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The Mystery of the Lorentz Transform: A Reconstruction and Its Implications for Einstein's Theories of Relativity and cosmology.

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ABSTRACT

The Lorentz Transformation (LT) is an arbitrary and poorly conceived mathematical tool designed to make Maxwell's electromagnetism conform to Galilean relativity, which formed the basis of classical mechanics and physics. A strange combination of this transform with an axiomatic assumption by Albert Einstein that the velocity of light c is an absolute and universal constant has led to an idealist, geometrical and phenomenological view of the universe, that is at variance with objective reality. This conundrum that has lasted for more than hundred years has led to rampant mysticism and has impaired the development of positive knowledge of the universe. The present reconstruction of LT shows that the gamma term, which fueled mysticism in physics and cosmology is, on the contrary, a natural outcome of the subjective geometrical rendition of the speed of light and the idealist unification of abstract space and time into a 4D "spacetime" manifold; by Minkowski and Einstein. Only a materialist dialectical perspective of space and time can rid physics of all mysticism arising out of LT; from the quantum to the cosmic.

Indexing terms/Keywords

Lorentz Transformations, Special Relativity, General Relativity, Electromagnetism

Academic Discipline And Sub-Disciplines

Theoretical Physics, Astrophysics, Dialectical Philosophy.

SUBJECT CLASSIFICATION

Physics, Cosmology, Philosophy

TYPE (METHOD/APPROACH)

Provide examples of relevant research types, methods, and approaches for this field: E.g., Historical Inquiry; Quasi-Experimental; Literary Analysis; Survey/Interview

Theoretical, Mathematical, Dialectical

The Lorentz Transformation:

The idea of Lorentz Transform arose after Oliver Heavyside [1] in 1889 showed from a consideration of Maxwell's equations that the spherical electric field surrounding a point charge would not retain the spherical symmetry, once the charge is in motion in a Galilean co-ordinate system. It was strongly believed since Maxwell that light (electromagnetic radiation (EMR)) travels at constant velocity through a fixed and inflexible medium known as aether. This would indicate that the velocity of light would not be a constant on a moving body like the earth, moving through the aether medium. But the famous Michelson Morley (M-M) experiment in 1887 showed that the velocity of light both in the direction of the earth's motion and in the opposite direction of the moving earth was the same. This puzzling result was explained later by John Francis FitzGerald in a published conjecture that bodies in motion are being contracted to give the null result of M-M experiment.



Hendrik Lorentz independently presented the same idea of length contraction 1892, which was subsequently known as FitzGerald-Lorentz contraction hypothesis. Their explanation was widely known before 1905 [2]. Lorentz along with J. Larmor also looked for the transformation under which Maxwell's equations are invariant, when transformed from the aether to a moving frame. They found out that the time coordinate has to be modified as well, to local time. Henri Poincaré gave a physical interpretation to local time as the consequence of clock synchronization, under the assumption that the speed of light is constant in moving frames. In 1905, Albert Einstein [3] published what is now called special relativity (SR), by deriving the Lorentz Transformation (LT) under the assumptions of the principle of relativity and the constancy of the speed of light in all inertial frames, and by abandoning the medium aether as unnecessary. But SR led to many unphysical inferences. The final form of the Lorentz transform agreed upon is shown below:

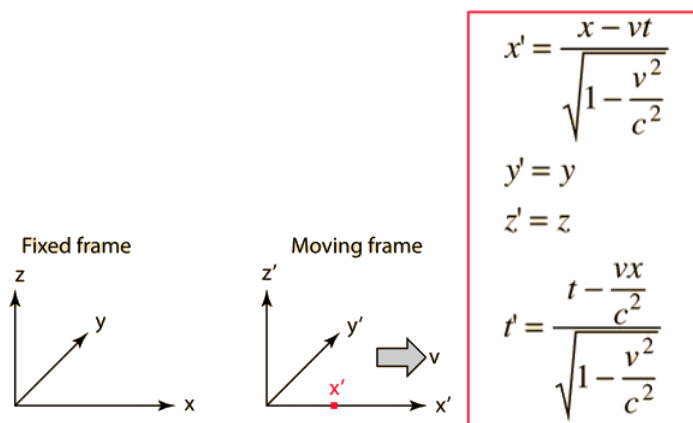


Fig.1

Fig. 2

The primed frame moves with velocity v in the x direction with respect to the fixed reference frame (x,y,z). The reference frames coincide at $t=t'=0$.

