Farewell Minkowski Space

The “Thomas Precession” is a consequence of Lorentz transformations in (3+1) dimensions. It violates the definition of an inertial frame of reference and is experimentally non-existent. “Minkowski space” is untenable, but Poincaré’s dynamic group and energy-momentum representation retains its validity. The true invariant \( E^2 - (ct)^2 = r^2 \) replaces \((ct)^2 = r^2\).

1. Introduction

In the physical world, rectilinear motion seems to be the exception rather than the rule. Every piece of matter, be it macro- or microscopic, interacts with all other pieces of matter and, therefore, its motion will be non-uniform and, as a rule, non-linear. One cannot but wonder about the profound intuition of the ancient Greeks who always saw rotational motion as fundamental and ubiquitous.

The reference frames to which the investigated motions are referred, are themselves “pieces of matter” interacting with and influenced by other pieces of matter. All physics is pervaded—whether pointed out openly or not—by the abstraction called “Galileian relativity” to all physical mechanics with Maxwellian electrodynamics (both would have been no need to reconcile Newtonian equality...)

2. Lorentz “boosts”

In both classical mechanics and SRT it is accepted that the totality of spatial translation of a material point forms a commutative (Abelian) group. While (extended) homogeneous center of mass, rotation around CM, momenta of inertia, potential energy are well-defined—albeit idealized—concepts in classical mechanics, they are contradiction-ridden concepts in SRT. The world of SRT is that of free, non-interacting, point-like particles moving uniformly along straight lines, as “observed” from non-interacting ficticious IFRs—very massive, but devoid of gravitational mass! Such a world provides the scenario for the axiomatic derivation of the one-dimensional Lorentz transformations (LT) in space \((3)\), also called \((1+1)\)-dimensional LT if time \(t\) is included as an additional dimension \([1]\). Assuming:

**Pointwise 1:**

- Straight (I) particle trajectories in the IFR \(I\) transform into straight \((\mathcal{I}, \mathcal{I}')\) trajectories in \(\mathcal{I}'\).

**Pointwise 2:**

- Finite \((\mathcal{I}, \mathcal{I}')\) values transform into finite \((\mathcal{I}, \mathcal{I}')\) values.

**Pointwise 3:**

- The origins of I and \(\mathcal{I}'\) coincide if \(t = 0\), one has the following transformation \(T_{II} \) connecting \((\mathcal{I}, \mathcal{I}')\) with \(\phi_{I} = \gamma (\mathcal{I}' - \mathcal{I}) + \mathcal{I}'\),

\[
\mathbf{x}' = \gamma (\mathcal{I}' - \mathcal{I}) + \mathcal{I}' \quad (3)
\]

where \(\gamma, \phi_{I}, (\mathcal{I}', \mathcal{I})\), and \(\mathcal{I}' + \mathcal{I}\) are arbitrary functions of the relative velocity \(v\) between \(I\) and \(\mathcal{I}'\).

Since ordinary, \(3\)-dimensional, spatial translations form a group, one tries to require group properties from translations with uniform velocities too.

The reciprocity of the relative velocity between I and \(\mathcal{I}'\):

\[
\mathbf{v} = \mathbf{v}_{I,I}' = -\mathbf{v}_{I}' \quad (4)
\]

and the existence of the inverse transformation of \(T_{II}\) lead to:

\[
\mathbf{x}' = \mathbf{x} - \mathbf{v}t - \mathbf{v}'t' \quad (5)
\]

where \(\mu(v) = \frac{1}{\sqrt{\gamma^2 - 1}}\).

Two successive, ordinary transformations being always equivalent to one single transformation, one requires

\[
T_{II} \mathbf{v} = \mu \mathbf{v} + \phi_{I} \mathbf{v} \quad (6)
\]

which turns out to be possible only for:

\[
\mathbf{v}' = \mathbf{v} + \mathbf{v}' \quad (7)
\]

and for \(\mu = \text{const.}\)

The transformation

\[
\mathbf{x}' = \gamma \mathbf{x} - \mathbf{v}t - \mathbf{v}'t' \quad (8)
\]
For the practically relevant case of uniform circular motion, the angle of precession for a single turn is:

\[
\theta = \frac{2 \pi}{180} \frac{m_e e h}{2 m_0 c^2} \quad (18)
\]

with \( m_e, e, m_0 \) the electron charge and rest mass, respectively, and \( B = \nabla \times \vec{E} \) the Lorentz magnetic field induced by the motion of the electron through the electric field \( E \) of the nucleus. The corrected fine structure became then:

\[
\Delta E \approx \frac{\hbar}{4 \pi S} = \frac{h}{4 \pi S} \quad (20)
\]

with \( S \) the spin vector and should have been a brilliant success, had Dirac never proposed his equation.

This equation derived, one is tempted to say "the" correct equation (20) without any classical model of a rotating or precessing particle. Since Dirac's theory is presently the accepted one, the "Thomas precession" remains just a curious historical artefact. Finally, it is important to stress that Dirac's equation is not a necessary consequence of SRT [10]. It was obtained, actually, by a linearization procedure from the Klein-Gordon equation, in which turn was obtained from the basic relationship \( E^2 - m^2 c^4 \Delta t \), the operator substitution \( p \rightarrow -i \hbar h/2\pi \partial/\partial t \) for momentum \( p \) and energy \( E \). The (21) formula is, however, completely independent of the kinematics of motion and of LT in particular.

