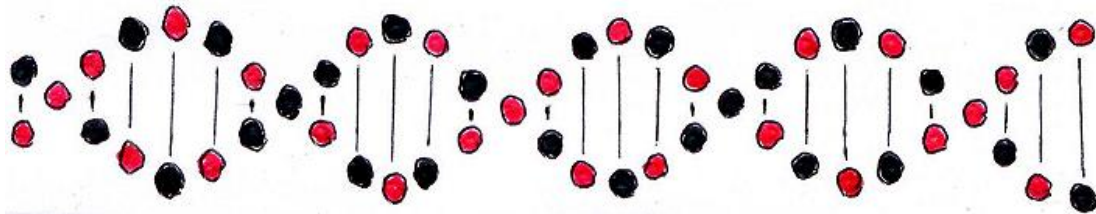


Einstein's Big Mistake

*Frederick David Tombe,
Belfast, Northern Ireland,
United Kingdom,
sirius184@hotmail.com
7th October 2020*



Introduction

I. Einstein overlooked the fact that the speed of light, as it occurs in the Lorentz transformation equations, is determined by the density and elasticity of a physical medium which pervades all of space, and which acts as the medium for the propagation of light waves [1]. This fact had already been established by Scottish physicist James Clerk Maxwell, (1831-1879), who happened to die in the same year that Einstein was born. The physical medium in question was known to Maxwell as the *luminiferous medium* although Einstein later referred to it as a *Lichtäthers (luminiferous aether)*. Maxwell provided us with a reasonably clear picture of what the physical structure of this medium would need to be. He proposed that all of space is filled with a sea of molecular vortices comprised of tiny aethereal whirlpools, each surrounded by electric particles [2]. This was an idea, which according to Tesla in 1907 [3], had in essence, long been known to men of old.

Long ago he (mankind) recognized that all perceptible matter comes from a primary substance, of a tenuity beyond conception and filling all space - the Akasha or luminiferous ether - which is acted upon by the life-giving Prana or creative force, calling into existence, in never ending cycles, all things and phenomena. The primary substance, thrown into infinitesimal whirls of prodigious velocity, becomes gross matter; the force subsiding, the motion ceases and matter disappears, reverting to the primary substance. Nikola Tesla, 1907

It was certainly known to John Bernoulli the Younger in the eighteenth century [4].

The Special Theory of Relativity

II. Einstein's *Special Theory of Relativity* first appeared in a paper entitled "*Zur Elektrodynamik bewegter Körper*" which was received for publication in Bern, Switzerland, on 30th June 1905 [5]. The Lorentz transformation equations appeared in this paper, although they had already been broadly established by Hendrik Lorentz and Sir Joseph Larmor in the previous decade [6], [7], *in conjunction with a luminiferous medium!* See **Appendix A**. Einstein was inspired by the symmetry inherent in electromagnetic theory which is observed in the case where an electric current is induced in a conducting coil when a bar magnet is moved into it. The result is exactly the same whether the magnet moves into the coil or the coil moves over the magnet. In order to rationalize with this observation, Einstein considered two of Maxwell's equations which happen to exhibit a perfect symmetry when expressed in electrostatic units. This perfect symmetry comes in conjunction with an overt expression of the speed of light 'c', but it is totally unrelated to the symmetry mentioned above. The two equations in question,

