Proton and Neutron Electric Charges

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1 Abstract

« The pressure for compliance is enormous. I have experienced this in the rejection by editors of articles submitted, based on venomous criticism from anonymous referees.
The replacement of impartial reviewing by censorship will be the death of science ».
Julian Schwinger, Nobel prize in physics (1965) [1]

The electric charges of the proton and the neutron, constituents of atoms nuclei, are explained in quantum mechanics in the so called "standard model" and this explanation is rather strange, with a combination of "quarks" having charges which are not an integer, and can change from one to another during radioactive transformation.
It is a fact that quarks are deduced from experimental data, like scattering of a proton by high energy electrons, but they can't be observed as a free object: *"Basically, you can't see an isolated quark because the color force does not let them go, and the energy required to separate them produces quark-antiquark pairs long before they are far enough apart to observe separately"* [2]!
In this paper, we will construct a model for the electric charges of proton and neutron with the presence of "electron-positron pair" inside the components of an atom nuclei, neutron and proton. In modern physics, whereas the existence of "electron-positron pair" is known since the sixties, still few scientists have explored the potential of such an existence. There were however attempts to explain some situations in quantum mechanics, and to describe the vacuum (ether) as a sea of "electron-positron pairs" [3].
We will present and validate this model with all the disintegration phenomenon observed, and even the disintegration of a proton inside an atom, which is not totally explained in the "standard model".

2 Free Neutron Disintegration β^-

The disintegration β^- or beta decay of a free neutron is the phenomenon which is transforming a free neutron, with no electric charge (viewed from its outside), into a proton with a positive electric charge and emitting also an electron and a electronic antineutrino [4]:

$$n \longrightarrow p + e^- + \bar{\nu_e} + radiated\ energy \tag{1}$$

In the standard model of the neutron, the zero electric charge is due to the presence of three "quarks" of electric charge as +2/3, -1/3, -1/3, the sum of which is zero. In the above reaction one of the quark of charge -1/3 should transform into a quark of electric charge +2/3.
There is another way to explain this disintegration of a free neutron, using natural elements.
We suppose the neutron being composed as a real neutral particle with an electron-positron pair inside and a proton being composed as a real neutral particle with a positron inside (a positron is the antiparticle

of the electron and has an electric charge of +1). With this hypotesis, not only the electric charges of neutron and proton can be explained, but also the disintegration phenomenon of the neutron, since an ejected electron is necessary to get a proton.
The other emitted elements are there for the reaction to take place and assures energy equilibrium. In the neutron decay, the ejected electronic anti-neutrino can be conjectured to be a part of an electron-positron pair. The above relation can be writen with this model as:

$$n^0 = [n_n + (e^- + e^+)] = (n_n + e^+) + e^- + \bar{\nu_e} + radiated\ energy \tag{2}$$

With n^0 a neutron, n_n a neutral particle, $(n_n + e^+) = p^+$ a proton, $\bar{\nu_e}$ a electronic antineutrino. The above hypothesis could seem ridiculous, but it is much more convincing when we will look at the other radioactive reactions like the proton disintegration or the electron capture in which a positron is ejected in place of an electron.
From the above disintegration model and the measured mass energy of the neutron (939,565 Mev/c^2), the proton (938,272Mev/c^2), the electron and the positron (each 0,511Mev/c^2), we can derive the energy of the neutral particle (937,761(Mev/c^2), and the radiation part (0,782 Mev/c^2). We can see that the measured energy mass of the neutron is higher than the one for the proton, explained by the electron-positron pair to create a neutron.
The transformation of a neutron into a proton is also occurring within an atom. For example the transformation of carbon $^{14}_{6}$C into nitrogen $^{14}_{7}$N is [5]:

$$^{14}_{6}C \longrightarrow ^{14}_{7} N + e^- + \bar{\nu_e} \tag{3}$$

We can see in this reaction for the $^{14}_{6}$ C , which has 6 protons and 8 neutrons, that a neutron is transformed into a proton while ejecting an electron. The resulting component $^{14}_{7}$ N has then 7 protons and 7 neutrons.
The “standard model” explains this reaction by the quarks transformation inside the neutron. According to the standard model, a neutron is composed of one quark “up”, with an electric charge of +2/3 , and two quarks “down”, each with an electric charge of -1/3. Then to get a proton, one of the quark “down” of the neutron has to transform into a quark “up”, giving an electric charge positive and equal to +1 to the proton.
It is evident to note the complexity of this explanation of the standard model for the β^- decay. Furthermore, there is no explanation of how a quarks gets an electric charge and is able to change it, to be transformed into a different quark. In the above disintegration model only observed particle are used.
There is more validation of this model with the disintegration of the proton which can also be explained with the new model. Has a free proton disintegration ever been observed? Never, but it can be observed in disintegration β^+ of an atom into another one, with a certain condition.
Before that, let’s look at the electronic capture.

