Mass deficit and topology of nucleons

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Abstract. Nucleus is identical with the lower inverse electric-nuclear field where a rapid increase of its potential occurs with a corresponding reduction of the space cohesive pressure, resulting to the mass deficit of the neutron entering the nucleus and to the finding of its location potential. Therefore, the so called topology of the nucleons can be now found. So, the neutrons are stable into the lower inverse nuclear field where a reduced cohesive pressure prevails. Moreover, there would be no nuclei without the presence of neutrons that reduce the negativity of the protons field, while neutrons are those that move into the nuclei (with the remaining half of their kinetic energy) on circular orbits around immobilized protons which have spin only.

Keywords: Inverse electric field; cohesive pressure; mass deficit; topology of nucleons.

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1. Mass deficit Δm of neutrons

By the unified theory of dynamic space[1,2] the inverse electric field[3] of nucleus is described (Fig. 1), whose the change of its relative electric density[3] ρ affects directly the cohesive pressure[1,2] of proximal space, since it depends on the number of pairs of electrically opposite elementary units,[1,2] which have remained in the electric field and caused from tensions

$$F = kL_0 \tag{1}$$

between these electric units where

$$L_0 = 0,558 \cdot 10^{-54} m \tag{2}$$

is the quantum dipole length.[4] Specifically, the remaining cohesive pressure P is proportional to these pairs of electrically opposite units, which have remained in the electric field and especially in the lower one (section 2), where this change happens rapidly. So, if ρ is the relative electric density at a position of the inverse electric field, then the absolute electric density $\rho_0 - \rho$ is proportional to the number of the above pairs of units, whose the attractive forces create the remaining cohesive pressure P at this position. Consequently, the cohesive pressures P_0 and P are respectively proportional to the background electric density ρ_0 and the absolute one $\rho_0 - \rho$, that is

$$\frac{P}{P_0} = \frac{\rho_0 - \rho}{\rho_0} \Rightarrow P = P_0 \frac{\rho_0 - \rho}{\rho_0}. \tag{3}$$

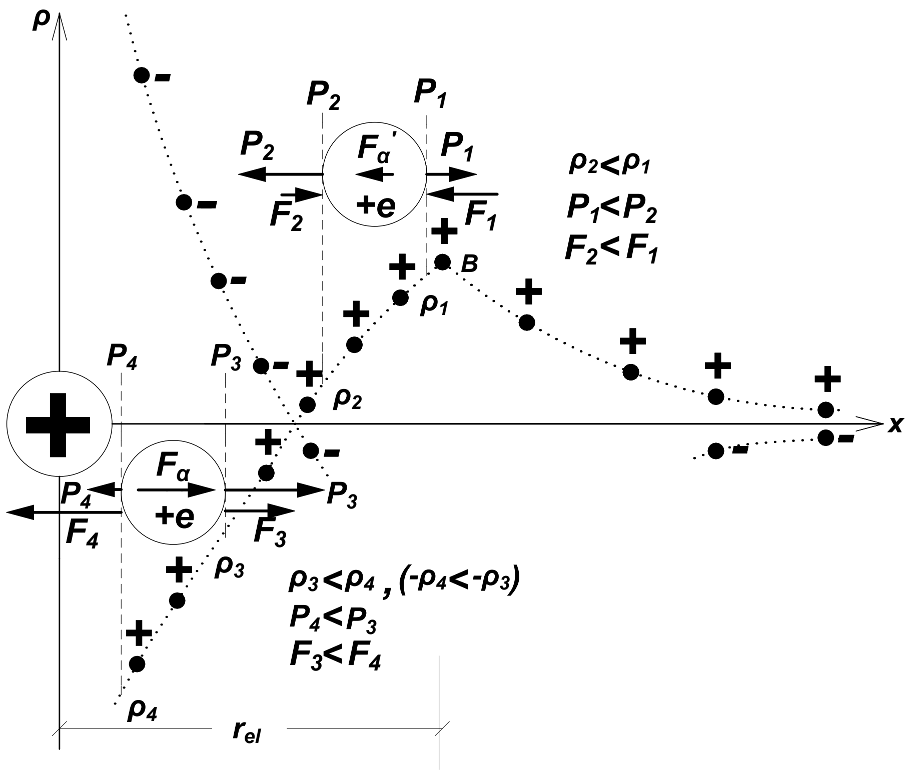

Figure 1. Dynamics of the upper and lower inverse electric field of proton by entering another proton into these fields where ρ_1, ρ_2, ρ_3 and ρ_4 the relative electric densities, F_1, F_2, F_3 and F_4 the Coulomb electric forces, P_1, P_2, P_3 and P_4 the cohesive pressures, F'_a and F_a the antigravity forces,[5] r_{el} the electric radius of proton and B the potential barrier

