# Is there Proton Neutrino

Zhi CHENG

（9 Bairong st. Baiyun District, Guangzhou, China. 510400. gzchengzhi@hotmail.com）

**Abstract:** This work based on my previous works. I postulate that there is proton neutrino just like electron neutrino since protons are also the elementary particles just like electrons. Then I point out that there must be proton meson that consisted with proton and proton neutrino. In this paper, I analysis the proton meson’s decay model by diagrammatic scheme. I also calculate some parameters of proton meson, and give some advises on how to detect these particles.

**Key words:** Elementary particle; Proton; Neutrino; Meson

# 0 Introductions

We can intuitionally understand the structure of elementary particles by using diagrammatic scheme. [1] We can also calculate the parameters of elementary particles by using this method. This paper is based on my previous works. [1~4] The key point of this work is whether there is proton neutrino. If it is true, then we can draw the conclusion that there must be proton mesons that are consisted with proton and anti-proton-neutrino.

# 1 Proton neutrino

There are three kinds of neutrinos, which are electron neutrino, muon neutrino and tau neutrino. If we consider that proton is the indivisible elementary particle just like electron, then we can also predict that there is proton neutrino corresponding to electron neutrino in theory.

Figure 1 shows the structure of proton neutrino and anti-proton-neutrino.


Figure 1. The structure of proton neutrino and anti-proton-neutrino

# 2 Proton meson

Figure 2 shows the structure of proton meson and its decay process. We can see that this proton meson carry one positive charge. Of course, the antiproton and proton neutrino can also form the anti-proton-meson that carrying one negative charge. There also may be zero charge proton meson that consisted with proton and antiproton, or proton neutrino and anti-proton-neutrino.

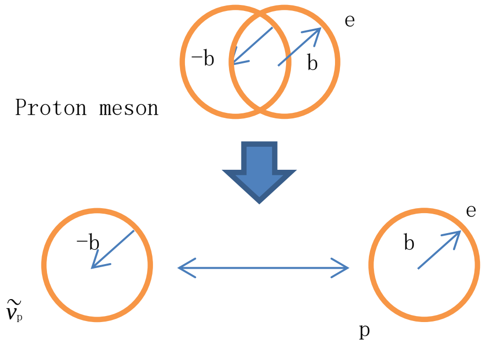


Figure 2. The structure of proton meson and its decay process

# 3 The calculation of some parameters of proton meson

If there are proton mesons, the proton and anti-proton-neutrino will be limited in proton's diameter range 2b. We can calculate the virtual photon's energy according to uncertainty principle. [2]

$$h\nu = \frac{\hbar c}{4b} = \frac{m_e c^2}{2\alpha} = 35.01MeV \quad (1)$$

So the total proton-meson's energy is

$$E = \sqrt{m_p{}^2 c^4 + 2 \times \left(\frac{e^2}{8\pi\varepsilon b}\right)^2 + h^2\nu^2 + h^2\nu^2} \approx 939.58MeV \quad (2)$$

It seems that the proton meson's mass is close to neutron's mass. However, proton mesons can carry charges.

Proton meson's spin is an integer besides mass and charges. It is different from neutron.

Since the combination of proton and anti-proton-neutrino is not solid, the proton mesons' lifetime is very shorter just like other mesons.

# 4 Detection

If we want to confirm the existence of proton neutrino, we can fist detect proton mesons. If there are proton mesons, there must be proton neutrino.

We can use magnetic field to distinguish proton mesons and neutrons since a part of proton mesons carry charges. We can also detect the particles' lifetime to distinguish proton mesons and proton.

On the other hand, we can also distinguish them by using angular momentum conservation principle, since the proton mesons have integer spin, which is different from fermions.

