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The Complete Theory of Relativity and How it Uses the Existence of Two Naturally Occurring Energy Momentum Theorems to Resolve the Problem of Massive Lightspeed Particles

Robert J. Martineau*

NASA Goddard Space Flight Center, Washington, D.C, USA

Abstract

For over 100 years Einstein's theory of Relativity has been incomplete, capable of explaining the relativistic behavior of slow particles, but not of those that travel at the speed of light. We will remedy this situation by examining the origin of this problem and what can be done to eliminate it. Hence the need to discuss the physical origin of relativity if we want to end up with a new and much improved theory of relativity, a Complete Theory of Relativity, a goal we have now achieved.

Keywords: Theory of Relativity • Speed of light • Einstein's theory

Introduction

The world consists of two types of particles, slow particles and those that travel at the speed of light. To be of any use, relativity must be able to describe the relativistic behavior of each type. It is wrong and counterproductive to concentrate solely on the slow particles and neglect lightspeed particles believing you won't be missing very much, even if that results solely in the relativistic theory of slow particles, that is the Einstein theory. We must never forget that lightspeed particles are in the vast majority, even if that doesn't appear to be true in the world around us. For most cases, the Einstein theory works very well, so it is easy to imagine that this is all there is. Only after repeated failed attempts to explain the motion of faster particles as their speeds approach the speed of light does there appear to be something extremely wrong with Einstein's theory. Massive photons do travel at the speed of light. Massive neutrinos do undergo neutrino oscillation while moving at the speed of light as determined by the Nobel Prize Committee. How can the Committee justify awarding the 2015 Nobel Prize for the discovery of neutrino oscillation of massive neutrinos traveling at the speed of light, when the theory of relativity says this can't happen. Clearly the theory of relativity is in need of significant changes. It has ignored the origin of particles traveling at the speed of light for too long.

It is not a coincidence that the speed of light is the same everywhere and is available everywhere as needed. The speed of light and its uniformity are necessary ingredients for relativity to apply anywhere. These are facts that must be explained, and are addressed by Point Particle Physics. If one goes back to its origin before molecules and other macroscopic particles came into existence, the universe had a uniform background structure devoid of any features. At that time we take it to be composed of an infinite number of point particles each of which travels at the speed of light. This is what makes the speed of light available everywhere and resolves the issue of how this comes about.

Point Particle Physics

In this paper we introduce the concept of Point Particle Physics and show that it leads to a complete theory of relativity of all particles, both those that travel at the speed of light and those that don't. Presently Einstein's relativity based on E=mc^2 and the associated energy momentum theorem apply to particles that don't travel at the speed of light but not to lightspeed particles. Through the ages, many errors have been generated in attempts to use Einstein's relativity on all particles. These errors will be corrected leading to a unified, error free theory of relativity.

We live in a universe consisting of an infinite number of space time points. In order to make the universal substrate as uniform as possible and realizing that the speed of light is the same everywhere, we take each of these points to travel at the speed of light. In a rectilinear coordinate system this would be

$$u_x^2 + u_y^2 + u_z^2 = c^2 \quad (1)$$

If we now use the z axis for translation with $u_z = v$ and the perpendicular x-y plane for rotation, we get $u_x^2 + u_y^2 + v^2 = c^2$, or

$$u_x^2 + u_y^2 = c^2\left(1 - v^2/c^2\right) = c^2/\gamma^2, \quad (2)$$

Where $\gamma = \left(1 - v^2/c^2\right)^{-}$ may be recognized as the Lorentz Factor. The total velocity of a point as it travels down the z axis is

$$u_x^2 + u_y^2 + v^2 = c^2/\gamma^2 + v^2 = c^2 \quad (3)$$

It is composed of a translational part, v, and a rotational part c/γ.

Energy Momentum Theorems

The Universe around us seems to be composed of only two types of particles, those that travel at the speed of light and those that do not. Why is that? What fundamental laws cause this to happen? It is easy enough to imagine a universe that begins with an infinite number of point particles all travelling at the speed of light, but what would cause this type of universe to evolve into the one we have now, one composed of both types of particles, and what rules the universe the way it is now composed?

