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About heavy neutrinos: Violation of lepton flavor in neutrinoless decays of leptons

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Summary

The fundamental description of nature, beyond the Standard Model (SM), may include heavy neutrinos that mix and thus allow processes in which lepton flavor is not preserved. We investigate the impact of charged currents that couple heavy gauge bosons to heavy neutrinos and SM leptons on neutrinoless lepton-flavor-violating decays of SM leptons into three charged leptons. We implement our expressions for the leading contributions to $\text{Br}(l \rightarrow \alpha - l \beta l \sigma l \sigma)$, which hold for either Dirac or Majorana neutrinos, to the neutrinoless trilepton decay $\mu \rightarrow 3e$, of the muon, and so determine sets of masses of heavy neutrinos and the heavy gauge boson, within GeVs to few TeVs, that are consistent with the upper bounds provided by the SINDRUM Collaboration. We utilize such parameters to find that the contributions to tau decays are the order of 10^{-14} - 10^{-13} , well below bounds from B factories.

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