# Interpretation of nuclear decay

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**Abstract.** The interpretation of nuclear decay is based on the structure of the nuclei that is two fundamental phenomena. The inverse electric field of the proton and the electric entity of the macroscopically neutral neutron. At the nucleus scale the neutron behaves as a positively charged particle due to the negative surface charge $q_n = -0.685e$, which creates an inverse electric field of positive potential (internal field) as a cloud of positive electrical units. Outside the nucleus the neutron decays with a half-life of 12min. However, the inverse electric field of the nucleus is considered to be the refuge of neutron salvation. A neutron's decay $\beta^-$ can occur due to the above electrical entity of neutrons and due to their synod (session) in the nucleus, with which the negativity of nucleus decreases due to the positive hill created by the neutrons' synod. A proton's decay $\beta^+$ can occur when the produced proton of a beta decay $\beta^-$ is immersed in a very negative potential of the nuclear field. Also, a neutrons' synod can cause potential imbalance, increasing the negativity of the field's region from which the neutrons were removed, resulting in a beta decay $\beta^+$. It is noted that the exit of the positron $e^+$ takes place through the canyon created by the neutrons' synod. Alpha decay $\alpha$ occurs in radioactive nuclei and for example in the uranium nucleus ${}^{235}_{92}U$, that emits a particle $\alpha$ of energy 4MeV, which is called to jump over the potential barrier 27MeV of uranium-235. The above nuclear decaying procedures act as a balance for the potential of the nucleus. This is an excellent compensatory mechanism for maintaining the stability of the nuclei.

*Keywords*: Beta decay; alpha decay.

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## 1. Beta decay $\beta^-$

By the unified theory[1,2] of dynamic space it is described the Genesis and structure of the neutron,[3] which accepts the effect of the Universal antigravity force,[4] that causes its centrifugal accelerated motion towards areas of increasing cohesive pressure.[5]

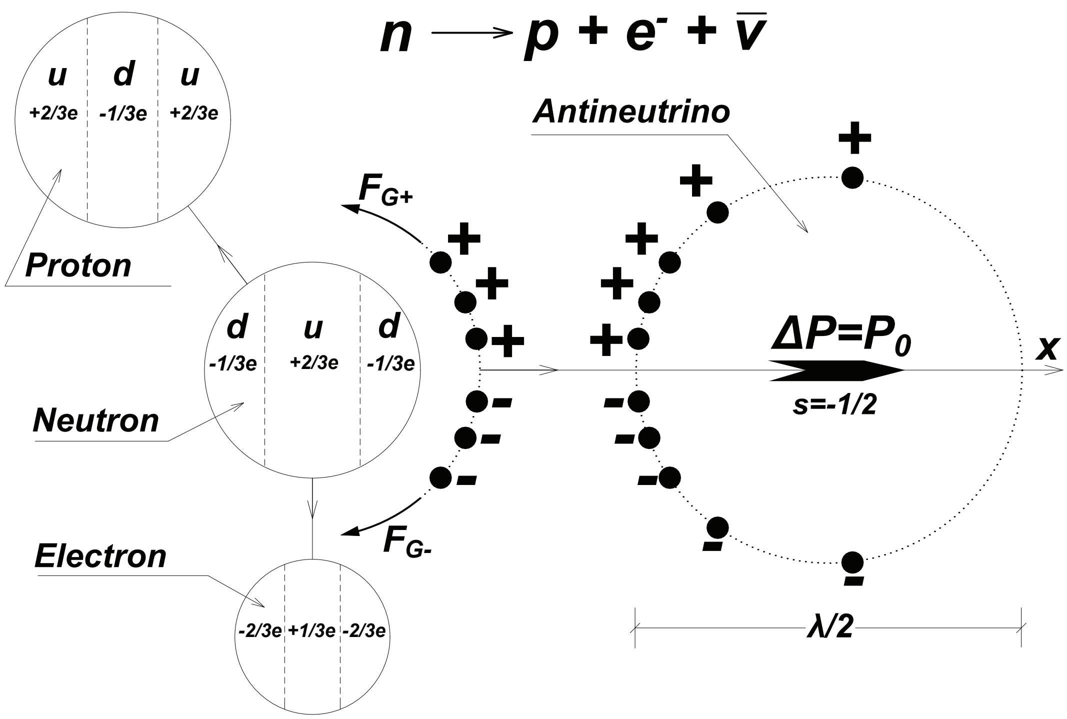


**Figure 1.** The beta decay $\beta^-$ creates the grouping units[6] of antineutrinos[7] (of one spindle) at the contact limits of the neutron quarks,[7] formed (as schematically is designed) by the induction forces[6] $F_{G+}$ and $F_{G-}$

