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Why No Einstein's Laws?

By Harry H. Ricker III, email:kc3mx@yahoo.com

1.0 Introduction

This short paper addresses the title question which appeared in a recent letter to Physics Today, January 2007 (http://www.physicstoday.org/vol-60/iss-1/12_2.html). The main thrust of the letter from Richard W. Kadel is to suggest that the special theory of relativity, "after a century of validation," should be elevated from just a theory to the status of a "law". The letter demonstrates a failure of critical thinking, an ignorance of the problems posed by the special theory of relativity, and of the fundamentals of the scientific enterprise.

2.0 Discussion

2.1 Kadel's Einstein's Laws

Kadel's letter proposes that "we, as physicists, define a set of Einstein's laws, just as we have Newton's laws, Coulomb's law, or Faraday's law." The proposal states three Einstein's Laws as follows:
(1) The laws of physics are identical in all non-accelerating (that is, inertial) frames.
(2) The vacuum speed of light, c, is the same for all inertial frames.
(3) The total energy E of a body of mass m and momentum p is given by $E = [\sqrt{m^2c^4 + p^2c^2}]$. In particular, the energy of a body measured in its own rest frame is given by $E = mc^2$, and the energy of a massless body is $E = pc$.
"Collectively, these laws should, in my opinion, be called Einstein's laws of special relativity. Others may prefer slightly different wording, or more lawyerly definitions; with that I have no quibble. Time dilation, length contraction, and the relativity of simultaneity could be considered corollaries of these laws."

The present author certainly does prefer a different wording, and furthermore fails to understand why time dilation is not one of the laws, since it is the primary basis for the presumed validation of the special theory of relativity along with the third law given above. It is not clear why three Einstein's laws are proposed, when there are only two postulates associated with Einstein's theory. The third law is a puzzle. Why add it and not laws for time dilation, space contraction, and relativity of simultaneity as well?

The most obvious reason to reject Kadel's proposed Einstein's laws is that they are not consistent with the reasoning which he gives. He suggests that his Einstein's laws are of the same status as Newton's laws, Coulomb's law, or Faraday's law. Here there is a definite point of confusion. Newton's , Coulomb's and Faraday's laws are empirical. They derive from an entirely different scientific tradition than the proposed Einstein's laws. The empirical laws derive from the inductive scientific style advocated by Francis Bacon. The laws expressed are inductively derived from experiment, and state basically experimental facts in a form suitable for theoretical interpretation. They form the basis of the theory, which is inductively derived from the laws. Einstein's method is the exact reverse of this. His "laws" are postulates from which the theory is derived deductively. The lawfulness of the presumed postulates is obtained from an experimental validation of the deductions obtained from the postulates. In the case of the special theory, the empirical verification is the time dilation, length contraction, and mass variation demonstrations resulting from experiments.

Here there is encountered a basic problem. Only two of the fundamental empirical results have been experimentally verified. Length contraction and relativity of simultaneity have not been experimentally verified. However, Kadel proposes these as corollaries to Einstein's laws.

If we embrace the principle that laws of nature should be clearly stated empirical facts, then there should not be any Einstein's Laws, because Einstein performed no experimental validations of his postulates. Furthermore, the laws should probably be credited to others who really established their validity.

The reader should note that of Newton's laws, only the third law was actually discovered by Newton. The others were borrowed from previous workers. However, Newton did empirically verify his laws, and his third law was formulated by him based on magnetic experiments. Newton's accomplishment was to formulate his laws in the form of a consistent scientific theory. (See http://www.wbabin.net/science/ricker9.pdf)

The writer considers the main issue to be the status of the first two proposed Einstein's Laws, which are the famous postulates of the special theory. Since they are not empirically established facts, they should be rejected as laws of nature.

2.2 Criticism Of The First Two Einstein's Laws

Kadel's position is clearly that because the special theory of relativity has been experimentally validated, then its two fundamental postulates must be absolutely true and elevated to the status of laws of nature. The first of the proposed laws has the flaw that it it not a law of nature but a statement of what a law of nature should be. It is obvious that a natural law should be universally valid and independent of the special status of the reference frame. Hence this proposed law is not a law at all but a philosophical principle to be applied to the theory.

It is curious that this proposed law is not the familiar “principle of relativity”. But that principle, if formulated as a law, should be named Poincare’s law, in honor of the real founder of the relativity theory. The present writer thinks that this is a much more equitable proposal. The first Einstein law should be Poincare’s law of relativity, and not the one given by Kadel.

