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Emission Theory with Re-Emission of Photons by the Medium

—Instead of Special Relativity

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Abstract

Instead of relying on the erroneous principles of Special Relativity, this paper proposes a new theory based on the emission of photons by a source and their re-emission by a transparent medium. Through over 60 articles, we have demonstrated that Special Relativity is based on optical experiments and observations that have been incorrectly explained by the theory of a non-existent ether. Our findings show that all known experiments can be explained using classical concepts of space and time, thereby refuting the theory of relativity. This article also addresses the fallacy of the widely accepted etheric Doppler effects and its significant role in the history of science.

Keywords

The Fallacy of the Theory of Relativity, The New Theory of Light, The Fallacy of the Doppler Effect and Its Role in the Development of Science, Analysis of the Main Optical Experiments

"*You can fool some of the people all of the time, and all of the people some of the time, but you cannot fool all of the people all of the time.*"

Abraham Lincoln

1. Introduction

In the 17th century, Descartes put forward the idea of a luminiferous ether and Huygens created a wave theory of light. In the early 19th century, the wave theory received experimental confirmation, which until the early 20th century discarded Newton's corpuscular theory.

The wave theory is based on the assertion that light is an ether oscillation: the source oscillates the ether and the oscillations propagate relative to the ether at a

constant speed *C*. This theory described all known optical phenomena, but immediately encountered a problem with the movement of the light receiver: in accordance with the ether theory, a moving observer should see the speed of light greater than *C*. In 1881, Michelson attempted to detect motion relative to the ether, but his interferometric experiment showed that the speed of light did not depend on either the motion of the light source or the motion of the receiver. A crisis arose in physics. Although Michelson's experiment actually proved that there was no ether, the belief in the idea of a luminiferous ether was so strong that ideas were immediately put forward to save it. Fitzgerald, Larmor, and others put forward the idea of the contraction of the sizes of bodies in the direction of their motion to explain the negative result of this experiment, and then Lorentz proposed relativistic transformations of coordinates in moving inertial systems. According to these transformations, due to the interaction of moving bodies with the ether, the length of the bodies is reduced in the direction of motion, time slows down in inertial systems associated with moving bodies, and the frequency of light changes.

In 1905, Einstein created the Special Theory of Relativity based on these etheric transformations, declaring that there is no ether, all inertial frames are invariant and therefore the speed of light is the same in all inertial frames, and the contraction of length and the dilation of time are explained not by interaction with the ether, but by some special properties of space.

2. What Are the Special Relativity and Emission Theory with Re-Emission of Photons by the Medium and What They Claime

The special relativity arose to resolve a crisis in physics: the speed of light turned out to be the same in different inertial frames and independent of either the motion of the source or the motion of the observer measuring this speed. The ether wave theory came to this conclusion, which obviously contradicted classical ideas, as a result of explaining optical experiments and observations conducted in the 19th century. In order to ensure the symmetry of all phenomena, the SRT declared all inertial frames equivalent and therefore not only mechanical but also electromagnetic phenomena do not allow one to detect the motion of the frame. The fundamental principle of SRT was the assertion that the speed of light in all inertial frames is the same, equal to *C*, and does not depend on either the motion of the source or the motion of the observer measuring this speed. The sameness of the speed of light in all inertial systems inevitably leads to conclusions about the contraction of length and the time dilation in moving frames.

The emission theory with re-radiation of photons by the medium that we propose is distinguished by the fact that:

- considers a beam of light not as a propagation of waves, but as a stream of photons, each of which has its own frequency, is polarized, is characterized by a phase and at the moment of emission moves by inertia at a speed *C* relative to the

source.

- unlike the well-known ballistic theory of Ritz, photons move with the speed C only until they meet the re-radiating atoms of the transparent medium and change their speed of movement. The re-radiating medium is present in all regions of space and therefore in all known experiments and observations photons almost immediately meet the atoms of the medium (dense or rarefied), are re-radiated, that is, are absorbed by the atoms and after a short delay are emitted by them in the same direction and move relative to the medium with an average speed C/n.

Note: Between re-emitting atoms of the medium, photons move with the speed C, but due to delays during re-emission, the average speed of movement C/n is less than C. The fact that between re-emissions, photons move with the speed C is confirmed by the fact that, when leaving the medium (for example, from glass), each photon moves not with the speed C/n, but with the speed C relative to the last re-emitting atom.

These two conditions, adopted by us in the proposed emission theory with re-emission of photons, allow, as shown below, to explain all known optical experiments and phenomena without relativistic fantasies about the contraction of length and the slowing down of time in moving frames.

3. Analysis of the Main Optical Experiments and Observations That Are Considered to Confirm the SRT

Below we briefly review the main optical experiments and observations and provide links to our papers, in which each of the experiments is considered in detail. Our analysis of the experiments is performed using two conditions:

- using Doppler emission effect proposed by us and
- under the condition that the speed of light depends on the observer's motion.

3.1. Roemer's Experiment (1676)

In 1676, Olaf Rømer, being confident that the period of the satellite's eclipses of 42.5 hours is strictly constant in value, observed changes in the time between eclipses and, explaining them by the change in the distance to Jupiter as the Earth moves along its orbit, calculated the speed of light from them. In addition to the first determination of the speed of light in history, this experiment by Rømer became the first experiment with the movement of an observer relative to a beam of light: when the Earth moves towards Jupiter, the light relative to the observer moves faster and therefore the observer sees that eclipses occur more often than after 42.5 hours. That is, Rømer actually discovered the effect of a change in frequency with the movement of the observer, similar to that discovered in the 19th century by Doppler (with the only difference that in his observations the period of "oscillations" was much longer than in the Doppler effect).

Römer's experiment contradicts the special theory of relativity, since it proves that, relative to an observer moving towards the beam, light travels at a speed greater than C.

3.2. James Bradley (1727)

While studying the parallaxes of stars, in 1727 Bradley discovered the phenomenon of stellar aberration: the apparent positions of the stars shifted in the direction of the orbital motion of the Earth. Bradley explained the discovered phenomenon by the corpuscular theory, the finiteness of the speed of movement of light particles and the addition of their speed to the speed of movement of the observer, which obviously contradicted the wave theory of light.

1) Fresnel explained the phenomenon of stellar aberration by the partial dragging of the ether by moving bodies, and this explanation became generally accepted for some time. Maxwell, Heaviside, Hertz and others tried to somehow explain the aberration and include it in Maxwell's laws, but no theories of electromagnetic ether could solve the problem of aberration.

Just like the classical theory, the SRT explains stellar aberration with a vector addition of velocities, but it uses relativistic formulas derived from the Lorentz ether transformations. And to this day, one of the "objections" to the classical explanation of aberration is that it…cannot explain why the aberration does not change in Airy's experiments when observed with a telescope filled with water.

2) The Emission Theory with re-emission of photons by the medium (see below, item 5B) that we propose explains stellar aberration in the same way as Bradley, by adding the speed of light to the speed of the observer.

Photons emitted by a fixed star move in all directions relative to the inertial frame rectilinearly with the speed C. If the Earth were also motionless, aberration would not occur. But when the Earth moves perpendicular to the light beam with the speed V, entering the atmosphere, the photons change their speed and direction of movement: their speed C is vectorially added to the speed V and in the atmosphere the photons move at the angle of aberration. The observer discovers that the visible positions of the stars are shifted by the angle of aberration relative to those stars in the direction of which the Earth is currently moving and in which aberration does not occur. When the Earth (after six months) changes the direction of movement relative to the star to the opposite, the angle of aberration changes sign.

