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Signals from Light Sneutrino Dark Matter at future e^+e^- Colliders

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We study the possibility of measuring neutrino Yukawa couplings in the Next-to-Minimal Supersymmetric Standard Model supplemented with right-handed neutrinos (NMSSM) when the lightest of such states is the Dark Matter (DM) candidate, by exploiting a ‘dijet + dilepton + Missing Transverse Energy’ (MET) signature. We show that, contrary to the minimal realisation of Supersymmetry (SUSY), the MSSM, wherein the DM candidate is typically a much heavier (fermionic) neutralino state, this extended model of SUSY offers one with a much lighter (bosonic) state as DM that can then be produced at the next generation of e^+e^- colliders with energies up to 500 GeV or so. The ensuing signal, mediated by (both neutral and charged) $\tilde{\nu}$ -into production and decay, is extremely pure so it also affords one with the possibility of extracting the Yukawa parameters of the (s)neutrino sector. Altogether, our results serve the purpose of motivating searches for light DM signals at such machines, where the DM candidate can have a mass around the Electro-Weak (EW) scale.

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