

Prospects of Neutrino Physics



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Leptogenesis from active neutrino oscillation

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The possibility of generating the baryon asymmetry of the Universe via flavor oscillation in the early Universe is discussed. After the inflation, leptons are born in some states, travel in the medium, and are eventually projected onto flavor eigenstates due to the scattering via the Yukawa interactions. By using the Lagrangian of the Standard Model with the Majorana neutrino mass terms, $\ell\ell H H$, we follow the time evolution of the density matrices of the leptons in this very first stage of the Universe and show that the CP violation in the flavor oscillation can explain the baryon asymmetry of the Universe. In the scenario where the reheating is caused by the decay of the inflaton into the Higgs bosons, the baryon asymmetry is generated by the CP phases in the Pontecorvo-Maki-Nakagawa-Sakata matrix and thus can be tested by the low energy neutrino experiments.

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