



Physical Sciences: From the Corrected Version of the SRT it Follows that Time Travels for People on Earth is Physically Possible and Technically Feasible*

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Abstract: The article explains that it will probably soon be possible to travel through time on Earth. And such a possibility is created by the corrected version of the special theory of relativity (SRT). But the version of SRT studied in all physics textbooks states that time travel on Earth will never be available to people. Nevertheless, ignoring this opinion of the generally recognized service station, currently millions of air passengers already travel through time every day, which is confirmed by the translation of their watches to local time after landing the plane.

Keywords: special relativity theory, relativistic formulas, Multiverse, anti-universe, antimatter, anti-time, internal time, external time, time zones of Earth, time travels

PREFACE

The author published his three “top secret” articles in which the physical reality of imaginary numbers was proved, during the existence of the USSR. And after this, the Library of the US Congress contacted the author’s place of work with a request to send an unclassified his publications. And at this time the author, having learned about the secret resolution of the Presidium of the USSR Academy of Sciences 1964 prohibiting any criticism of the works of Albert Einstein, not wanting to be repressed, stopped his research and left the Moscow region for Ukraine. And he resumed his research only after the collapse of the USSR, as a result of which Ukraine became independent. Later, already living in Ukraine, the author in 2008-2010. published five unclassified articles in English, in which he also proved the physical reality of imaginary numbers. And thus, with his publications, he made the unsuccessful ORERA experiment in 2011 unnecessary. However, participants in the ORERA experiment ignored these publications. And the incorrect version of the SRT still continues to be studied in all physics textbooks. And these textbooks are used in the educational process of universities, even the most prestigious ones.

INTRODUCTION

The article explains that the special theory of relativity (SRT), studied in all physics textbooks, rightly recognized as an outstanding scientific achievement due to the principle of relativism proposed in it, nevertheless, due to the lack of necessary experimental knowledge in the 20th century, turned out to be largely incorrect†. Therefore, she could not explain the phenomena of dark matter and dark energy, the problem of baryon asymmetry, denied the existence of tachyons and antimatter, and incorrectly solved other

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† For a new theory, this is forgivable. But then it still needs to be corrected.

problems of astrophysics. And due to the inability to explain the relativistic formulas obtained by the creators of this theory in the hyperluminal speed range, the incorrect principle of not exceeding the speed of light was introduced into the SRT, from which incorrect conclusions were drawn about the existence in nature of our only visible universe and about the physical unreality of imaginary numbers. But by denying the physical reality of imaginary numbers, this incorrect SRT denied the existence of radio technology and computer technology, resonance and bell ringing, tsunamis, piano music, swaying children's swings and much more. Therefore, due to the complete lack of experimental proof of its truth of this version of SRT, Albert Einstein for its creation, even despite the fact that he was nominated for the Nobel Prize 66 times, never received it.

This incorrect version of the theory of relativity also denies the possibility of time travel for humans. But every day, millions of airplane passengers on Earth make such time travel that they don't need. And this article explains how to make time travel necessary and beneficial for people on Earth.

THE VERSION OF SRT TAUGHT IN ALL PHYSICS TEXTBOOKS IS INCORRECT

However, while being brilliant in its concept, the version of SRT taught in all physics textbooks is nevertheless largely incorrect, since::

- the relativistic formulas obtained in this SRT are incorrect, because it is ignored the fact that the argument 'velocity' in them, in accordance with Newton's first law, is the fourth spatial dimension[‡] [1]-[5];
- the formula for the relativistic mass $m(v)$ in the hyperluminal $v > c$ speed range corresponds to a physically unstable process that cannot exist in nature;
- being unable to explain the physical meaning of the imaginary values of the quantities $m(v)$, (v) , $l(v)$ in the hyperluminal $v > c$ speed range, the authors of the SRT, in order not to explain their relativistic formulas in this range, introduced an incorrect postulate into it, called the principle of not exceeding the speed of light, which is incompatible with the fourth spatial dimension.
- in the 21st century, despite the fact that the attempt to refute SRT with the OPERA experiment [6] at the Large Hadron Collider was unsuccessful, it was still experimentally proven that imaginary numbers are physically real [7]-[24]. And, therefore, the principle of not exceeding the speed of light in the generally accepted SRT and this version of SRT itself, which is studied in textbooks, are incorrect [25]-[57].

In addition, the conclusions drawn from incorrect relativistic formulas using the incorrect principle of not exceeding the speed of light are also incorrect:

- about the existence in nature of our only visible universe;
- about the physical unreality of imaginary numbers.

[‡] *Not to be confused with the fourth dimension in four-dimensional space-time (Minkowski space).*

PROOF OF THE PHYSICAL REALITY OF IMAGINARY NUMBERS

But by now, numerous [7]-[24] experimental evidence of the physical reality of imaginary numbers have already been published. All of them are quite simple and can be completed by one radio engineer in less than one day. They can therefore always be repeated and checked in any other radio engineering laboratory. In contrast to these simple radio engineering experiments, the unsuccessful OPERA physics experiment at the Large Hadron Collider was carried out for a total of almost 15 years (2003-2018). And so that the reader can convince himself of the truth of the mentioned radio engineering experiments, let us consider one of them as an example. The rest are also quite simple experiments mentioned in the list of references.