Rotating point particles traveling at the speed of light introduce the Lorentz factor $\gamma^2(1 - v^2/c^2) = 1$. The Lorentz Factor is quadratic, and introduces a second factor $v^2/c^2 + 1/\gamma^2 = 1$. The two factors $\gamma^2(1 - v^2/c^2) = 1$ and $v^2/c^2 + 1/\gamma^2 = 1$ allow for the existence of two different types of particles, those that travel at the speed of light, and those that don't. Each is used to generate relativistic energy momentum theorems as follows: If we take $\gamma^2(1 - v^2/c^2) = 1$ and multiply it by $E^2 = m^2c^4$ we get

***Address for Correspondence:** Robert J. Martineau, NASA Goddard Space Flight Center, Washington, D.C, USA, E-mail: rjl.martineau@yahoo.com*

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$E^2 - c^2P^2 = E_o^2$ (Einstein) (4)

Where

P = mV, E = mc², E = γE_0, and

E_0 is the value of E at v= 0.

If we take $1/\gamma^2 + v^2/c^2 = 1$ and multiply it by $E_0^2 = m_0^2c^4$ we get

$E_0^2/\gamma^2 + E_0^2v^2/c^2 = E_0^2$ or $E^2 + c^2P_0^2 = E_0^2$, (Photodynamics) (5)

where

$E = E_0/\gamma = m_0c^2/\gamma = mc^2$.

$m_0 = m\gamma$, $P_0 = m_0V$, P = mV.

For the Einstein energy momentum theorem, we notice that $E = \gamma E_0$ that is $E \to \infty$ as v gets larger, tending to the speed of light. This is why present day relativity based solely on $E = mc^2$ and the associated energy momentum theorem fails to apply to all particles and must be replaced for light speed particles.

For Photodynamics, we notice that $E \to E_0/\gamma$ and goes to zero as the particle's speed goes to infinity. There is nothing in Photodynamics preventing a particle from achieving and traveling at the speed of light. In fact, we will see, in the section on photodynamics, that minimization of the internal energy of these particles drive them to the speed of light resulting in the particle's rotation becoming zero as the translational speed approaches the speed of light.

Photonic Behavior, a Room Full of Miracle

We take the world of lightspeed particles for granted. They do not make a constant impression on us like the world of particles constituting massive objects that surround us with their constant presence. There are several massive lightspeed particles that we could talk about like photons, gravitons, gluons, and neutrinos. We will focus on the photon, but we should not forget about other massive particles moving at the speed of light.

Imagine you are in a room looking at a painting of an old military battle with men on horses holding spears, etc. You focus on the tip of one spear and realize that it is sending a stream of photons towards your eyes in order to be seen. The photons are constantly being replaced in time as you look at the spear. If you move your head to the right, you realize that a similar stream of photons is being sent by the spear in that direction, in fact in all directions. Not only is this true for the tip of the spear, but it is true for every other point on the painting. The room is constantly being filled by these streams of light, whether or not you are in the room to observe them. Your eye is not sending out any signals to make this happen. It just represents one point on the other side of the room from the painting. In fact, the tip of the spear is sending out the same image to every other point on your side of the room whether or not there is an eye there to receive it. All these photons are flying through the air simultaneously. Beams of photons are emerging from every point in the room and continue to do so without effectively interfering with each other, a miracle and a real mystery as to how this can happen. As you leave the room, any room, you leave behind you a room full of miracles.

