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Analysis of the Scalar sector and prospect of a scalar dark matter candidate in the Electroweak Scale Right handed neutrino-model

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Motivated by the no-show of any New Physics signals coming from the BSM searches in the post-Higgs era of the LHC, we study the scalar sector of the original electroweak-scale right-handed neutrino (EW_v_R) model, which includes Majorana masses and mirror fermions having masses in the EW scale, within the reach of the current colliders. This scenario successfully links the see-saw mechanism, strong CP and DM sectors and contains distinguished Long-lived particle (LLP) signals with large displaced vertices (mm-cm) in quark and lepton sectors. In this work, we analyze the complete scalar sector spectrum which includes heavier triplets, doublets and singlet higgs states in conjunction with the specific 125-GeV scalar state. We present the obtained heavy scalar particle spectrum in the light of the current LHC constraints and comment on their reach at the current/future colliders. We also specifically investigate the prospect of the light singlet scalar fulfilling the role of the DM candidate in this framework.

Summary

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