As the neutron accelerate towards areas of increasing cohesive pressure, then decays (beta $\beta^-$) into a proton, an electron and an antineutrino (Fig. 1)

$$n \longrightarrow p + e^- + \bar{\nu}. \tag{1}$$

However, the inverse electric field[8] of the nucleus is considered to be the refuge of neutron salvation. Despite the stability of neutrons in the nuclear negative field, a beta decay $\beta^-$ can occur, when neutrons are at a reduced negative potential.

Specifically, the distant neutron of tritium[9] (Fig. 2)

$$^3_1H = p + n + n \tag{2}$$

is less stable due to the very small negative potential and decays with a half-life of 2.5 years. Nevertheless, when tritium is a component of other nuclei, it becomes stable within the strong negative field of these nuclei.

It is noted here the electric entity of the macroscopically neutral neutron. However, at the scale of the nucleus behaves as a positively charged particle due to the negative surface charge[10] $q_n = -0,685e$, which create an inverse electric field of positive potential (internal field) as a cloud of positive electrical units (Fig. 3).

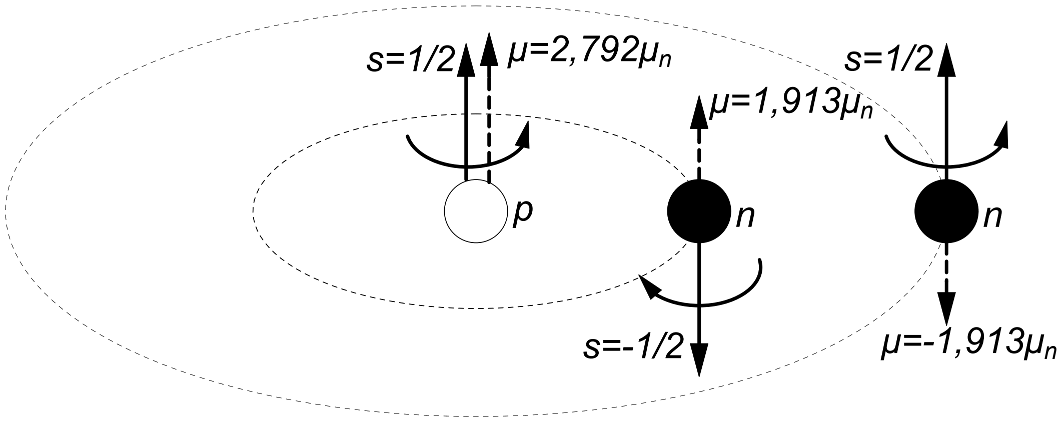


**Figure 2.** Structure model of tritium nucleus[9] ${}^3_1H = p + n + n$ with the distant unstable neutron

A beta decay $\beta^-$ can occur due to the above electrical entity of neutrons and due to their synod (session) in the nucleus, with which the negativity of nucleus decreases due to the positive hill created by the neutrons' synod.