From the well-known Ohm's law in the interpretation of Steinmetz [58], the validity of which is daily confirmed by millions of radio engineers throughout the world through their practical activities, it follows that in addition to the electrical resistance R of resistors, measured by real numbers, there are also electrical resistances $-j/\omega C$ of capacitors and $+j\omega L$ of inductors, which are measured by imaginary numbers.

Consequently, if these imaginary numbers $-j/\omega C$ and $+j\omega L$, in accordance with the generally accepted version of SRT are physically unreal, then the electrical resistance of any electrical LCR -circuit will always be measured in real numbers and will not depend on frequency. Therefore, when the frequency ω of the applied voltage changes, the amount of current flowing through such an electrical circuit will not change.

And vice versa, if the imaginary resistances $-j/\omega C$ and $+j\omega L$ are physically real, then the electrical resistance of any electrical LCR -circuit will be measured in complex numbers and when the frequency ω of the applied voltage changes, its resistance will change. Therefore, in accordance with Ohm's law, the magnitude of the current flowing through this electrical LCR -circuit will also change.

Consequently, an experiment proving the physical reality of imaginary numbers is extremely simple. You just need to change the frequency ω of the voltage applied to any electrical LCR -circuit and measure the value of electric current flowing through it. And all radio engineers know that in this case its value will change. Thus proving the physical reality of imaginary numbers. However physicists did not do such an experiment, since in fact, as shown below, on the contrary, they need evidence of the physical unreality of imaginary numbers. Which do not exist in nature.

CORRECTED VERSION OF SRT

And since the physical reality of imaginary numbers has just been proven in the most indisputable way, it remains to fully and correctly explain (which no one has done over the past hundred years) the relativistic formulas of SRT [59]-[67].

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

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

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

- in which m_0 is the rest mass of a moving body;
- m is the relativistic mass of a moving body;

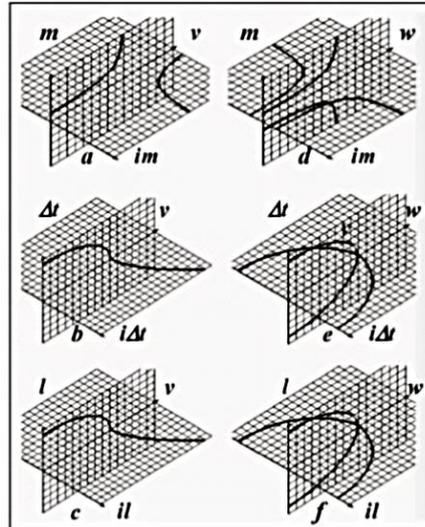


Fig 1: Graphs of functions $m(v)$, $\Delta t(v)$, $l(v)$, corresponding to the existing and revised versions of SRT in the subluminal $v < c$ and hyperluminal $v > c$ ranges

- 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;
- l_0 is the rest length of a moving body;
- l is the relativistic length of a moving body.

These formulas correspond to the graphs in Fig. 1a,b,c. And they show that these graphs in the subluminal $v < c$ and hyperluminal $v > c$ ranges of the argument v have different appearances. Therefore, the same processes cannot occur in these ranges. And in order for the same processes to occur in these ranges, the graphs of the corrected relativistic formulas should look the same, as shown in Fig. 1d,e,f. And for this, in formulas (1)-(3), since the speed v in them is the fourth spatial dimension, the factor[§] i^9 must be introduced

[§] In the theory of functions of a complex variable, the function i^q is defined only for integer values of the argument q . However, it can be further defined as follows. For integer values of the argument $\dots -2, -1, 0, +1, +2, +3, +4, +5, \dots$ the function i^q is equal to $\dots -1, -i, +1, +i, -1, -i, +1, +i, \dots$. But for the same integer values of the argument $\dots -2, -1, 0, +1, +2, +3, +4, +5, \dots$ to the same values $\dots -1, -i, +1, +i, -1, -i, +1, +i, \dots$ is also equal to the function $e^{iq\pi/2}$, which, in accordance with Euler's formula $e^{iq\pi/2} = \cos(q\pi/2) + i\sin(q\pi/2)$, is also defined for non-integer values of the argument q . Therefore, the function i^q can be further defined for any values of the argument q by the formula $i^q = \cos(q\pi/2) + i\sin(q\pi/2)$, similar to Euler's formula. The resulting formula allows you to determine the value of the function i^q for any, including non-integer, values of the argument q . And it will be needed in astro-geophysical studies of portals, which will be discussed further.

