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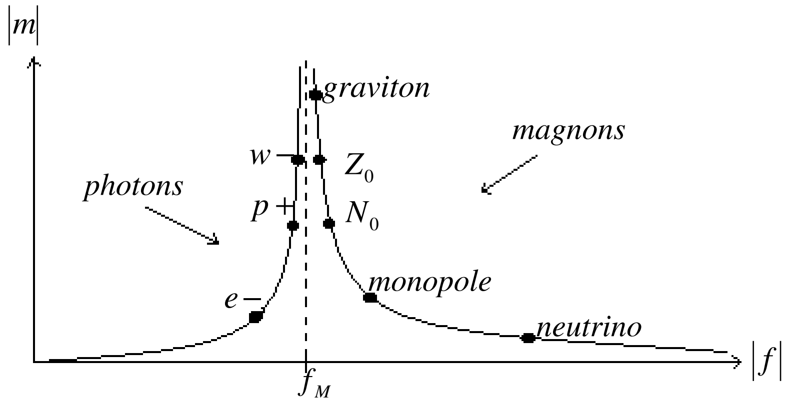
Masses of the Graviton, Monopole and Neutrino

António José Saraiva - 2006-02-28
ajps2@hotmail.com

According to our theory, (see other papers on the subject by the author in the listing, http://wbabin.net/papers.htm) the full spectrum of the particle masses is given by:

$$m = \frac{hf}{c^2 - kf^2}$$

m -- mass ; h – Planck's constant ; f – frequency ; c – light speed for $f = 0$
$i\sqrt{k}$ = wavelength of the neutrino.



--- The complete spectrum of the masses must have also negative frequencies.
--- The masses can be positive or negative
--- There are positive and negative energies.

As the charged particles are related to the photons ($e^+ + e^- = \gamma$) the neutral particles are related to a kind of magneticoelectric radiation – the magnons.

We have seen before, the force between two identical particles is:

$$F = \frac{kh\left(c^2 - v^2\right)^2 f_0^{\ 4}}{c^2\left(c^2 + vw_0\right)\left(w_0 + v\right)^3}$$

We know that the electrical force has the same behaviour in microscopic and in macroscopic scales, so for the gravitational force:

$$F = \frac{kh\left(c^2 - v^2\right)^2 f_0^{\ 4}}{c^2\left(c^2 + vw_0\right)\left(w_0 + v\right)^3} = G\frac{m_0^{\ 2}}{x_0^{\ 2}} \qquad \Leftrightarrow$$

G – gravitational constant

($m_0 w_0^{\ 2} = hf_0$; $c^2 / f_0^{\ 2} - x_0^{\ 2} = k$; $w_0 = x_0 f_0$ -- the particles are emitters or receptors of electromagnetic radiation with reference values of wavelength x_0, frequency f_0 and speed $w_0 = \sqrt{c^2 - kf_0^{\ 2}}$ -- see other papers by the author)

As w_0 has a very little value:

$$\Leftrightarrow \quad w_0^{\ 6} = \frac{Ghc^4 v^3}{k\left(c^2 - v^2\right)^2} \quad \Leftrightarrow \quad w_0 = i18.9070754 ms^{-1}$$

The imaginary value of w_0 tell us that the graviton is a neutral particle.

$$\Leftrightarrow \quad m_0 = 8.93834 \times 10^{-15} kg \ ; \quad f_0 \approx f_M \ \text{ -- matter frequency } \quad (f_M = c / \sqrt{k})$$

$$x_0 = i3.92079853 \times 10^{-21} m$$

Speed of the Gravitational Force

$$c^2 t^2 - x^2 = k \quad \text{and} \quad w = x / t$$

$$V = dx / dt \quad \Leftrightarrow \quad V = c^2 / w$$

$$V = 4.75 \times 10^{15} ms^{-1} \ ; \quad V = 1.6 \times 10^7 c$$

The Monopole

Our particles model states that the neutral particles must have some kind of magnetic charge. Let's just search for a neutral particle $\left(w_0 = iV_0\right)$ given directly by the general formula of the unified force:

