Orbital radius of the electron in the hydrogen atom and 137 with QHT

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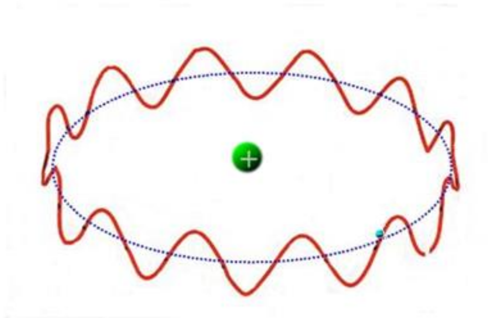
In order to describe a circumference, a wavelength must satisfy this relationship:



$C = n\,\lambda$ where n is an integer, or a whole quantity of oscillations.

$C = r\,2\pi$

$n = r\,2\pi / \lambda$

$r = n\,\lambda / 2\pi$

If we take the Compton wavelength of the electron and the Bohr radius to describe a circle, we will have that (n) will be equal to:

$n = r0 \times 2\pi / \lambda e = 137.035999$ ... but that is not an integer!

The electron Compton wavelength (λe) in order to describe a stable orbit, namely stationary hydrogen atom should satisfy the relationships expressed above.

According to the rule described above, (n) must be a whole number, but the result gives us a decimal number, why?

Here we will try to solve this question using an alternative method.

Through the use of our Quantum Habitat Theory (QHT) we can enter thanks to quantum gravity in the sub-atomic world to determine the value that the radius should have in the fundamental orbit of the hydrogen atom and then estimate the distance of the electron from the nucleus (proton) of hydrogen, in "stationary orbit" with uniform circular motion in respect of the mentioned rules.

That being said, we present our hypothesis for the electron orbital radius in the hydrogen atom, through the use of QHT.

According to the report proposed by Sir Arthur Eddington in 1938, (n) is an integer.

The reciprocal of the number 137 according to Eddington, has this mathematical solution.

$\frac{1}{2} n^2 (n^2 + 1) + 1 = 137$ number of oscillations

Where a (n) is given the value of 4.

We have tried to identify a possible version of the values expressed above in the following way:

1 = Z   number of protons present in the nucleus of the atom

n = 4   number of oscillations of the Compton wave of the proton in a circumference of radius (rp)

According to our QHT we can solve and satisfy the equation for the number of oscillations defined in the Arthur Eddington report in the following way:

$n = C / \lambda = rp2\pi / \lambda p = 3.9999999993 = 4$

where:

$$rp = \frac{Gq\ mp}{2c^2} = \frac{8GMp^2}{mp^2} = 8{,}4123564029 \times 10^{-16}\ \text{m}$$

From this simple analysis we can deduce that the stationary orbit for the electron is defined by the value that the proton generates in Arthur Eddington's formula, ie by the number of oscillations.

In this way, respecting the rule for $C = n\lambda$ we will have that:

$$C = n\lambda = 137 \times \lambda e = 3{,}324045016 \times 10^{-10}\ \text{m}$$

$$r0 = \frac{C}{2\pi} = 5{,}2903819668 \times 10^{-11}\text{m}$$

$$\alpha = \frac{1}{137} = 7{,}29927007299 \times 10^{-3}$$

From this we can deduce that:

If (n) is a pure integer number given by C / λ, this number represents the number of oscillations to describe with a wave a circumference of radius r.

The Compton wavelength of the proton makes 4 oscillations to describe a circumference equal to the mass radius of the proton itself having a radius (rp) described by the quantum formula expressed above.

The number 137 is therefore the number of oscillations that the electron wavelength (λe) must perform to place itself at a stable and therefore stationary distance from the nucleus of the hydrogen atom or from the proton, thus circumscribing a circular orbit of radius r0.

The reciprocal of this value (137) was therefore described by Sir Artur Eddington's mathematical relation as early as 1938.

The inverse of the pure number 137 or 1/137 is the number that represents the fine structure constant (alpha).

However, this fine structure constant (α) is not linked to electromagnetic constants but is related to the number of oscillations which in turn are related to pi greco (π).

$\alpha \pi = \lambda e / 2r0$

Rydberg constant

$$R = \frac{me\ c\ \alpha^2}{2h} = 1{,}09794994072 \text{ x } 10^{7} m^{-1}$$

$$K = \frac{1}{\lambda e} = \frac{2R}{\alpha^2} = 4{,}121484487 \text{ x } 10^{11} m^{-1}$$

Summary of the equations used for this discussion, derived from our QHT:

$$mp = \sqrt{\frac{8\ \hbar c}{Gq}} = 1{,}67262189821 \text{ x } 10^{-27} kg$$

$$Gq = \frac{8\hbar\ c}{mp^2} = 9{,}04047577441 \text{ x } 10^{\ 28}\ \frac{m^3}{kg\ s^2}$$

$$rp = \frac{Gq\ mp}{2c^2} = 8{,}4123564029 \text{ x } 10^{-16} m$$

$$re = \frac{Gq\ me}{2c^2} = 4{,}58151248261 \text{ x } 10^{-19} m$$

$$\alpha = \frac{1}{137} = 7{,}29927007299 \text{ x } 10^{-3}$$

$$G = \frac{Gq\ mp^2}{8Mp^2} = 6{,}67408319398 \text{ x } 10^{-11} \frac{m^3}{kg\ s^2}$$

With the values obtained from these equations we can demonstrate through different modes of equivalence, the estimated value for r0.

$$r0 = \frac{Gq\,\hbar\,mp}{2c^3\alpha\,me\,rp} = \frac{Gq\,\hbar}{2c^3\alpha\,re} = \frac{Gq\,mp^2}{8c^2\alpha\,me} = \frac{\hbar}{me\,c\,\alpha} = 5{,}2903819668 \text{ x } 10^{-11}\text{m}$$

The electron revolution speed in the fundamental level of the hydrogen atom using HQT will be equal to 1.6906395245 x 10^6 m/s where, from Kepler's third law we will have that:

$$t^2 = \frac{4\pi^2\,r0^3}{Gq\,mp} = 3{,}86573215383 \text{ x } 10^{-32}\text{s}^2$$

$$t = 1{,}96614652399 \text{ x } 10^{-16}\text{s}$$

$$Ve = \frac{C0}{t} = 1{,}69063952444 \text{ x } 10^6\ \frac{\text{m}}{\text{s}}$$

$$Ek(e-) = \frac{1}{2}mv^2 = 1{,}30185024452 \text{ x } 10^{-19}\text{J} = 8{,}1255100178\text{ eV}$$

The kinetic energy of the incident photon, experimented to ionize the hydrogen atom equal to 13.6 eV has a speed equal to 2.187 x 10^6 m/s.

This speed is higher than that of the kinetic energy possessed by the electron.

This difference shows that the energy of extraction and therefore its speed must be higher in order to reach and kick, or move away, the electron from the stationary state in which it is located.

" Hoping to have exhaustively and correctly explained our hypothesis of solution to the question of the fundamental atomic radius in the hydrogen atom and to the number related to it, that is the 137, we hope to have soon a feedback from the members of the community who will want to consider this document. "

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