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Special Theory of Relativity: A Gross Error in Physics (A Lesson for Physicists)

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Abstract

A detailed proof of the incorrectness of the special theory of relativity (STR) is proposed. The correct methodological basis for the proof is the unity of formal logic and rational dialectics. The unity of formal logic and rational dialectics is the only correct criterion of truth. The proof leads to the following irrefutable statement: STR as a consequence of incorrectness of Lorentz transformations contains gross errors. Gross errors are as follows: (1) two material metric inertial coordinate systems (the "primed" and "unprimed" coordinate systems) are not identical. Really, the "unprimed" coordinate system contains the clock that determines only the "unprimed" (ordinary) time, but the "primed" coordinate system contains both the clock that determines the "unprimed" time and the clock that determines the "primed" (non-ordinary, special) time. The "primed" (non-ordinary, special) time is not defined; (2) "unprimed" time characterizes the motion of some material object. This motion is described by the coordinate representation of the Galilean transformation formula. The coordinate representation of the equation of motion of light (photon) contains the "primed" (non-ordinary, special) time. "Primed" (non-ordinary, special) time is not defined; (3) the coordinate representation of the Galilean transformation formula and the coordinate representation of the equation of motion of light (photon) contain both the coordinates of material objects and the lengths of paths passed by material objects. Coordinate representations express the identity of the coordinate (i.e., the segment of the material scale) and the length of the path passed by a material object. But the coordinate representations are incorrect, because coordinate representations express a violation of the formal-logical law of lack of contradiction. According to the law of lack of contradiction, the coordinate of a material object (i.e., the segment of the coordinate scale) is not identical to the length of the path passed by the material object; (4) Substitution of the coordinate representation of the Galilean transformation formula in the coordinate representation of the equation of motion of light (photon) is an incorrect operation leading to Lorentz transformations. The essence of the operation is expressed by the mathematical equality, the left side of which is the "primed" coordinate of the material object as a function of "unprimed" (ordinary) time, and the right side is the "primed" coordinate of light (photon) as a function of "primed" (non-ordinary, special) time. This equality means the coincidence of material objects in the "primed" coordinate system. The nonsense is that the coincidence occurs at different moments in time for different objects: coincidence for the material object occurs at some point of "unprimed" (ordinary) time, and coincidence for light (photon) occurs at a certain point of "primed" (non-ordinary, special) time. Moreover, the nonsense is that the coincidence occurs not at fixed moments in time, but at arbitrary (current) points in time. Thus, the Lorentz transformations and the special theory of relativity are gross errors in physics. The special theory of relativity does not satisfy the criterion of truth and is not a scientific theory at all.

Keywords: Special Relativity, General Physics, Theoretical Physics, Mathematical Physics, Philosophy of Science.
PACS: 03.30.+p, 01.55.+b, 01.70.+w

Introduction

The special theory of relativity (STR) created by Lorentz-Poincaré-Einstein is known to everyone: from students to Nobel laureates (see, for example) [1-5]. The paradoxes of STR have ceased to surprise scientists and science fiction writers. Paradoxes have become an integral (inseparable) part of the theory. But, in the point of view of the correct methodological basis of science - the unity of formal logic and rational dialectics - the paradoxes of the theory are a manifestation of gross methodological errors made by scientists. Until now, scientists have not understood the fundamental importance of the correct methodological basis as the creation of truth [6, 7].

Methodological errors in the foundations of STR were first revealed (detected) and analyzed in the works [8-10]. But the physics community ignored the existence of errors in STR. The purpose of this work is to propose an irrefutable proof of the incorrectness of the foundations of STR [11-15]. The proof is carried out within the framework of the correct methodological basis: the unity of formal logic and rational dialectics

The Starting Point of STR

As is well known, the STR starting point expresses the absurd idea that substitution some relationship in another relationship leads to a new theory. (The substitution can probably only lead to some new aspect!). Specifically, the absurd idea is as follows [16].