$$F = \frac{kh\left(c^2 - v^2\right)^2 f_0^{\ 4}}{c^2\left(c^2 + vw_0\right)\left(w_0 + v\right)^3} \quad \text{and} \quad f_0^{\ 4} = \frac{\left(c^2 + V_0^{\ 2}\right)^2}{k^2} \quad \Leftrightarrow$$

$$\Leftrightarrow \quad \frac{h\left(c^2 - v^2\right)^2\left(c^2 + V_0^{\ 2}\right)^2}{kc^2\left(c^2 + ivV_0\right)\left(v + iV_0\right)^3} = F \quad \Leftrightarrow$$

$$\Leftrightarrow \quad \begin{cases} c^2\left(c^2+V_0{}^2\right)^2 = \left(c^4+v^2V_0{}^2\right)\left(v^2-3V_0{}^2\right)vFa \\ -v\left(c^2+V_0{}^2\right)^2 = \left(c^4+v^2V_0{}^2\right)\left(3v^2-V_0{}^2\right)Fa \end{cases} \quad \text{and} \quad a = \frac{c^2k}{h\left(c^2-v^2\right)^2}$$

$$\Leftrightarrow \quad V_0{}^2 = \frac{3v^2c^2+v^4}{3v^2+c^2} \quad \Leftrightarrow \quad V_0 = 1.2490466\times10^9 \ ; \quad F = 2.53965245\times10^3$$

$$a = 2.76736692\times10^{-14} \ ; \quad v = -2.107674\times10^9 \ ; \quad k = 3.864931\times10^{-27}$$

$$m_0 = \frac{h\sqrt{c^2+V_0{}^2}}{\sqrt{k}.V_0{}^2} \quad \Leftrightarrow \quad m_0 = 8.77543916\times10^{-30}\,kg$$

$$x_0 = i\sqrt{k}\,\frac{V_0}{\sqrt{c^2+V_0{}^2}} \quad \Leftrightarrow \quad x_0 = i0.972383544\sqrt{k}$$

If this particle is the monopole, the force between those two particles can be given by:

$$F = \frac{1}{\mu_0}.\frac{q_m{}^2}{x_0{}^2} \quad \Leftrightarrow \quad q_m = 3.41507738\times10^{-15} \quad \text{-- magnetic charge}$$

Electric charge -- $q_e = 1.60217653\times10^{-19}$; $\underline{q_m.q_e = 5.47155683\times10^{-34}}$

Planck's constant -- $h = 6.6260693\times10^{-34}\,kg.m^2.s^{-1}$

We can see that the values unities are equal:

$$F_m = \frac{1}{\mu_0}.\frac{q_m{}^2}{d^2} \quad \text{and} \quad F_e = \frac{1}{4\pi\varepsilon_0}.\frac{q_e{}^2}{d^2} \quad \Leftrightarrow$$

$$\Leftrightarrow \quad q_m{}^2.q_e{}^2 = F^2\mu_0\varepsilon_0 d^4 \quad \text{and} \quad \mu_0\varepsilon_0 = 1/c^2 \quad \Leftrightarrow$$

