Explanation Of Relativistic Phenomena by Revision of Classical Mechanics

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Abstract

At the time Michelson's experiment was first performed or even when SRT was formulated, the existence bosons and fermions had not yet been identified. Therefore SRT carries an inherent basic error of mixing up the 'relativistic phenomena' of fermions with those of bosons. (We define as 'relativistic' those phenomena that cannot be explained with the *prevailing* classical concepts). SRT has not recognized that the constancy of velocity of light arises from the nature of motion of bosons, and Lorentz transformation arises from that of fermions. Therefore it will become evident that the underlying reason for the doctrine of **spatio-temporal relatedness** in nature in SRT is the basic error of mixing up Lorentz transformation and constancy of the velocity of light under the same umbrella. Einstein has made his tangled web in such a manner, that even the dissenters can get trapped in it hopelessly unless a conscious approach is taken in regard to avoiding this basic error. The methodology proposed is to classify phenomena into three groups as arising from changes of states of energy a) of bosons, b) of fermions, and c) of boson-fermion interactions, and then to look for the common root causes for each of the groups.

Presently, while the mainstream is satisfied with Einstein's approach of considering a hodge-podge assortment of 'relativistic phenomena' piece meal, and attributing them separately to dynamic and kinematic reasons in an ad hoc manner, the dissenters also have failed to classify phenomena into different groups and to look for the common root causes for each of the discrete groups.

SECTION 1: MOTION OF FERMIONS.

1.1 The Relativistic Phenomena that are connected with the Motions of Fermions:

We shall therefore begin our search with the so-called 'relativistic phenomena' that are bound up with the motions of fermions, viz., 'mass increase', 'Lorentz transformation' (i.e. short falling of the displacement of a body), 'Clock retardation' (i.e., slowing down of internal processes of a body in motion) and show that they are all connected to one single root cause. (At the end of this paper we shall deal with the problem of the constancy of the velocity of light separately as a phenomenon related to the laws of motion of bosons).

1.2 From Where Does the Momentum of Motion Come From?

Let the kinetic energy required to set a particle in motion be E_K. From this we know that the momentum that is directly imparted to the particle is E_K/c. But as we show below, we find that the ***momentum of motion*** of the particle is p where $p >> E_K/c$. So the question arises how and from where does the particle acquire momentum p?

When the particle consisting of internal momentum $E_0/c = Mc$ (and of internal energy $E_0 = Mc^2$) is to be set in motion, a quantity of kinetic energy E_K adds to the internal energy E_0 of the particle and the total energy of the moving particle becomes $E = E_0 + E_K$. Whereas momentum mechanically applied to the particle is $E_K/c = Mc[1/(1- v^2/c^2)^{1/2}-1]$, momentum of motion of the body turns out to be p, given by the equation

$$p^2c^2 = E^2 - E_0^2$$

$$p^2 = (E - E_0)(E + E_0)/ c^2$$

$$p^2 = (E_K/c)(E + E_0)/c$$

$$p/(E_K/c) = (E + E_0)/pc$$

$$= E_0(\Gamma + 1)/pc$$

$$= Mc (\Gamma + 1)/\Gamma Mv \qquad [\text{since } E_0 = Mc^2 \text{ and } p = \Gamma Mv \text{ where } \Gamma = 1/(1- v^2/c^2)^{1/2}]$$

$$p = [c(\Gamma + 1)/\Gamma v] . E_K/c$$

Since $c(\Gamma + 1) >> \Gamma v$, it establishes that $p >> E_K/c$. This is *equivalent* to E_K/c getting ***amplified spontaneously*** by the factor $\Lambda = [c(\Gamma + 1)/\Gamma v]$ to attain the value p. For instance, for an object moving at 30 km/sec $\Lambda = 20{,}000$, and for an object moving at 100km/hr $\Lambda = 2.16 \times 10^7$.

The expression for kinetic energy in the range of velocities that classical mechanics apply, has been found empirically (by Thompson) as ½ Mv^2. This has not been rigorously derived. From the above relationship we can derive this expression as follows.

$$\Lambda = [c(\Gamma + 1)/\Gamma v] = p/(E_K/c).$$

When $v << c$, $\Gamma \to 1$, $(\Gamma + 1)/\Gamma \to 2$ and $p \to Mv$, therefore

$$E_K/c = Mv.\ v/2c = ½ (Mv).v/c$$

Hence, $p = Mv >> ½ Mv^2/c$.

It is evident that Newton has had an insight that Mv gets ***induced*** from a ***non-local*** source when the 'force' (½ Mv^2/c) is applied. Newton in his *Query 31 wrote*: "By this Instance it appears that Motion may be *got or lost* (note: in Newton's vocabulary 'motion' = momentum) …….Seeing therefore the variety of Motion which we find in the world is always decreasing, there is a necessity of conserving and **recruiting** it by **active Principles**, ***such as*** *are the cause of gravity* …… ….. For we meet ***very little Motion in the World***, besides what is owing to these Principles" (1, pp. 398-399). What Newton has said is that there is very little momentum that is produced locally ('world'), momentum is ‘recruited’ from ‘outside the world’ (i.e. non-locally) by ‘active principles’ in the same manner as in gravitation.

Accordingly, when E_K/c is applied***, it triggers** the **inducement** of momentum* of motion p of the particle ***non-locally***. We leave the question of *where* it is induced *from*, open. It may be said to come from the ‘aether’, the ‘universal field’, the ‘plenum’, the ‘neutrinos’ or whatever. Let us leave this debate for another day and just be satisfied that this momentum ***is induced*** from a ‘***non-local source***’. All we need to recognize is that in accordance with the circumstance confronted there is a flow of momentum from the system (local) to the outside of the system (non-local) or *vice-versa*.

1.3 Newton’s Provisional Theory and The Inadequacy of Newton’s Second Law.
The above indicates that the impressed force in Newton’s second law is not sufficient to generate motion, but that another ‘principle’ is necessary for this purpose. However, according to Newton there is the requirement of **yet another principle** (i.e. a third principle besides the recruitment of p non-locally) to achieve a new stable state of inertial motion when changing from the initial state that has been preserved by virtue of *vis inertia*: “The *vis inertiae* is a passive Principle by which Bodies persist in their Motion or Rest, receive Motion in *proportion* to the *Force* impressing it, and resist as much as they are resisted. By this Principle alone *there never could have been any Motion* in the World. *Some other Principle was necessary for putting Bodies into Motion;* ***and now they are in Motion, some other Principle is necessary for conserving the Motion***”(1, p. 397). So according to Newton, besides the impressed force, there needs to be **two** ‘some other principles’ involved in the change of state of a body from one inertial state to another.

Although Newton had stated these insights in the *Queries*, he was inhibited to speculate about them and incorporate them into the *Principia* due to his own policy of “*hypothesis non fingo*”. We find that not only that Newton is ‘guilty of sins’ of such omissions, but he is also guilty of sins of commission as we shall show below. It is these omissions and commissions together that he has made by the use of the Occam’s razor to shape his theory, that has later come to haunt us in the form of ‘relativistic phenomena’. In this context I need to re-iterate on a very salient point which I mentioned in my earlier article, by way of repeating it.