After Isaac Newton, Another Epoch-Making Wrong Turn in the History of Physics and Cosmology:

The historic and what was considered a disappointing null result of Michelson Morley (M-M) experiment in 1887; indicated that Maxwell's electromagnetism is not compatible to Galileo's co-ordinate transformation and also the velocity of light from the moving bodies in relative inertial reference frames are not additive as required by the Galileo's transformation. This lone and yet unsubstantiated experimental result, in a strange way led most physicists of the time to come to the firm conclusion that the speed of EMR is an absolute constant c - an inviolable objective truth that physics has to contend with. This rather ordinary but which turned out to be a fateful experimental result, became the most challenging problem of the time; as physicists tried to find a way to make Maxwell's theory compatible with Galileo's relativity, which itself was supposed to be an absolute truth of reality. This conundrum led to utter confusion, arbitrary formulations of theories, wild postulates, mathematical "jugglery" (as G.W.F. Hegel would term it) etc., in theoretical physics; turning it into a branch of metaphysics - a vulgarization of physics, which continues till today! It should be noted here that the pre-occupation with LT and SR was one way for official physics to escape from yet another unfathomable conundrum brought on by the discovery of the quantum phenomenon at the turn of the 20th century.

But the question remains: Is the velocity of light (EMR) an absolute constant? Velocity is a physical property of matter that can only be ascertained through experimental measurement. As everybody knows experimental measurements involve an unavoidable error margin, even with highly precise instruments; so, one can get only an approximate value in any measurement. Moreover, the speed of light c is such a high value compared to any other parameters of everyday life that even a large error in the measurement of c would make little difference in its estimated value. Moreover, the notion that the velocity of light c is a constant arises from Maxwell's equation for the propagation of light (EMR) through a medium of hypothetical aether or free space, whose properties are defined by permeability (μ_0) and permittivity (ϵ_0), where velocity of light c is given by the relation $c=1/\sqrt{\mu_0 \times \epsilon_0}$. Now, in terrestrial nature the values of μ_0 and ϵ_0 are influenced by the earth's environment including its own magnetism; which may not be the same elsewhere in the cosmos. But when a

physically measurable parameter is raised to the status of absolute truth or axiom; physics abandons reality and transcends to the ideal world, with all the horrendous unphysical implication. This is unfortunately what happened with modern Einsteinian physics; turning it to a branch of metaphysics. We will see later how this came to be. The irony is that Einstein himself answered this question in the negative, when he wrote: . . . *according to the general theory of relativity, the law of the constancy of the velocity of light in vacuo, which constitutes one of the two fundamental assumptions in the special theory of relativity [. . .] cannot claim any unlimited validity. A curvature of rays of light can only take place when the velocity of propagation of light varies with position.* [4]

It should be mentioned here that a similar wrong turn in cosmology took place with Newton's unphysical distortion [5] of Kepler's empirically derived laws of the solar system; with Newton's similar "jugglery" and indulgence on idealized mathematics – that for centuries and till now has blunted positive knowledge of the cosmos [5,6]; the same is the case with Einstein's theories of relativity. Both Newton's theory of gravity and Maxwell's theory of electromagnetism were developed in the context of terrestrial Nature; but were then arbitrarily extended to the extraterrestrial realm, without any limit and without any scientific basis at all. Incidentally, it is of historical importance to note that both Newton's theory of universal gravitational attraction and Einstein's theories of relativity were put forward as a negative reaction to revolutionary development in physics – the Copernican revolution in the macrocosm of cosmology and the quantum revolution of the microcosm, respectively. The theories of both Newton and Einstein sought to undermine the impact of the revolutionary developments in physics and attempted to re-establish the old order in new forms at the behest of the ruling authorities of their respective epoch.

In spite of all these, the principle of the absolute constancy of light remains one of the fundamental pillars of modern official science. This pre-conceived principle, forms one of the two primary axioms of Einstein's SR, which in turn forms the foundation on which the edifice of modern official physics is built. It is the peculiar characteristics of all idealism that a notion is abstracted from a material/physical source; this notion is then brought back to the real world, as if it is coming from outside, to which material/physical reality must now conform to. This axiomatic truth even forms the fundamental basis for practical measurements in physics and engineering. At the 1983 *Conference Generale des Poids et Mesures*, the following SI (Système International) definition of the metre was adopted: "*The metre is the length of the path travelled by light in vacuum during a time interval of 1/299 792 458 of a second*".

