Implications of the Incompatibility of the Lorentz Transformations with the First Postulate of Relativity

Vesselin C Noninski
New York Sofia Institute, New York, NY 10011

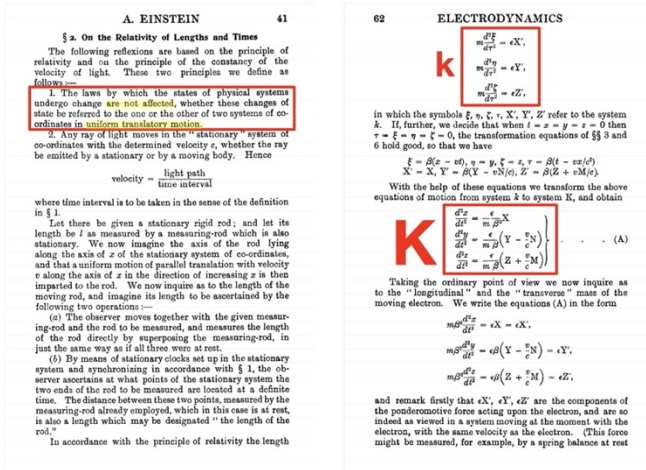
Abstract

This note identifies a significant flaw, specifically the incompatibility between Lorentz transformations and the first postulate of relativity, within Einstein's theory of relativity as detailed in his 1905 paper[1] and challenges the prevailing scientific consensus regarding the validity of the theory, calling for far-reaching consequences. The definitive nature of this critique reflects the evidence uncovered.

Since the inception of relativity in 1905, there have been attempts to criticize it, the most notable being that of Nordenson[2]. However, none of these critiques addressed the significant flaw that can be seen in the very pages of ref.[1] and that determines the ultimate fate of relativity. Detecting a flaw of this nature is a matter of discovery that, due to the nature of discovery, is overlooked by everyone else, leaving for the discoverer to detect it.

Main Findings

This critique focuses on a previously overlooked issue directly within Einstein's text, illustrated in Figure 1, where a critical problem is observed, related to honoring the principle of relativity as outlined in Einstein's 1905 paper[1]. The principle of relativity, which asserts that the laws of physics "referred to the one or the other of two systems of coordinates in uniform translatory motion" "are not affected" is presented in Section 2, page 41, of the referenced text[1].



A. EINSTEIN 41

§ 2. On the Relativity of Lengths and Times

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

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

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

$$\text{velocity} = \frac{\text{light path}}{\text{time interval}}$$

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

Let there be given a stationary rigid rod; and let its length be l as measured by a measuring-rod which is also stationary. We now imagine the axis of the rod lying along the axis of x of the stationary system of co-ordinates, and that a uniform motion of parallel translation with velocity v along the axis of x in the direction of increasing x is then imparted to the rod. We now inquire as to the length of the moving rod, and imagine its length to be ascertained by the following two operations:—

(a) The observer moves together with the given measuring-rod and the rod to be measured, and measures the length of the rod directly by superposing the measuring-rod, in just the same way as if all three were at rest.

(b) By means of stationary clocks set up in the stationary system and synchronizing in accordance with § 1, the observer ascertains at what points of the stationary system the two ends of the rod to be measured are located at a definite time. The distance between these two points, measured by the measuring-rod already employed, which in this case is at rest, is also a length which may be designated "the length of the rod."

In accordance with the principle of relativity the length

62 ELECTRODYNAMICS

k

$$m\frac{d^2\xi}{d\tau^2} = \epsilon X',$$
$$m\frac{d^2\eta}{d\tau^2} = \epsilon Y',$$
$$m\frac{d^2\zeta}{d\tau^2} = \epsilon Z',$$

in which the symbols $\xi, \eta, \zeta, \tau, X', Y', Z'$ refer to the system k. If, further, we decide that when $t = x = y = z = 0$ then $\tau = \xi = \eta = \zeta = 0$, the transformation equations of §§ 3 and 6 hold good, so that we have

$$\xi = \beta(x - vt),\ \eta = y,\ \zeta = z,\ \tau = \beta(t - vx/c^2)$$
$$X' = X,\ Y' = \beta(Y - vN/c),\ Z' = \beta(Z + vM/c).$$

With the help of these equations we transform the above equations of motion from system k to system K, and obtain

K

$$\left.\begin{aligned}\frac{d^2x}{dt^2} &= \frac{\epsilon}{m\beta^3}X\\ \frac{d^2y}{dt^2} &= \frac{\epsilon}{m\beta}\left(Y - \frac{v}{c}N\right)\\ \frac{d^2z}{dt^2} &= \frac{\epsilon}{m\beta}\left(Z + \frac{v}{c}M\right)\end{aligned}\right\} \quad . \quad . \quad . \quad (A)$$