5. Conclusions and perspectives

The nonexistence of "Thomas precession" fixes the value of the constant \( \mu \) in (7) as zero thus reducing (7) to (2). However, the Galilean transformation itself holds only approximately, since in the presence of gravitation and/or radiation the isolation of local "closed" systems is impossible. In the presence of gravitation and/or radiation there is no "principle of relativity" at all.

Realizing that "Minkowski space-time" is unable to describe intersections between particles, Henri Bacy [11] has openly issued a call to give it up. Certainly no harm will be done to physics if \( \mathbb{R} \) is again called "the law of motion of a point-like particle", rather than a "world line".... On the contrary, \( \mathbb{R} \) is again called "the law of motion of a point-like particle", rather than a "world line".... On the contrary, the vanishing of the null effect was registered. A 1.35 cm diameter disk (10 cm diameter) with 1000 r.p.s. rotation was that both the circumference and the radius would assure a finite value, \( \mu = \mu_0 \), for \( \omega_0 \) as \( \omega \) goes to infinity. Moreover, the disk radius would shrink due to torsion, therefore "the premises leading to the negative verdict of the experiment for granted.

While discussing (Paris, March 15, 1996) the issue of "Thomas Precession" as a consequence of "special" relativity, Professor J.P. Vigier expressed the opinion that: "if the 'Thomas Precession' is not confirmed by the experiment, then it is not a consequence of special relativity." Professor Vigier takes the negative verdict of the experiment for granted. However, he maintains that: "if the changes of linear momentum during the motion along a closed polygonal path are 'properly' - LT using the three-dimensional complex rotation group—taken into account, no Thomas effect will occur."

This position encounters several difficulties:

1. The 3D complex rotations and the vector form of LT are mathematically isomorphic, therefore both contain the same physical information. An isomorphism cannot create or destroy a physical effect. The situation is reminiscent of the use of the (more elegant and versatile) complex notation in electrical engineering which cannot avoid taking null results at the end of the calculations.

2. Einstein's "special" relativity was conceived as a purely kinematical theory. As such, the theory is not allowed to generate dynamical effects, and even less, to violate the inertiality of a transported system.

3. Although never included in the two postulates and/or in the axiomatic foundation of SRT, the thesis: "the special relativistic effects have nothing to do with acceleration (\( \omega \) force or change of linear momentum, G.G.) is implemented in all applications of SRT. For example, it is claimed that the functioning of any clock (spring, cesium, meson-, biological...) is affected only by its vedility in an inertial frame of reference. The details of the clock's internal and external dynamics are considered superfluous and completely irrelevant.

4. According to Mendel Sachs [13] the definition of "proper time" \( T = \int (1 - V^2/c^2)^{-1/2} dt \), where \( T \) is the uniform velocity of relative motion—cannot be generalized for variable velocity! "They then extend this transformation (relating \( T \) and \( t \), G.G.) by keeping its form but letting \( V(t) \) become variable. They then integrate \( dt = d \theta \int (1 - V^2(c^2/c^0)^2) \) over the whole closed path to get the proper time elapsed. But this is not a valid transformation for general relativity. " Sachs' resolution of the "two paradoxes" is that the consequent and consistent application of "general relativity" leads to the asymptotic aging of twins. This, however, is perfectly similar to Vigier's hope, namely that a rigorous—why not "general relativistic"?—treatment of the motion along a closed path will show up no "Thomas drift." Thus, a resolute adept of the post-Sievert interpretation of the Lorentz transformation (just a translation from the last two paragraph from "X.Y.Z.F. language" to "X.Y.Z.F. language", without any physical consequences. G.G.) and a neophyte Lorentzian believing in absolute length contraction and absolute time dilation—as a result of motion relative to an
absolute, preferred reference frame—find themselves in the same boat...

References


12. P. Wesley, Advanced Physical Theory (Benjamin Wesley, Blumberg 1991)

Reply by J.-P. Vigier

1. It is not true that two isomorphous groups contain the same information. The little group of Wigner is limited to one dimension only, so that the 3-D complex rotations contain more information.
2. The little group is certainly a kinematical theory, but this does not mean it does not imply restrictions on accelerated motions for the 3-D rotation group.
3. The postulate of isotropic light velocity $c$ in all directions and the utilization of light in length and time measurement is an assumption which can be modified within the framework of Relativity Theory itself, if photons have a non-zero rest mass as assumed by Einstein-Schrodinger-de Broglie, etc.
4. Sachs has not resolved the twin paradox within the framework of Relativity Theory. In fact, the "paradox" of variable aging has been confirmed by clocks moving in satellites around the earth in opposite directions.