The postulate of the absolute constancy of velocity c of light and LT, brought devastating consequences for physics and cosmology in particular and natural science in general. LT is a Frankenstein Monster that haunts humanity for more than hundred years and still counting. As would be shown below in relation to the theories of relativity; cosmology in particular lacs positive knowledge and in essence still remains the realm of wonder and Fairy Tales as it was in medieval period; after Newton and later Einstein revived the mathematical idealism of the early Greeks to formulate their esoteric theories. Enormous intellectual, human, economic and natural resources are being wasted for more than hundred years to "prove" these theories with subjective and contrived experiments, to boost the credibility of these theories as ruling ideas.

The question arises is there something more to the Lorentz Transform than simply explaining constant velocity of light and the null result of the uncertain initial M-M experiment? Motion of all macroscopic bodies, either terrestrial or cosmic can be dealt with Galilean transform. In 1925 Michelson and Gale [7] from a measurement of Sagnac Effect, demonstrated that the light velocity is anisotropic on the rotating earth. Moreover, from a re-calculation of the Sagnac Effect both from the classical and relativistic consideration, Engelhardt [8] recently showed that while the classical formula is validated by interferometric measurements and verified by the GPS-system, this is not the case for the relativistic result. As is well-known from radar technology and as Wolfgang W. Engelhardt demonstrated in his work [8]; Maxwell's equations transform correctly with Galilean co-ordinate system for two observers in relative uniform motion. This shows that Galilean transformation can explain the Doppler's Effect correctly; meaning that Doppler Effect is only an apparent effect to observers in relative uniform motion and there is no REAL change in the parameters (length contraction, time dilation) of the moving systems in relative uniform motion with each other. All other transformation of co-ordinate systems in relative uniform motion would be similar to Doppler's Effect, and any change seen by observers in inertial

frames would be mutual and only apparent. In a recent publication, Jörn Schlieewe [9] showed that the upper bound of EMR velocity c is not a result of the coordinate transformation used but depend on the properties of a coherent wave group. Furthermore, any minor difference (if any) in the Galilean and Lorentzian transformation of propagating EM waves can only occur at very high relative velocities with respect to the emitting source.

The assumed importance of Lorentz Transformation for the absolute invariance of the velocity of light c , and for Einstein's theories of relativity seems to be only reason why this transformation, rather the universally applicable Galilean Transformation retains so much importance in modern official physics.

The Real Story behind the formulation of Lorentz Transform (LT):

It would be demonstrated in the following discussion that LT was a rather arbitrary and even contrived formulation to make the velocity of light c , an absolute, axiomatic and universal constant and not merely a physical phenomenon of light moving in space. This abstraction and idealization of the velocity of light helped Einstein to transform a dynamical problem of motion to a static problem of geometry and thought experiments to derive unphysical and fantastic phenomenological and consequences.

In a recent publication retracing the original sources, Engelhardt [10] clearly demonstrated that the accepted form of the Lorentz Transform arose from a mistake committed by Woldemar Voigt in developing his "Theory of Doppler's Principle" [11]. As Engelhardt pointed out Voigt used a wrong transformation for time ($t' = t - xv/c^2$) in his derivation, without any justification. Engelhardt further notes, "It is unclear how Voigt arrived at this curious idea. He simply commented eq. (12) with the cryptic remark "da ja sein muss" ("as it must be").

According to Engelhardt this mistake was subsequently carried through by Lorentz and others, including Einstein in formulating his theories of relativity. Engelhardt wrote, "For reasons we do not know either, Voigt's transformation appeared attractive to Lorentz in his pursuit to develop an electrodynamics for moving media. In his paper of 1904ii he simply says: 'I take as new independent variables...' and introduces subsequently Voigt's transformation (13) without mentioning his name. In a monograph of 1913iii, however, which contained early papers related to relativity by Lorentz, Einstein, and Minkowski, he added a footnote where he acknowledged the equivalence of his transformation to that of Voigt's from 1887" [10].

