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Supersymmetric Crevices: Missing Signatures of RPV at the LHC

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Supersymmetry is under pressure from LHC searches requiring colored superpartners to be heavy. We demonstrate R-parity violating spectra for which the dominant signatures are not currently well searched for at the LHC. In such cases, the bounds can be as low as 800 GeV on both squarks and gluinos. We demonstrate that there are nontrivial constraints on squark and gluino masses with baryonic RPV (UDD operators) and show that in fact leptonic RPV can allow comparable or even lighter superpartners. We find that the constraints from many searches are weakened if the LSP is significantly lighter than the colored superpartners, such that it is produced with high boost. The least constrained models can have SUSY production cross-sections of $\sim \text{pb}$ or larger, implying tens of thousands of SUSY events in the 8 TeV data. We suggest novel searches for these signatures of RPV, which would also improve the search for general new physics at the LHC. This work is presented in arXiv:1403.7197.

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