The Theory of Relativity by Albert Einstein & the Physical Society – Part I

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Abstract

This article closes the famous page with a key importance for the 20th century physics – the "Theory of Relativity". The background of the research is (1) analysis of all "unexpected" and "inexplicable" results of the most famous experiments related to the measurement of the speed of light; an analysis of the article "On the Electrodynamics of Moving Bodies"; and (3) the published articles "The Speed of Light and Uncertainty Principle of the Macro-world" and "Awareness of Special and General Relativity and Local and General Physical Reality". The research results are "Model of Uncertainty of the Universe" and "Thesis about the Behavior of the Electromagnetic Radiation in Gravitational Field", which actually replaces the postulate of invariance of the speed of light formulated by Albert Einstein. A separate section is devoted to reveal the essence of the Special Theory of Relativity. The conclusion about the theory of relativity, is also based on Einstein's citation - when "the relativity theory could not be maintained…").

Keywords: special relativity, theory of relativity, speed of light postulate, Einstein, Michelson-Morley experiment, Sagnac experiment.

PACS:	04.20.Cv	Fundamental problems and general formalism
	04.20.Ex	Initial value problem, existence and uniqueness of solutions
	06.20.F	Units and standards

0. PREFACE BY THE AUTHOR

The present article "The Theory of Relativity by Albert Einstein & the Physical Society – Part I" will be submitted for publication in physics journals with a high impact factor but with a title "The Theory of Relativity by Albert Einstein – Awareness of the Physical Reality". The discussions (or the silence) of the editorial boards of these journals, (which can belong to the orthodox part of the physical society) will be publicized in the next article "The Theory of Relativity by Albert Einstein & the Physical Society – Part II".

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CONTENTS

1. Introduction

Galileo Galilei first described the principle of relativity in 1632. This principle states that the laws of motion are the same in all inertial frames of reference. Historically, after the development of Maxwell's theory of electromagnetism, the questions about the velocity of light and what medium supports the transmission of the electromagnetic waves have arisen. For James Clerk Maxwell and other scientists of that time, the answer was that light travels in a hypothetical medium called luminiferous ether. Albert Michelson (the so-called master of light) made his first experiment in 1881 in order to determine the rate of the motion of the Earth relatively to the stationary luminiferous ether. The result was that the hypothesis of stationary ether is incorrect. It was confirmed in 1887 by the "famous" Michelson-Morley experiment. FitzGerald, as well as Lorentz, attributed the "null result" of the experiments to a hypothetical contraction of the physical quantity "length", affecting the path traveled by the light. On the base of this idea, Albert Einstein proposed the complete explanation theory "Special Theory of Relativity" in his article "On the Electrodynamics of Moving Bodies" (Einstein, A., 1905).

Too many scientists were not and do not agree with the theory of relativity by Albert Einstein. So far, however, the author has not encountered a thorough argumentation against the theory of relativity, as well as a new comprehensive solution for the construction of the Universe, which can explain all "inexplicable" and "unexpected" results of the famous experiments related to the measurement of the speed of light.

The problem concerns not only the cosmology and the theoretical physics. It conserns, for example, and the proposed redefinition of the SI base units, what means that it refers to the entire field of applied physics and technology.

2. Model of Uncertainty of the Universe

The results of the most famous experiments related to the measurement of the speed of light show that the model of the physical reality in the Universe has to be considered in two aspects – in "the local physical reality" and in "the global physical reality".

2.1 Used Definitions and Acceptations

Time and space are mutually connected. The electromagnetic field exists on the gravitational field. The characteristics of the electromagnetic field μ_0 (permeability of free space) and ε_0 (permittivity of free space) are only local constants, and they are changing together with the change of the gravitational field intensity. In fact, the wavelength and the frequency of electromagnetic radiation are its spatial- and time- characteristics respectively. Space-time itself is often called "vacuum" or "empty space" and it actually exists on many levels. It lays among the elementary particles of matter, among all the planets, stars and galaxies. All these levels are interconnected, depending on each other, and changing in perfect but not yet discovered synchrony.

2.1.1 General Definition of the Universe

Based on awareness of the physical reality, the following general definition of the Universe can be given:

> "The Universe is warped by matter time-spatial gravitational force-field, on which other fields exist (such as the electromagnetic field), and where the energy accumulates and transforms."

2.1.2 Definition of GRULW (Global Relative Universe Level of Warping) of a time-spatial domain

The intensity of the gravitational field (caused by a mass M) in a certain small time-spatial domain is defined as the force exerted on unit mass in this domain by the gravitational field of the mass M. It is impossible to define "an absolute" gravitational intensity in a time-spatial domain in relation to all the mass in the Universe. We can compare the intensities of a gravitational fields among time-spatial domains in different areas in the Universe, but using our measurement units. Generally, the measurement units can be different in the different time-spatial domains. Definition of GRULW:

> "Different local areas in the Universe can be characterized by their GRULW (Global Relative Universe Level of Warping), which is actually a "relative local space-time level of expansion/contraction"."[3]

[3] In this paper it is accepted that "in empty space" or "in vacuum", corresponds to the "reference system related to the space itself", as well as the "Earth-centered inertial (ECI) coordinate frame" which has its origin at the center of the Earth and it is stationary in the space.

2.1.3 Definition of time-spatial domain “Local Physical Reality”

> “The local physical reality is any time-spatial domain with equal intensity of the gravitational field. Our local physical reality can be named “on the Earth’s surface”.”

2.1.4 Definition of “Global Physical Reality” in the Universe

> “The Global physical reality in the Universe is actually an infinite set of local time-spatial domains among the celestial bodies (and on the surfaces of the celestial bodies). Generally, the time-spatial domains are with different intensities of the gravitational field.”

2.1.5 The Electromagnetic radiation and the light

We know that:

> “The Electromagnetic radiation (EM radiation or EMR) is the radiant energy released by certain electromagnetic processes.”
>
> “The electromagnetic spectrum is all the range of all possible frequencies of electromagnetic radiation.”
>
> “The Light is the visible part of the electromagnetic spectrum that can be detected by the human eye.”

2.1.6 The speed of electromagnetic radiation in “empty space”

We know that:

The spectrum of the electromagnetic radiation is actually a spectrum of electromagnetic energy. Different electromagnetic energy corresponds to different, but a certain frequency and a certain wavelength of the electromagnetic radiation. However, in our local physical reality with equal intensity of the gravitational field, the correlation between the frequency and the wavelength in the whole electromagnetic spectrum is the same.

> “The “speed of light in empty space” is the correlation between the frequency and the wavelength in the whole electromagnetic spectrum, which is a local constant for our time-spatial domain.”

In order to be more precise, we will use the term “velocity”, when we mean the vector $\vec{V}$; and we will use the term “speed”, when we mean the scalar magnitude $|\vec{V}|$ of the vector $\vec{V}$.

2.1.7 About the Frames of Reference

The presented logical analysis of our local physical reality “on the Earth’s surface” is based on two frames of reference:

- One of the used frames of reference corresponds to the “Earth-centered inertial (ECI) coordinate system”. The origin of that system is at the center of the Earth and the frame is stationary in the space. In other words we can say that the “ECI coordinate system” is related to the space itself, where the Earth rotates, where the Sun and the planets move and warp the space around, where photons are born and propagate. The “ECI coordinate system” is not “absolute” frame. Another stationary in the space system of reference is the “Heliocentric inertial (HCI) coordinate system”, which has its origin at the center of the Sun.
- However, the frame of reference, which the humankind usually uses, is related to Earth’s surface. Not only all material bodies on the Earth’s surface are rotating together with the Earth. The molecules of the atmosphere also participate in this rotation, but in addition with other atmospheric phenomena.

Actually, we have to underline that: The atmosphere is rotating together with the surface of the Earth, but the space – not; and in our local physical reality “on the Earth’s surface” - every mechanical or optical experiment actually occurs in the common space of the two aforementioned frames of reference.

2.2 Model of the Physical Reality in the Universe

The Model of the Physical Reality in the Universe is based on the nature of existence of the electromagnetic field on a gravitational field.

2.2.1 Behavior of the electromagnetic radiation in local time-spatial domain

The celestial bodies (like the Earth) are rotating in the stationary (surrounded, contiguous, warped by the celestial body itself and belonging to it) local “time-spatial domain”.

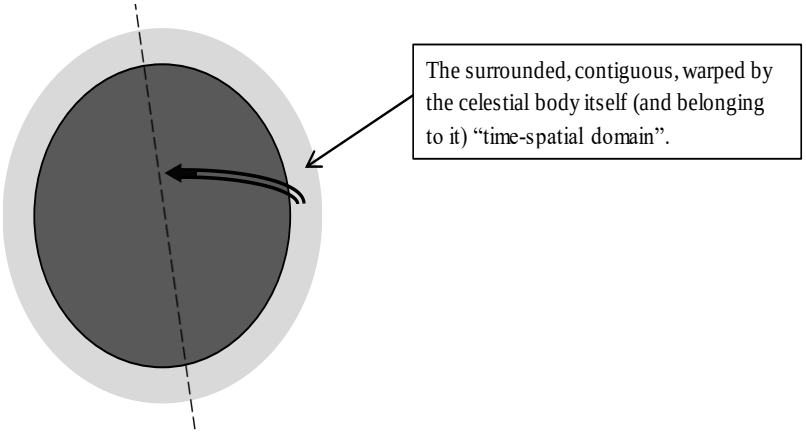

Fig.1. Rotation of the celestial bodies in the stationary space of the “local time-spatial domain”

In the local time-spatial domain “on the Earth’s surface”, the speed of light in the ECI reference frame (in the “empty space”) is a constant that corresponds to the local intensity of the gravitational field. However, in the frame of reference related to the Earth’s surface “light speed anisotropy” is a real fact due to the rotation of the celestial body in the stationary “empty space”.

Confirmation: In the case of “One-Way Light Speed Determination” in the reference system related to the Earth’s surface – the measured speed of light between two fixed points on the Earth’s surface in direction “East-to-West” is higher than the measured speed of light in direction “West-to-East”. This difference corresponds to the linear speed of the Earth’s surface at this latitude, because the speed of light in “empty space” is a constant. The experiments “One-Way Light Speed Determination”, “Sagnac’s experiment” and “Michelson-Gale-Pearson experiment are actually a proof that the measured speed of light is not the same in all frames of reference [see section 4].

2.2.2 Behavior of the electromagnetic radiation in the Global Physical Reality of the Universe

All celestial bodies (as well as the Earth) are traveling through the space-time of the Universe together with the contiguous, warped by the body itself (and belonging to it) “time-spatial domain”.

