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Baryon number violations involving tau leptons

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Baryon number violation is our most sensitive probe of physics beyond the Standard Model, especially through the study of nucleon decays. Angular momentum conservation requires a lepton in the final state of such decays, kinematically restricted to electrons, muons, or neutrinos. We show that operators involving taus, which are at first sight too heavy to play a role in nucleon decays, still lead to clean nucleon decay channels with tau neutrinos. While many of them are already constrained from existing two-body searches such as $p \rightarrow \pi^+ \nu$, other operators induce many-body decays such as $p \rightarrow \eta \pi^+ \bar{\nu}_\tau$ and $n \rightarrow K^+ \pi^- \nu_\tau$ that have never been searched for.

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