Numerical Analysis of Elementary Particles (Update)

In an earlier report (Pesteil 1991) that summarizes the contents of 17 envelopes left on permanent deposit at the French Academy of Sciences between 1982 and 1991, I proposed a numerical analysis of elementary particle masses and diameters and derived a law giving the masses and diameters of all stable objects in the Universe. From this I deduced a special system of mechanical units (l_o, m_o, t_o) in which the following series of equalities was derived:

$$\left.\begin{aligned} a_e^{-3} = 2h = e^3 = \frac{9}{p}K = \frac{s}{8p^2} = 4pJ^{-1} \\ m_i = d_i^2;\ a_e^{-2} = 2pm_e d_e \end{aligned}\right\} \quad (1)$$

where a_e is the fine structure constant, h, K, s and J are the Planck, Boltzmann, Stephan and Wesp constants, e is the elementary electron charge, I is the index of any stable body, e is the electron, m is the mass and d is the diameter.

This system of units leads to a determination of the magnetic moments for some elementary particles and gives a simple explanation of elementary nuclear interactions. Furthermore, it possesses an important property: it subsumes all "fundamental" constants into a_e, the fine structure constant, causing their specific identities to disappear. This reveals a fundamental

This system of units reveals a fundamental law of light and matter, although it does pose serious problems for physicists.

The first question that comes to mind is: are the units of this system constants? I have studied the evolution of matter on the assumption of creation of mass in an exponential progression. The time zero marks the birth of the first nucleon. In this analysis, I assume that a_e remains constant.

The following relations are compatible with the notion that the mass of the Universe m_u varies as $\exp(k,t)$ and c varies as $\exp(kt/2)$ in order to keep pace with the growth of d_u (Universe diameter) and to maintain $c = 1$ in the special system of units.

$$m_o = const.;\ l_o = const.;\ t_o \cong e^{-kt/2} \quad (2)$$

This equation determines the variation of the chief physical "constants" (in a system of fixed units, *e.g.* c.g.s.) with time (age of the Universe and/or the birth date of our Sun, as regards more up-to-date concerns).

I have repeated the results given in equation (1) in order to stress the fact that these that relations do not depend on any theory (with or without an ether, quarks, strings, *etc.*), whereas relations (2) depend on the hypothesis that the Universe is evolving. The choice of an hypothesis on the mechanism of Universe building affects the way the units given in (2) will vary, but does not affect the relations in (1). The problem is therefore simplified greatly, and becomes more tractable.

Since 1991, I have sent three more envelopes to the Academy of Sciences, and consequently it appears timely to sum up the results of the past two years of research.

When I first began calculating magnetic moments in 1983, masses appeared as vectorial products of two perpendicular vectors (Pesteil 1991). It took me ten years to see that this structure was analogous to electromagnetic waves. In the end, I attributed a purely electrical structure to matter, lending support to string theory, which was proposed before the quark theory and has never been completely abandoned (Broberg 1991). I selected the six vectors e, H, p (dipolar moment), H, B and M (magnetic moment) and sought the products of the two vectors that would obey the following condition: the vector resulting from the vector product must be the same in e.s.u. or e.m.u., since the general system agrees with both of these systems. I thus obtained the following four axial and four polar vectors:

axial:

$$E_\Lambda D \equiv H_\Lambda B \equiv rc^2\breve{l};\quad E_\Lambda p \equiv B_\Lambda M \equiv mc^2\breve{l}$$

polar: (3)

$$E_\Lambda H \equiv rc^2\vec{c};\quad E_\Lambda M \equiv mc^2\vec{c};\quad D_\Lambda B \equiv r\vec{c};\quad p_\Lambda B \equiv m\vec{c}$$

It therefore seems possible to say that the entire energy (in the form of light or matter) is of an electrical nature. We may also point out (a fact that has long been known) that m generally does not appear alone, and is instead often with energy or momentum, for example.