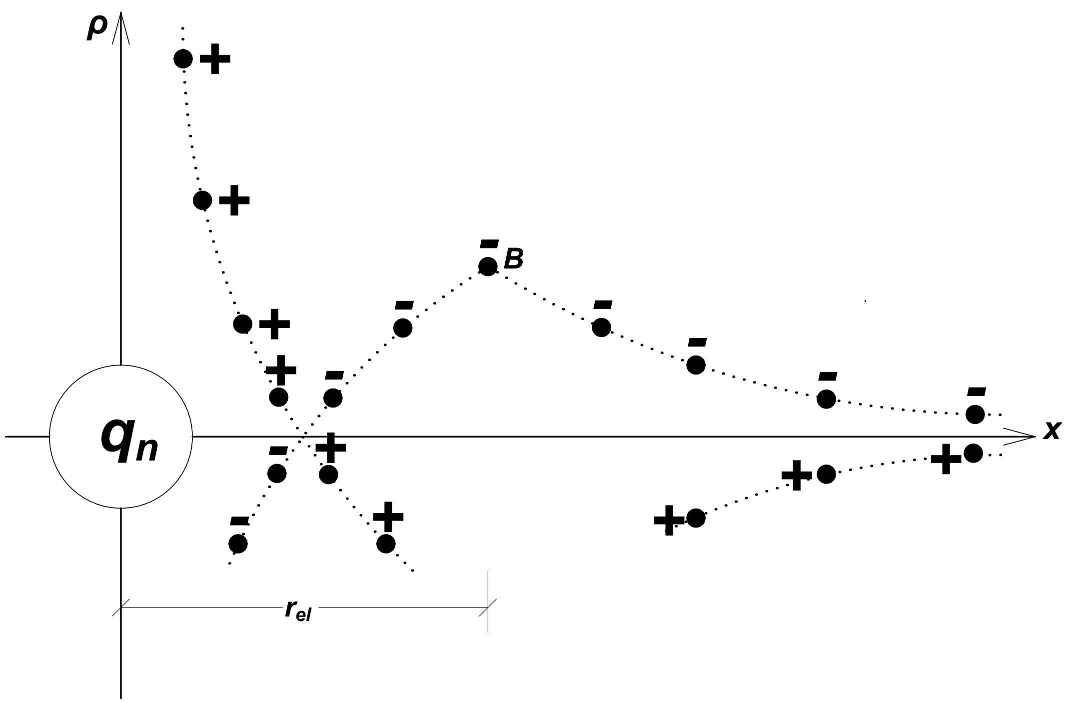


**Figure 3.** Limited internal electric field of the calculated negative electric charge[10] $q_n = -0,685e$ of neutron with its cloud of positive electrical units and limited external electric field with its negative electrical units

Then, one of the above synod's neutron decays to produce the proton, which increases the negativity of the nuclear field, saving the remaining synod's neutrons from decay. The produced proton of the beta decay $\beta^-$ is immersed in the lower inverse nuclear field, while the electron will be repelled and exits the nucleus (Fig. 4).

Additionally, if the beta decay $\beta^-$ occurred at the positive potential of the neutrons' synod, then the reduced potential of the nucleus would not be enough to repel the electron to pass the potential barrier[8] of the nucleus. In fact, at the time of maturation of the beta decay $\beta^-$ (non-instantaneous) the neutrons' synod is dissolved, increasing the negative potential of the nucleus, which is enough to repel the electron with sufficient kinetic energy to cross the potential barrier of the nucleus.

But why does not radiate the electron leaving the nucleus? The very strong negative field of the electron tears the potential barrier of the nucleus without accelerating or decelerating (linear motion) and does not radiate. Moreover, the linear motion[3] of the electron is caused, as we know, by the buoyancy condition[4] created by the inverse nuclear field.