In retrospect, it may be argued that Voigt used this arbitrary transformation for t' in such a way that the velocity of light c in the moving frame can also be shown to be constant, i.e., $x' = ct'$. This can be demonstrated in the following way as Einstein himself showed in it in his book [4]:

If a light-signal is sent along the positive x -axis, and this light pulse advances in accordance with the equation

$$x = ct,$$

i.e., with the velocity c . If we substitute for x the value ct in the first and fourth equations of the Lorentz transformation, we obtain:

$$x' = \frac{(c - v)t}{\sqrt{1 - \frac{v^2}{c^2}}} \quad t' = \frac{\left(1 - \frac{v}{c}\right)t}{\sqrt{1 - \frac{v^2}{c^2}}}$$

(a) (b)

Fig.3

from which, by division, the expression

$$x' = ct'$$

immediately follows. This is probably the reason why, Lorentz, Poincaré, Einstein and everybody else accepted this contrived time transformation of Voigt.

As Engelhardt's article [10] shows, a consensus was ultimately reached on an arbitrary Lorentz Transform that supposedly solved the apparent incompatibility of the Law of Propagation of Light with the Principle of Relativity. LT without any physical meaning ironically became the magic wand, which could be used to solve almost any problem of modern physics and cosmology; epitomized by Einstein's theories of relativity.

Derivation of the Lorentz Transformation

As the discussion above shows, the Lorentz transformation was originally postulated in an *ad hoc* manner to explain the Michelson–Morley experiment. According to Engelhardt, there was no reason for Voigt to use the term $t' = t - xv/c^2$ instead of $t' = t$ in his equation. But it seems that Voigt got this expression, serendipitously, which happened to be the right expression of t' that served his purpose to explain null result of M-M experiment.

No matter how mysteriously the formulation of LT came to be; it became of such astronomical importance in the subsequent development of physics that desperate attempts were made posteriori, to justify its unphysical mathematical form. The usual practice by physicists is to arbitrarily and mechanically insert the gamma term, $\gamma = \sqrt{1/(1 - v^2/c^2)}$ in an expression requiring Lorentz transformation and then inferring the effect they want to find. All kind of mathematical jugglery are being used to derive LT. One such attempt by Einstein [4] himself in the Appendix of his book, "*Relativity, The Special and General Theory*" is shown below: The following is a copy of the initial steps of Einstein's derivation of Lorentz Transformation:

"Simple Derivation of the Lorentz Transformation FOR the relative orientation of the co-ordinate systems indicated in Fig. 2 (Fig. 1 above, AM), the x-axes of both systems permanently coincide. In the present case we can divide the problem into parts by considering first only events which are localised on the x-axis. Any such event is represented with respect to the co-ordinate system K by the abscissa x and the time t, and with respect to the system k' by the abscissa x' and the time t'. when x and t are given.

A light-signal, which is proceeding along the positive axis of x, is transmitted according to the equation

$$x = ct$$

or

$$x - ct = 0 \dots\dots\dots(1)$$

Since the same light-signal has to be transmitted relative to k' with the velocity c, the propagation relative to the system k' will be represented by the analogous formula

$$x' - ct' = 0 \dots\dots\dots(2)$$

Those space-time points (events) which satisfy (1) must also satisfy (2). Obviously this will be the case when the relation

$$(x' - ct') = \lambda (x - ct) \dots\dots (3)$$

is fulfilled in general, where λ indicates a constant; for, according to (3), the disappearance of $(x - ct)$ involves the disappearance of $(x' - ct')$.

If we apply quite similar considerations to light rays which are being transmitted along the negative x-axis, we obtain the condition

$$(x' + ct') = \mu (x + ct) \dots\dots (4)''$$

Now, before we proceed further with this derivation of Einstein, there is no physically meaningful reason why he would introduce λ and μ constants in equations (3) and (4). But even if there is a rational, do they make any sense at all?

If we substitute (1) and (2) into (3) we get

$$\lambda = 0/0$$

Similarly, from (4) we get

$$\mu = 0/0$$

This much for a great mathematician and physicist like Einstein. So, mathematical fallacy is one of the mysteries Einstein used in his *"Simple Derivation of the Lorentz Transformation"*, which then became the fundamental basis of his theories of relativity!

Einstein's Methodology in the Development of the Theories of Relativity:

Einstein sought to bring order to the most tumultuous epoch in the history of physics, by abandoning its traditional materialist foundation and transporting the physical objects and phenomena to the realm of geometrical and subjective mathematical idealism, more or less the same way Isaac Newton found "success" in cosmology after the Copernican revolution brought chaos, dismay and uncertainty for the new ruling class, the Bourgeois Capitalists.

