

## Monopole – the Only Elementary Particle

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We see electrons coming from the nucleus – beta decay, and see electrons entering the nucleus – electron capture. Is it correct that they can't exist inside the nucleus?

Centripetal force of the electron:

$$F = \frac{m_e v^2}{R}$$

Electric force for hydrogen:

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_e^2}{R^2}$$

If light speed is a limit ( approximation ):

$$\frac{m_e c^2}{R} = \frac{q_e^2}{4\pi\epsilon_0 R^2} \quad \Leftrightarrow \quad R = \frac{q_e^2}{4\pi\epsilon_0 m_e c^2}$$

$$\Leftrightarrow \quad R = 2.8 \times 10^{-15} m$$

The proton radius:

$$x = 1.3 \times 10^{-15} m$$

So, it seems that the electron can't exist inside the nucleus, but from the point of view of the proton:

The mass of the electron becomes infinite  $m_e = \frac{m_{0e}}{(1 - v^2 / c^2)^{3/2}}$

The charge of the electron becomes infinite  $q_e = \frac{q_{0e}}{1 - v^2 / c^2}$

Cutting the infinities:

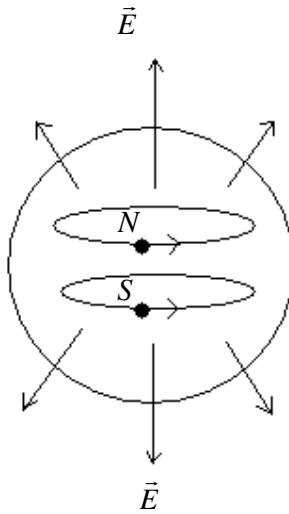
$$R = \frac{q_e}{4\pi\epsilon_0 c^2} \quad \Leftrightarrow \quad R = 1.6 \times 10^{-26}$$

So, the electrons can exist inside of the nucleus.  
The gravitational force is also infinite.

### The two monopoles electron

A rotating monopole creates an electric field.

$$\vec{E} = \frac{q_m v}{R^2} = c^2$$



The electron is made of two symmetric monopoles rotating at the same axis.

Binding energy of the monopoles:

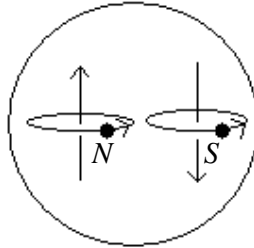
$$E = \frac{q_m^2}{\mu_0 x_0} = 26.4 \text{ TeV}$$

$$q_m = \frac{h}{2q_e} = 2.1 \times 10^{-15} \text{ ( Tm}^2 = \text{Wb )} - \text{Magnetic charge}$$

$\mu_0$  = Vacuum permeability

$x_0 = 8 \times 10^{-19} m$  -- Monopole wavelength

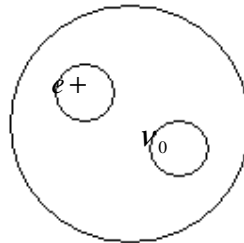
### The neutrino



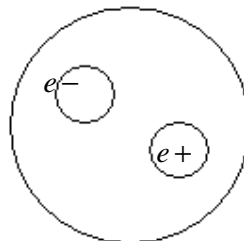
The neutrino is made of two symmetric monopoles with parallel axis.

The quarks are heavy electrons and neutrinos.

### The charged pion

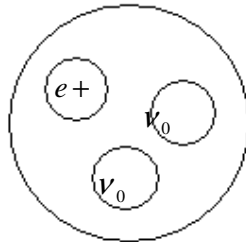


### Neutral pion



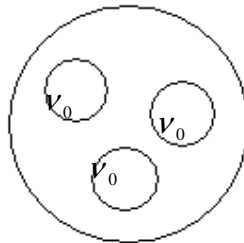
Inside the nucleus the neutrino is heavier than the electron.

### Proton



The number of the particles inside varies with the kinetic energy of the proton.

### Neutron



There are no fractionary charges.  
Inside the hadrons the monopoles are free from their neutrinos and electrons.