$$\nabla \times \mathbf{B} = (1/c) \partial \mathbf{E} / \partial t \quad (1)$$

$$\nabla \times \mathbf{E} = -(1/c) \partial \mathbf{B} / \partial t \quad (2)$$

are respectively the differential (curl) version of Ampère's Circuital Law, *with Maxwell's displacement current*, and the Maxwell-Faraday Law of Induction (time-varying case), also a differential (curl) equation. Einstein found a way to maintain the mathematical form of these two equations under a Lorentz transformation, although this wasn't able to be demonstrated correctly until Poincaré published his Palermo paper [8]. See **Appendix B**. This paper was received on 23 July 1905 and published in 1906. Henri Poincaré's Palermo paper introduced the concept of *four-vectors*, an ingenious mathematical tool which is essential to the analysis, and which exposes the existence of what we now know as *four-dimensional space-time*. The four-vector invention was in some respects the modification to Sir William Rowan Hamilton's quaternions, that was needed to make them fully useful in electromagnetic theory. Maxwell missed out on this tool, although in his 1873 treatise, he did inadvertently demonstrate the futility of quaternions within the context of electromagnetism. Hamilton, in 1843, had in effect substituted the imaginary part of a complex number with a *three-vector*. It is as if Poincaré then puts the imaginary part back in again, but this time in place of the scalar component. The term *imaginary* is somewhat misleading in the context. It simply refers to the use of the square root of minus-one as an algebraic tool. All physical concepts involved are real.

Einstein's Folly

III. The symmetry inherent in his 1905 *Special Theory of Relativity* arises from Einstein's belief that no physical medium is required for the propagation of light waves. He therefore used one absurdity to justify another absurdity. Firstly, it is absurd to suggest that light, being a wave, doesn't require a physical medium of propagation. A wave is by definition, a propagated oscillation in a physical medium. Secondly, it's the symmetry in Einstein's special relativity which leads to the absurd implication that two clocks in relative motion would each be ticking slower than the other. None of these absurdities would exist if the Lorentz transformation equations were to be applied in conjunction with the luminiferous aether, as they were originally intended to apply. The Lorentz transformation equations are mathematically identical to Einstein's special theory of relativity, but when applied as originally intended by Larmor and Lorentz, in conjunction with the luminiferous medium, the physical implications are no longer absurd. Many of the experiments which are claimed today as evidence of Einstein's theories of relativity are in fact merely evidence of aether wind theory, in conjunction with Maxwell's sea of molecular vortices. The important difference though, is that the aether provides an absolute physical rest frame, entrained within the Earth's gravitational field, and this means that there are no paradoxes associated with time. The time variable in the Lorentz transformation equations simply refers to the frequency of the physical processes within the molecular structure of a moving body.

So, when motion through the luminiferous medium causes GPS satellite clocks in orbit to tick slower than the ground clocks, this is simply due to a physical interaction between the caesium atoms within the mechanism of the atomic clocks and the luminiferous medium itself, and we are in no doubt that it is the satellite clocks, and not the ground clocks, which will tick slower as a consequence of this motion [9]. In actual fact, the satellite clocks tick faster than the ground clocks, but this is because of an additional dominant effect related to the Earth's gravitational field strength. Time dilation, within the context of aether wind theory, will not however involve a slowing down of actual time, and it will not involve any clock paradox since there will be no symmetry. The motion of ponderable matter through Maxwell's sea of molecular vortices will cause a shear interaction that results in an increase in the internal aether pressure, which will in turn cause all the atomic and molecular processes to slow down. This is just Dan Bernoulli's Principle. The frequency change in the atomic clocks is not the same thing as the actual time dilation that is inferred by Einstein's special relativity after he foolishly overturned centuries of wisdom by casting out the aether. The Earth will

still complete an orbit of the Sun, relative to the background stars, in a time period defined as *one year*, and this standard of time will apply equally to all observers throughout the universe, no matter how fast they are moving. Their own individual motion cannot alter the Earth's orbital period around the Sun, and so it cannot alter the measurement of actual time.

Had Einstein performed the exact same mathematical analysis that he performed in the kinematical part of his 1905 paper, but instead retained the luminiferous aether, he would have obtained the exact same results, because the analysis takes place over a return path. But by removing the luminiferous aether, that being the very physical medium within which light waves propagate, Einstein opened the door to the absurd idea that light is always measured to have the same speed, irrespective of the speed of the receiver.

The Back-Pedalling

IV. In 1920, when Einstein re-introduced the aether during an address at the University of Leiden, it was only a half-baked aether, more aimed at explaining gravity than explaining electromagnetic induction. In fact, it explained neither. Einstein proposed no structural details and it certainly wasn't Maxwell's aether. Ten years later in 1930, Paul Dirac proposed that all space is pervaded by a sea of electrons and positrons. Things were getting back on track again, but unfortunately the *Dirac Sea* was never applied to electromagnetic wave theory, where it should have been applied [10], [11], [12], [13].

