Alternative Physical Interpretation of Einstein's Special Relativity Theory

Anatoly V. Mamaev[1], candidate of engineering sciences, associated professor

Independent scientific researcher[2], Moscow, Russia

Abstract: An alternative interpretation of Einstein's Special Relativity Theory is offered based upon the only relativity principle in Galileo's formulation and the second Einstein's postulate is cut by Occam's sickle as superfluous. Instead of Einstein's second postulate a theorem is proved, which is a consequence from the relativity postulate, about equality of time measurement units for two light clocks of identical design moving each with respect to another one uniformly and rectilinearly. The proof is based upon a newly introduced concept of light speed in a moving inertial reference frame. That equality of time measurement units converts the Einstein's theorem about moving clock retardation with respect to a stationary clock into an erroneous statement. Transformation is derived for events space-time coordinates from one inertial frame to another one with non-invariant light speed. In this interpretation superlight speeds of motion are not forbidden, the value of a moving particle mass does not depend on the value of the particle speed, but a value of the moving particle charge does depend upon the value of its speed. This interpretation provides absolutely new explanation of supernovas and all astronomical phenomena leading to refusal from Bing Bang hypothesis, "accelerated expansion of the Universe", from "dark matter" and from "dark energy".

Key words: special relativity theory, light clock, time measurement unit, theory interpretation, Big Bang, "accelerated expansion of the Universe", dark matter, dark energy.

1. Occam's sickle and Galileo's Principle of Relativity

It is well known that when we study physics, we must use Newtonian or inertial reference frames (IRF), that is coordinate systems, which do not rotate, and are either fixed in three-dimensional space or move in a straight line at constant velocity (with zero acceleration) and comprise in addition some quantity of clocks synchronized each with others.

In physics all clocks that are at rest in some IRF are called as "synchronized clocks", if all these clocks at any time moment of that IRF have identical indications. For clocks synchronization in any IRF a procedure is used offered by Einstein in the 1905 article [1] on the special relativity theory (SRT).

It is also well known, that in the 1905 article [1] Einstein used in his SRT two principles (postulates):

[1] Anatoly V. Mamaev, JSC "Lianozovo Electromechanical Plant Research and Production Corporation", Chief of bureau, 110, Dmitrovskoje shosse, Moscow, 127411, Russian Federation

[2] JSC JSC "Lianozovo Electromechanical Plant Research and Production Corporation" refuses from paying Article Publication Charges (APC) for open access journals.

1. A relativity principle: “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. A postulate of light speed independence on the light source motion speed: “Any ray of light moves in the “stationary” system of co-ordinates with the determined velocity $\boldsymbol{c_0}$, whether the ray be emitted by a stationary or by a moving body”.

In his 1922 article [2] Einstein declared:

“The purpose of theoretical physics consists in creating the system of concepts based on possibly smallest number of logically independent hypotheses, which would allow establishing causal interrelation of all complexes of physical processes”.

This statement is one of possible versions of Occam’s methodological recommendation to any scientific researcher known as Occam’s sickle (razor). But in the SRT the number of postulates is not equal to minimal quantity. In order to decrease the quantity of independent postulates in the SRT it is possible to apply a formulation of Galiley’s relativity postulate: “The state of uniform translational motion is completely equivalent to the state of resting” and to refuse from Einstein’s second principle, having used instead of it some consequence from the Galileo’s relativity principle. Such consequence from Galileo’s relativity principle that can be used instead of Einstein’s second postulate in the SRT is the following statement: “Time measurement units of two identical light clocks, moving each with respect to the other uniformly and rectilinearly, are absolutely accurately equal to each other”. This statement is true because for two light clocks of identical design, moving uniformly and rectilinearly each with respect to the other, each of these clocks according to the relativity principle can be considered with equal foundation as being at rest, and the other – as moving uniformly and translationally. And namely under such condition the state of uniform and translational motion can be considered as completely equivalent to the state of resting.

2. Proof of a very important theorem

Now let us prove such a theorem: “If the speed c_u of light propagation in a moving IRF depends on light source speed $\boldsymbol{u}$ according to an Eq. (2.1)

$$c_u = c_0\sqrt{1+u^2/c_0^2} = c_0\gamma , \quad (2.1)$$

where c_0=299 792 458 m/s is the speed of light propagation in a stationary IRF, and if the length L of a moving body depends upon the speed $\boldsymbol{u}$ of the body motion according to the Eq. (2.2)

$$L = L_0/\gamma = L_0/\sqrt{1+u^2/c_0^2} , \quad (2.2)$$

where L_0 is the length of the stationary body, then the unit of time measurement by a light clock, moving at the constant speed $\boldsymbol{u}$ along a line perpendicular to planes of this light clock mirrors with distance equal to L_0 between the mirrors in the rest condition, is equal to the unit of time measurement by an immovable light clock and is determined by the Eq.(2.3)

$$T_0 = \frac{2L_0}{c_0} ”. \quad (2.3)$$

For the light clock moving in such a manner the time measurement unit must be calculated according to the Eq. (2.4), if we introduce the concept “light speed c_u in vacuum of a moving IRF”, as it was made in [3],

$$T = \frac{L}{c_u - u} + \frac{L}{c_u + u}. \quad (2.4)$$

Indeed, let us consider a light clock consisting of two parallel plane mirrors 1 and 2 fastened each with another by means of four rods of equal length L_0, as it is shown in Fig. 1. In this figure a straight line OX is perpendicular to planes of both mirrors 1 and 2. Let the vector $\boldsymbol{u}$ of light clock motion velocity be parallel to the line OX.

The first term in the right part of the Eq. (2.4) is the time interval, during which the light pulse moving at the speed c_u in a moving at speed $\boldsymbol{u}$ IRF from a moment of light pulse reflection from mirror 1 till a moment when light pulse will reach the light clock mirror 2, which tries to run away from the light pulse, as it is shown in Fig. 1 below. The second term in the right part of the Eq. (2.4) is the time interval, during which the light pulse moves from the moment of its reflection by the mirror 2 to the next reflection of light pulse from the mirror 1. The sum of these two terms from the right part of the Eq. (2.4) constitutes the time measurement unit T of the moving light clock from the left part of the Eq. (2.4).