Newton right from the start knew what he was doing, and the limitations of the theory he constructed in the form of the *Principia.* Therefore 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*" (2, 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 interactions of ***physical variables*** **– inertia and velocity -** directly but instead under the circumstances I have been forced to formulate a constructive theory with space and time ***substituting for*** these 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*'?

1.4 Newton's Fictitious Premises:

Now let us discuss what these fictitious premises are, that Newton has introduced in order to build his system ('the scaffolding'). We must also make a note that the terminology used at Newton's time is somewhat different to what is in usage now. Even today what we refer to as a 'force' is rather vague, but in Newton's day it was vaguer. Newton did not use the term 'energy' at all, he used the term 'motion' for momentum, and the term 'force' was used broadly to mean energy, momentum, impulse etc. Therefore, we must read Newton's Definition III (2, p. 2), bearing in mind the word 'force' therein actually means internal momentum of a body which is the ***active component*** of 'internal energy' (or rest energy).

Def. III, *The* ***vis insita****, or the innate force of matter, is a power of resisting, by which everybody, as much as in it lies, continues in its present state……*

"This force (vis insita) is always proportional to the body whose ***force it is*** and differs nothing from the inactivity of the mass, *but* ***only*** *in our* ***manner of conceiving*** *it*. …. Upon which account, this *vis insita* may, by the most significant name, be called ***inertia***"(2, p. 2)**.**

The sum and substance of this statement is, that although a body consists of a 'force' composed of two parts - inertia and acceleration (say), Newton is alerting the reader to a misunderstanding inherent in '*our vulgar way of thinking*' because 'we' have got accustomed to equate this **force** in terms of only **one** of the **two parts** that constitute this **force**. That is, in terms of its inertia only. Also this issue has been further confused because the term 'force' itself was used at Newton's time 'promiscuously and indifferently, one for the other'; and it was not reserved to refer to what we mean by it today. It (i.e. the word 'force') then meant energy, momentum, impulse also; and we may also note that in Newton's vocabulary the words energy or momentum did not even exist. (Note also that the word they used for momentum was 'motion'. – see Def. II (2, p. 1). Therefore Newton has **alerted the reader to bear in mind of the ambiguity in the concept of inertia** considered as a pure and independent category in his system, and has left it at that (to be re-discovered by Einstein anew: 'The inert mass of a closed system is identical with its energy, thus eliminating mass as an ***independent*** concept'. – (3, p. 61). Also we now find this 'force' as referred by Newton in Def III, is not a force given by the product of mass and acceleration, but it is the internal momentum Mc of a body, which is the product of inertia and velocity. That is, inertia is not an independent, unitary, primary category, ***as it has been misconstrued in classical mechanics*** but a part of an inseparable binary entity: inertia x velocity – of which inertia is a derivative notion. Inertia (mass) on its own and velocity on its own cannot exist as separate entities, they are the two inseparable constituent components of momentum. It is because the velocity of internal momentum of all bodies is constant at c, and that this common factor (i.e. the velocity c), has been subconsciously omitted out of this binary entity, that classical physics *by* ***convention*** has come to recognise that the quantity of substance of a body is represented by its inertia or mass. Furthermore, it is of interest that out of all the philosophers of that era, it was only Huygens who could conceive that 'motion' i.e. momentum, can exist in a body without its velocity aspect manifesting itself in the *displacement* of that body. He wrote: "Most people suppose that true motion of a body consists in its being transferred from a certain fixed place in the universe. This is wrong…" (4, p. 125). This is the case with internal momentum of a body. (In today's terms we might say that a fermion consists of confined internal momentum).

In creating his system, Newton made a second fictitious premise: We must note that a body consists of internal momentum given by the product of the two entities inertia x velocity; and momentum that moves that body too is given by the product of the two entities inertia x velocity. Therefore, in the most general sense, as momentum, both are of the same kind. However, for simplicity ***Newton ignored the fact that momentum of motion too has inertia*** in his *Prinicipia*. (But not in *Query* 31 as we shall discuss below).

In *Principia*, Def IV Newton states: "*An impressed force is an action exerted upon a body, in order to change its state,……* (Newton continues) This force consists in the action only, and remains no longer in the body when the action is over. For a body maintains every new state it acquires, by ***its*** inertia only…." (2, p.2).

Newton's above statement notwithstanding, we know that when kinetic energy E_K is applied to a body (of internal energy E_0) it adds and gets assimilated into the internal energy of the body.:

$E_K + E_0 = \Gamma E_0$ [where $E_K = E_0\{1/(1-v^2/c^2)^{1/2} -1\}$, and $\Gamma = 1/(1-v^2/c^2)^{1/2}$]

However when $v^2/c^2 \rightarrow 0$, $\Gamma \rightarrow 1$, therefore,

$E_K + E_0 \rightarrow E_0$

This circumstance has afforded Newton to 'Occam' his way in formulating the second law. According to Newton's simplified version, the momentum imparted merely changes the state of motion of the body (i.e. passes only its velocity) but does not remain in the body and does not affect the inertia of the body. The inertia of the body remains invariant.

Further, we saw in the above, that when E_K/c is applied to a body, momentum of motion p appears ***non-locally*** where $p = [c(\Gamma + 1)/\Gamma v] . E_K/c$

Newton has skirted around this problem in the *Principia* and written the 2nd Law very cautiously: "The change of motion (i.e. momentum) is ***proportional*** to the motive force impressed" (p.13). By ***convention*** we have come to accept that the 'impressed force' (arising from E_K/c) directly transfers momentum p to the body. Momentum p too has inertia $p/c >> E_K/c^2$. However, it is only by **ignoring the effect of inertia** of momentum of motion that he could formulate the 2nd law of motion.

> Note: SRT has amended the 2nd law to take into account the effect of E_K/c^2, but not that of p/c. This is because p/c does not cause a mass increase, but as we shall show, it is p/c that causes the slowing down of the internal processes (clock retardation), and reduction of the displacement (Lorentz transformation).

1.5 Inertia of Momentum and the build up of a Cumulative Residual Resistance: However, this ***convention*** of ignoring the inertia of momentum of motion seems to have haunted Newton. Therefore, in *Query* 31 he has written: : "The *vis intertiae* is a passive Principle by which Bodies persist in their Motion or Rest, receive Motion in **proportion** to the **Force** impressing it, and resist as much as they are resisted. By this Principle alone **there never could have been any Motion** in the World. *Some other Principle was necessary for putting Bodies into Motion* and ***now they are in Motion some other Principle is necessary for conserving Motion*** "(2, p. 397)

In order to overcome inertia of a body, there has to be 'some other principle' providing a quantity of momentum p **in proportion to the force impressed** (which is the 2nd law). But then he says, provision of a quantity of momentum p as stipulated in second law alone is inadequate, there has to be ***yet another principle*** providing another quantity of momentum to keep the body in motion. And then he states, a very interesting thing: "For from various Compositions of the two Motions (i.e. the two quantities of momentum), 'tis ***very certain*** that there is ***not always the same quantity of Motion*** (i.e. momentum) in the World.". What Newton says here is that ***motion of a body can occur only in violation of the principle of conservation of momentum***.

