

THE ONLY SOLUTION IS THE REVISION OF CLASSICAL THEORY

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Einstein wrote: "The chief attraction of the theory lies in its logical completeness. "If a single one of the conclusions is proven wrong, it must be given up; to modify it without destroying the whole structure appears to be impossible.". Nevertheless, there have been Sagnac's experiment in particular and various other experiments that have proved the conclusions of SRT to be wrong. There have also been numerous logical flaws in the theory that have been uncovered over the years. Yet, contrary to Einstein's commandment 'thou shalt not cling to the theory if even one iota of it is contradicted', the adherents of the theory have not given it up. Just like Einstein himself completely ignored Sagnac's experiment, his followers too completely ignore whatever valid criticism leveled against the theory. Not only that, they at times even go to the extent of defending it in a hostile manner, as if their religious beliefs have been offended.

The question is, why does the mainstream science turn a blind eye to all criticism of SRT, and reject any alternative propositions? There appears to be a process of self-deception on the part of the mainstream scientists by way of considering whatever deviations demonstrated by experiment or in theory as 'exceptions' to an otherwise sound theory, as if driven by a psychological necessity to stubbornly cling on to their faith in the theory. In order to understand this psychological phenomenon, we need to reflect back and find out the reason why SRT came to be necessary at a certain stage of development of physics in the first place.

SRT was necessitated due to the fact that classical mechanics could not explain the three main phenomena, constancy of velocity of light in Michelson's experiment, change of displacement in fast moving particles as expressed by Lorentz transformation, and the mass increase of particles in motion. Michelson's experiment contradicted the classical principle of addition of velocities. Lorentz transformation contradicted the principle of relativity and pointed to the dependence of the motion of a body on the velocity of motion of its space of location. In addition to the contradiction of the above two explicitly stated principles of classical mechanics, mass increase contradicted an implicit principle which is embedded under Definition IV of Newton's *Principia* which states: "For a body maintains every new state it acquires, by *its* inertia only" (1. p.2). This means that a body responds to externally imparted momentum by a changing only its velocity while maintaining its mass to be constant. The mass increase that was evident in Kaufman's experiments of fast moving electrons, contradicted this implicit principle as well. Nonetheless, notwithstanding the fact that these blatant contradictions became evident, once these empirical truths were discovered, they had to be applied in practice to obtain accurate results, in violation of the foundational concepts of classical mechanics. It made a mockery of physics, for it claimed one thing in its creed but did quite the opposite in practice. The majestic emperor who ruled for 200 years with all pomp and pageantry lost all his clothes

The scientific community required a messianic deliverance from this demeaning situation as regards the schism between theory and practice. As a way of out, Poincare proposed two options. The first option was by careful scrutiny of the formative process of concepts and conventions of classical mechanics from the very beginning, to ascertain whether there have been deliberate or accidental simplifications and abstractions made of more complex situations, in order to fit exclusively the case of slow moving bodies and then amend these concepts and generalize the theory to encompass all cases. (If this were to be done on the basis of first principles of dynamics, then it would result in a theory of principle). The second option was to retain the existing conventions of classical mechanics which were developed exclusively for bodies in slower motion, and superimpose it with more conventions to cover the problematic phenomena. (This approach would result in a constructive theory – a smoke screen). What Poincare pointed out can be metaphorically stated as follows: ‘that re-clothing the emperor (i.e. revision of classical physics) will be an endless task, hence the thing to do is to cover the indecent exposure by providing a smoke screen’. And once these two paths were defined, Einstein hastened with the second option and beat Poincare to provision of this ‘smoke screen’. The stratagem he used was to adopt these problematic phenomena as axioms of the theory, instead of providing theoretical explanations for them in terms of first principle of dynamics.

The stratagem consisted of the following. Firstly in the application Newton’s second law, the force F to be amended to ΓF (where $\Gamma = 1/(1-v^2/c^2)^{1/2}$). Secondly, it is to be assumed that the principle of relativity remains valid, however the displacement undergone by a particle to be considered as $x' = (x - ut)/(1-u^2/c^2)^{1/2}$ instead of x , where $x = vt$. Thirdly, it is to be assumed that the principle of addition of velocities remains valid in the motion of light, however since the time unit changes in the same proportion as the displacement change, the velocity of light remains the same. Finally SRT and classical mechanics are deemed to be reconciled by the assertion that when the velocity v of motion of a body is small compared to c , x' becomes equal to x . By imposing the above elements of the theory as indisputable axioms, the theory is to be believed without further questioning, and therefore it is to be considered as ‘logically complete’.