Maxwell and Einstein

V. We often hear it said that Einstein's special theory of relativity follows on naturally from Maxwell's theory. This statement is simply not true. It could however be argued that the Lorentz transformations do follow from Maxwell's equations, but only once we have introduced the concept of an aether wind. Following the death of Maxwell in 1879, attention soon swung towards the physical detection of the luminiferous medium by virtue of the Earth's motion through space. In 1887, the famous Michelson-Morley experiment was conducted in an attempt to detect this motion, and the ensuing null result caused much confusion. While it was interpreted by some, such as George Stokes, to mean that there is no aether wind in the immediate vicinity of the Earth [14], others such as Lorentz were nevertheless convinced that the aether wind was having an effect on the Michelson interferometer such as to undermine the expected

fringe shift. In 1889, Oliver Heaviside wrote a paper in which he introduced the concept of a *convection current*, which in effect amounted to an aether wind [15]. It was in connection with an aether wind that the concept of the Lorentz transformations evolved, and the first equation resembling these transformation equations, and applying in this context, appeared as equation (27) in Heaviside's 1889 paper († *see note on Woldemar Voigt at the end of the reference section*). This equation, in conjunction with the title of Heaviside's paper [15], suggested that electromagnetic forces are affected by motion through a dielectric aether. Later that same year, in part based on Heaviside's work, his friend George Francis Fitzgerald proposed the idea that the arm of the Michelson interferometer contracts along its direction of motion through the aether, owing to the fact that the constituent atoms are bonded together by electromagnetic forces [16]. Maxwell had already provided the nuts and bolts of the luminiferous medium. He saw this aether as a dielectric sea of tiny vortices, and he explained how it all linked up to the electromagnetic induction process. It was now just a matter of extrapolating his theory in order to take into account the effects of an aether wind. Had Maxwell still been around during the investigation of the aether wind, it is hardly likely that he would have disregarded the physical substance of the wind itself, the structure of which he had devoted so much time and energy into exposing.

Einstein's special theory of relativity is a counterfeit theory exhibiting an outward form of the Lorentz transformation equations, but with all the vital ingredients relating to electromagnetism having been excised. Far from contributing anything useful to the Lorentz transformation debate, Einstein actually engaged in one of the greatest acts of academic vandalism in the history of science by virtue of disregarding the physical essence underlying the equations that fronted his theory. Einstein's special theory of relativity is a hollow shell of a theory which merely mimics the more substantial Lorentz aether wind approach which went immediately before it.

Ironically, although Hendrik Lorentz envisaged the aether wind to be due to the Earth's orbital motion around the Sun, the weight of evidence arising from the GPS system is that the aether is actually entrained within the Earth's gravitational and magnetic fields, and that hence no aether wind blows as a result of the Earth's orbital motion. This does not however mean that the Lorentz aether theory is wrong in principle. Aether winds are involved in atomic clocks as the GPS satellites orbit around the Earth, but Fitzgerald and Lorentz may not have been correct in their belief that length contraction solves the Michelson-Morley problem.

Appendix A (The Lorentz Transformations)

In 1897, Ulster physicist Sir Joseph Larmor presented equations in a paper which was published in *Philosophical Transactions of the Royal Society* [17]. On page 229, Larmor wrote $x_1 = x\epsilon^{1/2}$, where the more familiar gamma factor, γ , appears in the form $\epsilon^{1/2}$. He probably meant to write, $x_1 = x'\epsilon^{1/2}$, where $x' = (x - vt)$. He also wrote $dt_1 = dt'\epsilon^{-1/2}$, where $t' = t - vx/c^2$. These equations approximate to what we know today as the Lorentz transformations. Then in the year 1900, on page 174 in his article entitled “*Aether and Matter*” [7], Larmor transformed x_1, y_1, z_1 , and t_1 into $\epsilon^{1/2}x', y', z'$, and $\epsilon^{-1/2}t' - (v/c^2)\epsilon^{1/2}x'$.