Einstein in his theories of relativity, like Newton in his theory of universal gravitation [5,6]; adopted the world view of causality and the principle of non-contradiction, in conformity with geometrical and mathematical idealism. Einstein performed this miracle with the help of thought experiments and some axiomatic postulates; which like geometrical axioms are considered as self-evident truth, without requiring any verification. In his book, *Relativity: "The Special and General Theory"* [4], Einstein offered a popular, simple and lucid exposition of his theories of relativity – a rich source for understanding the essence of the theories of relativity. This would be the main reference for the rest of this essay. In the first chapter, *"Physical Meaning of Geometrical Propositions"*, Einstein elaborates his methodology in the following way, *"Geometry sets out from certain conceptions such as "plane," "point," and "straight line," with which we are able to associate more or less definite ideas, and from certain simple propositions (axioms) which, in virtue of these ideas, we are inclined to accept as "true." Then, on the basis of a logical process, the justification of which we feel ourselves compelled to admit, all remaining propositions are shown to follow from those axioms, i.e., they are proven. A proposition is then correct ("true") when it has been derived in the recognised manner from the axioms. The question of the "truth" of the individual geometrical propositions is thus reduced to one of the "truth" of the axioms. Now it has long been known that the last question is not only unanswerable by the methods of geometry, but that it is in itself entirely without meaning. We cannot ask whether it is true that only one straight line goes through two points. We can only say that Euclidean geometry deals with things called "straight line," to each of which is ascribed the property of being uniquely determined by two points situated on it. The concept "true" does not tally with the assertions of pure geometry, because by the word "true" we are eventually in the habit of designating always the correspondence with a "real" object; geometry, however, is not concerned with the relation of the ideas involved in it to objects of experience, but only with the logical connection of these ideas among themselves"*.

The key point to remember of Einstein's methodology is that for him, *"geometry, is not concerned with the relation of the ideas involved in it to objects of experience, but only with the logical connection of these ideas among themselves"*. So, Einstein abstracts concepts and ideas from objects of reality, transform them to geometrical axioms and ideas, draws conclusion based on the *"logical connection of these ideas among themselves"* and then imposes those conclusions on objective reality. As it would be demonstrated through the following discussion, Einstein meticulously followed this methodology in developing his theories of relativity, with devastating implication for human perception of objective reality!

The Theories of Relativity:

Einstein formulated his theory of Special Relativity (SR) based on two postulates and Lorentz Transformation. His General Relativity (GR) in addition used his Equivalence Principle (EP) and Minkowski's 4D "Spacetime" manifold, as the foundation of GR.

First Postulate of Special Relativity: *"The laws of physics are the same and can be stated in their simplest form in all inertial frames of reference"*.

Second Postulate of Special Relativity: *"The speed of light c is a constant, independent of the relative motion of the source"*.

This is not the place to discuss in detail the formulation of these theories or the deductions and inferences drawn from these. But it can be safely asserted that unlike the theories of classical physics, these theories of Einstein did not have roots in historical/social practice, tangible relevance to life, technologies etc. nor led to even a single technological use in more than a hundred years of their history; – the only criteria that qualifies a theory as positive knowledge, as opposed to mysticism. Hence the theories of relativity do not qualify as positive or scientific knowledge. This is the very reason why unlike the theories of classical physics, the theories of relativity are subjects of centuries long contrived "proofs" and scholastic debates, without end in sight!

It must be mentioned here that like geometrical axioms or premises; any deduction, extension, elaboration or inferences drawn from the theories of relativity are mere tautologies. It is because to be logically consistent any axiom must implicitly contain the conclusion, deduction and elaboration makes explicit what is implicitly contained in the premise. From this point of view, Einstein's theories of relativity are consistent in and within themselves. This is aside from the accusations by many that he plagiarized, cheated, or exploited others' work. But this is an unfair judgement of Einstein. Even if he did any of these odd things (some of which could be true), Einstein published his works in leading peer-reviewed journal of the West, discussed his theories in open scientific conferences and seminars and most of all he was respected and valued by most scientists of the time. If official physics and interest groups used, exploited, distorted Einstein's theories of relativity and used his name and fame for selfish ends, Einstein can hardly be blamed for these.