We have given a detailed analysis of aberration already in our first published works:

G.G. Sokolov and V.G. Sokolov. The Special Theory of Relativity and Physical Reality. ВИНИТИ (1989) УДК. 530. 12: 531. 18 No. 2610-B.
http://gsjournal.net/Science-Journals/Essays/View/2009

Gennady Sokolov, Vitali Sokolov Star Aberration and the Transverse Doppler Effect. http://gsjournal.net/Science-Journals/Essays/View/2003

Bradley's experiment contradicts STR, since it proves that the speed of light is vectorially summed with the speed of the observer.

3.3. Young's Experiment (1801)

At the very beginning of the 19th century, Thomas Young discovered the phenomenon of light interference, after which the rapid development of the wave

theory began and light began to be considered only as oscillations propagating at the speed of C relative to the ether. The successes of the wave theory forced people to strongly believe in the idea of a luminiferous ether, which led to a crisis in physics at the end of the 19th century.

Despite the fact that in the 21st century numerous experiments with single photons are already being conducted, the generally accepted theory is the wave-corpuscular duality, according to which light simultaneously has both wave properties (allowing one to explain the phenomena of diffraction and interference) and corpuscular properties (which allow one to explain photo effect, absorption and emission).

3.4. Arago's Experiment (1810)

Almost immediately after Young's proof of the wave nature of light, an attempt was made to detect the motion of light oscillations propagating in the ether. In 1810, François Arago tried to detect this motion by changing the refractive index of glass when the speed of light increased to $C + V$: passing a beam of light coming from a star through a prism, he assumed that the speed of light is added to the orbital speed of the Earth and turns out to be greater than C, which, in accordance with the wave theory, should lead to a change in the angle of refraction. Arago did not detect any effect on the angle of refraction.

1) Arago's experiment is considered as an experiment with the movement of the observer relative to the beam of light, but it is assumed that the light relative to the observer travels at a speed of C. According to the wave theory, the angle of refraction should have changed when the Earth moved towards the star at a speed of about 30 km/sec or when it moved away from the star. But the angle of refraction did not change and to explain this, in 1818 Fresnel proposed a hypothesis of partial dragging of the ether by moving bodies: the ether is compressed and, taking into account the refractive index, flows inside the body at a different speed, as a result of which it becomes impossible to detect movement relative to the ether. It is generally accepted that Fizeau's experiment of 1851 with the dragging of light by moving water confirmed Fresnel's hypothesis. The negative result of Arago's experiment in SRT is explained by the relativistic addition of velocities, in which the speed of light cannot exceed the value of C at any speed of the observer.

2) The Emission Theory with the re-emission of photons by the medium that we propose explains Arago's experiment by the re-emission of star light by the Earth's atmosphere. Light travels from a stationary star at a speed of C, but since the Earth is currently moving towards the star (*i.e.* moving towards the photons) at an orbital speed of $V = 29.9$ km/sec, relative to the Earth and its atmosphere the speed of photons is equal to $C + V$, which Arago tried unsuccessfully to detect. He could not detect this speed in principle, since, when meeting the Earth's atmosphere, photons are re-emitted by the atoms of the atmosphere and relative to the atmosphere travel at a speed of C/n. Since the prism was stationary relative to the atmosphere, the photons entered Arago's prism with the speed C/n, that is, Arago and his prism did not actually move relative to the light beam and this experiment

cannot be considered as an experiment with the observer's movement. Instead of the speed $C+V$, Arago—due to re-radiation by the atmosphere—saw the speed C/n, that is, the photons coming from the star entered Arago's prism with the same speed C/n as the photons emitted by any terrestrial light source.

Arago's experiment is discussed in detail in these our first works:

ВИНИТИ (1987) УДК. 530. 12: 531. 18 No. 6364-B 87 G.G. Sokolov. The Proposals for the Direct Experimental Test of the Postulate of the Light Speed Invariability.

ВИНИТИ (1989) УДК. 530. 12: 531. 18 No. 2610-B G.G. Sokolov., V.G. Sokolov The Special Theory of Relativity and Physical Reality.

http://gsjournal.net/Science-Journals/Essays/View/2009

Arago's experiment does not confirm the STR, but contradicts this theory, since the observer in this experiment did not move relative to the beam.

3.5. Doppler Effect (1842)

In 1842, Doppler discovered the effect of changing the frequency of light: both when the receiver moves and when the light source moves, the receiver sees a changed frequency.

1) According to the wave theory, light is an ether vibration. A source with a frequency ν_0 and period T vibrates the ether. Relative to the ether, light propagates with a speed C and this speed, just as when sound propagates in air, does not depend on the movement of the source.

When a receiver moves towards the beam with a speed V, it encounters the light vibrations of the ether with a speed $C+V$, each vibration enters the receiver faster than in the case when the receiver is stationary, and therefore the receiver sees a frequency greater than ν_0.

When a source moves, the situation is different. When the source moves toward the receiver, the frequency also increases, since during the period T, while the oscillation with speed C travels a distance equal to the wavelength, the source has time to shift by a distance VT and the distance between the oscillations decreases.

That is, when the source moves, the frequency of light increases not because the oscillation period decreases, as when the receiver moves, but because the wavelength decreases. Therefore, the change in frequency is described by the Doppler effect using two different formulas

$\nu_2 = \nu_0 \dfrac{1}{\left(1-\dfrac{V}{C}\right)}$ —when the source moves and

$\nu_1 = \nu_0\left(1+\dfrac{V}{C}\right)$ —when the receiver moves.

Only for the reason that the speed of light relative to the ether does not depend on the speed of the source the formula for the movement of the source $\nu_2 = \nu_0 \dfrac{1}{\left(1-\dfrac{V}{C}\right)}$ differs from the formula for the movement of the receiver. This

formula confirms the condition of the wave theory that the frequency can change only with the relative motion of the light source and the receiver.

Modern physics suggests that the Doppler effect for light is explained by the same formulas as for sound. For example, a NASA article on the Doppler effect emphasizes: "it is important to note that the equations derived for the Doppler shift of sound work equally well for moving light sources provided the light sources are not moving near the speed of light. If the relative velocity between the emitting source and the observer was close to the speed of light, we would have to take relativistic effects into account" [1].

It is interesting to note the fact that:

Relativity theory of the relativistic formula for the addition of velocities is obtained by multiplying by the Lorentz factor only the formula $\nu_1 = \nu_0\left(1+\frac{V}{C}\right)$ corresponding to the motion of the receiver, while the formula for the motion of the source for some reason turned out to be "forgotten".

2) The currently generally recognized Doppler effect seems so simple and natural that no one remembers its etheric origin any more, and even after the ether hypothesis was rejected, frequency changes are "out of habit" determined by two different formulas. Moreover, the frequencies of light determined by the emission Doppler effect, proposed by us, even at the speeds of satellites, are practically no different from the frequencies determined by the etheric Doppler effect. But, as shown below, the "habit" of using the two formulas erroneously proposed by Doppler has led and continues to lead to a pile-up of new errors in modern cosmology.

In accordance with emission Doppler effect proposed by us, the change in frequency during the movement of the source is determined by the same formula $\nu_1 = \nu_0\left(1+\frac{V}{C}\right)$ as during the movement of the receiver, since the photons at the moment of emission move relative to the source not with the speed $C - V$, as in the ether wave theory, but with the speed C.