I do not have sufficient qualifications to choose which of the 8 vectors is the correct one. I might also add that the fundamental units for the microcosm are not l, m and t but electrical units. (Dishington 1993).

A final remark which does not have a direct bearing on the present subject. The deflection of a material particle grazing a large mass M (radius R) is given by:

$$j = \frac{2GM}{c^2 R}\frac{m_g}{m_i} \quad (4)$$

where $m_g = m_i$ for a mass particle. The Sun produces a deflection of 1.75 arcsec, *i.e.* twice the calculated result. This might be explained if $m_g = 2m_i$. However, Einstein has already given a far more clever explanation.

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Information Loss in Black Holes

One of the recent dilemmas in black hole physics is that of lost information. There have been many papers addressing the problem. I should like to present my solution to the problem, which I hope is not a duplication of previous efforts.

The problem stated simply by Dr. Leonard Susskind is this: "All present physics is based very heavily on the assumption that you can recover the past from the present—in principle, if not always in practice". Black holes seem to violate this belief.

If, for example, you burned this journal, you could—in principle—reconstruct the journal from the ashes if you monitored the burning process and applied the laws of physics. If instead, you threw the journal into a black hole, all information would be lost forever with no hope of recovery. There is no access behind the event horizon of a black hole.

"If information leaves the universe, it must be accompanied by energy", so says Susskind. We now have a major problem. Physicists certainly do not want to give up energy conservation. Stephen Hawking believes the information is lost forever and that this example proves the laws of physics are fundamentally flawed. Can there be a reasonable way out of this dilemma?

Bell's Inequality was violated by the Aspect experiment. It may provide the tools necessary to solve the mystery of the missing information. The (Alain) Aspect experiment verified the predictions of quantum mechanics by showing how two correlated photons from a calcium atom can relay polarization information at speeds above that of light. This does not prove faster than light communication, but the mechanism (if one can call it that) is certainly not yet clear.

The two photons must be correlated for this strange phenomenon to take place. The situation is similar to Hawking radiation, the

radiation emitted from a black hole. Hawking radiation does not come from the hole itself, but is made up of particle/antiparticle pairs just outside the event horizon. One particle of radiation may fall into the hole while the other may escape to a large distance if it is pointed in the right direction.

Suppose both matter and antimatter particles are correlated during creation, like the photons in the Aspect experiment. The particles falling into the black hole could relay black hole Information to the escaping particles and information can escape the black hole by violating Bell's theorem. This information can traverse distances, no matter how far apart the two particles are. The result is that Hawking radiation does contain information about the black hole.

Predictions of this theory are: 1. Matter and antimatter are correlated during creation; 2. Particles (like electrons and quarks) can violate Bell's Inequality. Experimental tests of this theory's predictions can be performed.

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Corrections to "On the Relativity of Simultaneity" (*Apeiron* 16:8-11).

Page 9. left column, line 18: "in negative" should read "in the negative".
right column, line 11: "of from" should read "of the beam from".
right column, 17 lines from bottom: "1936" should read "1923".
right column, equation (2) should read:

$$t'_A - t_B = \frac{r_{AB}}{c+v}$$

Page 10. left column, line 2: "1936" should read "1923".

Page 11. right column, "*Galilean Electrodynamics* 3:60" should read "*Galilean Electrodynamics* 1:5; 3:60".

On the Relativity of Simultaneity (*Apeiron* 16:8)

In criticizing the Relativity of simultaneity, the authors raise two questions. To their discussion I would like to contribute following arguments.

