A Brief Review of Special Relativity

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Abstract   This review is dedicated to those which already have understood special relativity (SR), but designated to these which still have not. From the kinematical context and EM pretext, as the starting bases, the simplest methodology of the initial constitution of SR is here presented. Some inconsistencies of the adopted premises, applied procedures and thus obtained results are clearly pointed at. Apart from the alleged dependence of the relative time on the mutual motion of the two frames, it would also depend on the object position, determined in its own arbitrarily adopted frame! Some reinterpretations of the known empirical facts call in question the empirical bases of SR. The scientific wander was conditioned by the incomplete EM theory, tried to make up by a sequence of the ideal symmetries.

Keywords   Kinematical, Electrodynamic, Speculative

1. Introduction

Starting by the direct experience, the inductive development understands a sequence of theoretical explanations of the established relations between accessible facts. Practical confirmation of the final results further advances the new theories, thus increasing their reliability. Sufficiently reliable theories form the scientific tradition, as the basis of the further development. However, possible mistakes or omissions of the inherited tradition cannot be excluded. This reason demands occasional reexaminations of some its aspects, and sometimes – even of its fundaments.

This necessity is followed by some practical limitations. In the aim to avoid a scientific dead end, the reexaminations must not be postponed for a long time. In the absence of the reliable ideas, the strict scientific criteria are substituted by practical testing of the provisory results, at the cost of possible refutations of some of them. However, these tests also depend on their clear theoretical interpretation. The optimal balance between the simplicity and reliability of a scientific theory is thus conditioned by the objective technical abilities and subjective intellectual powers.

Trying to compose a transparent and convincing exposition of EM theory, this author met a sequence of unfinished ideas and unresolved problems. In the absence of enough technical abilities to resolve and rise above these dilemmas, the cooperation with some scientific institutions was asked. However, nobody was ready to call in question any of the scientific canons already adopted. The only remaining possibility was the strong reliance on own intellectual powers. The successful elaboration of EM theory points to the excess of various physical theories.

The speculative theories are doubtful or can be bypassed at least. On the other hand, the known empirical results can be reinterpreted by consistent reconsiderations. In the search for the solid scientific bases, some nearly forgotten classical problems were thus resolved and finally superseded. Though predominantly speculative theories do not deserve the canonizations, SR is an exceptional, but typical example. This famous scientific provocation has never been officially accepted, but was gradually imposed in the absence of the convincing orientation in space.

2. Principal Views

Alike in EM theory, we will here present the main relevant empirical facts and causal relations concerning SR. Without the typical ideological prejudices, we will consider possible pretexts of such manner of thinking, principal starting views and the obtained conclusions. As the main aim, we are trying to supersede the situation in which the majority of physicists only believes in this theory, their minor number is familiar with its origins and logics, but nobody can understand it. Not only that certain its difficulties are ignored, but some of them have not been even noticed so far.

Alike n physical quantities related by $(n-1)$ natural laws, SR tries to relate the *three* natural *categories* (space, time and matter) by the *two postulates*. 1) "All inertial reference frames are equal in law". Not only that these frames cannot be strictly defined, but all other frames stay out of scope. 2) "Speed of light does not depend of the motion of its emitter and/or detector". Depending on the reference of light propagation, this postulate is a *consequence* of, or *opposition*

to the former one. Both these relations between two postulates are unacceptable in a consistent theory.

Instead of a sweeping acceptance or rejection of SR, the elaborate EM theory enables some selection of its various aspects. In the extended approach, the final exclusion of the assumed *magnetic monopoles* [1, 2] and restriction of *relativity principle* [5] call in question the *classical* (4), as the bases of *relativistic* field transformations (6) and respective *kinematics* (7). On the other hand, the *mass function* and *Einstein's relation*, as the bases of relativistic *dynamics*, are already convincingly affirmed [6]. We will thus primarily examine the kinematical aspects of SR.