The equations of the spherical wave front for light in identical geometric metric systems XOY and $X'O'Y'$ are the following coordinate representations:

$$x^2 + y^2 + z^2 = c^2 t^2,\ x'^2 + y'^2 + z'^2 = c^2 t'^2,\ t' \neq t .$$

The dimensions of the quantities are the following:

$$[x]=[y]=[z]=m,\ [x^2]=[y^2]=[z^2]=m^2,\ [t]=s,\ [c]=\frac{m}{s}.$$

The coordinate representation of the Galilean transformation connects quantities relating to two metric geometric reference systems has the following form (in the one-dimensional case):

$$x' = x - Vt,\quad y' = y,\quad z' = z,\quad t' = t,$$

$$[V]=\frac{m}{s}$$

The problem is to obtain the relationship

$$x^2 + y^2 + z^2 = c^2 t^2$$

by substituting the coordinate representation of the Galilean transformation

$$x' = x - Vt,\quad y' = y,\quad z' = z,\quad t' = t$$

in the relationship

$$x'^2 + y'^2 + z'^2 = c^2 t'^2,\quad t' \neq t .$$

This substitution leads to the following relationship:

$$x^2 - 2xVt + V^2 t^2 + y^2 + z^2 = c^2 t'^2,\quad t' \neq t .$$

This relationship, after some strange manipulations, leads to the solution of the problem - the Lorentz transformation:

$$x' = \frac{x - Vt}{\left(1 - V^2/c^2\right)^{1/2}},$$

$$y' = y,\quad z' = z;$$

$$ct' = \frac{t - \left(V/c^2\right)x}{\left(1 - V^2/c^2\right)^{1/2}}c,$$

$$x' = ct',\quad x = ct .$$

Objections

1) By correct definition, material metric inertial systems (inertial frames of reference) XOY and $X'O'Y'$ are identical. (Metric system scales have the dimension “meter”). The system $X'O'Y'$ s inserted in the system XOY: $X'O'Y' \subset XOY$. The connection between inertial systems XOY and $X'O'Y'$ is only logical (informational). Material objects L (light, photon) and M (material point) are not clocks. Objects L, M and clocks □ are mutually independent objects. Clocks determine time t; time t characterizes clocks. (Clocks do not measure time!). Time is a universal informational (not physical and not geometric!) variable quantity, which is used by man to order (organize) information about processes and events in the world [17, 18]. Consequently, identical clocks determine identical time $t' = t$ in identical systems $X'O'Y'$ and $X'O'Y'$. But the relationship $t' \neq t$ contradicts to the condition of identity of coordinate systems XOY and $X'O'Y'$. Also, the relationship $t' \neq t$ contradicts to the condition that objects L, M and clocks © are mutually independent objects [19-22].

2) According to the correct definition, the geometric space of a material object is the set of admissible (accessible) positions (geometric states) of the material object in the material geometric system. Empty geometric space (i.e. geometric space that does not contain a material object) does not exist. The connection between the position of a material object and time is only informational: time serves to order (organize) the positions of the object. Therefore, assertion about the existence of physical “space-time” is a gross error.

3) According to the correct definition, expressions $s^{(L)}(t) = c^{(L)} t$ and $s'^{(L)}(t) = c^{(L)} t$ the lengths of paths passed by the material object L in the material metric geometric coordinate systems XOY and $X'O'Y'$. The length of a path (i.e. a number) is not a geometric element (object) in the coordinate systems XOY and $X'O'Y'$. In other words, the length of a path as a geometric element (object) does not exist in the geometric coordinate systems XOY и $X'O'Y'$. Expressions

$s^{(M)}(t) = v^{(M)} t$ and $s'^{(M)}(t) = v'^{(M)} t$

are the lengths of paths passed by the material object M in the material metric geometric coordinate systems XOY and XOY

. The length of a path (i.e. a number) is not a geometric element (object) in the geometric coordinate systems XOY and $X'O'Y'$. In other words, the length of a path as a geometric element (object) does not exist in the geometric coordinate systems XOY and $X'O'Y'$. The length of a path is an additive quantity:

$$s^{(M)}(t) - s'^{(M)}(t) \equiv v^{(M)} t - v'^{(M)} t \equiv V^{(M)} t$$

$$v^{(M)} - v'^{(M)} \equiv V^{(M)}.$$

If

$$s^{(L)}(t^*) = s^{(M)}(t^{**}), \text{ then } s^{(L)}(t^*) = s^{(M)}(t^{**}),$$

$$c^{(L)} t^* = v^{(M)} t^{**}, \quad \frac{t^*}{t^{**}} = \frac{v^{(M)}}{c^{(L)}}.$$