The laser does not oscillate some light-bearing ether with the frequency ν_0, but emits photons, "shoots" them and at the moment of emission photons move relative to laser in the vacuum (before meeting with the re-emitting atoms of the medium) with the speed C and each of them has its own frequency ν_0. The frequency of photons changes only when they meet with the atoms of the stationary medium and changes in accordance with the formula $\nu_1 = \nu_0\left(1+\frac{V}{C}\right)$. That is, the frequency changes in the same way as when the receiver moves relative to the stationary medium.

What does the transition from the etheric Doppler effect to the emission effect give? Almost nothing at real speeds of movement, including cosmic speeds.

But the emission effect is fundamentally different from the ether effect and allows us to refute the assertion of the wave theory and the theory of relativity about the impossibility of changing the frequency of light in the case when the light source and receiver are stationary, but a re-emitting medium moves between them

at a speed V. As it is the case in cosmology, where gas clusters move between the Earth and stationary galaxies, or, what is the same, when the source and receiver move at the same speed relative to the re-emitting rare atmosphere and the distance between them does not change—as in the experiments with GPS satellites that we propose.

In both of these situations, photons leave the source with frequency ν_0 and their speed relative to the source is equal C. With such frequency and such speed they move in a vacuum until meet re-emitting atoms of the medium. In the proposed experiment, the first satellite emits a signal backwards, the signal enters the gas medium with speed $C - V$ and its frequency decreases to $\nu_1 = \nu_0\left(1+\frac{V}{C}\right)$.

With the second satellite, photons meet with the speed $C + V$ and their frequency increases by $(1 + V/C)$: $\nu = \nu_1\left(1+\frac{V}{C}\right) = \nu_0\left(1-\frac{V}{C}\right)\left(1+\frac{V}{C}\right) = \nu_0\left(1-\frac{V^2}{C^2}\right)$, that is, the second satellite does not see the same frequency ν_0, as the theory of relativity claims, but a lower frequency $\nu = \nu_0\left(1-\frac{V^2}{C^2}\right)$.

(in the GPS experiment the signal frequency changes from ν_0 = 10,230,000,000 Hz to $\nu = \nu_0\left(1-\frac{V^2}{C^2}\right)$ = 10,229,999,998, 3 Hz, *i.e.* it decreases by 1.71 Hz).

With a single re-emission, the decrease in frequency is very small, but over the millions of years that light travels to Earth from distant galaxies, photons pass through moving gas clusters and the atmosphere of moving stars billions of times, are re-emitted by them, and each time decrease their frequency.

Almost a hundred years ago, because the red shift discovered by astronomers could only be explained by the etheric Doppler effect, a mystical hypothesis of galactic recession arose. The emission Doppler effect allows us to explain the cosmological red shift based on classical ideas about the nature of light without relativistic fantasies about time dilation, galactic recession, and the Big Bang. A detailed analysis of the Doppler effect is available in our published works.

Doppler effect in a situation when the receiver is at rest relative…
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8565

Doppler effect extended to the ballistic hypothesis
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9390

Modern optics uses the ethereal Doppler effect erroneously
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9453

Ballistic Hypothesis with Photon Re-Emission and the Doppler Effect view
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9715

Which Idea Better Describes Effect: Ethereal or Emission Doppler Eff.

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9832

The classical Doppler effect is erroneous and incompatible with modern ideas about the nature of light.

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9861

EXPERIMENT WITH GPS SATELLITES DESTROYS RELATIVITY THEORY

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9884

The Ether Doppler Effect is fundamentally wrong and should be replaced by an effect that we call the Emission Doppler Effect.

3.6. Fizeau's Experiment on the Dragging of Light by Moving Water

In 1851, Fizeau performed an experiment in which he compared the speeds of coherent light beams in two pipes with moving water using the interferometric method: in one pipe the beam went in the direction of the water's movement and should have increased in speed, while in the other the beam went against the movement and its speed should have decreased. The change in the speed of light in Fizeau's experiment was detected, but it turned out to be less than with full entrainment: the shift of the interference fringes showed that the speed of light was not added to the speed V with which the water moved, but to a speed approximately twice as small.

1) The Fizeau experiment is considered one of the main confirmations of the Special Theory of Relativity. The decrease in speed turned out to be close to what was predicted by the hypothesis of partial Fresnel dragging, and therefore it is still accepted that the Fizeau experiment confirmed the hypothesis of partial dragging of light by a moving medium and the relativistic formula for the addition of velocities. At the speed of water V and the refractive index of water n, the ether flows relative to the water with the speed $C/n + V(1 - 1/n^2)$ and with this speed (and not with the speed V) it drags light.

Since, according to wave theory, the number of wave fronts cannot change unless the distance between the light source and the receiver changes (as is the case in an interferometer), the fringe shift in a Fizeau interferometer is determined by the difference in the times it takes for coherent beams to travel the same distance, simply assuming that the fringe shift in the interferometer is proportional to this time difference.

2) The Fizeau experiment is the only experiment in which the medium moves between a stationary light source and a stationary receiver. This is the most difficult experiment to explain by the theory of relativity, since all relativistic formulas do not take into account the influence of the medium on the speed and frequency of light and are derived for a vacuum that does not exist in nature.

In several of our works (some of them are listed below) an analysis of the Fizeau interferometer is given and it is shown that in fact the beams are dragged by

moving water not partially but completely and in one pipe the light travels at a speed of $C+V$, and in the other at a speed of $C-V$, but the shift of the fringes is smaller due to the fact that, in accordance with the Doppler effect, entering moving water, photons change frequencies and travel the same distance with different frequencies, as a result of which their phases change at different speeds and during the time of movement in the water an additional change in phases occurs. When leaving the moving water, the frequencies change again and interference fringes are created on the screen, shifted by a distance smaller than that which the wave theory determines simply by the difference in time.

A detailed analysis of the Fizeau experiment is given in our works

Gennadiy and Vitali Sokolov, Optical Fizeau Experiment with Moving Water is Explained without

Fresnel's Hypothesis and Contradicts Special Relativity Journal of Physical Mathematics 2017, 8:1 DOI: 10.4172/2090-0902.1000207

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8225

Gennady Sokolov and Vitali Sokolov A Classical Explanation of the Fizeau Experiment with

Moving Water GALILEAN ELECTRODYNAMICS Vol. 22, No. 6

https://drive.google.com/file/d/1b23EjWeDSimni9ddLTpy1nVZEfAUxMyI/view

Gennady Sokolov, Vitali Sokolov The Fizeau Experiment Proves Not Partial, but Complete

Dragging of…: http://gsjournal.net/Science-Journals/Essays/View/5602

Gennady Sokolov and Vitali Sokolov A Theory of the Interferometer with Changing Frequencies

http://gsjournal.net/Science-Journals/Essays/View/4945

Optical Fizeau Experiment with Moving Water Without Fresnel's/Aether Hypothesis

https://www.gsjournal.net/Science-Journals/Research%20Papers/View/6557

The generally accepted explanation of Fizeau's interferometric experiment with the hypothesis of partial entrainment of the ether by a moving medium is erroneous and cannot serve as a confirmation of the postulate of the invariance of the speed of light. An analysis of this experiment, taking into account the Doppler change in the frequencies of the rays and the additional phase shifts that arise in this case, shows that in Fizeau's experiment the light is actually dragged by the moving water completely, and not partially, and its speed turns out to be greater than C, which refutes the postulate of the constancy of the speed of light.