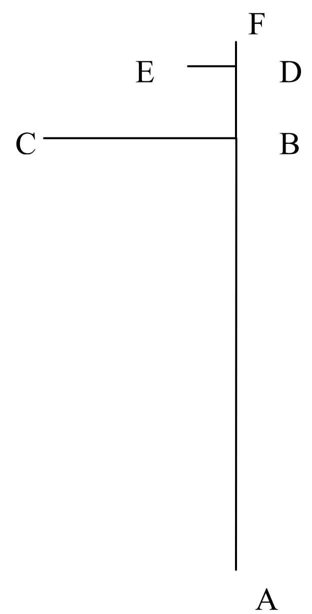

Fig. 1.

Reference the figure above, AB = Mc represents the internal momentum of the body. In order to overcome the inertia M of this internal momentum and move the body at a certain velocity v, it would need a quantity of momentum p = BC = Mv. However, BC too has inertia. Since the inertia of Mc is M (i.e., Mc/c), by the law of proportions the inertia of Mv is M(Mv/Mc) = Mv/c. Unless this inertia is overcome, the body cannot move. Therefore in order to overcome this inertia, it requires a quantity of momentum BD = Mv^2/c, and this momentum in turn has inertia Mv^2/c^2. The body cannot still move unless this inertia is overcome and the process goes on and on *ad infinitum*. AB requires BC, BC requires BD such that BC/AB = BD/BC, and then BD requires DE, and DE requires DF and so on such that BC/AB = BD/BC = DE/BD = DF/DE etc. That is there is a build up of a ***cumulative residual resistance***.

Since Newton could not fathom out how nature has solved this problem of the build up of the ***cumulative residual resistance***, he dare not bring this into the *Principia*. He has avoided the problem by pretending that this process did not exist and simplified the theory to consider it as if the ‘impressed force’ directly imparts the momentum p = Mv and the body moves happily with velocity v as indicated in Def. IV, without any resistance being encountered.

One of the chief reasons ***why classical mechanics can not explain relativistic phenomena*** is because it has been built on ***the pretence that momentum has no inertia***. And when there is no inertia, there is no build up of a cumulative residual resistance.

Upon taking a build up of a cumulative residual resistance into consideration, it would appear that the sum of the quantities of momenta, (required to move the body at velocity v) in the following infinite series is almost (but not quite) equal to the momentum q:

$\Sigma\, p(1 + v/c + v^2/c^2 + v^3/c^3 + \ldots\ldots\ldots\ldots + v^n/c^n + \ldots\ldots\ldots) \rightarrow q$

However, we discern that in nature’s computation, the sum of this series is not the above arithmetical sum but it is determined by the following geometrical theorem.

When the force is impressed, it ***triggers*** the ***induction*** of momentum Mv = ED non-locally. The tendency of the induced momentum M is to transport the internal momentum AD =Mc. However this momentum Mv itself has inertia Mv/c and this inertia acts as a constraint to the transportation of the body of momentum Mc. This new constraint has to be overcome for the body to move. In order to overcome it, a further quantity of momentum ED’ = (Mv/c)v is required. If this momentum were to be supplied then this quantity of momentum too has inertia $(Mv^2/c)/c$, and in order to overcome this newer constraint a further quantity of momentum E’D’ = $(Mv^2/c^2)v$ is required and so on.

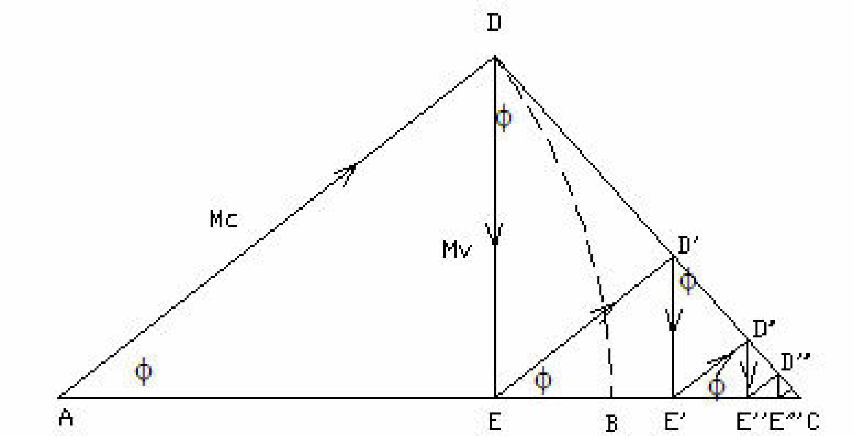

Fig 2

The sum of ED’ and E’D’ is EE’= Mv.sinϕcosϕ. If E’D’ were to be supplied then the inertia Mv^3/c^3 of that too adds to the system and in order to overcome this constraint, a quantity of momentum E’D” = Mv^4/c^3 becomes required. In this manner, in order to make the body move, v/cth fraction of a given quantity of momentum has to be supplied, but when this fraction is supplied, because this newly added momentum too has inertia to be overcome, a further v/cth fraction of this newly added momentum becomes necessary. Thus always there comes to be a residual effect of the inertia of added momentum acting as a constraint and the requirement of v/cth fraction of that momentum to be added to overcome its inertia in an endless series as shown in fig 2.

Considering the triangles ED’E’, E’D”E” and so on; ED’ + E’D’ = EE’, E’D’+ E”D” = E”E”’ and so on. Thus it will be clear that sum of the series of ‘added momenta’ has to be

EE’ + E”E”’ + ---- -> EC

EE’ = Mvsinϕcosϕ; E”E”’ = Mvsin^{3}ϕcosϕ and so on

Therefore we have the sum of EE’ + E”E”’ + ---- represented by the series as shown below.

EE’ + E”E”’ + ---- = $Mv\cos\phi(\sin\phi + \sin^3\phi + \sin^5\phi + \sin^7\phi + ----) \rightarrow Mv\tan\phi$

Hence EE’ + E”E”’ + ---- -> EC

This series has the form of a ‘Zeno paradox’ where it only tends to $Mv\tan\phi$ more and more, but can never attain that value, therefore the body will never be able to move by the progressive injections of momentum in this manner. How Nature solves this problem is by creating a device to inject $Mv.\tan\phi$ in one instance.

A matter that needs to be noted is that, in the above geometrical theorem, the internal momentum of the body comes to be represented by the line segment AD. It is on this main stay that the whole ***fractal structure*** of cumulative residual resistance is formed. However, in classical mechanics, since by Definition III, it divests the velocity aspect of internal momentum, and retains only the inertia aspect of it, the ‘***mass***’ of a body comes to be represented only by a ***geometrical point*** with ***no extended structure***. Therefore, in classical mechanics, what a body constitutes of (i.e. internal momentum) does not get represented by a line segment. This is a great draw back that is inherent in the classical structure (and also in the theory of relativity).