4) According to the correct geometric definition, the coordinate (i.e. the segment of the metric scale determining (defining) the position of the material point) and the trajectory of a moving material point exist as geometric elements in the coordinate system [23]. But the coordinate and trajectory of a material object are not the length of the path passed by the material point in the coordinate system. Therefore, the following relationships in STR are incorrect:

$$x^{(L)}(t) = c^{(L)} t, \quad x'^{(L)}(t) = c^{(L)} t;$$

$$x^{(M)}(t) = v^{(M)} t, \quad x'^{(M)}(t) = v'^{(M)} t;$$

$v^{(M)} - v'^{(M)} \equiv V^{(M)}$ (this speed representation of the Galilean transformation is correct);

$$x'^{(M)}(t) = x^{(M)}(t) - V^{(M)} t, \quad t' = t;$$

$$x'^{(M)}(t) = x'^{(L)}(t'), \quad t' \neq t;$$

$$x'^{(M)}(t) = c^{(L)} t' \text{ under } y = 0, \quad z = 0;$$

$$x'^{2(M)}(t) = x'^{2(L)}(t'), \; t' \neq t$$

$$x^{2(M)}(t) - 2x^{(M)} V^{(M)} t + V^2 t^2 +$$

$$+ y^2 + z^2 = c^{2(L)} t'^2$$

etc.

In other words, in these relationships, the qualitative determinacy of the coordinate x (as the segment of the material metric scale OX) is not identical to the qualitative determinacy of the path length (i.e. numbers vt, Vt, ct). Therefore, these relationships represent a violation of the formal logical law of lack of contradiction. According to the law of lack of contradiction, the correct logical relationship is the following:
"(coordinate, i.e. the segment of the scale OX)
is not
(path length, i.e. non-segment of the scale OX, number)".

According to the dialectical category of measure, all members of a mathematical relationship must have identical qualitative determinacy [24, 25]. Therefore, a correct mathematical expression for the coordinate of a material object should not contain the product of the quantities of speed and time. In this case, the correct relationship

$$x^{(L)}(t^*) = x^{(M)}(t^*), \quad t^* = const$$

means the coincidence (intersection, superposition, combination) of independent objects L and M at some point in time $t^* = const$. If time were a variable in this relationship, then this relationship would mean nonsense: the independent objects L and M are coincided (connected) at any point in time.

5) The relationships

$$x^2 + y^2 + z^2 = c^2 t^2,$$

$$x'^2 + y'^2 + z'^2 = c^2 t'^2,$$

$$x'^2 = (x - Vt)^2$$

are meaningless in metric coordinate systems because the area, which has the dimension

$$[x^2] = [y^2] = [z^2] = m^2,$$

has no geometric (graphical) representation in the metric coordinate system (in other words, the area is not a segment). But if the scales of the coordinate system did not have dimensions (i.e., if the coordinate system were non-metric), then the expression $x^2 + y^2 + z^2 = c^2 t^2$ would be dimensionless and would geometrically (graphically) represent the surface of a sphere. But this would have no physical meaning [26-30].

6) The essence of STR is the following relationship

$$x'^{(M)}(t) = x'^{(L)}(t'), \quad t' \neq t.$$

This relationship means the coincidence (intersection, superposition, combination) of objects M and L in the system $X'O'Y'$. The nonsense is that the coincidence (intersection, superposition, combination) occurs at different points in time for different objects: the coincidence (intersection, superposition, combination) for the object M occurs at the point of time t, and the coincidence (intersection, superposition, combination) for the object L occurs at the point of time t'. Moreover, the nonsense is that the coincidence (intersection, superposition, combination) does not occur at fixed point of time, but at any arbitrary point of time [31].