Figure (1a) in the article represents Einstein's argument concerning the ROS, Figure (1b) an inversion by the authors due to the relativity of motion. They correctly conclude that in (1b) the observer M' sees "the two beams simultaneously". Then they ask "But then, where is the ROS?", because they "come to the unavoidable dilemma that either the two beams of light will arrive simultaneously at point M', as at point M, or the PIVL must be invalid". In my view, the light beams will not arrive simultaneously at M in Figure (1b). A will strike M earlier than B. It is just a consequence of the PIVL (*i.e.*, that no addition of velocities exceeds c), that A and B, moving with c, neglect the proper movement of the embankment. In other words, they behave as if they were part of the non-moving system of M'. What the authors neglected to do is to transform A and B in (1b) from the embankment to the train line. Only then are both figures equivalent in the sense of Special Relativity, and the ROS is not violated. In short: The authors' change from (1a) to (1b) is a Galilei transformation concerning the velocities of A and B; only when $c + v$ is assumed for A and B, then they will arrive at M simultaneously. The authors have described the correct transformation in point (5) ("if the two strokes of lightning strike at the train instead of the rails ..."), but they are not aware that this follows from (1a) by obeying the principle of relativity and the PIVL.

This question requires a pragmatic answer rather than a philosophical one: Using Galilei transformation the observer on the train will come to the conclusion that the two strokes are not simultaneously even in the embankment frame. He does not distinguish between "seeing" and "taking place". Using the Lorentz transformation, the observer may find out that the strokes "take place" simultaneously in another frame. For him, the concept of "taking place" only makes sense when the event is related to a frame. Einstein's observer on the train thinks pre-relativistically. Thus he does not distinguish between "seeing" and "taking place". The answer to this question is "in the negative", even if one is not inclined to follow the authors' arguments.

Furthermore, the authors call equations (1) and (2), in which Einstein describes the time difference from A to B and back to A' "self-contradictory". (By the way: in Einstein's original paper from 1905 the left side of (2) reads: $t'A - tB$.) This is not the case. The equations describe time differences, which have to be related in one way or the other to the values of c and v. The sums $(c + v)$ and $(c - v)$ are part of formulas and cannot be regarded as velocity addition. This point becomes clearer when we regard the addition theorem for velocities, inserting c for v_1. Then we have $v = (c + v_2)/(1 + v_2/c) = c$. We see that the addition theorem is not self-contradictory just because there occurs an addition $(c + v_2)$—we must regard that term as part of a formula. With their remarks on "various values for the light velocity, such as $(c - v)$, $(c + v)$, and $\sqrt{|c^2 - v^2|}$ etc." the authors also seem to neglect the two-way-definition of the PIVL.

On the other hand, I agree with the authors, that the Theory of Relativity is not necessarily connected with a constant c. In his original paper from 1905, in which c is called V, Einstein wrote: "Wir setzen noch der Erfahrung gemäss fest, dass die Grösse V eine universelle Konstante [...] sei." The postulate of a constant c is merely an empirical act. There was no need in 1905 to consider a $c(t)$-function. Nevertheless, the Theory of Relativity could adopt a slightly variable c without essential changes if this should ever happen to be necessary.

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The authors reply

Regarding the PIVL, Huber says that

1. No addition of velocities exceeds c.
2. The sums of $(c + v)$ and $(c - v)$ are part of formulas and cannot be regarded as velocity addition.
3. We have $v = (c + v_2)/(1 + v_2/c) = c$.
4. Relativity is not necessarily connected with a constant c.
5. Relativity could adopt a slightly variable c without essential changes... and so forth.

So, what does Huber want to say? Should the velocity of light be a *universal constant* or not?

If Huber believes point (1) to be true, in view of $(c - v) < c$, he has

$$(c - v) \neq (c - v)/|1 - cv/c^2| = c,$$

and then he must discard part of (2) and the entire PIVL.

If he persists that (2) is right, he has to agree with our conclusion (Xu and Xu 1993a) that said equations (1) and (2)—by the way, the left side of (2), misprinted in the final version, is $t'_A - t'_B$ in our manuscript (see also our paper 1993b) are irreconcilable with the PIVL, because relativistic addition demands

$$c \oplus v = \frac{c+v}{1+cv/c^2} = c = \frac{c-v}{1-cv/c^2} = c - v$$

then

$$t_B - t_A = t'_A - t'_B$$

where the symbols $\oplus$ and $-$ represent relativistic sums.

