

Updated status of the gluino searches in pMSSM in the light of latest LHC data and Dark Matter constraints

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Minimal Supersymmetric Standard Model (MSSM) is one of the most well-motivated and well-studied scenarios for going beyond the Standard Model (SM). Apart from solving the hierarchy problem, one of the primary motivations is the presence of a suitable dark matter (DM) candidate, namely the lightest neutralino, in the particle spectrum of SUSY. Measurement of DM relic density of the universe by the WMAP/PLANCK experiments puts the model under probe. In addition, stringent constraints on the masses of strongly interacting sparticles have also been shown at the Large Hadron Collider (LHC) experiment by analysing **Run II** data for specific simplified models. However, many assumptions made by the experimental collaborations can not be realized in the actual theoretically motivated models. In this study, we revisit the bound on the gluino mass placed by the ATLAS collaboration. We reveal that the exclusion region is shrunk in the $M_{\tilde{g}} - M_{\tilde{\chi}_1^0}$ plane in the pMSSM scenario corresponding to different hierarchies of left and right squark mass parameters. Importantly, for higgsino type lighter electro-weakinos, the bound on gluino mass from 1l + jets + MET search practically does not exist. We have also performed detailed analysis on neutralino dark matter and have found that in most of the region of LSP mass range, required relic density is achieved and also, the direct as well as the indirect detection constraints are satisfied.

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Primary authors: MUKHERJEE, Abhi (University of Kalyani); Dr GANGULY, Nabanita; Dr NIYOGI, Saurabh (Gokhale Memorial Girls' College); Dr PODDAR, Sujoy (Diamond Harbour Women's University)

Presenter: MUKHERJEE, Abhi (University of Kalyani)

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