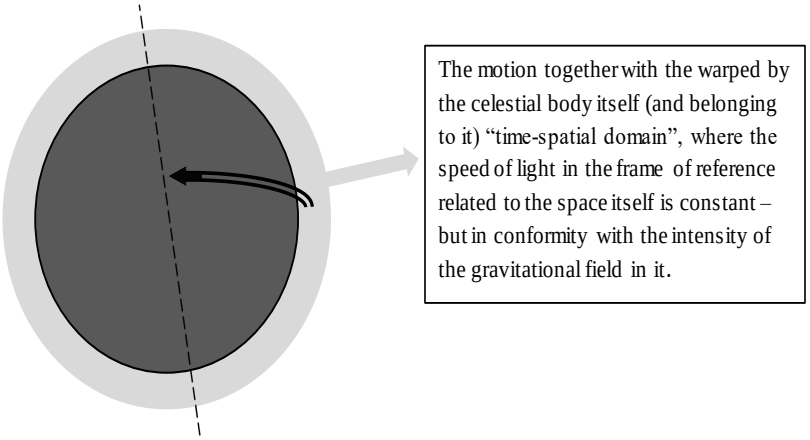

Fig.2. Moving of the celestial bodies together with their “own time-spatial domain”

This is the reason why it is no variation in the speed of light in vacuum due to the motion of the Earth around the Sun and in the Galaxy. The speed of light in the “empty space” (traveling together with the Earth) remains always the same and corresponds to the equal intensity of the gravitational field in the local time-spatial domain “on the Earth’s surface”. One can say that the speed of light is a fundamental constant in the Universe. However, it is a big delusion, because actually the speed of light in “empty space” is different in areas with different intensity of the gravitational field. „Shapiro time delay effect” is a proof of this reality. At the entrance toward the increasing intensity of the gravitational field of the time-spatial domain surrounding the Sun, photons are losing energy, which is absorbed by the gravitational field. The frequency and the wavelength of the photons are decreasing, therefore the speed of the photons is decreasing ($c=\nu.\lambda$) in conformity with the level of the gravitational field intensity. Conversely, when entering areas of weak gravitational field, the frequency and the wavelength of the photons are

increasing, therefore the speed of the photons is increasing.[2]

On the base of this "Model of the Physical Reality", the suggested "Thesis about the Behavior of the Electromagnetic Radiation in Gravitational Field" actually replaces the postulate of invariance of the speed of light formulated by Albert Einstein. As a result, all "unexpected" and "inexplicable" results of the famous experiments related to the measurement of the speed of light obtain their genuine explanations [see section 4].

Some existing misconceptions in contemporary physics:

- As a consequence, the reader will logically come to a conclusion that the astronomical unit of length "light year" is a big delusion.
- If someone claims that the age of the Universe is 13 or 15 billion years, I would ask: "Where in the Universe the used unit of time is defined?" Obviously, the length of a year on Earth can be equal to a "second" in areas with extremely strong gravitational field. Therefore, such a statement is meaningless ...
- The "red shift" or the "blue shift" of the frequency of the electromagnetic radiation due to the "Doppler effect" is actually another big delusion. Moreover, this delusion has caused other big problems in the physics today to be generated (such as: "the accelerated expansion of the Universe", "the dark matter and the dark energy in the Universe", etc.), which have been under research for a long time…
- In areas with equal intensity of the gravitational field, the correlation between the frequency and the wavelength in all the electromagnetic spectrum (what actually is the speed of light), remains always the same. Therefore, with the change of the energy (frequency) of the electromagnetic radiation, the wavelength is changing too, but in a way that the correlation between them (the speed of light) remains the same. This is the case of the "Doppler radar", when the momentum (the energy) of the photon is changing at the contact with moving object. Therefore, the explanation that the change of frequency of the photons is due to the "Doppler effect" is another delusion.

2.3 Uncertainty in the Macro-World

The Physical Reality in the Universe is based on the nature of existence of the electromagnetic field on a gravitational field. Let us imagine a time-spatial domain with equal intensity of the gravitational field, where the measurement base units of time and length are defined by means of the characteristics of the electromagnetic radiation.

For example, the definition of the base unit of time "the second" in International System of Units (13th meeting of the CGPM, 1967/68), is:

> *"The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium 133 atom."*

and, the the base unit of length "the metre", as was defined (17th meeting of the CGPM, 1983):

> *"The metre is the length equal to 1650763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels 2p10 and 5d5 of the krypton 86 atom."*

Let us imagine that the level of the intensity of the gravitational field in this time-spatial domain changes (but the gravity remains equal in all the points). Therefore, and the characteristics of the electromagnetic radiation will change in synchrony. It means that the frequencies and the wavelengths of the entire electromagnetic spectrum will change; it means that the properties of the atoms will change, because the electromagnetic field exists on the gravitational field. The characteristics of the electromagnetic field will change together with the change of the gravitational field intensity, and as consequence, the measurement units will change (because they are defined by means of the characteristics of the electromagnetic radiation)…. However, for the changed physical constants (which we will measure by means of the changed units of measurement), we will obtain the same numerical values, because the laws of physics remain the same. Therefore, the entire physical reality will change in synchrony, but we will not be able to measure, (to fix) this change… and this change, however, is in a still undiscovered way.

On the other side, we receive information from the Universe only by means of the electromagnetic radiation. The electromagnetic signals travel to the Earth for an uncertain period of time (the unit of time is changing), they cover an uncertain distance of warped space (where the unit of length is changing),… at an uncertain velocity.

[2] The accepted in contemporary physics behavior of the photons in the gravitational field is erroneous and does not correspond to the physical reality.

Therefore, we can summarize that:

> *"The uncertainty of the macro-world consists in the fact, that we cannot measure or calculate in our local time-spatial domain (where the units of time and length are defined by means of the characteristics of the electromagnetic radiation), neither the change of the defined by us units, nor the change of all our local constants, because they all change in perfect synchrony with the change of the entire physical reality. Also, we cannot measure or calculate any change in the physical reality in another remote time-spatial domain with different level of contraction/expansion of the space-time, because the measurement units in the remote domain are uncertainly different."* (Sharlanov, 2012a).

In other words, if all measurement units of the physical quantities are changing in synchrony with the change of the gravitational field intensity, then:

1) in time-space domains with different intensity gravitational field - all physical equations (representing physical laws) will be the same, but used units of measurement will be different (according to the different intensity of the gravitational field). In this way the numerical values of all the local physical constants will be measured the same too.

2) in time-spatial domain with equal intensity of the gravitational field (equal in every point), but where the intensity of the gravitational field is changing (in the same way in every point) – the laws of physics remain the same. However, with the changing of the gravitational field intensity - all the local physical units will change in synchrony. Therefore, we will obtain the same numerical values for the changed physical constants, and we will not be able to register whatever change. Therefore, the perception of "absoluteness" will be perfect, and the delusion will be "irrefutable".

As a logical consequence of the presented "Model of uncertainty of the Universe", the following "Thesis about the behavior of the electromagnetic radiation in a gravitational field" is formulated.

3. Thesis about the Behavior of the Electromagnetic Radiation in Gravitational Field

This thesis replaces the postulate of invariance of the speed of light formulated by Albert Einstein.

3.1 In Areas with Equal Intensity of the Gravitational Field (the Local Physical Reality)

> **Statement 1)** The speed of the electromagnetic radiation is a local constant in the "reference system related to the space itself", (in "empty space").

In a "time-spatial domain" where the intensity of the gravitational field is the same, the speed of the electromagnetic radiation in "empty space" is a local constant and depends only on the intensity of the gravitational field.

> **Statement 2)** The speed of the electromagnetic radiation in the "reference system related to the space itself" does not depend on the velocity of the body of the source of electromagnetic radiation.

This is because the electromagnetic radiation is a vibration, which occurs at a quantum level and does not depend on the velocity of the body to which the atom belongs (the atom, which emits the photon in the space).

> **Statement 3)** The measured speed of the electromagnetic radiation in areas with an equal gravitational field intensity is not the same in all frames of reference.

Mathematically, in areas with an equal gravitational intensity, the relationship between the readings in the different reference systems is expressed through Galilean transformations - it is a subject of Newtonian mechanics. This fact is actually proved by the experiments "One way light speed determination", "Sagnac's experiment" and "Michelson-Gale-Pearson Experiment". The real explanation of these experiments is shown below.

3.2 In Areas with Different Intensity of the Gravitational Field (the Global Physical Reality in the Universe)

> **Statement 1)** The speed of the electromagnetic radiation in vacuum (in the reference system related to the space itself) depends on the intensity of the gravitational field and it is different in the time-spatial domains with different intensity of the gravitational field. The speed of the electromagnetic radiation in vacuum changes when it passes through areas with different intensity of the gravitational field.

In particular, the speed of the electromagnetic radiation increases in areas with a weaker gravitational field and decreases in areas with a stronger gravitational field. This fact is actually proven by the Shapiro time-delay effect (Shapiro, 1964).

Statement 2) The properties of the atoms (photon emission and absorption) are different in areas with different intensity of the gravitational field. The energy of the emitted and absorbed photons, what means the frequency and wavelength (at a transition between the same hyperfine levels) are in conformity with the intensity of the gravitational field in the area where the atom is located.

This is so, because the electromagnetic field exists on the gravitational field.

4. Genuine Explanation of All the "Unexpected" and "Inexplicable" Results of the Famous Experiments Related to the Measurement of the Speed of Light

Initial conditions:

- The experiments are carried out in our local physical reality – in the time spatial domain "on the Earth's surface", where the intensity of the gravitational field is equal (the same), and where the units of the time and length are defined by means of the characteristics of the electromagnetic radiation.
- The two frames of reference, which we are considering, are: the first one, related to the Earth's surface and the second one, related to the space itself. As mentioned above, the "reference system related to the space itself", which we use in our time spatial domain "on the Earth's surface", corresponds to the "Earth-centered inertial (ECI) coordinate frame", which has its origin at the center of the Earth and is stationary in the space.

4.1 One-Way Light Speed Determination

Based on GPS timing, in "The GPS and the Constant Velocity of Light" (Marmet, 2000), Marmet observed that a light signal takes traveling eastward from San Francisco to New York about 28 nanoseconds longer than traveling westward from New York to San Francisco. Using GPS (Kelly, 2005), Kelly also determined that the light signal takes 414.8 nanoseconds longer to circumnavigate the Earth eastward at the equator than the light travelling westward around the same path. Both researchers concluded that these observed travel time differences in each direction arise because light travels at speed $(c - V)$ eastward and at speed $(c + V)$ westward, where V is the linear speed of the Earth's surface at the corresponding latitude.