3.7. Experiments with a Water-Filled Telescope

Astronomers again tried to detect the effect of the Earth's motion on the aberration of light, which Arago's prism experiment failed to detect in 1810. In 1868, Hooke and 1872, Airy measured the angle of aberration with a telescope filled with

water, but obtained the same result: when observing through water, the aberration also did not change.

1) Relativists explain the independence of irradiation from the magnitude of the refractive index (glass or water) by Fresnel's hypothesis about the partial entrainment of the ether by a moving medium and consider these experiments as proof of the impossibility of detecting the speed of light greater than C by a moving observer.

2) Experiments with a water-filled telescope, as well as Arago's experiment, cannot be considered as experiments with the observer's movement relative to the light beam, since in these experiments the observer does not move relative to the atmosphere, in which photons travel at a speed of C/n, that is, the observer does not move relative to the light beam. Having met the atmosphere moving together with the Earth, the photons are re-emitted and relative to the atmosphere they travel at an angle of aberration with the same speed C/n as photons emitted by any stationary or moving terrestrial light source. These experiments could detect the influence of the Earth's speed on optical phenomena only if the moving Earth had no atmosphere and the observers were in a vacuum.

The experiments of Hook and Etzry, as well as the experiment of Arago, are explained by the influence of the atmosphere and therefore cannot be considered as confirmation of the postulate of the invariance of the speed of light.

3.8. Michelson's Experiment (1881)

The theory of the ether was confirmed by many optical experiments, but contradicted the phenomenon of aberration. The speed of light relative to the ether by definition did not depend on the recession of the source and was already known with a fairly high accuracy. In order to check the influence of motion directly on the speed of light, in 1881 Michelson performed an interferometric experiment in which the bands were supposed to shift if the device moved relative to the ether with the orbital speed of the Earth. The bands in the interferometer did not shift and Michelson, although he understood that the sensitivity of his interferometer was almost insufficient to detect the "ether wind", declared that Fresnel's hypothesis was incorrect and there was no ether at all. And yet, in 1886, together with Morley, he repeated the experiment with a much more sensitive device and, as is commonly believed, confirmed Fresnel's hypothesis. Throughout the 20th century, supporters of the wave theory repeated this experiment many times, Attempts to detect ether continue to this day.

Almost immediately after this experiment, the first explanations appeared for the independence of the speed of light beams relative to the infraferometer from the movement of the device.

1) Fitzgerald, Larmor and others put forward the idea of a reduction in longitudinal dimensions when the device moves relative to the ether, and then Lorentz published coordinate transformations in which, unlike Galileo's transformations, velocities and distances additionally change due to interaction with the ether. The

transformations proposed by Lorentz were supposed to theoretically justify the equivalence of all inertial frames not only for mechanical but also for optical phenomena, and were developed under the condition that light in all inertial frames propagates at the same speed. Poincaré showed that distance reductions alone are insufficient to explain Michelson's experiment and introduced the so-called local time into Lorentz's transformations: due to the movement of the system, not only the longitudinal dimensions change in it, but time also flows more slowly.

2) In Michelson's experiment, the fringe shift could not occur because his interferometer was stationary relative to the atmosphere, in which light in all directions travels at the same speed C/n, *i.e.*, neither the light source nor the receiver moved relative to the light beam. This experiment proved only that photons move relative to the atmosphere at the same speed in all directions.

The contraction of longitudinal dimensions in moving bodies and the dilation of time in moving systems, as stated by the Lorentz transformations, underlie the Special Theory of Relativity, but none of these statements have been confirmed by any experiment: no one has ever even tried to test the contraction of length experimentally, and the so-called "time dilation", as it is shown in several our works, is in all cases explained by a change in the speed of light and, as a consequence of this, a Doppler change in the frequency of light. "Length contraction" and "time dilation" are discussed in detail in our works:

Star Aberration and the Transverse Doppler Effect view
http://gsjournal.net/Science-Journals/Essays/View/2003

Proposal for Experimental Test of Relativistic Length Contraction view
http://gsjournal.net/Science-Journals/Essays/View/2007

Theory of Relativity and Physical Reality
http://gsjournal.net/Science-Journals/Essays/View/2009

The Global Positioning System (GPS) and The Invariability of Light…
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/5716

Gravitational frequency shift and transverse Doppler effect in GPS
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8354

Lorentz transformations and special theory of relativity
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8672

Frequency Changes in GPS Satellite Signals
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8706

Is the atomic clock accelerating in satellite orbit?
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8875

All experiments with relativistic "time dilation" are ex…
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9656

For what is a correction of 38 microseconds introduced into GPS sat…

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9799

Michelson's experiment proved that light is erroneously considered as oscillations propagating in some stationary medium and is explained by the corpuscular theory based on classical ideas about space and time without fantasies about relativistic length contraction and time dilation in moving frames.

3.9. Special Theory of Relativity (1905)

In addition to Michelson's experiment, photoelectric effect discovered by Hertz in 1887 and Planck's quantum hypothesis (1901) contradicted the theory of ether. In 1905, Einstein stated that the ether does not exist and on the base of Lorentz's transformations created the Special Theory of Relativity.

1) Already in the first article about the new theory, Einstein declared that there is no ether at all, the reduction of sizes and time dilation are explained by the relativistic principle of relativity and arise in moving frames not because of the interaction of bodies with the ether, but because of some special "properties of space and time". In accordance with the new principle of relativity, all inertial frames are equivalent, complete symmetry is observed in nature and therefore not only mechanical but also electromagnetic phenomena do not allow one frame to be distinguished from another.

The invariance of the speed of light, as stated by the Special Theory of Relativity, means that the speed of light does not depend on the motion of the source or the motion of the observer, that is: photons emitted by a moving source move relative to a given inertial frame with the same speed C as photons emitted by a stationary source an observer moving towards the beam sees that photons move relative to him with speed C but not $C+V$.

It is generally accepted that the principle of relativity proposed by Einstein does not contradict the classical principle of relativity of Galileo and is a natural extension of it to electromagnetic phenomena.

2) "There is no ether, and all effects associated with it are explained by the properties of space-time, and all inertial systems are equivalent."

Taking into account Galileo's principle of relativity, the ideas of symmetry and equivalence of systems seem so natural that many agree with them without thinking. After all, if we imagine that the light source and receiver are moving in an ideal void and there are no external signals, their movements are actually symmetrical, that is, the movement of the source is equivalent to the movement of the receiver. But this is only in an ideally empty Universe, where even distant stars are absent, observing which anyone can determine whether it is moving or stationary. When declaring the equivalence of movements, we must not forget that there is still physical reality. And the ideas about movement in an ideal void accepted by the theory of relativity are not applicable to this reality.

What does the equivalence of inertial frames proclaimed by Einstein's postulates actually mean? Is the relativistic principle an extension of Galileo's principle,

and is this principle valid?

It is not at all difficult to answer these questions.

Galileo's principle of relativity means the equality (equivalence) of all inertial frames for mechanical phenomena: no mechanical experiments conducted inside the system allow us to determine whether the system is moving or stationary. Galileo considers two inertial frames—a ship moving without acceleration and the shore of a lake. And he clearly warns that experiments should be conducted only inside the frame (in the ship's hold), because observation of external signals allows us to determine the system's own motion ("if you leave the hold, you will see that the ship is moving").

