

Speed of light and Maxwell's constant (Relative Relativity)

Introduction

The speed of light is the most famous natural constant. The value of many parameters, and also the validity of many theories and postulates, was based on its size. In fact, it is a speed of moving of photons as quanta of electromagnetic radiation. The size of this fundamental physical constants is determined - on the one hand - on the basis of values obtained by measuring, and on the other hand - on the basis of electro magnetic theory by J. C. Maxwell (James Clerk, 1831-1879). Namely, in his "Dynamic theory of electromagnetic fields" published in the 1865th The Maxwell defined constant which determines the relation between electric and magnetic phenomena, where the relationship - in a dimensional sense represented speed and had a very close numerical value to measured value of speed of light.

Although this fact was only emphasizing fact that the light has electromagnetic nature, these two highly related but essentially different, natural categories were completely equalized and completely associated not only in terms of quantity but in terms of quality also! Unfortunately, even bigger mistake was made when this "unified" velocity value was adopted as "the greatest possible speed of any phenomenon in nature", and then it became a key value of the Lorentz transformations.

This is one of the most important, although unintentionally committed (procedural) errors in the development of scientific thought, because with this mistake we lost an entire world - a world that is an integral part of the existing reality, but completely inverse for the one that we know. First world which is measurable and perceptually accessible to us, we call reality. The second one, extremely far from our senses but quite familiar with our experience although it is not directly measurable, also exist as a real component of one higher reality we live in. This "lost world" we only can anticipate, theoretically we are describing as a virtual. By accepting the heterogeneity of named categories, with "disuniting" their values and with adopting Maxwell's constant, instead of the speed of light, as a key value of Lorentz transformation we will significantly expand the realm of reality covered by existing theories, including an entirely "new" world in which the photon is "normal" particle with full real-remaining mass and in which all current virtual structures such as the "dark mass", "dark energy", "exoteric matter" and so on are "translated" into the realm of the real world ...

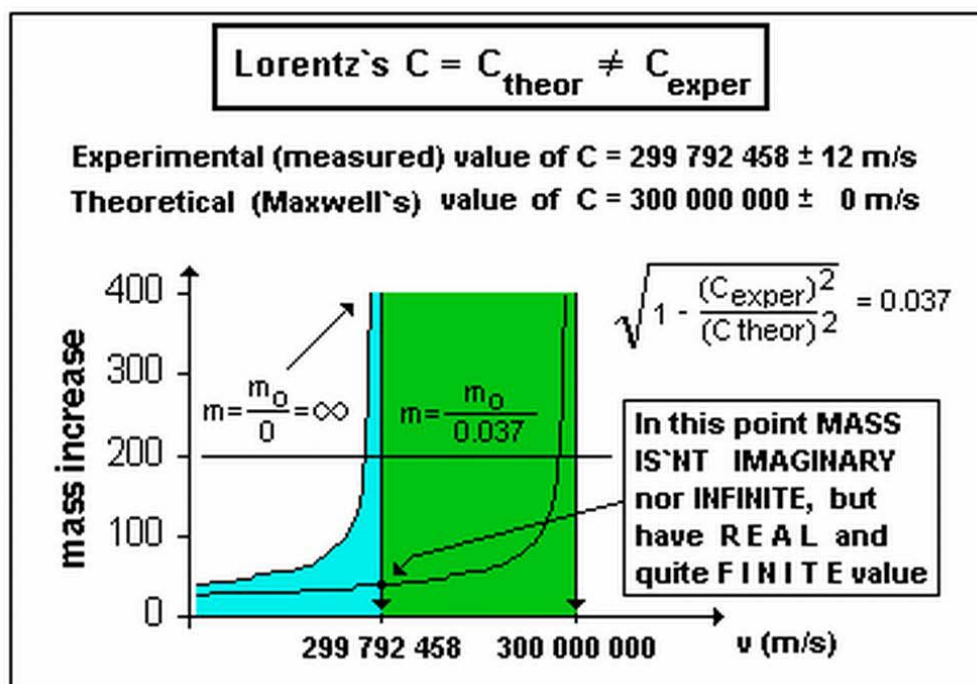
The maximum possible speed in nature

In our opinion, based primarily on analysis of original works Coulomb (Charles-Augustin de Coulomb, 1736 to 1806) and Maxwell, the measured speed of light should not be equated, and certainly not equalized with Maxwell's constant, because they are related, but structurally totally different forms - a completely analogous to the concepts of electromotive force (E) and voltage (U) in the electric circuit, which are also very similar but still significantly different sizes. More importantly, the value of Lorentz constant which determines the quantity of relativistic effects, certainly should not be

defined based on measured values of the speed of light, ie. experimentally measured velocity of the photon!