To his credit Einstein consistently abided by the principle he set for himself at the very beginning of his book (4) that is the basis of this essay; which is, *"The concept "true" does not tally with the assertions of pure geometry, because by the word "true" we are eventually in the habit of designating always the correspondence with a "real" object; geometry, however, is not concerned with the relation of the ideas involved in it to objects of experience, but only with the logical connection of these ideas among themselves"*. So, if his theories seem un-intuitive to common-sense or unscientific, Einstein could not be blamed for this. Like Immanuel Kant, Einstein practised subjective idealism, even if less consistently. It is the very nature of subjective idealism that it leads to antinomies; which cannot be settled based on its logical/mathematical categories. So, all the ills of the theories of relativity are due to the methodology, epistemology and the world view, they were based on. A rejection of the theories of relativity is possible only by rejecting the world view on which these theories are based on.

As far as Einstein is concerned, he can simply use the Galilean transforms:

$$x' = x - vt \quad (5)$$

$$y' = y \quad (6)$$

$$z' = z \quad (7)$$

$$t' = t \quad (8)$$

then use Lorentz transform to (5) and (8) above and substitute ct for x , to get his relativistic equations shown in Fig. 3 (a, b). In Fig. 3(b) the term v/c^2 can be considered as zero for small v . So, in essence one can get the relativistic forms from Galilean co-ordinates simply by substituting ct for x and multiplying equation (5) and (8) by the γ term, $\gamma = \sqrt{1/(1 - v^2/c^2)}$. This also means that the misleading expression $t' = \gamma(t - vx/c^2)$ by Voigt, is not necessary for the theories of relativity, the use of the gamma term is enough to make any relativistic transformation. Einstein used similar consideration to derive relativistic mass $m = \gamma m_0$; where m_0 is the rest mass, or the relatively lower-velocity mass in inertial reference frame (IRF).

Now, it should be obvious from the above discussion that the two inertial frames in Fig. 1 can be made equivalent by using Lorentz transform and are symmetrical. Either of them can be made a reference frame. Any change in a rigid rod or clock time in frame 2, recorded by an observer in frame 1, will be the same when an observer at frame 2, views similar changes in frame 1. It means that changes observed by either of the observers are NOT REAL by only APPARENT. This conclusion derived from relativistic consideration is exactly similar to Doppler Effect, Sagnac Effect and other phenomena explained by Engelhardt and others discussed above.

Einstein expressed similar view [4] as quoted below:

"The principle we have made use of not only maintains that we may equally well choose the carriage or the embankment as our reference-body for the description of any event (for this, too, is self-evident). Our principle rather asserts what follows: If we formulate the general laws of nature as they are obtained from experience, by making use of

- a. *the embankment as reference-body,*
- b. *the railway carriage as reference-body,*

then these general laws of nature (e.g. the laws of mechanics or the law of the propagation of light in vacuo) have exactly the same form in both cases. This can also be expressed as follows: For the physical description of natural processes, neither of the reference-bodies K, K' is unique (lit. "specially marked out") as compared with the other". But then adds the confusing statement, "Unlike the first, this latter statement need not of necessity hold a priori; it is not contained in the conceptions of "motion" and "reference body" and derivable from them; only experience can decide as to its correctness or incorrectness".

But unfortunately, this conclusion by Einstein himself is not the way how things developed in physics as the outcome of the theories of relativity. Misconception some of which Einstein sowed himself led to an outgrowth of fantasies, science fiction, Fairy Tales etc., that has turned physics itself in to a branch of metaphysics that impaired scientific development for more than a century and misguided generations physicists to the pursuit of meaningless scholasticism. The notions of length contraction, time dilation, relativistic mass increase, twin paradox, etc., and other mystical concepts like black hole, dark matter, dark energy, Big Bang creation, inflation etc., coming from GR has permeated the popular culture as if these are objective truths! As discussed above, the arbitrary expression for the transformation of the time coordinate in LT as $t' = \gamma (t - vx/c^2)$ by Voigt and its acceptance by others has provided much fuel to this bandwagon of mysticism in modern physics. One can replace either v or x in the above relation with pre-conceived terms to make fantastic conclusion like twin paradox, etc.

The Mystery Behind the Lorentz Transform;

It is possible to speculate that FitzGerald, Lorentz, Voigt et al were trying to form some arbitrary transform to explain the constant velocity of light in Maxwell's equations through length contraction, merely as a technical aspect without any deep epistemological significance. This transform named after Lorentz attained much greater significance after Einstein proposed that the velocity of light c is a universal and absolute constant. It means that the velocity of light c is in a fundamental relation with space and time and that velocity c , time t and distance S form a perfect right-angle triangle, where velocity c defines the unified geometric structure, and c also defines the values of the variables S and t to conform to the Pythagorean relation, $c^2 = S^2 + t^2$. This relation can be represented by the triangle below (Fig. 4), AB represents c , BC is time t and CA is S . In the triangle below one can interchange the positions of S and t without any effect on the above relationship of c , S and t . The Fig. 5 corresponds to the square area that c^2 would occupy.