$$\Leftrightarrow \quad \underline{q_m.q_e = kg.m^2.s^{-1}}$$

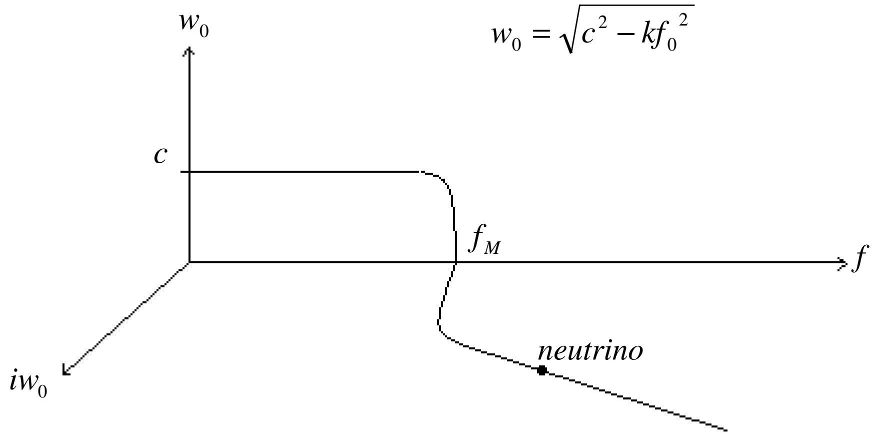
When we have calculated the values of the constants k and v (see paper " unification of all forces" -- http://www.wbabin.net/saraiva13.pdf) we got several solutions near the values that we have adopted. Choosing another pair of values we are sure find the exact product:

$$\underline{q_m.q_e = h}$$

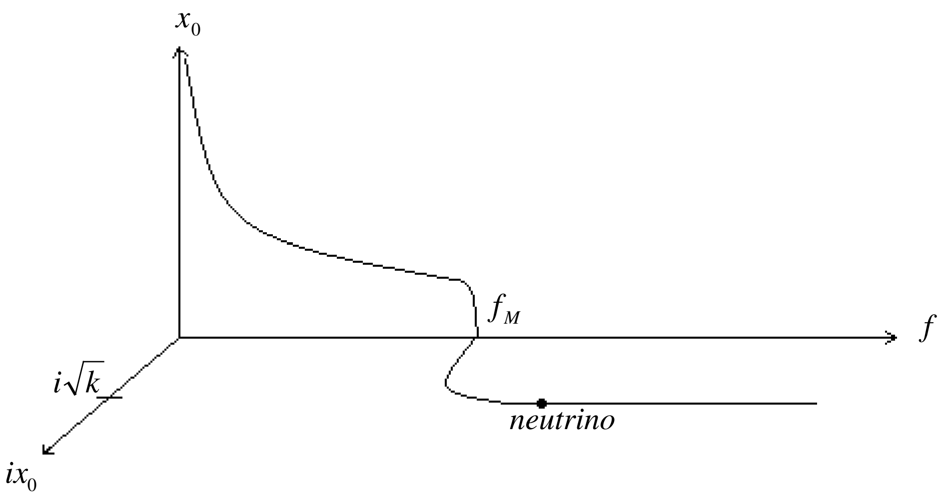
About the Neutrino

According to several experimental data, the electron neutrino has a mass $m_0 = 4 \times 10^{-36} kg$ and is a neutral particle.

As the speed of the photons is apparently equal to *c*:



The wavelength of the neutral particles is apparently equal to $i\sqrt{k}$:



If the neutrino is a photon particle it's classical energy will be $\approx 2.2 eV$ but as it is a magnon is true energy is:

$$E_0 = hf_0 \qquad \text{and} \qquad f_0 = \frac{h + \sqrt{h^2 + 4m_0^2 kc^2}}{2m_0 k} \qquad \Leftrightarrow$$

$$E_0 = 177.264 TeV$$

The neutral particles with very low masses have large values of energy.

We think that the neutrino is made of two symmetric monopoles so, the binding energy of the monopoles must be almost equal to the energy of the neutrino and this huge energy explains why we have never saw monopoles.

The energies can be positive or negative.

$$E_{MP} = +85.5MeV \quad + \quad E_{MP} = -85.5MeV \quad =$$

$$= \quad E\nu = +177.3TeV \quad + \quad Binding.E = -177.3TeV$$

This hypothesis can be tested by calculating the binding energy of the monopoles.

The only way of explaining the neutrino oscillation is to consider that the sum of the neutrino energy and the binding energy is almost zero, and that they have opposite signals.