Taking the ordinary point of view we now inquire as to the "longitudinal" and the "transverse" mass of the moving electron. We write the equations (A) in the form

$$m\beta^3\frac{d^2x}{dt^2} = \epsilon X = \epsilon X',$$
$$m\beta^2\frac{d^2y}{dt^2} = \epsilon\beta\left(Y - \frac{v}{c}N\right) = \epsilon Y',$$
$$m\beta^2\frac{d^2z}{dt^2} = \epsilon\beta\left(Z + \frac{v}{c}M\right) = \epsilon Z',$$

and remark firstly that $\epsilon X'$, $\epsilon Y'$, $\epsilon Z'$ are the components of the ponderomotive force acting upon the electron, and are so indeed as viewed in a system moving at the moment with the electron, with the same velocity as the electron. (This force might be measured, for example, by a spring balance at rest

Fig. 1. Pages 41 and 62 of Einstein's founding paper ref.[1]

However, a simple look at page 62 of ref.[1], shown in Fig. 1, reveals that, although the system of coordinates lower case k and the system of coordinates upper case K, are in uniform translatory motion, the equations referred to K contain velocity v, while the equations referred to k do not contain velocity v—the Lorentz transformations applied to the law of physics referred to k, in an effort to make that same law of physics refer to K, have clearly affected that law of physics. After the Lorentz transformations are applied, a different law of physics, a function of velocity v, referred to K, is obtained compared to the initial law of physics, the one referred to k, which is not a function of velocity v. Therefore, the observed difference is not only in the mathematical form of the two different laws, but is also a difference in the physical content of the two laws of physics. The production of two different laws of physics when referring a single law to K and k is forbidden by the foundational principle of relativity, which underlies the theory proposed in ref.[1].

Furthermore, any doubt that the absence of the velocity v in the formulae in k and the presence of the velocity v in the formulae in K, as seen in §10 of ref.[1], constitutes affecting a physical law, which is forbidden by the principle of relativity, vanishes when it is also observed that the formulae of the physical law referring to k contain the magnetic field components M and N, while the formulae of the

physical law referring to k do not contain the magnetic field components M and N.

Discussion

Implications of the observed incompatibility. This affecting of the law of physics by the Lorentz transformations, contrary to what the principle of relativity dictates—comprising an internal contradiction at the core of the theory put forward in ref.[1], and propagated in all its subsequent theories—is sufficient to unequivocally invalidate the entire theory of relativity and all its subsequent theories, to exclude the theory of relativity and its subsequent theories from further scientific consideration, and to not expect said theory of relativity to produce any experimentally verifiable conclusions whatsoever. Therefore, there is no need to consider at all any allegedly confirmatory experiments. There are no such experiments, and there cannot be any. Because logical consistency trumps experiment, and as shown, relativity theory is internally contradictory, it is rejected before any experiment is performed, not to mention that an internally contradictory theory cannot produce a testable result. Consequently, it must be made very clear that any experiment that purports to validate the theory of relativity must be rejected out of hand, with no expectation that there could ever be an experiment that would mitigate or eliminate the observed inconsistency and produce a result in harmony with reality. This conclusion also has a methodological implication, restoring the true meaning of the scientific method, by recognizing the primacy of logical consistency over often fallacious assumptions that empirical evidence plays a crucial role even when a theory suffers from internal contradictions. It may be that logical consistency over empirical evidence both are often considered together, but it is unclear what empirical evidence there is, concerning an internally contradictory theory that is incapable of producing any conclusion that would justify seeking evidence for it.

Implications for GPS. As an illustration of an experiment that is thought of as confirming relativity but, in fact, fails to do so, one may

mention the GPS satellites, which are used to supposedly confirm time-dilation due to supposed relativistic corrections of the clocks contained therein. But time-dilation cannot follow from relativity. As seen, relativity is internally contradictory as a result of the incompatibility discussed, so nothing can follow from relativity.

The GPS corrections of clocks are due to trivial reasons, such as, the finite speed of the signals with which the GPS satelites communicate, or some fortuitous coincidences of empirical formulae of engineering origin with the observations.

Time-Dilation Fallacy. Not to mention that time-dilation is impossible in principle, because it contradicts the absolutely true syllogism that follows from these two absolutely true premises:

a) Spatially coincident clocks are synchronous (acknowledged by Einstein himself in ref.[1], page 42, "We imagine further ...")

and

b) All stationary clocks are synchronous.

