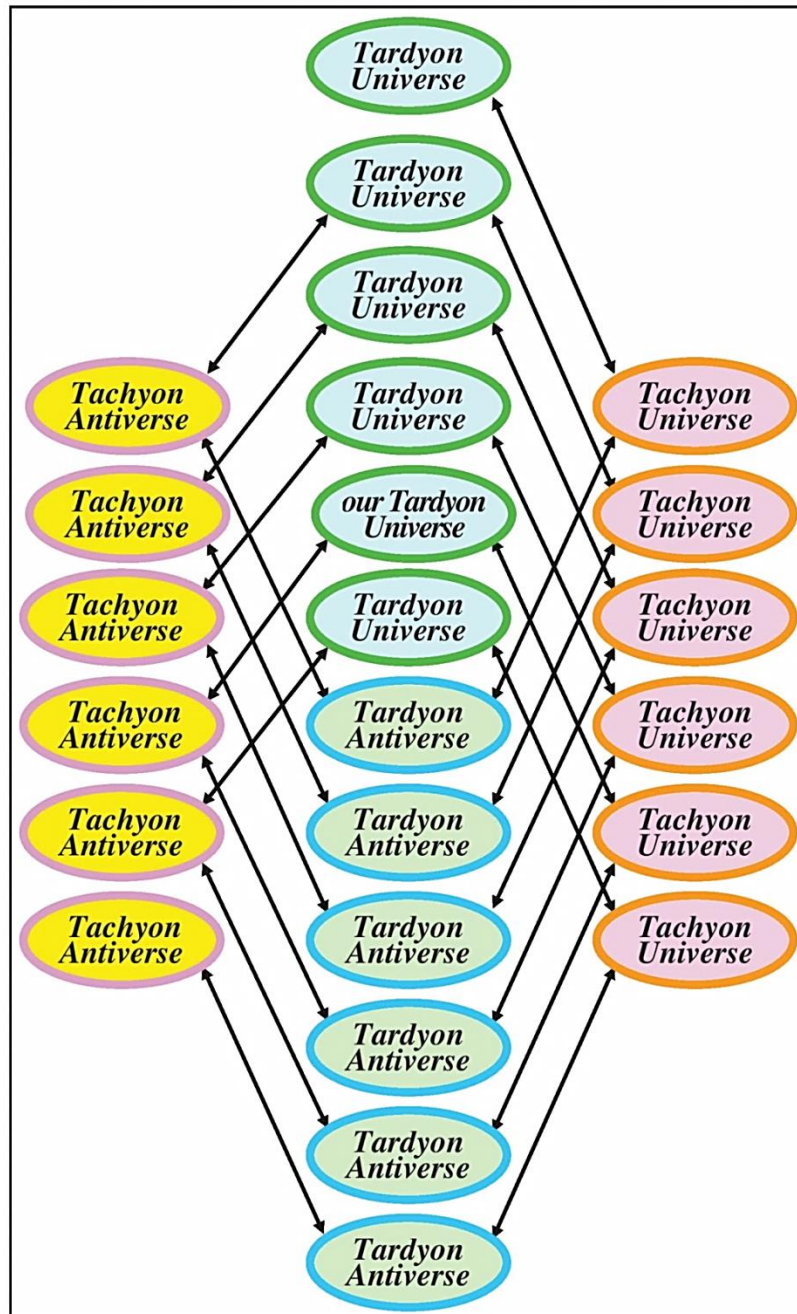


Fig. 4. Structure of the hidden Multiverse corresponding to the principle of physical reality of complex numbers

I.e. according to formulas (4)-(6) there is not one universe in Nature, as it is stated in the generally recognized version of SRT, but a set of mutually invisible universes forming the Multiverse, which therefore we will call hidden. Such a hidden Multiverse, the structure of which is helical, is given in Fig. 4. And in this structure of the hidden Multiverse the distribution of material contents in each three-dimensional parallel universe will be determined by its function $f_q(x,y,z)$, and the value q is the coordinates of these universes. I.e. the hidden Multiverse will be described by the formula $f_q(x,y,z) + iq$.

And this structure of the hidden Multiverse already allows us to explain the problem - where antimatter is located [67]-[71], which is inexplicable within the framework of SRT studied in all physics textbooks. It is clear that it cannot be in our visible universe, because due to its annihilation with matter our universe would

cease to exist. But the fact that antimatter still exists has been proven experimentally. In 1995 at CERN a sensational result was obtained - scientists managed to get nine atoms of antihydrogen, which existed for about forty billionths of a second. And just one gram of such antihydrogen would cost 662.5 trillion (i.e., a thousand billion) dollars.

In the structure of the hidden Multiverse shown in Fig. 4, antimatter (in relation to our earthly matter) is in the nearest tardion antiuniverse [72], which is the cosmic antipode of our visible tardion universe. Moreover, in this tardion antiuniverse there also exists anti-time and anti-space [73]-[82]. But if an inhabitant of the Earth got into the tardionic antiverse, he would not notice anything unusual, as antipodeans do not notice it on the Earth.

Such structure of the hidden Multiverse also allows, at last, to explain the problem that has been tormenting us for a long time - how to reconcile the experimentally proven principle of physical reality of imaginary numbers and the supposedly experimentally irrefutable principle of non-exceeding of the speed of light (because of which the wrong version of SRT, presented in all physics textbooks, is still in demand)? And it turns out that everything is explained very simply and clearly. The statement about existence in the nature only our visible universe follows from the refined principle of non-excess of speed of light. And the refined principle of non-excess of speed of light of SRT follows from the statement about existence in the nature only our visible universe. But that's self-deception that proves nothing! In fact, the refined principle of the unexceeded speed of light, irrefutable in the generally recognized version of SRT, is refuted by the existence of other mutually invisible tardion and tachyon universes and antiverse within the hidden Multiverse, since for all of them $v > c$.

And in order to learn something else about the hidden Multiverse, additional experimental knowledge is already needed.

5. Correction of relativistic formulas using experimental data obtained by WMAP and Planck spacecrafts

And as such additional experimental data we will use the data obtained by the WMAP and Planck spacecrafts, although they were launched into space with a different purpose - to study dark matter and dark energy.