3. Kinematical Context

Irrespective of their inventor, the two relativistic transformations of space and time were introduced hypothetically and supported by a sequence of doubtful formal procedures. Let us present their kinematical context, with the applied procedures. At first, there are the simple rational relations of the *accessible* and *wanted* kinematical quantities of a moving celestial object. Owing to the finite speed of light, the temporal interval between the object and observer is taken into account. The two equations (1) thus relate the wanted and measurable kinematical quantities.

$$\mathbf{r}' = \mathbf{r} + \mathbf{v}r/c \quad t' = t + r/c \qquad (1)$$

The *former* position ($\mathbf{r}$) is visible at *present* time (t'). With the known object speed ($\mathbf{v}$), the present position ($\mathbf{r}'$) and time (t) of the passage through the former position ($\mathbf{r}$) can be calculated. The delay (r/c) is determined by the known distance (r) and speed c. This procedure is negated in SR, on the pretext of insolvable practical difficulties. Instead, the two *provisory* transformations between two reference frames (2), mutually moving at the speed u, were implicitly understood. For the simplicity, instead of the arbitrary direction, the motion may be collinear with the x-axis.

$$x' = x + ut \quad t' (=) t + ux/c^2 \qquad (2)$$

The transformation (2a) reminds of (1a). The object position (x) – in the 'moving' frame, increased by the relative frame displacement (ut) after a common start, gives the position (x') in the 'resting' frame. Instead of the common time ($t' = t$), its transformation (2b)[1] was expected. As if the fraction from (1b) – of the *distinct* meanings, is multiplied by u/c. Apart from the *mutual speed* (u), a temporal difference ($t' - t$) also depends on the *object position* (x), in principle arbitrarily adopted! Irrespective of these two fantastic conclusions, this pair can be formally inverted (3).

$$x (=) (x' - ut')/g^2 \quad t [=] (t' - ux'/c^2)/g^2 \qquad (3)$$

These two equations point to the *asymmetric* relations of the two frames. Apart from the opposite signs of the variable

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1 More or less doubtful equalities are marked. Thus (=) denotes at least single, [=] double and {=} triple inconsistencies.

terms, the set *determinant*, $g^2 = 1 - (u/c)^2$, scales the inverse pair (3). Insisting on the frame *symmetry*, already arbitrarily adopted – as a *desirable postulate*, the set determinant was distributed between the two sets (7), by $1/g$ into each of them, thus saving the mutual inversion only. Though this action cannot be covered by any reasonable physical argument, it was imposed in advance by the *principle of relativity*, taken from the doubtful EM relations [5].

4. EM Pretext

The three types of EM forces affecting a moving charge are expressed by the summary electric field (4a), where $\mathbf{u}$ is the object-field speed. The *kinetic* and *dynamic* inductions, affecting the charge, are thus added to the *static* electric field [5]. Not only that all the three EM interactions are thus taken into account, but the symmetric magnetic transformation (4b) understands the free magnetic monopoles already refuted [2]. Owing to the axial form and distinct behavior of magnetic moments [1], the magnetic force acting on them would be additionally complicated and problematic.

$$\mathbf{E}' = \mathbf{E} + \mathbf{u} \times \mathbf{B} \quad \mathbf{B}' (=) \mathbf{B} + \varepsilon\mu\mathbf{E} \times \mathbf{u} \qquad (4)$$

By the mentioned procedure, the pair (4) is also inverted (5). Apart from the opposite mutual speed, the *set determinant*, $g^2 = 1 - \varepsilon\mu u^2$, additionally disturbs the frame symmetry, announcing a *preferential* frame related with the medium. In the aim of the *symmetry*, the medium is denied, and set determinant distributed between the two sets (6). The *transverse* field components were thus *enlarged*. The similar ellipsoidal field deformation, predicted by H. A. Lorentz, concerns the *weaker longitudinal* electric field, subdued by the opposite dynamic induction [6].

$$\mathbf{E} (=) (\mathbf{E}' - \mathbf{u} \times \mathbf{B}')/g^2 \quad \mathbf{B} [=] (\mathbf{B}' - \varepsilon\mu\mathbf{E}' \times \mathbf{u})/g^2 \qquad (5)$$

$$\mathbf{E}' [=] (\mathbf{E} + \mathbf{u} \times \mathbf{B})/g \quad \mathbf{B}' \{=\} (\mathbf{B} + \varepsilon\mu\mathbf{E} \times \mathbf{u})/g \qquad (6)$$