By resorting to this stratagem, all what SRT has provided amounts to a license for the scientific community to use the mathematical expressions of above empirical truths without being agonized by doing something against their belief system, and thereby they are relieved of the feeling of guilt of being heretical. In fact, we know even those scientists who reject SRT, apply the same mathematical expressions of these empirical truths in the analysis of their experiments and they too get the same results as those who believe in SRT. Further, if we look back, the practice of application of the mathematical expressions of these empirical truths in utter disregard to the fact that they contradicted principles of classical mechanics began before the advent of SRT. Therefore, even if SRT was not formulated at all, they would have continued to apply these ‘heretically’ and obtain the same results as if a devout Christian were resorting to practicing voodoo out of desperation. Therefore, without the smokescreen provided by SRT, the ‘shameful nakedness’ of the ‘emperor’ would have continued and the heresy of physics would have persisted. SRT provides for an escapism out of this predicament feeling heretical. This

will explain that the reason why the mainstream science defends SRT so vehemently is that *in their opinion* it safeguards physics from falling into disrepute of utter inconsistency. SRT provides them with the necessary psychological comfort and peace of mind by believing that the ‘smoke screen’ is the new kind of clothing that the emperor wears.

We must recognize that the mainstream consists of intelligent individuals. Given the pseudo-epistemological function that the SRT affords for them, they will not abandon it, ‘just because’ there are ‘a few’ inconsistencies and contradictions within it, no matter how much we dissenters harp about them. For them to abandon SRT and accept a new alternative theory, that theory must be coherent and comprehensive and it must explain the phenomena (mass increase, Lorentz transformation, slowing down of internal processes etc..) not separately in isolation in an *ad hoc* manner, but as a concatenation, one in relation to another, and supported by experiments. The theory should not only cover a wider range of phenomena than it is done within the narrow confines of SRT; but it should also be applicable in general to slow as well as fast moving bodies. When the ‘emperor’ is adorned in such proper clothing, the mainstream will have no use of the ‘smoke screen’, and it will diffuse and fade away.

As already pointed out, given the fact that the above mentioned empirical truths contradict foundational principles of classical mechanics, Poincare pointed to two options. One is a complete revision of concepts of classical mechanics and to transcend the contradictions. In the best case scenario we would arrive at a theory of principle (like thermodynamics). The second is a patch up job or a makeshift solution, to keep the original concepts of classical mechanics that were contradicted intact, and to formulate additional conventions to patch over the holes that have appeared. As opposed to these two paths, when the dissenters try to hit back at SRT upholding the same classical concepts (principle of relativity, principle of addition of velocities, constancy of mass) that have been contradicted over and over by empirical truths, together with this or that proposition of their own, what they do amounts to trying to put the old ill-fitting clothes back on the ‘emperor’. They are in fact treading the same second path of sticking to the existing concepts as proposed by Poincare. All these amount to nothing more than makeshift solutions leading to formulation of constructive theories. In this sense the theories proposed by dissenters turn out to be distant relatives of SRT.

We the dissenters must understand that the crisis in physics began because empirical truths contradicted the fundamental tenets of classical mechanics. The resolution of this crisis will not come by merely criticizing and disproving SRT, but more importantly by analyzing why those empirical truths contradict principles of classical mechanics and revising these where necessary. In order to do this we must critically appraise the works of Galileo and Newton, in regard to the short sighted assumptions they might have made deliberately or accidentally in the process of formulation the foundational principles.

We must *temporarily* abandon the question “why SRT is wrong”. We must temporarily forget that SRT and its conceptual framework ever existed; and leap back to pre-1905 period, and resurrect the original question, “why do these new phenomena contradict

classical mechanics?”. In doing this we must so to speak turn our ‘guns’ on classical mechanics, ‘destroy’ its narrow and restrictive framework and from its own ruins rebuild an all encompassing and a flexible structure.

Newton right from the start knew what he was doing and the limitations of the theory he constructed and he made sure to forewarn the readers of *Principia* about it. The only problem is that nobody has cared to take any notice of it. In order to make certain that the reader will constantly bear in mind the fictitious and constructive nature of his theory Newton wrote at the end of the *very first paragraph* of the *first edition* of *Principia*: “I wish we could derive the rest of the phenomena of Nature by the same kind of reasoning from mechanical principles, for I am induced by many reasons to suspect that they may all depend upon *certain forces* by which *particles* of bodies (i.e., “corpuscles”), by some *causes hitherto unknown* are mutually impelled towards one another, and cohere in regular figures, or are repelled from one another. *These forces being unknown*, philosophers (i.e., corpuscularian philosophers like Democritus, Epicurus, Boyle, Hooke & c) have attempted the search of Nature in vain; but I hope the principles here laid down will afford some light either to this or *some truer method of philosophy*” (1, p. xviii).