Jean-Pierre Vigier
Laboratoire de Gravitation et Conception Relativistes
Université Paris 6, Marie Curie
Paris, France

Obscurities in the Theory of "Quantum Touching"

For the past forty years, V. Pope has been advocating a form of instantaneous action at a distance. The claim that this has something to do with B" theory is refuted as follows:

Let K' move at v in Z with respect to K. Let:

Then from the Lorentz transform, for absolute values of $t$ and $Z$,

$$ t' = \gamma \frac{vZ}{c^2 - k} $$

$$ Z' = \gamma \frac{Z}{c} $$

For the inverse transform (frame K moving at $-v$ with respect to $K'$):

$$ t = \gamma \frac{vZ}{c^2 - k} $$

$$ Z = \gamma \frac{Z}{c} $$

So we see that when $v = c$, the retarded time $(t - Z/c)$ appears on the right hand side of eqn. (1). The electromagnetic phase is $0(Z - t/c)$ where $c$ is angular frequency, this quantity is non-zero at $c$ in K. This Lorentz invariant is the phase of a plane wave moving at c in vacuo. There is no instantaneous action at a distance as asserted in the “quantum touching” theory of Pope [1]. Similarly, the advanced time $t' + Z/c$ appears in eqn. (3); and $0(Z - t/c)$ is also a Lorentz invariant. These phases also appear from eqns. (2) and (4) self consistently. However, at $c$, the quantity $t'/t$ in eqn. (1) is identically zero, so $(t - Z/c)$ is also zero, implying that 0 is infinite in frame K if $0(Z - t/c)$ is a Lorentz invariant as required. The observable electromagnetic phase is always measured for finite $0$ with a prism or spectrometer [2-5].

The phase at $c$ is finite in all frames for finite $0$. The signal velocity is $c$ in all frames. Thus $0(Z - t/c)$ is finite at $c$ and equal to $0(Z - t/c)$. This is the measurable electromagnetic phase. Therefore there is no instantaneous action at a distance because the propagation velocity of electromagnetic radiation or gravitation is always finite in all frames. There is no rest frame for a particle at $c$. The phase at the speed of light in all frames is the measurable:

$$ \Phi = 0(Z - t/c) $$

in which $0, t, Z$ and $c$ are all non-zero. The q.t. theory asserts $t = 0$ (no interval) and infinite signal velocity $c$ is infinity because the theory asserts instantaneous action at a distance. At the same time, the theory asserts that $c$ is a scaling factor with value $3 \times 10^8$ metres per second, but at the same time Pope appears to reject measurement in natural philosophy. This mix of ideas is very obscure to me at present.

If $t = 0$ and “$c$” is infinite, (instantaneous signal transmission, or action at a distance) $\Phi$ is zero and there is no longer any defined electromagnetism, let no field. The argument of q.t. starts with a field theory and finishes with no field, so action at a distance becomes erroneously instantaneous with no inter-mediating field with finite signal velocity. This is because the whole argument is based on the Lorentz transform of $0(Z - t/c)$ applied when $v = c$. However, at $v = c$, the Lorentz transform is singular mathematically, and physically the rest frame is indistinguishable from the moving frame. If so, how can a transform be applied from one to the other? This is the quicksand upon which the whole of q.t. is based. Or so it appears to me at present.

The speed of light exists in vacuo has been accurately measured, and is not merely a “scaling constant” as suggested by q.t. Having ploughed through q.t.’s opaque theory many times, this is my current view. Experimental evidence for special relativity is given in texts such as the one by Marion and Thornton [2]. There appears to be no evidence for quantum touching, and the concept is ill-defined.

Mr. Pope is entitled to his views in philosophy and linguistics, but they are obscuring the theory and interpretation of B" theory [6-10]. His claim [11] that B" is an example of quantum touching is incorrect because B" propagates at $c$ in vacuo in the opinion of Vigier and myself. If the photon has mass, B" propagates at less than $c$, and correctly worked out tachyonic theories may allow it to propagate at greater than $c$.

The phase in the B" theory is finite, because there is present a propagating electromagnetic field. In vacuo the signal velocity is $c$, and $B_{\lambda}$ propagates at $c$ because the conjugate product through which it is defined topologically propagates at $c$. Empirical evidence for B" in given in magneto-optics [6-10] and the theory of B" is CPT conserving and Lorentz covariant inter alia. This is alone sufficient to show that B" is a fundamentally novel magnetic flux density in vacuo.

A careful reconsideration by Chubykalo and Smirnov-Rueda [12] has shown that under well defined mathematical conditions, longitudinal solutions of the electromagnetic field equations appear in vacuo. These may provide a route to understanding Coulombic action at a distance as discussed by, among others, Dirac [13]. Work is in progress to relate these solutions to B", but the work of Chubykalo et al. [12] has been criticised by Rodrigues [14]. The present author finds no flaw in the logic of Chubykalo et al. In three papers, Munera and Guzman [15] have provided a rigorous and important reconsideration of the Maxwell equations, leading once more to longitudinal solutions.

There may be some way of reconciling the work of Pope to these developments in physics. However, Pope appears to reject fundamental concepts such as: 1) the need for empirical measurement in natural philosophy; 2) the d’Alembert equation; 3) the vacuum; 4) the speed of light. This is a very radical point of view, and perhaps I have misunderstood statements of his such as “a pox on the d’Alembert equation”. Before reaching for the penicillin, I feel that Mr. Pope should publish his ideas in a book, explaining them for physicists.