5. 4D Transformations

The *transverse* fields, being artificially enlarged, call in question Maxwell's equations. Owing to their authority, the *longitudinal* and *temporal* axes must be inversely deformed (7). In the causal sequence, each former was tried to compensate by the next inconsistency! The cross products of the transverse fields (6) accord with the longitudinal speed u. Instead of the abstract kinematical speed c, suppressing into oblivion the negated vacuum *medium*, the two EM constants are here used: $c^2 = 1/\varepsilon\mu$. The main inconsistencies are imposed by the idealistic frame symmetry.

$$x' [=] (x - ut)/g \quad t' \{=\} (t - \varepsilon\mu ux)/g \qquad (7)$$

Not only that the relative time further depends on the *arbitrary* object position (x), but its dependence on the speed u cannot be supported by any reasonable physical argument. Moreover, time dependent on speed – as the ratio of length

and time – thus directly relates the three kinematical quantities into the *implausible* logical loop. Moreover, the cosmic age would be practically given in the *infinite* values, thus being *undetermined* and *senseless*. And finally, these consequences disable any *interpretation* of time, as may be its relation with the cosmic process [9].

Maxwell's differential equations were confirmed by EM waves already predicted by them. Thus obtained divine authority, expressed by the phrase '*And Got said*', is saved by presented accommodation of the relations (7). In the opposite sense, these transformations are supported by *invariance* of Maxwell's equations! Owing to the dynamic forces, SR is restricted to the inertial frames. However, the uniform rectilinear motion of these frames demands a preferential reference. Overlooking these details, the *invariant* form of all natural laws is loudly promoted by SR.

6. Einstein's Postulate

The classical speed transformation, $v' = v - u$, is substituted by an alluring more complex relativistic equation (8). Namely, the ratio of the two transformations (7) directly gives this fantastic speed transformation. Apart from the mutual motion of the two frames (u), here the symbols v and v' denote the speeds of an object observed in the two frames. Unlike the object speed, the mutual motion (u) appears invariant: only its signs are opposite in the two frames. As the boundary classical relation, an object resting in one, would move at this speed in the other frame.

$$v' = \frac{x'}{t'} \{=\} \frac{v-u}{1-\varepsilon\mu vu} \qquad (8)$$

Applied to the light propagation, this equality gives the known identity: $c' = c$. As the consequence of frame symmetry, this speed appears invariant, instead of the unique time. This fantastic conclusion, also promoted into postulate, cannot be confirmed by Michelson-Morley's result. Referred to Earth and its field, this result cannot be generalized to the other, more or less arbitrary, formal frames. The same invariance is directly disproved by Sagnac's effect, founded on discrimination of the *relative speed* of light, *variable* in the reference to the applied technical device.

7. Empirical Facts

Sagnac's effect, directly disproving the *invariance* of the *relative speed* of light, has never been related with SR. The circular propagation of light, along the perimeter of a rotating plane figure, may be a possible pretext for this overlook. Namely, SR was already restricted to 'inertial frames' and their rectilinear motion. However, for the same formal reason, it could not be applied to the orbital revolution in MM experiment. On the other hand, the newer similar experiments notice certain delay of the frame of light propagation, behind the orbital Earth's motion.

Though independent of the two transformations (7), the similar *mass function* ($m = m_o/g$) was also taken as the part of the relativistic basis. Alike this function – predicted empirically, the two transformations were tried to confirm. The life of a particle, dependent on its motion, was ascribed to the *relative time*. By similar formal logic, this fact may be ascribed to the *particle stability*, possibly dependent on its motion. Just as a rule, such particles arise and can exist only at the speeds near to speed c. A minimal speed loss usually results in the particle dissolution.

Moreover, an *absolute speed* of Earth has also not related with SR. The frequency of so-called *background radiation* depends on the observed direction. Its maximal value, from the direction of the Lion star constellation, points to certain Doppler's effect caused by unknown Earth's motion, about 20 times faster from the orbital one. Irrespective of the nature of this radiation, it emphasizes a wider reference of the Solar system motion relative to 'cosmic background' or something else. Although also unnoticed by MM experiment, this one absolute speed calls in question SR.