1.6 Theorem of Motion and the Concomitant Relativistic Phenomena

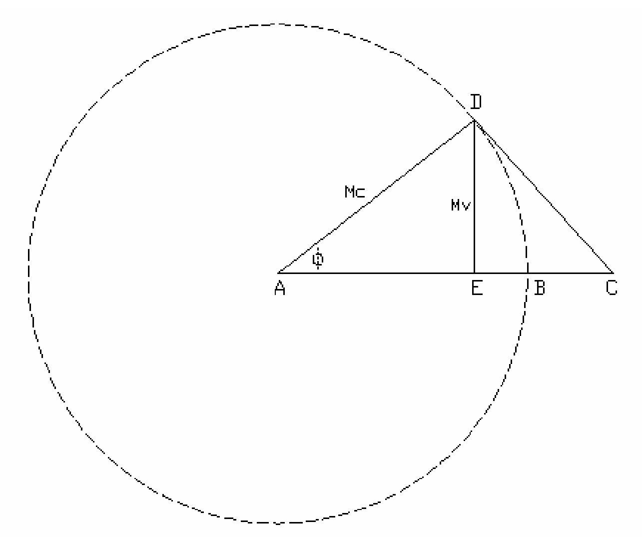

Fig 3

We chose to disregard Newton’s Definition III, and re-instate mass x velocity as the true constituent of a body. Then we have internal momentum of the body being represented by AB = Mc (= AD).

When kinetic momentum BC = $E_K/c = Mc(\sec\phi - 1)$ is locally applied the following series of phenomena occur concurrently:

a) BC = E_k/c gets assimilated into the internal momentum AB of the body, and the total internal momentum becomes AC. In order to explain how this assimilation occurs let us consider the more familiar case. :Classically, two quantities of momentum Mv and Mu add having the inertia M as the common factor, therefore it manifests as the principle of addition of velocities by the apparent 'disappearance' of M from the equation by virtue of it being on both sides of the equation Mv + Mu = M(v +u). The converse theorem operates in the case of application of $E_k/c = Mc(\sec\phi - 1)$ to set a body in motion.

$M(\sec\phi - 1) \times c + M c = [M(\sec\phi - 1) + M] \times c$

In this case c plays the role of the common factor and it 'disappears' from the equation, and hence, it ***manifests*** as the theorem of addition of inertia. Hence the notion of 'mass increase' when a body is set in motion

b) The addition of E_K/c ***triggers*** the ***inducement*** non-locally of the momentum BD' = Mv (BD' not shown in fig. 3) equal and parallel to ED = Mc sinϕ = Mv. But this brings along with it the *cumulative residual resistance* and the body is incapacitated of any movement until this resistance is overcome. In order to overcome this resistance, it requires momentum Mvtanϕ (as we showed in the previous theorem). Therefore, the BD' gets shifted to the position ED. And thereby it bifurcates the total internal momentum AC into two parts, AE = Mc.cosϕ and EC = Mv.tanϕ. And this fraction EC is sacrificed from the total internal momentum AC to *overcome the cumulative residual resistance*. It must be noted that in forming EC, it takes away the fraction EB from the *original* internal momentum AB. And consequently, momentum left for internal processes is AE = Mc.cosϕ. So we find that when a body is in motion at velocity v, ***internal processes slow down (or clocks retard)*** by the ratio 1: cosϕ, where $\cos\phi = (1 - v^2/c^2)^{1/2}$.

It must be noted that the *total momentum* of motion of the body is the sum of the *induced* momentum ED = Mv and the *empirically* obtained momentum EC = Mv.tanϕ which becomes equal to DC = Mv.secϕ $= Mv/(1-v^2/c^2)^{1/2}$. This is what appears in equations of motions of particles as momentum p.= $Mv/(1-v^2/c^2)^{1/2}$

It will be found that the relationships between the elements of ***line segments*** constituting the above theorem correspond to the various terms of already established and tested empirical equations of motion of particles. (Note: Ref. figure 3, AB = E_0/c, AC = E = $(E_0/c)\sec\phi$, DC = p = $(E_0/c)\tan\phi$

CB + AB = AC ⇒ $E_K/c + E_0/c = E/c$

$DC^2 = AC^2 - AD^2$ ⇒ $p^2 = E^2/c^2 - E_0^2/c^2$

DC = ACsinϕ ⇒ $p = E.v/c^2$

This perfect complementarity between empirically derived equations and the geometry of the theorem will confirm that we are dealing with the correct architectural framework of motion.

1.7 The Physical Basis of the Law of Inertia:
We can now understand the reason underlying the law of inertia. Ref. fig. 3, suppose, the internal momentum AB of a fermion, resolves itself into AE and ED in an attempt to spontaneously move by itself. (This can be done by emitting the fraction EB and by inducing ED). But ED invokes along with itself, the *cumulative residual resistance* EC. The emitted quantity of momentum EB ***is not sufficient*** to overcome EC. It is for this reason that "Every body continues in its state of rest, or of uniform motion …..". That is, a body on its own cannot induce momentum to change its state of motion. To overcome the cumulative residual resistance EB must be complemented by BC. That is unless acted on by BC externally, it continues to be in the same state of motion.

We need to draw an important corollary to the law of inertia. This corollary is analogous to the law of entropy, where any action or its opposite is always concurrent with an *increase* of entropy. (We also emphasize that the law of inertia and the corollary applies only to fermions and not to bosons).

1.8 Corollary to Law of Inertia – The Theorem of Momentum Enhancement:
In the case of fermions, every change of state of energy (manifesting in a change of velocity w) is concurrent with an ***increase in inertia*** by the factor $1/(1 - w^2/c^2)^{1/2}$.

Nature works by replication. It works by using the same algorithm over and over in different ways in different circumstances. Therefore, it must be noted that it is not only in the main interaction of setting a body in motion (as discussed above), that the above momentum boosting occurs. In the subsidiary interactions too this process occurs. This is very important for the understanding of how the "Lorentz transformation" occurs (which is a due to a subsidiary interaction which takes place concurrently with the main interaction). It is the use of the algorithm for momentum boosting that gives the DNA signature of $1/(1 - w^2/c^2)^{1/2}$ to various mathematical expressions of various phenomena.

1.9 The Physical Basis of the Lorentz Transformation:
Let us first consider the ***mental construct*** that has been used in classical mechanics giving it the title 'Galileo's principle of relativity'. We must first of all note that Galileo gave the ***physical reason*** that underlies such a notion, but did not enunciate this principle as such. Those who followed him have used this notion as a practical working tool and have forgotten the reason upon which the notion was based, which is the ***co-movement*** *of a body with its space of location*. We must also take into consideration that whole of mechanics they worked on, concerned bodies moving at velocities $v << c$, and the working tool performed perfectly well for this condition, and therefore they would have found it quite unnecessary to work out possibilities for other exotic cases which they would have thought would never come into practical use. Therefore leaving out the underlying cause, (i.e. the co-movement of a body with its space of location) they have formed an abstract principle by 'rule of thumb': "the motion of a body is not affected by the motion of its space of location".

According to Newton and Galileo the motion of a body consists of a ***dual motion*** in two spaces at the same time. The body moves not only relative to its immediate space of location, but it also moves *simultaneously* in the space in which its immediate space of location moves. This *dual motion* is the very basis of the Galilean principle of relativity: According to Galileo, a body in motion has also a **motion in common** with the space of its location. He expressed this in the following statement. "The cause of all these correspondences of effects is the fact that the **ship's motion is common** to all things contained in it" (5, p. 187). When a fly moves in a cabin of the ship, in addition to it moving relative the cabin, it also moves along with the cabin relative to the earth. Newton re-stated this notion of Galileo, as follows: "a body, which is moved from a place in motion, **partakes also of the motion of the place**"(2, p. 9).

