The diagrams of particles decay process and the prediction of new particle

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Abstract: I have proposed an intuitive diagrammatic method to explore the elementary particles' structures and decay processes based on virtual space-time. Then I discuss the possibilities of the existing of new particles. I also raised some issues that need to attention when probing those new particles.

Key words: Elementary particles; diagram; neutron; decay

0 Introduction

Currently, we have no tools to observe the structures of elementary particles. So the most useful tools are the diagrams, such as Feynman's diagram. [1] Here I postulate a new diagram scheme based on virtual space-time. [2~4] This diagram can provide us an intuitive view of the elementary particles' structure and help us explore the particles' decay process.

1 Some conventions

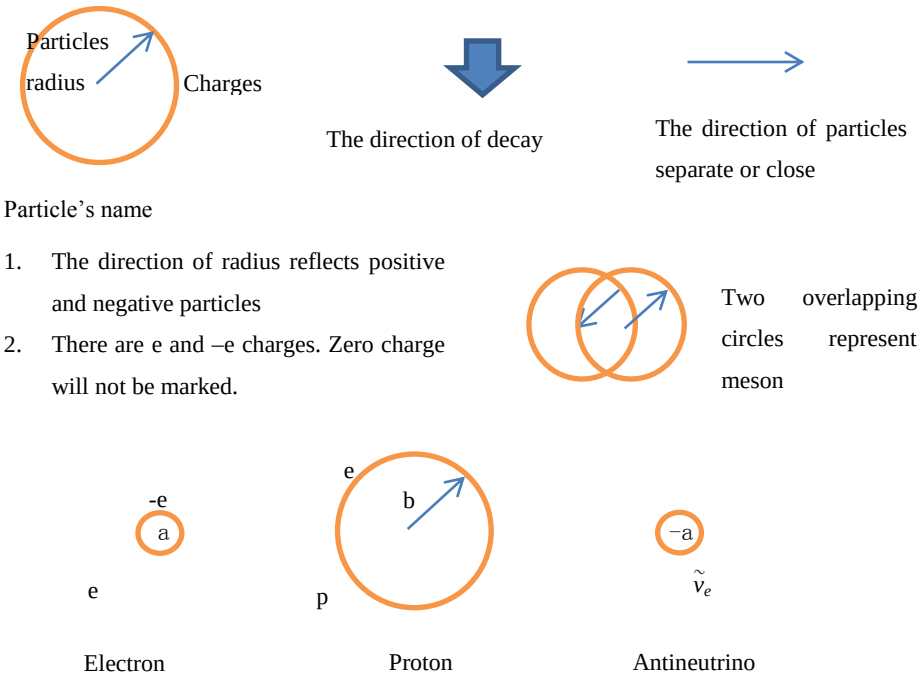

Figure 1. Diagram conventions

There may be another postulate. It means that there is a sequence that the leptons will only decay in step by step. For example, the Tau cannot decay to electrons directly. However, the higher energy photons can produce three lepton pair of positive and negative particles directly.

