

High Energy Physics - Experiment

Expected Performance of the ATLAS Detector in GMSB Models with Tau Final States

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Gauge Mediated Supersymmetry Breaking (GMSB) models provide a possible mechanism to mediate Supersymmetry to the visible sector. In these models the lightest supersymmetric particle (LSP) is usually the gravitino, while the next-to-lightest supersymmetric particle (NLSP) is either a neutralino or a slepton. In the case of a stau NLSP events with large missing transverse energy, highly energetic jets and up to four τ leptons are expected in pp -collisions at the LHC. A study of the expected performance of the ATLAS detector in GMSB scenarios with a stau NLSP for a LHC center-of-mass energy of $\sqrt{s} = 10$ TeV is presented. A cut-based selection has been optimised using a typical GMSB scenario and a scan of the GMSB parameter space has been performed to determine the discovery reach as a function of the integrated luminosity. In addition, the invariant mass distribution of two τ leptons has been used to study the measurement of masses of supersymmetric particles with larger event samples.

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