Einstein's principle of relativity asserts that optical experiments also do not allow us to determine the motion of a given frame. This is true. But only under the condition that the experiments are carried out inside the frame and no external signals are observed. Only under these conditions could we say that Einstein's principle of relativity is an extension of Galileo's principle of relativity.

However, in optical experiments considered as confirmations of relativity theory, these conditions are violated and the experiments are not conducted within the given frame, but use signals coming from another inertial frame (remember the experiments of Roemer, Bradley, Arago, Le Sitter, Ives and Stillwell). That is, the principle of relativity is proclaimed, but is not observed in each experiment, and conclusions (about the constancy of the speed of light, about the change in the angles of refraction and frequency) are made as if the experiments were conducted within the given frame.

The non-observance of the principle of relativity and the violation of the equivalence of inertial frames can be illustrated by the following example.

Let's imagine that a laser beam is directed towards the Moon, we measure its speed and see that relative to the frame of the Earth, photons move with the speed C/n.

From the Moon, a spaceship moves towards the beam with speed V and also measures the speed with which the same beam moves in its inertial frame.

It is obvious that in the ship's frame the beam—due to the Doppler effect—travels with an increased frequency, *i.e.* the ship already by the change in frequency, detects its movement relative to the beam and the frame of the Earth, in which the beam travels with a different frequency, Inside the ship—due to the re-emission of photons by the window glass—this same beam travels with the same speed C/n relative to the observer and his measuring instruments as on Earth.

And what conclusion follows from this experiment?

Relativists consider such experiments as confirmation of the postulate of the constancy of the speed of light in all inertial systems. The situation turns out to be extremely simple and understandable if we measure the speed of the beam with devices placed outside the spacecraft—the devices will show that relative to the ship, the photons move at a speed of $C+V$, which will confirm Galileo's principle and prove the erroneousness of the relativistic postulate of the constancy of the

speed of light.

The speed of light does not have the mystical property of invariance. The conclusion of the theory of relativity about the equivalence of inertial systems and the sameness of the speed of light in all inertial frames is erroneous, since it is made on the basis of an erroneous explanation of optical experiments.

The equivalence of inertial frames and the invariance of the speed of light are considered in the article:

Gennady Sokolov, Vitali Sokolov The Postulates of Special Relativity
http://gsjournal.net/Science-Journals/Essays/View/2001

3.10. Cosmological Redshift (1912)

In 1912-1914, astronomer Slipher discovered that the spectra of some galaxies were shifted toward longer waves and stated that these galaxies—in accordance with the Doppler effect—were moving at speeds of about 1000 km/sec, with most of them moving away from the Earth. The red shift was explained by the Doppler effect and the galaxies moving away from the Earth, since no other explanations satisfied the observed fact: all frequencies of the spectrum were shifted equally, which can only be explained by the Doppler effect.

1) Cosmological redshift explained by the galaxies moving away from Earth and are considered as confirmation of the generally accepted hypothesis of the Big Bang. "The most natural interpretation of the cosmological redshift is that it is indeed a Doppler shift" [2].

2) The red shifts of the spectra are indeed explained by the Doppler effect, but not by the ether effect, but by the emission Doppler effect proposed by us, which, as shown in point 5, allows us to prove that the spectra can shift (and only towards longer waves) not only when the distance between the light source and the receiver changes, but also at a constant distance, if a re-emitting medium moves between them (see point 3.5 above).

According to emission Doppler effect, the cosmological redshift occurs at a constant distance between the Earth and the galaxy as follows:

In the direction towards the Earth, the light of a stationary galaxy travels in the intergalactic medium with a speed C/n, close to C. Along the way, the photons encounter a galaxy moving in any direction and, entering its atmosphere, change their speed and frequency. Leaving the moving atmosphere, the photons again change their frequency and travel in the intergalactic medium with a new frequency. As shown in point 3.5, this frequency of photons turns out to be less than the frequency with which the photons encountered the moving galaxy, regardless of whether the galaxy is moving in the same or opposite direction—in both cases, a red shift occurs. This shift is not large, but it accumulates and increases with each re-emission by the moving atmosphere or moving gas cluster. Over billions of years, while the light travels from the stationary galaxy to the Earth, the red shift turns out to be the same as astronomers now observe.

The cosmological redshift does not prove that galaxies are moving away from Earth. According to the Emission Doppler Effect, this shift is not due to the

receding galaxies, but to multiple re-emissions of photons by moving atmospheres and moving gas clusters.

3.11. De Sitter's Observations of Double Stars (1913)

According to Ritz's ballistic theory, light emitted by a moving source should travel at the speed of $C + V$ for any length of time. But in 1913, de Sitter showed by observing double stars that the light from both stars in a double star system travels to Earth at the same speed: if the speed of light depended on the motion of the star, during its journey to Earth, the light from the approaching star would overtake the light emitted by the receding star; astronomers observed orbital distortions, but de Sitter did not detect any distortions.

1) Relativists consider the absence of distortions in the orbits of binary stars as confirmation of the independence of the speed of light from the movement of the source and a refutation of Ritz's theory.

2) Light from binary stars travels to Earth at the same speed due to the re-emission of photons by the intergalactic medium. In addition to their own atmospheres, a binary system has a common atmosphere, entering which photons emitted by stars are re-emitted, travel relative to it at the same speed, and then travel to Earth in the intergalactic medium at the same speed.

De Sitter's observations cannot be considered as confirming the postulate of the constancy of the speed of light, because the photons emitted by stars travel to the Earth at the same speed because of re-emitting by the intergalactic medium.

3.12. Sagnac Effect (1913)

Attempts to detect the ether continued, and in 1911 Harress and then in 1913 Sagnac performed an experiment with a rotating interferometer. The experiment, named after Sagnac, showed that a beam traveling against the rotation arrives at the screen earlier than a beam traveling in the direction of rotation. Einstein knew about Harress's experiment and already in 1911, that is, even before Sagnac performed his experiment, Max von Laue showed that the experiment with a rotating interferometer confirmed the theory of relativity. Sagnac believed that his experiment proved the existence of a stationary ether rejected by the theory of relativity. In 1914, Paul Harzer analyzed the results of Harress's experiment and claimed that they contradicted the theory of relativity. Later, Laue explained the shift of the fringes in the interferometer by the dragging of light by the glass and by the fact that each part of the device "runs away from one beam and approaches the other," but the accelerations associated with rotation do not affect the speed of light in any way.

In 1926, Michelson and Gale conducted an experiment with a ring interferometer, the diameter of which was 1.9 km, in order to detect the effect of the Earth's rotation on the speed of light. It is believed that the experiment was compatible with both the idea of a stationary ether and the special theory of relativity. The Sagnac effect has been discussed for over a hundred years, but there is still no

generally accepted explanation. Nevertheless, fiber optic laser gyroscopes have been successfully used in various navigation systems for many years.

1) According to relativists, the Sagnac interferometer and optical gyroscope respond to change in direction in space due to the invariance of the speed of light in all inertial systems.

2) Based on the condition of constant angular momentum, a mechanical gyroscope maintains direction in space. An optical gyroscope responds not to direction, but to changes in direction in space. The sensitivity of an optical gyroscope to changes in direction is explained by the independence of the movement of emitted photons from the further rotation of the light source relative to space: after emission, photons move in space in a straight line and their re-emission by the elements of the rotating device does not affect the direction of their movement.

