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Light Neutralino Dark Matter > 24 GeV from LHC data

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We investigate the current status of the light neutralino dark matter scenario within the 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 a manageable simplified model defined by a subset of MSSM parameters. Within this simplified model we reinterpret a recent search for electroweak supersymmetric particle production based on a signature including multi-taus plus missing transverse momentum performed by the ATLAS collaboration. In this way we derive stringent constraints on the light neutralino parameter space. In combination with further experimental information from the LHC, in particular the bounds on possible invisible decays of the SM scalar, we obtain a lower bound on the lightest neutralino mass of about 24 GeV. This limit is stronger than any current limit set by underground direct dark matter searches or indirect detection experiments. With a mild improvement of the sensitivity of the multi-tau search, light neutralino dark matter can be fully tested up to about 30 GeV.

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