The WMAP spacecraft [83] was launched by the National Aeronautics and Space Administration (NASA) in 2001, and it operated until 2010. And Planck spacecraft [84], launched by European Space Agency (ESA) in 2009, operated until 2013. And according to the data obtained by the WMAP spacecraft, the entire Universe (in fact, of course, the entire hidden Multiverse) consists of 4.6% baryonic matter, 22.4% dark matter and 73.0% dark energy. And according to more recent data obtained by the Planck spacecraft, the entire universe (again, in fact, the entire hidden Multiverse) is 4.9% baryonic matter, 26.8% dark matter and 68.3% dark energy. But what dark matter and dark energy are themselves, was not explained.

And since it was proved above in the most indisputable way that there is not a mono-universe but a hidden Multiverse in Nature, dark matter and dark energy should now be explained in the hidden Multiverse [85]-[89]. In this case it is quite logical to assume that these phenomena are somehow generated by the very structure of the hidden Multiverse and are caused by mutual influence of invisible parallel universes on each other. And then the main features of these phenomena - their invisibility and undetectability of their corpuscular contents - which have been unexplained so far, can be explained clearly and convincingly:

- dark matter and dark energy are in fact not any material physical entities, but only phenomena (presumably gravitational shadow) generated by the existence, besides our visible tardion universe, by other invisible parallel universes and antiverse of the hidden Multiverse;

- dark matter is a phenomenon generated by the existence of invisible parallel universes of the hidden Multiverse neighboring our visible universe;

- dark energy is a phenomenon generated by the existence of other invisible parallel universes of the hidden Multiverse besides our visible universe and its neighboring invisible universes;

- and precisely because dark matter and dark energy are merely phenomena, they have no material content⁴.

Therefore, attempts to detect some subatomic particles of dark matter and dark energy by the current research at the Large Hadron Collider are probably of little promise.

Such an explanation of these phenomena also allows us to clarify the structure of the hidden Multiverse. Indeed, assuming, in accordance with the law of communicating vessels, that the mass of different invisible parallel universes in the hidden Multiverse is almost identical with a high degree of accuracy due to the presence of a large number of portals between them that have existed for billions of years, it is possible to determine:

- how many parallel universes form the hidden Multiverse. And according to the above data obtained by the WMAP spacecraft, their number is $100\% / 4.6\% = 21.74$. And according to the data obtained by the Planck spacecraft, their number is $100\% / 4.9\% = 20.41$. Therefore, their real number is presumably 20 ... 22 parallel universes.

- how many parallel universes are neighboring our universe and give rise to the phenomenon of dark matter. According to the data obtained by the WMAP spacecraft, their number is $22.4\% / 4.6\% = 4.87$. And according to the data obtained by the Planck spacecraft, their number is $26.8\% / 4.9\% = 5.47$. Therefore, their real number is most likely 5 ... 6 parallel universes.

- how many parallel universes generate the phenomenon of dark energy. And according to the data obtained by the WMAP spacecraft, their number is $73.0\% / 4.6\% = 15.87$. And according to the data obtained by the Planck spacecraft, their number is $68.3\% / 4.9\% = 13.94$. Therefore, their real number is presumably 14...16 parallel universes.

And as can be seen, the experimental data obtained by the WMAP and Planck spacecrafts did not confirm the above conclusions about the structure of the hidden Multiverse, since our visible universe in this structure has not two neighboring invisible parallel universes - one tachyon universe and one tachyon antiuniverse - but five or six.

Therefore, it is obvious that there was some error in the previous reasoning. And it turns out that we were wrong in assuming that in the hidden Multiverse⁵ there

⁴ Just as our shadow on a sunny day has no material content

⁵ Just like in the only visible universe in the generally accepted version of STR

is only one additional dimension q and, consequently, its correspondence to physically real complex numbers containing only one imaginary unit. And in order for six⁶ other parallel universes to be neighbors with our visible universe in the really existing hidden Multiverse – three tachyon universes and three tachyon antiuniverses – it is necessary to have three additional dimensions q, r, s ,

where $q(v) = \lfloor v_q/c \rfloor$ – is the "floor" function of discrete math from the argument v_q/c , which is

the coordinate q of the fourth spatial dimension v ; $r(v) = \lfloor v_r/c \rfloor$ – is the "floor" function of discrete math from the argument v_r/c , which is the r coordinate of the fourth spatial dimension;

$s(v) = \lfloor v_s/c \rfloor$ – is the "floor" function of discrete math from the argument v_s/c , which is the s coordinate of the fourth spatial dimension;

$\bar{v}_q, \bar{v}_r, \bar{v}_s$ – projections of the velocity vector $\bar{v}$ on orthogonal coordinates q, r, s .

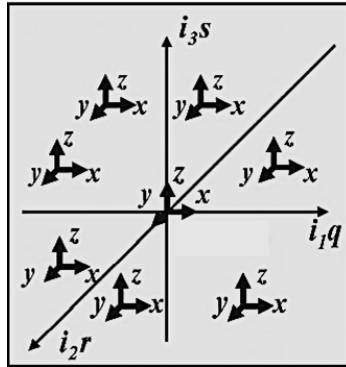


Fig. 5. Six-dimensional space of the hidden Multiverse, where q, r, s are the coordinates of invisible parallel universes, and x, y, z are the coordinates of the matter content in each parallel universe

