SUSY 2024

Theory meets Experiment

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Search for electroweak supersymmetry with compressed spectra at ATLAS

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Supersymmetry (SUSY) models with featuring small mass splittings between one or more particles and the lightest neutralino could solve the hierarchy problem as well as offer a suitable dark matter candidate consistent with the observed thermal-relic dark matter density. However, the detection of SUSY higgsinos at the LHC remains challenging especially if their mass-splitting is O(1 GeV) or lower. Searches are developed using 140 fb^{-1} of proton-proton collision data collected by the ATLAS Detector at a center-of-mass energy \sqrt{s}=13 TeV to overcome the challenge. Novel techniques are developed exploiting machine-learning techniques, low-momentum tracks with large transverse impact parameters, or topologies consistent with VBF production of the supersymmetric particles. Results are interpreted in terms of SUSY simplified models and, for the first time since the LEP era, several gaps in different ranges of mass-splittings are excluded.

Presenter: SHAHINIAN, Jeff (University of Pennsylvania (US))

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