Contribution ID : **28** Type : **Plenary Topical Talk (30 min)**

Effects of heavy Majorana neutrinos in semileptonic heavy quark decays

Saturday, 22 October 2011 13:00 (0:30)

Abstract content

The experimental observation of lepton number violating (LNV) processes, where the total lepton number is violated by two units (\Delta L = 2), represents the most appropriate way to address the question of the nature of neutrinos as Majorana or Dirac particles. LNV processes mediated by the exchange of heavy Majorana neutrinos, such as three-body decays of tau lepton and charged pseudoscalar mesons, have been studied extensively. Extending the search of these kinds of process, in this work we study the contribution of heavy Majorana neutrinos in LNV four-body semileptonic decays of neutral B mesons and top quarks. We focus in a scenario where a single heavy neutrino can enhance the decay rates of these processes via the resonant mechanism. Using current bounds on heavy neutrino mixings, we find that the branching ratios of this processes can to be at the level of 10^{−6} to 10^{−7}. These decay modes seem to be at the reach of the current and forthcoming experiments, and their experimental search can provide complementary constraints on masses and mixings of heavy Majorana neutrinos.

Summary

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Session Classification : Electroweak and Flavor Physics

Track Classification : Electroweak and Flavor Physics