Due to the rotation of the device relative to the rectilinear beam, the direction of movement of photons relative to the interferometer changes and therefore the observer moving with the interferometer sees curved trajectories and the fact that photons travel different distances relative to the device.

The Sagnac effect cannot be explained by the theory of relativity and obviously contradicts it.

We have considered the Sagnac effect and the influence of rotation on the shift of interference fringes in detail in many works, for example:

Gennadiy Sokolov, Vitali Sokolov Sagnac effect in GPS
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8366

Gennadiy Sokolov, Vitali Sokolov Sagnac effect in GPS (with an additional) view
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8485

Vitali Sokolov, Walter Babin, Gennadiy Sokolov A Classical Explanation of the Sagnac Effect http://gsjournal.net/Science-Journals/Essays/View/3453

Vitali Sokolov, Gennadiy Sokolov Analysis of the Phase Difference in a Fiber-Optical Conv http://gsjournal.net/Science-Journals/Essays/View/4387

3.13. An Addition to Stellar Aberration (1921)

Despite its apparent simplicity, the phenomenon of stellar aberration was widely discussed throughout the 19th century. And in 1921, when Einstein had already been awarded the Nobel Prize, Nobel laureate Lenard named another fact that contradicted the theory of relativity: aberration is observed when the observer moves, but is absent when the light source (the star) moves. If aberration occurred when the light source moved, the observed trajectories of binary stars moving in opposite directions would be distorted, which is not actually observed. Lenard named the fact obviously contradicting the STR, but did not explain it.

We also explain the absence of distortion of the observed orbits by the influence of the environment: photons emitted by a moving star do not travel in a vacuum, but in the interstellar gas medium: when photons enter the stationary interstellar medium, their speed changes to C/n, information about their speeds is lost and photons emitted by stars travel in all directions at the same speed. When photons

meet the Earth's atmosphere moving at speed V, aberration occurs, but it is the same for both stars and the observer does not see any distortion of the orbits.

3.14. Big Bang (1927)

In 1922, A. Friedman published the first article on relativistic cosmology and independently of him, in 1927, the Belgian abbot Georges Lemaitre explained the expansion of galaxies by the expansion of the Universe and then proposed the Big Bang theory, according to which the Universe arose from a "primordial atom". According to modern concepts, the Big Bang occurred 13,799 billion years ago and the Universe began to expand from "some singular state" and this expansion continues today.

1) Taking into account new discoveries, the Big Bang theory is constantly being adjusted, but the basic idea remains the same: the Universe arose from a singularity as a result of the Big Bang and will continue to expand.

2) Despite the fact that the latest telescopes are discovering effects that contradict the generally accepted theory of the expansion of the Universe (as the distance to galaxies increases, the distances between them do not increase, the rotation speeds of some of the most distant galaxies do not correspond to their mass, too "young galaxies" have been discovered at large distances, etc.), they are trying to explain these effects with the general theory of relativity, but the Doppler explanation of expansion is not questioned.

3.15. Hubble's Law (1929)

In 1929, astronomer Hubble discovered that the further away a galaxy is, the greater its cosmological redshift, with this shift being proportional to the distance to the galaxy.

3.16. Ives-Stilwell Experiment (1938)

According to the ether Doppler effect, the receiver sees a higher frequency when the light source approaches it and a lower frequency when the source moves away. But in the direction perpendicular to the source's motion, the frequency, as the ether theory states, cannot change. In 1938, Ives and Stilwell, observing the light emitted by moving ions, discovered that in the transverse direction the light travels with a frequency lower than the frequency emitted by the ions, as if the source were moving away from the receiver at some speed. The experiment refuted the wave theory, but is generally believed to have confirmed the transverse Doppler effect predicted by the theory of relativity.

1) The theory of relativity explains the transverse Doppler effect by relativistic time dilation and considers it as the main confirmation of time dilation in moving systems. Later, the transverse effect was confirmed with high accuracy by numerous experiments.

2) We explain the transverse Doppler effect by the emission theory: light is not waves in some light-carrying ether, but a stream of photons, each of which has its

own frequency. Excited ions moving with velocity V emit photons, which relative to the emitting atoms move in all directions with velocity *C*. Relative to the laboratory and the spectroscope, their velocities are determined by the vector sums of their velocities relative to the emitting atoms and the velocity *V* parallel to the motion. Therefore, photons whose velocity relative to the atoms is perpendicular to the direction of motion do not enter the spectrometer, and instead the device sees those emitted at some angle backwards. These photons at the moment of emission relative to the device move with a speed lower than *C* and the spectrometer sees a lower frequency. Thus, the decrease in frequency is explained by a change in the speed and direction of photons, and not by a mystical slowing down of time in moving ions. It is interesting to note that Ives and Stilwell tried to explain the change in frequency they discovered not by time dilation, but in some other way, but they could not.

The transverse Doppler effect is explained on the basis of classical ideas about the nature of light without fantasies about time dilation.

The transverse Doppler effect is discussed in detail in a number of our works:

Sokolov Vitali, Sokolov Gennadiy The classical Doppler effect is erroneous and incompatible with modern

ideas about the nature of light

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9861

Modern optics uses the ethereal Doppler effect erroneously

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9453

Frequency Changes in GPS Satellite Signals

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8706

Star Aberration and the Transverse Doppler Effect

http://gsjournal.net/Science-Journals/Essays/View/200

The Theory of Relativity and Physical Reality view

http://gsjournal.net/Science-Journals/Essays/View/2009

Gravitational frequency shift and transverse Doppler effect in GPS

https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8354

3.17. Experiment to Compare the Speed of Light from Different Edges of the Sun (1956)

In 1956, Bonch-Bruevich and Molchanov conducted a complex and expensive experiment to compare the speeds of light emitted by different edges of the Sun, but did not find any significant difference, and therefore their experiment is still considered a confirmation of the independence of the speed of light from the movement of the source. We consider this experiment to be one of the most illiterate experiments to confirm the Special Theory of Relativity, since before entering the measuring device, the rays changed speed not only due to the re-emission of light by the Sun's atmosphere, the interplanetary medium, and the Earth's atmosphere,

but also due to numerous reflections and refractions of light by elements of the optical system.

This experiment obviously cannot be considered as a confirmation of the postulate of the invariance of the speed of light.

3.18. Pound-Rebka Experiment (1960)

In 1960, Pound and Rebka performed an experiment that relativists regard as a "brilliant confirmation" of Einstein's 1916 prediction of time dilation in a gravitational field—one of Einstein's three proposed tests of General Relativity. Using the resonant absorption effect just discovered by Mössbauer, the experimenters were able to measure the change in frequency of gamma rays as they traveled between a source and a receiver placed at different heights.

1) The experimentally measured decrease in the photon frequency is explained by the General Theory of Relativity as a time dilation in a stronger gravitational field. Since, according to the postulate of invariance, the speed of light cannot increase when photons move toward the Earth, the fact that photons of increased frequency arrive at the Earth is explained by the fact that "at the height where the source is located, time flows faster and therefore the source emits photons of increased frequency and the photons travel the entire distance with increased frequency." And if the source is located below the receiver, photons of lower frequency go upward: since the source is in a stronger field, where time flows more slowly, it emits "slow" photons and they travel the entire distance to the receiver with reduced frequency.