If the electromagnetic field is gauged in vacuo we find that B" is implied topologically, together with novel non-local effects in electromagnetism. There may be some way here of locking in to Pope’s ideas, but after studying them many times I am unable to understand them. Gauge transformation of type two is again based on special relativity, and is meant specifically to avoid instantaneous action at a distance. It appears that the Aharonov-Bohm effects now known with precision experimentally contradict the assertions of quantum touching. It is not even clear to me however whether Mr. Pope means instantaneous action at a distance or not, so obscure is the verbal development in his theory. My own method is to respect received opinion until logic forces me to do otherwise: I do not use a theory which blatantly contradicts empirical data. Since Mr. Pope has no training in mathematics, it is difficult to see how he can develop his work without getting bogged down in a morass of verbiage. The d’Alembert equation still seems free of infection to me.
In summary, the standard equations of the Lorentz transform, on which Pope bases the obscure verbal assertion known as “quantum touching”, mean that the square of the four-interval does not change from frame to frame. This implies, using the standard arguments [2], that the proper time does not change with Lorentz transformation, \(\mathbb{I}^0\) is “Lorentz invariant”. If so, the proper time does not vanish, because then it would \textit{not} be a Lorentz invariant. This remains true whether or not the photon is thought to have mass. If the photon’s mass is zero, the four-interval vanishes, (the photon is “light-like”), and the proper time does not. Pope’s error is due to lack of elementary training in physics and an inability to accept criticism. In view of his long history of erroneous verbal assertion, Pope will refuse to accept the description in this Letter of the standard Lorentz transformation, and therefore this will be my last communication on the subject.

References

11. V. Pope, personal communication.

MW. Evans
Rhodlon Rd, Cng/Cfn Parc
Swansea SA6 5RA Wales, U.K.

Reply by N.V. Pope

A classical fallacy which logicians call \textit{frustration} is to assume that a thesis can be refuted simply by asserting and reasserting its antithesis. Evans seeks to ‘refute’ any association between my theory of action-at-a-distance and his own \(H^0\) theory simply by driving home to his public how mathematically watertight his own theory is. But that is like a Ptolemaic astronomer seeking to ‘refute’ Copernicus’ heliocentric theory by stressing and restressing the mathematical intricacy and sufficiency of the Ptolemaic system.

However, Evans regards this as no more than ‘a morass of verbiage’ and he would want ‘mathematics’ to support it. However, that is a very unusual and hardly sustainable view, that a logical argument without intricate mathematics is no more than just words.

Moreover, I feel I should point out that it was Evans who first offered the view that my philosophical theory had ‘foreshadowed’ his \(H^0\) theory, and my paper which specifically seeks to articulate this association by stressing the longitudinal character of instantaneous quantum touching, was invited by him on that understanding. So I am intrigued as to why he has now changed his mind.

In general, the basis of Evans’ ‘refutation’ of my --- or, rather, Gilbert Lewis’—concept of proper-time instantaneous quantum touching [1] is that he (Evans) assumes that the only question can be that of whether the speed of light is finite (\(\mathbb{I}^0\), time-rotated) or infinite (instantaneous). However, although it is a very subtle logical point, light may be both finite and instantaneous. This, of course, is because light, like anything else, has two velocities. One is the distance from A to B traveled in the time registered by the clocks of the observer of the motion; the other is that same distance traveled in the time that the same observer of the motion sees to be registered by the clocks of the traveling body itself—the so-called proper time. The first of these velocities tends to the finite limit \(c\), as in relativity theory; the second tends to an upper limit of infinity, as in classical or Newtonian physics. That upper limit on the speed of light is therefore both finite and infinite, without this involving any contradiction whatsoever [2].

Now Evans says that there is no evidence for such instantaneous action-at-a-distance. However, as Mach, Tom Phipps, and Assis, \textit{et al.} have pointed out, there has to be an instantaneous balancing—
influence between bodies that are linked in paired and overall-conserved angular momentum relations. (Shades of d’Alembert, here!)[3]

No galaxy, for instance, could hold together in the way it does if the balance between its component stars and so on took thousands of years to get from edge to edge at the speed \(c\). Also, for some physicists the plainest evidence of instantaneous action-at-a-distance is provided by the Thomas Young two-slit experiment and all the recent developments upon it described by Professor Clive Kilminster and myself in the 1996 ANPA Newsletter. (Copies are available from myself as Secretary.)

However, Evans says that there can be ‘no instantaneous action-at-a-distance because the propagational velocity of electromagnetic radiation or gravitation is always finite in all frames.’ What he fails to see, as I say, is that although that is unarguably the case, the speed of the quantum elements of those finite-speed propagations may nevertheless be infinite. For instance, in a cinematographic film (movie) each photographic ‘still’ is a complete picture—\(L\), a pattern of instantly interconnected photographic grains from which three dimensions of distance are informationally projected. By definition, nothing moves in those photographic stills. All motion and change are generated out of temporal sequences of those stills. And since there is no logical contradiction in saying that, then, by the same token, neither is there any logical contradiction in suggesting that a light-wave (or a gravitational wave) may be a kinematical sequence, in relativistic time, of threedimensional patterns of Lewisian, proper-time— instantaneous quantum touchings. The fact that this is not what Evans was taught is no argument against it.

I suggest, then, that the only valid way for Evans to refute my theory and its connection with his own would be by the method of \textit{false idols} that is, by falsifying my thesis, not by simply affirming and reaffirming his. This would accord with Popper’s falsification criterion for sorting out scientific theories. Evans mentions that I have been at this for over 40 years. During that time, with the advice and cooperation of many professionals and, indeed, some very eminent, mathematicians, I have sought to make my thesis as logically and mathematically tight and therefore as falsifiable as possible. So I shall look forward to being shown by Evans, with specific reference to my various published texts, which of my arguments, logical or mathematical, he regards as false.

