

LVN & LVN heavy baryon decays, in presence of two almost degenerated heavy neutrinos

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We study the four-body heavy baryon decay, including two leptons in the final state, of the form $B_A \rightarrow B_B P l_\alpha l_\beta$, which can be either a lepton number conserving (LNC) or a lepton number violating (LVN) process (where B , P and l are baryons, pseudoscalar mesons and leptons, respectively), including all kinematic allowed lepton pair possibilities. We work beyond the simplified assumption of a single heavy Majorana neutrino mixing with the active sector, considering potential interference effects when including two nearly degenerate heavy Majorana neutrinos. Particularly, we provide a first estimate of the decay channels involving different flavors for the external leptons (e.g., muon-tau), and elaborate on the interference pattern due to leptons exchange. We show that the results for the two heavy almost degenerate neutrinos can be recast into a single Majorana neutrino, and exhibit the features for both the LNC and LVN scenarios. We determine the potential exclusion region for the mass and heavy-light mixing parameters, of the neutrinos driving the decay, including finite size detector effects. We also obtain the Branching ratio as a function of the heavy neutrino mass for the current upper limit of the heavy-light mixings.

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