7) The coordinate form of the Galilean transformation $x' = x - Vt$ is incorrect. But the speed form of the Galilean transformation $v^{(M)} - v'^{(M)} \equiv V^{(M)}$ is correct. The correct form contains a reference to a material object M, but it does not contain a description of the properties of the object M. In the point of view of formal logic, this is an essential feature of the Galilean transformation [32-35]. In the point of view of formal logic, the correct Galilean transformation for an object L (a photon as a material point) has the form:

$$c^{(L)} - c'^{(L)} \equiv V^{(L)}$$

where $c^{(L)} = c'^{(L)}$ in accordance with the principle of constancy of the speed of light. The correct Galilean transformation for

the object L (a photon as a material point) does not contain information about the shape of the light wave front [36, 37]. This means that substitution of the coordinate form of the Galilean transformation

$$x'^{(M)}(t) = x^{(M)}(t) - V^{(M)}t$$

in the relationship

$$x'^2 + y'^2 + z'^2 = c^2 t'^2$$

is inadmissible.

8) The lack of correct definitions of concepts and quantities, as well as the lack of correct detailed designations of quantities, introduces confusion in reasoning and leads to gross errors [38-40].

Discussion

Thus, STR is a false theory. Moreover, STR is not a theory at all. The first important question arises: Why did Einstein's role in the creation and development of STR was more essential than role of the outstanding scientists Lorentz and Poincaré? How did the young scientist Einstein ("a self-confident, almost impertinent young man") differ from Lorentz and Poincaré? The answer is as follows (Wikipedia, etc.).

a) "In 1902, Henri Poincaré published a collection of essays titled "Science and Hypothesis", which included detailed philosophical discussions on the relativity of space and time".

b) In 1905, Einstein removed the name of his wife Mileva Marić as a co-author from the final version of his paper, "On the Electrodynamics of Moving Bodies" (1905).

c) Einstein's article, "On the Electrodynamics of Moving Bodies" (1905) published in the prestigious journal "Annalen der Physik" does not contain references to other papers. This is a violation of an ethical principle in science. The manuscript of the article was reviewed by Poincaré. But it is strange that this review vanished (disappeared) from the archives of the journal "Annalen der Physik".

d) Lorentz later said, "Einstein simply postulates what we have deduced". This means that the article "On the Electrodynamics of Moving Bodies" (1905) contains plagiarism. Plagiarism is a violation of an ethical principle in science [41].

e) "Why didn't Poincaré mention Einstein in his Göttingen lectures?" "Why didn't Poincaré write in any of his articles about Einstein's role in creation of the theory of relativity?" Poincaré mentioned Lorentz, but not Einstein. Poincaré expressed his opinion of Einstein as follows: "Mr. Einstein is one of the most original thinkers I have known. What is especially admirable is the ease with which he accepts new concepts and draws all possible conclusions from them. Since he works in many directions at the same time, most of the paths he takes will lead to a dead end." "Poincaré was resolutely opposed to the theory of relativity".

In my opinion, the above means that Einstein's role in the creation of STR was most essential because some important (influential) person in the editorial board of the journal "Annalen der Physik" supported Einstein. Later, the support of influential friends was decisive for Einstein's advancement in science. (Einstein led a bohemian lifestyle and therefore had influential friends).

I have been engaged in critical analysis of the foundations of theoretical physics and mathematics for 45 years. Over many years, I have studied all of Albert Einstein's works and letters (A. Einstein. "Collected Scientific Works". Vol. 1-4. Publishing House "Nauka", Moscow, 1965-1967). All of Einstein's works (including the general theory of relativity) contain formal-logical and dialectical errors [42].

For example, a scientific achievement that characterizes Einstein's works is the following Einstein relationship:

$$\frac{E^{(M)}}{m^{(M)}} = c^{(L)2}$$

where $E^{(M)}$ and $m^{(M)}$ are the internal energy and mass of a material object M (body, particle), respectively; $c^{(L)}$ is the speed of a material object L (light, photon). By definition, material objects L and L are mutually independent objects (i.e., there is no physical interaction of objects; there is no logical connection between objects). This implyies that Einstein's relationship contradicts to the condition of independence of objects L and L. Really, Einstein's relationship contains the following physical and methodological errors.

(a) The energy of the object M defines (determines) the speed of the object L; the speed of the object L defines (determines) the energy of the object M. In other words, a property (qualitative determinacy, essential feature) of the material object M defines (determines) a property (qualitative determinacy, essential feature; speed) of the independent material object L; a property (qualitative determinacy, essential feature; speed) of the material object L defines (determines) a property (qualitative determinacy, essential feature; energy) of the independent material object M. But the qualitative determinacy of objects M and L are different. Therefore, in the point of view of formal logic and dialectics, Einstein's relationship represents the following error: objects M and L are identical.

