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Probing light neutralinos from pair produced sleptons with a displaced vertex at the LHC

We study light neutralinos ($\tilde{\chi}_1^0$) with masses of the order of the GeV scale in the context of R-parity-violating (RPV) supersymmetry. For such masses, the neutralinos can become long-lived particles and decay with a macroscopic (order cm) displacement inside LHC detectors. Complementing previous works, we focus on their production through a pair of sleptons ($\tilde{e}_L$) with process $pp \to \tilde{e}_L\tilde{e}_L \to e\tilde{\chi}_1^0 e\tilde{\chi}_1^0$. As the neutralino production does not depend on the RPV coupling to sleptons (i.e.$\tilde{}\lambda'_{111}$) but it is dominated by drell-yan processes, we can access values of the λ'_{111} coupling (neutralino masses) with smaller(highers) orders of magnitude when compared to the sensitivity attainable with displaced vertex searches for singly slepton production. Also, we provide a reinterpretation of our signal in the context of the RPC slepton pair-production with 2 leptons and missing energy final state. This goes to exlusion limits in the RPV coupling - neutralino mass plane and the slepton and neutralino masses plane, where we will expect that our DV 95\% C.L. will be lower than this prompt-search recast.

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