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# Appendix: Chinese Version

# 是否存在质子中微子

程智

（广州市白云区机场路百荣街 9 号. gzchengzhi@hotmail.com）

**摘要:**本文在基于前期工作的基础上，提出质子中微子存在的可能性，并在此基础上提出了由质子和质子中微子组成的新的介子。本文采用图解的方式分析了新介子的衰变方式，以及新介子的质量等参数的计算。

**关键词**：基本粒子；质子；中微子；介子

# 0 导言

通过图解的方式有助于我们更直观地了解基本粒子的组成[1]，计算基本粒子的各种参数。本文在我之前工作的基础上进一步提出[1~4]，是否存在新的质子中微子?而如果质子中微子确实存在，则可以合理地推论存在以质子和反质子中微子为基础构成的新的介子。

# 1 质子中微子

目前我们已经证实的中微子主要有三种，分别是电子中微子、Muon 中微子和 Tau 中微子。如果将质子也视为如同电子一样的基本粒子，则理论上应该存在与质子相对应的质子中微子。

而质子为如同电子一样的基本粒子这一结论，则可以从至今尚未发现质子衰变的实验事实获得证实。

图 1 显示了质子中微子和反质子中微子的结构。


图 1 质子中微子和反质子中微子

从图 1 可以看出，如同电子中微子一样，质子中微子具备了与质子一样的半径，但是不携带电荷。

# 2 质子介子

如果确实存在质子中微子，按照已知的介子的性质来看，则一定存在由质子和质子中微子构成的质子介子。

图 2 显示了这种质子介子的结构及其可能的衰变产物。从图中可以看出，该介子携带一个正电荷。当然如果由反质子和质子介子组合在一起，则可以构成携带负电荷的质子介子。如果由正反质子或者正反质子中微子结合在一起则可以形成零电荷的质子介子。

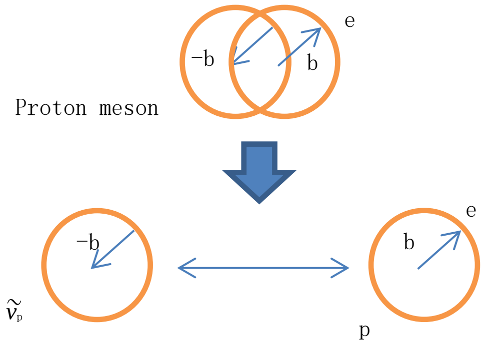


图 2  质子介子的结构及其衰变

# 3  质子介子参数的计算

如果质子介子确实存在，则这两个粒子将被局限在质子直径 2b 范围之内。按照测不准原理，可以计算出所产生的虚光子能量为[2]：

$$h\nu = \frac{\hbar c}{4b} = \frac{m_e c^2}{2\alpha} = 35.01MeV \quad (1)$$

因此质子介子的总能量大约为：

$$E = \sqrt{m_p{}^2 c^4 + 2\times\left(\frac{e^2}{8\pi\varepsilon b}\right)^2 + h^2\nu^2 + h^2\nu^2} \approx 939.58MeV \quad (2)$$

可以看出质子介子的质量与中子质量基本相同。然而质子介子可能携带电荷。

除了质量以及可能携带电荷以外，质子介子的自旋为整数，这也是与中子显著不同的地方。

从寿命来看，质子与反质子中微子之间的结合是不牢固的，从其他介子的寿命来看，质子介子的寿命会比较短，其寿命要明显小于中子的寿命。

# 4  探测

如果要探测质子中微子的存在，可以先探测质子介子。因为如果质子介子存在，则一定存在质子中微子。

然而由于质子介子的质量与中子的质量基本一致，在探测过程中，可能存在将部分质子中微子被误测为中子。

考虑到部分质子介子携带有电荷，可以利用磁场来区分质子介子和中子。

质子介子的质量与质子也比较接近，区分质子介子和质子，可以通过粒子的稳定性来进行区分。质子是不会衰变的，而质子介子则很容易衰变。

另外也可以从粒子的自旋这一角度来进行区分。由于质子介子的自旋为整数，可以从粒子反应的角动量守恒来区分质子介子与质子或中子。

# 参考文献

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