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The Electron is the Unit of Radiation

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Abstract: The unit of radiation is not the photon or that wave having a discrete amount of energy determined by frequency $(E = hf)$ *since Planck's constant became a very great land mark in physical world. The unit of radiation is the electron itself moving with the speed of light* c *when it interacts momentarily on atomic level at distance* $d = 2{,}8 \times 10^{-15} m.$ *with another electron bearing the same charge , or interacts with other particle bearing opposite charge on nuclear level forming with the positron a gamma ray , or with a proton forming a neutron, where an electron is emitted from the neutron as beta ray, These two last rays at* d *distance have their minimum energies on nuclear level but the chance is opened for the distance* d *to be less than its mentioned value and therefore the speed of light c will be exceeded.*

Key words: electron, proton, neutron, gamma, beta

I. INTRODUCTION

Most conflict in the long history of trying to understand light's phenomenon was between particle and wave theories. Wave concept continued its effect reaching quantum theory, but waves in this theory could gain or lose energy in finite amount called quanta according to their frequency. Bohr postulated that the photon or that packet of energy is emitted from the electron through its transition from higher level in the atom to lower one, and the amount of this energy is Planck's constant multiplied by frequency hf or $h\frac{c}{\lambda}$.

We are going here to prove that the electron itself is the unit of light moving with c speed, and sometimes exceeds this speed. In fact analyzing h itself reveals that the electron in this constant is the particle that moves its orbital motion with certain wavelength and also, as we are going to prove.

II. ON QUANTUM LEVEL

It is the particle that moves with the speed of light c when it interacts with another particle at distance equals the nuclear diameter! Therefore, there is no escape from considering the electron with its known mass the unit of radiation. In fact number of our familiar and very dear concepts in physics must be changed, and we should have the courage to accept the new and correct ones! On atomic level: The orbital velocity v of an electron around a nucleus is changed to the speed of radiation c when this electron interacts with a bombarding electron bearing the same charge; the bombarded electron keeps its original frequency in the atom by changing its wavelength as follows

$$\frac{v}{\lambda} = \frac{c}{\lambda/} \qquad [1]$$

The first excitation state of mercury vapor in Frank & Hertz experiment during electron bombardment occurs at $4.9\ volts$, and a line of wavelength 254 nm is emitted(1) Now, to prove eq [1] we have $4.9\ ev = 7.84 \times 10^{-19} J$, then the atomic velocity of the electron is 9.28×10^5, its wavelength is 7.83×10^{-10} , and therefore

$$\frac{9.28\times10^5}{7.83\times10^{-10}} = \frac{3\times10^8}{\lambda/} \qquad [2]$$

Where $\lambda/$ = 254 nm in agreement with the result of Franck & Hertz experiment The energy $4.9ev$ is the unit of excitation of mercury atoms, thus the intervals of excitation are multiples of $4.9ev$ energy(2) (physics.rutgers.edu/ugrad/389/Feanck-Hertz.pdf) where they occur at $2 \times 4.9ev$ and at $3 \times 4.9ev$ etc

The analytical form of Maxwell's equation tells us that the mentioned interaction between the electron in the atom and the bombarded particle occurred at distance equals to the squared root of nuclear diameter or $\sqrt{d} = \sqrt{2.8 \times 10^{-15}}$ m because

$$c = \sqrt{\frac{e^2}{4\pi d m_e \varepsilon_0}} \qquad [3]$$

Without the value of $\sqrt{d}$ here, c cannot take its value at all! In fact Maxwell's equation is a state in the constant U, I reached to this constant some few years ago and it simply describes the interaction of the electron with another particle bearing the same or opposite charge as follows

$$m_e v^2 r = \frac{e^2}{4\pi\varepsilon_0} = 2.30 \times 10^{-28} J - m \qquad [4]$$

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When the distance $r = d$ or the basic nuclear diameter[3] then v^2 turns out to be c^2, the speed of light, this proves that Maxwell's celebrated equation in its analytical form is a special state in constant U as follows

$$c^2 = \frac{e^2}{4\pi r m_e \varepsilon_0} = \frac{1}{\mu_0 \varepsilon_0} \quad [5]$$

Why even quantum theory leads to the same result in [1] ? The answer is that analyzing quantum calculation about the experiment of Franck & Hertz shows us that it ends by the same result shown in eq [1] because Planck's constant has three terms as an angular momentum of the electron as follows

$$h = m_e v \lambda$$

Let us see the numerical value of h as they can be obtained easily from multiplying the mass of the electron by its orbital velocity and its wavelength $(2\pi r)$ in the ground state of hydrogen atom as follows

$$9.11 \times 10^{-31} Kg . 2.18 \times 10^{6} . 3.33 \times 10^{-10} = 6.613 \times 10^{-34}$$

