A Note on the Boson of Higgs

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We consider that the Higgs boson, discovered recently at CERN, does not give a mass to the other particles.

Key words: Higgs boson, virtual particle.

In the CERN web page [1], it is affirmed that the Higgs field with its associated Higgs boson were formed after the Big Bang and that prevail throughout the cosmos, giving a mass to the other particles. We disagree with this, because there was not any Big Bang: the light of the galaxies is redshifted because the light scatters the microwaves of the Cosmic Microwave Background Radiation (CMBR) losing energy [2, 3]. Therefore, the Higgs field was not formed after any Big Bang nor prevails throughout the cosmos.

Because of the Heisenberg's uncertainty principle

$$\Delta E \Delta t \geq \frac{\hbar}{2} \tag{1}$$

(where ΔE is the energy uncertainty, Δt the time uncertainty, $\hbar = h/2\pi$ and h is the Planck's constant) a real particle creates, $E - \Delta E$, and reabsorbs, $E - \Delta E + \Delta E$, one or more virtual particles in its surrounding vacuum in a time $\Delta t \leq \hbar/2\Delta E$ without violation of the law of the energy conservation [4], E being the energy of the real particle and $\Delta E = (<(E - <E>)^2>)^{1/2} = (<E^2> - 2<E><E> + <E>^2)^{1/2} = (<E^2> - <E>^2)^{1/2}$ its uncertainty (where $<E> = <\psi|E|\psi> = \int_V \psi^* E \psi dV$ is the expected (or mean) value of E, $<\psi|$ the bra vector, the dual of the ket vector $|\psi>$, ψ^* the complex conjugate of the wave function ψ and V the volume). This applies to any particle.

Therefore, in the decay of a free neutron into a proton, an electron and an antineutrino: $n \rightarrow p + e^- + \overline{\nu}_e$, the virtual particles emitted and absorbed by the neutron give, during the process of decay and reabsorption, the (rest) masses, and in this case also the (electric) charges, to the proton and to the electron, giving no mass and no charge to the antineutrino. We postulate that these virtual particles would be (gamma) photons, because a photon in the presence of a nucleus may decay into a positron and an electron: $\gamma \rightarrow e^+ + e^-$. That is, the photon, without mass nor charge, may give masses and charges. We think that in the neutron decay the particles H^0 and W^- do not give, respectively, the masses and the charges. The key particle would be γ, not H^0.

Note also, that the Casimir effect can be explained with these (virtual gamma) photons. As a photon is an electromagnetic wave, it cannot penetrate a metallic surface. Then, between the two (metallic) plates, the number of photons is restricted by $\lambda \leq d$ (where λ is the wavelength and d the distance between the plates). However, on the outer side of both plates, there is no such restriction, and the number of photons is greater, which produces the attractive force between the two plates. Therefore, this attractive force is not due to any vacuum energy. That is, the vacuum has not any energy. But, the Standard Model need a vacuum expectation value of the Higgs field of *246 GeV* (*Giga-electron Volts*) [5], for that its associated Higgs boson have a mass of about $125\ GeV/c^2$ (where c is the speed of the light in the vacuum).

In summary, we consider that the Higgs boson, discovered recently at CERN, does not give a mass to the other particles, because there was not any Big Bang nor the vacuum contains energy.

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