Notes and References

3. My remark ‘A pox on the d’Alembert equation!’ was made to Evans in an impromptu discussion, at the Swansea Astronomical Society, filmed by a freelance TV journalist, Mr. John Blay. The remark was by no means meant to signify any disrespect of d’Alembert but was simply an expression of irritation at Evans’ insistence, as in his communiqué to which I am now responding, on keeping the argument grounded in its familiar but stultifying historical groove.

N.V. Pope
Llys Alaw, 10 West End
Pendevi Serein
West GlamSA4 3XU, U.K.

Length Contraction and Time Dilation?

Reference is made to the recent exchange of letters between Wilhelm and Li (\textit{Apeiron} July 1995) on the subject of length contraction and time dilation. This letter describes a couple of conceptual experiments that address these matters and provide a basis for judging who is correct, Li or Wilhelm.

Length Experiment

Mark two points \(O^0\) and \(O^0\) on a straight line a great distance apart. Mark a segment of length \(L\) on the line between points \(O^0\) and \(O^0\) and place photon emitters, one \textit{gam} and the other \textit{gam} at the ends of segment \(L\) and synchronize them so that they periodically emit photons at the exact same time in both directions towards \(O^0\) and \(O^0\). Now observers at \(O^0\) and \(O^0\) can determine the length of this segment by measuring the difference in arrival times of the \textit{gam} and \textit{gam} photons and multiplying by the velocity of light \(c\). In Figure 1a, the two observers and segment \(L\) are all at rest with respect to one another, and the observer at \(O^0\) measures a length \(L^0\) where \(L^0 = L\).
Next let the two observers move with the same velocity $\beta = v/c$ and $0 < \beta < 1$, as shown in Figure 1b. It is evident that the two observers will obtain different measurements for segment $L$ and $L' \neq L$. The observer at $O'$ will perceive segment $L$ to have expanded, and the observer at $O''$ will think the segment has contracted.

**Time Experiment**

Consider three identical monochromatic light sources, having a wave period $T_G$ (Color Green), located at points $O$, $O'$, and $O''$ along a straight line with point $O$ being between points $O'$ and $O''$ (Figure 2: The two arrangements are equivalent).

Let points $O'$ and $O''$ move along this line with the same uniform motion $p$ so that point $O'$ is "receding" from point $O$ and point $O''$ is "approaching" point $O$ at the same speed. Points $O'$ and $O''$ are at rest with respect to one another. The observers at $O$, $O'$, and $O''$ will perceive the following:

a) The observer at $O$ will detect a wave period $T_G$ (Color = $\text{Green}$) from the source at $O$, a wave period $T_G$ (Color = $\text{Red}$) from the source at $O'$ and a wave period $T_G$ (Color = $\text{Blue}$) from $O''$.

b) The observer at $O'$ will detect a wave period $T_G$ from the sources at $O'$ and $O''$ and wave period $T_G$ from $O$.

c) The observer at $O''$ will detect a wave period $T_G$ from the sources at $O'$ and $O''$ and wave period $T_B$ from $O$.

Since these monochromatic light sources are ideal clocks, what has been demonstrated for wave periods is also true for clock rates.

**Conclusions**

If it is true that (i) a single rod will both expand and contract at the same time just to accomodate two observers, one receding and the other approaching, and (ii) a single monochromatic light source can emit red green and blue light at the same time, then, of course, Wilhelm is correct.

![Fig. 1](image1.png)

![Fig. 2](image2.png)

**Daniel H. Deutsch: Flights of Fancy**

In his discussion of the meaning of Planck's constant, Daniel H. Deutsch (Apim Vol. 3 Nr. 2, p52) asks by what flight of fancy is one justified to let $h \rightarrow 0$; he suggests that one might as well let $e \rightarrow 0$ or $c \rightarrow 0$. Readers might be interested to learn that the proposition that $c^2 = 0$ has been used in a recent landmark article on SR kinetics [1].

The authors write: "If we now put $u = 0$, then $u'$ will be the 'reciprocal' velocity of frame $S$ as measured by observers at $O'$ and $O''$ and wave period $T_B$ from $O$.

The assumption that $u = 0$, and therefore $u' = c$, will be the 'reciprocal' velocity of frame $S$ as measured by observers at $O'$ and $O''$ and wave period $T_B$ from $O$.

Since these monochromatic light sources are ideal clocks, what has been demonstrated for wave periods is also true for clock rates.

**References**


G. Walton
18 St. Swithin St.
Winchester SO23 9PJ (UK)

**Reply to Wilhelm**


**References**


**Determination of Proton and Neutron Radii**

The Newtonian gravition formula has the following form:

$$F = -G \frac{M_1 M_2}{R^2}$$

We assume $G = K \rho_1 \rho_2$ where $\rho_1$ and $\rho_2$ denote the densities of both $M_1$ and $M_2$ separately. Using the Cavendish experiment we determine $K$. In (2) $G = 6.7 \times 10^{-8} \text{cm}^2/\text{g} \text{sec}^2$ and the density of lead $\rho_1 = 11.37 \text{g/cm}^3$. From (2) we have

$$K = 5.2 \times 10^{-10} \text{cm}^3/\text{g sec}^2.$$ 

Thus, $K$ is a new gravitational constant.

By using (2) we determine the proton radius $r_p$.

