



Contribution ID: 370

Type: parallel talk

Long Lived Light Scalars as a Probe of Seesaw

Tuesday 9 May 2017 18:15 (15 minutes)

We point out that in generic TeV scale seesaw models for neutrino masses with local $B-L$ symmetry breaking, the Higgs field breaking the $B-L$ symmetry can leave a physical real scalar field with mass around GeV scale. In the specific case when the $B-L$ symmetry is embedded into the left-right symmetry, low energy flavor constraints necessarily require the light scalar to be long lived, with displaced vertex signals of collimated photon jets at the LHC. Thus, the search for such long-lived light scalar particles provides a new way to probe TeV scale seesaw models for neutrino masses at colliders.

Summary

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Session Classification: Neutrinos and Lepton Flavor II