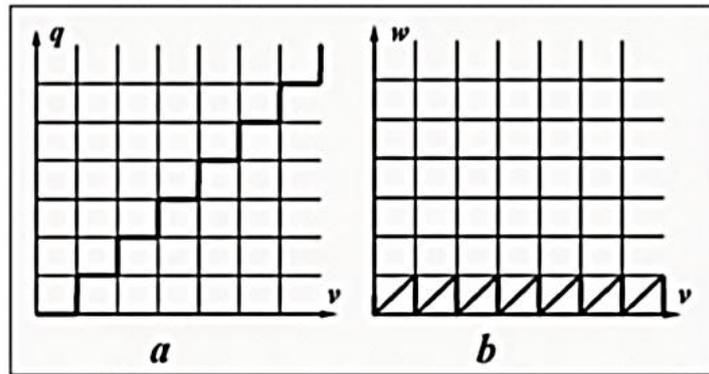


Fig. 2: Graphs of functions $q(v)$ and $w(v)$, illustrating the meaning of the “floor” function of discrete mathematics

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

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

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

where $q(v) = [v_q/c]$ is the “floor” function of discrete mathematics from the argument v_q/c (its graph shown in Fig. 2a), which is the fourth spatial dimension;

- $w = v - qc$ - is the local speed in all universes (its graph is shown in Fig. 2b).

At that, this function iq in formulas (4)-(6), which determines the essence of each universe, for integer values of the argument $q(v)$ equal to ... 0,1,2,3,4,5,..., takes the values +1, +i, -1, -i, +1, +i, ... etc. And the value $q(v) = 0^{**}$ in formulas (4)-(6) for the range of sublight speeds $v < c$ corresponds (since $i^0 = 1$) to our visible universe, which for definiteness we will call the tardyon universe^{††} (see Fig. 3). The value $q(v) = 1$ in the hyperluminal speed range $2c > v > c$ corresponds (since $i^1 = i$) to some other invisible universe, since it is located beyond the event horizon. For definiteness, we will therefore call it the tachyon universe^{‡‡}. Then the value $q(v) = 2$ in the speed range $3c > v > 2c$ will correspond (since $i^2 = -1$) to an invisible tardion antiverse. The value $q(v) = 3$, in the speed range $4c > v > 3c$ will correspond (since $i^3 = -i$) to an invisible tachyon antiuniverse. The value $q(v) = 4$ in the speed range $5c > v > 4c$ will correspond (since $i^4 = +1$) to another (and therefore also invisible) tardyon universe. The value $q(v) = 5$ in the speed range $6c > v > 5c$ will correspond (since $i^5 = +i$) to another tachyon universe. Etc.

Consequently, in nature there is not only, as stated in the generally accepted version of SRT, our visible universe corresponding to formulas (1)-(3), but also many other mutually invisible^{§§} universes and antiuniverses corresponding to formulas (4)-(6). And these mutually

^{**} Those. if we take our visible universe as the origin of coordinates q .

^{††} Tardyon universe is a term used by Isak Asimov in his short story ‘Take a Match’.

^{‡‡} Tachyon universe is a term used by Isak Asimov in his short story ‘Take a Match’.

^{§§} Since they are all beyond the event horizon

invisible universes and antiuniverses, together with our visible universe, form the Multiverse, which we therefore called hidden. Such a hidden Multiverse, the structure of which is helical, is shown in Fig. 3.

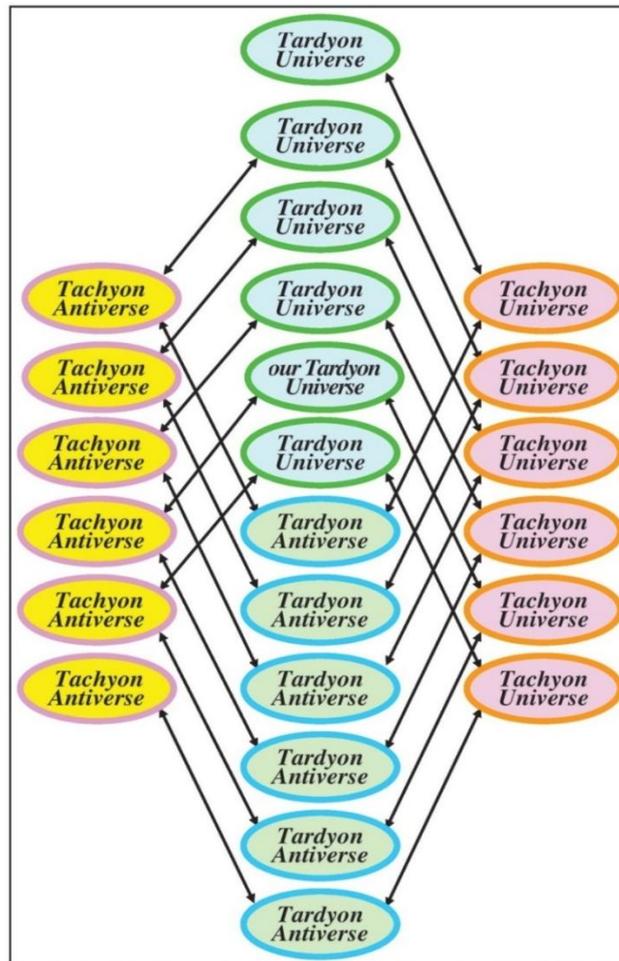


Fig. 3: Structure of the hidden Multiverse corresponding to the principle of physical reality of complex numbers