In fact, Lorentz transformations are the basis of the theory of relativity. The quantity of relativistic effects (weight increase, length contraction, time dilatation ...) depends on the value of the constant gamma, $\gamma=1/\sqrt{1-(v/c)^2}$ where the parameter "c" represents the highest possible speed in the nature and that is - according to current conventions - the speed of light, whose value is mistakenly identified with the value of Maxwell's constant. And there is a problem. In accordance with this definition of the Lorentz constant, particles with no real rest mass can't reach the speed of light, and on the other hand, photon, which is (however) moving at that speed, is defined as "particle" with no real rest mass and has a virtual mass $m = E / c^2$, which is - although paradoxically - widely accepted.

What we suggest is conceptual separation of the measured speed of light, and Maxwell's constant, so that to the quantity of the "c" (which, in our view, in the Lorentz transformations is the theoretical value of the "greatest possible speed" of movement in nature) should not be assigned the value of the measured speed of light as it is now, but the value of Maxwell's constant. Due to fact that its size is slightly, but still a bit higher than the speed of light, that value would actually have to be the real Lorentz "theory barrier" and substantial objects completely unattainable speed, which, as such, can never be measured experimentally, but - as Maxwell showed - it can be obtained on the basis of electromagnetic properties of the vacuum.



By adopting of our suggestion, Lorentz transformations remain the same, their invariance is not in question, but a qualitative difference becomes huge because now "Luxon wall" can be achieved, even skipped, without violate to currently valid postulates and / or theories.

Given that consideration of our claims led to the Copernican Revolution in Science, and - I immodest claim – to the third technological revolution, we will try to explain this idea. Let's start from the historically recorded fact.

Historical facts

By studying the movement of Jupiter's satellite Io in the year 1676, Ole Christensen Roemer, showed that light travels at finite speed, and estimated its value at about 300 000 km / sec. In 1848th Hippolyte Fizeau developed his method for measuring the speed of light and got a value of 315 000 km / sec. By improving this method, Leon Foucault at 1862nd, with the new measurements, obtained a value of 298 000 km / sec. In the year 1972. using laser technology, accuracy of a measured speed of light in vacuum has significantly increased and measured velocity was $299\,792\,456 \pm 1.1$ m / s. After several repeated measurements, at the General Conference on Weights and Measures (Conférence Générale des Poids et Mesures, CGPM) held the 1975th, the speed of light in vacuum is definitely determined the value of 299,792,458 m / s, which is used today.

On the other hand, back in the 1856 Wilhelm Eduard Weber and Rudolf Kohlrausch measuring the ratio of electrostatic and electromagnetic constants, by discharging Leyden jar, get the numeric value of that relation which, in value, was very close to the speed of light which was measured by Fizeau. That laid the foundation of Maxwell's theory.

Finally, in the early 1860s, Maxwell showed that, according to electromagnetic theory, on which he just worked, electromagnetic waves in vacuum spread with a speed value almost equal to the relation received over Weber and Kohlrausch. Noticing a large numeric value closeness of this relationship and the value of the speed of light measured by the Fizeau, Maxwell consider this fact as evidence that light has electromagnetic nature, ie. prove the concept that light is in fact an electromagnetic wave, which was 1846, in his paper "Thoughts on Ray Vibrations" stated Michael Faraday. However, we emphasize that Maxwell personally never and nowhere in his theory has identified electromagnetic and electrostatic phenomena with the speed of light.

Maxwell's constant

Maxwell's constant value is indeed slightly higher than the measured speed of light and, with certain conventions that will be explained below, has the value $v = 3 * 10^8$ [m / s]. This "slight" difference has almost no effect at low, medium or even high speeds and this is probably one of the main reasons why Maxwell's constant value was equaled with the speed of light.

If we carefully examine the original work of Maxwell [1], eg.: *"... We may define the ratio of the electric units to be a velocity ... this velocity is about 300,000 kilometers per second. ..."*, we can see that he really nowhere did not say that the speed of light is a universal constant, but is a constant defined as the basic relationship between electrical and magnetic phenomena, with the relationship - in a dimensional sense - is the speed and has a numerical value that is the same order as the speed of light!