Therefore, both Galileo and Newton recognized that when a body moves, it also ***co-moves with its space of location***. We must remember that Galileo has been credited for changing the question 'how a thing happens' to 'what happens'. Therefore, it appears that he was not concerned about how the common velocity is acquired by the body, but was satisfied to recognize that it happens. However, in order to co-move in this manner, there has to be a *co-movement* component of ***momentum***. Therefore, Newton being circumspect, has left the question of how a body ***acquires*** the co-movement component of momentum open. He has recognised that a body even at rest, partakes in the motion of its place. 'that if a place is moved, whatever is placed therein moves along with it'(2, p. 9). So if a body were at rest in a moving place, it will retain the co-movement component of momentum when it acquires momentum to move relative to the place. But if the body were moving and the place were at rest, and then when the place is made to move, the question arises from where will the body acquire the component of momentum necessary to co-move with the place. Newton left this question open. He wrote ***his version*** of the principle of relativity in terms of invariance of ***relative*** *velocities* of *bodies* moving in a ***given space***; and not the invariance of **the** velocity of *a body* relative to its space and it being ***independent*** of the velocity of the space of location.

Thus Newton in the Corollary V of *Principia* has formulated the 'principle of relativity' as: "The motions of bodies included in a ***given space*** are the same among themselves, whether that space is at rest or moves uniformly forwards in a right line without any circular motion" (2, p. 20).

So we must note that Newton's principle of relativity is ***quite different*** from what has been attributed as Galileo's principle of relativity. It must be noted that Newton's principle accommodates the possibility of the *motion of a body to be* ***affected by*** *the motion of its space of location* as follows.

Let two bodies A and B move at velocities V_A and V_B when the space is at rest. So the velocity of B relative to A is (V_A - V_B). Let the space move at velocity u. It could be that the co-movement components for A and B are acquired from the total momentum imparted to make the space to move. In that case, the total velocities of A and B become (V_A + u) and (V_B + u). So the velocities of A and B relative to the space remain V_A and V_B; and the relative velocity between the two (V_A – V_B). On the other hand, it may be that the co-movement components of momentum are formed by scaling off the original momentum of the two bodies. Then the velocities of the two bodies relative to the space become (V_A – u) and (V_B – u). Still the velocity of B relative to A remains to be

(V_A -V_B). The careful wording of the Corollary V by Newton indicates that he had suspected that there is a possibility that co-movement component of momentum might have to be generated by bifurcating the momentum of motion.

In the last case discussed, because initially the body was moving and the space was not, when the space moves, the momentum Mv bifurcates into M(v-u), which is momentum of motion relative to the space, and Mu, which is momentum of co-movement with the space. In the other case, where Newton has considered both the body and the space to be moving, he has left out its pre-history, where initially the space was moving and the body was at rest relative to it. In this, the body would already possess the co-movement component of momentum Mu (in accordance with Newton's premise, 'that if a place is moved, whatever is placed therein moves along with it'). Therefore upon setting the body in motion by imparting momentum M'v, (where $M'v = Mv/(1-v^2/c^2)^{1/2}$), if an ***assumption*** is made that this momentum would be fully employed for the motion of the body at velocity v relative to the space, it then amounts to 'Galileo's principle of relativity'.

But the crux of the matter is that this added momentum M'v is something apart from the body. (The body consists of internal momentum M'c). In the most general terms both M'c and M'v are quantities of momentum. Therefore just as much as momentum Mc (when the body is at rest) requires momentum Mu to co-move with the space at velocity u, ***by the law of proportions***, the momentum M'v requires momentum (M'v/M'c).M'u = (M'v/c).u, for co-movement with the same space of location at velocity u. Therefore what would be left for motion of the body relative to the space is M'(v/c)(c-u) and not M'v. This would give a displacement of x' = v/c(c-u)t = v/c(x –ut) and not x = vt.

A 'body' is an aggregation of ***fermions***. As such, the inertia of the body is the aggregate inertia of internal momentum of the fermions that constitute the body. And since fermions are subject to law of inertia, the body (i.e. the aggregate of fermions) can not move unless acted on by external momentum. But this external momentum is itself on the one hand ***fermion - like*** and it must overcome its inertia as a pre-requisite in order to co-move with the space of location; and on the other hand, it is ***not-fermion-like***, in that it does not need yet another quantity of *external momentum* to overcome its inertia but it parts with a ***fraction of itself*** to do this and form the co-movement component.

The overall motion of the system consists of the motion of the body and that of the external momentum. The system works in the following manner. a) The internal momentum of the body is activated to move relative to the space by external momentum. b) Since the body already possesses the co-movement component Mu, acquired from its rest position (and enhanced to M'u when in motion), this continues to activate the body to co-move with the space. c) While the external momentum M'v co-habits with the body and moves along with it, it also propels itself at velocity u by sacrificing a fraction of itself, in order to be in co-movement with the space.

What has been passed off in SRT as the "Galilean transformation" is a particular case of the equation that we derived (two paragraphs above) which is,

$x' = v/c(c-u)t = v/c(x - ut)$

The *particular* case SRT has considered to be ***universal*** (in the form of Galilean transformation) is the one applicable for fast moving particles *only*, where v -> c, then,

$x' = x - ut$

We take note that in classical mechanics it has been assumed, that the momentum necessary to set a body of mass M in motion at velocity v was Mv, but it has been found that this had to be $p = M'v = Mv/(1-v^2/c^2)^{1/2}$. This is in accordance with the corollary to the law of inertia (similar to the law of entropy increase) which we discussed above. That is in any given interaction involving a momentum change, it has to be necessarily concurrent with the boosting of the momentum by a factor Γ, related to the velocity of motion w (we use velocity w to represent the general case), given by $\Gamma = 1/(1-w^2/c^2)^{1/2}$. Hence the same process that happened when imparting momentum M'v initially to the body, happens over again, ***under the same algorithm***, when the change (bifurcation) of this momentum occurs for the *formation of the co-movement component* for motion at velocity u. For this interaction, the momentum boosting factor is $\Gamma_u = 1\ /(1-u^2/c^2)^{1/2}$. Therefore imparted momentum $p = M'v$ gets boosted to $p_1 = M'v/(1-u^2/c^2)^{1/2}$. Thereafter, by ***conjugate variation***, the mass reverts back to M' and the velocity becomes increased to $v/(1-u^2/c^2)^{1/2} = \Gamma_u v$. The momentum therefore is $p_1 = M'(\Gamma_u v)$. Then p_1 bifurcates into momentum of motion relative to the space $p_2 = M'.\Gamma_u v(1-u/c)$ and the co-movement component $p_3 = M'\Gamma_u v.u/c$.

Therefore the displacement *relative* to the space of location becomes,

$x'. = \Gamma_u (v/c)(c-u)t$ ----------------(1) (General equation valid for any velocity v)

For the special case where v -> c

$x' = \Gamma_u(x - ut)$ ------------------(2) ("Lorentz transformation").