Thus, Einstein's ROS vanishes together with his Relativity—immediately. Either (4) or (5) suffices to kill Einstein's PIVL. Few in the scientific community will agree with Huber's viewpoint, because even the

slightest "variable *c*" causes Einstein's Relativity to collapse and brings about a revolution in the field of physics, astrophysics, cosmology, philosophy, *etc.*, as we have pointed out before (Xu and Xu 1993b, Xu and Shuoping 1994).

Regarding the ROS, Huber states:

1. In Figure 1a, M sees the two lightning flashes A and B simultaneously, but M' does not.
2. In Figure 1b, M' (no longer M) sees them simultaneously, but M does not.

Why should this be the case? Why has the physical situation so essentially different? The two sketches are equivalent according to Einstein's principle of relativity (PR-E). Can Huber offer a reason? We require a "pragmatic answer rather than a philosophical one. " It must be pointed out that Huber's argument differs essentially from our statement, viz., that "if the two strokes of lightning strike at the train instead of the rails, the result should be opposite." Evidently, in our argument the location of the source of light is an indispensable factor in making the physical situation change. Yet, the source of light is unreal or imaginary in both Huber's and Einstein's dictionary. In our argument there is a preferred (inertial) frame at which the source of light lies, whereas Huber puts his preferred frame where he pleases. Either way, a preferred frame kills Einstein's PR-E.

Unfortunately, Huber's argument demonstrates that he either misunderstands Einstein's PIVL or knows little about Einstein's PR-E.

We should learn an historical lesson from Copernicus: what an event (or object, physical process, *etc.*) is observed (or measured) to be is one thing, and what it is in reality is another. For example, we see the sun rise from the East every day, but we know that the earth is moving, though we cannot distinguish between the Earth's motion and the sun's. Another example: a body appears to be different sizes at different distances, and we cannot distinguish the real size from one of the visual sizes; but we know it has a unique size in reality, unless we are a dogmatist or fool like the train observers concocted and "trained" by Einstein. Accordingly, there is no reason for the train observers "to come to the conclusion that the lightning flash B took place earlier...", only because one of them, M', midway between A-B sees the lightning B earlier. Today, theoretical physics has reached the point where it is so closely connected with philosophy that the two cannot be dealt with separately. When Einstein identified "seeing" with "taking place", he made a choice that is replete with philosophical implications. Since Einstein has led us into the Palace of Philosophy, we will have to go along: he mistook "seeing" for "taking place" unconditionally, except for the premise that both M and M' are midway between A and B when the lightning strikes A and B simultaneously, whereas we deny this.

There is little doubt that the ROS is radically false. This is the fundamental reason why the SRT has introduced so many "paradoxes" that have not been resolved yet. Dr. Huber's further arguments are welcome.

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I greatly appreciated your arguments in analyzing Einstein Relativity of Simultaneity. It is an avenue we (Jacques Trempe and myself) did not explore during our ten year study of Relativity (1960-1970).

Because of the great experimental successes of this century based on Relativity, I considered that the mathematics must have been correct although I did not agree with Einstein's interpretation, except as optical illusions due to the fact that light had a finite velocity.

During these ten years we sought to find an interpretation of Relativity in a Galilean space-time where space and time are invariant instead of the invariance of light velocity as in Einstein Relativity. I am happy to say that we succeeded, as you can see in the accompanying articles which, I hope will be later published in *Apeiron.*

In the light of what was found, I take the liberty to agree and disagree with certain parts of your "On the Relativity of Simultaneity". I fully agree with your conclusions 1, 2, 4 and the first part of 5. However I could not agree fully with section 4, conclusion 3 and last sentence of conclusion 5.

