



Contribution ID: 526

Type: Poster

Searches for the Signatures of Trilinear R-Parity Violating SUSY at the LHC

Friday 16 December 2022 14:00 (1 hour)

LHC Run-I and RUN-II data highly constrain masses of electroweakinos in R-parity conserved (RPC) scenarios through various final states usually associated with large missing energy. In R-parity violating (RPV) scenarios the situation may differ depending on various RPV decay modes of the lightest supersymmetric particle. Trilinear RPV coupling term ($\lambda_{ijk} L_i \cdot L_j e_k^c$) allows the lightest supersymmetric particle, neutralino, to decay into two charged leptons (electrons and muons are considered) and one neutrino. For our analysis, we choose the decay channel having at least four charged leptons in the final state. In this work, we look for the projected reach of direct searches at the High Luminosity LHC (HL-LHC, operating at $\sqrt{s} = 14$ TeV, $\mathcal{L} = 3000 fb^{-1}$). We probe the projected exclusion and discovery range at HL-LHC using cut-based analysis as well as machine learning-based analysis.

Session

Beyond the Standard Model

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