2 Several common particles decay diagram

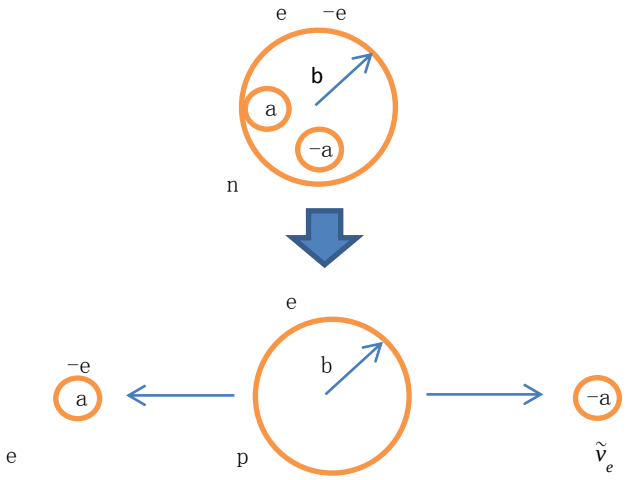

Figure 2. Neutron decay

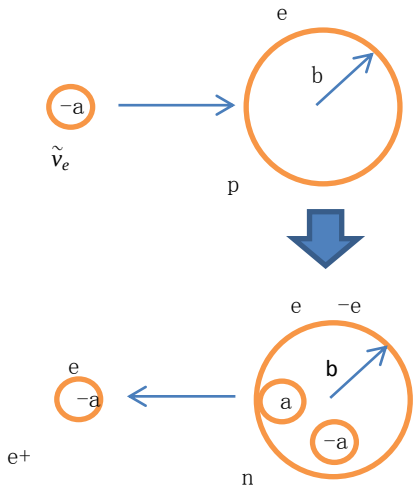

Figure 3. The reaction of antineutrino and proton

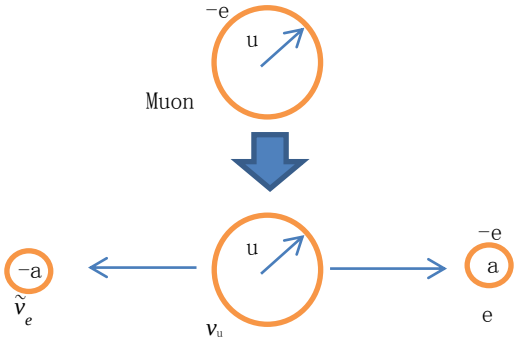

Figure 4. Muon and its decay process

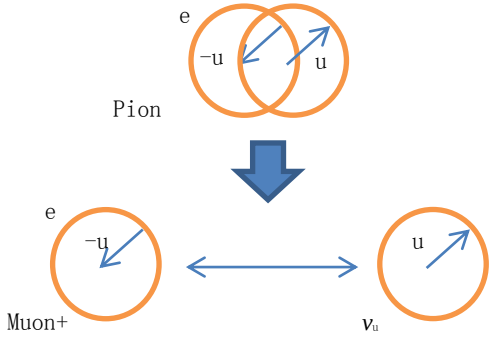

Figure 5. The structure of Pion and its decay

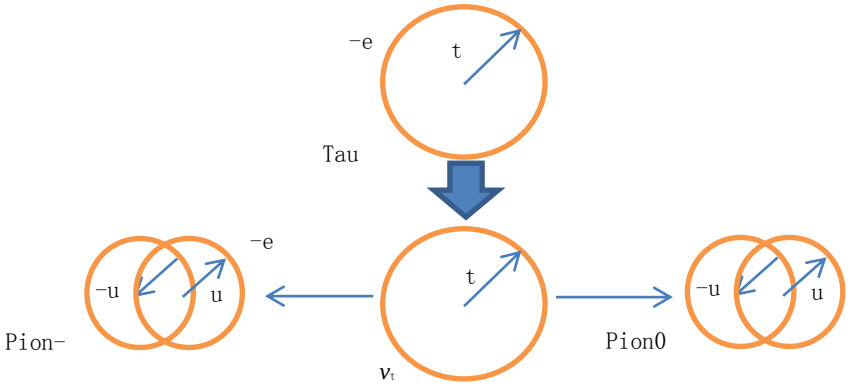

Figure 6. Tau's decay 1

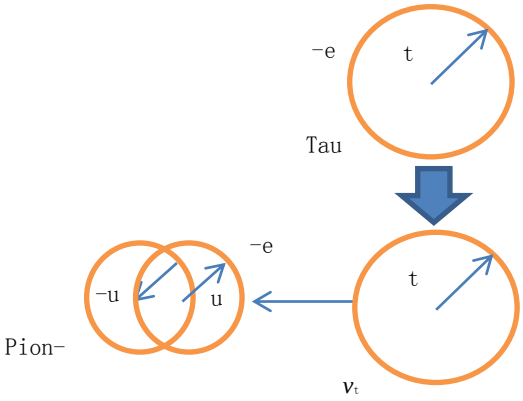

Figure 7. Tau's decay 2

3 Other particles decay diagram

Since the final stable particles are only electrons, protons, neutrinos and photons in all of the particles decay process, so the diagram method provided in this paper can be applied in all of the elementary particles' decay process. It can be also supported by the fact that six quarks and six leptons have the correspondence relationships in standard model.

