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## Right Handed Neutrinos, TeV Scale BSM Neutral Higgs and FIMP Dark Matter in EFT Framework

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We consider an effective field theory framework with three standard model (SM) gauge singlet right handed neutrinos, and an additional SM gauge singlet scalar field. The framework successfully generates eV masses of the light neutrinos via seesaw mechanism, and accommodates a feebly interacting massive particle (FIMP) as dark matter candidate. Two of the gauge singlet neutrinos participate in neutrino mass generation, while the third gauge singlet neutrino is a FIMP dark matter. We explore the correlation between the  $v_{ev}$  of the gauge singlet scalar field which translates as mass of the BSM Higgs, and the mass of dark matter, which arises due to relic density constraint. We furthermore explore the constraints from the light neutrino masses in this set-up. We chose the gauge singlet BSM Higgs in this framework in the TeV scale. We perform a detailed collider analysis to analyse the discovery prospect of the TeV scale BSM Higgs through its di-fatjet signature, at a future  $pp$  collider which can operate with  $\sqrt{s} = 100$  TeV c.m.energy.

### Summary

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