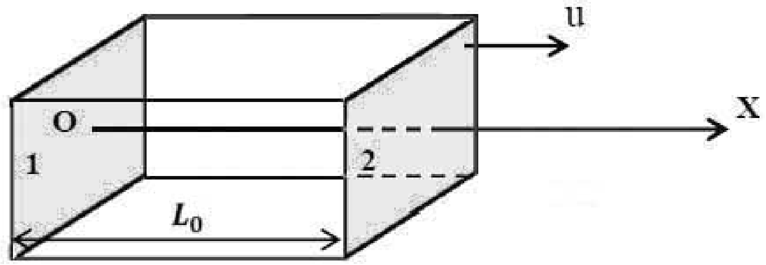


Fig. 1. Light clock consisting of two plane mirrors 1 and 2. Distance between two plane mirrors of the stationary light clock is equal to L_0, OX is a line perpendicular to planes of both mirrors, u is the velocity vector of light clock motion parallel to the line OX.

Then, substituting Eq. (2.1) and (2.2) into the Eq. (2.4) we obtain consequently the following results (after each equality sign)

$$T = \frac{L}{c_u - u} + \frac{L}{c_u + u} = \frac{L_0}{\gamma} \frac{c_u + u + c_u - u}{c_u^2 - u^2} = \frac{2L_0}{c_0} = T_0 . \quad (2.5)$$

Thus, as in two most left parts of the Eq. (2.5) we see time measurement unit of the moving light clock and in two most right parts of the Eq. (2.5) we see time measurement unit of the stationary light clock of the same design, the above theorem is proven.

After that the Einstein's theorem from his article [1] becomes an erroneous statement, because the equality of time measurement units in two IRF moving with respect to each other in the SRT is proved independently by methods of linear algebra.

3. Dependence of light speed on the speed of light source

At that we must confirm that in the Eq. (2.5) we made replacement under the Eq. (3.1)

$$c_u^2 - u^2 = c_0^2 , \quad (3.1)$$

because in accordance with the Eq. (3.1) the Eq. (3.2) must be true

$$c_u^2 = c_0^2 + u^2 . \quad (3.2)$$

It is evident that Eq. (3.2) is obtained from Eq. (3.1) by adding the value $(+u^2)$ to the both parts of the Eq. (3.1).

In the Eq. (2.5) we also used the Eq. (3.3)

$$c_u = c_0 \gamma , \quad (3.3)$$

which is obtained by excluding the middle component $c_0\sqrt{1 + u^2 / c_0^2}$ from the Eq. (2.1).

Now we must show how we derived the Eq. (2.1) and (2.2).

How can we practically perform measurement of the "light speed in vacuum of a moving IRF" defined by the Eq. (2.1)? We can perform such measurement in accordance with Fig. 2.

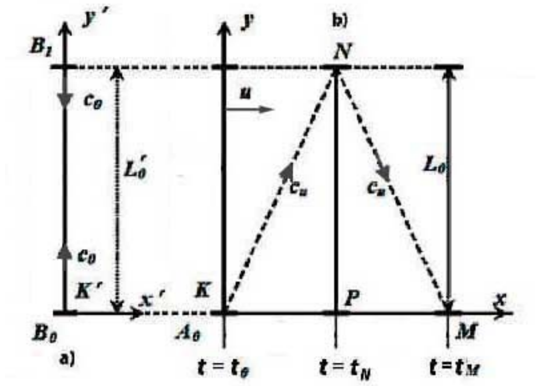


Fig. 2. Propagation of light in a light clock in two IRFs moving each with respect to the other at the speed u.

In the Fig 2a) propagation of light in the stationary primed IRF K′ is shown from a source being at rest in point B_0 in the primed IRF K′ from a point of view of an observer resting in the primed IRF K′, light propagates in the «stationary” IRF K′ at the light speed c_0= 299 792 458 m/s along axis y';

In the Fig. 2b) propagation of light is shown in the unprimed IRF K from a point of view of an observer resting in the unprimed IRF K, light propagates along straight lines A_0N**,** NM at the light speed $\mathbf{c_u}$ For the observer resting in the unprimed IRF K the primed IRF K' is a moving IRF and light propagates between mirrors in points A_0 and N, as well as between points N and M at the speed $\mathbf{c_u}$.

Let us consider two IRF K′ (x′, y′) and K (x, y) moving each with respect to another one at the velocity $\boldsymbol{u}$ (see Fig. 2). In all points of the unprimed IRF K named with letters (points A_0, *N, M*) there are technological timers that are synchronized (show the same time at any time moment of the IRF K). The primed IRF K′ in Fig. 2 is a stationary IRF. That means that an arbitrary light clock with stationary mirrors in points B_0 and B_1 of the primed IRF K′ is at rest in this primed IRF K′ and the moving unprimed IRF K is moving in a direction, that is parallel to planes of mirrors B_0 and B_1.

Let at a time moment, when the $\boldsymbol{y}$ axis of the unprimed IRF K moving at a constant speed $\boldsymbol{u}$ in positive direction of the axis x' of the primed IRF K′ points B_0 and A_0 of the both primed IRF K′ and unprimed IRF K coincide each with other, two light sources in point B_0 radiate simultaneously two light pulses in two directions. One pulse is sent into the direction of the mirror B_1 (that pulse will move along the straight line A_0N) and the second pulse is sent from point B_0 along a perpendicular to the plane $x'y'$ of the primed IRF K′ to point A_0, where this pulse stops a technological timer resting in point A_0 of the unprimed IRF K (that timer was earlier synchronised with timers in points N and M of the moving unprimed IRF. And point A_0 is marked on the $\boldsymbol{x}$ axis of the unprimed IRF *K*.

When the light pulse radiated in the point B_0 arrives to the point B_1**,** a light source in the point B_1 radiates a light pulse that puts a spot mark in a point N of the unprimed IRF and stops a timer (that timer was earlier synchronised with timers in points A_0 and M of the unprimed IRF K) in the vicinity of point N of the IRF K**.** Simultaneously a light pulse arrived from the point B_0 is reflected by the mirror in the point B_1 and moves back to the point B_0**.**

When the pulse reflected from the point B_1 arrives back to the point B_0 a light source in the point B_0 puts a spot mark in the point *M* of the IRF *K* and stops a timer situated in the vicinity of point *M* (at a time moment t_M). The timer near point M was earlier also synchronised with timers in points A_0 and N.

