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Left Right symmetry, neutrinoless double beta decay and the LHC

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The question of parity restoration has lead to a theory with a left-right symmetric gauge sector, which predicts a non-zero neutrino mass. The existence of (heavy) right-handed neutrinos leads to lepton number violating phenomena at low and high energy scales in the form of neutrinoless double beta decay and two leptons with two jet signatures at colliders. We argue that the neutrinoless double beta transition may need to be dominated by new physics due to an interplay of cosmology and direct searches. We carefully analyze the possible contributions in the minimal model and show how this tension may be relieved by a new contribution which comes from an O(TeV) scale.

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