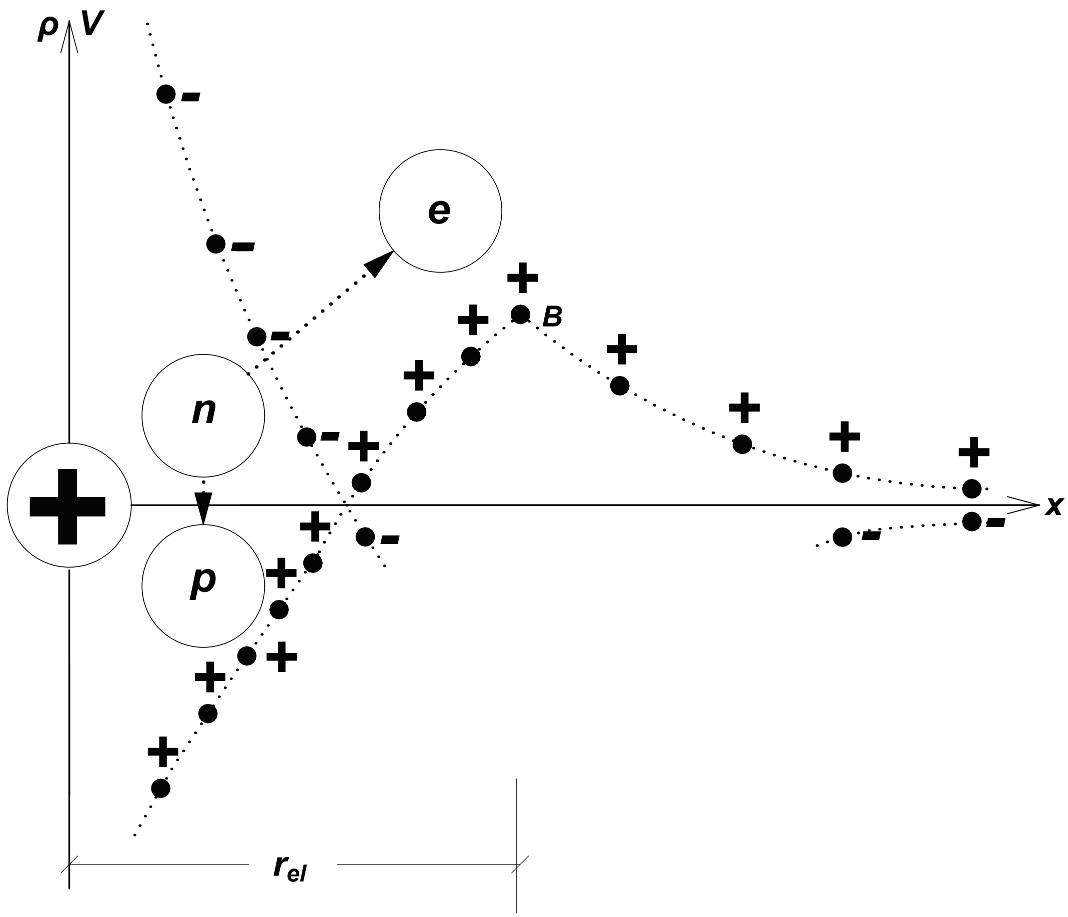


**Figure 4.** In the inverse nuclear field one synod's neutron decays to produce a proton, an electron and an antineutrino

The produced proton of the beta decay $\beta^-$ remains at the same potential of the nucleus without $\gamma$-radiation, or it sinks deeper into the negative nuclear field, emitting $\gamma$-radiation.

The produced antineutrino is described as an independent E/M formation[7,11] of one spindle with a wavelength $\lambda/2$ and a spin[12] $s = \pm 1/2$ (Fig. 1).

## 2. Beta decay $\beta^+$

The proton is stable outside the nucleus and in a positive potential environment, while it decays at a negative potential below of $-26$MV. A proton's decay

$$p \longrightarrow n + e^+ + \nu \tag{3}$$

can occur when the produced proton of the beta decay $\beta^-$ (see section 1) is immersed in a very negative potential of the nuclear field. Also, a neutrons' synod can cause potential imbalance, increasing the negativity of the field's region from which the neutrons were removed, resulting in a beta decay $\beta^+$.

The exit of the positron $e^+$ takes place through the canyon created by the neutrons' synod. The positive units (Fig. 3) of the limited internal electric field of the neutrons' synod cause an increase in the potential of the inverse nuclear field locally, resulting the rise of the positron at a positive potential. Respectively, the negative units (Fig. 3) of the limited external electric field of the neutrons' synod, on the one hand attracts the positron, on the other hand reduces the potential barrier of the nucleus below the potential to which the positron has risen, so that exits the nucleus.

Of course, the neutrino is removed from the nucleus as an independent E/M formation of one spindle with a wavelength $\lambda/2$ and a spin[12] $s = \pm 1/2$, while the neutron remains in the negative regions of the nuclear field as an orbital or bonding neutron around a potential column.

## 3. Alpha decay $\alpha$

Alpha decay $\alpha$ occurs in beryllium-8,[13] which decays into two helium nuclei ${}^4_2He$

$$^8_4Be \longrightarrow {}^4_2He + {}^4_2He. \tag{4}$$

This phenomenon occurs in radioactive nuclei with atomic number $93 > Z > 80$. We will mention for example the uranium nucleus ${}^{235}_{92}U$, that emits a particle $\alpha$ of energy 4MeV, which is called to jump over the potential barrier 27MeV of uranium-235. Uranium nucleus[14] ${}^{235}_{92}U$ (Fig. 5)

$$^{235}_{92}U = {}^{209}_{83}Bi + ({}^4_2He + {}^3_1H + n) + (2{}^4_2He + 2{}^3_1H + 4n) \tag{5}$$

is constructed from the addition of one helium nucleus ${}^4_2He$, one tritium ${}^3_1H$ and one orbital bonding neutron[11] adjacent to the middle potential column of bismuth nucleus ${}^{209}_{83}Bi$, while two helium nuclei ${}^4_2He$, two tritium nuclei ${}^3_1H$ and four orbital bonding neutrons are added at the other corner potential column of bismuth nucleus.