Then an observer being at rest in the unprimed IRF *K* measures the optical length of light ray path $S = A_0N + NM$ in the unprimed IRF *K* and makes read out of the indications t_N and t_M of the timers being at rest near the points N and M of the IRF K (these timers were stopped by the light pulse at moments when the light pulse emitted from point A_0 arrived to point N and when the light pulse reflected from point B_1 returns back to the point B_0 after reflection from the mirror in the point B_1. Then the "light speed in vacuum of the moving IRF" may be calculated using the Eq. (3.4)

$$c_u = \frac{S}{t_M - t_0}. \quad (3.4)$$

So the value "light speed in vacuum of the moving IRF" calculated by means of the Eq. (3.4) can be rather simply measured and calculated according to Eq. (3.4) in the experiment, if the light in Fig. 2 propagates in vacuum.

By the way, as the time moment t_M of the light pulse arriving to the point M of the IRF K coincides with a time moment of the light pulse returning back to the point B_0 in the IRF K'**,** and the optical length of light pulse path $S = A_0N + NM$ in the IRF K is greater than optical length of the light pulse path $S' = 2L_0$ in the stationary IRF K', the value of "light speed in a moving IRF" c_u exceeds the value of "light speed in the stationary IRF" c_0 determined by Eq. (3.5)

$$c_0 = \frac{S'}{t_M - t_0}, \quad (3.5)$$

that means that $c_u > c_0$. Thus, during the time travel of the light pulse from the point B_0 to the point B_1 and back from the point B_1 to the point B_0 at the speed c_0 in the stationary IRF K' the same light pulse performs in the moving IRF K a travel from the point A_0 through the point N to the point M at the greater speed c_u. So, considering a rectangular triangle A_0NP in the Fig. 2, we have an Eq. (3.6)

$$c_u^2 = c_0^2 + u^2, \quad (3.6)$$

or an Eq. (3.7)

$$c_u = \sqrt{c_0^2 + u^2}, \quad (3.7)$$

or removing a factor c_0 from the radical sign according to the Eq. (3.8)

$$c_u = c_0\sqrt{1 + u^2 / c_0^2}. \quad (3.8)$$

Thus, having introduced the concept "light speed in a moving IRF" by Eq. (2.1) we have shown above how this "light speed in the moving IRF" K can be measured experimentally using the procedure described above by means of Fig 2.

4. Derivation of new transformation instead of Lorentz transformation

Now we must derive instead of Lorentz transformation a new transformation of space-time coordinates basing upon the only Galiley's relativity principle using Logunov's method [4].

Let the primed inertial reference frame (IRF) X', Y', Z', T' be an IRF moving at a constant speed V in a direction of positive values of the X coordinate of the unprimed IRF X, Y, Z, T.

Let all the clocks being at rest in the primed IRF be synchronized each with other using Einstein's method by means of light sources being at rest in the same primed IRF and all clocks being at rest in the unprimed IRF be synchronized each with other using Einstein's method by means of light sources being at rest in the same unprimed IRF.

Let the IRF K' with primed coordinates (X', Y', Z', T') be a stationary IRF and the unprimed IRF K with unprimed coordinates (X, Y, Z, T) be an IRF moving at the speed V in the positive direction of the axis X' of the stationary primed IRF K.

Then the expression for square of an interval in the primed Cartesian coordinates of IRF K' will be determined by an expression

$$dS^2 = c_0^2 (dT')^2 - d(X')^2 - d(Y')^2 - d(Z') \ . \quad (4.1)$$

Let us perform over Eq. (4.1) the Galilean transformation comprising Eq. (4.2)

$$t = T', \quad x = X' + VT', \quad y = Y', \quad z = Z' \, . \quad (4.2)$$

For that purpose let us write a transformation inverse to transformation (4.2) that comprises Eq. (4.3)

$$T' = t, \quad X' = x - Vt, \quad Y' = y, \quad Z' = z \, . \quad (4.3)$$

Having taken differentials from the both parts of Eq. (4.3) and having substituted these differentials into the expression (4.1), we shall have the Eq. (4.4)

$$dS^2 = c_0^2 \left(1 - \frac{V^2}{c_0^2}\right) dt^2 + 2V dx dt - dx^2 - dy^2 - dz^2 \, . \quad (4.4)$$

In order to dispose in the right part of the Eq. (4.4) from a cross term 2Vdxdt, let us separate a perfect square in it. In the result of this operation the interval (4.4) acquires the form of the Eq. (4.5)

$$dS^2 = \frac{c_0^2}{1 - \frac{V^2}{c_0^2}} \left[\left(1 - \frac{V^2}{c_0^2}\right) dt + \frac{V}{c_0^2} dx \right]^2 - \frac{dx^2}{1 - \frac{V^2}{c_0^2}} - dy^2 - dz^2 \, . \quad (4.5)$$

Now let us introduce a new speed determined by the Eq. (4.6)

$$u = \frac{V}{\sqrt{1 - \frac{V^2}{c_0^2}}} \, , \quad (4.6)$$

where V is the speed of motion from the SRT, that can not exceed the speed of light in the stationary IRF; $\boldsymbol{u}$ is the physically measurable speed of motion, as well as new time and space coordinates determined by Eq. (4.7)

$$T = t\left(1-\frac{V^2}{c_0^2}\right)+\frac{V\,x}{c_0^2}, \quad X=\frac{x}{\sqrt{1-\frac{V^2}{c_0^2}}}, \quad Y=y, \quad Z=z\,. \quad (4.7)$$

Then the interval (4.5) for these variables will have the form of the Eq. (4.8)

$$dS^2=\frac{c_o^2}{1-\frac{V^2}{c_0^2}}dT^2-dX^2-dY^2-dZ^2. \quad (4.8)$$

In order to have invariant expression for the interval the Eq. (4.8) should have the form of the Eq. (4.9)

$$dS^2=c_u^2\,dT^2-dX^2-dY^2-dZ^2\,, \quad (4.9)$$

where c_u is some new speed of light determined in accordance with the Eq. (4.10)

$$c_u=\frac{c_0}{\sqrt{1-\beta^2}}=c_0\gamma\,, \quad (4.10)$$

where $\gamma=\frac{1}{\sqrt{1-\beta^2}}=\sqrt{1+\frac{u^2}{c_0^2}}$; $c_u=\frac{c_0}{\sqrt{1-\beta^2}}$ is the speed of light in vacuum of a moving IRF (it is also equal to the speed of light in vacuum of the stationary IRF from a source moving at the physically measurable speed $\boldsymbol{u}$); $\beta=\frac{u}{c_u}$ is the ratio of the physically measured speed of IRF motion to the light speed in the moving IRF.