To help a bit to understand what is going on, it helps to remember that this room is also full of point particles of the underlying space time constantly providing uniformity to the existence and basic motion of the photons. Each photon and each particle has translational velocity, v, and rotational velocity $v_x^2 + v_y^2 = c^2/\gamma^2$ leading to a total velocity of c²

$v_x^2 + v_y^2 + v^2 = c^2/\gamma^2 + v^2 = c^2$. (6)

A photon at rest is all rotational energy. Even at rest, it is moving at the speed of light. Upon release it begins to move down a given axis, and its previously confined internal energy, subject to energy minimization, is now released as translational energy. Then the photon quickly uses its rotational energy as a propellant as it accelerates down the axis to the speed of light. In time, a very short time, it has no rotational energy, only translational energy. This is the way we encounter most photons. Some have travelled only a short distance, while others may have travelled millions of miles. This type of behavior is built into the energy momentum theorem which is summarized by the equation $E=E_0/\gamma$. As the velocity increases, its energy is driven to zero, or, to read the equation a different way, minimization of internal energy drives the photon to the speed of light. For ordinary massive objects, like nuts and bolts, the energy goes like $E = \gamma E_0$, and does not decrease with velocity. You need to supply energy if you want such a massive particle to go faster. What we have been doing is showing how the equations of Photodynamics work, and why they are absolutely necessary to describe the motion of photons and other particles that travel at the speed of light. Nobody has ever been able to describe the motion of photons before our Photodynamics became available in 2018 [1-4].

Critical Components Which Led to the Complete Theory of Relativity

It was not possible to construct the Complete Theory of Relativity until a list of critical components became known. Not only is the list important, but the manner in which they become available is also crucial. The components are strongly related and depend on each other for their existence We have identified a list of 4 of these critical components as we examined the origin of the Complete Theory of Relativity. These are:

1. The world has to be composed of two types of particles, slow particles and those that travel at the speed of light. These types of particles are not closely related, like fast and faster, but are different in kind.

2. Each type of particle must have its own energy momentum theorem. So there is also the need for a mechanism which produces two independent energy momentum theorems from these particles.

3. Such a mechanism arises if individual points of space time have translational and rotational velocities resulting in their motion at the speed of light. If this is so, then these components of a particle's speed are related by the Lorentz factor. Since the Lorentz factor is a quadratic form, it contains another independent factor of the same kind. These two quadratic factors are then used to create the two independent energy momentum theorems needed.

4. Finally we come to Point Particle Physics, needed not only for the theory of relativity, but for all of physics. Point Particle Physics refers to the fact that space time, devoid of molecules and other such particles, is a uniform substrate containing an infinite number of point particles each traveling at the speed of light as described above. It provides the mechanism required to create the two energy momentum theorems needed for the two components of the Complete Theory of Relativity described in Section 3.0 above [1, 5-17].

Concluding Remarks

In this paper we have presented a number of findings which should be highlighted lest we lose sight of them in the rush, when they deserve to be again the center of attention and consideration. This list of significant findings will hopefully help readers to remember discoveries he made along the way.

List of significant findings

1. The underlying structure of space-time is composed of point particles each of which has rotational and translational velocities.

2. If c/γ is the magnitude of the rotational velocity and v the magnitude of the translational velocity, then $c^2/\gamma^2 + v^2 = c^2$, that is, each point particle moves at the speed of light even if it is at rest.

3. The existence of similar point particles each moving at the speed of light provides uniformity to the resulting space-time before various processes begin to build the world we know out of them.

4. Most important of all, the world of point particles moving at the speed of light introduces the Lorentz factor $\gamma(1 - v^2/c^2) = 1$ from which two energy momentum theorems may be constructed: the Einstein Energy Momentum Theorem and that of Photodynamics.

5. The two energy momentum theorems result in the existence of two types of particles, those that travel at the speed of light and those that don't.

6. Einstein's theory of relativity applies only to particles that do not travel at the speed of light.

7. Without Photodynamics, relativity would not cover any particle that travels at the speed of light.

8. Photodynamics allows massive particles that travel at the speed of light to exist. Besides photons, this includes gravitons, gluons, and neutrinos all of which together constitute the vast majority of particles.

9. For the first time in its history, Physics is capable of explaining the motion of all particles in the Universe.

10. The energy of a particle depends on its velocity in two different ways. For Einstein's energy momentum theorem its energy goes like $E = E_0 \gamma$ and for Photodynamics it goes like $E = E_0 / \gamma$.