THE INVISIBLE UNIVERSES AND ANTI-UNIVERSES OF THE HIDDEN MULTIVERSE ARE DARK MATTER AND DARK ENERGY

However, in this structure it is still necessary to take into account and explain the phenomena of dark matter and dark energy, so named because of their incomprehensibility, since not a single chemical element has been found in them, and also because they do not emit, absorb, reflect or refract electromagnetic radiation and, therefore, are invisible. Finally, it is not clear why dark matter and dark energy, which accounts for more than 95% of all mass-energy contained in nature, are being persistently searched for at the Large Hadron Collider in the microcosm of our only visible universe. It's impossible to explain.

Therefore, let us assume that dark matter and dark energy are all other mutually invisible universes and antiuniverses of the hidden Multiverse. Then the phenomena of dark matter and dark energy will be a gravitational shadow on our visible universe from the remaining mutually invisible universes and antiuniverses included in the hidden Multiverse. That is why these phenomena do not contain, like our shadow on a sunny day, a single

chemical element, and dark matter and dark energy contain more than 95% of all mass-energy contained in nature. This assumption explains all the incomprehensibility of phenomena simply and clearly. That's why we will use it.

Then, assuming that over the billions of years of its existence, the mass-energy of all universes and antiuniverses of the hidden Multiverse, due to the presence of a huge number of portals between them according to the law of communicating vessels, has been largely averaged, it becomes possible, using the data obtained by the WMAP and Planck spacecraft, to determine the structure of the hidden Multiverse. And according to data obtained by the WMAP spacecraft [68], the mass-energy of our visible universe (in fact, our 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 [69], the mass-energy of our visible universe (again, actually our hidden Multiverse) consists of 4.9% baryonic matter, 26.8% dark matter and 68.3% dark energy. As you can see, these data differ little from each other, which proves their truth. Therefore:

- the entire hidden Multiverse, according to experimental data obtained by the WMAP spacecraft, consists of $100\% / 4.6\% = 21.8$ parallel universes, and according to data obtained by the Planck spacecraft, it consists of $100\% / 4.9\% = 20.4$ parallel universes;
- dark matter, according to experimental data obtained by the WMAP spacecraft, consists of $22.4\% / 4.6\% = 4.9$ parallel universes, and according to data obtained by the Planck spacecraft, it consists of $26.8\% / 4.9\% = 5.5$ parallel universes;
- dark energy, according to experimental data obtained by the WMAP spacecraft, consists of $73.0\% / 4.6\% = 15.9$ parallel universes, and according to data obtained by the Planck spacecraft, it consists of $68.3\% / 4.9\% = 13.9$ parallel universes;
- and our visible universe, naturally, is only one.

CORRECTED VERSION OF SRT (CONTINUED)

As can be seen, received by the WMAP and Planck spacecraft experimental data did not confirm the above conclusions about the structure of the hidden Multiverse, since our visible universe actually has not two neighboring invisible parallel universes - one tachyon universe and one tachyon antiuniverse - but five or six^{***}. Consequently, there was some error in the previous reasoning. And we, it turns out, were wrong in assuming that in the hidden Multiverse there is only one additional dimension q . And therefore, when describing it, they used complex numbers containing only one imaginary unit. And now, in order for six other parallel universes to coexist 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 . At the same time relativistic formulas must be corrected again as follows [70]-[77]

$$m(q, r, s) = \frac{m_0 i_1^q i_2^r i_3^s}{\sqrt{1 - [v/c - (q + r + s)]^2}} \quad (7)$$

^{***} According to WMAP data 4.9 universes and Planck data 5.5 universes

$$\Delta t(q, r, s) = \Delta t_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (8)$$

$$l(q, r, s) = l_0 i_1^q i_2^r i_3^s \sqrt{1 - [v/c - (q + r + s)]^2} \quad (9)$$

where $q(v) = [v_q/c]$ is the “floor” function of discrete mathematics from the argument v_q/c

which is one of the orthogonal coordinates q of the fourth spatial dimension v ;

- $r(v) = [v_r/c]$ is the “floor” function of discrete mathematics from the argument v_r/c which is another orthogonal coordinate r of the fourth spatial dimension v ;
- $s(v) = [v_s/c]$ is the “floor” function of discrete mathematics from the argument v_s/c which is another orthogonal coordinate s of the fourth spatial dimension v ;
- v_q, v_r, v_s is projections of the velocity vector v onto the orthogonal coordinates q, r, s (see Fig. 4).