It has been found that the cohesive pressure P_0 causes at the core vacuum[1,2] of neutron (of a radius r) a total gravity force[4]

$$F_0 = 4\pi r^2 P_0, \tag{4}$$

which, due to $E_0 = F_0 L_0$ (Eq. 6),[4] is identical with its gravity[6] mass‡

$$m_0 = \frac{E_0}{C_0^2} = \frac{F_0 L_0}{C_0^2} \Rightarrow m_0 = \frac{F_0 L_0}{C_0^2}. \tag{5}$$

‡ $F_f^2 = F_0^2 + F_s^2$,[6] where for the E/M wave[7] applies $F_0 = 0$, therefore $F_f = F_s$, namely the final force F_f of the formation is equal to the accumulated force[6] F_s, where $F_f = E/L_0$ represents the energy of the E/M wave and $F_s = pC_0/L_0$ represents its momentum.[6] Substituting in the above $F_f = F_s$ we have $E/L_0 = pC_0/L_0$, where $p = mC_0$ is the momentum of the formation, so $m = E/C_0^2$.

Moreover, the dynamic energy of neutron, due to Eq. 4, becomes

$$E_0 = F_0 L_0 = P_0 V = \frac{P_0 4\pi r^3}{3} = \frac{(P_0 4\pi r^2) r}{3} = \frac{F_0 r}{3} \Rightarrow E_0 = \frac{F_0 r}{3}, \tag{6}$$

which decreases proportionally to the F_0 and r. Therefore, the reduction of cohesive pressure (Eq. 3) in the lower inverse electric field (section 2) creates a reduction of the total gravity force F_0 (Eq. 4) and the dynamic energy (Eq. 6) of the neutron, with result to its mass deficit Δm (Eq. 5), which makes the neutron stable into this field.

However, for the protons there is no mass deficit. When a proton enters in the lower inverse nuclear field, the cohesive pressure P_0 of the field decreases further (Fig. 1), due to the increase of negative units (attracted close to the positive cortex[8] of proton) of the above nuclear field. This negativity in the environment of the lower field causes an attraction force on the positive cortex of the proton, equilibrating its possible shrinkage and a loss of energy-mass. Therefore, the role of protons is to create the inverse electric field and of neutrons to suffer the consequences of the mass deficit. However, protons contribute to the increase of the nuclei mass deficit, because they increase (by their entering in the nuclear field) the negativity of the field, thus contributing to the reduction of cohesive pressure P_0 and therefore to increase of the neutrons mass deficit.

2. Potential of nuclear field and its topology

For the interval between M and E the potential of nuclear field is positive (Fig. 2), namely there is a zero potential at M and a maximum one at the potential barrier[3] B.

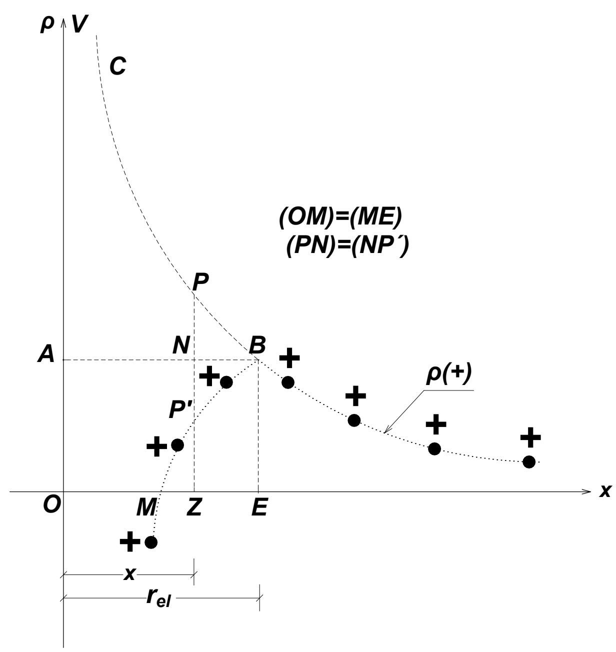

Figure 2. Potential V of the proton's inverse electric field

Between M and O the potential of nuclear field is negative and takes very large values. Consequently, from M to E there exists the upper inverse electric-nuclear field and from M to O the lower one, where the increase of potential is rapid.