Today, in the terminology of modern physics, we can say that the speed represented by Maxwell's constant, and which has a dimension of speed is not the speed of any physical phenomena, electrical, magnetic, light, gravity, or any kind but only a theoretical value of velocity vector sum of the electron spin and propagation perpendicular to the spin while the light speed imply real moving speed of the photons. So Maxwell's constant that represents a speed and not a speed of light is invariant physical barrier of speed propagation for electromagnetic fields in vacuum, and that can be achieved only in theory, indefinitely after spending large amounts of energy, which of course is impossible!

In line with this interpretation of the speed of light may or may not have unchangeable value - but all the current theory postulates remain intact. This is significant because a new study has unequivocally confirmed that the speed of light changed during the history of its value!

Why do we believe that the photon as a "massless particle" (?) reached the velocity barrier, "luxon wall", when Maxwell said [1]:

"It is manifest that the velocity of light and the ratio of the units are quantities of the same order of magnitude. Neither of them can be said to be determined as yet with such degree of accuracy as to enable us to assert that the one is greater than the other. It is to be hoped that, by further experiment, the relation between the magnitudes of the two quantities may be more accurately determined. "

"In the mean time our theory, which asserts that these two quantities are equal, and assigns a physical reason for this equality, are not contradicted by the comparison of these results such as they are."

(Page 436, Volume II)

So Maxwell claims (only) that the speed of light and the ratio of electric and magnetic phenomena ("Ratio of Units") are quantities of the same order of magnitude, which, as two different qualities, may have identical size, ie. numeric value.

Unfortunately, after the publication of Maxwell's theory, in spite of different ideas (Sommerfeld, Heaviside, for example) these two quantities are completely identified which is quite understandable because light is, at that time, the only known phenomenon with this speed.

At the end of the nineteenth century were carried out some experiments to measure the ratio of electro magnetic phenomena (Rowland in 1870, Rosa in 1889, Rosa and Dorsey in 1905) but measurement accuracy was small. The observed differences in obtained values and the measured speed of light was masked with the possible errors in measurement, so emphasis was put on the most precise measurement of the speed of light while measuring the relationship of electromagnetic phenomena was forgotten. However, the fundamental problem of Maxwell's constant and speed of light diversity, though well disguised, stayed there.

That the theory of relativity was published before Maxwell's theory is probably no one doubts that the Maxwell constant numerically close and yet related but qualitatively different physical categories of the measured speed of light. Thus, when TR was published many years later (STR, 1905, GTR, 1916) Maxwell's constant united and equalized with light speed became the mainstay of the Einstein's key postulate - the constancy of the speed of light. Maxwell's notes are forgotten and the speed of light is named for the fundamental natural constant. The fact that the photon must be massless

particles is not considered to be absurd, as it actually is, but it is widely accepted as evidence that light have wave nature.

Why all this year, this error is not detected and corrected?

First, there are very few of those who believe that Maxwell's constant and the speed of light are different qualities. On the other hand, Einstein's authority is really great, TR supported by appropriate experimental evidence so that anything that requires any corrections or contradict the theory in any sense – is not an allowable option for science.

However, the experimental reality points as to the insufficient lack of width of the existing theories, demanding new ideas. In our opinion the solution is very simple. It only takes a small change in the understanding and interpretation of the concept of the highest possible speed in nature as the key size, which determines the value of the Lorentz constant.

Lorentz transformations in the function of Maxwell's constant

Let's look at what is actually Maxwell's constant.

In the modern interpretation of Maxwell's theory, electric and magnetic fields can be spread through space in the form of waves and spread at a rate that depends on the ratio of electric and magnetic constants of free space. That speed is equal to the speed of light and has the value $c = \sqrt{1/\epsilon_0\mu_0}$, where ϵ_0 is the vacuum permittivity (electrical permeance), μ_0 is vacuum permeability (magnetic permeance).

However, the Maxwell terms of permittivity and permeability of vacuum (ϵ_0 and μ_0) were completely unknown at this time because there was no hint of quantum field theory.