This is why when Lorentz analyzing results of experiments of electrons moving at ***near light velocities*** stumbled upon the equation (2). This would establish that the root equation from which (2) derives its validity is (1). It is only in our theory that this connection is made for the first time, and (2) derived on the basis of physical principles.

1.10 The Achilles Heel of SRT.

SRT has adopted (2) as a ***postulate*** without subjecting it to analysis, being oblivious to the connection between equations (1) and (2). Therefore, SRT has an inbuilt **systemic error,** of understating the displacement by the amount $ut(1 - v/c)/(1-u^2/c^2)^{1/2}$. The establishment may say, "that's easy we will adapt equation (1) instead of (2) as the postulate for the co-ordinate". And that is the trap, they will finally fall into from which they can never get out. That's the *coup de grace*. That's where they get check-mated!!

This is because the central thesis of SRT is that the co-ordinate and time unit, change by the same factor $\Gamma_u(1\text{-}u/c)$ from x and t to x' and t', where,

$x' = \Gamma_u x(1\text{-}u/c)$ and $t' = \Gamma_u t(1\text{-}u/c)$ such that, $x/t = x'/t' = c$.

But when (1) is substituted for (2), ***what happens to the time unit?*** The time unit is then not only a function of the 'velocity u of the moving reference frame', but also ***a function of the velocity v of the moving object***. That is, every moving object will have its own time unit. The ***clock*** can no more be stationary relative to the laboratory frame, but it will have to ***co-move with the moving object*** at the same velocity!!!

So let us investigate. It must be noted that the equation (2) when it was first adopted into SRT, it was not an equation rigorously derived mathematically on the basis of physical principles. This equation was developed empirically by trial and error, by Lorentz to fit the results of fast moving electrons in Kaufman's experiments in early 1900's. And it is this empirically developed equation that has been *picked up arbitrarily and made into a postulate*, in the construction of SRT.

In SRT it is claimed that x = ct. But it has been left ambiguous, because under the circumstance v-> c, x which is equal to vt tends to ct and creates the illusion that x = ct.. However, in SRT because x = ct in (2), is considered *a priori* given, it implies that no matter whatever is the empirical velocity v of the particle, the displacement $x' = t(c - u)/(1\text{-}u^2/c^2)^{1/2}$ = a constant. **This is absurd**. This absurdity remains hidden for empirical velocities v -> c. Nevertheless, by virtue of the fact of (2) providing sufficiently accurate results for the condition v -> c, SRT has come to be acclaimed to be a 'very accurate theory' for particles moving at ***near light velocities***, little realising that the equation (2) ***pre-existed SRT***, and what in fact the latter results confirm is Lorentz' empirical finding to be 'true'. Even before SRT was developed, this equation was confirmed by results of experiments. Therefore, even if SRT was *not developed at all* and only Lorentz theory persisted, this equation would have stood the test of time (independently of SRT). This is because the equation is independent of SRT, although SRT has been formulated around it.

Although the equation (2) corresponds to results of particles moving at ***near light velocities***, if a larger range of velocities were to be covered, which would include particles moving at velocities somewhat less than c, then not withstanding the fact that by definition x = ct in SRT, the term x in (2) has to be substituted by the value vt, where v is determined in relation to the kinetic energy input given by $E_K = Mc^2[1/(1\text{-} v^2/c^2)^{1/2} - 1]$.

Here we would find establishment physicists claiming x = ct in theory but in practice we would find them to be determining the velocity v from the kinetic energy applied, and substituting vt for x in (2). When (2) is treated in this manner, it can provide results for a wider range of velocities But in this case also, its accuracy would decline as the velocity v becomes less and less than c. This is because no matter whatever the value of v, the ut term in (2) remains constant; and this leads to a ***systemic error***, with an error factor of

$ut(1 – v/c)/(1-u^2/c^2)^{1/2}$ causing the results to be less and less accurate as the empirical velocity v declines from being near to c.

Now consider for instance, a particle that is supposed to move at the velocity v = 0.6c upon input of kinetic energy E_K. Let $\Gamma_u = (1- u^2/c^2)^{-1/2}$. The equation (1) will predict x' = Γ_u 0.6(c- u)t. Equation (2) will predict x' = Γ_u(0.6c – u)t. For an experiment carried out on Earth where u = c x 10^{-4} (which is 30 km/sec) and v = 0.6c, equation (1) will give the result x' = 179.98199 mm in a nanosecond, whereas equation (2) will give the result x' = 179.9700009 mm in a nanosecond. This type of difference allows the possibility of the two equations being verified against empirical results. Considering a wider range of values for v, we have the following table demonstrating the widening trend of disparity of predicted results of the two equations as the value of v becomes less and less from c.

Velocity v	**x' according to (1)** **x' = Γ_u(c-u)t.(v/c)**	**x' according to (2)** **x' = Γ_u(v – u)t**	**Error% of x' of (2)** **[{(1) – (2)}/(1)]%**
.99c	296,970.3	296,970.003	.0001
.9c	269,973.0	269,970.001	.0011
.8c	239,976.0	239,970.001	.0025
.7c	209,979.0	209,970.001	.0043
.6c	179,982.0	179,970.001	.0067
.5c	149,985.0	149,970.001	.0100
.1c	29,997.0	29,970.000	.0900
.01c	2,999.7	2,970.000	.9901
.001c	299.97	270.000	9.9909

There are thousands of experiments, of particles moving at various velocities, that have been carried out during the past century. From the recorded data, the equation (2) of SRT and equation (1) of our theory can be checked out. For all velocities, our equation (1) will represent the empirical result without deviation whereas equation (2) of SRT will deviate as predicted in the last column of the table above. This will validate (1) as the correct equation representing the displacement. This in turn will validate our theory over SRT.

2.0 MOTION OF BOSONS:

The Constancy of the Velocity of Light:
The basic tenet on which the Special Theory of Relativity has been built, , see Art # 3 (6, pp 43 – 48) is that if x is the co-ordinate (presumably) representing the displacement of a ray of light in a unit of time t in the stationary co-ordinate system K, then in a co-ordinate system k moving at velocity u relative to K, the corresponding co-ordinate x' and time unit t' are given by,

$x' = (x - ut)/(1-u^2/c^2)^{1/2}$ ----------------------(2)

$t' = (t - ux/c^2)/(1 - u^2/c^2)^{1/2}$ -----------------(3),

so that velocity c of the light ray remains the same in both systems (p. 48). The essential idea underlying Einstein's theory is that both the co-ordinate and the time unit decrease in the system k, by the same ratio $(1-u/c)/(1 - u^2/c^2)^{1/2}$ so that when $x/t = c$,

$x'/t' = [x(1-u/c)/(1 - u^2/c^2)^{1/2}] \div [t(1-u/c)/(1 - u^2/c^2)^{1/2}]$ is also equal to c.

Therefore, what is central to the validity of SRT is the ***change of the time unit*** in k by the same ratio $(1-u/c)/(1 - u^2/c^2)^{1/2}$, compared to the time unit in K in consonance with the change of the displacement co-ordinates between the two systems.