(b) In the point of view of the dialectical category of measure, the left and right sides of a mathematical relationship must have identical qualitative determinacy and belong to the same material object. But Einstein's relationship does not satisfy this requirement, because the left and right sides of Einstein's relationship have not identical qualitative determinacy and do not belong to the same material object.

Therefore, Einstein was a middle level scientist supported by influential friends. It is known that even a good paper cannot be published in a prestigious journal without strong support [43].

A second important question arises: Why does well-founded scientific criticism of standard theories have not a significant impact on the development of science (physics, mathematics)? In my opinion, the answer is as follows. Well-founded scientific criticism of standard theories relies on the only correct methodological basis: the unity of formal logic and rational dialectics. The unity of formal logic and rational dialectics is the only correct criterion of truth (Einstein and other classics of science could not find correct criterion of truth!). In my opinion, standard theories do not satisfy the correct criterion of truth. Rremoval of the methodological errors from standard theories leads

to the abolition of standard theories and the destruction of inductive science.

A third important question arises: Is substantiated scientific criticism of standard theories vain efforts (fruitless)? In my opinion, the answer is as follows. Substantiated scientific criticism of standard theories is necessary because it expands the consciousness of scientists. Expanded consciousness allows scientists to make changes to standard theories. These changes can and should contradict to the assertions of the standard theories. The era of romanticism has passed. The era of realism and rational thinking in science is coming [44].

Conclusion

Thus, the special theory of relativity (STR) of Lorentz-Poincaré-Einstein is incorrect. The incorrectness of STR as a consequence of the incorrectness of the Lorentz transformations is proven within the framework of the correct methodological basis: the unity of formal logic and rational dialectics. The errors leading to the formulas of the Lorentz transformation are as follows:

(a) two material inertial metric coordinate systems (the "primed" and "unprimed" coordinate systems) are not identical. Really, the "unprimed" coordinate system contains a clock that determines only the "unprimed" (ordinary) time, but the "primed" coordinate system contains both the clock that determines the "unprimed" time and the clock that determines the "primed" (non-ordinary, special) time. The "primed" (non-ordinary, special) time is not defineed;

b) "unprimed" time characterizes the motion of some material object. This motion is described by the coordinate representation of the Galilean transformation formula. The coordinate representation of the equation of motion of light (photon) contains "primed" (non- ordinary, special) time. "Primed" (non- ordinary, special) time is not defined;

c) The coordinate representation of the Galilean transformation formula and the coordinate representation of the equation of motion of light (photon) contain both the coordinates of material objects and the lengths of paths passed by material objects. Coordinate representations express the identity of the coordinate (i.e., the segment of the material scale) and the length of the path passed by a material object. But coordinate representations are incorrect, because coordinate representations express a violation of the formal-logical law of lack of contradiction. According to the law of lack of contradiction, the coordinate of a material object (i.e., the segment of the coordinate scale) is not identical to the length of the path passed by the material object.

d) Substitution of the coordinate representation of the Galilean transformation formula in the coordinate representation of the equation of motion of light (photon) is an incorrect operation leading to the Lorentz transformation. The essence of the operation is expressed by a mathematical equality, the left side of which is the "primed" coordinate of the material object as a function of "unprimed" (ordinary) time, and the right side is the "primed" coordinate of light (photon) as a function of "primed" (non-ordinary, special) time. This equality means the coincidence (intersection, superposition, combination) of material objects in the "rimed" oordinate system. The nonsense is that the coincidence (intersection, superposition, combination) occurs at different moments in time for different objects: coincidence (intersection, superposition, combination) for a material object occurs at some of "nprimed" (ordinary) time, and the coincidence (intersection, superposition, combination for light (photon)) occurs at a certain moment of "primed" (non-ordinary, special) time. Moreover, the nonsense is that the coincidence (intersection, superposition, combination) occurs not at fixed poins of time, but at arbitrary points of time.

Thus, the Lorentz transformations and the special theory of relativity are gross errors in physics [45].

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