Thus, having applied consequently transformation (4.2) and transformations (4.5) – (4.7) we passed from the interval (4.1) in the primed IRF to the interval (4.9) in the unprimed IRF. That means that after substitution of the transformation (4.2) into the transformation (4.7) we shall obtain the following transformation (4.11) of coordinates and time from one IRF to another IRF

$$T=T'\left(1-\frac{V^2}{c_0^2}\right)+\frac{V}{c_0^2}\left(X'+VT'\right), \quad X=\frac{X'+VT'}{\sqrt{1-\frac{V^2}{c_0^2}}}, \quad Y=Y', \quad Z=Z'. \quad (4.11)$$

Now let us change groups in the right parts of first two expressions in (4.11) to the form of the Eq. (4.12)

$$T=T'+\frac{VX'}{c_0^2}, \quad X=\frac{X'+(V/c_0)c_0\,T'}{\sqrt{1-\frac{V^2}{c_0^2}}}, \quad Y=Y', \quad Z=Z'. \quad (4.12)$$

And now let us multiply left and right parts of the first Eq. in (4.12) by a multiplier γc_0. We obtain the transformation

$$\gamma c_0 T = \gamma c_0 \left(T' + \frac{VX'}{c_0^2} \right), \quad X = \gamma \left(X' + \frac{V}{c_0} c_0 T' \right), \quad Y = Y', \quad Z = Z'. \quad (4.13)$$

And now let us bring the constant c_0 inside the brackets in the right part of the first Eq. in transformation (4.13). We obtain the transformation

$$\gamma c_0 T = \gamma \left(c_0 T' + \frac{VX'}{c_0} \right), \quad X = \gamma \left(X' + \frac{V}{c_0} c_0 T' \right), \quad Y = Y', \quad Z = Z'. \quad (4.14)$$

Now in transformation (4.14) let us introduce the following designations

$$c_u = c_0 \gamma, \quad (4.15)$$

$$\beta = \frac{V}{c_0}. \quad (4.16)$$

Then the transformation (4.14) will take the form of the transformation

$$c_u T = \gamma (c_0 T' + \beta X'), \quad X = \gamma \left(X' + \beta c_0 T' \right), \quad Y = Y', \quad Z = Z'. \quad (4.17)$$

Having substituted in the transformation (4.17) the large Latin letters with small letters, the transformation (4.17) may be written in the form of the transformation

$$c_u t = \gamma (c_0 t' + \beta x'), \quad x = \gamma \left(x' + \beta c_0 t' \right), \quad y = y', \quad z = z'. \quad (4.18)$$

Having resolved transformation (4.18) with respect to the primed space-time coordinates, we obtain the transformation

$$c_0 t' = \gamma (c_u t - \beta x), \quad x' = \gamma (x - \beta c_u t), \quad y' = y, \quad z' = z. \quad (4.19)$$

The formulas (4.18) and (4.19) are direct and inverse transformations of space-time coordinates of the new relativistic space-time theory (NRSTT).

From transformations (4.18) and (4.19) of the new space-time theory it is seen that whatever large the speed u of IRF movement should be, the speed $c_u = \sqrt{c_0^2 + u^2}$ of light in vacuum of a moving IRF will be greater and no imaginary numbers in the new theory does not appear. Consequently, the prohibition on existence of superlight speeds, existing in the SRT, in the new space-time theory does not exist.

As a consequence of the second formula from the transformation (4.19) the transformation of length in the new space-time theory has the form of the Eq. (4.20)

$$x'_2 - x'_1 = \gamma \left[(x_2 - x_1) - u(t_2 - t_1) \right]. \quad (4.20)$$

In order to obtain the length of a moving body in the unprimed IRF, we should mark two coordinates at the same moment of time $t_2 = t_1$. In the result we shall have the formula (4.21) for transformation of length

$$x'_2 - x'_1 = \gamma(x_2 - x_1)\,. \quad (4.21)$$

In case if $L_0 = x'_2 - x'_1$ and $L = x_2 - x_1$ from the formula (4.21) we shall have the formula

$$L = L_0 / \gamma = L_0 / \sqrt{1 + u^2 / c_0^2}\,. \quad (4.22)$$

Thus, the formula (2.2) coincides with the formula (4.22) and really it is a consequence from the space-time transformation (4.19) of the new theory.

As a consequence of the first formula in (4.19) transformation of a time interval in the new space-time theory has the form of the Eq. (4.23)

$$c_0(t_2' - t_1') = \frac{c_u(t_2 - t_1) - \beta(x_2 - x_1)}{\sqrt{1-\beta^2}}\,. \quad (4.23)$$

As we consider here inertial reference frames, then their relative speed u of motion is a constant value and for motion only along axis x the following formula is valid

$$(x_2 - x_1) = u\,(t_2 - t_1)\,. \quad (4.24)$$

Then substituting the Eq. (4.24) into the right part of the Eq. (4.23), we obtain the Eq. (4.25)

$$c_0(t_2' - t_1') = \frac{[c_u(t_2 - t_1) - \beta\, u\,(t_2 - t_1)]}{\sqrt{1-\beta^2}}\,. \quad (4.25)$$

Bringing out in the right part of the equation (4.25) the multiplier $c_u(t_2 - t_1)$ behind the square bracket, we have the Eq. (4.26)

$$c_0\left(t_2' - t_1'\right) = c_u\left(t_2 - t_1\right)\frac{[1-\beta^2]}{\sqrt{1-\beta^2}}\,. \quad (4.26)$$

Reducing by $\sqrt{1-\beta^2}$ in the right part of Eq. (4.26) we obtain the Eq. (4.27)

$$c_0(t_2' - t_1') = c_u\sqrt{1-\beta^2}\,(t_2 - t_1)\,. \quad (4.27)$$

Because of Eq. (4.10) validity, the Eq. (4.27) acquires the form of the Eq. (4.28)

$$t_2' - t_1' \;=\; t_2 - t_1. \quad (4.28)$$

Consequently, whatever large the speed of movement u of one IRF with respect to the other IRF will be, in the new theory not in the single IRF the consequence can not happen earlier than the cause. Because the time coordinate with index 1 is the coordinate of the event, which is the cause in the both IRF, and the time coordinate with the index 2 is the coordinate of the consequence in the both IRF. Namely because of this the causality principle in the new theory does not contradict the existence of superlight speeds.