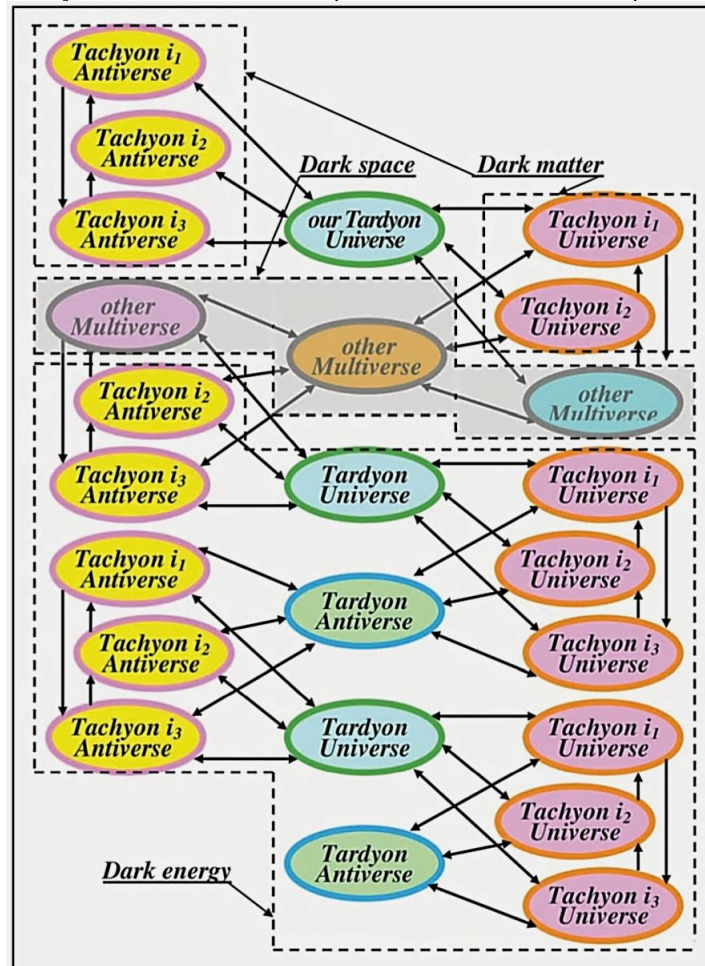


Fig. 6. Possible quaternion structure of the hidden Multiverse containing twenty-two parallel universes, including six invisible universes adjacent to our visible universe

⁶ Or less. Then some parallel universes of our hidden Multiverse may be missing and replaced by universes of neighboring Multiverses.

Consequently, the space of such a hidden Multiverse will be six-dimensional (see Fig. 5). And its structure will correspond to quaternions $\sigma + i_1\omega_1 + i_2\omega_2 + i_3\omega_3$, i.e. hypercomplex numbers [90], containing three imaginary units i_1, i_2, i_3 , which are related to each other by the relations

$$i_1^2 = i_2^2 = i_3^2 = -1 \quad (7)$$

$$i_1 i_2 i_3 = i_2 i_3 i_1 = i_3 i_1 i_2 = -1 \quad (8)$$

$$i_1 i_3 i_2 = i_2 i_1 i_3 = i_3 i_2 i_1 = 1 \quad (9)$$

In such a quaternion structure of the hidden Multiverse [91], [92], unlike the structure considered earlier (in Fig. 4), the distribution of the material content in each three-dimensional parallel universe will be determined by some function $f_{q,r,s}(x, y, z)$, and the quantities $i_1 q, i_2 r$ and $i_3 s$ are the coordinates of these universes. That is, the hidden Multiverse will be described by the formula $f_{q,r,s}(x, y, z) + i_1 q + i_2 r + i_3 s$. This is exactly what Lisa Randall predicted: “*We live in a three-dimensional pocket of higher dimensional space*”. And therefore, the relativistic formulas (7)-(9) should be corrected once again as follows

$$m(q, r, s) = \frac{m_0 i_1^q i_2^r i_3^s}{\sqrt{1 - [\frac{v}{c} - (q + r + s)]^2}} \quad (10)$$

$$\Delta t(q, r, s) = \Delta t_0 i_1^q i_2^r i_3^s \sqrt{1 - [\frac{v}{c} - (q + r + s)]^2} \quad (11)$$

$$l(q, r, s) = l_0 i_1^q i_2^r i_3^s \sqrt{1 - [\frac{v}{c} - (q + r + s)]^2} \quad (12)$$

And from formulas (10)-(12) it follows that such a hidden Multiverse still has a helical structure. In this case, it is possible to move to the tardion antiuniverse from the tardion universe and to the tardion universe from the tardion antiuniverse in different ways, but not in an arbitrary way, but only in such a way (see Fig. 6)

in which the quantity $i_1^q i_2^r i_3^s$ will successively take

the values $+1, +i_1 \oplus i_2 \oplus i_3, -1, -i_1 \oplus i_2 \oplus i_3, +1, \dots$ and so on, where $\oplus$ is the symbol of the logical operation of discrete mathematics ‘exclusive OR’. In this case, different trajectories of movement from some universes (or antiuniverses) to others can differ only due to the replacement of some tachyon universes from i_1, i_2, i_3 with others and some tachyon antiuniverses from i_1, i_2, i_3 with others. Therefore, the tachyon universes

i_1, i_2, i_3 in the hidden Multiverse are placed parallel to

each other. The tachyon antiuniverses i_1, i_2, i_3 for the same reasons are also placed parallel to each other. And therefore, in the hidden Multiverse, when moving from any tardyon universe to a tardyon antiuniverse and then to another tardyon universe, parallel universes and antiuniverses must alternate in the following sequence – ‘tardyon universe’, ‘one of the tachyon universes’, ‘tardyon antiuniverse’, ‘one of the tachyon antiuniverses’, ‘tardyon universe’, ‘one of the tachyon universes’, etc.

One of the simplest to explain such quaternion structures of the hidden Multiverse is shown in Fig. 6. It differs from the structure shown in Fig. 4 in that it contains several different tachyon universes and antiuniverses arranged in parallel, corresponding to three imaginary units i_1, i_2, i_3 . Another difference is that such a structure of the Multiverse contains not only bi-directional portals corresponding to formula (7) and designated by double-sided arrows, but also unidirectional portals⁷ corresponding to formulas (8), (9) and designated by single-sided arrows.

Moreover, naturally, movement from our tardyon universe to a tardyon antiuniverse through some tachyon universe – for example i_1 – does not necessarily

have to proceed through a tachyon antiuniverse i_1 . It can proceed through tachyon antiuniverses and . The same reservation applies to the situation if the movement from the tardion universe to the tardion antiuniverse begins through tachyon universes i_2 or i_3 .

All these transitions are shown in Fig. 6. Moreover, since the data obtained by the WMAP and Planck spacecraft correspond to open helical structures of our hidden Multiverse, united through corresponding portals with other Multiverses, then all together they form the Hyperuniverse.

6. How can we be sure that there are other mutually invisible universes neighboring our visible universe?

Thus, we have finally fully proven and explained that the version of STR studied in all physics textbooks is incorrect and have proposed a corrected version of this theory. But for this corrected version to have every right to be called a theory, it must be fully confirmed experimentally. We have already proven the physical reality of imaginary numbers. Therefore, it remains to prove the real physical existence of other mutually invisible universes and anti-universes in addition to our visible universe.

And again, it turns out that this is possible and not even very difficult. It would seem that for this it is necessary to visit other universes. But this is not necessary. It is enough to at least look into them. As in order to be

⁷ Why in such portals movement is possible only in one direction - from the entrance to the exit - is difficult for us, living in a space in which movement in nature is possible in any direction, to imagine. The processes that determine the possibility of such movement in nature are yet to be understood.