Some cosmological estimations as if point to the major amounts of the cosmic matter and energy inaccessible by possible physical observations. All attempts to localize these amounts in the galaxies or black holes already failed. There remains the idea of their even distribution at a supposed medium, throughout the cosmic space. This idea accords with the opinions of the classical EM theory, especially of its elaboration [1]. Therefore, the *relativistic symmetry* of the inertial reference frames, ignoring or explicitly denying the *vacuum medium*, must be refuted.

8. Summary

The *former* of two relativistic postulates and succeeding procedures implicate the invariant speed of light propagation in reference to *arbitrary* technical *device*, moving at a constant speed. The same frame in the *latter* postulate would make excessive one of them. On the other hand, light propagation referred to the medium is successfully applied to Doppler's effects [9], including the wall of light, thus confronting the two postulates. In the similar way, unlike the obvious starting transformations (2a,4a), the two additional ones (2b,4b) are unfounded at all.

In parallel with Maxwell's differential set, imposed empirically, the algebraic EM theory was culminated by the field transformations. Despite the convincing asymmetry of the differential equations, the artificial formal symmetries were persistently imposed onto the algebraic relations, even after these transformations. By the expected symmetry of electric and magnetic phenomena, free magnetic poles are understood, at least conditionally. The formal reconciliation of the results from the two approaches called in question the fundamental senses of space and time.

Instead of the reconciliation of the derived equations, the two formal approaches are related in advance, in their basic forms [1]. By clear interpretation of the magnetic field lines,

as the kinetic isohypses, magnetic monopoles are convincingly excluded [2]. The full affirmation of the algebraic, in parallel with the differential equations, clearly restricts and generally disproves the principle of relativity. These results deny the artificial transformations (7), thus keeping intact space and time, as the two natural categories, the ambient and reference of all natural events.

The resolution of spatial orientation, by the objective reference frames, is presented in [7]. Instead of the inconsistent generalization of MM result to all the 'inertial' frames, it can be generalized to all the other *celestial bodies* and their own gravitations. At least approximately, all physical processes concern predominant material surroundings. In the terrestrial frames, this is Earth and its motion. At an arbitrary cosmic location, this orientation concerns one or more nearby celestial bodies. Their different motions are taken into account by the fractional contributions [7].

Instead of the ideal *absolute* reference, special relativity advocated the more ideal equivalence of all *inertial* frames at least, with subjective orientation in the pairs of such frames. Exceeding these two idealistic antitheses, we offer the objective preferential orientation, according to the local physical situation. On the other hand, as the best temporal etalon amongst various physical processes, the universal cosmic expansion strictly determines the lapse of time. Starting by Big Bang, the *absolute time* is related with the *present* value of the Hubble's speed/distance ratio [9].

9. Scientific Wander

Einstein (E) had affirmed a sequence of genius ideas, thus deserving the status of the leading physicist of 20th century. These ideas are: the fourth dimension, curve space, photons of light and mass function with the famous relation: $w = mc^2$. Though each of them was initiated by another scientist, E firmly stayed behind them. However, all of them remain incomplete up to these days. Without clear vision of physical processes, E was satisfied by upgrading speculations, but personally contributing to their limitations. Let us briefly present some of such details.

The temporal axis is old on a par of the notions of space and time. Its relative sense, advocated by E, diminishes or calls in question this axis reality. Unable to confirm empirically any spatial curvature, Gauss missed its public presentation. Riemannian curve space would be senseless without any its substantial content. Even limited by the surrounding substance, a void lacks in any intrinsic form. The atoms of light were also predicted by Newton, but without convincing idea of their essence up to these days. Something as a wave packet has no example in the reality.

With reliance on Kaufman's empirical data, H. A. Lorentz formulated the mass function, $(m = m_o/g)$, but without any saved analytical derivation. By help of this function, E derived his famous relation, but the formal procedure clearly points to the accidental obtaining of this result by the random

calculations. Moreover, there are still not clearly determined the quantities related by this equation. The later prediction and alleged recent verification of Higgs bosons understand the fundamental sense of elementary mass, irrespective of its direct reduction to the energy [6].