4 The calculation of other particle

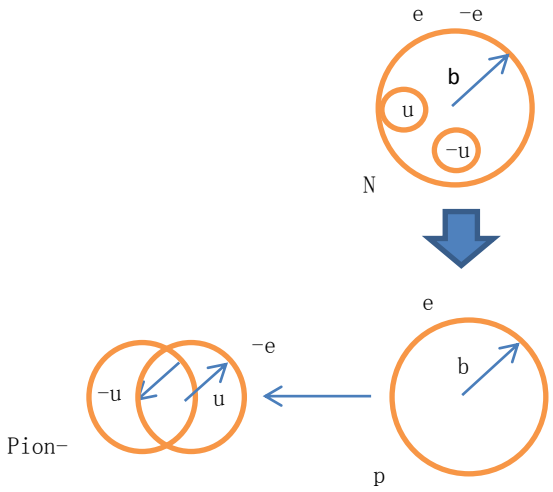

Figure 8. New particle

If the process in figure 8 exists, then we can calculate the new particle's mass according to paper [2].

We can calculate the virtual photon's energy carried by chargeless Muon according to paper [2].

$$h\nu = \frac{\hbar c}{4b} = \frac{m_e c^2}{2\alpha}$$

So the total energy of chargeless Muon is

$$E = \sqrt{m_u{}^2 c^4 + \left(\frac{e^2}{8\pi\varepsilon u}\right)^2 + h^2\nu^2 + h^2\nu^2}$$

Since $m_u{}^2 c^4 + \left(\frac{e^2}{8\pi\varepsilon u}\right)^2 >> h^2\nu^2 + h^2\nu^2$

We have $E_3 \approx \frac{2h^2\nu^2}{2\sqrt{m_u{}^2 c^4 + \left(\frac{e^2}{8\pi\varepsilon u}\right)^2}} = 11.59\text{MeV}$

We can obtain the new particle's mass as

$$m_N c^2 \approx m_p c^2 + m_\mu c^2 + E_1 + E_2 + E_3 \approx 1055.01(MeV)$$

It is close to the particle Λ^0. Since lifetime of muon is shoter, the lifetime of this particle may be also shorter.

5 Is there existence of lighter mesons

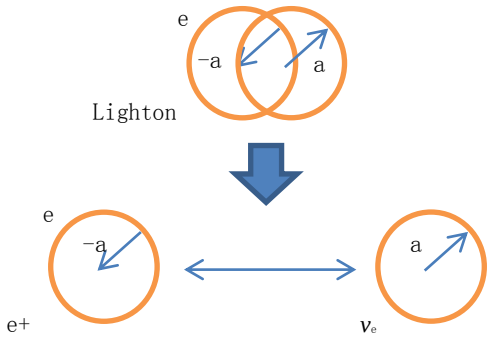

Figure 9. The structures of lighter meson and its decay

If we replace muon by electron in figure 5, we can obtain a new particle. Here I call it Lighton. It is belong to mesons. However, it is lighter than pions. Just like pions, Lighton's mass is close to electron's mass. Therefore, in the experiment detection process, it may be mistaken for electrons or positrons.

6 Proton decay

Since protons are the structure less particles just like electrons in this model, protons will not decay. It is the key difference between this model and standard model.

7 Conclusion

We can understand the particles behaviors intuitionally through the new diagram scheme. In the same time we can also calculate some important parameters of elementary particles by using these diagrams, such as the mass and charge. It also provides a new method to predict new particles. The key difference between this model and standard model is that protons will not decay in any way.

Reference

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