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Searches for electroweak supersymmetry in final states containing one lepton, two b-tagged jets and missing transverse energy at the ATLAS experiment.

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Supersymmetry (SUSY) is one of numerous, and one of the most famous, theoretical extensions to the Standard Model aiming to answer open questions in particle physics, such as the nature of dark matter and the origin of the electroweak symmetry breaking. SUSY extends the particle spectrum of the SM such that each SM particle has at least one supersymmetric partner. Mixtures of the SUSY partners to the gauge bosons and Higgs can form to produce the electroweakinos; charginos and neutralinos. The lightest neutralino, often referred to as the lightest supersymmetric particle (LSP), is one of the most commonly considered WIMP dark matter candidates.

Using data collected in 2015-2016 by the ATLAS collaboration, a search for chargino-neutralino pair-production is presented. The chargino decays via a W boson and an LSP, while the neutralino decays via a Higgs boson and an LSP. The final state contains a lepton from the W decay, two b-jets from the Higgs decay, and missing transverse energy. No significant excess is observed, but exclusion limits on this process are set upto 550 GeV. A projected limit for this search channel for the HL-LHC results in an expected exclusion limit of 1280 GeV and discovery potential up to 1080 GeV. Finally, future prospects for this channel are presented, including the use of machine learning techniques to improve signal-background discrimination.

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