2) In fact, the frequency emitted by the source does not depend on the altitude at which the source is located: with such an insignificant change in the gravitational field, as in the Pound-Rebka experiment, the properties of the atoms, as Brillouin and Logunov theoretically rigorously showed, do not change and they emit gamma quanta of the same frequency. But neither Brillouin nor Logunov could explain what happens to the quanta when moving in a gravitational field, since they believed in the Special Theory of Relativity and believed that the postulate of invariance was experimentally absolutely proven and the speed of light cannot change.

According to the emission theory, when photons go down, they move with an acceleration of 9.8 m/sec, like all bodies "falling" in a gravitational field, and their speed increases. If we imagine that photons are moving in a vacuum, they reach the receiver below with a speed greater than C, and the receiver—in accordance with the Doppler effect—sees an increased frequency. Not because the source works differently at a height and emits a higher frequency, but because photons move in a gravitational field with acceleration and their speed becomes greater than C. The frequency received by the receiver does not change from the fact that photons are not moving in a vacuum, but in air, since photons are accelerated between re-emitting air atoms and their frequency increases slightly with each re-emission.

The change in frequency in the Pound-Rebka experiment is explained on the basis of classical ideas about the nature of light and therefore cannot be considered as confirmation of time dilation in a gravitational field.

The Pound-Rebka experiment is considered in more detail in our work

Gravitational frequency shift and transverse Doppler effect in GPS

https://www.gsjournal.net/Science-Journals/Research%20Papers/View

3.19. Field Stability during Magnet Rotation

Einstein begins his first article on the Special Theory of Relativity with the assertion that asymmetry is not inherent in real phenomena; as an example of symmetry, he cites the situation with the movement of a magnet and a conductor and asserts that the movements of the conductor and magnet are equivalent and the emf in the conductor arises only during their relative movement:

"for example, the reciprocal electrodynamic action of a magnet and a conductor. The observable phenomenon here depends only on the relative motion of the conductor and the magnet, whereas the customary view draws a sharp distinction between the two cases in which either the one or the other of these bodies is in motion" [3].

In several works we considered the well-known Faraday paradox and proved that when an axial magnet rotates, the field does not rotate and therefore the emf is not induced in the conductor, *i.e.* in this case the statement about the equivalence of the movements of the magnet and the conductor turns out to be erroneous. The proof of the immobility of the field when the magnet rotates allowed us to conclude that the field of the Earth is immobile and the emf is induced in all vertically located conductors moving relative to the immobile field when the Earth rotates.

The immobility of the field during the rotation of the magnet contradicts the principle of relativity: the emf is induced in the conductor when it moves relative to a stationary magnet, but is not induced when the magnet rotates.

The immobility of the field during the rotation of the magnet is discussed in detail in the works:

Unipolar DC motor as a second confirmation of field immobility

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9542

A new electrodynamic effect: The Earth's magnetic field is im

https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8374

The Earth's Magnetic Field Analyzed as an Electrodynamics Effect

https://www.gsjournal.net/Science-Journals/Research%20Papers-Mechanics%20/%20Electrodynamics/Download/9525

Faraday's Paradox & its Solution GED

https://www.gsjournal.net/Science-Journals/Research%20Papers-Mechanics%20/%20Electrodynamics/Download/9524

Resolution of the Faraday Paradox

https://www.gsjournal.net/Science-Journals/Research%20Papers/View/7713

3.20. Refraction of Single Photons

In the wave theory, the refraction of a light beam is explained by Huygens' principle and the change in the speed of light at the boundary of two media. Single photons are refracted at the same angles as a normal light beam, which can hardly be explained by Huygens' principle. We have not found any explanations for why a single photon obeys Snell's law of refraction, and have decided to give our own explanation, which we have outlined in the works below:

Gennadiy Sokolov, Vitali Sokolov Refraction and Reflection of Single Photons vs Wave Theory

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9567

Refraction of Single Photons vs Wave Theory

https://www.gsjournal.net/Science-Journals/Research%20Papers-Mathematical%20Physics/Download/9222

Gennadiy Sokolov & Vitali Sokolov Photons vs Waves: Which idea Better Describes Refraction?

GALILEAN ELECTRODYNAMICS

https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9915

The fact that our proposed method of determining the angles of refraction is consistent with Snell's law may, we hope, lead to a new explanation of this law.

3.21. Relativistic Length Contraction

In all attempts to explain the absence of shifts of interference fringes in Michelson's 1881 experiment, it is first assumed that in moving systems the longitudinal dimensions of the device are reduced, that is, a reduction in length is assumed.

If Lorentz tried to somehow justify this reduction by the interaction of a moving device with a stationary ether, then the Special Theory of Relativity "explains" the relativistic reduction of length by the fact that space and time have such properties that in all moving systems the length is reduced and time slows down.

Simple, but not clear. And perhaps that is why one of the great relativists joked that only three people understand the theory of relativity.

Simple, but not clear. And perhaps that is why one of the great relativists joked that only three people understand the theory of relativity.

And it is not clear because there are nor length reductions or time dilations in reality.

Why has no one tried to experimentally test length reduction until now? After all, modern measurement technology has long allowed such an experiment to be performed. And such an opportunity appeared after Michel Dugua managed to photograph a short laser pulse propagating in water in 1971. He research some relativistic effects, but did not pay attention to the effect of length reduction.

Especially, at the speed of 225,000 km/sec, with which the beam travels in water, the pulse length, according to the STR, should have been reduced by only 30%.

Almost 20 years ago we proposed to repeat a similar experiment with a beam traveling in air, where the speed of light is close to C and the pulse length of the beam should, according to SRT, be reduced by tens of times (which—of course, if desired—is not difficult to detect).

The proposed experiment is described in the article

Proposal for Experimental Test of Relativistic Length Contraction

http://gsjournal.net/Science-Journals/Essays/View/2007

Relativistic length contraction has not been confirmed by any experiment and can be refuted relatively easily.

3.22. Gravitational and Velocity "Time Dilation" in the GPS System

Above (in points 3.13 and 3.14) we showed that the Ives-Stilwell experiment 1938 and the Pound-Rebka experiment 1960 are explained on the basis of classical ideas about space and time and do not confirm the claims of relativists about time dilation in moving systems and in a gravitational field.

When the GPS satellites were first launched, precise measurements during orbital adjustments revealed strange frequency jumps in the signals, which were immediately identified as relativistic effects. Relativists continue to claim that time dilation is manifested and confirmed with high accuracy in the GPS system.

The GPS system uses high-precision atomic clocks and the frequency of the signals is determined by the frequency of these clocks. It turned out that the clock, strictly synchronized with the clock of the control center, after launching into orbit (at an altitude of 20,184 km) sends a signal of increased frequency to Earth.

1) The increase in frequency was explained by the acceleration of time: in a weaker gravitational field, the atomic clock runs faster and sends a higher frequency signal. But since the clock moves at orbital speed (3.874 km/sec), relativistic time dilation occurs, the atomic clock runs slower and the frequency decreases. As a result, due to gravitational time acceleration and frequency dilation, a signal of increased frequency comes to Earth from GPS orbits.

A detailed and, as we understand, the first relativistic explanation of time decelerations and accelerations in GPS was given by Professor Neil Ashby:

"atomic clocks have gravitational and motional frequency shifts which are so large that, without carefully accounting for numerous relativistic effects, the system would not work. …Relativistic principles and effects which must be considered include the constancy of the speed of light, the equivalence principle, the Sagnac effect, time dilation, gravitational frequency shifts, and relativity of synchronization" [4].