Here, we will examine the both cases - the case "Eastward Transmission" and the case "Westward Transmission". The transmitter, the receiver and the propagation path (the path of light) are located in a time-spatial domain with equal intensity of the gravitational field (on the surface of the Earth). In the "ECI coordinate frame", the transmitting and receiving stations are moving towards East (together with the Earth's surface) at the speed V for the corresponding latitude. The position of station A in the ECI coordinate frame at time t is $X_A(t)$ and the position of the reception station B is $X_B(t)$. The distance on the ground surface between station A and station B is equal to D. According to the thesis [see subsection 3.1], in areas with equal intensity of the gravitational field (our local physical reality), the speed of light in "empty space" (in relation to the ECI coordinate frame) is constant.

4.1.1 The case "Eastward Transmission"

Station A transmits a signal eastward at time t_I to station B, which receives it at time t_F.

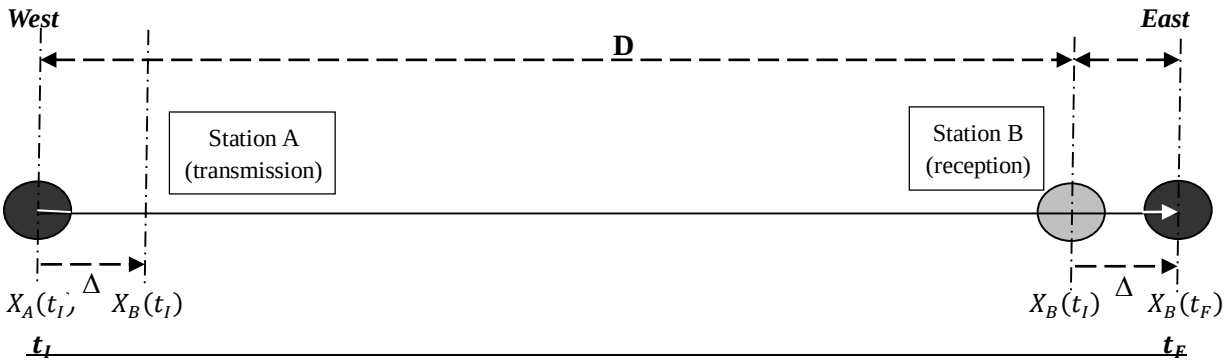

Fig.3. One-way light speed determination – eastward transmission

Explanation of the experiment in conformity with the physical reality:

- In the Earth-centered inertial system (ECI):

The light passes a certain distance in "empty space" at a constant speed c - from the position $X_A(t_I)$ of station A at the moment of transmission t_I, to the position $X_B(t_F)$ of station B at the moment of receiving t_F (see Fig.3). The distance in the "empty space" is equal to the distance between the two stations D plus the distance Δ, which station B passes during the time interval of $(t_F - t_I)$ at a speed V (as the linear speed of the Earth's surface at this latitude). The time interval between the transmitting and receiving is:

$$(t_{F-}t_I) = \frac{Path}{c} = \frac{D + \Delta}{c} \tag{1}$$

, where *c* is the local constant "speed of light" in "empty space" in our local physical reality "on the Earth's surface".

- In the reference system related to the Earth's surface, the obtained result is:

The light passes the exact distance equal to D for the same time interval $(t_F - t_I)$ and the measured speed of light in the case "Eastward transmission" is equal to $(c - V)$:

$$(t_F - t_I) = \frac{D}{c - V} \tag{2}$$

Mathematically, the expression (2) is the same as (1), but Δ is replaced with $(t_F - t_I)$. As the reader can see, the two events are "sending signal" and "receiving signal". The time interval between the two events $(t_F - t_I)$ is equal for the two frames of reference. Therefore, the concept of simultaneity of two events observed in two inertial frames of reference is valid. However, the measured speed of light is different for the two frames of reference and that fact is confirmed by the experiments.

4.1.2 The case "Westward Transmission"

Station A transmits a signal at time t_I, to station B, but westward, and station B receives electromagnetic signal at time t_F.

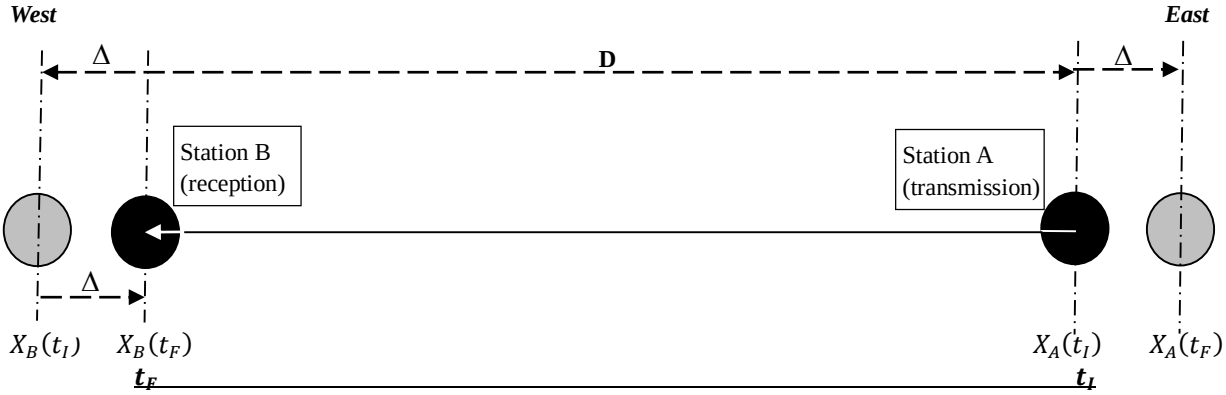

Fig.4. One-way light speed determination – westward transmission

Explanation of the experiment in conformity with the physical reality:

- In the Earth-centered inertial system (ECI):

The light passes a certain distance in the "empty space" at a constant speed *c* - from the position $X_A(t_I)$ of station A at the moment of transmission t_I, to the position $X_B(t_F)$ of the station B at the moment of receiving t_F (see Fig.4). However, this distance in the "empty space" is equal to the distance between the two stations D minus the distance Δ, which the station B passes during the time interval of $(t_F - t_I)$ at a speed V (as the surface of the Earth). The time interval between the transmitting and receiving is:

$$(t_{F-}t_I) = \frac{Path}{c} = \frac{D - \Delta}{c} \tag{3}$$

- Respectively, in the reference system related to the Earth's surface, the obtained result is:

The light passes the exact distance equal to D for the time interval $(t_F - t_I)$ and the measured speed of light in the case "Westward transmission" is different and equal to $(c + V)$:

$$(t_F - t_I) = \frac{D}{c+V} \tag{4}$$

Mathematically, the expression (3) is the same as (4) again – where Δ is replaced with $\big(V(t_F - t_I)\big)$. As was shown above - and in this case the time interval between the two events $(t_F - t_I)$ is equal for the two frames of reference and the concept of simultaneity of two events observed in two inertial frames of reference is valid. However, the measured speed of light is different for the two frames of reference – it is $(c+V)$ instead c.

4.1.3 Conclusion related to the experiments "One-Way Light Speed Determination"

Therefore, the experiments "One-Way Light Speed Determination" are irrefutable evidence that:

The measured speed of light in the local time-spatial domain with equal intensity of the gravitational field is not the same in all frames of reference. These experiments prove that measured speed of light is not the same in different directions in the frame of reference related to the Earth's surface.

Nowadays, the value of the speed of light is recommended by (15th meeting of the CGPM, 1975):

"[CGPM] recommends the use of the resulting value for the speed of propagation of electromagnetic waves in vacuum c = 299 792 458 metres per second."

Important note: Therefore, if we are situated in the frame of reference related to the Earth's surface, and we have to measure the speed of light in vacuum, we must take the arithmetical average of the measured speed of light in two opposite directions (East-to-West) and (West-to-East). This note is directed to the current definition of the SI base unit of length "meter" by means of the speed of light (17th meeting of the CGPM, 1983). This definition concerns to the entire field of applied physics and technology:

"*The metre is the length of the path traveled by light in vacuum during a time interval of 1/299 792 458 of a second.*"

4.2 Sagnac's Experiment

George Sagnac, French physicist, constructed a device "ring interferometer", also called "Sagnac interferometer". The light source, collimator, beam-splitter, light pencils and 4 mirrors of the interferometer (Fig.5), were all mounted on a spinning disc (0.5m in diameter). In this way, they are all rotating in the reference system associated to the space itself -"in empty space".

Description of the experiment: A monochromatic light beam is split and the two beams are designed to follow the same path but in opposite directions around a polygonal mirror course. The two recombined beams are then focused on a photographic plate, permitting measurement of fringe shifts with a high accuracy, as was described (Sagnac, 1913). The observed effect is that the displacement of the interference fringes is changing with the change of the velocity of the disk rotation.

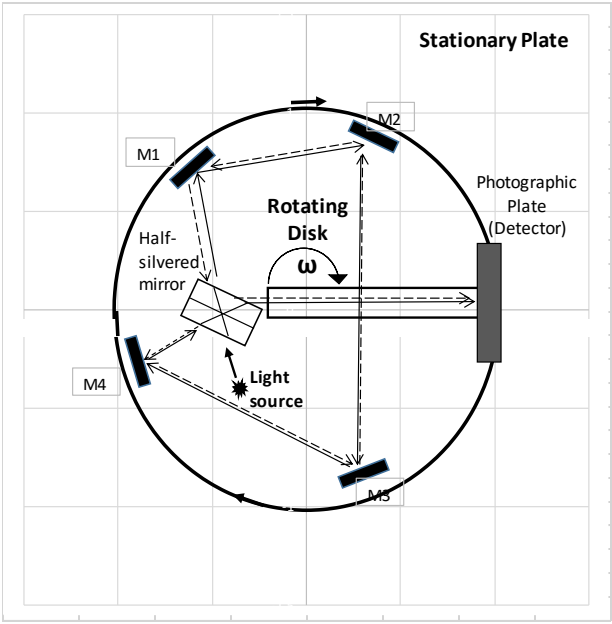

Fig.5. Schematic representation of the Sagnac interferometer

The reported result by George Sagnac is:

> *"The result of these measurements shows that, in ambient space, light propagates with a velocity V_0, independent of the collective motion of the source of light O and the optical system. This property of space experimentally characterizes the luminiferous aether. The interferometer measures, according to the expression, the relative circulation of the luminiferous aether in the closed circuit."* (Sagnac, 1913).

This result is in correspondence with the aforementioned thesis for areas with equal intensity of the gravitational field [see subsection 3.1]. The difference is that the real fact "the speed of light is not the same in all frames of reference", has been explained with a relative circulation of the luminiferous ether in the closed circuit.

Explanation of the experiment in conformity with the physical reality:

It is appropriate to consider the Sagnac's experiment in a "Disk-Centered Inertial coordinate system" (DCI frame), which is stationary in the space, similarly to "Earth-centered inertial system" (ECI frame), where the disk is rotating (instead of the Earth). The plane of the disk represents the (x, y) plane and the origin of the "DCI coordinate frame" is the center of the disk.

