



Is light neutralino as dark matter still viable?

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Motivated by the recent re-confirmation by CoGENT of the low-energy excess of events observed last year, and the recent improved limits from the XENON-100 experiment that are in contention with the CoGENT data, we re-examine the low mass neutralino region of the Minimal Supersymmetric Standard Model and of the Next-to-Minimal Supersymmetric Standard Model, both without assuming gaugino mass unification. We make several focused scans for each model, determining conservative constraints on input parameters. We then determine how these constraints are made increasingly stringent as we re-invoke our experimental constraints involving the dark matter relic abundance, collider constraints from LEP and the Tevatron, and then from flavour physics, as a series of successive 2 sigma hard cuts. We find that for both models, when all relevant constraints are applied in this fashion, we do not generate neutralino LSPs that possess a spin-independent scattering cross section in excess of 10^{-5} pb and a mass $\sim 7 \text{ GeV} < m_{\chi} < \sim 9 \text{ GeV}$ that is necessary in order to explain the CoGENT observations.

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