5. Dependence of charge upon speed

The space-time theory basing upon transformations (4.18) - (4.19) essentially differs from the Einstein's SRT. The first difference consists in absence of lag (retardation) of a moving clock with respect to a stationary clock (in absence of time dilation in the moving IRF).

The second essential difference of the new RSTT from the SRT consists in absence in the NRSTT of the prohibition of superlight speeds.

The third essential difference of the NRSTT from the SRT consists in dependence of the moving particle electric charge upon value of this particle movement speed. This dependence has the form:

$$q_u = \frac{q_0}{\gamma}, \tag{5.1}$$

where q_u is the charge value of a particle moving at the speed u; q_0 is the charge value of an immovable particle,

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} = \sqrt{1+\frac{u^2}{c_0^2}}, \ \beta = \frac{u}{c_u}, \tag{5.2}$$

Really, having applied the transformations (4.18) – (4.19) in the primed stationary IRF to Maxwell's Eq. (5.3.1) – (5.3.4)

$$rot'\vec{H}' = \vec{j}' + \frac{\partial \vec{D}'}{\partial t'}'; \tag{5.3.1}$$

$$div'\vec{D}' = \rho'; \tag{5.3.2}$$

$$rot'\vec{E}' = -\frac{\partial \vec{B}'}{\partial t'}'; \tag{5.3.3}$$

$$div'\vec{B}' = 0, \tag{5.3.4}$$

where $\vec{D}'$, $\vec{B}'$ are vectors of electric field induction and magnetic field induction in the primed stationary IRF;

$\vec{E}'$, $\vec{H}'$ are vectors electric field strength and magnetic field strength in the primed stationary IRF;

ρ' is the electric charge density in the primed stationary IRF,

$\vec{j}'$ is the vector of current density in the primed stationary IRF,

we shall obtain Maxwell's equations in unprimed moving IRF

$$rot\vec{H} = \vec{j} + \frac{\partial \vec{D}}{\partial t}; \tag{5.4.1}$$

$$div\vec{D} = \rho; \qquad (5.4.2)$$

$$rot\vec{E} = -\frac{\partial \vec{B}}{\partial t}; \qquad (5.4.3)$$

$$div\vec{B} = 0, \qquad (5.4.4)$$

where $\vec{D}$, $\vec{B}$ are vectors of electric field inductance and magnetic field inductance in unprimed moving IFR;

$\vec{E}$, $\vec{H}$ are vectors of electric field strength and magnetic field strength in unprimed moving IRF ,

ρ is the density of electric charge in the unprimed moving IRF;

$\vec{j}$ is the current density vector in the unprimed IRF,

and between field parameters in two IRF moving each with respect to the other there are the following dependences:

$$c_u D_x = c_0 D'_{x'}; \qquad (5.5.1)$$

$$c_u D_y = \gamma\left(c_0 D'_{y'} + \beta H'_{z'}\right); \qquad (5.5.2)$$

$$c_u D_z = \gamma\left(c_0 D'_{z'} - \beta H'_{y'}\right); \qquad (5.5.3)$$

$$E_x = E'_{x'} \qquad (5.5.4)$$

$$E_y = \gamma\left(E'_{y'} + \beta c_0 B'_{z'}\right); \qquad (5.5.5)$$

$$E_z = \gamma\left(E'_{z'} - \beta c_0 B'_{y'}\right); \qquad -(5.5.6)$$

$$c_u B_x = c_0 B'_{x'}; \qquad (5.5.7)$$

$$c_u B_y = \gamma\left(c_0 B'_{y'} - \beta E'_{z'}\right); \qquad (5.5.8)$$

$$c_u B_z = \gamma\left(c_0 B'_{z'} + \beta E'_{y'}\right); \qquad (5.5.9)$$

$$c_u \rho = \gamma\left(c_0 \rho' + \beta j'_{x'}\right); \qquad -(5.5.10)$$

$$j_x = \gamma\left(j'_{x'} + \beta c_0 \rho'\right); \qquad (5.5.11)$$

$$j_y = j'_{y'}; \qquad (5.5.12)$$

$$j_z = j'_{z'}, \qquad (5.5.13)$$

where $\beta = \frac{u}{c_u}, \gamma = \frac{1}{\sqrt{1-\beta^2}}$.

From the expression (5.5.10) at $\boldsymbol{j}'_{\boldsymbol{x}} = 0$ we shall have

$$\rho = \rho', \qquad (5.6)$$

i.e. according to the NRSTT at absence of longitudinal current in a stationary primed IRF the electric charge density is an invariant value.

But the electric charge densities in two IRF moving each with respect the other uniformly and rectilinearly at absence of longitudinal current in the stationary IRF are determined by the expressions

$$\rho = \frac{q_u}{\Omega_u}; \ \rho' = \frac{q_0}{\Omega_0}, \tag{5.7}$$

where q_u is the value of a charge moving at the speed u; q_0 is the value of a stationary charge; Ω_0 is the volume of the charge in a stationary IRF;

$$\Omega_u = \frac{\Omega_0}{\gamma} \tag{5.8}$$

is the volume occupied by the charge in a moving IRF.

Having substituted now formulas (5.7) and (5.8) into the formula (5.6) we shall have the formula of charge dependence upon speed in the new relativistic space-time theory in the form

$$q_u = \frac{q_0}{\gamma} \tag{5.9}$$

that coincides with the formula (5.1) at

$$\gamma = \frac{1}{\sqrt{1-\beta^2}} = \sqrt{1+\frac{u^2}{c_0^2}}. \tag{5.10}$$

Thus, in the NRSTT the more is the speed of a charged particle, the less is its electric charge.