From (2) we have

$$r_p = \frac{K \rho_p M_p}{\pi G}$$

$$y_p = \frac{K \rho_p M_p}{\pi G}$$

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This is going to change however when we consider what is happening inside a massive body like the planets and stars. All indications so far are that bodies of all sizes are existing in their space, partaking of that space as required, and only fall towards a body of a greater mass when their space envelope is drawn towards that body.

When combining this with the fact that nothing known can shield gravity we must conclude that any freely moving particles at the center of a planet or star are subject to the same laws and will also move towards the greater mass which always surrounds them and that the true center of gravity of gaseous or partially molten planets and stars resides at the spherical border between equal masses, which is at approximately 72% of the radius from the center.

This view goes a long way in explaining exploding stars, jets, ring-galaxies and ring-nebulae: the inward pressure of the outer shell is balanced by the outward pressure from within and it is understandable that the rate of rotation with its centrifugal force is an important factor that determines the stability; changes in the rate of rotation or internal pressure could have disastrous consequences (as observed).

It will be noted that in the foregoing the gravitational force is not considered to originate from the center of all bodies in spite of the fact that it is directed that way when observed from the surface. The fact that the earth is thought to have a heavy solid core in order to explain the total mass, should have pointed to the solution proposed here, namely that the material is concentrated in a much larger area; the boundary of equal masses which can contain much more concentrated matter than a core could.

It is therefore clear that the proposal herein only presents problems for the present views and none at all with observations.

A Universe without a Big Bang

Nowadays, we can even see into black holes (Mészáros 1994). Nevertheless, some authors only know one side of the published results in cosmology. The big bang is actually dead. If Mészáros and Molnar (1988, 1989a,b, 1990, 1991, 1992) can be as seen from these papers, the standard cosmology (the big bang) should be considered ideology, since it does not satisfy the requirements of exact physical theory. It lacks consistency, an exact mathematical description of phenomena and the possibility of verification and confirmation. For instance, in the big bang theory, it is correct to state that "the big bang happened if time is greater than or equal to x".

Furthermore, the big bang cosmology does not have a single solution compatible with its postulational basis. As a consequence of the violation of causality, it is probable that not one single relativistic model can be adapted to this situation. Therefore, the origins of the Hubble law and the 3K blackbody radiation remain unclear; moreover, they are not evidence of the big bang.

In addition, the above statements for the standard big bang are hereditary for inflationary cosmological models. Namely, in these models, which are based on the standard big bang, the evolution of the universe is completed in a short time interval of $10^{44}$ s to $10^{50}$ s only. Some prejudiced authors suggest that, after all, in the hot universe, the equilibrium state of photon gas $P = constant$ and $T = constant$ should be called the "adiabatic-isothermal changes of state" of the photon gas.

What is more, Friedmann did not know the 1892 and 1894 stability results of his compatriot Liapunov in 1922 and 1924. Therefore, Friedmann’s stability results are entirely wrong. But, since then mathematical stability theory has been developed but not used in cosmology. So Friedmann’s stability investigations are archaic from the modern mathematical viewpoint.

It can be seen from these references that the big bang model was a purely fictitious one for the dynamical universe model with an inadequate instrument-system for such a model. Consequently, the big bang or big crunch means the explosion or collapse of conceptual categories only, but not the gravitational explosion or collapse of the universe. As a result, after the often metaphysical optimism of a century, we again return to the fundamental questions [5,6].

The scientific merit of the Standard and inflationary model is that it connects the physical processes in such a way that the logical structure of the universe becomes related to its history. Furthermore, these models are dynamical cosmologies and so raise the notion of the genesis of the elements. “If some day the Standard Model is replaced by a better theory, it will probably be because of observations or calculations that drew their motivation from the Standard Model” (Weinberg 1977).

I propose that the authors involved should think about rewriting their texts completely, only if after an exhaustive open-minded search through the modern literature they still feel absolutely convinced that not everything in their papers has been properly treated in all the up-to-date texts. After their exhaustive and objective investigations it will be seen that the big bang is dead. Therefore, new models of the universe without the big bang are necessary.
absolute motion. Albert Einstein being aware of the “relative” constancy of $c$, the speed of light concluded that “motion is never observable as motion with respect to space”. The concept that light must travel in something due to its wave nature was also abandoned when no ether drager was observed on Earth’s passage around the Sun. This lack of any observed ether medium led to the concept of empty space between any “material” objects in a vacuum of the outer space and the extension of the so-called “Special Theory of Relativity” to encompass gravity in “The General Theory of Relativity”. The main tenets of his gravitational theory are that space itself is curved in proximity of mass and therefore “the greater the mass then greater is the curvature of space in proximity of this mass”. Many observational tests have shown agreement with this theory. Einstein himself came to the wrong conclusions about the passage of time with synchronised clocks placed on the equator and at the poles because according to special relativity, the clock at the pole moving relative to it? (NewSci 21 Oct. 95 p.58)². The following inconsistencies with observations need to be addressed: 1. Difficulty of unifying gravity with other forces of nature. 2. Failure of detecting gravitational waves arising on Earth. 3. Failure of detecting vector particles for the transmission of this force to make it compatible with quantum mechanics.

Have the wrong questions been asked for their solution? One such question for which answers will be examined in the following is: What is the “fuel” of the atom?

First Postulate: All atoms need fuel to exist, the inward flow of the fuel entity is displaced and polarised by the wave function of radiation to become the gravitational force.

