

Intrinsic flavor violation for massive neutrinos

It is shown that intrinsic neutrino flavor violation invariably occurs when neutrinos are created within the SM augmented by the known massive neutrinos, with mixing and nondegenerate masses.

The effects are very small but much greater than the naive estimate $\Delta m^2/E_\nu^2$ or the branching ratio of indirect flavor violating processes such as

$\mu \rightarrow e\gamma$ within the SM.

We specifically calculate the probability (branching ratio) of pion and muon decay processes with flavor violation, such as $\pi \rightarrow \mu\bar{\nu}_e$ (two-body) and $\mu \rightarrow e\nu_\mu\bar{\nu}_\mu$ (three-body), showing nonzero results.

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