In the NRSTT the formula for losses of a particle energy because of braking (bremsstrahlung) radiation (taking into account a minimal value of the so called impact parameter following from quantum theory) has the form

$$-\frac{dE}{dx} = \frac{\pi \cdot N \cdot (z \cdot q_0)^2 \cdot q_u^4}{3 \cdot E_0 \cdot \hbar \cdot \left(\frac{u}{c_0}\right)}, \tag{5.11}$$

where **- *dE/dx*** are losses of a particle energy along 1 cm of the path through some substance because of braking (bremsstrahlung) radiation during its motion through some substance;

N is the number of atomic nuclei in 1 cm^3 of substance;

zq_0 is the charge of one atomic nucleus (z is number of protons in one atomic nucleus);

$\boldsymbol{E_0 = mc_0^2}$ is the energy of one resting particle emitting the breaking radiation;

m is an invariant mass of that particle;

$\hbar$ is the Plank's constant;

u is the speed of a particle motion;

q_u is the charge of a particle moving at the speed $\boldsymbol{u}$ included in the formula (5.1);

$\boldsymbol{c_0}$ is the speed of light in vacuum of immovable IRF.

For a particle moving at superlight speed (if $\boldsymbol{u} >> \boldsymbol{c_0}$ from the formulas (5.9) and (5.10) we have

$$q_u \approx q_0 / (u / c_0). \tag{5.12}$$

Then having substituted the expression (5.12) into the formula (5.11) we shall obtain the formula

$$-\frac{dE}{dx} = \frac{\pi \cdot N \cdot z^2 \cdot q_0^6}{3 \cdot E_0 \cdot \hbar \cdot \left(\frac{u}{c_0}\right)^5}, \tag{5.13}$$

in accordance with which at increase of the superlight speed of a particle motion by one order (at 10 times increase) the particle losses because of braking radiation will decrease by five orders (decrease by 10^5 times). As a consequence of such a formula the braking radiation for high energy electrons (moving at speeds sufficiently exceeding the speed of light in vacuum of a stationary IRF $\boldsymbol{c_0}$) becomes considerably lesser, than the braking radiation of low energy electrons. This allows identifying cosmic ray particles in K. Anderson and S. Nedderamyer experiment in 1938 [5] having high penetration capability with high-energy electrons moving at superlight speeds.

For example, as in accordance with the NRSTT the speed of an electron or a positron can be determined using the formula,

$$\frac{u}{c_0} = \frac{BRq_0}{mc_0}, \tag{5.14}$$

where $\boldsymbol{B}$ is the magnetic field inductance, $\boldsymbol{R}$ is the radius of an electron (or a positron) trajectory curvature, the speed of a positron in the upper part of a photographic picture shown in the article [5] is 100 times greater than the light speed $\boldsymbol{c_0}$, and the positron speed in the lower part of this picture is 14 times greater than the speed of light $\boldsymbol{c_0}$.

6. Alternative explanation of supernovas excluding accelerated expansion of Universe, dark matter and dark energy

Most of all other consequences from new transformation of the new RSTT are discussed in papers [6] (at first the paper was sent to “Nature Physics”, but was not sent even to referees), [7], [8], [9] and [10]. But one of main consequence from the new interpretation of Einstein’s SRT is the new explanation of supernovas operation, according to which light flashes of supernovas are not the results of explosions of stars, but are the results of light grouping because of light propagation speed dependence on the light sources motion speed discussed above.

Indeed, the Nobel Prize in Physics 2011 was awarded to Saul Perlmutter, Brian P. Schmidt and Adam G. Riess "for the discovery of the accelerating expansion of the Universe through observations of distant supernovae"[11].

According to results described in [6] (see also [10]) for understanding mechanism of supernova flash formation let us consider the Fig 3.

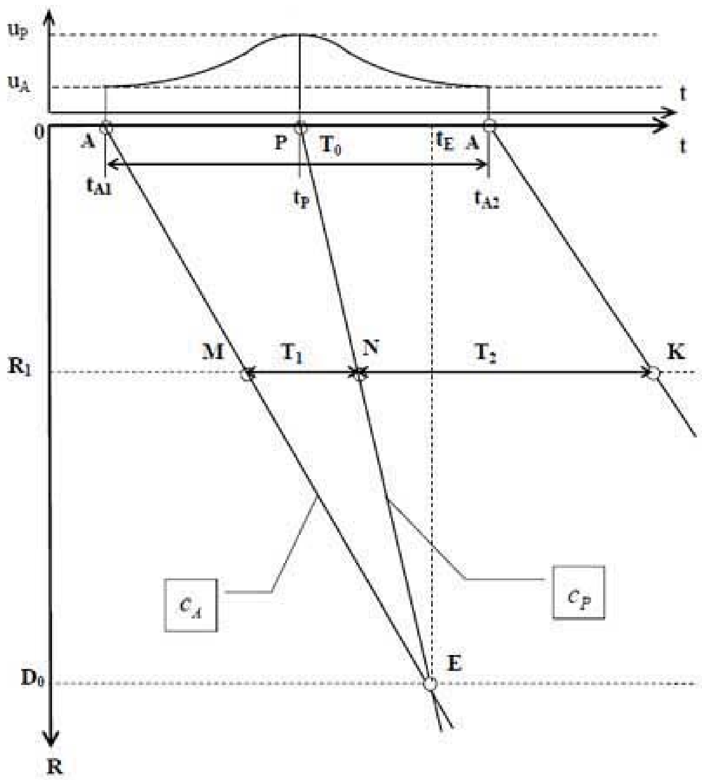


Fig. 3. Propagation of light from a binary star in outer cosmic space.

Fig. 3 consists of two parts. In its upper part we see dependence on time of speeds of motion of stars that are components of some binary star system (if these components have equal masses). In this part of Fig.3 we see the horizontal axis of time and the vertical axis on which values of star speeds in the apastron u_A and in the periastron u_P are shown. On the figure itself we see a line depicting dependence of star speed on time when this star moves along its whole trajectory from the apastron A to the periastron P and back to the apastron A. In the figure we see that the star speed is minimal in the apastron A and maximal in the periastron P, at that we know that star speeds in apastron and periastron depend on the ellipse eccentricity under the formula [10]

$$\frac{u_P}{u_A} = \frac{1+e}{1-e}, \tag{6.1}$$

where u_P and u_A are speeds of binary star components in the periastron and in the apastron; e is the ellipse eccentricity.