But for visitors who find themselves in such one-way portals, they are more dangerous than two-way portals, since it is impossible to return from them to your universe. Although in the metro with one-way movement on escalators we still encounter. But the metro is not nature.

convinced that in addition to the room visible to us, in which we are now, there is a neighboring invisible room, it is enough to look into the neighboring room from the corridor connecting these rooms. The corridor connecting neighboring universes is the portals [93]-[95]. And the entrances to the portals are at least some of the so-called anomalous zones, of which there are

many on Earth – more than one hundred thousand [96]-[99]. And in order to be sure, while in the portals, that you are no longer in our universe, but on the way to a neighboring universe, you need to look at the starry sky through a telescope and see other constellations in it [100]-[105]. This is a very reliable experiment, since you cannot draw constellations in the sky.



Fig. 7. Main Astronomical Observatory of the National Academy of Sciences of Ukraine

But people avoid visiting these anomalous zones, because people who get there usually do not return. And they are right to avoid them, because portals are labyrinths, and invisible ones at that. Therefore, getting out of them is really very difficult. But if you know this, then portals can still be used for scientific research, taking appropriate precautions. Well, at least in the form of Ariadne's thread, which helps to find the way back. And even better with the use of unmanned robotic vehicles, which are now very successfully used in military operations. It is also possible to create portal orientation tools (similar to a compass for sailors), using the phenomenon of weakening the level of terrestrial radio radiation when immersed in portals.

It is even possible to take advantage of the fact that since there are a great many anomalous zones, observatories are already located in some of them. For example, the Main Astronomical Observatory of the National Academy of Sciences of Ukraine, which is located in the Goloseevsky Forest just 12 km from the center of the capital of Ukraine, Kiev (Fig. 7). Of course, in the anomalous zone at the very entrance to the portal, the change in the configuration of the observed constellations is very small and is imperceptible

to the human eye, but with the help of a computer, into which information from several observatories located close to each other in the anomalous zones and outside the anomalous zones will be entered, these changes can be detected (see Fig. 8). Otherwise, astronomers with a telescope will have to go deeper into the portal. After all, the English astrophysicist Sir Arthur Stanley Eddington [106] managed to confirm the deflection of light rays in the gravitational field of the Sun predicted by the general theory of relativity back in 1919 with his famous experiment, similar to the one we are proposing.

The proposal to conduct such a simple and low-cost experiment was published several years ago. And it is even strange that it has not been done yet, since in the case of a successful discovery of neighboring parallel universes, one could receive a Nobel Prize for their discovery, and in the case of their failure to discover them, one could very authoritatively prove the validity of the generally accepted version of STR studied in all physics textbooks. So in any case, a very valuable scientific result would have been obtained.

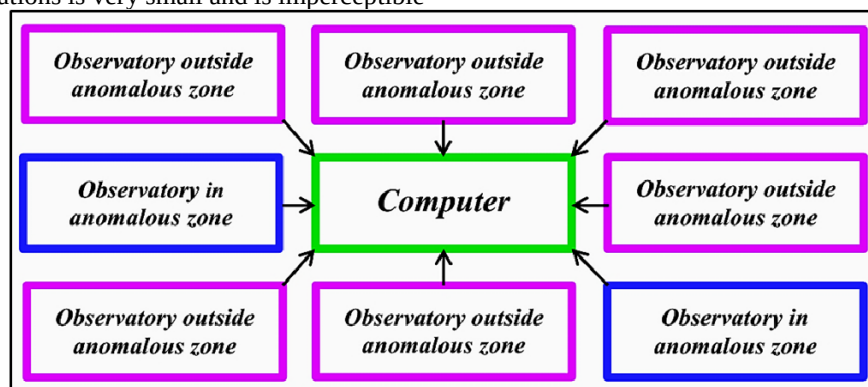


Fig. 8. Scheme of an astronomical experiment to detect invisible universes

But when such an experiment is done, then if the existence of neighboring invisible universes is proven, sooner or later there will be a desire to study them. And first of all, to find out how many there are. But it will be difficult to answer this question with the help of astronomical observations, since all the observatories are located in different places and their observations will therefore be difficult to compare. And in this situation it will therefore be useful to additionally use geophysical research of portals [107]-[116].

7. Conclusion.

Thus, the article has proven experimentally and explained theoretically that the version of STR presented in all physics textbooks is indeed incorrect, since:

- the relativistic formulas obtained in it are incorrect;
- the relativistic formulas obtained in it are incorrectly explained using the incorrect principle of not exceeding the speed of light;
- from these incorrect relativistic formulas, incorrect conclusions are made about the physical unreality of imaginary numbers and the existence in nature of our only visible universe, in which everything is measured only by real numbers.

But in the generally accepted version of STR, from the relativistic formulas obtained in it, it follows that speed is the fourth spatial dimension, in which, therefore, other parallel universes exist. And these parallel universes, in order to exist without plunging into each other, are mathematically described by alternating real and imaginary numbers, as a result of which they are all mutually invisible.

However, without understanding this, the creators of STR, without completing their derivation, left their relativistic formulas such that the incorrect mathematical description of the invisible universes adjacent to our visible universe made them physically unrealizable. And, unable to explain all this, they postulated the principle of not exceeding the speed of light, by which from the fourth spatial dimension realizing the principle of relativism they left only our visible universe, because only in this way could they explain anything. But in this article the author offers a description of an astronomical experiment in portals, by which the existence of mutually invisible parallel universes can be proven and thereby also the existence of the fourth spatial change in full.

Therefore, the article once again presents the corrected version of the STR proposed by the author [117]-[125], from which incorrect principle of not exceeding the speed of light is excluded and replaced by an experimentally proven general scientific principle of the physical reality of imaginary numbers discovered 500 years ago, which finally explains their physical meaning.

