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Revisiting the high-scale validity of Type-II seesaw model with novel LHC signature

The Type-II seesaw model is a well-motivated new physics scenario to address the origin of the neutrino mass issue. We show that this model can easily accommodate an absolutely stable vacuum until the Planck scale, however with strong limit on the exotic scalar masses and the corresponding mixing angle. We examine the model prediction at the current and future high luminosity run of the Large Hadron Collider (LHC) for the scalar masses and mixing angles fixed at such high-scale valid region. Specifically, we devise the associated and pair production of the charged scalars as a new probe of the model at the LHC. We show that for a particular signal process the model can be tested with 5σ signal significance even at the present run of the LHC.

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