- Examination of the Sagnac's experiment in the frame of reference related to the space itself – in the so named DCI frame of reference:

According to the thesis [see subsection 3.1, statement 1], in areas with equal intensity of the gravitational field (like our local physical reality), the speed of light in empty space is constant. This is the speed of light for the stationary DCI frame of reference - equal to c. However, all the apparatuses mounted on the spinning disc are rotating (moving) in the stationary DCI frame of reference. The two light beams travel in opposite directions. Therefore, in this frame of reference, the pathlengths, which the two light beams actually cover in the space, are different. It is due to the movement of the target's mirrors in the space during the travel time of the light beams. Thus, the path length of one of the light beams (which is traveling in opposite direction of the disk rotation) is shortening, and the pathlength of the other light beam (which travels in the direction of the disk rotation) is extending. As a result of the change of the pathlengths of the two light beams, due to the different velocities of the disk rotation - different phases between the two beams are created.

Therefore, the conclusion for this frame of reference is that the displacement of the interference fringes is due to the change of the pathlengths covered by the two light beams, which in turn is dependent on the velocity of the disk rotation.

- Examination of the Sagnac's experiment in the frame of reference related to the rotating disk:

In this frame of reference, the mirrors, the light source and the photographic plate are stationary and the pathlengths of the beams (the distances among the mirrors) are not changing when the disk is rotating. As a result, the measured speeds of the two light beams in the reference system related to the spinning disk are different, and the difference depends on the velocity of rotation: the speed of the beam which travels in the direction of rotation decreases $(c - V)$, where V is the linear speed of the mirrors, but the speed of the other beam which travels opposite to the direction of rotation – increases $(c + V)$.

Therefore, the conclusion for this frame of reference is that the displacement of the interference fringes is due to the change of the speed of the two light beams in the frame of reference related to the rotating disk, which in turn is dependent on the velocity of the disk rotation.

4.3 The First Michelson's Experiment

Albert Michelson designed an experimental apparatus (later known as a Michelson interferometer) and made his first experiment in 1881, in order to determine the change of the speed of light due to the motion of the Earth through the stationary luminiferous ether.

4.3.1 Michelson's expectations

If the stationary luminiferous ether exists, the motion of the entire Solar system and the motion of the Earth along its trajectory around the Sun will result in a summary effect of the "ether wind" on the speed of light. The effect of the "ether wind" will differ at night and at the day and will be different at different points of the Earth's orbit.

4.3.2 The Michelson interferometer

The designed by Michelson experimental apparatus, illustrated in Fig.6, uses two-way path of light propagation on two perpendicular arms and consists of a light source, detector, "SSM" (Semi-silvered mirror) and two mirrors (A and B), which are horizontally located (at the same gravitational potential). The Michelson's expectations were that the change of the speed between the two light beams would cause different shift of the interference fringes.

Using a wavelength of about 600 nm, Michelson expected that there would have been a shift of about 0.04 interference fringes. However, the expected shifts of the interference fringes were not observed.

Michelson reported the results:

"The small displacements -0.004 and -0.015 are simply errors of experiment." (Michelson, 1881).

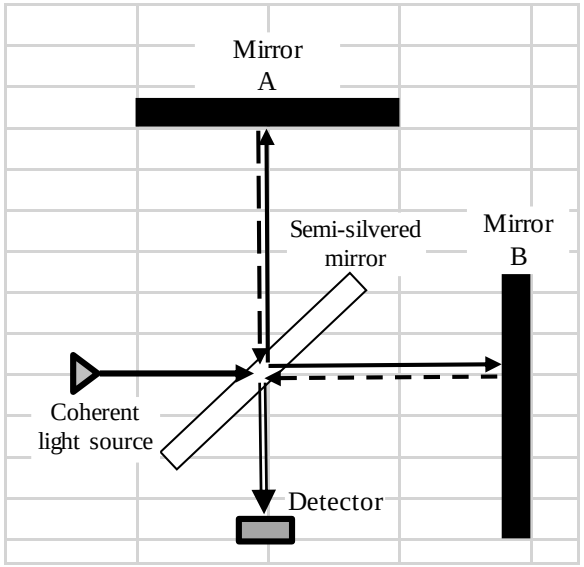

Fig.6. Scheme of the Michelson interferometer

The Michelson's conclusion was:

"The interpretation of these results is that there is no displacement of the interference bands… The result of the hypothesis of a stationary ether is thus shown to be incorrect, and the necessary conclusion follows that the hypothesis is erroneous." (Michelson, 1881).

4.4 The famous Michelson-Morley Experiment

The famous Michelson–Morley experiment was performed in 1887. Albert Michelson, with the collaboration of Edward Morley, constructed a new improved interferometer. As in the first experiment, the improved interferometer used two-way path of light propagation on two perpendicular arms. But by using multiple mirrors, the light pathlength was about 10 times longer. The light was repeatedly reflected back and forth along the arms of the interferometer, increasing the light pathlength to 11m. Thus, according to the intention, there was more than enough accuracy to detect the ether-hypothetical effect of the Earth's motion. At the pathlength of 11m, the expected shift should have been about 0.4 fringes. To eliminate thermal and vibration effects, the Michelson and Morley's interferometric apparatus was assembled on the top of a large block of sandstone, about a foot thick and five feet square, which was then floated in a pool of mercury.

4.4.1 The results

The result of the experiment was entirely unexpected and inexplicable again - the apparent velocity of the Earth around the Sun through the hypothetical ether was practically zero at any time of day or night, at all times of the year in different points of the Earth's orbit. The reported results were given by Michelson:

"It seems fair to conclude that if there is any displacement due to the relative motion of the earth and the luminiferous ether, this cannot be much greater than 0.01 of the distance between the fringes." (Michelson & Morley, 1887).

Although repeated over the next 40 years with even greater precision, this experiment proved the same negative result and earned Michelson the Nobel Prize in 1907.

4.4.2 Reasons for the "unexpected" result of the "Michelson-Morley experiment"

Here, it could be mentioned again that the efforts of this experiment were directed to register the change of the speed of light due to the motion of the Earth through the stationary luminiferous ether.

The reasons of the unexpected result are:

- "All the celestial bodies (and the Earth) are traveling through the space-time of the Universe together with the

surrounded, adjacent, warped by the body itself (and belonging to it) “time-spatial domain” [see Fig.2].

- In the surrounding Earth “time-spatial domain”: The speed of the electromagnetic radiation in the “empty space” (in “the Earth-centered inertial coordinate frame”; in “the frame of reference related to the space itself”) is constant and it depends only on the intensity of the gravitational field determined dominantly by the Earth.

- However, in our local physical reality “on the Earth’s surface”, which is an area with equal intensity of the gravitational field, the measured speed of light is not the same in all the frames of reference. In the frame of reference related to the Earth’s surface, the measured speed of light is different in directions “East-toWest” and “West-to-East” and and can be registered. Unfortunately, the speed of light anisotropy could not be registered by the Michelson-Morley interferometer, because the usage of two-way path of the two beams on the arms eliminates this possibility. This is because the difference in the speed of light in the two directions for each arm is completely compensated. However, the speed of light anisotropy is registered by the “Sagnac experiment”, “Michelson-Gale-Pearson Experiment” (see below), and by all the “One-Way speed of light measurements”.

4.4.3 Conclusion related to the “Michelson-Morley experiment”

The badly designed Michelson-Morley experiment can be classified as a very big mistake if we mean more than hundred years delusions. In summary:

> The “Michelson-Morley experiment” is actually the primary root cause for the great delusion that “the speed of light is the same in all inertial frames of reference”, which is the core of the theory of relativity.

4.5 Michelson-Gale-Pearson Experiment

This is the next experiment, which actually proves the validity of the “Thesis about the behavior of the electromagnetic radiation in areas with equal intensity of the gravitational field”, especially in our local physical reality [see subsection 3.1].

4.5.1 The ring interferometer

The “Michelson-Gale-Pearson experiment” (Fig.7) uses a very large rectangular ring interferometer (a perimeter of 1.9 kilometer – 612.648m x 339.24m). The experiment was carried out in the northern hemisphere at a latitude (41° 46'). A beam of light was split in half and the two beams are sent in opposite directions in an evacuated tube. Mirrors located in each corner of the rectangular are reflecting the two beams. When the two beams were reunited, they were out of phase.

The experiment is similar to that of George Sagnac, but the moving plate (with the interferometer and the detector) is the Earth’s surface itself, which moves with the linear velocity at the certain local latitude.

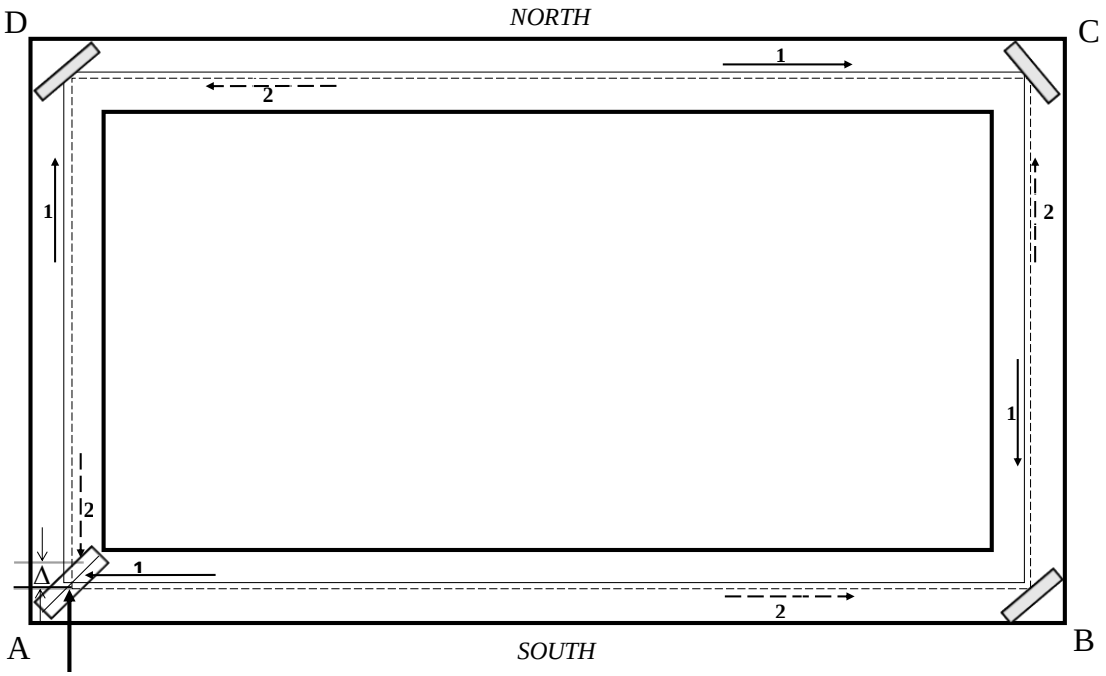

Fig.7. Scheme of the Michelson-Gale-Pearson experiment

"Air was exhausted from a twelve-inch pipe line laid on the surface of the ground in the form of a rectangle 2010x1113 feet. Light from a carbon arc was divided at one corner by a thinly coated mirror into direct and reflected beams, which were reflected around the rectangle by mirrors and corners. The two beams returning to the original mirror produced interference fringes." (Michelson & Gale, 1925).