In the lower part of Fig. 3 we see trajectories of light propagation radiated from the apastron A (lines AME and AK) and radiated from the periastron (line PNE). As the speed of light emitted by a star from the periastron is greater than the speed of light emitted by a star from the apastron, the angle between the time axis and the respective trajectory AE or PE depends on the value of light speed and the angle between the line PE and the time axis is greater than the angle between the line AE and the time axis. The speed of light propagation along the line AE that is equal to the value c_A and along the line PE that is equal to the value c_P are determined under the formulas

$$c_A = c_0\sqrt{1+u_A^2/c_0^2}, \tag{6.2}$$

$$c_P = c_0\sqrt{1+u_P^2/c_0^2}, \tag{6.3}$$

where u_A and u_P are values of star speeds in the apastron and in the periastron, respectively.

In Fig. 3 we see that an observer situated at the distance R_1 from the binary star will see that (because of light speed dependence on the value of light source speed) the first semi-period of a binary star motion with positive acceleration (from the apastron to the periastron) is decreased to the value T_1 and the second semi-period of the same binary star motion with negative acceleration (from the periastron to the apastron) is increased to the value T_2.

In the lower part of Fig. 3 we also see that the light radiated by the star from the apastron and propagating along the line AME and the light radiated by the star from the periastron and propagating along the line PNE simultaneously arrive to the point E at the time moment t_E, though time interval between time moments t_{A1} (when the star is in the apastron) and t_P (when the star is in the periastron) can be equal to some thousand years. Thus, as the speed of the star moving with acceleration from the apastron A to the periastron P is greater than u_A, but less than u_P, then we may suppose that all the light emitted by the star from any point of the trajectory during a semi-period of accelerated motion of the star from the point A to the point P will arrive approximately simultaneously at the moment t_E, And an observer that is at rest in point E (for example, on Earth) at the distance OD from the binary star, which is situated in the origin O of the coordinate system depicted in the lower part of the Fig. 3, will see such a binary star as a tremendous flash of light at the moment t_E (similar to tremendous explosion of the star at the moment t_E). Because the light emitted by the binary star during a semi-period of its motion from the apastron to the periastron is subject to the grouping effect as a consequence of light propagation speed dependence on the speed of light source motion (light emitted during a semi-period of some thousand years for local observer situated not far from the binary star is received by the remote observer during a time period of 1 to 3 years).

As it is proven in [10] the distance from a binary star to a remote observer, at which the remote observer will see the binary star like a tremendous explosion at the time moment t_E, is determined under the formula

$$D_0 = \frac{T_0 c_0}{\left(\frac{u_P^2}{c_0^2} - \frac{u_A^2}{c_0^2}\right)}, \tag{6.4}$$

where T_0 is a semi-period of the binary star elliptical orbit circularization; c_0 = 299792458 m/s is the speed of light in a stationary IRF; u_P, u_A are speeds of identical binary stars in periastrons and apastrons, respectively; D_0 is the distance from a binary star mass center to an observer in space, to which light emitted by stars in the apastrons and in the periastrons arrive simultaneously. If the distance D_0 is great enough for that observer, that the stars apastrons and periastrons are not distinguished for such an observer separately, then such an observer will observe such a binary star as nova or supernova (depending upon the value of the semi-period T_0). For example, if T_0 is equal to 1000 years and the light flash duration is equal to 3 years, then all light that was radiated during 1000 years of that binary star existence into the telescope objective spatial angle will arrive to the telescope vicinity during 3 years (because of the grouping effect). And in the result of such grouping effect the observer will see a very bright light flash similar to explosion of the star. Now we call such light flashes as supernovae.

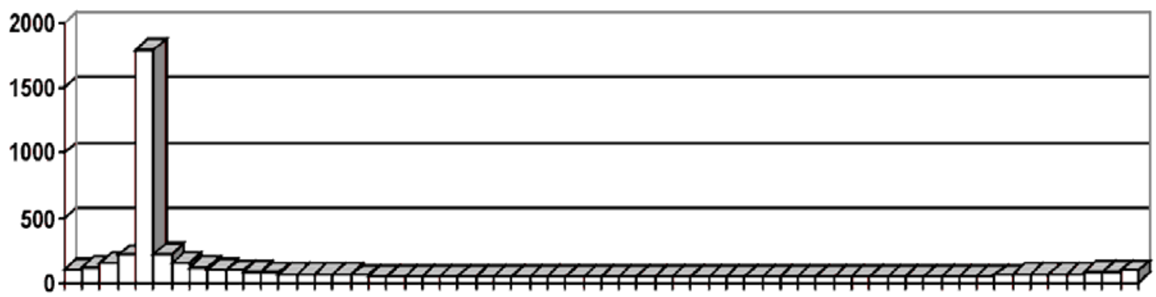


Fig. 4. A light flash from a binary star because of light speed dependence on the light source speed motion obtained by simulation of light propagation from a binary star R=0.7 D_o [10].

As simulation shows, at distances greater than D_0, the flash of brightness bifurcates into two flashes and the time interval between two flashes changes in dependence on distance to a binary star. Such bifurcated flash of brightness from a binary star is shown in the Fig. 5 and Fig. 6.

