Searching for long-lived particles at the LHC and beyond: Ninth workshop of the LLP Community



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Long-lived light neutralinos at Belle II

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We consider light neutralinos of mass about 1 GeV, produced from τ lepton rare decays at Belle II, in the context of R-parity-violating (RPV) supersymmetry. With large and clean samples of τ leptons produced at the Belle II experiment, excellent sensitivity to such light neutralinos with the exotic signatures of displaced vertices is expected. We focus on two benchmark scenarios of single RPV operators, $\lambda'_{311}L_3Q_1\bar{D}_1$ and $\lambda'_{312}L_3Q_1\bar{D}_2$, which induce both the production and decay of the lightest neutralino. For the reconstruction of a displaced vertex, we require at least two charged pions in the final states. We perform Monte-Carlo simulations for both signal and background events, and find that Belle II can explore regions in the parameter space competitive with other probes. In particular, for the λ'_{311} scenario, it can put limits up to two orders of magnitude stronger than the current bounds.

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