4.5.2 Explanation of the experiment in conformity with the physical reality. Conclusion

Let us examine in details the movement of the two beams (Fig.7), taking in account that the two sides of the rectangular ring interferometer (AB and CD) are parallel to the equator. All the parts of the pipeline (with the mirrors), are moving with the linear velocities of the latitudes corresponding to their location. Since the experiment was carried out in the northern hemisphere, the linear velocity of mirrors A and B (located at the South side of the rectangle) will be higher than the linear velocity of mirrors C and D (the Northern side). We will try to examine the experiment in terms of both reference systems: in the reference system related to the Earth's surface, and in the reference system related to the space itself (the ECI coordinate frame). As was shown in Fig.7, beam "1" travels in a clockwise direction, and beam "2" travels in a counter-clockwise direction.

- In the system related to the space itself (in the stationary ECI frame of reference).

In this reference system, the speed of light is equal to the speed of light in "empty space" and therefore is constant. However, in this frame of reference, the two beams cover different total travel-paths, due to the different advance (movement) of the mirrors located on the southern and northern latitude, during the travel-time of the beams. If we designate the pathlengths in ECI reference frame, covered by the beam "1" and the beam "2" on side AB respectively as $|BA|_1$ and $|AB|_2$; the pathlengths covered by beam "1" and beam "2" on side CD respectively as $|DC|_1$ and $|CD|_2$, then:

$$(|AB|_2 - |BA|_1) > (|DC|_1 - |CD|_2) \quad (5)$$

In other words, the difference between the travel-path of beam "2" in the direction "East-to-West" and the travel-path of beam "1" in the direction "West-to-East" on side AB, will be greater than the difference between the travel-path of beam "1" in the direction "East-to-West" and the travel-path of beam "2" in the direction "West-to-East" on side CD. This is because the linear velocity of the mirrors on the south side AB is higher. As a result, when beam "1" is back to point A, beam "2" will be at a distance "Δ" before point A. Actually, this is the interference fringes displacement.

- In the frame of reference related to the Earth's surface:

The two beams are moving in opposite directions and they cover the same total travel-path. However, if we measure the speed of light in the frame of reference related to the Earth's surface, we will register different speed in the directions "East-West" and "West-East" of the light beams [see subsection 4.1]. However, this difference in the speeds of the beams will be higher on the South side in comparison with this difference on the North side, due to the higher linear speed of the Earth's surface at the South side. The result is the same - the two beams are out of phase when they return to point A.

In the reference system related to the Earth's surface, we can make calculation for the time difference:

If l_1 is the northern pipe line length (latitude $\emptyset_1$), where the linear velocity of the Earth's surface is v_1 ; and l_2 is the southern pipe line length (latitude $\emptyset_2$), where the linear velocity of the Earth's surface is v_2, then:

the time necessary for beam 1 (clockwise direction) to travel on the northern and on the southern sides is:

$$T_1 = \frac{l_1}{c - v_1} + \frac{l_2}{c + v_2} \quad (6)$$

and the time required of the beam "2" (counter-clockwise direction) to travel on the northern and on the southern sides is:

$$T_2 = \frac{l_2}{c - v_2} + \frac{l_1}{c + v_1} \quad (7)$$

It is so, because in the reference system related to the Earth's surface, the measured speed of light is different in the directions "East-to-West" and "West-to-East" and it depends on the speed of the Earth's surface at the corresponding latitude:

- the measured speed of light in the northern side in the direction "East-to-West" is actually $(c + V_1)$ and in the direction "West-to-East" is $(c - V_1)$; and

- the measured speed of light in the southern side in the direction "East-to-West" is actually $(c + V_2)$ and in the direction "West-to-East" is $(c - V_2)$.

If we ignore the small difference between the travel-time of the two beams on side BC and side AD, the time-difference will be:

$$T_2 - T_1 = \frac{2l_2v_2}{c^2 - v_2^2} - \frac{2l_1v_2}{c^2 - v_1^2} \tag{8}$$

The conclusion is clear:

> In the frame of reference related to the Earth's surface, the measured speed of light is different in the directions "East-to-West" and "West-to-East", and this difference depends on the different velocity of the Earth's surface at the different latitude.

This equation is the same as what Michelson shows in his article (Michelson & Gale, 1925):

> *"If l_1 is the length of path at latitude ϕ_1 and l_2 that at latitude ϕ_2, v_1 and v_2 the corresponding linear velocities of the earth's rotation, and V the velocity of light, the difference in time required for the two pencils to return to the starting-point will be:*
>
> $$T = \frac{2l_2v_2}{V^2 - v_2^2} - \frac{2l_1v_2}{V^2 - v_1^2} \tag{9}"$$

The reader can see that Michelson obtained the same result. The "Michelson-Gale-Pearson experiment" was carried out accurately:

> *"The displacement of the fringes due to the earth's rotation was measured on many different days, with complete readjustments of the mirrors, with the reflected image sometimes on the right and sometimes on the left of the transmitted image, and by different observers."* (Michelson & Gale, 1925).

We know that Michelson earned the Nobel Prize in Physics in 1907 and he was known as "the Master of Light". However, it is strange why he did not come to the correct conclusion in 1925. The "Effect of the Earth's Rotation on the Velocity of Light" is that the measured speed of light is different in the frame of reference related to the Earth's surface (where he obtained the measurement results). This fact is clear evidence that the speed of light is not the same in all inertial frames of reference. Therefore, the special theory of relativity could be canceled in 1925.[3] The "invariance of the speed of light in all inertial frames of reference" is with a key importance for the special theory of relativity. This importance is analyzed in the next section, and this coincides with the opinion (quotation) of Einstein.

5. Revealing the Essence of the „Special Theory of Relativity"

5.1 A contemporary reading of the article "ON THE ELECTRODYNAMICS OF MOVING BODIES" by Albert Einstein

At the beginning of the article, after introduction of the subject, Einstein gives a definition of the two well-known postulates. The first section of the article is a "KINEMATICAL PART", which starts with a subsection *"Definition of Simultaneity"*, where Einstein examines a system of co-ordinates, *"in which the equations of Newtonian mechanics hold good"*, and he calls this system a "stationary system". Actually, the considered "stationary system" is static in the "empty space", where the motion of material bodies takes place. He describes the motion of a material point by means of "employment of rigid standards of measurement" and the methods of Euclidean geometry. The key subject, which he starts to discuss, is the term "time". Indeed, when we talk about the time, we make relation of a certain event to the certain instant (a fixed moment in time). Here Einstein prepares the reader with the consideration about the lack of simultaneity of the events, and investigates the term "time interval" between two events. He examines a "stationary system" and a way of synchronizing two "stationary clocks" located in the points A and B. The use of "rigid standards of measurement" is actually a fact, that the units of time and length are accepted as constant and unchangeable. It means that the "measuring-rod" is constant and unchangeable, and the "second" hands of the clocks in the "stationary system" are "ticking" in the same way – that the clocks measure seconds with equal duration. When the clocks are "stationary", the paths of the light in the

[3] Michelson-Gale-Pearson experiment proves the same reality as the Sagnac's experiment (carried out earlier in 1913)…

"empty space" in the two directions between the statonry points A and B are equal. The consideration is:

"Let a ray of light start at the "A time" t_A from A towards B, let it at the "B time" t_B be reflected at B in the direction of A, and arrive again at A at the "A time" t'_A.".

That is why:

"In accordance with definition the two clocks synchronize if

$$t_B - t_A = t'_A - t_B \qquad " \tag{10}$$

The meaning of this equation is that in the examined "stationary system", the registered events, which occur in different locations in the system, are fixed simultaneous by the synchronized clocks. The points A and B in the "stationary system" are not moving, when the light is traveling between them. Therefore, the light passes in the "empty space" in the two directions between the points the same path and the following statement corresponds to the reality:

"In agreement with experience we further assume the quantity

$$\frac{2AB}{t'_A - t_A} = c \tag{11}$$

to be a universal constant—the velocity of light in empty space."

About this subsection: The argumentation in this subsection (where actually a "stationary system" and the receipt of measurement signals were examined), is correct and corresponds to the physical reality.

At the beginning of the next subsection *"The relativity of distance and time"*, Einstein defines the two postulates in the following way:

"The following reflexions are based on the principle of relativity and on the principle of the constancy of the velocity of light. These two principles we define as follows:—

1. The laws by which the states of physical systems undergo change are not affected, whether these changes of state be referred to the one or the other of two systems of co-ordinates in uniform translatory motion.

2. Any ray of light moves in the "stationary" system of co-ordinates with the determined velocity c, whether the ray be emitted by a stationary or by a moving body. Hence

$$velocity = \frac{light\ path}{time\ interval} \tag{12}$$

where time interval is to be taken in the sense of the definition in § 1".

In fact, the reader must agree with this definition: 1) that the physical laws in the inertial frames of reference are the same (because the processes are carrying out in the common space for the two system), and 2) that the speed of light is constant and it is irrelevant *"whether the ray be emitted by a stationary or by a moving body"* (because the emission of light occurs at a quantum level).

If we compare this definition with the definition given at the beginning of the article - *"light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body"*, we can see that Einstein omitted to insert that this statement concerns *"the empty space"*, but makes it equivalent to the examined *"stationary" system, where light moves with "the determined velocity c"*. Moreover, in this definition, he does not mention the case, when the material point (which receives the light) is moving. However, Einstein starts to examine a moving rigid rod AB and an observer, who *"moves together with the given measuring-rod and the rod to be measured"*. Actually, this is a moving inertial system in relation to the stationary system, and he examines a ray emitted by A and reflected from B back to A. However, Einstein did not specify exactly the examined frames of reference – the stationary one and the moving one, which in the next subsections, he names respectively as system "K" and system "k". He examines a rod, lying along the axis of x of the stationary system (point A is closer to the origin of the co-ordinates than point B):

"and that a uniform motion of parallel translation with velocity v along the axis of x in the direction of increasing x is then imparted to the rod."