The second law is clearly Einstein’s, so there is no authorship dispute here. The main problem is that this law is certainly false. As stated the law is empirically unprovable in principle, and since there is no actual empirical proof, the law is unacceptable. The main problem is that there is no actual way to perform an experiment that measures the velocity of light in two different inertial frames. These frames are theoretical fictions that do not actually exist. All experiments are performed in non-inertial frames which are taken to be approximations to the fictious inertial frames. Essentially this second law is a theoretical hypothesis that gives a rational for the mathematical deduction of the Lorentz transformations, which are apparently validated by experiments. But there is no proof that this theoretical deduction and interpretation of the Lorentz transformations is correct. In fact there is a mountain of evidence that this deduction is faulty.

2.3 The Validity Of The Special Theory Of Relativity

The primary thesis of Kadel’s letter is the claim that the special theory of relativity should be elevated to a status above that of a theory. Kadel says “Some may ask what is the consequence of renaming a "theory" to a "law"; obviously Nature does not care. To my way of thinking a theory is speculation based on incomplete knowledge, and a law is valid in all cases where the appropriate circumstances apply. I believe that the special theory of relativity falls into the latter category equally with Newton's laws, Coulomb's law, or Faraday's law. If nothing else, this change would help us impress upon students and nonscientists (a) the importance of special relativity to our understanding of nature and (b) the multitude of advances in science made possible as a consequence of its formulation.”

Essentially Kadel’s proposal is polemical. His objective is to insulate the special theory of relativity from criticism and doubt by elevating its status as scientific truth. The proposed method is to adjust the language of the physics textbooks to elevate the theory to an unquestionable status above that of a “mere theory”. This is an absurd proposal, because there is no concept that a theory can be elevated to, that enhances its truth. All scientific knowledge is theoretical. Humans interpret the natural world through theories, and all theories are provisional truths, even if extensively verified.

This leads to the main issue. Why is it necessary to elevate the special theory of relativity to the status of a natural law? It seems unnecessary to the present author to do this. The physics establishment has certainly rebuffed all attempts at criticism of the theory. Although Dingle clearly proved that the theory was internally inconsistent over forty years ago, his proof has been ignored.

The present writer rejects the idea that the special theory has been proved correct. It has serious mathematical flaws and has failed to be conclusively proved by experiment. Consider the following contradiction. The theory claims that the speed of light is the same for all inertial frames. Hence we have $c=\Delta x/\Delta t$. according to the Lorentz transforms the transformations of space and time are: $\Delta x'=\beta^{-1}\Delta x$, and $\Delta t' =\beta\Delta t$. The first is the Lorentz contraction and the second is the time dilation. These give, according to the theory,
the velocity of light in the transformed reference frame as the result $c'= \beta^{-1}\Delta x/ \beta\Delta t =\beta^{-2}c$. This contradicts the second law so the predictions of the theory contradict the second law. Obviously the theory is false. This is merely one of many absurd results that can be obtained from the theory which Kadel wants to be established as absolute truth by elevating the "theory" to a "law" of nature.

3.0 Author's Concluding Remarks

The main objection I have to Richard Kadel's proposed Einstein's laws is that he is proposing to make unproven hypotheses into apparently proven laws of nature. One fatal flaw of the proposal is that it mixes up inductive and deductive scientific methods. Newton's method bases the theory upon empirical scientific facts, while Einstein's method deduces scientific facts from apparently validated hypotheses, despite the problem that the theory from which the scientific facts are derived has been demonstrated to be internally inconsistent and the claimed laws have not actually been verified by experiment. Since the theory is clearly false, it should not be elevated to the status of a law. Kadel's proposal is apparently motivated by a desire to insulate the theory from further criticism, a fact which demonstrates that the theory has not been firmly established on solid scientific grounds.

The author has written a number of papers which conclusively demonstrate that the conclusions of the special theory of relativity are false (See http://www.wbabin.net/physics/ricker2.pdf). They show the cause of the contradictions proven by Dingle over forty years ago. A different theory is proposed which is contradiction free. It does not have the internal contradictions that crop up in Einstein's special theory. However, in the contradiction free theory of relativity, Einstein's second postulate is not assumed to be valid as stated in the form given in Richard Kadel's letter. (See http://www.wbabin.net/physics/ricker3.pdf)