First, in the set-up of the problem, there is a definite advantage in the discussion to consider the distance AB between the lightning flashes as the length of the station platform and the length of the train. Light from the lightning flashes instantaneously reflected on the train ends (null distance) is sufficient to make them two additional light sources, A' and B', immobile in the train reference frame and moving sources for the station master. It is not absolutely necessary, as mentioned in section 5 that the lightning strike the train. This way, the problem remains the same as set-up by Einstein, and the phenomena are perfectly symmetrical in the two reference frames of the station and of the train, as shown in my second article.

Evidently to obtain this observed effect, the light speeds from A' and B' in the station reference frame should vary as from B and A respectively in the train reference frame.

I think an additional comment is in order relative to your paragraphs 5(a) and 5(b). Simultaneous reception of light from A and B for M or from A' and B' for M' is not sufficient to ascertain the simultaneity of light emission events.

In the premises of his problem, Einstein says that the stationmaster is at the midpoint of distance AB and the train observer is at the midpoint of the train. This supposes that M and M' have measured the distances AM and MB or A'M' and M'B' with rods in their respective reference frames, either before or after the lightning events. But such surveying methods are not always possible, especially in astrometry or cosmology.

However, light contains other information: the Doppler factor tells us the speed of the source relative to the observer. Then, knowing the speed of the source and the reception time, we can calculate the time of light emission and check the simultaneity of events, assuming Special Relativity conditions prevail, *i.e.* uniform relative motion and no gravitational field.

Time synchronization between the two reference frames was given by the premise of the problem by stating that M and M' were practically at the same place at time of events A and B. As you stated in paragraph 4(b), the principle of Relativity and equivalence of two reference frames in relative uniform motion have not been respected by Einstein; nor has the principle of light constancy. However, the principle of Relativity and equivalence between inertial reference frames are still valid when viewed in Galilean space-time, where light speed is not invariant.

You also add: ".. the observed radial Doppler shift .... is the best *disproof* of the infallible equivalence of inertial frames..." As you can see in my first article "Light Signals in Galilean Relativity" it is the Doppler factor which corrects the position and time of reception of light by an observer moving relatively to a light source, making this event different from the reception of light by an observer fixed relative to the light source, contrary to Einstein's interpretation. This correction due to the Doppler factor allows us to define the general equations for the speed of light in Galilean space-time, whether the relative speed between reference frames is taken as Einstein speed v or Einstein proper speed $v' = v\left/\left(1 - v^2/c^2\right)^{1/2}\right.$ or Galilean speed V (Trempe 1990).

With $L = \left(1 - v^2/c^2\right)^{1/2}$ and $B = V/c_o$,

$$v = c_o \tanh B = Lv' = \frac{v'}{\cosh B}$$

and

$$v' = \frac{v}{L} = c_o \sinh B, \quad V = c_o B$$

we have, relative to the source:

$$\text{light speed} = \frac{\text{relative speed}}{\sinh B - \cos\theta(\cosh B - 1)}$$

$$c = \frac{v}{\sinh B - \cos\theta(\cosh B - 1)}$$

$$\frac{c}{L} = \frac{v/L}{\sinh B - \cos\theta(\cosh B - 1)}$$

$$C = \frac{V}{\sinh B - \cos\theta(\cosh B - 1)}$$

and relative to the observer:

$$\text{light speed} = \frac{\text{relative speed}}{\sinh B + \cos\theta'(\cosh B - 1)}$$

$$c' = \frac{v}{\sinh B + \cos\theta'(\cosh B - 1)}$$

$$\frac{c'}{L} = \frac{v/L}{\sinh B + \cos\theta'(\cosh B - 1)}$$

$$C' = \frac{V}{\sinh B + \cos\theta'(\cosh B - 1)}$$

θ is the angle between the light velocity vector and the positive x-axis in the source frame.
θ' is the angle between the light velocity vector and the positive x'-axis in the observer frame.
$(\theta' - \theta)$ is the aberration angle.

Observers in relative motion see the same events differently is not because the principle of Relativity is at fault, but because light speed varies with the relative velocity.

