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On the Radius of the Neutron, Proton, Electron and the Atomic Nucleus

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Abstract

The neutron can spontaneously produce disintegration and turn into a proton and at the same time eject an electron and some matter. According to the force equilibrium relation, before the disintegration of the neutron, we have the formula as follows：

$$F = K \times Qp \times Qe / Rn^2 = (Mn - Mp) \times C^2 / Rn \quad (1)$$

where the K is the electromagnetic constant, the Qp is the electric charge of the proton, Qe is the electric charge of the electron, Mn is the mass of the neutron, Mp is the mass of the proton, Rn is the radius of the neutron, C is light velocity.

Key Words：Neutron；Proton；Nucleon；Electron；Atomic nucleus；Disintegration；Mass；Radius；Frequency；Density；Physical Constant。

One: The disintegration of the neutron

The neutron can spontaneously disintegrate and turn into a proton and at same time, send out an electron and some matter.

$Mn = 1.674954386 \times 10^{-27}$ Kg；$Mp = 1.672648586 \times 10^{-27}$ Kg；$Me = 9.10953447 \times 10^{-31}$ Kg。

where the Mn is the mass of the neutron，the Mp is the mass of the Proton and the Me is the mass of the electron.

The total mass for releasing from neutron disintegration is Mn - Mp as follows:

$$Mn - Mp = 1.674954386 \times 10^{-27} - 1.672648586 \times 10^{-27} = 2.3058 \times 10^{-30} \text{ Kg}$$

Two: The radius of the neutron
From formula (1), we can acquire the calculation formula of the neutron radius,

$$Rn = K \times Qp \times Qe / ((Mn - Mp) \times C^2) \quad (2)$$

According to exact physical constants from modern science, we take the following values:

$K = 8.987551786262 \times 10^{+9}$ m/F, $Qp = Qe = 1.602189246 \times 10^{-19}$ C, $C = 2.99792458012 \times 10^{+8}$ m/s

from formula (2), we can calculate the radius Rn of the neutron:

$$Rn = K \times Qp \times Qe / ((Mn - Mp) \times C^2) = 1.113284057367 \times 10^{-15} \text{ m} \quad (3)$$

Three: The frequency of the neutron

From the radius of the neutron, we can compute the frequency of the neutron：

$$Fn = C / (2 \times \pi \times Rn) = 4.285829054907 \times 10^{+22} \text{ 1/s} \quad (4)$$

Four: The density of the neutron

From the radius of the neutron, we can compute its average density:

$$D = Mn / (4/3 \times \pi \times Rn^3) = 2.897986816995 \times 10^{+17} \text{ Kg/m}^3 \quad (5)$$

Five: The radius of the proton

According to the average density of the neutron, we can calculate the radius of the proton:

$$Rp = (Mp/Mn)^{(1/3)} \times Rn = 1.112772961016 \times 10^{-15} \text{ m} \quad (6)$$

Six：The radius of the electron

According to the matter average density of the neutron, we can calculate the radius of the electron：

$$Re = (Me/Mn)^{(1/3)} \times Rn = 9.087345835484 \times 10^{-17} \text{ m} \quad (7)$$

Seven：The radius of the atomic nucleus

According to the radius of the neutron and the average density of matter, we can calculate the radius of the atomic nucleus:

$$Ra = (Ma / Mn)^{(1/3)} \times Rn \quad (8)$$

where the Ma is the mass of the atomic nucleus and Ra is the radius.

Mu ($1.6605655 \times 10^{-27}$ Kg) is the atomic mass unit and Ru is its radius.

$$Ru = (Mu / Mn)^{(1/3)} \times Rn = 1.110086953716 \times 10^{-15}\ m \quad (9)$$

$$Ra = Ru \times A^{(1/3)} \quad (10)$$

where the A is the nuclear number of the atomic nucleus.

CONCLUSION

Releasing mass $(Mn \times (Nn + Np) - Ma)$ of atomic nucleus, there exists an undulation with four for a period in the course of increasing nuclear mass and it does not exceed 1% of the total mass of the atomic nucleus.

The ratio $(Nn / (Nn + Np))$ of the amount of neutrons to the amount of nucleons inside the heavy atomic nucleus approach the divine ratio 0.618 $((Mn - Mp - Me) / (Mn - Mp) = 0.605$.
where Nn is the amount of neutrons inside the atomic nucleus and Np is the amount of protons inside the atomic nucleus, giving the combined total of nucleons.