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(Withdraw) Search for higgsinos using one electron and one electron-like track using the ATLAS detector with full Run-2 data set

Higgsinos with masses near the electroweak scale and within a compressed mass spectrum represent a poorly constrained region of the SUSY parameter space that is nonetheless strongly motivated by both naturalness and dark matter considerations. In this talk we develop a search for higgsinos in compressed scenarios by studying the production of the second lightest neutralino ($\tilde{\chi}_2^0$) in association with the lightest chargino ($\tilde{\chi}_1^\pm$) or the lightest neutralino ($\tilde{\chi}_1^0$) and a hard initial state radiation jet. We assume the mass difference between $\tilde{\chi}_1^0$ and $\tilde{\chi}_2^0$ is below 5 GeV, R-parity is conserved, and $\tilde{\chi}_1^0$ is the lightest supersymmetric particle. Specifically, we consider the case where $\tilde{\chi}_2^0$ decays to $\tilde{\chi}_1^0$ and two opposite-sign same-flavor leptons (via an off-shell Z boson). Due to the small mass splitting, the final-state leptons tend to have low-p_T and small calorimeter energy depositions. These "soft" leptons suffer from low reconstruction efficiencies using standard algorithms, severely limiting the di-lepton channel's sensitivity to mass splittings below 5 GeV. Instead, this search targets events containing one well-identified electron and one electron-like track. In this talk, we discuss the signal track selection strategy which uses a new boosted decision tree developed to identify electrons below the standard 4.5 GeV reconstruction threshold within ATLAS. Additionally, we present the status of our event selection optimization, background estimation strategy, and preliminary sensitivity estimates using the full Run 2 ATLAS data set.

Career stage

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