The space of such a hidden Multiverse will already be six-dimensional (see Fig. 4). And its structure will correspond to the quaternions $\sigma + i_1\omega_1 + i_2\omega_2 + i_3\omega_3$, i.e. hypercomplex numbers [78] containing exactly three imaginary units i_1, i_2, i_3 , which are related to each other by the relations

$$i_1^2 = i_2^2 = i_3^2 = -1 \quad (10)$$

$$i_1 i_2 i_3 = i_2 i_3 i_1 = i_3 i_1 i_2 = -1 \quad (11)$$

$$i_1 i_3 i_2 = i_2 i_1 i_3 = i_3 i_2 i_1 = 1 \quad (12)$$

In such a quaternion structure of the hidden Multiverse [79], in contrast to its structure considered earlier (in Fig. 3), the distribution of material content in each three-dimensional parallel universe will be determined by a certain function $f_{q,r,s}(x, y, z)$, and the coordinates of these universes will be determined by the values $i_1 q, i_2 r, i_3 s$. Those. the hidden Multiverse (see Fig. 4) 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: “Perhaps we live in a three-dimensional pocket of higher dimensional space”

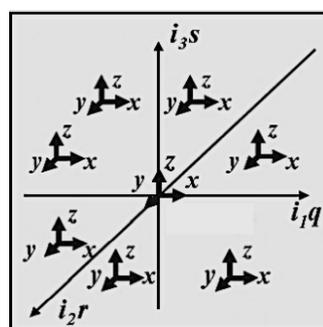


Fig. 4: Six-dimensional space of the hidden Multiverse, where Q, R, S are the coordinates of invisible parallel universes, and X, Y, Z are the coordinates of the matter content in each parallel universe

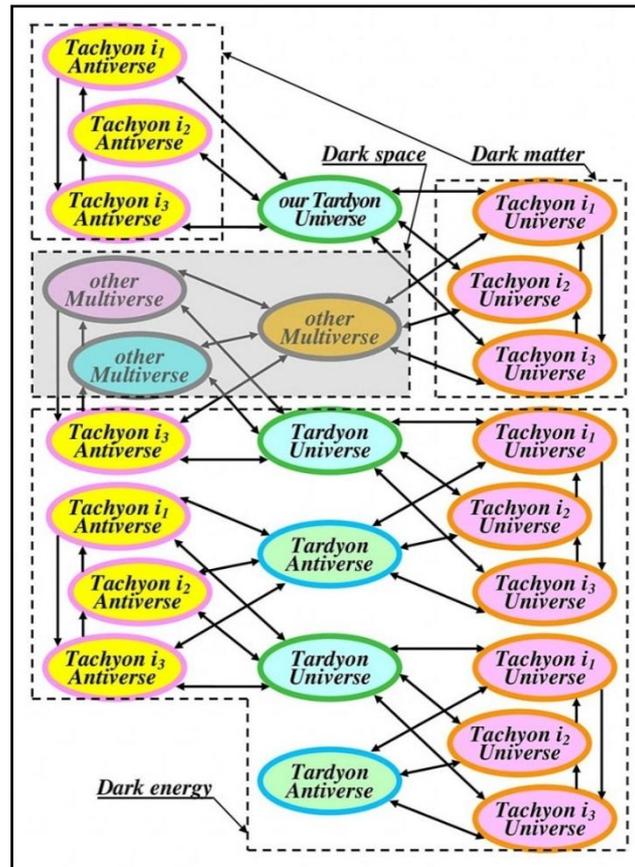


Fig. 5: Structure of the hidden Multiverse corresponding to the principle of physical reality of hyper-complex numbers

From formulas (7)-(9) it follows that such a hidden Multiverse still has a helical structure, and its mutually invisible universes and antiuniverses (in addition to our visible universe) form dark matter and dark energy. In this case, it is possible to move into the tardion antiuniverse from the tardion universe and into the tardion universe from the tardion antiuniverse in various, but not arbitrary, ways, but only in such a way (see Fig. 5), in which the value of i^q will successive-ly take on the values $+1, +i_1 \oplus i_2 \oplus i_3, -1, -i_1 \oplus i_2 \oplus i_3, +1, \dots$ and etc., where \oplus is the symbol of the logical operation of discrete mathematics ‘exclusive OR’. In this case, different trajectories of movement from one universe (or antiuniverse) to another can differ only due to the replacement of some tachyon universes from i_1, i_2, i_3 with others and some tachyon anti-universes from i_1, i_2, i_3 with others. Consequently, tachyon universes i_1, i_2, i_3 in the hidden Multiverse are located parallel to each other. Tachyon antiuniverses i_1, i_2, i_3 are also located parallel to each other for the same reasons. And therefore, in the hidden Multiverse, when transitioning from any tardion universe to a tardion anti-universe and then to another tardion universe, parallel universes and antiuniverses must alternate in the following sequence - ‘tardion universe’, ‘one of the tachyon universes’, ‘tardion anti-universe’, ‘one of the tachyon anti-universes’, ‘tardion universe’, ‘one of tachyon universes’, etc.

