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Resolving a challenging supersymmetric low-scale seesaw scenario at the ILC

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We investigate a scenario inspired by natural supersymmetry, where neutrino data is explained within a low-scale seesaw scenario. For this the Minimal Supersymmetric Standard Model is extended by adding light right-handed neutrinos and their superpartners, the R-sneutrinos. Moreover, we consider the lightest neutralinos to be higgsino-like. We first update a previous analysis and assess to which extent does existing LHC data constrain the allowed slepton masses. Here we find scenarios where sleptons with masses as low as 175 GeV are consistent with existing data. However, we also show that the up-coming run will either discover or rule out sleptons with masses of 300 GeV, even for these challenging scenarios.

We then take a scenario which is on the borderline of observability of the upcoming LHC run assuming a luminosity of 300 fb^{-1}. We demonstrate that a prospective international e^+e^- linear collider with a center of mass energy of 1 TeV will be able to discover sleptons in scenarios which are difficult for the LHC. Moreover, we also show that a measurement of the spectrum will be possible within 1-3 percent accuracy.

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