Actually, we have two frames of reference. The first frame of reference is the *"stationary system"*, and the second

frame of reference is the moving frame of reference, *"with velocity v along the axis of x in the direction of increasing x"*. The units of time and length, used in the two frames of reference are accepted to be the same, as was described:

- In the stationary system, "*the length of the rod is l, as measured by a measuring-rod, which is also stationary"*. The time is measured "*by means of stationary clocks set up in the stationary system and synchronizing in accordance with § 1*".
- In the moving frame of reference, *"the observer moves together with the given measuring-rod and the rod to be measured, and measures the length of the rod directly by superposing the measuring-rod, in just the same way as if all three were at rest"*. The measurement of the time is performed by the clocks, placed at the ends A and B of the rod, and *"their indications correspond at any instant to the "time of the stationary system" at the places where they happen to be. These clocks are therefore "synchronous in the stationary system".* In this way Einstein sets that the unit of time is the same, as in the stationary system, and the clocks in the moving system indicate the same time, as the clocks in the stationary system in the same points, which are "synchronized in accordance with § 1".

The next reflections in the system of co-ordinates *"in which the equations of Newtonian mechanics hold good*", are:

> *"We imagine further that with each clock there is a moving observer, and that these observers apply to both clocks the criterion established in §1 for the synchronization of two clocks. Let a ray of light depart from A at the time* t_A*, let it be reflected at B at the time* t_B*, and reach A again at the time* t'_A*. Taking into consideration the principle of the constancy of the velocity of light we find that:*

$$t_B - t_A = \frac{r_{AB}}{c - v} \tag{13}$$

and

$$t'_A - t_B = \frac{r_{AB}}{c + v} \quad " \tag{14}$$

where *c* is the speed of light in the "empty space" (the common space for the two frames of reference), and *v* is the speed of the rod (the relative speed between the two inertial frames of reference). As the reader can see: $(t_B - t_A) > (t'_A - t_B)$.

It is specified that r_{AB} denotes the length of the rod. If the covered distance by the light in the two directions is r_{AB} (the same), then the time intervals (13) and (14) were measured in the moving frame of reference (the observer travels together with the rod). Whereas in the stationary system, the points A and B are moving (during the travel of the light), and the covered pathlength by the light in the "stationary system" will be different in the two directions. Therefore, in the stationary frame of reference, the measured speed of light c is equal to the speed of light in the *"empty space"*, and the measured time intervals are respectively:

$$(t_B - t_A)^{st} = \frac{r_{AB} + \Delta_{AB}}{c} \tag{15}$$

and

$$(t'_A - t_B)^{st} = \frac{r_{AB} - \Delta_{BA}}{c} \tag{16}$$

where Δ_{AB} is the distance, which point B passes during the time interval $(t_B - t_A)^{st}$ at a speed *v*, and Δ_{BA} is the distance, which point A passes during the time interval $(t'_A - t_B)^{st}$ at a speed of the rigid rod *v*.

It is important to underline, that $(t_B - t_A)$=$(t_B - t_A)^{st}$, because the equation (13) is the same as (15), where Δ_{AB} is replaced with $\big(v(t_B - t_A)\big)$, as well as $(t'_A - t_B) = (t'_A - t_B)^{st}$, because the equation (14) is the same as (16), where Δ_{BA} is replaced with $\big(v(t'_A - t_B)\big)$. It actually is a confirmation of the simultaneity in the two coordinate systems, as well as the equation (1) is equal to the equation (2) and the equation (3) is equal to the equation (4), what is a confirmation of the simultaneity in the reality. Not only the simultaneity in the reality is a fact (the moment of occurrence of an event cannot be two or more moments!), but it is true and for the examined by Einstein case.

Therefore, the conclusion of Einstein that *"we cannot attach any absolute signification to the concept of simultaneity"* does not correspond to the physical reality (and to the examined case of Einstein).

The mistake deepens **in the next subsection** of the Einstein's article - *„Theory of the Transformation of Co-ordinates and Times from a Stationary System to another System in Uniform Motion of Translation Relatively to the Former"*. In this subsection Einstein actually considered again the abovementioned systems of co-ordinates – but now he names them "the stationary system *"K'"*" and "the moving system *"k'"*", which is moving at a constant velocity *v* in relation to the stationary system *"K"*. The common space for the two systems, Einstein names "stationary space".

"From the origin of system k let a ray be emitted at the time τ_0 *along the X-axis to* x' *, and at the time* τ_1 *be reflected thence to the origin of the coordinates, arriving there at the time* τ_2*; we then* ***must*** *have:*

$$\frac{1}{2}(\tau_0 + \tau_2) = \tau_1 \tag{17}$$

or, by inserting the arguments of the function τ *and applying the principle of the constancy of the velocity of light in the stationary system:*

$$\frac{1}{2}\left[\tau(0,0,0,t) + \tau\left(0,0,0,t + \frac{x'}{c-v} + \frac{x'}{c+v}\right)\right] = \tau\left(x',0,0,t + \frac{x'}{c-v}\right) \tag{18}$$

The equation (17) appears to be a big mistake with a key importance. It was written by Einstein in the case of stationary system see equations (10) and (11), where the points A and B in the "stationary system" are not moving. In this case, however, the system *"k"* is moving and:

$$\frac{1}{2}(\tau_0 + \tau_2) < \tau_1 \tag{19}$$

(according to the written by Einstein himself in the previous subsection equations (13) and (14)):

$$(t'_A - t_B) < (t_B - t_A) \tag{20}$$

…and as a consequence, not only the equations (17) and (18) in this article are false, but and the subsequent...

The reader can see that Einstein considers time intervals in a moving system, but uses an equation, obtained for the stationary system. The equation (17) is true only for a „stationary system" – see equations (10) and (11). In a stationary system, the light travels an equal path in the "empty space" between any two static points - and in the two directions between them. In the case of inertial frames of reference, however, (inertial frames are in a state of constant, rectilinear motion with respect to one another) - the laws of physics are the same; the speed of light in the common "empty space" is the same; but the experiments confirm that the measured speed of light in the inertial frames of reference is not the same - the relationship between the readings in the different reference systems is expressed through Galilean transformations - it is a subject of Newtonian mechanics.

The reader can see the irrefutable fact that:
the equations of Einstein about the "Transformation of Co-ordinates and Times" are not correct.

For two inertial frames of reference: the equation (17) (and the subsequent...), can be true only if the measured speed of light between two common points in the two frames of reference is the same, and moreover – to be the same in the two directions. In other words, the required condition for the correctness of the equations (17) and (18), as well as the "Transformation of Co-ordinates and Times", is that:

the meusered speed of light has to be the same in all inertial frames of reference (what, however, it is not confirmed by all remarkable experiments related to the measurement of the speed of light).

However, on the basis of these false equations, Einstein deduced equations for transformation of the coordinates and the time between two inertial frames of reference, and then he continues:

„We now have to prove that any ray of light, measured in the moving system, is propagated with the velocity c, if, as we have assumed, this is the case in the stationary system; for we have not as yet furnished the proof that the principle of the constancy of the velocity of light is compatible with the principle of relativity."

If the reader applies the equation (12) to the equations (13) and (14) (all written by Einstein himself), it is a clear evidence that "measured in the moving system" is not equal to *c* ! However:

Here Einstein considers again two inertial frames of reference and examines spherical light wave, emitted at the moment when the origins of the coordinate systems coincide. The mathematical description of the propagation of the spherical wave in the stationary coordinate system *[(x, y, z); t]* is:

$$x^2 + y^2 + z^2 = c^2 t^2 \qquad (21)$$

For the "moving coordinate system" [(ξ, η, ς); τ], Einstein obtains the following equation (**but by using the wrongly derived transformations)**. It is clear, that the result will be again "the same spherical wave", because Einstein actually applied a "circular reference":

> *"Transforming this equation with the aid of our equations of transformation we obtain after a simple calculation*
>
> $$\xi^2 + \eta^2 + \varsigma^2 = c^2 \tau^2 \qquad (22)$$
>
> *The wave under consideration is therefore no less a spherical wave with velocity of propagation c when viewed in the moving system."*

As a result, it was wrongly concluded that this is a proof … "that any ray of light, measured in the moving system, is propagated with the velocity c, if, as we have assumed, this is the case in the stationary system"

The author will not continue with the analysis of all the equations in the article "ON THE ELECTRODYNAMICS OF MOVING BODIES", because all subsequent reflections and "arguments" are actually on the base of the wrong statement that "the measured speed of light is the same in all inertial frames of reference in all directions". The reader can judje whether the famous results of this article (what means and the Special Theory of Relativity) are a delusion.

5.2. The Opinion of Einstein

The fact that the speed of light is not the same in all frames of reference was proved by the Sagnac's experiment in 1913 (Sagnac, 1913). This was even before the publishing of the General Theory of Relativity. Too many unreal explanations of this experiment have been published. For example, in the article "The Sagnac effect: correct and incorrect explanations" by Malykin G. B., the distorted explanation is called "the correct explanation" (Malykin, 2000). However, the proponents of the special theory of relativity still cannot find "convenient" explanation of another very important fact:

> Why in case of "one-way measurement" of the speed of tight (in the frame of reference related to the Earth's surface), the measured speed of light in direction of "East-to-West" is higher than the measured speed of light in direction "West-to-East"?

The fact that in the case of "one-way measurement", the measured speed of light is different in different directions has been demonstrated repeatedly through using GPS (the global positioning system) [see subsection 4.1].

Einstein also clearly confirmed the crucial importance of the constancy of the measured speed of light in all frames of reference. As a matter of fact, Einstein's exact formulation of the two postulates: (1) "the principle of relativity" and (2) "the constancy of the speed of light" is:

> *"The same laws of electrodynamics and optics will be valid for all frames of reference for which the equations of mechanics hold good. We will raise this conjecture (the purport of which will hereafter be called the "Principle of Relativity") to the status of a postulate, and also introduce another postulate, which is only apparently irreconcilable with the former, namely, that light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body."* (Einstein, 1905).

At the beginning of the subsection "The relativity of distance and time", Einstein defines again the principle of relativity and the principle of the constancy of the speed of light. However, both definitions do not point directly that the speed of light is the same in all frames of reference. No doubt, this claim is with a primary importance for the veracity of the theory of relativity. This primary importance is confirmed by Einstein himself in "My theory and Miller's experiments" (Einstein, 1926), after the widely discussed Dayton Miller's publication "Significance of Ether-drift Experiments of 1925 at Mount Wilson" (Miller, 1926). There Einstein wrote:

> *"If the results of the Miller experiments were to be confirmed, then relativity theory could not be maintained, since the experiments would then prove that, relative to the coordinate systems of the appropriate state of motion (the Earth), the velocity of light in a vacuum would depend upon the direction of motion. With this, the principle of the constancy of the velocity of light, which forms one of the two foundation pillars on*

which the theory is based, would be refuted." (Einstein, 1926).