Therefore, a moving clock, by its very nature immersed in an infinite manifold of synchronous stationary clocks, is synchronous with all clocks in space, because the moving clock is inevitably spatially coincident; i.e., synchronous, with the underlying stationary clock at every moment. Time is absolute. This absolute truth unequivocally abolishes the idea, which some imagine to derive from the theory of relativity and its subsequent theories, that a clock in motion measures a different rate of time-change than a clock at rest. Consequently, it is impossible (it is contrary to the absolute truths of physics) for a clock in a GPS satellite to show a different time from the world synchronous time at any instant.

Accidentally, the above absolutely true syllogism can serve as an alternative way to show the Lorentz transformations wrong, along with directly observing that these transformations erroneously equate a constant to a variable.

Insistence on Experiment. Nevertheless, even in the face of the unequivocally demonstrable foundational internal contradiction

presented here, more than a few people still have a hard-wired belief, that in order to disprove the theory of relativity there must be experimental evidence for it. The fact that the theory of relativity, because of its exposed incompatibility, cannot produce conclusions that can be tested, and therefore, as said, all claims for experimental confirmation must be rejected in their entirety, these people still remain unfazed. Although claiming that the theory of relativity has been 100% confirmed is the same as claiming that one equals two has been 100% confirmed, which does not stand up to scrutiny, they still share the belief that while internal consistency is crucial, scientific theories often survive through empirical validation despite theoretical flaws. Such a position is unsustained and its advocates cannot give an example where such survival had ever occurred. It may be mentioned that giving quantum mechanics as an example of such survival is also unacceptable for reasons that are discussed elsewhere. It should also be remembered that such a position is unsustainable also because theories with internal contradictions at their basis cannot lead to any results at all, let alone to results that can be tested experimentally.

First Experiment Rejecting Relativity. To accommodate those seeking experiments to validate relativity, although there are none, an experiment comes to mind which does the opposite—it unequivocally rejects relativity. Thus, one can point to the first experimental overthrow of relativity by Michelson and Morley[3,4] whose results contradicted the second postulate of relativity. Without interrupting the main discussion, a hint to that effect may be in order. According to Michelson's theory[3] on which he based his experiment, in absence of ether, the outcome will be a null experiment in which no interference patterns are observed only by the observers at rest with the interferometer (at rest with system of coordinates k), where $c = const$ in all directions. In the absence of ether, for observers in the system of coordinates K, in which the interferometer k is moving, the speed of light is $c \neq const$. This is exactly what contradicts the second postulate in absence of ether. For observers in K, if the interferometer k moves, $c = const$ will be observed only in the presence of ether—

light would have emancipated itself from the light source and would have become an expression of the undulatory properties of the ether, unaffected by whether or not its light source moves. In the absence of ether; i.e., what Michelson and Morley found experimentally, $c \neq const$ in K, which contradicts the assumption of the second postulate that $c = const$ under all circumstances, regardless of whether the source of light is moving or not.

However, we do not need to go that far, because the theory of relativity invalidates itself due to the incompatibility discovered here, making further invalidating arguments superfluous.

Conclusion

The fact, discovered in this note, that the theory of relativity suffers from an insurmountable internal contradiction, makes the perception that the theory of relativity is one of the most tested theories in physics a myth.

This is an original critique, unrelated to any previous doubts about relativity. This critique presents a compelling case for a reevaluation of relativity, suggesting that its conclusions are final because they are based on a directly detectable and unequivocal discrepancy between formulae, a discrepancy that is forbidden by the foundational principle of the theory, leaving no room for future scrutiny or potential error in interpretation. Therefore, further investigation into this unequivocal inconsistency is not warranted if we honor the scientific method, which disapproves of further dwelling on a discovered internal contradiction in the hope that it will go away. Science is unapologetic when it encounters internal contradictions, and it is downright dismissive of such content, no matter what consensus has been reached. Not to mention that the scientific method does not aim for consensus, but for unequivocal truth that can be definitively stated, of which this study is a prime example. The theory of relativity and its subsequent theories must be removed from physics altogether, without replacement, and physics must return to classical physics, the physics without the theory of relativity. Thus, after this discovery, the scientific debate should be directed towards meticulous cleaning of

physics from remnants of relativity and engaged with furthering the studies of classical physics.

References

1. Einstein, A., On the electrodynamics of moving bodies. In *The Principle of Relativity*. 37-65 (Dover Publications, 1952). English translation of the original Einstein A. Zur Elektrodynamik bewegter Körper. *Ann. Phys*. **17**, 891-921 (1905).

2. Nordenson, H. *Relativity, time and reality: a critical investigation of the Einstein theory of relativity from a logical point of view*. (Allen and Unwin, 1969).

3. Michelson A. A. The relative motion of the Earth and the luminiferous ether. *Am. J. Sci.* **22**, 120-129 (1881).

4. Michelson, A. A. & Morley, E. W. On the relative motion of the Earth and the luminiferous ether. *Am. J. Sci.* **34**, 333-345 (1887).