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References:

1. Larmor J.J. (1897). A Dynamical Theory of the Electric and Luminiferous Medium. Part III. Relations with Material Media. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences. 190, 205-300.
2. Lorentz H.A. (1899). Simplified Theory of Electrical and Optical Phenomena in Moving Systems. Proceedings of the Netherlands Academy of Arts and Science. Amsterdam. 1, 427-442.
3. Poincaré H. (1905). On the Dynamics of the Electron. Comptes Rendus. 140. 1504-1508.
4. Einstein A. (1905). Zur Elektrodynamik bewegter Körper. Annals of Physic. 17. 891-921.
5. Einstein A. (1920). Relativity: The Special and General Theory. H. Holt and Company. NY.
6. Bohm D. (2006). The Special Theory of Relativity. Routledge, Abingdon on Thames.
7. Penrose R. (2010). The Nature of Space and Time. Princeton University Press. Princeton.
8. Antonov A.A. (2021). The special theory of relativity stated in physics textbooks is incorrect. 77th International Scientific Conference of the Eurasian Scientific Association "Theoretical and practical issues of modern science". Moscow. ESA. 11-15
9. Antonov A. A. (2021). Version of the special theory of relativity that is studied in all physics textbooks is incorrect. Österreichisches Multiscience Journal (Innsbruck, Austria). 43(1). 17-22. <http://osterr-science.com>
10. Antonov A. A. (2021). Generally accepted version of the special theory of relativity contained in physics textbooks is incorrect. The scientific heritage. (Budapest, Hungary). 73(2). 39-43. DOI: 19.24412/9215-0365-2021-73-2-39-43
11. Antonov A. A. (2021). Special theory of relativity, which is studied in physics text-books, is incorrect. German International Journal of Modern Science. 16, 49-53. DOI: 10.24412/2701-8369-2021-16-49-53
12. Antonov A. A. (2021). Special theory of relativity, which is studied in all physics textbooks, is incorrect. Danish Scientific Journal. 51(1). 31-35. <http://www.danish-journal.com>
13. Antonov A. A. (2021). Special theory of relativity taught in all physics textbooks is incorrect. Annali d'Italia. 22(1). 39-44. <https://www.anditalia.com/>
14. Antonov A. A. (2021). Special theory of relativity presented in physics text-books is wrong. Norwegian Journal of development of the International Science 68(1). 3-7. DOI: 10.24412/3453-9875-2021-68-3-7.
15. Antonov A. A. (2021). In all physics textbooks an erroneous version of special theory of relativity is given. International independent scientific journal. 31.34-39. <http://www.iis-journal.com>
16. Antonov A. A. (2021). Special theory of relativity taught in physics textbooks is wrong. Journal of science. Lyon. 23. 47-52. <https://www.joslyon.com/>

17. Antonov A. A. (2021). All physics textbooks study incorrect special theory of relativity. *Sciences of Europe*. (Praha, Czech Republic) 79(1). 30-35.
DOI: 10/24412/3162-2364-2021-79-30-35
18. Antonov A. A. (2021). Experimental proofs of infidelity of the version of the special theory of relativity studied in physics textbooks and the truth of its alternative version. 80th International Scientific Conference of the Eurasian Scientific Association "Development of science and education in the conditions of global instability". Moscow. ESA. 8-17.
<https://esa-conference.ru/sborniki/?y=2021>
19. Antonov A. A. (2021). The fallacy of the STR version studied in physics text-books proved experimentally. *Österreichisches Multiscience Journal* (Innsbruck, Austria). 45(1). 17-26. <http://osterr-science.com>
20. Antonov A. A. (2021). Experimental evidences for the fallacy of the STR version in the physics textbooks. *European Journal of Applied Sciences. Services for Science and Education*. UK. 9(6). 349-364. DOI:10.14738/aivp.96.11304.
21. Antonov A. A. (2021). If the STR version in physics textbooks were true, we would never have heard the music of the piano and the bell ringing, there would be no television, no cellular telephony, no radar or GPS navigation, we would not even be aware of the existence of resonance and Ohm's law as interpreted by Steinmetz, and our children could not swing on the swings. *The scientific heritage* (Budapest, Hungary). 78(2). 41-50.
DOI: 10.24412/9215-0365-2021-78-2-41-50
22. Antonov A. A. (2021). Experimental refutations of the STR version contained in physics textbooks and confirmations of the truth of its alternative version. *German International Journal of Modern Science*. 22. 52-61. DOI: 10.24412/2701-8369-2021-22-52-61
23. Antonov A. A. (2021). The STR version in physics textbooks must be corrected, because if it were true, there would be no tsunamis or indian summer in nature, we would be never have heard piano music, engineers would be not have been able to create television, cell phones, GPS trackers, and even children would not be able to swing on swings. *Danish Scientific Journal*. 54(1). 29-38. <http://www.danish-journal.com>
24. Antonov A. A. (2021). Experimental evidence of the incorrectness of the STR version studied in physics textbooks. *Annali d'Italia*. 25(1). 32-41. <https://www.anditalia.com/>
25. Antonov A. A. (2021). The incorrectness of the STR version presented in physics textbooks proven experimentally. *Norwegian Journal of development of the International Science*. 74(1). 3-7. DOI: 10.24412/2453-9875-2021-74-53-62.
26. Antonov A. A. (2021). Experimental refutations of the generally accepted version of the SRT studied in physics textbooks. *International independent scientific journal*. 34(1). 23-32. <http://www.iis-journal.com>
27. Antonov A. A. (2021). Experimental refutations of the SRT version in the physics textbooks. *Journal of science*. Lyon. 26(1). 29-37. <https://www.joslyon.com/>
28. Antonov A. A. (2021). Experimental evidences for the fallacy of the STR version in physics textbooks. *Sciences of Europe* (Praha, Czech Republic). 82(2). 19-28.
DOI: 10.24412/3162-2364-2021-82-2-19-28
29. Antonov A. A. (2021). The version of STR stated in physics textbooks is incorrect because it denies the existence of radio engineering. 82nd International Scientific Conference of the Eurasian Scientific Association "Scientific result in theory and practice". Moscow. ESA. 11-15. <https://esa-conference.ru/sborniki/?y=2021>
30. Antonov A. A. (2022). The version of STR presented in physics textbooks is incorrect, since it follows from it that radio engineering should not exist. *European Journal of Applied Sciences. Services for Science and Education*. UK. 10(1). 440-445.
DOI://doi.org/10.14738/aivp.101.2022
31. Antonov A. A. (2022). The existence of radio engineering refutes the physics text-books version of STR. *The scientific heritage*. (Budapest, Hungary). 83(1). 19-22.
DOI: 10.24412/9215-0365-2022-83-1-19-22
32. Antonov A.A. (2022). The fundamental Ohm's law in radio engineering as interpreted by Steinmetz, which proves the physical reality on imaginary capacitive and inductive reactances, refuted the version of the STR presented in physics textbooks even before its creation. *German International Journal of Modern Science*. 26. 50-53.
DOI: 10.24412/2701-8369-2022-26-50-63
33. Antonov A.A. (2022). The version of STR stated in physics textbooks is refuted by the existence of radio engineering. *Danish Scientific Journal*. 56. 56-59.
<http://www.danish-journal.com>
34. Antonov A.A. (2022). The version of STR presented in physics textbooks is incorrect because it denies the possibility of the existence of Ohm's law as interpreted by Steinmetz and, consequently, the existence of radio engineering. *Annali d'Italia*. 28(1), 43-47.
<https://www.anditalia.com/>
35. Antonov A.A. (2022). The version of STR stated in physics textbooks is refuted by the existence of radio engineering. *Norwegian Journal of development of the International Science*. 78(1). 63-67. DOI: 10.24412/3453-9875-2022-78-63-66.
36. Antonov A.A. (2022). If the physics textbook version of STR were true, then Ohm's law should not exist in nature, and therefore all radio engineering would not exist. *International independent scientific journal*. 36. 16-19. <http://www.iis-journal.com>
37. Antonov A.A. (2022). If the version of STR in physics text-books were true, then there would be no radar, no television, no radio navigation, no telecommunication and many other things. *Journal of science*. Lyon. 28. 76-79. <https://www.joslyon.com/>
38. Antonov A.A. (2022). The version of STR set out in physics textbooks is incorrect because it states that Ohm's law as interpreted by Steinmetz does not really exist, and therefore radio engineering does not exist either. *Sciences of Europe* (Praha, Czech Republic). 87(1). 54-57. DOI: 10.24412/3162-2364-2022-1-54-57

