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On a Neutrino Problem

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Abstract: *The proposed neutrino oscillation methods looks quite naíve. We don't allow the mixture of heavy and light neutrino. The see-saw mechanism of neutrino mass generation seems to be doubtful.*

Keywords: *Neutrino oscillation, mass term, Standard Model, see-saw mechanism*

1. INTRODUCTION

Since the moment of appearance of elementary-particle Physics its advancement and development were quite successful until the researchers have confronted with a neutrino problem. The crux of the matter is proposed, for example, in our earlier investigations in this area, see e.g., [1], [2], [3].

It is necessary to note that experiments with neutrino are hard to realize and therefore are very expensive. It results in appearance of simplified experiments, in transition to the repetition of the known and in lack of the original experiments. It leads in turn to necessity to adapt the data of experiments to the required result and impossibility to make a forecast. Moreover there are no attempts to find out the reasons of the first strange results in neutrino investigation.

In this sense the research method based on the see-saw mechanism of the neutrino mass generation seems to be worthy. Note that while one part of the monographs dedicated to the neutrino refers to the see-saw mechanism, another one doesn't include any information to that. We give a short overview of such method in [4] and [5].

2. MAIN RESULTS

A study of the see-saw mechanism of the neutrino mass generation deserves undoubtedly attention. A direct linkage of this phenomenon to the Standard model can turned to be unsuccessful. It is proposed that the neutrino has no complete similarity of the structure with other elemetrary particles and acts as cosmic dust. The main difference of neutrino from other elementary particles consists in instability of a neutrino structure. The willing to mixture the heavy and light neutrino will not reach a success. The interaction of the heavy and light has only a gravitational reason. Such interaction can not be observable taking into account a negligible neutrino mass.

We intend to discuss shortly the see-saw mechanism of neutrino mass generation. As it is known the neutrino masses are much lower as the masses of quarks and leptons. It is assumed the mechasism of neutrino mass attenuation. The Dirac mass term is

$$L^{D} = -m_{D}\overline{\nu}_{lR}\nu_{lL} + э.с. \qquad (1)$$

Except the mass term (1) there is a Majorana mass term which disturbs the lepton number,

$$L_{R}^{M} = -\frac{1}{2}M_{R}(\nu_{lR})(\nu_{lR})^{C} + э.с. \qquad (2)$$

Such a term is excepted only for neutrino and is not allowed for the quarks and leptons due to the conservation of electric charge. Then a total mass term oft he Majorana and Dirac type is equal to

$$L^{M+D} = -\frac{1}{2}\overline{(\nu'_{L})^{C}}M^{(M+D)}\nu'_{L} + э.с., \qquad (3)$$

where

$$\nu'_L = \begin{pmatrix} \nu_{lL} \\ (\nu_{lR})^C \end{pmatrix}, \; M^{M+D} = \begin{pmatrix} 0 & m_D \\ m_D & M_R \end{pmatrix}. \tag{4}$$

After a further diagonalization the muss term (3) is of the form,

$$L^{M+D} = -\frac{1}{2}\sum_{i=1,2} m_i \bar{\nu}_i \nu_i \,, \tag{5}$$

$$m_{1,2} = \frac{1}{2}\left(M_R \pm \sqrt{M_R^2 + 4m_D^2}\right). \tag{6}$$

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