In Maxwell's original work his constant has a value:

$$V = \text{sqrt } 1/(\epsilon * \mu),$$

where ϵ represent electric constant and μ magnetic constant of empty space, whose quantity is determined experimentally. Based on available data at that time, Maxwell got the speed : $V = 310\,740\,000 \text{ m / sec}$.

Otherwise, the value of constants ϵ_0 and μ_0 that are used today are not independent values but are function of the adopted Units measurement system. In order to avoid many problems that have brought various systems of units (CGS, Heaviside-Lorentz, Gaussian ...) that have different definitions of size and value, the Italian physicist and mathematician Giovanni Giorgi in 1901. , proposed a very practical system of units.

Following Maxwell's original ideas, Giovanni Giorgi, invented a system of units (Giorgi system), the forerunner of the International System (SI), in which the basic quantity of an expression can be obtained as a function of all ather quantities without any measurements. Thus, instead of experimental measurements of ϵ_0 ili μ_0 , their values can be easily calculated.

System that is proposed by G. Giorgi, known as a practical system, use meter, kilogram and second (MKS) as a measurement units by which is defined value of constant K in Coulomb's law and thereby the value of magnetic permeability, so that in this system they have the following value:

$$K = 9 * 10^9 [\text{Nm}^2 / \text{Coulomb}^2]$$

$$\mu_0 = 4 \pi * 10^{-7} = 1.256637 * 10^{-6} \text{ [Henry/meter]}.$$

By definition in Coulomb law:

$$\epsilon_0 = 1/4\pi * K, \text{ i.e. } \epsilon_0 = 1/36\pi * 10^9 = 8.841941 * 10^{-12} \text{ [Coulomb/Volt*m]}.$$

Hence, it follows that the ratio of electrostatic and electromagnetic constant is:

$$\beta = \text{sqrt } 1/(\mu_0 * \epsilon_0) = \text{sqrt } (36\pi * 10^9 / 4\pi * 10^{-7}) = \mathbf{3 * 10^8} \text{ [meter/sec.]}$$

and this is in fact the real value of Maxwell's constant !

Unfortunately, order of defining procedures of the fundamental physical entities was modified. The value of magnetic permeability μ_0 is accepted by definition and in accordance with the adopted system of units:

$$\mu_0 = 4 \pi * 10^{-7} \text{ [Henry/meter]},$$

and that first step was correct, but value of electric permittivity ϵ_0 was obtained indirectly - on the basis of the measured speed of light instead of its real, original, value arising directly from Coulomb's law ($1/36\pi * 10^9$ C/Vm)! Bearing in mind that the Coulomb's law (in any formulation) is correct only for stationary conditions because the charge in its motion produces a magnetic field which then changes force intensity (these conditions are generally known as "electrostatic approximation"), we consider this procedure as a quite illogical.

Hence the fact - that the constant value of Coulomb's law that defines the intensity of the (line and direction) electrostatic force which acts stationary spot on the second, also immobile, charge, determined through dynamic entities such as the speed of the photon, which is absurd - it is completely ignored and the present value of the dielectric constant of vacuum is defined as follows:

$$\epsilon_0 = 1 / (\mu_0 * c^2) = 8.854171 * 10^{-12} \text{ [farad/meter]},$$

so that Coulomb's constant, instead of its original value based on the adopted Unit measurement system also receives the value indirectly - from the permittivity of vacuum (the value of which, as we have seen, is defined by the speed of light (?) ...):

$$K = 1/4\pi * \epsilon_0 = 8.987569 * 10^9 \text{ [Nm}^2 \text{ / Coulomb}^2 \text{]}.$$

In short, instead of fact that Maxwell constant value should be quite independent of the speed of light (moving speed of the photon) and its value determined only by relations of electromagnetic phenomena whose quantity is derived from the adopted system of units and Coulomb's law, is done quite the opposite! Maxwell's constant is fully equal to the speed of light and the value of electric permittivity and Coulomb constants are predefined and adjusted to the values imposed by the measured speed of light, which is paradoxical because the theoretical-static units are defined on the basis of experimentally-dynamic values!

The consequences are as follows.

The photon as a quantum carrier of EM interactions may not have a real rest mass, which sets it apart from all other existing real objects of our world (!?). Values of ponderous and heavy mass and therefore the actual kinetic and gravitational effects in extreme relativistic conditions are significantly different from those pre-defined by theory of relativity and the difference is more and more greater as far as the real speed is closer to the speed of light. Bearing in mind the existing problems of modern theoretical physics (dark matter, dark energy, exotic matter, teleportation, halted light, ...) that it imposes an experimental reality, this issue should be resolved as soon as possible.

