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Search for higgsinos in compressed mass spectra using a low-momentum displaced track with the ATLAS detector

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Supersymmetry (SUSY) models with nearly mass-degenerate higgsinos 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 $O(1 \text{ GeV})$ or lower. A novel search using proton-proton collision data collected by the ATLAS detector at a center-of-mass energy $\sqrt{s} = 13 \text{ TeV}$ and corresponding to 140 fb^{-1} of integrated luminosity is presented. This search targets final states with an energetic jet, missing transverse momentum and a low-momentum track with a large transverse impact parameter. Results are interpreted in terms of SUSY simplified models and mass-splittings between the lightest charged and neutral higgsinos from 0.3 GeV to 0.9 GeV are excluded up to 170 GeV of higgsino mass for the first time since the LEP era.

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