We must ask the question why did Einstein make this proposition of the two systems of co-ordinates? This is because there were two empirical findings for which classical mechanics could not provide explanations. Firstly there was Michelson's experiment, which suggested that the velocity of light (motion of a ***photon***) remains independent of the velocity of motion of the earth. Secondly, there was equation (2) which was discerned by Lorentz upon empirical analysis of the data of Kaufman's experiments on fast moving ***electrons*** at near light velocities. Lorentz found out that the displacement is given by equation (2), when according to the contentions of classical mechanics it should have been $x \approx ct$.

At the time Einstein developed SRT, the sharp difference between the behaviours of fermions and bosons were not known. Or even this categorization of particles between fermions and bosons had not been made. Therefore, he was not in a position to take into consideration that *Michelson's experiment pertained to the behaviour of* ***bosons*** in regard to a state of change of energy of motion in relation to the motion of the space of its location, whereas *Kuafman's experiments and the resulting equation* (2) *pertained to the behaviour of* ***fermions*** in regard to state of change of energy in their motion in relation to the motion of the space of location.

As Pauli's Exclusion principle and Anti-exclusion principle indicate, the behaviours of fermions and bosons are antithetical, and as such, this antithesis suggests prohibition of the use of the behaviour of one type of particle to explain the behaviour of the other. The basis of this antithesis is the following.

a) A fermion requires an external quantity of momentum to change its state of motion, whereas a boson comes into being in motion and moves by its own momentum.

b) In the face of an external constraint, a fermion would tend to change the state of *energy of its motion* by changing its velocity while tending to keep its inertia constant, whereas a boson would tend to change its inertia in a certain pattern to a certain new value, and change its velocity by *conjugate variation* in relation to this new value of inertia (see below for this pattern).

c) The energy of motion of a fermion interacts with the energy of the space of its location in an entirely different manner to the way a boson interacts with the same. The end result of this interaction for a fermion is the ***scaling down of its velocity*** v of its energy of motion by the factor $(1-u/c)/(1 - u^2/c^2)^{1/2}$, where u is the velocity of the energy of the space of location (as we discussed in the derivation of equation 1).

In contrast, in the same interaction for a boson, the pattern is that it ***changes the inertia*** of its energy (i.e. energy of its self motion) by the factor $(1 + vu/c^2)$. The addition of momentum mu to the momentum mv of the boson, causes the inertia of momentum to increase from m to $m(1+vu/c^2)$. Hence it settles for a velocity w given by:

$w = (v + u)/(1 + vu/c^2)$.-----------------------(4)

When the boson concerned happens to be a photon, then the velocity v = c. Hence substituting this value in equation (4)

$w = (c + u)/(1 + cu/c^2) = c$ (***This is why the velocity of light turns out to be constant.***)

Because Einstein (without any further analysis), has blindly adopted the equation that Lorentz empirically derived by iterating the data of experiments for particles moving at near light velocities, he did not realise that there is the term v/c hidden in the general equation (1).

$x'. = \Gamma_u (v/c)(c-u)t$ ----------------(1) (General equation valid for any velocity v)

$x'. = \Gamma_u (c-u)t$ ----(2) (General equation reduces to 'Lorentz transformation when v -> c)

Therefore he did not know that (1) is the *root equation* from which (2) derives its validity. He has also blindly assumed that (2) is the general equation of motion for *all particles*. In doing this, he has made two errors. a) He has assumed that (2) is valid for the motion of all particles moving at all velocities when actually it applies only for near light velocities. b) He has assumed that (2) applies for both fermions and bosons when it applies only to fermions.

Let us imagine that the same apparatus from which the electron was released (and analysing which data Lorentz obtained the equation (2)), also emitted a photon at the same time. While being within the apparatus,. the ***pre-cursor*** of the photon too possesses a fraction of momentum mu to co-move with the ‘place’. So at the point of emission it has a total momentum of m(c +u). However, upon emission, the photon,

a) it no longer co-moves with the place.

b) unlike the electron, it does not acquire momentum of motion (non-locally), where this acquired momentum would have required to undergo the process to set apart a fraction of itself to ‘partake in the motion of the place’.

As we pointed out, a boson would tend to change its inertia in a certain pattern to a certain new value, and change its velocity by *conjugate variation* in relation to this new value of inertia. And, when equation (4) is considered for the *particular case of a photon* moving at velocity c, it tends to retain its *velocity constant* and manifest any change of state of momentum in its inertia. Hence, the total momentum the photon has, upon emission is subjected to conjugate variation of inertia and velocity. From out of the total momentum m.(c+u), it changes its inertia from m to m(c + u)/c so that it can change the velocity .(c +u) back to c..

Einstein did not realise that the constancy of velocity of light occurs by this simple process of ***conjugate variation of the intensive and extensive components*** (as it happens in Boyle’s law). {Intensive components: pressure, temperature, velocity; Extensive components: Volume, entropy, mass, charge).

a) He did not see, that the ‘rule connection of co-ordinates’ in classical physics (which is based on the rule of addition of velocities) is true only for fermions (and for bodies made up of aggregates of fermions).

b) He did not see that in the motion of fermions, they also have to co-move with the place; and for this, a fraction M’v.u/c of the momentum of motion M’v has to be sacrificed, (Note:This is only a hypothetical case where the theorem of momentum boosting for motion at velocity u has not been taken into consideration)

c) He did not see, that it is the above sacrifice of a fraction of momentum that manifests as the term ut in what he called the ‘Galilean transformation’ x’= x –ut (in the hypothetical case.

d) He did not see that instead of the ‘Galilean transformation’, in the actual case, it turns out to be the Lorentz transformation in the empirical situation, because even in the *initiation* of this *co-movement with the place* at velocity u too, (as a consequence of the corollary to the law of inertia which is the theorem of momentum boosting applies) it has to be preceded by *boosting up* of the momentum by the factor $1/(1- u^2/c^2)^{1/2}$.

e) He did not see that the ***general equations*** are x’ = x – ut.v/c (for the hypothetical case) and $x' = (x-ut.v/c)/(1- u^2/c^2)^{1/2}$ (for the empirical case) which are valid for all velocities, and that these general equations respectively turn into the so-called Galilean and Lorentz transformations at near light velocities when v/c -> 1.

f) He did not see that Lorentz transformation is a consequence of momentum of motion of a particle having to 'partake in the motion of the place', and hence laws of physics applicable to fermions are very much *dependent* on the velocity of *the* inertial system *physically relative* to which the motion of the particle occurs.

g) He did not see that in the case of motion of light, since it does not 'partake in the motion of the place', ***Lorentz transformation has nothing to do with it (the motion of light)***.

h) He did not see that it is only to fermions that the law of inertia and its corollary of momentum boosting apply and for bosons they did not apply. (His way of saying that bosons were exempt of the law of inertia and its corollary was to declare that they were 'massless').

Since Einstein did not realize the above mentioned facts, he confused and mixed up motion of light with Lorentz transformation and he wrote the mantra: "According to the rules of connection, used in classical physics, of spatial co-ordinates and of the time of events in the transition from one inertial system to another, the two **assumptions** of (1) the constancy of the light velocity. (2) the independence of the laws of the choice of the inertial system (principle of special relativity), are mutually incompatible. ….. The insight which is fundamental for special theory of relativity is this: The **assumptions** (1) and (2) are compatible **if** relations of a new type ('Lorentz transformation') are **postulated** for the **conversion of** co-ordinates and the **time.**"(3, p. 55).