2) Using the GPS system as an example, it is much easier to demonstrate the fallacy of the claims about "time dilation" in moving systems than in the Ives-Stilwell and Pownl-Rebka experiments, since there is a lot of information about GPS. The speed of the atomic clock does not depend on either the satellite's movement

or the change in gravity. The high accuracy of the system is achieved primarily due to the fact that the clocks of all satellites are synchronized with an accuracy of up to 2 - 3 nanoseconds and the synchronization is continuously monitored.

The observed frequency changes in GPS are explained by the change in the speed of photons. From satellites to Earth, photons move faster in the gravitational field and increase their frequency. Before launching into orbit, a correction is introduced into the satellite clocks (the frequency is lowered) so that signals arrive at receivers with a frequency convenient for them of 10,230 megahertz; a correction is introduced into the satellite clocks (the frequency is lowered) before launching into orbit, but this correction has nothing to do with the theory of relativity.

All these issues are discussed in detail in many of our works, some of which are given below:

Gravitational frequency shift and transverse Doppler effect in GPS
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8354

What the Global Positioning System Tells Us about Relativity, Tom Van Flandern http://acmephysics.narod.ru/b_r/gps.htm

Frequency Changes in GPS Satellite Signalsvie
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8706

Is the atomic clock accelerating in satellite orbit?
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/8875

All experiments with relativistic "time dilation" are ex
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9656

For what is a correction of 38 microseconds introduced into GPS sat.
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9799

The relativists' assertions that the GPS system cannot work without taking relativistic corrections into account are absolutely incorrect, and the very fact that it works very accurately and is explained in our works on the basis of classical concepts without mystical "time dilations" proves the fallacy of the theory of relativity.

3.23. Modern Experiments and Observations

Various experiments to prove the independence of the speed of light from the movement of the source are carried out using accelerators and high speeds of movement of radiating ions, and it is assumed that light moves in a vacuum. However, the vacuum in accelerators is not an ideal physical vacuum and turns out to be worse than in interstellar space, where each cubic centimeter contains several hydrogen atoms. Due to re-radiation, photons cannot move in such a "vacuum" at a speed greater than C. By the way, as we imagine, in an accelerator ions cannot accelerate to a speed greater than C, in principle, not because of insufficient power

of the accelerator, but because the accelerating fields themselves move at a speed of *C*.

3.24. The Experiments We Proposed to Refute the Invariance Postulate

Based on the postulate of the invariance of the speed of light, the Special Theory of Relativity states that the speed of light does not depend on either the motion of the source or the motion of the receiver. However, to verify this postulate, only experiments with the motion of the source were conducted, but experiments to verify the independence of the speed of light from the motion of the observer (receiver) have never been conducted by anyone. Why? Only because the motion of the observer is declared equivalent to the motion of the source. But this is also a postulate, but not a confirmation. Moreover, the postulate is obviously erroneous. Or because the observer cannot move with sufficient speed? But for more than half a century, an observer with instruments can move on a satellite at a speed of several kilometers per second, which is quite enough to verify the postulate, but such experiments are not even planned.

We have proposed several space experiments to test the dependence of the speed with which light moves relative to a moving observer and relative to an inertial frame in which the observer is stationary.

The very first experiment we proposed was an optical experiment to disprove the relativistic "length contraction" mentioned in point 3.21 and we do not refer to it here.

In order to detect the speed of light greater than *C*, in the late 90s we proposed experiments with an interferometer installed outside the satellite, which, unlike the Michelson interferometer, actually moved relative to the rarefied atmosphere. However, these experiments were complex and expensive, and we do not refer to them here either (if desired, you can find all of them among our works on the GSJ website at address

https://www.gsjournal.net/Science-Journals-Papers/Author/1768/Gennadiy,%20Sokolov).

After the advent of the GPS system, an idea arose to experiment with two satellites moving at the same speed and exchanging signals. The satellites have atomic clocks and can measure, as is done in GPS, the time intervals during which the signal from one satellite arrives at the second satellite, which, with a precisely known distance between the satellites, allows one to determine the speed of signal in one direction (and not in two directions "there and back", as Einstein proposed in his principle of synchronization).

In [5], the authors, describing in detail the measuring capabilities of GPS, repeat the statements of Professor Neil Ashby [4] that the very appearance of the GPS system became possible only thanks to the theory of relativity.

Experiments with GPS satellites that we proposed are described in detail in several of our works:

Einstein's Theory of Relativity and the Experiment to Disprove It
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/6234
Experiment with Two Interplanetary Space Ships
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/6315
GPS experiment with measuring the speed of light greater than C
https://www.gsjournal.net/Science-Journals/Research%20Papers/View/8402
GPS experiment to detect the speed of light greater than C
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9610
Experiment with GPS Satellites Destroys Relativity Theory
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9884
Experiment that Will Allow Us to Detect the Influence of Gravity on the Speed of Light
https://www.gsjournal.net/Science-Journals/Research%20Papers-Relativity%20Theory/Download/9933

What all these experiments have in common is that the satellites move in the same orbit at the same speed at a known distance and each satellite has an atomic clock that is synchronized before it is launched into orbit, and it is assumed that in orbit the clocks remain synchronous and run at the same frequency as on Earth. The fact that the clocks of all 24 - 27 satellites in orbit remain synchronized is confirmed by the very fact that the GPS system works.

Since the distance between GPS satellites moving in the same orbit is known with an accuracy of several centimeters and the times during which the signal travels this distance from the first satellite to the second and from the second to the first are measured with an accuracy of 2 - 3 nanoseconds, each satellite can very accurately calculate the speed at which the signal is traveling to it. In this experiment, the signal from the first satellite will arrive at the second in less time than from the second to the first, and relative to the second satellite, the speed of photons will be greater than C.

For those who doubt that the signal "there" and the signal "back" travel at different speeds relative to the inertial system in which the satellites are stationary, we recommend imagining that the satellites are not moving relative to the very rarefied atmosphere at an altitude of 20,000 kilometers, but in a low orbit, where the atmosphere is so dense that it affects not only the speed of light, but even the speed of the satellites.

4. Conclusions

The new physical theory proposed in this paper is based on classical ideas about space and time and is not connected with the mystical ideas about the "invariance of the speed of light", about "time dilation" and "length contraction", which led to the erroneous hypothesis of the "Big Bang". The impeccable explanation of all known experiments and observations by this theory, as well as the new

experiments proposed to confirm it allow, we hope, to answer the question:

Which better reflects physical reality:

Emission Theory with Re-Emission of Photons by the Medium or Special Relativity Theory?

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Doppler Shift. Imagine the Universe! NASA. https://imagine.gsfc.nasa.gov/features/yba/M31_velocity/spectrum/doppler_more.html

[2] Bunn, E.F. and Hogg, D. W. (2009). The Kinematic Origin of the Cosmological Redshift. *American Journal of Physics*, **77**, 688-694. https://doi.org/10.1119/1.3129103

[3] Einstain, A. (1905) On the Electrodynamics of Moving Bodies. *Annalen der Physik*.

[4] Ashby, N. (2003) Relativity in the Global Positioning System. *Living Reviews in Relativity*, **6**, Article No. 1. https://doi.org/10.12942/lrr-2003-1

[5] Van Flandern, T. (1998) What the Global Positioning System Tells Us about Relativity. In: Selleri, F., *Open Questions in Relativistic Physics*, Apeiron, 81-90.