One of the easiest to explain such possible quaternion structures of the hidden Multiverse is shown in Fig. 5. Its difference from the structure shown in Fig. 3 is the presence in it of several different tachyon universes and antiuniverses located in parallel,

corresponding to three imaginary units i_1, i_2, i_3 . Another difference is the presence in such a structure of the Multiverse of not only bidirectional portals corresponding to formula (7) and indicated by two-way arrows, but also unidirectional portals corresponding to formulas (8), (9) and indicated by one-way arrows.

In Fig. 5 all these transitions are shown. Moreover, since the data obtained by the WMAP and Planck spacecraft correspond to the not closed screw structures of our hidden Multiverse, united through the corresponding portals with other Multiverses, then all together they form the Hyperuniverse.

HOW TO SEE INVISIBLE UNIVERSES AND ANTI-UNIVERSES?

But in order to believe in the existence of the Multiverse mentioned in the article instead of the Monoverse mentioned in the textbooks, experimental confirmation of the above is necessary [80]-[97]. Those. it is necessary to prove that in addition to our visible universe, there are other universes and antiuniverses in nature. And it is possible to do this. After all, invisible universes and anti-universes in outer space, continuously drifting, touch each other in many places and even submerge slightly into each other, forming transitions called portals between the touching universes and anti-universes. And since the constellations in the starry sky in neighboring universes and antiuniverses are always different^{†††}, when moving through portals, the map of the starry sky in them will change, which will prove the existence of invisible universes neighboring the Earth. On Earth there are more than two hundred thousand anomalous zones^{##} [98]-[101], which are entrances to portals. Moreover, in some of them observatories are already located. For example, the Main Astronomical Observatory of the Academy of Sciences of Ukraine is 12 km away. from the center of the capital of Ukraine, Kyiv, in the Goloseevsky forest. Therefore, by comparing maps of the starry sky on a computer in portals (or even in anomalous zones) and outside portals, universes neighboring the Earth can be discovered. And as a result of astro-geophysical studies of portals, it will be possible to determine the main parameters of neighboring tachyon universes and antiuniverses. Which will ultimately allow us to determine the structure of our hidden Multiverse.

WHERE ARE ANTIMATTER AND ANTI-TIME LOCATED?

And this structure of the hidden Multiverse allows us to explain another problem that is currently inexplicable within the framework of all physics textbooks - where antimatter is located [102]-[112]. It is clear that it cannot be in our visible universe^{§§§}, since due to its annihilation with matter, our universe would then cease to exist. But the fact that antimatter exists has been proven experimentally. In 1995, a sensational result was obtained at CERN - scientists managed to obtain nine antihydrogen atoms, which lasted for about forty billionths of a second. And just one gram of such antihydrogen would cost 662.5 trillion dollars.

^{†††} Like all people, everything that is in their apartments

^{##} Which in itself confidently - more than two hundred thousand times - also confirms the existence of neighboring universes and anti-universes.

^{§§§} But the textbooks state that there are no other universes in nature besides it. And this, naturally, gives reason to doubt the truth of this version of SRT.

Consequently, this experiment can be considered proof that, in accordance with formulas (7)-(9), antimatter can exist in nature in the invisible tardyon and tachyon antiuniverses of the hidden Multiverse and Hyperuniverse. (see Fig. 5). Moreover, in these invisible tardyon and tachyon anti-universes, anti-time and anti-space also exist.

TIME TRAVELS

And the discovery of anti-time already allows us to assert that due to the choice of one or another route of travel in space, time travel also becomes possible [113]-[123], since from formulas (8), (9) it follows that time Δt in universes and antiuniverses during such travel will always change simultaneously with the change in distance l . But since neither the portals, much less the universes and anti-universes of the hidden Multiverse, are still unexplored, time travel in space is now inaccessible to us. And that's why we're interested in time travel on Earth now. However, although official modern science admits the possibility of time travel in some exotic situations in the special^{****} and general^{†††} theories of relativity, as well as in quantum physics^{###}, it still claims that time travel of people on Earth, neither now nor in the distant future, will never be possible.

Nevertheless, these time travels on Earth are now already carried out by airplane flights. And millions of people take part in these flights every day, since upon landing at any airport, air passengers always change their watches to a local time other than at the airport of departure. Thus, they confirm their time travel. Indeed, due to the rotation of the Earth and the presence of time zones on it, movement in space on Earth, as in space, is always accompanied by movement in time.