39. Antonov A.A. (2022). Why the physics textbooks teach an incorrect version of the special theory of relativity which denies the existence of radio- and electrical engineering. III international scientific conference "Challenges and problems of modern science". London. Great Britain. 78-86. DOI: <https://doi.org/10.5281/zenodo.7486814>
40. Antonov A. A. (2023). Why is the incorrect version of the special theory of relativity being studied in physics textbooks, refuted the existence of radio- and electrical engineering even before its creation? The scientific heritage. (Budapest, Hungary). 105. 83-89. DOI: [10.5281/zenodo.7560145](https://doi.org/10.5281/zenodo.7560145)
41. Antonov A.A. (2023). Why is an incorrect version of the special theory of relativity that denies the possibility of the existence radio and electrical engineering being studied in physics text-books? German International Journal of Modern Science. 48. 23-29. DOI: <https://doi.org/10.5281/zenodo.7541137>
42. Antonov A.A. (2023). Who needs the incorrect version of special relativity taught in physics textbooks despite all its experimental refutations? Annali d'Italia. 39, 64-70. DOI: [10.5281/zenodo.7568916](https://doi.org/10.5281/zenodo.7568916)
43. Antonov A.A. (2023). Why is incorrect version of the special theory of relativity that denies the possibility of the existence of radio and electrical engineering being studied in textbooks of physics? Norwegian Journal of development of the International Science. 100. 27-33. <https://doi.org/10.5281/zenodo.7528512>
44. Antonov A.A. (2023). Why is incorrect version of the special theory of relativity, refuted by the existence of radio and electrical engineering, is still studies in all university physics text-books? Danish Scientific Journal. 69. 66-72. <https://doi.org/10.5281/zenodo.7692053>
45. Antonov A.A. (2023). Why is incorrect version of the special relativity still being studied in physics textbooks, which denies Ohm's law for alternating current used worldwide by millions of radio- and electrical engineers? International independent scientific journal. 46. 38-44. <https://doi.org/10.5281/zenodo.7525751>.
46. Antonov A.A. (2023). Why is the generally accepted version of STR, which denies the possibility of the existence of radio engineering and electrical engineering, tsunamis and bell ringing, the physical phenomenon of resonance and Ohm's physical law for alternating current, music created by the piano and even swing swings on the playground, nevertheless is still considered correct and studied in physics textbooks? Sciences of Europe (Praha, Czech Republic). 112. 44-50. DOI: [10.5281/zenodo.7708515](https://doi.org/10.5281/zenodo.7708515)
47. Antonov A.A. (2023). Why is the incorrect version of the special theory of relativity still being studied in physics textbooks, despite all its experimental refutations. European Journal of Applied Sciences. Services for Science and Education. UK. 11(2). 61-71. DOI: <https://doi.org/10.14738/aivp.112.14128>
48. Antonov A.A. (2023). Why the incorrect version of the special theory of relativity, which denies the possibility of the existence of radio engineering and electrical engineering, has not yet been refuted. Journal of science. Lyon. 40. 19-25. <https://doi.org/10.5281/zenodo.7704392>
49. Weinstein E.W. (2005). The CRC Concise Encyclopedia of Mathematics. 3-rd ed. CRS Press. Boca Raton, FL.
50. Beckmann P. (1976). A history of π . 3rd edition. St. Martin Press. NY.
51. Cherenkov P.A. (1959). Radiation of particles with superluminal speed and some applications of this radiation in experimental physics. Advances in Physical Sciences 68(3). 377-386. DOI: <https://doi.org/10.3367/UFNr.0068195907b.0377>
52. Adam T., Agafonova N, Aleksandrov A. et al. (2012). Measurement of the neutrino velocity with the OPERA detector in the CNGS beam. arxiv:1109.4897v4[hep-ex].
53. Antonello M., Baibussinov B., Boffelli F. et al. (2012). Precision measurement of the neutrino velocity with the ICARUS detector in the CNGS beam. arxiv:1208.2629v[hep-ex].
54. Steinmetz C. P. (2010). Theory and Calculation of Electric Circuit. Nabu Press.
55. Antonov A. A. (2008). Physical Reality of Resonance on Complex Frequencies. European Journal of Scientific Research. 21(4). 627-641. <http://www.eurojournals.com/ejsr.htm>
56. Antonov A. A. (2009). Resonance on Real and Complex Frequencies. European Journal of Scientific Research. 28(2). 193-204. <http://www.eurojournals.com/ejsr.htm>
57. Antonov A. A. (2010). New Interpretation of Resonance. International Journal of Pure and Applied Sciences and Technology. 1(2). 1-12. http://doi.org/10.17686/sced_rusnauka_2010-888
58. Antonov A. A. (2010). Oscillation processes as a tool of physics cognition. American Journal of Scientific and Industrial Research. 1(2). 342-349. doi:10.5251/ajsir.2010.1.2.342.349
59. Antonov A. A. (2010). Solution of algebraic quadratic equations taking into account transitional processes in oscillation systems. General Mathematics Notes. 1(9). 11-16. http://doi.org/10.17686/sced_rusnauka_2010-887
60. Antonov A. A. (2013). Physical Reality of Complex Numbers. International Journal of Management, IT and Engineering. 3(4). 219-230. http://doi.org/10.17686/sced_rusnauka_2013-898
61. 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. doi:10.5251/ajsir.2014.5.2.40.52
62. Antonov A. A. (2015). Physical reality of complex numbers is proved by research of resonance. General Mathematics Notes. 31(2). 34-53. http://www.emis.de/journals/GMN/yahoo_site_admin/assets/docs/4_GMN9212-V31N2.129701.pdf
63. Antonov A.A. (2015). Principle of physical reality of imaginary and complex numbers in modern cosmology: the nature of dark matter and dark energy.