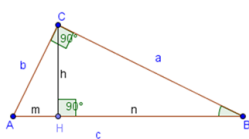
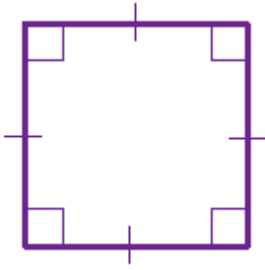


Fig 4



Fig, 5

CH is a line perpendicular to AB. If we consider any point on the line CH (or h) represented by γ and draw triangles A'B'C' as an exact replica of ABC. If we designate the hypotenuse of the series of triangles (from $h = 0$ to $h = 1$), as v , then v would be fractions of the line AB representing c , the velocity of light. The areas corresponding to the triangles A'B'C' will occupy fractions of the square area in Fig. 5; from 0 to 100% as the value of h goes from 0 to 1.

We can now define the position of a parameter γ on line CH (h) in the following way:

$$1/\gamma^2 = c^2 - v^2/c^2 = 1 - v^2/c^2$$

Or $\gamma = \sqrt{1/(1 - v^2/c^2)}$; which is the well known gamma factor in Lorentz Transform.

It is obvious that any point in the plane of ABC representing c , S and t would have a fixed co-ordinate defined by the values of these three parameters to keep the integrity of the triangle ABC. A point on the plane of ABC can only move along CH which defines the gamma factor in Lorentz transform.

Now. If one fixes both c and t in the above triangular relationship, then S can have only a singular value in the plane ABC and any motion of a point on this plane becomes prohibited if the integrity of the triangular relationship is to be maintained. Any motion of a point on this plane is possible only if the whole plane moves vertically up and down.

These consideration leads us to Minkowski "spacetime", which formed the basis of Einstein's GR. It is obvious from the above consideration that any motion of a point in Minkowski "spacetime" is impossible and remain fixed on the spacetime surface or hypersurface in a multi-dimensional manifold. This has led to the fantastic idea of a "Big Bang" origin, expanding or contracting unversed in modern official cosmology and all the mysticism and the Fairy Tales that go with it.

The new and simple derivation of the gamma term as shown above, uncovers all the mysteries behind LT and also the theories of relativity. It shows that all mysticism of SR and GR arises from a single factor, i.e., the axiom by Einstein that the velocity of light c is an absolute and universal constant. This assertion transforms objective reality into a geometric manifold with rigidly defined and inflexible parameters and the theories of relativity as unreal and un-necessary narratives of physics and cosmology

A Dialectical Materialist View of Space and Time:

It follows from the above discussion that the concept of the absolute velocity of light and the unification of space and time into one entity leads to the elimination of motion as an aspect of objective reality. But this would be an impossible notion of objective reality. In Nature, motion of some form or other, as change, evolution, development etc., is an unstoppable phenomena and physical motion exists even at millionth of absolute zero K. So, this fact alone invalidates the "spacetime" abstract manifold of Minkowski and Einstein, Lorentz Transformation included; and any form of physics associated with these concepts.

It must be mentioned in the conclusion that the denial of contradiction in Nature and dependence on mathematical idealism starting from Newton (5,6), and greatly extended by Einstein has led to metaphysics, mysticism and hence the crisis in modern physics and cosmology. From the point of view of materialist dialectics, contradiction is at the root of any motion, change, evolution etc. Any material existence in any form, in this view is a contradiction, which spontaneously resolves itself mediated by chance and necessity to give

rise to the phenomenology of this infinite, eternal and ever-changing universe. Only a dialectical perspective [12] of space and time can correct the lack of a proper understanding of the cosmos. A dialectical materialist view of space and time is in direct contrast with the abstract and unified spacetime geometrical construct of Minkowski and Einstein and is a negation of the negation of their cosmology. In opposition to the "spacetime" model of GR, Hermann Weyl (13) in his book —RAUM—ZEIT—MATERIE proposed a perspective of the dynamical relation of space, time matter and motion; which is in conformity with the materialist dialectics.

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