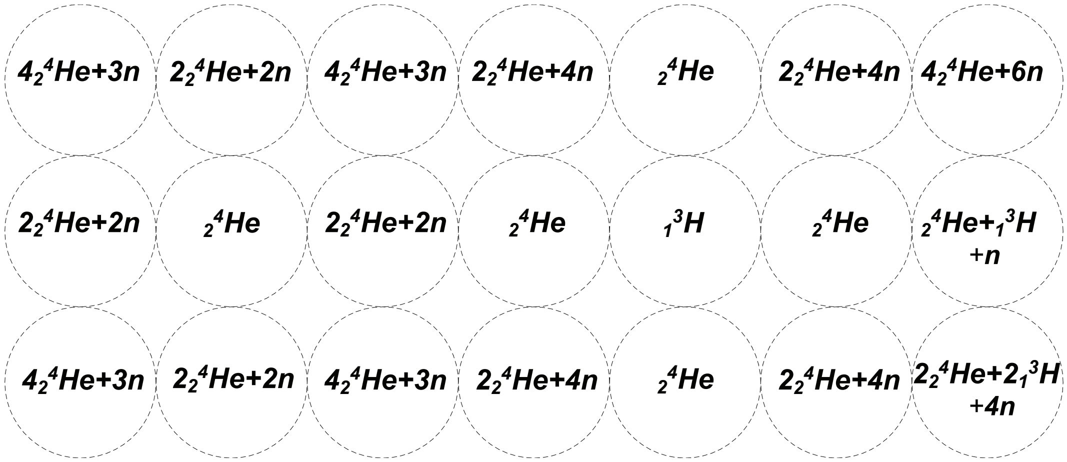


**Figure 5.** Representation of the uranium nucleus $^{235}_{92}U$, where appears the addition of one helium nucleus $^4_2He$, one tritium and one orbital bonding neutron at the middle potential column of bismuth nucleus $^{209}_{83}Bi$, while the addition of two helium nuclei $^4_2He$, two tritium nuclei and four orbital bonding neutrons appears at the other corner potential column of bismuth-209

However, the weak link of uranium $^{235}_{92}U$ is the unstable nucleus of the tritium $^3_1H$, which is located in the center (in the half tin nucleus[15] $1/2^{120}_{50}Sn$ of bismuth nucleus[14] $^{209}_{83}Bi$), where the strong negative electric field of the protons prevails. This critical point becomes an attraction pole of neutrons, i.e. of a thermal neutron and rarely of a fast one, which it is cleaved (beta decay $\beta^-$), incorporating the produced proton (Eq. 1) into the tritium nucleus $^3_1H$ (Eq. 2), turning it into helium nucleus[9] $^3_2He$

$$^3_2He = p + p + n \tag{6}$$

and finally into helium nucleus[9] $^4_2He$

$$^4_2He = n + p + p + n. \tag{7}$$

So, this mechanism acts as a catalyst for the nuclear fission of uranium $^{235}_{92}U$ with the most common products being barium nucleus $^{141}_{56}Ba$ and the krypton nucleus $^{92}_{36}Kr$ plus three neutrons as in nuclear reaction

$$n +^{235}_{92} U \longrightarrow^{141}_{56} Ba +^{92}_{36} Kr + 3n. \tag{8}$$

In Fig. 5 shows the right part of the uranium nucleus $^{235}_{92}U$, where in the middle column are a helium nucleus $^4_2He$, a tritium nucleus $^3_1H$ and an orbital bonding neutron. The two neutrons of tritium, one neutron of helium-4 and the bonding neutron can form a neutrons' synod, as described above (see sections 1 and 2). Thus, this helium-4 (alpha particle) of the above middle column will be at increased potential, just as happened with the positron (see section 2), and at the same time the negative units of the neutrons' synod (limited external electric field, Fig. 3) reduces the uranium's potential barrier, so that alpha particle leaves the uranium nucleus-235 produced the thorium $^{231}_{90}Th$

$$^{235}_{92}U \longrightarrow^{231}_{90} Th +^4_2 He. \tag{9}$$

The above nuclear decaying procedures act as a balance for the potential of the nucleus. When the nucleus potential becomes more positive, a beta decay $\beta^-$ occurs, so the produced proton restores the lost negativity of the nucleus. Conversely, when the nucleus potential becomes more negative, a beta decay $\beta^+$ occurs, so the produced neutron reduces the increased negativity of the nucleus. This is an excellent compensatory mechanism for maintaining the stability of the nuclei.

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