

ATLAS SUSY Summary: pMSSM scanning results

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The phenomenological Minimal Supersymmetric Standard Model (pMSSM) scan is an analytical approach designed to reinterpret ATLAS Run 2 searches for supersymmetry (SUSY). This study evaluates and summarizes the sensitivity of ATLAS searches from Run 2 and anticipates possibilities for Run 3, all while incorporating additional constraints from dark matter (DM), flavor physics, electroweak precision measurements, and Higgs observables. This SUSY Summary talk covers four specific pMSSM scans conducted in ATLAS: general, third-generation (3G), electroweak (EWK), and gauge-mediated supersymmetry breaking (GMSB). Each scan provides distinct insights into the broader SUSY parameter space. The general scan employs parameter scanning to model strong and electroweak production of supersymmetric particles within the pMSSM framework. Separately, the GMSB scan examines a unique SUSY-breaking framework with gauge-mediated effects, highlighting the gravitino as the Lightest Supersymmetric Particle (LSP) and capturing the rich phenomenology of GMSB-pMSSM interactions. The pMSSM scans effectively summarize Run 2 results by integrating them with Higgs and external constraints, highlighting that features of unexcluded models could guide future searches. Notably, Bino-LSP SUSY models remain viable, except within the $\tilde{g}/h$ funnel regions, and the bounds on sparticle masses are weaker in the pMSSM compared to more constrained models, suggesting areas for further exploration in future analyses.

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