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The ABC of RPV II: Classification of RPV Signatures from UDD Couplings and their Coverage at the LHC

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We perform a detailed study of the current phenomenological status of baryon number violating operators within the framework of the R-parity violating Minimal Supersymmetric Standard Model (RPV-MSSM). This study aims to identify any gaps in the experimental coverage of the RPV landscape. We identify the unique final states for all possible LSPs decaying via four different benchmark UDD operators. Both the direct production of the LSP and its production via gauge-cascades are considered. For each LSP, we assume that only one UDD coupling is non-zero at a time and confront the signals with existing ATLAS and CMS searches implemented in the recasting framework CheckMATE 2. We find that the UDD colored LSP sector is well covered with the mass bounds on the gluino LSP being the strongest, and with possible improvements for some of the right-handed squark LSPs. We also point out that there is limited coverage for electroweakino and slepton LSPs with UDD decays. This limitation may be due to the lack of targeted experimental searches for these specific final states or the appropriate recasting of existing searches.

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