The potential V of the electric-nuclear field is[9]

$$V = 2K\frac{Ze}{r} - K\frac{Ze}{x}, \tag{7}$$

where r is the electric radius[3] of nucleus, Ze its electric charge and K the Coulomb constant.

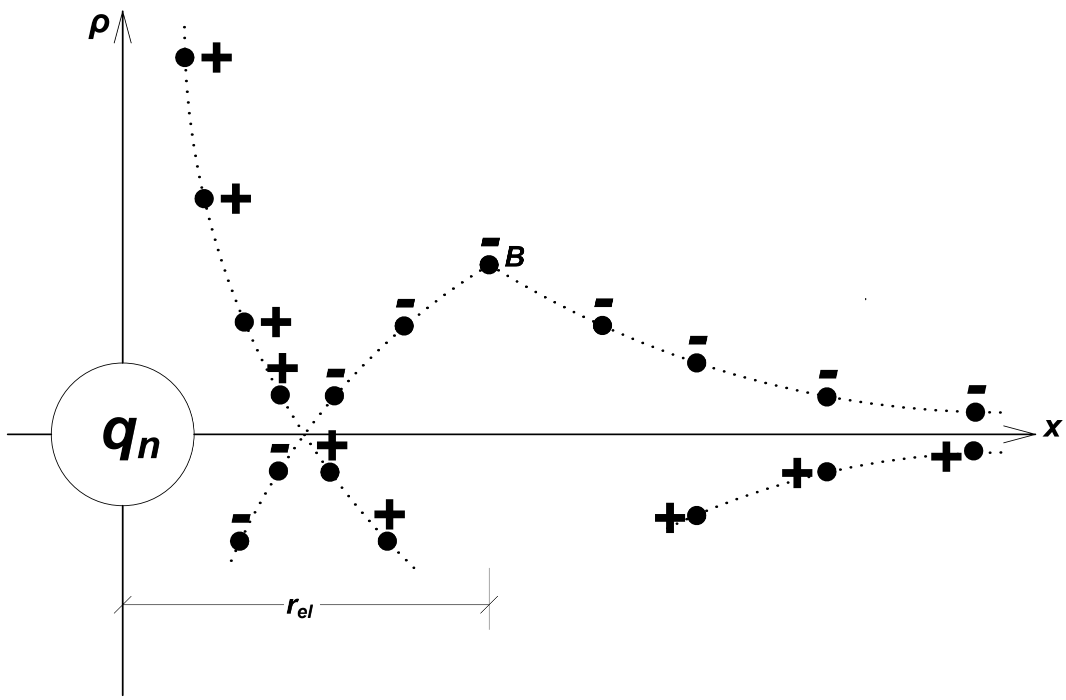

Figure 3. Limited inverse electric field of the calculated[10] negative electric charge $q_n = -0,685e$ of neutron with its cloud of positive electrical units

Nucleus is identical with the lower inverse electric-nuclear field where a rapid increase of potential occurs with a corresponding reduction of cohesive pressure. By the mass deficit of the neutron (section 1) entering the nucleus, the location potential and the topology of the nucleons can be now found. The proton entering the nucleus can be cleaved (beta decay β^+) at the strong negative potential of field, which though reduced by entering of the neutron in the nucleus. This happens at the scale of nucleus where, due to the neutron's magnetic dipole moment[10]

$$\mu = -1,913\mu_n, \tag{8}$$

the calculated[10] negative electric charge of neutron (Fig. 3)

$$q_n = -0,685e \tag{9}$$

behaves as a positively charged particle with the positive potential of its inverse electric field as a cloud of positive electrical units. So, the result is to affect the nuclear field and the cohesive pressure of the proximal space. This reduction in the negative potential of the field allows protons to be present in the nuclei.

It is noted that two protons can not exist in the nucleus without the presence of a neutron, because the increased negative potential of field causes a cleaving (beta decay β^{+}) of one proton. There would be no nuclei without the presence of neutrons that reduce the negativity of the protons field.

Oppositely, a greater reduction in the negativity of nuclear field may cause a neutron cleaving (beta decay β^{-}) and a reduction in mass deficit due to increased cohesive pressure.

Moreover, the neutron as a positively charged particle at the nucleus scale repels the closest proton, which is now moving on a helical orbit emitting gamma radiation and is finally immobilized. This radiant energy of the proton transmitted by the neutron is measured as mass deficit Δm and is equal to half of the kinetic energy of the neutron. Therefore, neutrons are those that move into the nuclei[11] (with the remaining half of their kinetic energy) on circular orbits around immobilized protons which have spin[12] only.

3. References

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