the general science journal

Magnetic Dipole Moment Error

António Saraiva -- 2009-03-26
ajps2@hotmail.com

The magnetic dipole moment is only a linear momentum.

$IA = p$; I – Electric current; A – Area

The true magnetic dipole moment of the electron:

$\mu = q_m x$; q_m - Magnetic charge; x - Compton wavelength

$$q_m = \frac{h}{2q_e} \; ; \qquad \mu_e = 5\times 10^{-27} m^4 s^{-1}$$

Momentum:

$$p = IA \; ; \qquad I = \frac{q_e c}{N^2 x} \; ; \qquad A = \frac{N^2 x^2}{4\pi} \qquad \Leftrightarrow$$

$$\Leftrightarrow \qquad p = \frac{q_e c x}{4\pi}$$

Electron:

$$p_e = \frac{g_e}{2}\frac{q_e c x_e}{4\pi} = 9.3\times 10^{-24} \; ; \qquad g_e \approx 2$$

Proton:

$$p_P = \frac{g_p}{2}\frac{q_e c x_p}{4\pi} = 1.4\times 10^{-26} \; ; \qquad g_p = 5.6$$

x_p = Compton wavelength of the proton

Neutron:

$$p_N = \frac{3.83}{2}\frac{q c x_N}{4\pi} = 9.66\times 10^{-27}$$

Muon:

$$p_\mu = \frac{g_\mu}{2}\frac{q c x_\mu}{4\pi} = 4.5\times 10^{-26} \; ; \qquad g_\mu \approx 2$$

Gyromagnetic ratio

$$\gamma = 2\frac{momentum}{angular..momentum} = 2\frac{p}{h/2\pi}$$

Electron:

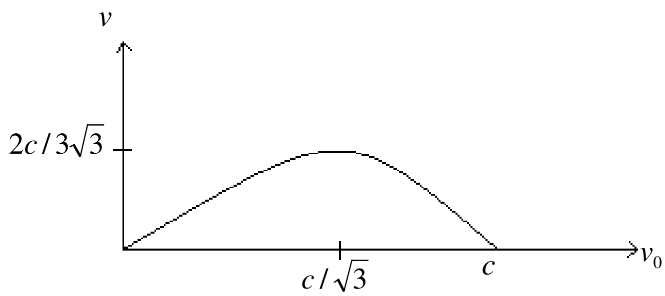
$$\gamma_e = \frac{g_e q_e c x_e}{2h} = 1.76\times10^{11} m^{-1}$$

Proton:

$$\gamma_p = \frac{g_p q_e c x_p}{2h} = 2.675\times10^{8} m^{-1}$$

The relative speed is also relative

$$v = v_0\left(1-\frac{v_0{}^2}{c^2}\right)$$



Momentum:

$$p = mv = \frac{m_0}{\left(1-\frac{v_0{}^2}{c^2}\right)^{3/2}} v_0\left(1-\frac{v_0{}^2}{c^2}\right) = \frac{m_0 v_0}{\sqrt{1-v_0{}^2/c^2}}$$

Angular momentum:

$$mvR = \frac{h}{2\pi} \;; \qquad h = h_0$$

$$\frac{m_0}{\left(1-v_0{}^2/c^2\right)^{3/2}} R_0\sqrt{1-v_0{}^2/c^2}\, v_0(1-v_0{}^2/c^2) = \frac{h}{2\pi}$$

Light speed variation with gravity

Energy:

$$E = \frac{E_0}{\sqrt{1-v^2/c^2}} \quad \Leftrightarrow \quad \left(\frac{\varepsilon}{\mu}\right)^2 = \left(\frac{\varepsilon_0}{\mu_0}\right)^2 \frac{1}{\sqrt{1-v^2/c^2}}$$

$$w_0{}^2 = \frac{1}{\varepsilon_0\mu_0} \;; \qquad w^2 = \frac{1}{\varepsilon\mu}$$

Speed:

$$w = w_0 (1 - v^2 / c^2)$$

Permittivity and permeability variation:

$$\varepsilon = \frac{\varepsilon_0}{(1 - v^2 / c^2)^{9/8}} \quad ; \qquad \mu = \frac{\mu_0}{(1 - v^2 / c^2)^{7/8}}$$

With gravity:

$$\varepsilon = \frac{\varepsilon_0}{\left(1 - \frac{2GM}{Rc^2}\right)^{9/8}} \quad ; \qquad \mu = \frac{\mu_0}{\left(1 - \frac{2GM}{Rc^2}\right)^{7/8}}$$