3 Orbital Electronic Capture

In this process, a proton, in an atom nucleus, absorbs an inner atomic electron from the lower electronic shell, and becomes a neutron. An electronic neutrino is also emitted:

$$p + e^- \longrightarrow n + \nu_e \tag{4}$$

Or

$$(n_n + e^+) + e^- = [n_n + (e^- + e^+)] + \nu_e \tag{5}$$

For example the reaction $^{26}_{13}$Al is transformed in $^{26}_{12}$Mg by:

$$^{26}_{13}Al + e^- \longrightarrow ^{26}_{12} Mg + \nu_e \tag{6}$$

In ${}^{26}_{13}$Al, there is 13 protons and 13 neutrons. From our proton model, which is a neutral particle with a positron, the capture of an electron creates an electron-positron pair giving a new neutron. Then in ${}^{26}_{12}$Mg, there is 12 protons and 14 neutrons.

4 Disintegration β^+ (or positron emission)

The disintegration of a free proton is hypothesized and has never been observed. According to a theory (Georgi-Glashow model) its half-life is too long to be observed. Another explanation could be that it is not possible or not observable. Indeed, if we look at a possible disintegration with our model, we end up with a neutral particle (which is not a neutron in our model) and a positron. It may not have been observed since nobody thinks there can be a real neutral particle ejected.
However, the disintegration of a proton is observed inside a radionuclide nucleus possessing numerous protons. In such a disintegration [6] a proton is converted into a neutron with the emission of a positron and a neutrino with the reaction:

$$p \longrightarrow n + e^+ + \nu_e \tag{7}$$

An example of disintegration β^+, is the decay of magnesium ${}^{23}_{12}$Mg, containing 12 protons and 11 neutrons, into ${}^{23}_{11}$Na , which has 11 protons and 12 neutrons by:

$$^{23}_{12}Mg \longrightarrow ^{23}_{11} Na + e^+ + \nu_e \tag{8}$$

If we apply our proton model, we end up with a real difficulty in the proton model proposed here. This transformation should give a neutral particle without the electron-positron pair, which is not a neutron! Then it would be natural to say that our proton model is totally untrue. But, in reality, the disintegration of an inside proton is possible, if and only if, the mass of the nuclei of the father atom is strictly superior to the mass of the nuclei of the son atom, plus two times the mass energy of two electrons. For this reaction to be possible, we have to suppose that this particular initial proton must possess, in addition to the positron for its electric charge, an electron-positron pair. When the positron is ejected and the electron-positron pair stays in place, it results in a neutral particle plus an electron-positron pair which is a neutron in our model. Then we have the reaction :

$$[(n_n + e^+) + (e^- + e^+)] \longrightarrow n_n + (e^- + e^+) + e^+ + \nu_e + radiated\ energy \tag{9}$$

This condition of two additional electron masses on the initial proton which is going to disintegrate (positron mass is about the same as electron mass), is justifying the conjectured presence of an electron-positron pair in the initial proton before disintegration β^+. No explanation for this condition on the father atom, necessary for the reaction to take palce, has been given. This phenomenon can be observed in isotopes which undergoes this decay of a proton. As an example the decay of the carbon 11 is:

$$^{11}_{6}C \longrightarrow ^{11}_{5} B + e^+ + \nu_e + 0.96 Mev \tag{10}$$

We can conclude that all the disintegration of neutron and proton can be explained simply by the presence of electrons and positrons in the way exposed above.

5 Conclusion

The standard model explains the electric charges of the proton and the neutron by the presence of quarks having charges of ± 1/3 or ± 2/3. These quarks have never been observed as a free component!

Conversely the existence of electron, positron and electron-positron pair have been proved to exist. The previous model for the electric charges of proton and neutron has been constructed with these only

known elements and can explain all the radioactive phenomenon observed.
The presence in each radioactive reaction of the emission of electric neutrino and electric antineutrino could be necessary for the stability of the electron-positron pair.
The fact that the proton, which is far more massive than the electron, has a positive electric charge been explained by the presence of a positron, with a priori the same size of an electron, means that no geometric parameter is intervening in the process of creating the electric charge. This may facilitate the search of the nature of the electric charges.

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