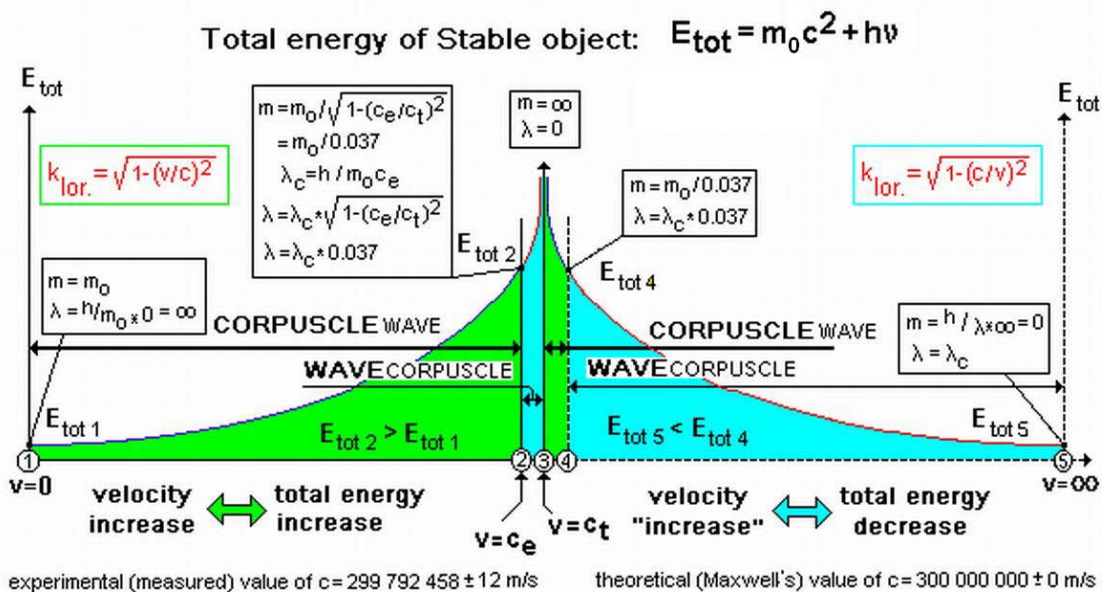
How? Here's proposal.

The difference between the energy of the particles determined by accurately measuring and the value that is obtained based on the relationship of the real distance and time of its flight, gets larger and larger as the real speed of the particle becomes closer to the speed of light. Also, directly measuring of the ratio of electric and magnetic phenomena using modern technology could prove that product ($\epsilon_0\mu_0$) differs from the value of c^{-2} which would lead to major progress in our understanding the structure of matter.

In this way, wave-particle duality of objects could be described in a more natural way - through the symmetry of "sub-luxons" and "super-luxons" entities in our phenomenal world and that in itself represented a union of two equal but inverse/opposite space-time categories.

Conclusion

Maxwell's constant value and speed of light (namely photons velocity) have to be disunited. Releasing Maxwell's constant of join to the measured value of the speed of light and adopting its released, original Maxwell's, value as the greatest possible speed in nature, we will free matter from the shackles of subluminal speed allowing it a new form of existence and the qualities that now depend only on the local-structural properties of the vacuum, where the speed of light itself ie. speed of photons, becomes invariant. The photon is finally transformed into a "normal" particle with real rest mass which he already express in a number of experiments, and all theories and postulates remain valid. What's more - Maxwell's constant that is now free of its dependence on the measured velocity of the photon and the value of which is now structurally related only to the structure of the vacuum and its properties - offering us a whole new image and the possibility of seeing, understanding and interpretation, as the quantum, and relativistic world. This is of crucial importance for modern physics because the structure of the vacuum does not - or can have, nor anything in nature - the absolute attributes, which confirms the practice.



And in the end – the most beautiful part... If we accept that a photon has a real rest mass, just like all other known stable particles, their structure can be explained in function of a more primary entities, the basic bricks of our world, from which everything is made up - from atoms to the largest celestial bodies including, of course, and all forms of life.

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In Belgrade, 06.05.2011.g.

Goran Marjanovic, BscTr