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Revisiting neutrino and sneutrino dark matter in natural SUSY scenarios

We study natural supersymmetric scenarios with light right-handed neutrino superfields, and consider the possibility of having either a neutrino or a sneutrino as a dark matter candidate.

For the former, we evaluate the possibility of having SUSY corrections on the $\nu_4 \rightarrow \nu_\ell \gamma$ decay rate, such that the NuStar bounds are relaxed. We find that corrections are too small.

For sneutrino dark matter, we consider thermal and nonthermal production, taking into account freeze-out, freeze-in, and super-WIMP mechanisms. For the nonthermal case, we find that the $\tilde{\nu}_R$ can reproduce the observed relic density by adjusting the R-sneutrino mass and Yukawa couplings. For the thermal case, we find the need to extend the model in order to enhance sneutrino annihilations, which we exemplify in a model with an extended gauge symmetry.

Mini-abstract

In natural SUSY, R-sneutrinos might still be good dark matter candidates.

Experiment/Collaboration

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