Recall: The light is spreading always "in a vacuum", but the velocity of the light is measuring practically always in relation to some frame of reference. In fact, the "stationary system", which Einstein considered is "stationary" in relation to the vacuum (frame of reference related to the vacuum itself). In this "stationary system", the speed of light is constant (… and it is true in the physical reality - in the areas of equal intensity of the gravitational field, as is „on the Earth's surface"). However, that does not mean that the speed of light is measured the same in all frames of reference, which he tacitly accepted, using the equation (17) for the moving system. Actually, the measured speed of light in the moving frame of reference in relation to the vacuum itself "depends upon the direction of motion" or, as Einstein said above, – depends on "the state of motion (the Earth)". Neglecting this important difference actually leads to "play on words". As the reader can see, Einstein asserts that the speed of the light in vacuum is constant, but he calculates and receives his famous results in the article, on the base that the measured speed of light is the same in all inertial frames of reference. However, this is not true, and this fact was proven repeatedly nowadays with the experiments "One-Way Light Speed Determination"; it was proven by "Michelson-Gale-Pearson Experiment", and at the first time by "Sagnac's Experiment" in 1913… , or this fact was proven by the results of experiments made over last 100 years! Lastly, we must honestly say that the badly designed Michelson-Morley experiment (carried out in the frame of reference related to the Earth's surface), was actually the primary root cause for the great delusion that "the speed of light is the same in all inertial frames of reference", which is the core of the special theory of relativity. The speed of light anisotropy could not be registered by the Michelson-Morley interferometer, because the usage of two-way path of the two rays on the arms, exactly eliminates this possibility. This is because the difference in the speed of light in the two directions for each of the arms is completely compensated.

5.3. Thought Experiment for the Revealing the Essence of Special Relativity

Every "Instrumentation & Control" engineer in his practice had necessitated to solve problem when, for some reason, the obtained numerical value of a physical quantity had to be changed to another desired value. In the same way, we can obtain the measured speed of every object (the numerical value), to be the same in any two inertial frames of reference. Now, let us demonstrate an example, because it is in relation to the revealing of the essence of the "Special theory of relativity".

We can use one of the Einstein's favourite experiments. First, let us recall the process "measurement". Measurement is the process of associating real numbers with physical quantities and phenomena. The assignation of a real number, as a result of measurement, is a result of comparing of a physical quantity with precisely defined unit of measurement. Therefore, measurement units are of crucial importance in the measuring of the physical quantities.

Let us imagine an observer standing next to a railway line and to the building of the railway station. At that moment a train, moving with a constant velocity $\overrightarrow{V_{tr}}$, passes by the observer. Let us accept the railway line as an "axis *x*", and that the train is moving in the direction of increasing *x*. In order to be more precise, as was aforementioned, we will use the term "velocity", when we mean the vector $\vec{V}$; and we will use the term "speed", when we mean the scalar magnitude $|\vec{V}|$ of the vector $\vec{V}$. The scalar magnitude $|\vec{V}|$ is obtained using the units of length "meter" and time "second", which are our "primary physical constants".

We will examine two cases of a moving object (e.g. a ball).

- First case: "A moving ball in the stationary building of the railway station" - (in the stationary frame of reference).

In this case, the ball is moving with a constant velocity $\overrightarrow{V_0}$ in the stationary building. The angle between the direction of movement of the ball and the direction of the adopted by us *"axis x"* is θ. All measurements are carried out in the frame of reference related to the railway station, which is the stationary frame of reference of the observer, and where the denotation of the base unit of time "second" is S_0 , and the denotation of the base unit of length "meter" is L_0 . The projected magnitude of the velocity vector of the ball $\overrightarrow{V_0}$, on the *"axis x"* (the railroad), can be in opposite directions, and accordingly with a "minus" sign. Therefore, the measured speed of the ball on the "axis x" is $\left(|\overrightarrow{V_0}| \cos\theta\right)$, which is a result of comparing with precisely defined physical units of time and length.

- Second case: "A moving ball inside the moving train" – (in the moving frame of reference).

In this case, the ball is moving in the train with the same constant velocity $\overrightarrow{V_0}$, but measured in the frame of reference related to the moving train. The train is moving on the railroad in the direction of increasing *x* with a constant velocity $\overrightarrow{V_{tr}}$ relative to the stationary frame of reference of the observer. Therefore, for the observer, the

ball inside the train is moving with a velocity ($\overrightarrow{V_0} + \overrightarrow{V_{tr}}$), and the measured speed of the ball by the observer on the *"axis x"* (on the railroad) is the scalar $\left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}| \cos\theta\right)$, where $\left(|\overrightarrow{V_0}| \cos\theta\right)$ is the projected magnitude of the velocity of the ball on the railway line; and θ is the angle between these two vectors; where $cos\theta$ can be *(-1< $cos\theta$ <1)*. Actually, the measured (by the observer) speed of the object obeys the Galilean transformations between two frames of reference, moving relative to each other in parallel, with a constant velocity $\overrightarrow{V_{tr}}$. Here it should be underlined with a thick line the fact that we have accepted that the units of length (meter) and time (second) are the same for both frames of reference. This is the irrefutable reality in our time-spatial domain, named "on the Earth surface".

Now, let us set **the imaginary logical task**, if the observer is situated in the "stationary system":

> How the real number, obtained by the observer, as a result of the measurement of the speed of the object (the ball in our case), would have been the same for the two abovementioned cases? In other words, instead of the real speed of the ball, which moves inside the train, $\left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}| \cos\theta\right)$ — the measured numerical value to be again $\left(|\overrightarrow{V_0}| \cos\theta\right)$?

From the point of view of the normal logic, the mathematics and the reality, the only possible answer to this question is:

> It is possible, but when the observer measures the speed of the ball, which moves inside the train, he must use other units of length and time, which are changing in a manner depending on the relative speed between the two frames of reference (the speed of the train in our case).

According to this solution, when the observer measures the speed of movement of the ball inside the train, he should use the following different units of time and length, which depend on the relative speed between the two frames of reference (the speed of the train in our case):

1) s_{tr} – is the duration of the unit of time "second", which the observer must use when he measures the speed of the moving ball inside the train:

$$s_{tr} = \frac{s_0}{\sqrt{1 + \frac{|\overrightarrow{V_{tr}}|}{|\overrightarrow{V_0}| \cos\theta}}} \tag{23}$$

, where s_0 is the duration of the unit of time "second" in the stationary reference system of the observer (the real unit); $|\overrightarrow{V_{tr}}|$ is the speed of the train; and the $(|\overrightarrow{V_0}| \cos\theta)$ is the desired numerical value of the speed of the ball (the scalar of the vector of velocity of the moving ball in the stationary reference system, projected on the railway line – the so accepted "*x axis*").

The difference between the new unit and our real unit of time, is given by a quotient of "units-of time-difference" k_s:

$$\frac{s_{tr}}{s_0} = \frac{1}{\sqrt{1 + \frac{|\overrightarrow{V_{tr}}|}{|\overrightarrow{V_0}| \cos\theta}}} = k_S \tag{24}$$

2) L_{tr} - is the length of the unit of length "meter", which the observer must use when he measures the speed of the moving ball inside the train:

$$L_{tr} = L_0 \sqrt{1 + \frac{|\overrightarrow{V_{tr}}|}{|\overrightarrow{V_0}| \cos\theta}} \tag{25}$$

, where L_0 is the duration of the unit of length "meter" in the stationary reference system of the observer (the real unit); $|\overrightarrow{V_{tr}}|$ is the speed of the train; and the $(|\overrightarrow{V_0}| \cos\theta)$ is the desired numerical value of the speed of the ball (the scalar of the vector of velocity of the moving ball in the stationary reference system, projected on the "*x axis*").

The difference between the new unit and our real unit of length is given by a quotient of "units-of length-difference"

k_L:

$$\frac{L_{tr}}{L_0} = \sqrt{1 + \frac{|\overrightarrow{V_{tr}}|}{|\overrightarrow{V_0}|\cos\theta}} = k_L \tag{26}$$

And thereby, if the real value for the speed of the moving ball in the train is $\left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}|\cos\theta\right)$, (obtained by means of the real units of time s_0 and length L_0), then we can obtain the desired numerical value for the speed of the moving ball in the train $\left(|\overrightarrow{V_0}|\cos\theta\right)$ by using the new units. We can verify the correctness of the new units to fulfil our task, if we multiply and divide respectively the real value of the speed of light with the quotients of "units-differences" - (26) and (28):

$$\left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}|\cos\theta\right)\frac{k_S}{k_L} = \left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}|\cos\theta\right)\frac{1}{\left(1 + \frac{|\overrightarrow{V_{tr}}|}{|\overrightarrow{V_0}|\cos\theta}\right)} = |\overrightarrow{V_0}|\cos\theta \tag{27}$$

As we see, we received exactly the desired numerical value $\left(|\overrightarrow{V_0}|\cos\theta\right)$ … what actually was the task. Therefore, using the changing units of time and length (depending on the speed of the train $|\overrightarrow{V_{tr}}|$), the observer will always obtain the same numerical value, [as in the stationary system $\left(|\overrightarrow{V_0}|\cos\theta\right)$, instead of $\left(|\overrightarrow{V_{tr}}| + |\overrightarrow{V_0}|\cos\theta\right)$], for the scalar of the vector of velocity of the moving ball inside the train, projected on the railway laine *("x axis")*. In order the equations (25) to (29) to be always valid in a real mathematical, not in imaginary sense (when the angle θ is equal to 180^0 - $(\cos\theta = -1)$), the speed $|\overrightarrow{V_0}|$ of the object must be a limit. In our case, the relative speed between the frames of reference (the speed of the train $|\overrightarrow{V_{tr}}|$) must never reach the speed of the object $|\overrightarrow{V_0}|$ (the speed of the ball). In the considered by Einstein case in the special theory of relativity, the moving object is a photon (instead of a ball), $|\overrightarrow{V_0}|$ is the speed of light, and it is always higher than the relative speed between the frames of reference $|\overrightarrow{V_{tr}}|$.

This simple thought experiment shows that any unspecified object can be used (be it a photon or ball), moving at any other speed $\vec{V_i}$, if $\left(|\vec{V_i}| > |\overrightarrow{V_{tr}}|\right)$. Therefore, many "special theories of relativity" can be created – with other "speeds of object".

