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Neutrinoless double beta decay versus lepton number violation at LHC

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Lepton number violation (LNV) mediated by short range operators can manifest itself in both neutrinoless double beta decay and in processes with same sign dilepton final states at the LHC. We derive limits from existing LHC data at 8 TeV and compare the discovery potential of the forthcoming 14 TeV phase of the LHC with the sensitivity of current and future doble beta decay experiments, assuming the short-range part of the double beta decay amplitude dominates. We focus on the first of two possible topologies triggered by one fermion and two bosons in the intermediate state. In all cases, except for the pure leptoquark mechanism, the LHC will be more sensitive than double beta decay in the future. In addition, we propose to search for a charge asymmetry in the final state leptons and to use different invariant mass peaks as a possibility to discriminate the various possible mechanisms for LNV signals at the LHC.

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