- Journal of the Russian physico-chemical society. 87(1). 328-355. (In Russian)
http://doi.org/10.17686/sced_rusnauka_2015-1119
64. Antonov A. A. (2016). Physical Reality and Nature of Imaginary, Complex and Hypercomplex Numbers. *General Mathematics Notes*. 35(2). 40-63.
http://www.geman.in/yahoo_site_admin/as-sets/docs/4_GMN-10932-V35N2.31895146.pdf
65. Antonov A. A. (2017). The physical reality and essence of imaginary numbers. *Norwegian Journal of development of the International Science*. 6. 50-63.
<http://www.njd-iscience.com>
66. Antonov A. A. (2018). Physical Reality and Essence of Imaginary Numbers in Astrophysics: Dark Matter, Dark Energy, Dark Space. *Natural Science*. 10(1). 11-30.
 doi:10.4236/ns.2018.101002
67. Alfvén H. (1966). *Worlds-Antiworlds: Antimatter in Cosmology*. W. H. Freeman & Co. San Francisco.
68. Foot R. (2002). *Shadow Lands: Quest for Mirror Matter in the Universe*. Universal Publishers. Parkland, FL.
69. Frazer G. (2004). *Antimatter: The Ultimate Mirror*. Cambridge University Press, Cambridge, UK.
70. Santilli R. M. (2006). *Isodual Theory of Antimatter: With Applications to Antigravity, Grand Unification and Cosmology*. Springer. Dordrecht. Netherlands.
71. Alain M., Le Brun V. (2012). *Matter, Dark Matter, and Anti-Matter: In Search of the Hidden Universe*. Springer-Verlag. NY.
72. Antonov A.A. (2016). Dark matter, dark energy and antimatter are located in the hidden Multiverse. *PONTE*. 72(8). 288-300.
73. Antonov A. A. 2021. Antimatter, Anti-Space, Anti-Time. *Journal of Modern Physics*, 12(05), 646-660. DOI: 10.4236/jmp.2021.125042.
74. Antonov A. A. Antimatter, anti-space, anti-time. (2021). 75th International Conference of the Eurasian Scientific Association "Strategies for Sustainable Development of World Science". Moscow. ENO. 1-4. DOI: 10.5281/zenodo.4926585 (In Russian)
75. Antonov A. A. 2021. Do antimatter, anti-time and anti-space exist in nature. *Annali d'Italia*. 20(1). 14-24. <https://www.anditalia.com/>
76. Antonov A. A. 2021. From the alternative version of the SRT it follows that there is not only antimatter, but also anti-space and anti-time. *Norwegian Journal of Development of the International Science*. 62(1). 41-51. DOI: 10.24412/3453-9875-2021-62-1-41-51
77. Antonov A. A. 2021. Antipodes in space. *German International Journal of Modern Science*. 11(1). 15-25. DOI: 10.24412/2701-8369-2021-11-1-15-25
78. Antonov A. A. 2021. There is not only antimatter, but also anti-space and anti-time. *Journal of science*. Lyon. 21. 22-30. <https://www.joslyon.com/>
79. Antonov A. A. 2021. Where are antimatter, anti-space and anti-time? *Österreichisches Multiscience Journal*. (Innsbruck, Austria). 40(1). 34-44. <http://osterr-science.com>
80. Antonov A. A. 2021. Do antimatter, anti-time and anti-space exist in nature? *Danish Scientific Journal*. 48(1). 64-74. <http://www.danish-journal.com>
81. Antonov A. A. 2021. Antipodes in space. *International independent scientific journal*. 28. 50-61. <http://www.iis-journal.com>
82. Antonov A. A. 2021. How alternative version of SRT explains the existence of antimatter, anti-space and anti-time? *The scientific heritage (Budapest, Hungary)*. 67(1). 11-21.
 DOI: 10.24412/9215-0365-2021-67-1-11-21
83. Hinshaw G., Larson D., Komatsu E., et al. (2013) Nine Year Wilkinson Anisotropy Probe (WMAP) Observations: Cosmological Parameter Results. arXiv:1213.5226 [astro-ph/CO].
84. Adam R., Ade P.A.R., Aghanim N., et al. (2015). Planck 2015 Results. 1. Overview of Products and Scientific Results. arXiv:1502.01582v2 [astro-ph.CO].
85. Antonov A. A. (2015). Hidden Multiverse. *International Journal of Advanced Research in Physical Science*. 2(1). 25-32.
http://doi.org/10.17686/sced_rusnauka_2015-903.
86. Antonov A.A. (2015). The astrophysical phenomenon of dark matter and dark energy proves the existence of the hidden Multiverse. *American Journal of Modern Physics*. 4(4). 180-188. DOI: 10.11648/j.jamp.20150404.14
87. Antonov A. A. (2015). Hidden Multiverse: explanation of dark matter and dark energy phenomena. *International Journal of Physics*. 3(2). 84-87. doi:10.12691/ijp-3-2-6
88. Antonov A. A. (2015). Principles and structure of the real Multiverse: explanation of dark matter and dark energy phenomena. *American Journal of Modern Physics*. 4(1). 1-9.
 doi: 10.11648/j.ajmp.20150401.11
89. Antonov A. A. (2016). Hypothesis of the Hidden Multiverse: Explains Dark Matter and Dark Energy. *Journal of Modern Physics*. 7(10), 1228- 1246. doi: 10.4236/jmp.2016.71011
90. Kantor I. L., Solodovnikov A. S. (1989). *Hypercomplex Numbers: An Elementary Introduction to Algebras*. Springer-Verlag
91. Antonov A. A. (2015). Quaternion structure of the hidden Multiverse: explanation of dark matter and dark energy. *Global Journal of Science. Frontier Research A: Physics and Space Science*. 15(8). 8-15.
https://globaljournals.org/GJSFR_Volume15/2-Quaternion-Structure-of-the-Hidden.Pdf
92. Antonov A. A. (2016). Verifiable Multiverse. *Global Journal of Science Frontier Research: A Physics and Space Science*. 16(4) 4-12. doi: 10.17406/GJSFR
93. Antonov A. A. (2012), Earth, portals, parallel universes. *American Journal of Scientific and Industrial Research*. 3(6). 464-473. doi:10.5251/ajsir.2012.3.6.464.473
94. Antonov A. A. (13 January 2016). How Portals of the Invisible Multiverse Operate. *Science PG Frontiers*.
<http://www.sciencepublishing-group.com/news/sciencepgfrontiersinfo?articleid=7>