Whatever the finer details are, because they are not always very clear, Lorentz and Larmor were the two pioneers who first worked on the problem throughout the 1890s. They achieved what they believed to be justification for length contraction, but as regards their twin aim of finding a transformation that would make Maxwell’s equations invariant, this wasn’t possible until Henri Poincaré invented four-vectors in 1905. In that same year, Einstein re-derived the Lorentz transformations in the form below, which is unequivocally that which is used in modern textbooks,

$$\begin{aligned} x' &= \gamma(x - vt) && \text{(1A)} \\ y' &= y && \text{(2A)} \\ z' &= z && \text{(3A)} \\ t' &= \gamma(t - vx/c^2) && \text{(4A)} \end{aligned}$$

Appendix B (The Advent of Four-Vectors)

On page 907 of his 1905 Bern paper [5], Einstein purported to subject Ampère’s Circuital Law and Faraday’s Law to a Lorentz transformation. He wrote these two curl equations out in a perfectly symmetrical format, using Gaussian units, which expose the speed of light, and he expanded them into their three Cartesian components, hence resulting in six equations in total. The primed versions were then displayed on pages 907-908 as seen below, with the solutions shown within the curved brackets. The deliberate gaps which Einstein left in the spacings have been highlighted in yellow,

$$\begin{aligned} 1/c \cdot \partial E_x / \partial t' &= \partial / \partial y' [\gamma(B_z - v/c \cdot E_y)] - \partial / \partial z' [\gamma(B_y + v/c \cdot E_z)] \\ 1/c \cdot \partial / \partial t' [\gamma(E_y - v/c \cdot B_z)] &= \partial B_x / \partial z' - \partial / \partial x' [\gamma(B_z - v/c \cdot E_y)] \\ 1/c \cdot \partial / \partial t' [\gamma(E_z + v/c \cdot B_y)] &= \partial / \partial x' [\gamma(B_y + v/c \cdot E_z)] - \partial B_x / \partial y' \\ 1/c \cdot \partial B_x / \partial t' &= \partial / \partial z' [\gamma(E_y - v/c \cdot B_z)] - \partial / \partial y' [\gamma(E_z + v/c \cdot B_y)] \\ 1/c \cdot \partial / \partial t' [\gamma(B_y + v/c \cdot E_z)] &= \partial / \partial x' [\gamma(E_z + v/c \cdot B_y)] - \partial E_x / \partial z' \\ 1/c \cdot \partial / \partial t' [\gamma(B_z - v/c \cdot E_y)] &= \partial E_x / \partial y' - \partial / \partial x' [\gamma(E_y - v/c \cdot B_z)] \end{aligned}$$

This would not have been possible using the kinematical Lorentz transformations which he had derived on page 902. He would not have been able to introduce the beta

factor, v/c , so symmetrically. The fact that he deliberately left spacings in the equations above hints at the fact that Einstein force fit what he believed the correct result should be, albeit that he was unable to attain this using 3D algebra.

