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Clues for Simplified Models from SUGRA Sparticle Hierarchies and LHC Data

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Sparticle mass hierarchies contain significant information regarding the origin and nature of supersymmetry breaking. The hierarchical patterns are severely constrained by electroweak symmetry breaking as well as by the astrophysical and particle physics data. They are further constrained by the Higgs boson mass measurement. The sparticle mass hierarchies can be used to generate simplified models consistent with the high scale models. The mass hierarchies and their truncated versions enlarge significantly the list of simplified models currently being used in the literature. It is seen that a knowledge of the spin-independent neutralino-proton cross section and the neutralino mass will narrow down the list of the allowed sparticle mass hierarchies. Thus dark matter experiments along with analyses for the LHC Run-II will provide strong clues to the nature of symmetry breaking at the unification scale.

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