It is not the 'Lorentz transformation' that applies for the motion of bosons, but it is what Einstein has 'derived' kinematically as 'Composition of velocities' under article # 5 in his first paper (6, p. 50) that applies to these. Because of the kinematic approach he has taken to 'derive' this latter, he has not realised what actually happens is a *conjugate variation of inertia and velocity*. As we show below, when the two quantities of momentum mv and mu combine, if the inertia were to remain constant, then the resultant would become m(u + v), but immediately thereafter, there occurs a conjugate variation of inertia and velocity. Inertia becomes $m(1 + uv/c^2)$ and the velocity becomes w. Hence,

$$m(1 + uv/c^2)\, w = m(u + v)$$

Since m is found on both sides of the equation it becomes a hidden parameter. Hence, the above equation acquires the appearance:

$$w = (u + v)/(1 + uv/c^2)$$

and creates the illusion that it is arising from a kinematic relationship, though this velocity w is determined dynamically.

In the case of a photon, the velocity v = c. Hence substituting c for v in the above equation, we get

$w = [(u + c)/ c(c +u)].c^2 = c.$

Now let us explain how the inertia of a boson acquires the value $m(1 +uv/c^2)$.

Let a boson acquire a momentum of motion mv on emission, which will enable it move potentially at velocity v. At the point of emission, its ***precursor*** also possessed momentum mu to enable it to 'co-move with the place'. This quantity of momentum *remains attached* to the boson even upon emission, but its function becomes *redundant* as the boson does not 'co-move with the place'. The boson comes to consist of a *composite of the two quantities of momentum* mv and mu, which must merge into one quantum. For this purpose these two quantities of momentum come to act ***as if***, one is the 'place' of the other. That is the quantum mv considers the quantum mu to be its 'place' and *vice-versa*. So they mutually have to set apart a fraction of itself for the co-movement with the other. Thus mv *wants* to utilize the fraction of momentum (mv/c).u from out of itself for co-movement with mu, and mu *wants* to utilize the fraction (mu/c).v from out of itself to co-move with mv. (Note that the theorem of momentum boosting does not apply for bosons, because the law of inertia does not apply to these. Therefore, a change of momentum does not have to be preceded by a boost of the momentum by the factor Γ). The *inertia* of each of these '*wanting*' co-movement components come to be $(mvu)/c^2$. When what is 'wanting', is not fulfilled, it turns into an *impedance*. Hence the inertia m of each quantity of momentum mv and mu gets increased by the fraction $\alpha = vu/c^2$ so that its total inertia adjusts to $m(1 + \alpha) = m(1 + uv/c^2)$. Hence when the inertia increase has occurred, they conjugately vary their inertia velocities such that $mu = m(1 + \alpha).u'$ and $mv = m(1 + \alpha)v'$.

Hence,

$mu + mv = m(1 + \alpha)(u' +v').$

Let $w = v' +u'$.

Then $w = (u+ v)/(1+ \alpha) = (u + v)/ (1 + vu/c^2)$ ------------------(4)

This is the general equation of motion for bosons. It will be clear that this equation has nothing to do with the Lorentz transformation, which is the equation of motion for fermions under the limiting condition v/c -> 1. However, Einstein did not realize that there exists a distinction between the two types of particles requiring two different equations of motion. He instead considered (4) as the equation that will provide the resultant velocity w to be substituted, when a result x' obtained with respect to a frame k moving at velocity u as in equation (2), is to be transformed to one relative to a frame k' which is in motion along the X-axis at velocity v relative to frame k (If this statement is too condensed and is not clear, see 4, p. 51).

Accordingly, it is claimed that

$x' = (x-ut)/(1-u^2/c^2)^{1/2}$ ----------------(2) becomes

$x'' = (x - wt)/(1-w^2/c^2)^{1/2}$ ------------(5)

However, there being no experiment that we can perform practically to verify equation (5), it will remain an *empty proposition* of Einstein.

On the other hand the fact that equation (4) applied to motion of bosons will be confirmed by their Doppler shifts in proportion to change of inertia by the factor $(1 + \alpha)$ where $\alpha = uv/c^2$).

For instance for the motion of a photon v = c. Then the factor $(1 + \alpha)$ becomes (c + u)/c. Consider the Doppler shift that occurs due to the relative motion between the source and the observer, of velocity u.

The frequency of a wave is related to the inertia of its momentum by the relationship that any change in inertia by a fraction α causes a change of the frequency by a fraction $1/(1- \alpha)$. That is when the inertia m changes from m to $m(1 +/- \alpha)$ the frequency n changes in converse/inverse fashion from n to $n/(1 -/+ \alpha)$.

Hence when inertia of a photon increases from m to m(1+ u/c), the frequency changes from n to n/(1 –u/c).

Since the wavelength λ = velocity/frequency

The wave length changes from λ_0 to $\lambda' = c/[n/(1-u/c)]$

$= (c/n).(c -u)/c = \lambda_0 (c - u)/c$

So we have the relationship, when the inertia of momentum of a wave changes from m to m $(1 + \alpha)$ the wave length changes from λ_0 to $\lambda_0(1-\alpha)$.

Firstly, by checking for Doppler shifts of other types of bosons and verifying that the wavelengths change by the fraction $- \alpha = - vu/c^2$, (which is the same term in the denominator of the right hand side of equation (4) but in opposite sign), it will confirm our contention of the relationship between the inertia change of a boson wave and that of its wavelength. Secondly, checking of the Doppler shifts of a light beam at the free-end of the arm of Michelson's apparatus will verify that there occurs wavelength changes in different directions; and by correlating these changes to the inertia change of the momentum of the beam in these different directions by the above relationship, it will confirm that the constancy of the velocity of light is maintained by the mechanism of ***conjugate variation of inertia and velocity***, and not by change of time unit as it is claimed in SRT.

It must be noted that our explanation of the constancy of the velocity of light is entirely different from Einstein's. In SRT constancy of the velocity of light and the Doppler change in the wavelength are disjointed. In SRT constancy of the velocity of light is not explained, instead it is ***postulated*** as to be occurring in conformity to Lorentz transformation (3, p.57), and the Doppler shift is kinematically explained separately (4, p. 55). In our theory, Doppler change of wave length is a direct consequence of the ***conjugate variation*** between inertia and velocity to maintain the velocity to be constant, and a blue or a red shift manifests in direct proportion to the increase or decrease in inertia. Hence they are both dynamically explained in their interconnection. The corroboration of the explanation of one phenomenon (Doppler shift) with that of the other (constancy of the velocity of light) confirms the veracity of our theory as against SRT.

This prediction of ours in regard to the relationship between the ***conjugate variation*** of inertia from m to $m(1 + uv/c^2)$ and velocity from v to w upon assimilation of the co-movement component of momentum mu which a boson possessed in the *precursor phase*, in order to move independent of the motion of the 'place' on the one hand, and on the other hand, the correlation between the inertia change and the Doppler shift will be further confirmed by checking on the Doppler shifts of bosons.

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