Comparing this idea with General Relativity brings forth both conflicting and complimentary agreements. One starting point is the question: Could the Einstein’s “curvature of space-time continuum” also be explained if an invisible “fuel” of the atoms was affecting all our observations? This distinct possibility must at least be examined if it could simplify our concepts of reality. Unification of the forces of nature could be started with gravity if all atoms needed this fuel to exist. Looking then at how the atoms would consume this “fuel”? The duality of all quantum phenomena could be explained if atoms were “breathing” this stuff and thus supplying their fuel deficiencies in the form of the gravitational flow. This at once conflicts with the existence of “gravitational waves” because the fuel input (in this theory) is always inward, but since no such waves have been observed to arrive on Earth, we can go on theorising. Extending the concept of breathing of all living beings to atoms will also help to change our illusion of the passage of time. In the same way that our breathing on a mountain top increases due to a lowering of the air density, the fuel inputs of the atoms may also be affected by gravitational density.

Thus observed lower frequencies from high gravitational density astronomical sources, such as Sirius B when compared to reference spectrum on Earth could be expected if the atoms vibrated slower in a high gravitational density environment. The equivalence principle actually tells us something profoundly fundamental, provided the concept of “duality” is taken literally, “the fuel also becomes the engine and MiV MIRI”. The equivalence of acceleration with gravity can be understood as consumption of a comparable fuel input to achieve equal momentum for the atoms. Furthermore all infinities such as “Black Holes and Singularities” will disappear in this theory because there is never an infinite “fuel” supply available in any local situation. Similarly there must be a maximum fuel density and an equilibrium gravitational density in the atomic world which becomes apparent when a neutron is removed from a high density atomic nucleus to a lower “fuel” density and consequently decays into a lower mass in about 15 minutes. Magnetism is thus a polarised “breathing” of the atoms and the so-called vector and virtual “particles” become nothing more than “fuel inputs” converted very briefly into momentum and then as an “ether ripple”. Neutrinos in this theory are that quality of mass that reverts back into the background gravitational density from which the Universe evolved in the first place.

Relative Constancy of $c$: The speed of light, can be observed to be affected by some entity or medium because its velocity is observed to be slower through liquids and even slower in clear solids. This brings up the question that since $c$ is dependent on gravitational density in proximity of mass, how can we be sure that the vacuum itself outside thermal bodies such as galaxies is not more rarefied? Indeed if this was really so the whole concept of the expansion of the Universe is an illusion caused by the stretching of the wavelengths of radiation through such an expanding “gravitational medium”. Voids² between galaxies are evidence that ordinary matter has decayed and returned back to where it originated from. Constancy of $c$ becomes only relative to its own environment. If its speed is relative to atoms when absorbed or reflected, then any instrument made of atoms will measure this velocity. How could the existence of such a gravitational entity be measured in the emptiness of outer space? Assuming that such a gravitational entity was following the rotation of the Sun and Spiral Galaxies, a huge invisible whirlpool effect would be created. In order to demonstrate that the propagation of light was affected by such gravitational flow, it should be possible to observe this bending if satellites with mirrors were placed at 45 degree angles on each side of the Sun, forming a right angled triangle with the Earth. When contemplating this experiment I came upon a previous 18th century observation, rendering this experiment unnecessary.

German observer Johann Schroter in the 18th century discovered a curious discrepancy in that Venus was not half lit at dichotomy 09h at the greatest elongation from the Sun as seen from the Earth, but 10 days before and about a week after (mornings). (Sky & Tloclep Jan 92 pbs)³. This effect is accentuated even more by the fact that the Sun is not a source and should therefore light up slightly more than a half hemisphere, especially in the case of Mercury, which is so much closer to the Sun. A similar effect is also observed with the Moon. As these two have almost no atom sphere, this seems only to deepen my mystery. The best guess so far has been that very light little falls on the terminators but with the powerful telescopes of the day are we to believe this?

The problem may be solved when the gravitational flow is taken to be temperature dependent and flowing without resistance. The Sun would exert a kind of whirlpool effect on its surrounding invisible gravitational medium due to its rotation. The curving of the medium has the effect of altering the plane of the wave fronts. Firstly, because of the gravitational red shift that is accentuated by the light having to take a longer path in this curving environment. Secondly, such curving of the light path is amplified by the fact that the reflected light from the planet is propagated at a tangent to the Sun when such slowed-down light waves are more affected by the inward falling (to the Sun) gravitational medium. Further proof of the rotation of the gravitational medium can be observed with the moons in the rings of Saturn. It is a well known fact that all the large planets rotate much faster than small. Could a larger gravitational force give them a higher rate of rotation? Voyager 2 in 1981 discovered two new moons, Prometheus and Atlas, whose positions were then recorded. Saturn’s rings were observed edge on, on 22 May 95 and the two moons could be observed to be displaced in their predicted orbits by some 20 degrees. Atlas ahead and Prometheus lagging. The effects of gravitational density in the cores of the large planets (spiral galaxies) may have a role to play in this as well. The whirlpool effect of the inward flowing gravity and the conservation of the gravitational input may cause outflows that speed up the orbital velocities of the moons. The evidence for this being the observed “spokes” in the rings of Saturn and the “plumes” inside the Earth, forming hotspots and earthquakes.

Second Postulate: All matter (protons) is conserved in a gravitationally contracting entity, hence it (protons) will decay in an expanding one.