Without the strict scientific criteria, E also introduced a sequence of untenable concepts such as the *equivalence* of various *reference frames* and *invariant forms* of all *natural laws*, usually founded on arbitrary symmetries. Owing to the obvious restriction by laws of mechanics, the equivalence is restricted to so-called inertial frames. However, a consistent determination of their uniform rectilinear motion demands a given *preferential* frame. Subjective observers, personalizing the reference frames, are excessive in an objective science of reality, as physics pretends to be.

The relative time is especially inconceivable and contradictory. The equivalence in the class of reference frames and respective observers follows into the known *twin paradox*, as the classical *reduction ad absurdum*. But this difficulty E covered by the phrase 'the equality in inequality' as the mere word play. In the aim of formal symmetries, E denied the vacuum medium as the 'classical fallacy', thus disabling any rational interpretation of EM waves. There are unknown any waves propagating through the empty space, without a medium more or less empirically evident.

Not only that the false E ideas are not called in question by the physicists, but nobody tries to elaborate, complete and interpret the valid ones. The time dependent on the object position in (7b) has not been even noticed let alone called in question. Alike the traditional religions, this modern one is founded on the inconceivable miracles. Each attempt of their explanation would be rejected as a sacrilege. The card tower would fall at any attempt of its reconstruction. Instead, the references mentioned below present a solid building founded on the elaborate classical bases.

10. Discussion

Reviewer: *The manuscript describes the philosophical aspects of Special Relativity*.

Author: If the meaning of *philosophy also includes the elementary logics and mathematics,* this assertion may be accepted. These two 'philosophical' aspects are used against the *ideological postulates, such as the equality of various references and invariance of natural laws*. Not only that each of these principles does not obey some concrete examples, but they are disproved in general.

With respect to the *heliocentric* frame – treating planetary orbits, and *geocentric* one – applied to the satellites, these two frames are not equivalent but hierarchical. The formal invariance is directly balked by the variable quantities, usually dependent on the kinematical states.

Though the light propagation in MM experiment was referred to the geocentric frame, it is nearly independent of the rotating device at Sagnac's effect. These two frames are not equivalent. Their objective difference in the referent

masses may be also included into philosophy.

Being dependent on their *interpretations, empirical facts* may be also included into philosophy. For instance, the life of a particle may be ascribed to its stability or relative time, each dependent on the motion. However, such particles arise and can exist only at the speed near to c.

The most philosophical attitude in this manuscript is the negation of any intrinsic form of a void and its partaking in physical processes, such as EM waves are. Not only that the opposite examples are not noticed in the former experience, but they also cannot be anyhow imagined. Their speculative assumptions are not founded at all. Moreover, they directly follow into the logical contradictions.

Reviewer: *The manuscript does not present mathematical proofs of the summary philosophical ideas*.

Author: The time dependent on the arbitrary object position (7b) is the mathematical fact unnoticed or ignored for a century. The inconsistent distribution of the set determinant between the direct and inverse transformation was an intentional mathematical error, just conditioned by the two ideological principles already above mentioned.

Reviewer: *The math description is not well presented.*

Author: In the aim to avoid the former delusions, these descriptions are arranged into a more logical and transparent order. However, they are strictly consistent, with exception of the relativistic arbitrariness, of course.

Reviewer: *The manuscript must be rewritten or can be sent to a philosophical journal*.

Author: With respect to the speculative physics, what can be expected from philosophy? If such a discipline still exists, it is dedicated to the ephemeral questions.

Reviewer: *The references are insufficient*.

Author: This is the original self-sufficient consideration, founded on the facts already well-known.

Reviewer: *Relevance 6, Originality 6, Significance 6, Soundness 6, and Clarity 6*.

Author: This is the worst assessment during my scientific carrier. There is the time to stop writing.

Reviewer: *Major Revision*.
Author: This discussion is sufficient.

11. Conclusions

The *special relativity* was initially conditioned by the incomplete EM theory. The gradual elaboration of this theory was also stimulated by the fantastic relativistic views referred to it. However, all the attempts to place SR on a solid scientific basis completely failed. It finally appears as the exaggerated speculation, based on the *apparent* empirical facts and *inconsistent* formal procedures. The unrestricted scientific courage was its single respectable characteristic. Without the needed critical distance, its followers took it much more seriously than its inventor himself.

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