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Nuclear Decay Configuration

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Plate I

Abstract

Nuclear physics and high energy physics experiments led to very highly precise results effectively confirming the theoretical base of the subject. The present paper proposes a theoretical justification of nuclear decay and therefore predicts a kind of weird particles. This paper essentially deals with theoretical analysis and predicts a new particle of proton decay in excited nucleus.

Keywords: Pentaquark, Feynman diagram, Composite Particles

Before I speak about the proposal, I would like to draw a brief sketch about nucleons and its fundamental constituents, since from the discovery of nucleus[1]** several experiments using high energy probes or cyclotrons[2]** were performed and the results obtained from it were fruitful particularly in the branch of particle physics. In particular the theoretical predictions forced us to discover the undiscovered particles and its interactions with others. It was then quiet clear that nucleus builds themselves with two sorts of composite particles (which were thought as elementary at that time) these particles were Protons[3]** and Neutrons**[4] of + and nil charge respectively. The question of the term “composite” requires two justifications the theoretical predictions and experimental verifications. In 1964 the new particle called quark model was proposed by Murray Gell-Mann and George Zweig[5]**. Currently quarks of unique six flavors are confirmed. However here I will try to give a brief flavor of down quark as because it will hold the very significant base of the following theory which is proposed here.

Down Quark

In 1968 massive experiments at Stanford Linear Accelerator Centre (SLAC) [6] ** gave invincible indication about the existence of down quark (notation d) and its typical decay modes. This quark has found to be the second lightest quark, with elementary compositions and fundamental constituents of matter. It obeys the Fermi-Dirac statistics with ½ integer spin, contains electric charge of -1/3e. The down quark shows experience with four fundamental interactions. It has its own antiquark.

Highly excited unstable nucleus undergoes radioactive disintegration by emitting high velocity charged particles and gamma rays of high energy. I shall wish to discuss here the proposition on Beta positive decay. Sir E. Fermi**[7] theoretical interpretations gave us a rich idea about the beta decay, an unstable nucleus with excess number of protons must decays into neutron, a positron and a neutrino. However neutrino hypothesis was put

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forwarded by Wolfgang Pauli**[8] who later won the Nobel Prize in physics.

The reaction of B+ decay is follows

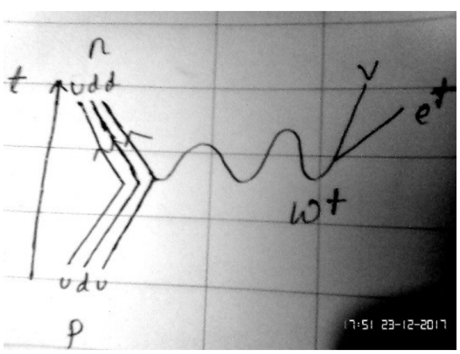
$$p^+ \to n + e^+ + v$$

This equation shows the possible positron emission from nucleus and v is the neutrino. But these particles not exist inside nucleus they are born during beta decay process.

Protons and neutrons are baryons their quark combinations are

$p^+ = uud \; and \; n = udd$ Where u is the up quark

So the Feynman diagram for beta positive decay is



Where W^+ is the boson.

The proposal here is the strict modification of Feynman argument and Fermi's interpretation that proton converts directly into neutron with positrons and neutrinos during this process. The typical decays of down quark is

$$d \to u(stable) + e^- + v_e \; (electron\ antineutrino)$$

So if we consider proton to neutron decay only then the equation being the form

$$uud \to udd$$

This equation represents the quark combination as described in Feynman's diagram. In accordance with my preliminary theoretical thoughts and investigations which led up to a very weird consequence that is the proton must not gets converted directly into neutron but in fact it converts into a very highly unstable and excited pentaquark particle whose lifespan is very tiny fraction, in accordance with this theory the beta positive decay must hold the form

$$p^+ \to P_0(new\ particle) \to n + e^+ + v$$

Where P_0 is pentaquark unstable particle. The proton first converts into highly exotic pentaquark particle and then its gets decayed into normal decay outcomes. This hypothetical particle is born during this nuclear disintegration.

Particle notation- P_0(assumed)

Composition- composite particle contains five quarks (Pentaquark Particle)

Quarks composition- $udd_0du \; where \; d_0 \; is \; antidown \; quark$ (Theoretical expectation)

Stability- highly excited and unstable (theoretical prediction)

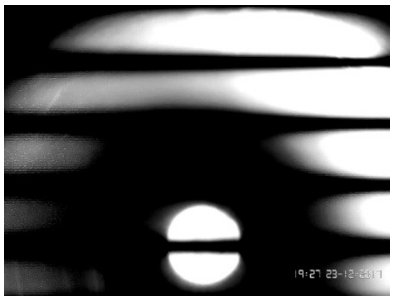
Decays into- neutron+ positron+neutrino in beta+ decay. (Theoretical prediction)

Lifespan- very very minute less than a fraction of a second (Theoretical prediction)

Charge- +1 (Theoretical Prediction)

So the quark based B+ decay is therefore given by the form

$$uud \rightarrow uddd_0u \rightarrow udd + e^+ + v$$



Possible existence of pentaquark particle P_0

This mechanism occurs in nuclear disintegration in beta positive decay, however it is still theoretical but it might be in accordance with reality, if we detect this particle.

