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Neutrino mass and baryon asymmetry in two right-handed neutrino model

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We discuss the Standard Model which extended by two right-handed neutrinos. In this case, the tiny neutrino masses observed by neutrino oscillation experiments and the baryon asymmetry of the universe (BAU) can be explained by these right-handed neutrinos, simultaneously. Moreover, we focus on the testability of right-handed neutrinos by the direct search experiments. Then, we investigate right-handed neutrinos lighter than the charged kaon. Even if the masses of right-handed neutrinos are such small, the seesaw mechanism can work due to the suppressed neutrino Yukawa couplings. Furthermore, from the small Yukawa couplings the right-handed neutrinos deviate form thermal equilibrium in the early universe, and the BAU can be generate by Baryogenesis via right-handed neutrino oscillation. Therefore, we study to test the origin of neutrino mass and BAU with searching for right-handed neutrinos.
In this scenario, we evaluated the allowed parameter space from experimental and cosmological bounds of right-handed neutrinos. The right-handed neutrinos can be produced by meson decays through the mixing with left-handed neutrinos. Then, some experiments using meson decays have set upper bounds for interaction strength of right-handed neutrinos because the right-handed neutrinos have not been discovered yet. On the other hand, to keep the successful Big bang nucleosynthesis the lifetime of right-handed neutrinos are restricted.
As a result, we found Majorana phase are limited in the allowed parameter space in inverted mass hierarchy case, and calculated the impacts on neutrinoless double beta decay.
In addition, we showed a possibility that all unknown parameters in this model might be determined by realization of the observed value of BAU, future oscillation experiments and direct search for right-handed neutrinos.

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