This is shown explicitly in my second article "Einstein train in Galilean Space-time" (unpublished) where we see that light receptions viewed by the station master M and the train observer M' in their respective reference frames happen exactly at the same times, from fixed or moving sources, respectively. This is due to the principle of Relativity, equivalence of inertial frames and variation of light speeds with the frame relative velocity.

As you mention in 4(a) the velocity of light has no physical meaning unless it is defined to what the velocity is referred. Einstein was not very explicit on this point.

According to his calculations he takes c_o as the light speed relative to the source and $c_o + v$ or $c_o - v$ relative to the observer in the source reference frame while taking c_o as the light speed relative to the moving observer and $c_o + v$ or $c_o - v$ relative to the source in the moving observer reference frame. That seems very much like *ad hoc* adjustments to agree with PIVL.

Consequently, agree partially with the last sentence of conclusion (5), but not fully. As stated above, it is only the Principle of Invariance of Light Velocity which is physically invalid.

However, with this postulate, Einstein created a mathematical space-time where the speed of light signals has been normalized to the light speed between two fixed points, *i.e.* within the same reference frame. As he noted in 1905, his Special Relativity transforms problems of relativistic speed into problems of statics, which definitely helped in the solution of certain problems and cleared the way for tremendous progress in the experimental physics of this century. He definitely contradicts himself when, taking the light speed as $c_o + v$ or $c_o - v$ for reference frames in relative motion, he says that the speed of light is independent of the source velocity.

I hope the reasons for my disagreement with section 4(b) and conclusions (3) and (5) are clarified with the help of my two articles and the article by Trempe (1990) enclosed.

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The authors reply

It was a pleasure for us to peruse Mr. Martin's letter (Martin 1994b) with the two enclosed articles (Martin 1993a, 1994a), and to learn of his substantial agreement with our conclusions.

As for the minor disagreement, it involves some basic problems, since many errors and confusion have been spread in physics which need to be rectified or clarified.

In this discussion, we will follow two principles: 1. The unique final criterion for judging an idea is to see if it tallies with empirical fact, not to see if it agrees with a theory, not matter how well accepted it may be; 2. One crude empirical fact is sufficient to defeat a dozen beautiful physical theorems, if the latter conflict with the former.

The equivalence of inertial frames is not infallible. As Martin states, Einstein's principle of relativity (PR-E) says that "physical phenomena *appear* the same for two observers in relative motion" (our italics). But we will show that the PR-E is not perfect.

We may adduce a number of empirical facts to disprove the PR-E. For example, the simultaneity results under discussion are explicitly different for two observers in relative motion. So is the Doppler effect, unless Mr. Martin can demonstrate that it is not a physical phenomenon.

Let us examine the question further. In the simplest case of two frames with two observers, four situations may arise:

1. E_A^A—a physical phenomenon observed by observer O in frame A for an event E that happened in frame A.
2. E_A^B—the physical phenomenon observed by another observer O' in frame B for the same event.
3. E_B^B—the physical phenomenon observed by O' for the same event, but in frame B.
4. E_B^A—the physical phenomenon observed by O for the same event, but in B.

Einstein's PR-E states that

$$E_A^A = E_A^B = E_B^A = E_B^B \qquad (1)$$

which, however, can be refuted, as shown above. The only possibly true cases are

$$E_A^A = E_B^B \text{ and } E_A^B = E_B^A. \qquad (2)$$

As long as he relates theory with practice, anyone will find that (2) is valid for both inertial and non-inertial frame, only if they have relative motion with constant speed under similar conditions. We could cite numerous examples to show this.

It is surprising that so many physical phenomena are unreasonably excluded in Einstein's PR-E. How can one say that PR-E is perfect and the SRT is a covering theory of the classical theory?