What this theory proposes is very interesting and absolute weird in natural experience, but according to me it seems very strong and very solid theoretical indications.

This theory is just a prediction which needs invincible experimental evidence to proof the existence of this particle, this mechanism explained here must put to experimental observation and must try to find the pentaquark particle with all possible experimental efforts, and therefore all and any possible aspects and signals in favor of this high prediction.

References

[1] E. Rutherford Phil Mag. 1911 "the scattering of alpha and beta particle by matter and the structure of the atom"

[2] Sir Ernest Orlando Lawrence inventor of cyclotron, Nobel Prize in Physics, 1939

[3] Sir Eugene Goldstein discovered protons,

[4] Sir James Chadwick discovered neutrons, Nobel Laureate in physics, 1935

[5] Murray Gell-Mann Predicted the possible existence of quarks, Nobel Laureate, 1969

[6] Experiments at SLAC discovered down quarks in 1968

[7] Sir Enrico Fermi, Nobel Laureate, 1938

[8] Sir Wolfgang Pauli, Nobel Laureate, 1945

PLATE II

On The Introduction of Variables and Mathematical Forms of Electron in Magnetic Field

And Schrodinger Equation

The basic approximations and assumptions in quantum physics seems very fundamental in clearly explaining the observed facts and experimental outcomes. This paper shows the introduction of mathematical variable which clearly a physical constant, and frames a mathematical equation which is compatible with this constants.

In previous paper it had been shown that introduced variables is in theoretical argument to set those in the equations for the electrons in

M.F. it was also introduced that any electron in magnetic field should be compatible with a equation given by

$$\frac{F_B H_\phi}{M\,(\phi A)(\phi y)} - \frac{B\partial' v}{2\pi^2 V\lambda} = 0$$

This equation requires the coordinate rule which was already introduced in former paper by the author, and the variable which fits in the equation shown above requires the basic assuming vision to obtain it.

Furthermore the equation using new parameters successfully explains the physical makeup in terms of mathematics. In former papers we have introduced an equation of electron in the form of equation

$$\pi m - \frac{\partial B}{\partial\, F_B}\frac{\partial V}{\partial v} e^2 \pi = 0$$

This equation is however very essential in forming the definitions of the introduced variables introduced here. Basically here is the introduction of the physical constant here described, the notation being φ. This assumed quantity for electron must be incorporated in the equation, such that one gets the form

$$\frac{1}{h} 2\pi \frac{\partial B}{\partial\, F_B}\frac{\partial V}{\partial v} - \hbar m \varphi^{-2} = 0$$

If one defines the parameter or sets

$$\varphi = \hbar e$$

Such that

$$\varphi = \varphi_2 - \varphi_1$$

Or it follows that

$$\hbar e = \varphi_2 - \varphi_1$$

Then the equation will take the form

$$\frac{1}{h} 2\pi \frac{\partial B}{\partial\, F_B}\frac{\partial V}{\partial v} - \hbar m (\varphi_2 - \varphi_1)^{-2} = 0$$

These variables are introduced as its component actions. However this quantity clearly fits in the above equation which must be proposed as

$$\theta - \frac{\partial B}{\partial\, F_B}\frac{\partial V}{\partial v}\varphi_1 = 0$$

If one puts

$$\varphi_1 = h^3 \pi e$$

Consider the component parameter θ_1 such that this quantity is defined by

$$\theta_1 = \frac{m h^5 \pi}{20e}$$

So the above variable θ must therefore given by equation

Such that

$$\theta_1 \neq \theta$$

So the constant must be defined by

$$\theta = \frac{d^2}{dh^2}\,\theta_1$$

This fits in our above equation in order to describe it

So from the second equation described in this paper it follows that

$$\sqrt{\frac{m}{\frac{\partial B}{\partial F_B}\frac{\partial V}{\partial v}}}$$

This expression is nearly to e, the charge of an electron.

From above physical constants introduced in this paper clearly compatible with the equation described above. Basically these physical constants in the mathematical definitions which incorporates very well in these equations.

Furthermore the non- relativistic Schrodinger equation can be treated with this first introduced mathematical quantity.

The form of wave equation is given by

$$\nabla^2\psi + \frac{8\pi^2 m}{h^2}(E - V)\psi = 0$$

The wave function is introduced in this equation which defines electron as a wave and a Laplace or del operator. The operator must be in the form for three dimensions

$$\nabla^2 = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$$

If we allow these variables of physical considerations in Schrödinger equation then it can be show that it gets easily fitted in it without any emerging difficulty. The form of the equation one can derive is given as proposed.

The modified version of Schrodinger equation is therefore

$$\nabla^2\psi\varphi + \frac{4\pi m}{h}e(E - V)\psi = 0$$

Or since

$$\varphi = \varphi_2 - \varphi_1$$

$$\nabla^2\psi(\varphi_2 - \varphi_1) + \frac{4\pi m}{h}e(E - V)\psi = 0$$

Which is clearly as equivalent as the former one, we proposed.