The non decay of the proton here on earth may be environmental and the following chain of events can be postulated:

First: Some faint galaxies¹ have been observed to be stretched to gigantic proportions and their decay could become part of the expanding “gravitational medium”.

Second: The collisions between two expanding “voids” could be the sources of gamma rays, because non thermal “fuel” collisions need not be restricted to the Sun because they are not aware of each other’s presence before “The Cold Collision”.

Third: At this point, before the formation of matter, there are no atoms, unlike the propagation of light with atoms, the birth of Quasars in a cold collision, emits radiation which would have to “swim” against the enormous gravitational flow, giving high $z$ (Redshift). This could at last be explained as the first step in the actual birth of matter according to the original mass-energy equation $E=mc^2$.

Fourth: When the gamma and Xray sky became available to astronomers it became evident that the X-ray sky was far too bright to have survived since the “big bang”. The gamma rays were far too powerful and often without visible sources. This gives a possible solution to a dilemma if a “Steady State Theory” of the Universe is reintroduced. Because gamma rays have the highest frequency it points to an even higher “continuous” mode of emission that could emanate from high gravitational density cores of galaxies, first like S orbitals of hydrogen atoms and later in the form of (continuous emissions) the spiral arms, in which matter would form. Because these emissions are faster than $c$, the gravitational stability (cartwheel rotation)
of a galaxy is possible without the so called dark matter since the gravitational medium will eventually follow the rotation of the galaxy.

**Third Postulate:** The wavelength of a given frequency of radiation is the minimum volume in a given space required to reach a minimum density to “fire” one quantum $\hbar$ (Planck’s constant).

Condensation theory is no longer viable for the initial birth of the stars and planets because there is up to $10^6$ too much angular spin momentum in the star forming clouds to condense into stars. There may be a “continuous emission” from a high density Gravitational entity at the cores of Galaxies. The inert low melting point elements could be the first elements to form from neutral hydrogen in these proto star forming clouds. Close examination of the so called “Integral and Fractional Quantized Hall Effect” points to an early stage in the evolution of matter that must have formed in a cryogenic two dimensional “Landau Level” sheet, pierced perpendicularly by the magnetic field of the galaxy; this scenario was inadvertently observed on a small scale in 1980 by Klaus von Klitzing working at the High Magnetic Field Laboratory of the Max Planck Institute in Grenoble.

Volcanic activity here on Earth and on the many Moons of the Solar system is too hot for the current theories to explain their heat sources. The other half of the duality of matter can be the fuel of the atoms and the so called emptiness of the inner nuclei of the atoms may really be the cryogenic world we get a glimpse of with liquid Helium and the confinement of the Quarks in their repulsion of the thermal world. Should we now start to look to physics for evidence for the existence of a non thermal duality of life when a “fuel” of the atoms becomes accepted as reality? The first steps in understanding antigravity and harnessing it may become possible by concentrating our efforts to the cold end of the energy spectrum. Gravitational input (cold) is conserved in the solar wind to drive outputs (hot) of over one mil. deg. K. in the corona of the Sun, and the acceleration of the charged particles to an even greater speed (when according to current wisdom they should be slowed down) are evidence of some real substance escaping the Sun.

Such substance is lacking in the General Theory of Relativity.

**References**

1. Referring to an error in Einstein’s 1913 special theory of relativity by Gerald Pellegrini (New Scientist Sept. 95) Herbert Dingle in *Science at the Crossroads* (1972)

Karl Teppo
23 Rumourer Sturt
Mermaid Waters 4218
Queensland Australia
Corrigenda
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Page 31 after equation (3) should read:

"... The gravitational field determines the property of the gravitational wave..."

Page 31, col. 2, lines 13-14 should read:

"... obtained a four-soliton solution and the collision between two of them..."

Page 31, after equation (9) insert:

\[
R = -\frac{1}{2} g^{\phi \phi} \frac{\partial^2 g^{\mu \nu}}{\partial x^\mu \partial x^\nu} - \Gamma^{\phi \phi} \Gamma_{\mu \nu} (10)
\]

Page 31, equation (12) should read:

\[
g^{\phi \phi} \Gamma^{\mu \nu} \frac{\partial^2 g^{\mu \nu}}{\partial x^\mu \partial x^\nu} = \frac{1}{2} g^{\phi \phi} \frac{\partial g_{jk}}{\partial x^k} - \frac{1}{2} g^{\phi \phi} \frac{\partial g_{jk}}{\partial x^k} + \frac{1}{2} g^{\phi \phi} \frac{\partial g_{jk}}{\partial x^k}
\]

Addendum to Monstein and Wesley (Vol. 3, Nr. 2, pp. 33-37)

The value of the absolute velocity of the solar system \( v_o \) in Table 1 above was computed neglecting the Earth's orbital velocity about the sun; because the Earth's orbital velocity, being only about 10% the absolute velocity of the solar system is smaller than 1/4th the experimental error found. However, when the Earth's known orbital velocity is subtracted off (as it should be in principle), a discernable improvement is achieved. From the accumulated data to 11 April 1996, subtracting off the Earth's orbital velocity, yields a solar system velocity of \( v_o = 340 \pm 150 \) km/s, \( \alpha_o = 9.4 \pm 3.1^\circ \), \( \delta_o = -8.1 \pm 16.0^\circ \).