Fine-structure constant - the scale energy factor

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Labels: ε_0 - permittivity of free space, e - electron charge magnitude, m_e - electron mass, $E_0=m_ec^2$ - energy of an electron, E_e - energy of an electric field of an electron, $\alpha=137.03599^{-1}=e^2/2\varepsilon_0hc$ - fine-structure constant (alpha), h - Planck constant, c - speed of light in vacuum, $E_R=0.5E_0\alpha^2=13.6$ eV - Rydberg energy, $\lambda=h/m_ec$ - electron Compton wavelength,

1. We shall define E_e as energy of an electric field of sphere of Compton radius $r=\lambda/2\pi$:

$$E_e = \frac{e^2}{4\pi\varepsilon_0 \cdot r} = E_0 \cdot \alpha \quad . \qquad (1)$$

2. We shall accept that other part of energy of an electron consists of energy E_s, peculiar to a strong interaction, and these energies sum up quadratic:

$$E_s = \sqrt{E_0^2 - E_0^2 \cdot \alpha^2} = E_0 \cdot \sqrt{1-\alpha^2} \quad \text{Or} \quad E_s = E_0 \cdot \left(1 - 0.5a^2\right) = E_0 - E_R \text{ (with a margin error) } 3 \cdot 10^{-10},$$

(A site: <http: // savrukhin.narod.ru>).

3. We shall view decay of a pion mass m_π on an electron and neutrino. Expression for energy e1 right after decay of electron looks like(Phys. Rev. D66, 1 (2002)):

$$e1 = \frac{m_\pi^2 + m_e^2}{2m_\pi} \quad . \qquad (2)$$

Then we shall gain:

$$\frac{e1}{m_e} = \frac{\frac{m_\pi}{m_e} + \frac{m_e}{m_\pi}}{2} = 1.003431\alpha \quad . \qquad (3)$$

More precisely: $\frac{m_\pi}{m_e} = \frac{2}{\alpha} - 1 = 273.131$ with a margin error $2 \cdot 10^{-4}$.

4. We observe a following series of the energies located on degrees an alpha:

1	2	3	4
Label	Expression for energy	Quantity	The Name
$E_R\alpha$	$0.5E_0\alpha^3$	0.1 eV	Energy communications of molecules
E_R	$0.5E_0\alpha^2$	13.6 eV	The ionization energy of atom of hydrogen
E_e	$E_0\alpha^1$	3.73 keV	Energy of an electric field of an electron
E_0	$E_0\alpha^0$	0.511 MeV	Energy of an electron
E_π	$E_0(2\alpha^{-1} - 1)$	139.57 MeV	Energy of a pion
E_i	$E_0\alpha^{-2}$	9.56 GeV	Energy of group of particles Ipsilon