Newton’s message in the above is the following. It appears that phenomena of Nature arise due to a certain *natural structure* formed by the interactions of certain ‘forces’ of the ‘least particles’ or ‘corpuscles’; which ‘forces’ I and other philosophers (i.e. corpuscularians) have desperately tried to fathom out, but have hitherto failed. Due to this reason, instead of exploring the *natural structure* itself by scaling it to get to its summit by way of physically treading on the inbuilt supports in the form of these intrinsic ‘forces’, I have been compelled to build an ‘*artificial scaffolding*’ (i.e. classical mechanics) besides the *natural structure* to get an idea of what it looks like from a distance. I hope this distant view obtained by means of climbing this ‘scaffolding’ will throw some light towards understanding of these intrinsic ‘forces’ or in the alternative it is hoped that it will ultimately lead to the conquering of the summit of the *natural structure itself*, by physically scaling it. (In other words, I would have preferred to formulate a theory of principles based on the interaction of physical variable directly but instead under the circumstances I have been forced to formulate a constructive theory with space and time substituting for actual physical variables). Newton made this declaration loud and clear in the preface to the first edition itself. But has *anyone* taken serious notice of this declaration about the fictitious basis of the premises upon which his system has been constructed and that Newton knew his theory was provisional and all he wanted was to *pave the way* for ‘*some truer method of philosophy*’?

Further in the *Queries*, Newton stated the general basis of the “truer method of philosophy”. He considered the trend of development of physics into different independent branches on concepts specific to each branch has little merit. It is not developing specific branches of physics separately and then unification of these, is not what he professed, but development of a *unified physics* on the basis of a few general principles right from the start. Newton wrote in his *Query 31*: “To tell us that every Species of Things is endow’d with an occult specifick Quality (of Gravity, and of magnetick and electrick Attractions, and of Fermentations) by which it acts and produces

manifest Effects, is to *tell us nothing*: But to derive two or three *general Principles of Motion* from Phenomena, and afterwards to tell us how the *Properties and Actions of all corporeal Things* follow from those manifest Principles would be *a very great step* in Philosophy (i.e. a revolution in physics), though the Causes of those Principles were not yet discover'd: And therefore I scruple not to propose the Principles of Motion above mention'd, they being of *very general Extent*, and leave their Causes to be found out". (2, p. 53). We must take serious note what Newton in effect calls for is a *unified theory* to explain all phenomena by deriving a few *general principles of action of energy*. So our primary and basic task must become the derivation of these general laws.

These ideas of Newton which indicated the necessity to break loose from the narrow confines of classical mechanics went unnoticed for nearly two hundred years. Then Maxwell confronted the 'paradoxes' of fast moving objects for the first time. Although Michelson's experiment was designed on the idea of use of interference fringes as proposed by Maxwell, he was no more by the time the experiment was actually performed. Therefore, he could not contribute to the next step towards the solution of the 'paradox'. Nevertheless he left his insights towards the solution of these 'paradoxes'. One, of these insights is: "In fact the *special work* which lies before the physical inquirer in the *present state of science* is the determination of the quantity of energy which *enters or leaves* the system from its standard state to any other state" (3, p. 74)

Maxwell further pointed out that although the concept of force works with 'heavenly bodies, electrified bodies and magnetized bodies' ... "The investigation of the mode in which the *minute particles* of bodies act on each other is rendered more difficult from the fact that both the bodies we consider and their distances are so small that we cannot perceive or measure them, and are therefore unable to observe their motions as we do those of planets or electrified or magnetized bodies" (3, p. 121-2). Hence he suggested the adaptation of the method used in molecular science (i.e. thermodynamics).

Maxwell wrote: "The success of this approach depends on the generality of the hypothesis we begin with. If our hypothesis is the *extremely general one* that the phenomena to be investigated depend on the *configuration and motion* of a material system, then if we are able to deduce any available results from such an hypothesis, we may safely apply them to the phenomena before us. If, on the other hand, we frame the hypothesis that the configuration, motion, or action of the material system is of a *certain definite kind*, and if the results of this hypothesis agree with the phenomena, then, unless we can prove that no other hypothesis would account for the phenomena, we must still admit the possibility of our hypothesis being the wrong one. It is therefore of greatest importance that we should be thoroughly acquainted with the *most general properties* of material systems, and it is for this reason that in this book I have rather dwelt on these general properties than entered on the more varied and interesting field of the special properties of particular forms of matter"(3, p.122).