Now, as another example, consider two conducting wires moving with constant speeds within the gap of a magnet surrounded by "no gravitational field", satisfying Mr. Martin's "special relativity conditions". As is well known, the inductive potentials produced in the two wires may be different from one another. For example, when a wire moves in the direction of the magnetic field or along the wire itself, it will not produce any potential. Does Mr. Martin wish to say that the production of potentials is not a physical phenomenon?

In summary, the PR-E is incorrect and incomplete. The PR has been misinterpreted by Einstein and requires correction. The equivalence of inertial frames is not infallible, and is valid only under certain circumstances.

Now, what does it mean to say that "light... reflected on the train ends (null distance) is sufficient to make two additional light sources A' and B'..."? We have come across various viewpoints concerning the moving mirror problem, such as:

1. A moving mirror can be regarded as a new source, as in Martin's view.
2. The mirror adds twice its own speed to the incident velocity of light.

In our view, neither of the above is true, because a moving mirror can *never* add (or subtract) the velocity of light *referred to the source frame*, in spite of the fact that it does change the frequency of the incident light beam. If one spatial dimension is considered, the correct relations are

$$C_{re} = C_{in} = c$$
$$C'_{in} = C_{in} \pm u = c \pm u \qquad (3)$$
$$C'_{re} = C_{re} \mp u = c \mp u$$

where C_{in} and C_{re} are the incident and reflected velocities of light referred to the source, respectively; C'_{in} and C'_{re} are the velocities referred to the mirror moving with speed u ($\pm$ for receding, $\mp$ for approaching) instead.

It is still too early to say that Ritz's theory (hereafter we shall confine it to the realm of "pure observation", *in vacuo*) is wrong, despite its acceptance by major physicists, since there still remain many incorrect verdicts to be rectified. For example, there is no reason to believe that stellar binaries are genuine double stars, as is generally believed (see Xu and Xu 1993b).

Mr. Martin states that Lorentz's and Trempe's mathematics "...succeeded...". But in our view, this success only means that results calculated using Trempe's mathematics (1990) comply with those obtained using Einstein's, but not with empirical facts. Unfortunately, Trempe's mathematics are just as incorrect as Einstein's, though we hold him in the greatest esteem. The invariant equation

$$x^2 + y^2 + z^2 + c^2t^2 = \text{invariant} \qquad (4)$$
$$= x'^2 + y'^2 + z'^2 - c^2t'^2 = F$$

can never hold, whether $F = 0$ or $F \neq 0$ (see Xu and Xu 1992a, 1992b, 1993a, 1993c), because it violates common sense of linear algebra, which states that (4) holds if and only if there is no non-orthogonality among the four variables in it. But the following equations, in the simplest case

$$x - ct \equiv 0, \qquad x' - ct' \equiv 0 \qquad (5)$$
$$x - vt = 0, \qquad x' + vt' = 0 \qquad (6)$$

correlate x with t, *i.e.* (4) contains only three, not four, independent variables. Thus, x and t in (4) are disqualified from being orthogonal.

An invalid (4) necessarily means that Lorentz's (and Trempe's) formula is indeterminate. This is the basic reason why the Lorentz formula can (seemingly) "interpret" anything but actually do nothing, and why the SRT has produced so many paradoxes.

Mr. Martin's further arguments are welcome.

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Coming events

XIV Cracow Summer School of Cosmology on "The Structure of Space and Time", August 29 to September 3, 1994 at the University of Lodz, Lodz, Poland.

Topics: The structure of space and time from point of view of philosophy, mathematics, physics, cosmology, astronomy, art and music.
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NATO Advanced Study Institute on "Electron Theory and Quantum Electrodynamics 100 Years Later", September 5 to 16, 1994, International Center for Physics and Applied Mathematics, Edirne, Turkey.

Topics: History and development of electron theory and quantum electrodynamics, conceptual and fundamental problems, review of perturbative QED, precision tests of QED, cavity QED (theory and experiments), QED and quantum optics, unified synthesis of radiative processes.
Information: Prof. S. Ekmekci, ICPAM, P.K. 126, Edirne, Turkey.