And when explaining this situation, we must take into account the existence in nature of two different types of time that we will use - internal human time, which we have always used until now, and external time, which, on the contrary, we have never used before. These two times are generated by different processes that exist independently of each other and have different features. Internal time is determined by processes occurring in human bodies. One second is one contraction of the human heart. Therefore, internal time is the biological time of people. External time is determined by processes occurring in the external environment. Namely, by the rotation of the Earth and the existence of time zones. These features of it are reflected in formula, absent from physics textbooks, derived from the relativistic SRT formulas (5), (6) and (8), (9)

$$\Delta t = \Delta t_0 l / l_0 \quad (13)$$

- in which Δt is external time in hours;
- Δt_0 - 24 hours;
- l - path length in the direction perpendicular to time zones;
- l_0 - the length of a circle that intersects 24 time zones at a given latitude.

^{****} For example, in the 'twin paradox'

^{†††} For example, in a region of ultra-high gravity near the event horizon of a black hole

^{###} For example, as a result of teleportation not of information, but of physical objects

These two different times also have different properties. Human biological time cannot flow backwards. A person cannot return to his youth or childhood. And external time, when changing the direction of movement, can change its sign - the plane can fly across time zones both to the west and to the east. When the speed of movement of the aircraft changes, the value of external time will also change. Therefore, in the external environment it is possible to move both into the past and into the future. Moreover, even short-term movements in external time can sometimes be very useful. This is known to everyone, although it has not yet been used in any way in human activity. But this is a free resource given to us by nature for solving the problem of people traveling through time, which would even seem easy to use (you just need to fly on an airplane).

The only difficulty with this is that such time travel on Earth necessarily involves traveling long distances, which is why they are not used. However, this problem can be overcome. Aircrafts flights must be carried out in compliance with two mandatory conditions:

- the flight of the aircraft must be around the world, i.e. all the time from take-off to landing at the same airfield from which the plane took off, it must be carried out in the same direction - to the West or to the East, as a result of which, ultimately, the movement of the aircraft in space can be ignored;
- the aircraft must fly at a high enough speed that it will cross each time zone in less than one hour of domestic time

Moreover, there are a great many aircraft models suitable for time travel. They are called business jets⁵⁵⁵⁵. Table 1 illustrates the performance characteristics of some of these business jets. Table 2 lists airfields close enough to the North Pole to provide the shortest possible round-the-world flight route. Therefore, time travels to the present is already physically and technically feasible.

Table 1: Examples of business jet performance flight performance characteristics that could be used for time travels

Aircrafts	Maximum range	Cruising speed	Hourly rates	Seats
Citation Latitude	5 300 km	815 km/h	3 500 €/hour	8
Citation Longitude	7 400 km	910 km/h	5 000 €/hour	12
Challenger 300	5 700 km	850 km/h	4 900 €/hour	8
Challenger 350	5 926 km	850 km/h	4 000 €/hour	9
Challenger 600	5 500 km	850 km/h	4 600 €/hour	12
Challenger 3500	6 297 km	985 km/h	5 500 €/hour	10
Falcon 20	4 200 km	987 km/h	3 900 €/hour	8
Falcon 50/50EX	5 600 km	850 km/h	4 900 €/hour	8-10
Global 5500	10 927 km	900 km/h	8 000 €/hour	16
Gulfstream G150	5 200 km	850 km/h	3 900 €/hour	6-8
Gulfstream G200	5 000 km	870 km/h	6 200 €/hour	8

⁵⁵⁵⁵ A business jet is a small private jet aircraft for transporting a limited number of passengers (usually from 6 to 20) on an individual order for businessmen, officials and VIPs; it features a higher level of comfort, the ability to take off from small airfields and high speed, allowing it to cross time zones in less than one hour of internal passenger and crew time.

Hawker 850 XP	4 800 km	750 km/h	3 400 €/hour	6-8
Hawker 900XP	5 400 km	865 km/h	3 700 €/hour	6-8
Hawker 4000	5 280 km	890 km/h	5 400 €/hour	10
Learjet 70	3 815 km	967 km/h	3 500 €/hour	7
Legacy 450	5 370 km	860 km/h	3 300 €/hour	8
Praetor 600	7 400 km	850 km/h	6 000 €/hour	12

Table 2: The value of external time at different latitudes

Location of departure and arrival airfields	Geographic coordinates of the airfield	Size of 24 times zones for a round-the-world flight	Size of one time zone.
Santiago de Chile	33,45° S.	33422 km	1393 km
Buenos Aires	34,60° S.	33021 km	1375 km
Melbourne	37,82° S.	31339 km	1306 km
New York City	40,72° N.	30456 km	1269 km
Reykjavík	64,15° N.	17616 km	734 km
Murmansk	69,58° N.	14424 km	601 km
Kirkenes	69,73° N.	14376 km	599 km
Longyearbyen (Spitsbergen, Norway)	78,13° N.	8184 km	341 km
Alert, (Canada)	82,5° N.	5230 km	218 km

CONCLUSION

From the above it follows that for Albert Einstein in his version of SRT, it turns out that the most important thing was to prove not physical reality, but, on the contrary, the physical unreality of imaginary numbers. Because otherwise it became clear to everyone that his theory was frankly incorrect.