J-s

Now, multiplying h as an angular momentum by the frequency $\frac{1}{t}$ $or\ f$ gives the energy as $E = m_e v \frac{\lambda}{t} = m_e v^2$, this is the natural relation between momentum and energy, where v and not c is the orbital velocity of the electron in any atom like that of hydrogen, and also mercury one , but we are accustomed to see the following

$$E = h \frac{c}{\lambda} \text{(4)} \quad [6]$$

And this means the following *strange* formula

$$E = m_e v \lambda \times \frac{c}{\lambda} \quad [7]$$

Describing the spectral emission in an atom!

De Broglie's derived formula 6 from putting $p = m_e c$, and this equals in quantum theoty $\frac{h}{\lambda}$, simply multiplying $m_e c$ and $\frac{h}{\lambda}$ by c we have

$$c^2 = h \frac{c}{\lambda} \text{(5)} \quad [8]$$

No doubt the appearance of Einstein's famous equation here gave De Broglie a great faith about this formula, but in mercury atom, $4.9\ ev$ never be $m_e c^2$ at all. Now let us keep the left side of eq 8 as $m_e v^2$ (the natural and right expression for energy in Planck's constant) with the *strange* quantum formula 7, this leads to the following:

$$m_e v^2 = m_e v \lambda \frac{c}{\lambda}$$

For our surprise this leads to our eq [1] where

$$\frac{v}{\lambda} = \frac{c}{\lambda /}$$

Giving the meaning of changing the electron's orbital v to the radiation speed c explained by Maxwell's equation as a momentarily interaction between two electrons bearing the same charge. In fact we see no transition from higher level of energy to lower level resulting in emitting a photon according to Bohr, but the transition was from orbital velocity v in the atom to radiation speed c where no change occurred in the frequency from one state to another!

III. ON NUCLEAR LEVEL

The electron still the unit of radiation on nuclear level as it interacts with one of two particles with opposite charge, they are the positron and the proton, therefore there is no momentarily interaction here but the electron at the previous mentioned distance $d = 2.8 \times 10^{-15} m.$ forms with the anti-electron or positron an entity called gamma ray moving with the speed of light c where the analytical form of Maxwell or that form of constant U is

$$c^2 = \frac{e^2}{4\pi d m_e \varepsilon_0} \quad [9]$$

And the two electrons together have the following energy in their radiation state

$$2m_e c^2 = \frac{e^2}{2\pi d \varepsilon_0} = 1.645 \times 10^{-13} J = 1.026\ Mev \quad [10]$$

There is no annihilation, but simply again two electrons bearing opposite charges forming one entity moving with the speed of light. This is the minimum energy of gamma ray. As there are greater energies of it, no explanation could be presented here but the increase in the speed c with the decrease in the distance between the two electrons according to constant

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When our electron interacts with a proton at mentioned distance d the neutron is formed , and the electron emitted from it is the speedy one called beta ray with its minimum energy determined by constant U taking the special state of Maxwell equation where $r = d = 2.8 \times 10^{-15} m.$ Therefore while the minimum energy of gamma is one Mev , that of beta is half Mev and the different values of beta as well as that of gamma are due to the different values of the distance r, therefore with constant U we have no problems created in quantum theory like that of the existence of electron in the nuclear range. As it is known the wavelength of the electron according de Broglie formula is $\lambda = \frac{h}{m_e c} = 2.42 \times 10^{-12} m$ preventing the existence of the electron inside the nucleus as the wavelength of the electron according it exceeds greatly the nuclear diameter $2.8 \times 10^{-15} m.$ It is clear that beta as a speedy electron indeed gets out of the nucleus, but quantum theory explained beta emission by supposing that it is created only in the moment of departing the nucleus which is a very weak explanation! In fact, the energy and not the momentum is the right description for the motion in the universe, and for this reason according to constant U the electron as beta as well as gamma, and their different energies on nuclear level are easily understood. At last we appreciate the efforts of Planck in quantum theory and Einstein in S Relativity but the development of science sometimes makes it necessary to contradict familiar results and concepts.

IV. CONCLUSION

The electron is in radiation state when it moves with the speed of light and greater than this speed, this occurs when the electron interacts with another particle bearing the same charge on atomic level or interacts with two particles (proton or positron) bearing opposite charge on nuclear level, where constant U explains all the states of the electron on these two levels.

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