

Search for the direct production of slepton pairs in $\sqrt{s} = 13$ TeV pp collision with the ATLAS detector

Wednesday, 15 February 2023 10:20 (20 minutes)

A search for the electroweak production of pairs of charged sleptons decaying into two-lepton final states with missing transverse momentum is presented. A simplified model of \mathbb{Z} -parity-conserving supersymmetry is considered: direct pair-production of sleptons ($\tilde{\ell}\tilde{\ell}$), with each decaying into a charged lepton and a $\mathbb{Z}01$ neutralino. The lightest neutralino ($\mathbb{Z}01$) is assumed to be the lightest supersymmetric particle (LSP). The analysis targets the experimentally challenging mass region where $\mathbb{Z}(\tilde{\ell})-\mathbb{Z}(\mathbb{Z}01)$ is close to the \mathbb{Z} -boson mass (‘‘moderately compressed’’ region). The decay topology is similar to those of SM processes, making it challenging to separate signal from background. The search uses 139-fb^{-1} of $\sqrt{s}=13\text{-TeV}$ proton-proton collisions recorded by the ATLAS detector at the Large Hadron Collider. No significant excesses over the expected background are observed, therefore exclusion limits on the studied simplified model are reported in the mass plane at 95% CL. Sleptons with masses up to 150 GeV are excluded at 95% CL for the case of a mass-splitting between sleptons and the LSP of 50 GeV. In particular, since electroweak-scale SUSY with light smuons and a light LSP can explain the $\mathbb{Z}-2$ anomaly for small $\tan\beta$ values, exclusion limits are also set for selectrons and smuons separately and parts of the region excluded by this search in the $\mathbb{Z}(\tilde{\ell})-\mathbb{Z}(\mathbb{Z}01)$ plane are compatible with the $(\mathbb{Z}-2)\mathbb{Z}$ anomaly for small $\tan\beta$ values.

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Session Classification: Young Researchers Session