But the physical reality of imaginary numbers in radio engineering was factually proven by Charles Proteus Steinmetz in his proposed interpretation of Ohm's law back in 1893. That is. before the creation by Albert Einstein and Jules Henri Poincaré in 1905 of the version of SRT that is now studied in all physics textbooks. And since then, radio engineers have never had the slightest reason to doubt this, since always when the frequency of the sinusoidal voltage applied to any electrical *LCR*-circuit changes, the amount of current flowing through it changes. This well-known fact, which occurs in the practical activities of radio engineers literally at every step, is an extremely simple, absolutely understandable and irrefutable proof of the physical reality of imaginary numbers.

And Albert Einstein, in his proposed version of SRT, needed to obligatorily object to this^{****}. For this reason, a postulate^{****} was introduced into the SRT, called the principle of not exceeding the speed of light, from which a conclusion was made about the physical unreality of imaginary numbers^{####}, which was not confirmed by any experiments. And only

^{****} Unable to explain in any other way the incorrect relativistic formulas of SRT in the hyperlight range of speeds

^{####} As it turned out later, it turned out to be incorrect and refuted by all published experimental evidence of the physical reality of imaginary numbers.

^{###} At the beginning of the 20th century, this assumption saved special relativity, as it allowed it to be explained somehow. Otherwise, a theory that its creators couldn't explain would have been of no use to

the Nobel Committee - and this causes the greatest respect for it - remained faithful to common sense and scientific integrity. Due to the lack of any experimental evidence of the truth of the proposed version of SRT, despite the fact that Albert Einstein was nominated for the Nobel Prize 66 times, he never received it for this theory.

And in order to preserve the denial of the physical reality of imaginary numbers in SRT, relativistic physicists had to make great sacrifices. In particular, in order to create the impression that it is impossible to refute the statement of SRT about the physical unreality of imaginary numbers, at the Large Hadron Collider (worth ten billion dollars), the OPERA collaboration, which includes more than one hundred of the most authoritative physics professors, carried out the unsuccessful OPERA experiment for almost 15 years^{sssss} (2003-2018), which allegedly had as its goal proving the physical reality of imaginary numbers, but not managed to do it. And thereby allegedly proving the impossibility of refuting the statement about the physical unreality of imaginary numbers. In 2011, its sensationally successful completion was even announced, but six months later in 2012 it was announced that it had been refuted at the same Large Hadron Collider by the ICARUS experiment.

For this reason, numerous publications were ignored, citing simple and easily understood radio engineering experiments that successfully demonstrated the physical reality of imaginary numbers and explained that if imaginary numbers were truly, as claimed in the SRT, physically unreal, then all radio engineering devices and computers would not exist, tsunamis, bell ringing, piano music would not exist, children's swings would not swing after a parent's push, and much more.

Furthermore, because of the assertion of the physical unreality of imaginary numbers and, therefore, the existence of our only visible universe in nature, it turned out that antimatter and tachyons had no place in single visible universe. The corrected version of the SRT, however, explains where they are located.

It also turned out that due to the statement about the physical unreality of imaginary numbers and therefore about the existence in nature of our only visible universe, the phenomena of dark matter and dark energy have not been and will never be explained, since dark matter and dark energy are actually, according to the corrected version of SRT, mutually invisible universes and antiuniverses of the really existing hidden Multiverse.

More than two hundred thousand anomalous zones have also been discovered on Earth, which are entrances to portals to the invisible universes and antiuniverses neighboring our visible universe. And even this alone already proves their existence. Moreover, these universes and antiuniverses, invisible outside the portals, can also be seen by astronomical observations of the starry sky in portals. But these low-cost astronomical observations, which would allow sensational scientific discoveries of other universes, are still not carried out due to fears that these invisible neighboring universes and antiuniverses can actually be seen. And then the version of SRT studied in textbooks will undoubtedly have to be recognized as incorrect.

In the version of SRT studied in physics textbooks, it was also concluded that time travel is impossible for people. Although in fact, millions of air passengers on Earth already

anyone. Therefore, back then, such an assumption, as a temporary measure, was acceptable. But now, in the process of knowledge, it's time to move on.

^{sssss} *Let's remember - one day is more than enough for a radio engineering experiment proving the physical reality of imaginary numbers.*

make such time travel every day, which is confirmed by the translation of their watches to local time after the planes land. But since such time travel by airline passengers occurs simultaneously with travel on Earth, they are not used. And the article explains how it is still physically and technically possible to travel through time on airplanes without ultimately traveling through space.

Less expensive telephone time travel is also possible, which, when needed, can be implemented quickly and inexpensively. Then telephone conversations with people located in the past or future tense will become publicly available. However, probably the most promising is the joint use of aviation and telephone options for time travel: aviation when crossing time zones over the ocean, and telephone when crossing them over land.

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