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Three-generation baryon and lepton number violation at the LHC

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While stringent constraints have been obtained at low energies, systematic and direct tests of the baryon and lepton number conservations have not been carried out at the current energy frontier. We observe that the flavour symmetries of the Standard Model gauge sector, broken as they are in the Standard Model Yukawa one, naturally suppress baryon and lepton number violation at low energy and, simultaneously, make it accessible at the LHC through resonant processes involving at least six fermions, from all three generations. We establish a model independent classification of such transitions and identify two classes that give rise to particularly clean LHC signatures, namely $[t \mu^+ e^+]$ and $[\bar{t} \bar{t} + \text{jets}]$.

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