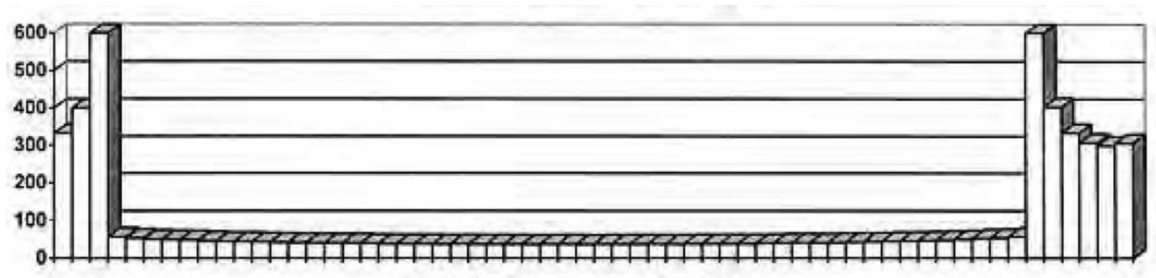
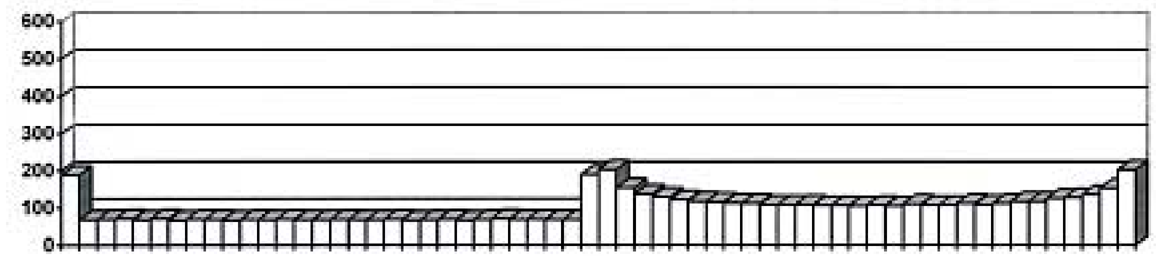


Fig. 5. A bifurcated light flash from a binary star at R = D_0 [10].

As it is seen from Fig. 5, the pattern of changing brightness in every flash is different: the second flash is decreasing smoothly but increases sharply and the first flash is increasing smoothly but decreases sharply.



Fig, 6. A bifurcated light flash from a binary star at R = 10 D_o [10].

As it is seen from Fig. 6 at increased distance to the binary star the light flash becomes weaker. For very large distances to binary stars (when R >> D_o) the effect of light grouping decreases and brightness of light flashes becomes less and less . That is why very far binary stars seem to distant observers many times weaker than other binary stars, situated at less distances from the on-Earth observers. So, using the above model of supernovas it is possible to refuse from accelerated expansion of the Universe as well from the "dark matter" and "dark energy".

7. Experimental disproof of Einstein's SRT and conclusions

In July 1994 a very important event has taken place in the solar system: a collision of Shoemaker–Levy 9 comet with Jupiter planet (known as "astronomical event of the century"). The results of this event are discussed in [12]. Russian scientists from Novosibirsk observed over dynamic change of physical conditions of some pieces of earth substance during collisions of Shoemaker-Levy 9 comet fragments with the Jupiter planet at a distance of 750 mln km from the earth laboratory. The time of changing physical conditions (weight and transperancy index) of some pieces of substance were measured together with Universal coordinated time of events, when such changes took place in the laboratory. The results reported in [12] show that changes of dynamic physical conditions took place in the earth laboratory practically simultaneously (in the Universal coordinated time) with the events in the Jovian stratosphere that were situated remotely from the on-Earth laboratory at a distance of 750 mln km. But the data via the electromagnetic channel of the Hubble space telescope (that obtained image of collision in light diapason of electromagnetic waves) arrived to the Hubble telescope only approximately 42 minutes after the events of each fragment collision with the Jupiter that was necessary for the light signal to overcome the distance of 750 mln km (about 5 AU) at the speed of light approximately equal to 300 thousand km/s.

Comparison of moments of anomalies beginning in dynamic condition of earth substance and impact moments of respective comet fragments is given in Table 1 [12].

According to table 1 data the response of used indicators was in advance of light signals by the value of approximately 43 minutes.

As according to the Einstein's SRT there are no signals propagating faster than light and light speed is identical both in the stationary and in moving IRF, such a result means that Einstein's SRT was disproved by the "astronomical event of the century" almost 25 years ago.

Other conclusions from the above considerations are as follows:

1. It is possible to create a relativistic space-time theory (RSTT) based upon only one relativity principle in Galiley's formulation "The state of uniform translational motion is completely equivalent to the state of resting". In this RSTT a concept "light speed in a moving inertial reference frame" may be introduced, which is equal to the light speed in a stationary IRF from a moving source and is determined according to the Eq. $c_u = c_0\sqrt{1+u^2/c_0^2}$, where *u* is the physically measured speed of a source (or IRF) motion determined according to the Eq. $u = \dfrac{V}{\sqrt{1-V^2/c_0^2}}$, where *V* is the speed of motion from Lorentz transformation of Einstein's SRT.

2. In this RSTT the length of a moving body in a direction of its motion is determined under the Eq. $L = L_0/\sqrt{1+u^2/c_0^2}$, where L_0 is the proper length of a body.

3. In this RSTT the time measurement unit (TMU) of a light clock (and any other clock) moving at the speed ***u*** is equal to the time measurement unit of the clock of the same design being at rest and is equal to the value $T = \dfrac{2L_0}{c_0}$, where L_0 is the distance between light clock mirrors.

4. In this RSTT the known Lorentz transformation from Einstein's SRT is replaced with the new one having the form $c_0 t' = \gamma(c_u t - \beta x)$, $x' = \gamma(x - \beta c_u t)$, $y' = y$, $z' = z$, where $c_u = c_0\sqrt{1+u^2/c_0^2}$, $\beta = u/c_u$, $\gamma = \sqrt{1+u^2/c_0^2}$.

5. New transformation of the RSTT does not forbid superlight speeds of particle motion, which are not also forbidden by the known causality principle (see Eq. (4.28)).

6. For very far binary stars the grouping effect becomes less and supernova flash becomes weaker, than flashes for nearer binary stars. That is why new explanation of supernovas excludes accelerated expansion of the Universe.

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Contents

Table 1

Comparison of moments of anomalies beginning in dynamic condition of earth substance and impact moments of respective comet fragments. (Time moments are given in Universal coordinated time).

Anomaly beginning (date: hour: min)	Moment of astronomical surveillance of the impact (fragment: fate: hour: min)
17.VII 23:48±3	F: 18.VII 00:33±5
20.VII 05:00±3	M: 20.VII 05:45*
20.VII 09:48±0	N: 20.VII 10:31±4
20.VII 19:03±1**	Q2: 20.VII 19:44±6
20.VII 19:30,5±1**	Q1: 20.VII 20:12±4

* This fragment was lost in astronomical observations from VII.93, calculated data are given. As it was reported later the fragment M revealed itself at a moment of falling with sufficient evidence.

** These data are given taking into account the results of measurements by the astronomical measuring-computational complex.