We see that the shown solution of the aforementioned imaginary logical task is a result of (we can say an "I&C transformation"). We can examine the same task, but using other - "Lorentz new units" of time and length (received as a consequence of the Lorentz transformation). When the observer, situated in the stationary system, measures the speed of the moving ball inside the train, he must use other units of time and length - $s_{tr}^{Lorentz}$ and $L_{tr}^{Lorentz}$:

$$s_{tr}^{\text{Lorentz}} = \frac{s_0}{\sqrt{1 - \frac{V_{tr}^2}{c^2}}} \tag{28}$$

and

$$L_{tr}^{Lorentz} = L_0\sqrt{1 - \frac{V_{tr}^2}{c^2}} \tag{29}$$

Instead of expressions (26) and (28), for the quotients of "units-differences" we will have:

$$k_s^{Lorentz} = \frac{s_{tr}^{Lorentz}}{s_0} = \frac{1}{\sqrt{1 - \frac{V_{tr}^2}{c^2}}} \tag{30}$$

, and

$$k_L^{Lorentz} = \frac{L_{tr}^{Lorentz}}{L_0} = \sqrt{1 - \frac{V_{tr}^2}{c^2}} \tag{31}$$

We can verify the correctness of the "Lorentz new units", if we multiply and divide respectively the real value of the speed of light with the quotients of "units-differences" - (32) and (33). If the real speed for the moving ball

inside the train (which the observer measures by means of the real units of time and length) is (V_tr+c), then (using the new units) the measured value for the speed of the moving ball inside the train, will be:

$$(V_{tr}+c)\frac{k_S^{Lorentz}}{k_L^{Lorentz}} = (V_{tr}+c)\frac{1}{\left(1-\frac{V_{tr}^2}{c^2}\right)} = (V_{tr}+c)\frac{c^2}{(c+V_{tr})(c-V_{tr})} = \frac{c^2}{(c-V_{tr})} \approx c \qquad (32)$$

, only if $(c \ggg V_{tr})$.

The reader can see that the solution (as a result of the Lorentz transformations), is not better for the aforementioned **imaginary logical task**, because the demonstrated "I&C" solution satisfies all directions of movement of the ball. However, the both solutions are solutions of an imaginary task, which does not correspond to the existing physical reality – they can be true only in an imaginary mathematical field!

As a conclusion, the demonstrated thought experiment is an illustration that shows how the scientific notion about the existing physical reality can be distorted.

5.4. One Consequence of the Logic of the Unreality

A misleading claim inevitably leads to other delusions. One of them is a basis of a very widespread paradox. This is that the units of time and length really change in a moving inertial system.

This claim does not correspond to the elementary logic, because in case of two inertial frames (moving uniformly and rectilinearly relative to each other) - it cannot be determined which of them actually moves. Therefore, if the units of time and length really are changing in the moving inertial system, it cannot be determined in which of the two systems this change actually happens.

As a consequence of this claim, the remarkable "twins paradox" was created. However, it is unscientific fiction, which can be only a source of interesting, but unreal fantastic stories without scientific meaning.

6. Conclusion about Special Theory of Relativity

Experimental and logical evidences that were presented in this article reveal the essence of the special theory of relativity: that special relativity is a fictional hypothesis that does not correspond to the physical reality. That is why, it is a delusion. The main reasons for this delusion are:

- The first reason is the lack of understanding of the physical reality that the electromagnetic field exists on the gravitational field. In a strong gravitational field, the "permittivity of free space" (the electric constant ε_0) increases, as well as the "permeability of the free space" (the magnetic constant μ_0) increases - and as a result the speed of light decreases. Vice versa – in a weak gravitational field (with higher level of expansion of the space), the "permittivity of free space" (the electric constant ε_0) decreases, as well as "the permeability of the free space" (the magnetic constant μ_0) decreases - and as a result the speed of light increases (Sharlanov, 2012b):

$$c = \frac{1}{\sqrt{\mu_0 . \varepsilon_0}} \qquad (33)$$

It actually means that the properties of atoms and the characteristics of the electromagnetic radiation (including the speed of light), depend on the intensity of the gravitational field. As was mentioned above, it was confirmed by "Shapiro time-delay effect" (Shapiro, 1964). The hypothetical medium in which electromagnetic waves propagate turns out to be the space-time itself. All celestial bodies (including the Earth) are traveling through the space-time of the Universe together with the surrounded, warped dominantly by the body itself "time-spatial domain". On the surface of the celestial body, where the intensity of the gravitational field is constant, the speed of light, the "permeability of the free space", the "permittivity of free space" are only local constants.

- The "Michelson-Morley experiment" is actually the primary root cause for the great delusion that "the measured speed of light is the same for all frames of reference". The fact that in our local time-spatial domain, the measured speed of light is not the same for all frames of reference, is registered by the "Sagnac experiment", "Michelson-Gale-Pearson Experiment" and by all "One-way speed of light measurements".

the speed of light is a local constant in the frame of reference related to the space itself.

- Not least as a reason for supporting this delusion is the dominant orthodox part of the scientific community for more than one century. The only argument of these scientists is that "if the special theory of relativity is mathematically proven – then this theory is correct…", but "not everyone can understand the Special Theory of Relativity". We all know the anecdote concerning Ludwik Silberstein and Arthur Eddington about – "who are the three men who actually understood the theory of relativity…"

7. About General Theory Of Relativity

7.1. Awareness: "What Is the Difference between Mathematical and Physical Equation"

- The mathematical equation is actually an assertion for equality of two numeric expressions. The mathematical equation most often expresses the relationship between the given variables, some of them known (a, b, c, d...), and variables that need to be determined - the unknown (x, y, z, w, etc.).

The process of expressing the unknowns in an equation or system of equations, in terms of the known ones, is called solving the equation (or the system of equations).

- In physics, however, the equality of the expressions concerns the links between physical quantities, but this relationship is expressed in an equation, which is written on the basis of a certain system of units of measurement (for example, SI-System).

Here, we must realize that physical equations are based on the assumption that the units of the measurement systems are constant. In such a way, the use of the equality sign between the two expressions is correct.[4]

One correct example: If we calculate tension in a piece of material caused by a force, we use units of a measurement system, which are defined in the time-spatial domain outside the material body. In our case it is our time-spatial domain "on the Earth's surface", where the intensity of the gravitational field is equal and therefore the defined physical units are permanent. As a result, we can say that the physical equations for the tension calculation in a piece of material are correct (the use of the equality sign is correct).

7.2. Einstein's Field Equations

In the scope of Einstein's field equations, however, we must realize that we use physical units of length and time defined inside a "material" named "Universe". This "material" consists of planets, stars and galaxies (instead of atoms and molecules). The intensity of the gravitational field is different in different areas of the space-time of the Universe, therefore the physical units of length and time are different too. The EFE themselves express the change of the units of time and length. The used units are not permanent in the scope of the equations, and the use of the "equality" sign is not correct. Therefore, Einstein's field equations express only an "idea"! That is why, the equations cannot be subjected to mathematical solving directly.

Brief analysis of the Einstein's modified field equation:

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu} \qquad (21)$$

7.2.1. Note 1 (concerns the measurement units)

The expression on the left side of this equation represents unknown warping of the structure of space-time: (Rμν is the Ricci curvature tensor, R is the scalar curvature, gμν is the metric tensor, and Λ is the cosmological constant. The expression on the right side represents the known matter and energy (Tμν is the stress-energy tensor). The gravitational constant G and the speed of light c appear as physical constants and π is a numeric constant.

Therefore the EFE can then be interpreted as a set of equations representing how the matter and energy determine the curvature of space-time, or how the units in particular time-spatial domain are changing by the matter and energy. But as any physical equation, the expressions on both sides of the equation have to be written on the base of the same, unchangeable measurement units. If this equation is not written on the basis of unchangeable units of

[4] However, the units of the measurement systems are constants, but only in a local physical area, where the intensity of the gravitational field is constant (in time-spatial domains with equal intensity of the gravitational field) (Sharlanov, 2015).

measurement – the equation simply ceases to be an equation in terms of math and the use of the sign "equality" is not correct.

7.2.2. Note 2 (concerns the physical constants)

There are different ways to prove (although it is already proven by the experiment of Shapiro), that the speed of light in "empty space" changes depending on the intensity of the gravitational field. But not only the speed of light - all physical constants change depending on the intensity of the gravitational field (Sharlanov, 2015).

Unfortunately, our vision of the physical reality in the Universe is based on our local perception of "absoluteness". The perception of "absoluteness" (not only of the time and space) is a result of irrefutability of all the "mathematical and experimental evidence" about constancy of all local physical constants in our local time-spatial domain, what in turn is based on the perception of unchangeability (constancy) of all local units of measurement. However, all local units change with the change of the intensity of the gravitational field. So we are misled to adopt /accept that the local physical constants are fundamental, universal and unchangeable (like the speed of light).

For example, this also applies to Maxwell's equations, which are irrefutably true in our (and in any other) local physical area with equal intensity of the gravitational field where the units of measurement are defined... and where we have a perception of full certainty. Thus, ε_0 – "the permittivity of the free space" (also called the electric constant), μ_0 – "the permeability of the free space" (also called the magnetic constant) and "the speed of light" in Maxwell's equations are perceived and adopted as constants, but they are only local constants. In Maxwell's equations, the relation between electricity, magnetism, and the speed of light can be summarized by the equation (33).

However, ε_0, μ_0 and c are only local constants – they are changing with the change of the intensity of the gravitational field. But:

"In the local "time-spatial domain", where physical units are defined, it is not possible to prove by measurement the change of the value of any physical constant (the speed of light, Planck's constant, etc.)" (Sharlanov, 2012a).

Actually, the physical reality in the Universe turns out to be:

„perception of local absoluteness, against the background of global relativity in the Universe".

In other words:

"perception of complete local certainty against the background of overall uncertainty in the Universe." (Sharlanov, 2012b).

7.3. Conclusion about the General Theory of Relativity

- The field equations of the general theory of relativity are a brilliant general idea, which breaks the perception of absoluteness of time and space, but the use of the sign "equality" is not correct.
- The General Theory of Relativity has an extremely great contribution to the humankind – it opens a new page, a new vision of global relativity in the Universe.

8. Final Conclusion about the Theory of Relativity

The thorough analysis in this article undoubtedly proves that:

THE "THEORY OF RELATIVITY BY ALBERT EINSTEIN" - HAS TO BE RESTARTED!

Which should be the next step of the physical science?

Undoubtedly, the new model of uncertainty of the Universe is a different vision, which not only reveals the essence of Theory of Relativity by Albert Einstein, but also explains a lot of problems in physics today (such as: "the accelerated expansion of the Universe", "the dark matter and the dark energy in the Universe", etc.), which have been under research for a long time.

The big task of the next generation of physicists will certainly be: "How the characteristics of the electromagnetic radiation (and all physical reality) change with the change of the intensity of the gravitational field". This task is a subset of the main task: "How the uncertainty in the macro-world (macrocosm) can be more certain for us"…

COMPETING INTERESTS

The author has no competing interests. Moreover, the author is an INDEPENDENT RESEARCHER, who did not receive any remuneration for his work as researcher.

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