There is also an important guideline Maxwell has provided: "... *all phenomena depend on variations of energy*" (3, p. 91). That is in our studies, any given phenomenon must be

considered as manifestation of a change of state of energy arising from a specific type of interaction.

So we see that between Newton and Maxwell, they have broadly outlined the path that the development of physics must follow.

Now let us consider certain problems involved in classical way of thinking. The primary problem is that it is assumed that according to Newton's second law, when a force is applied, the body *directly* acquires momentum in proportion to that force, and the velocity of the space of location will have no bearing on the velocity of the body. However, it needs to be pointed out that the notion that the actual quantity of energy that is involved in moving a body is the applied kinetic energy ($\frac{1}{2}Mv^2$ or $Mc^2[1/(1-v^2/c^2)^{1/2} - 1]$ as suggested by Newton's second law is erroneous. In practice this problem comes out into the open, and yet it has not been highlighted and confronted, but has been left untouched. Let energy of motion of the particle be $pc = E.v/c$ and kinetic energy $= E - E_0$, and it is found that $E.v/c > (E - E_0)$, where $E = Mc^2/(1-v^2/c^2)^{1/2}$ and $E_0 = Mc^2$. At the classical level it will be realized that $Mv = Mvc/c \neq \frac{1}{2}Mv^2/c$ and since $\frac{1}{2}Mv^2/c = Mv(\frac{1}{2}v/c)$, it means that $Mv \gg \frac{1}{2}Mv^2/c$. For example an object moving at velocity 100 km/hr, $\frac{1}{2}Mv^2/c = Mv \times 4.6 \times 10^{-8}$, that is applied momentum is 4.6×10^{-8} of momentum of motion. So the question that Maxwell raised in regard to "the quantity of energy which enters or leaves the system from its standard state to any other state" arises here..

In classical thinking there is a single interaction when the force is applied and the body's motion is considered a manifestation of its change of state of energy. There is only one interaction and there is only one change of state of energy. But if as Maxwell stated if "all phenomena depend on variations of energy", then the mass increase, Lorentz transformation of displacement, slowing down of internal processes etc., must arise from secondary interactions that lead to a series of subsidiary changes of states of energy. If we analyze why we do not grasp this fact, we find that it is the *principle of relativity* that creates the *mental block* even to think that such subsidiary changes of states of energy occur, and prompting in the alternative to look for 'kinematic reasons' by misinterpretations (or simplifications) of the basic dynamic concepts that underlay them. The most significant misinterpretations, misrepresentations and omissions are the following.

- a) Classical theorem of addition of velocities as the sole manifestation of addition of momentum.
- b) The Newtonian concept of inertia
- c) Bodies being considered as mass-points without extended structure
- d) Disregarding of the inertia of momentum of motion of a body
- e) Role of field energy in the motion of a body
- f) Galileo's principle of relativity denying the interaction with the space of location and other interaction
- g) Failure to recognise the differences in the laws of motion of fermions and those of bosons.

h) Separation of interactions into two separate branches of study – inertial motion and gravitation - based on motion (velocity) and location (position) of bodies.

We contend that in order to explain all the phenomena considered as ‘relativistic’ in special theory of relativity, (i.e, mass increase, Lorentz transformation, slowing down of internal processes of moving bodies etc.), the identification of the interaction of the physical variables that underlies the change of state of energy applicable to each case is sufficient. And the foundation laid down by Galileo and Newton could have been *expanded and extended* to cover these phenomena as well, if not for certain contradictions which have been self-imposed into the framework of classical mechanics at its inception. That is, ironically certain other petty conventions that the founders of classical mechanics subjectively created and accidentally imposed to simplify the mathematical representation of slower moving bodies, and to make their mechanics less complicated in the process of building their framework, (i.e. the liberal use of the Occam’s razor) have now turned out to fetter this natural extension of classical mechanics to cover the so called ‘relativistic phenomena’. For the most part, we find that Galileo has made certain bold speculations assuming them to conform to reality. And Newton has adopted them by convention even though *he knew* they do not strictly conform to reality. Through paying careful attention to certain passages that Newton has *embedded in his writings*, we can unravel these petty conventions and extend classical mechanics to cover the ‘relativistic’ phenomena. Study of Maxwell’s insights too will be invaluable towards the fulfillment of this project.

1. *Mathematical Principles of Natural Philosophy*: Isaac Newton, University of California Press, Berkeley.
2. *Opticks*: Isaac Newton, Dover Publications Inc. New York.
3. *Matter and Motion*: James Clerk Maxwell, Dover Publications Inc. New York.