References

- [1] Tombe, F.D., *“The 1855 Weber-Kohlrausch Experiment”* (2019)
<http://gsjournal.net/Science-Journals/Research%20PapersMechanics%20/%20Electrodynamics/Download/7711>
- [2] Maxwell, J.C., *“On Physical Lines of Force”*, Philosophical Magazine, Volume XXI, Fourth Series, London, (1861)
http://vacuum-physics.com/Maxwell/maxwell_oplf.pdf
- [3] O’Neill, John J., *“PRODIGAL GENIUS, Biography of Nikola Tesla”*, Long Island, New York, 15th July 1944, quoting Tesla from his 1907 paper *“Man’s Greatest Achievement”* which was published in 1930 in the Milwaukee Sentinel.
<http://www.rastko.rs/istorija/tesla/oniell-tesla.html>
<http://www.ascension-research.org/tesla.html>
- [4] Whittaker, E.T., *“A History of the Theories of Aether and Electricity”*, Chapter 4, pp. 100-102, (1910)
“All space, according to the younger Bernoulli, is permeated by a fluid aether, containing an immense number of excessively small whirlpools. The elasticity which the aether appears to possess, and in virtue of which it is able to transmit vibrations, is really due to the presence of these whirlpools; for, owing to centrifugal force, each whirlpool is continually striving to dilate, and so presses against the neighbouring whirlpools.”
- [5] Einstein, Albert, *“Zur Elektrodynamik bewegter Körper”*, Annalen der Physik 322 (10) pp. 891-921, Bern, (1905)
http://users.physik.fu-berlin.de/~kleinert/files/1905_17_891-921.pdf
https://en.wikisource.org/wiki/Translation:On_the_Electrodynamics_of_Moving_Bodies
- [6] Lorentz, H.A., *“La théorie électromagnétique de Maxwell et son application aux corps mouvants”*, E.J. Brill, Leiden (1892)
- [7] Larmor, J. *“Aether and Matter”*, p. 174 (1900)
https://en.wikisource.org/wiki/Aether_and_Matter
- [8] Poincaré, Henri, *“Sur la dynamique de l’électron”*, Rendiconti del Circolo Matematico di Palermo 21, pp. 129-175 (1-47), received on 23 July 1905, (1906)
- [9] Tombe, F.D., *“Atomic Clocks and Gravitational Field Strength”* (2017)
https://www.researchgate.net/publication/319366888_Atomic_Clocks_and_Gravitational_Field_Strength

[10] Tombe, F.D., “*The Positronium Orbit in the Electron-Positron Sea*” (2020)
<https://www.researchgate.net/publication/338816847> The Positronium Orbit in the Electron-Positron Sea

[11] Tombe, F.D., “*The Double Helix Theory of the Magnetic Field*” (2006)
Galilean Electrodynamics, Volume 24, Number 2, p.34, (March/April 2013)
<https://www.researchgate.net/publication/295010637> The Double Helix Theory of the Magnetic Field

[12] Tombe, F.D., “*The Double Helix and the Electron-Positron Aether*” (2017)
<https://www.researchgate.net/publication/319914395> The Double Helix and the Electron-Positron Aether

[13] Lodge, Sir Oliver, “*Ether (in physics)*”, Encyclopaedia Britannica, Fourteenth Edition, Volume 8, pp. 751-755, (1937)
<http://gsjournal.net/Science-Journals/Historical%20PapersMechanics%20/%20Electrodynamics/Download/4105>
In relation to the speed of light, “*The most probable surmise or guess at present is that the ether is a perfectly incompressible continuous fluid, in a state of fine-grained vortex motion, circulating with that same enormous speed. For it has been partly, though as yet incompletely, shown that such a vortex fluid would transmit waves of the same general nature as light waves— i.e., periodic disturbances across the line of propagation—and would transmit them at a rate of the same order of magnitude as the vortex or circulation speed*”

[14] Stokes, George Gabriel, “*On the Aberration of Light*” Philosophical Magazine 27, pp. 9–15 (1845)

[15] Heaviside, O., “*On the Electromagnetic Effects due to the Motion of Electrification through a Dielectric*”, Philosophical Magazine, series 5, 27, pp. 324-339 (1889)
https://en.wikisource.org/wiki/Motion_of_Electrification_through_a_Dielectric

[16] Fitzgerald, G.F., “*The Ether and the Earth’s Atmosphere*” Science, Volume XIII page 390 <https://archive.org/details/science131889mich/page/390/mode/2up>
https://en.wikisource.org/wiki/The_Ether_and_the_Earth%27s_Atmosphere

[17] Larmor, J., “*Dynamical Theory of the Electric and Luminiferous Medium*”, Philosophical Transactions of the Royal Society, Part III, p.229 (1897)
<https://royalsocietypublishing.org/doi/pdf/10.1098/rsta.1897.0020>
https://en.wikisource.org/wiki/Dynamical_Theory_of_the_Electric_and_Luminiferous_Medium_III

† In 1887, Woldemar Voigt formulated equations which bore a striking resemblance to the Lorentz transformations, but these applied in the context of the Doppler effect, which is a concept that is not entirely unrelated to the distortion of electromagnetic fields in an aether wind.)