95. Antonov, A. A. (2016). Star gates of the hidden multiverse. Philosophy and cosmology. 6. 11-27. (In Russian). <http://ispcjournal.org/journals/2016-16/Antonov16.pdf>
96. Chernobrov, V. (2000). Encyclopedia of mysterious places of the Earth. Veche Publishing House. Moscow. (In Russian).
97. Chernobrov, V. (2004). Encyclopedia of mysterious places of Russia. Veche Publishing House. Moscow. (In Russian).
98. Chernobrov, V. (2007). Encyclopedia of mysterious places of the Earth and space. Veche Publishing House. Moscow. (In Russian).
99. Chernobrov, V. (2009). Encyclopedia of mysterious places of Moscow and Moscow region. Helios ARV Publishing House. Moscow. (In Russian).
100. Antonov A. A. (2020). How to See Invisible Universes. Journal of Modern Physics. 11(05), 593-607. DOI: 10.4236/jmp.2020.115039
101. Antonov A. A. (2020). Can invisible universes be seen? International independent scientific journal. 21(2). 51-60. <http://www.iis-journal.com>
102. Antonov A. A. (2020). How to discover invisible universes. Norwegian Journal of development of the International Science. 42(1). 36-48. <http://www.njd-iscience.com>
103. Antonov A. A. (2020). Universes Being Invisible on Earth outside the Portals Are Visible in Portals. Natural Science. 12(8). 569-587. <https://doi.org/10.4236/ns.2020.128044>
104. Antonov A. A. (2020). Invisible universes can be seen in anomalous zones. Danish Scientific Journal. 43(1). 9-24. <http://www.danish-journal.com>
105. Antonov A. A. (2021). Invisible universes can be seen in anomalous zones. International independent scientific journal. 23(1). 28-44.
106. Dyson F.W, Eddington A.S., Davidson C. (1929). A determination of the deflection of light by the sun's gravitational field, from observations made at the total eclipse of May 29, 1919. Philosophical transactions of the Royal Society A. 220. 291-333. <https://doi.org/10.1098/rsta.1920.0009>
107. Antonov A.A Geophysical exploration of portals will provide new knowledge about space. Proceedings of the III International Scientific Conference. Philadelphia. USA. "The modern vector of the development of science". Philadelphia, USA. 2023. 85-101. DOI <https://doi.org/10.5281/zenodo.7709801>
108. Antonov A.A. 2023. Geophysical researches of portals will allow to discover invisible universes and to explore them. European Journal of Applied Sciences. Services for Sciences and education. UK. 11(2). 370-391. DOI:10.14738/aivp.112.14323.
109. Antonov A.A. 2023. The necessity of geophysical researches of portals. The scientific heritage. (Budapest, Hungary). 110. 77-90. 82. DOI: 10.5281/zenodo.7804563
110. Antonov A.A. 2023. Geophysical researches of portals will allow to prove the existence of invisible universes and to explore them. German International Journal of Modern Science. 53. 64-78. DOI: 10.5281/zenodo.7796151
111. Antonov A.A. 2023. The relevance of geophysical researches of portals. Danish Scientific Journal. 70. 75-89. <https://doi.org/10.5281/zenodo.778944>
112. Antonov A.A. 2023. Geophysical researches of portals will allow to prove the existence of hidden Multiverse and to research it. Annali d'Italia. 42. 71-85. DOI: 10.5281/zenodo.7865307
113. Antonov A.A. 2023. Why geophysical researches of portals are necessary. Norwegian Journal of development of the International Science. 105. 83-96. <https://doi.org/10.5281/zenodo.7779019>
114. Antonov A.A. 2023. Geophysical researches of portals will allow to prove the existence of hidden Multiverse and to research it. International independent scientific journal. 49. 23-37.
115. Antonov A.A. 2023. Geophysical researches of portals will allow to discover invisible universes. Journal of science. Lyon. 41. 26-38.
116. Antonov A.A. 2023. Geophysical researches of portals will allow to prove the existence of hidden Multiverse and to research it. Sciences of Europe. 114. 76- 90
117. Antonov A.A. (2023). The Corrected Version of the Special Theory of Relativity. European Journal of Applied Sciences. Services for Science and Education. UK. 11 (5). 68-83. DOI:10.14738/aivp.115.15474
118. Antonov A. A. (2023). Corrected special theory of relativity. Journal of science. Lyon. 47. 14-23. <https://doi.org/10.5281/zenodo.10068983>
120. Antonov A. A. (2023). Corrected special theory of relativity. Annali d'Italia. 49, 25-35. DOI: 10.5281/zenodo.10214679
119. Antonov A. A. (2023). Corrected special theory of relativity. Journal of science. Lyon. 48. 27-36. <https://doi.org/10.5281/zenodo.10277156>
121. Antonov A. A. (2023). The Corrected Version of the Special Theory of Relativity. The scientific heritage. (Budapest, Hungary). 123. 72-81. DOI: 10.5281/zenodo.10033028
122. Antonov A. A. (2023). The Corrected Version of the Special Theory of Relativity. Norwegian Journal of development of the International Science. 118. 40-49. <https://doi.org/10.5281/zenodo.10009500>
123. Antonov A. A. (2023). Alternative Version of the Special Theory of Relativity. Sciences of Europe. (Praha, Czech Republic). 128. 62-71. DOI: 10.5281/zenodo.10081933
124. Antonov A. A. (2023). Special Theory of Relativity. German International Journal of Modern Science. 67. 64-73. DOI: 10.5281/zenodo.10966458
125. Antonov A. A. (2023). Corrected Version of the Special Theory of Relativity. Danish Scientific Journal. 77. 88-97. <https://doi.org/10.5281/zenodo.10054677>