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The Speed of Light on Atomic and Nuclear Levels

Salah Eid

Faculty of Arts, Suez Canal University, Ismailia, Egypt

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Abstract: The unit of radiation is not the photon, but it is the electron itself moving with the speed of light outside or inside nuclear range when it interacts momentarily with another electron bearing the same charge on atomic level or interacts constantly on nuclear level with one of two particles bearing the opposite positive charge. The positron forming with it gamma ray or a proton forming the neutron from which beta the speedy electron is emitted. In all these cases the electron moves with c speed when the interaction between it and the other charged particle takes place at a distance equaling the basic nuclear diameter $r = 2.8 \times 10^{-15} m$. The speed of the electron c on nuclear level is exceeded when the mentioned distance r is shorter than its value, being for example the nuclear radius or shorter than its value, and this explains the energy of gamma exceeding 1.02 MeV or beta exceeding 0.55 MeV.
We are going to prove this fact about the speed of light through the universal unifying constant U we came to some years ago.

Keywords: Speed of light, Nuclear levels, Atomic levels

1 Introduction

Physicist James Franson announced in New Journal of Physics [1] that the speed of light as described by the theory of relativity is actually lower than has been thought. Franson's arguments are based, as it is well known now, on observations made of the supernova $SN1987A - it$ exploded in February 1987 when the arrival of light (or its so-called photons) as picked up on the Earth was later than expected by 4.7 hours. After the attention of physics community aroused around this subject it is a necessity now to explain the fact about the speed of light on its two levels outside and inside nuclear range through our unifying constant U.

1.1 What unifying constant U is?

I came to this constant some few years ago as follows [2]:

$$m_g v^2 r = \frac{e^2}{4\pi\varepsilon_0} = 2.80 \times 10^{-28} J - m \qquad (1)$$

Where the electron's mass moves with velocity v at distance r from another charged particle being another electron with the same negative charge on atomic level, or positron or proton with the positive charge on each of them on nuclear level. The fantastic fact here is that when the distance r has exactly the value of basic nuclear diameter $2.8 \times 10^{-15} m$ [3]. In these two levels, then the velocity of the electron m_e in this constant is that the well known one c of light, here this constant is the analytical form of Maxwell's celebrated equation as follows [4]:

$$C^2 = \frac{e^2}{4\pi r m_g \varepsilon_0} = \frac{1}{\mu_0 \varepsilon_0} \qquad (2)$$

It is clear that the speed of light c is in accordance with the experiments performed to measure it since Romer's measuring the speed of light by observing Jupiter's moons, centuries ago [5], and as Maxwell's equation is the basis of the area of wireless communications which we live now there is no chance for suggesting that the speed of light is lower than has been thought as has been mentioned about the delay in arrival of light from the explosion of the supernova SN 1987 A. On the contrary we will see that the speed of light c is exceeded in the nuclear range.

1.2 The speed of light on atomic level

When an electron hits another one revolving a proton in an atom, the atomic electron is emitted from the atom changing its velocity and its wavelength but keeping its

* Corresponding author e-mail: salaheid050@gmail.com

original frequency and accordingly its previous energy in the atom as follows:

$$\frac{v}{\lambda} = \frac{c}{\lambda} \quad (3)$$

The appearance of c here proves that the interaction between the two interacting electrons took place at the mentioned distance r in the analytical form of Maxwell's equation, and this process had been proved to be correct in the first excitation state of mercury vapor in Frank & Hertz experiment occurring at 4.9 volts [6].

Because the two electrons have the same negative charge the interaction between them is momentarily where there is no excess or any change in the light's speed c in this case.

I want to add here that this happens when the free electrons of the solar corona hit the gaseous envelop of the Earth causing the light of the day when the electrons of terrestrial atoms are taken out of their atoms moving with the speed of light changing their original wavelengths keeping in the same time their original frequencies in their atoms as it is the case of eq (3).

1.3 The speed of light on nuclear level

The electron form with the positron gamma ray at its minimum energy when the distance between them is exactly the nuclear diameter 2.8×10^{-15} m. and this can be determined from the previously mentioned analytical form of Maxwell's equation as:

$$2m_g C^2 = \frac{e^2}{2\pi r \varepsilon_0} = 1.639 \times 10^{-13} J = 1.0235\ MeV \quad (4)$$

Naturally, at distance r shorter than 2.8×10^{-15} m. there no escape from c being greater than its value, for example with $2.2\ MeV = 3.524 \times 10^{-13} J$ energy of gamma the neutron is separated from the proton in the deuterium nucleus called deuteron [7]. The new speed in this case is 3.86×10^{-17}, and for greater energies of gamma the distance r is necessarily shorter.

On the other hand, no puzzle is created in the state of beta with constant U , this puzzle came because:

1. According to Quantum theory no electron can take place in nuclear range.
2. In beta decay of $^{210}_{83}BiK_{max} = 1.17\ MeV$ where $E_{max} = m_0C^2 + K_{max}$ [8].

Now, with constant U there is no need to suppose that the speedy electron or beta is created "only" in the moment of being emitted from the nucleus , and the energies exceeding m_0c^2 is explained by the distance shorter than $r = 2.8 \times 10^{-15}\ m$. between the electron and the proton in the neutron as a system and not as a particle.

2 Conclusion

The electron is the unit of radiation, it moves with the speed of light c outside and inside nuclear range at a distance equaling the basic nuclear diameter r according to constant U, this happens momentarily on atomic level with two electrons bearing the same negative charge and constantly between an electron and a positron or proton creating the minimum value 1.02 MeV of gamma and 0.55 MeV of beta. With shorter value of r the speed c of gamma or beta is exceeded and accordingly their energies are greater. On the other hand the puzzling different energies of beta can be explained in the light of the value of r in constant U without the need to suppose the existence of the neutrino.

Appendix

1. Constant U could be explained in the light of Coulomb's law

$$F = \frac{e^2}{4\pi\varepsilon_0 r^2}$$

$$m_g v^2 r = \frac{e^2}{4\pi\varepsilon_0} = 2.80 \times 10^{-28} J - m$$

2. In the case of forming the deuteron from one neutron and one proton , the electron inside neutron' system is supposed to have the 2.2 MeV energy according to U constant, and it divides this energy between its proton in the neutron system and the other proton, what shows us that this is actually the case is that through constant U we can have exactly the basic nuclear radius from dividing constant U by half of 2.2 MeV as follows:

$$2.2\ MeV = 3.5244 \times 10^{-13} J,$$

$$\frac{2.30 \times 10^{-28} J - M}{1.7622 \times 10^{-18}} = 1.30 \times 10^{-15} m$$

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