

Search for electroweakinos with small Δm using XGBoost

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At the LHC, the production cross-section for supersymmetric partners of the colored Standard Model particles, namely squarks and gluinos, are expected to be much higher than for the sparticles that do not feel the strong interaction. So far there has been no indication of squarks or gluinos being produced. However, if the colored sparticles are too heavy to be produced at the LHC, we could still probe supersymmetric particles that interact weakly, if they were to be light enough. Charginos and neutralinos, collectively called electroweakinos, are fermionic superpartners of the electroweak gauge and higgs bosons. We here consider a search for a mass-degenerate pair of a lightest chargino and a next-to-lightest neutralino, which both decay to the lightest neutralino via the W and Z boson, respectively, into final states with two leptons, hadronic jets and missing transverse energy. A feasibility study will be shown for the application of Boosted Decision Trees (XGBoost) to increase the sensitivity to particularly challenging signal scenarios, where the mass-difference between the pair-produced electroweakinos and the lightest supersymmetric particle (LSP) is close to the mass of the W and Z bosons. The sensitivity will be compared to that of a more conventional cut-and-count analysis.

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