

Collider limits on light neutralino dark matter

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We investigate the current status of the light neutralino dark matter scenario within the minimal supersymmetric standard model (MSSM) taking into account latest results from the LHC. A discussion of the relevant constraints, in particular from the dark matter relic abundance, leads us to manageable simplified models defined by a subset of MSSM parameters. Within these simplified model we reinterpret recent searches for electroweak supersymmetric particle production at the LHC. In this way we derive stringent constraints on the light neutralino parameter space. In combination with further experimental information from the LHC, such as constraints on invisible Higgs decays, we obtain a lower bound on the lightest neutralino mass of about 24 GeV when the lightest neutralino is accompanied by a light stau to fulfil the relic density constraint. Without additional light scalars more stringent constraints can be obtained. These limits are stronger than any current limit set by underground direct dark matter searches or indirect detection experiments.

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