11. $E = E_0 \gamma$ of the Einstein theory prevents a particle from going faster unless more energy is provided. An infinite amount of energy is required to reach the speed of light, so according to Einstein, photons do not exist. The $E = E_0 / \gamma$ of Photodynamics makes the particle energy smaller as it goes faster and allows photons to exist.

12. The photon is capable of self propulsion wherein it consumes its internal energy to generate forces which accelerate it in the direction of flight until all its internal energy has been consumed and it has reached the speed of light. This is a breakthrough in particle propulsion and evolution.

13. Photodynamics explains how CMB photons can lose energy for 13.8 billion years and continue to travel at the speed of light. This is a breakthrough in cosmology.

14. Photodynamics provides the physical mechanism which allows neutrinos to possess non-zero rest masses, travel at the speed of light, and undergo neutrino oscillation at the same time. This is a breakthrough in neutrino astrophysics, one which confronts and resolves the problem posed by the 2015 Nobel Prize in Physics. How can massive neutrinos travel at the speed of light?

15. As seen in a different light, the existence of CMB photon cooling and neutrino oscillation at the speed of light is experimental verification of Photodynamics, as is the existence of massive photons, gravitons, gluons, and neutrinos traveling at the speed of light.

References

1. Martineau, Robert J. "Photodynamics: How massive photons, gravitons, gluons and neutrinos manage to travel at the speed of light." *J Phys Math* 9 (2018): 2090-0902.
2. Greene, B. "The Hidden Reality: Parallel universes and the deep laws of the cosmos. New York, NY: Alfred A. Knopf." (2011).
3. Alpher, Ralph A and Robert Herman. "Evolution of the universe." *Nature* 162 (1948): 774-775.
4. Mather, John and John Boslough. The very first light: The true inside story of the scientific journey back to the dawn of the universe. Basic Books (2008).
5. Cleveland, Bruce T, Timothy Daily, Raymond Davis Jr and James R. Distel, et al. "Measurement of the solar electron neutrino flux with the homestake chlorine detector." *Ap J* 496 (1998): 505.
6. Bahcall, John N. "Solar neutrinos. i. theoretical." *Phys Rev Lett* 12 (1964): 300.
7. Davis Jr, Raymond. "Solar neutrinos. ii. experimental." *Phys Rev Lett* 12 (1964): 303.
8. Davis Jr, Raymond, Don S. Harmer and Kenneth C. Hoffman. "Search for neutrinos from the sun." *Phys Rev Lett* 20 (1968): 1205.
9. Pontecorvo, Bruno. "Neutrino experiments and the problem of conservation of leptonic charge." Sov. Phys. JETP 26 (1968): 165.
10. Gribov, V and B. Pontecorvo. "Neutrino astronomy and lepton charge." *Phys Lett* B 28 (1969): 493-496.
11. Wolfenstein L (1976) Neutrino Oscillation of Atmospheric Neutrinos in Matter. *Phys Rev D* 17; 2369.
12. Fukuda, Yoshiyuki, T. Hayakawa, E. Ichihara and K. Inoue, et al. "Evidence for oscillation of atmospheric neutrinos." *Phys Rev Lett* 81 (1998): 1562.
13. McDonald, Arthur B, Joshua R. Klein and David L. Wark. "Solving the solar neutrino problem." *Sci Am* 288 (2003): 40-49.
14. Ahmad, Q. Retal, R. C. Allen, T. C. Andersen and J. D. Anglin, et al. "Measurement of the Rate of ν e+ d⟶ p+ p+ e− Interactions Produced by B 8 Solar Neutrinos at the Sudbury Neutrino Observatory." *Phys Rev Lett* 87 (2001): 071301.
15. Kalbfleisch, George R, Neil Baggett, Earle C. Fowler and Joshua Alspector. "Experimental comparison of neutrino, antineutrino, and muon velocities." *Phys Rev Lett* 43 (1979): 1361.
16. Longo, Michael J. "Tests of relativity from SN1987A." *Phys Rev D* 36 (1987): 3276.
17. Shrock, Robert, ed. "Neutrinos and Implications for Physics Beyond the Standard Model." *World Sci* (2003).

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