

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



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## Searching for light neutralinos with a displaced vertex at the LHC

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We study a bino-like light neutralino ( $\tilde{\chi}_1^0$ ) produced at the LHC from the decay of a scalar lepton ( $\tilde{e}_L$ ) through the process  $pp \rightarrow \tilde{e}_L \rightarrow e\tilde{\chi}_1^0$  in the context of R-parity-violating (RPV) supersymmetry where  $\tilde{\chi}_1^0$  is the lightest supersymmetric particle. For small masses and RPV couplings, the neutralino is naturally long-lived and its decay products can be identified as displaced tracks. Following existing searches, we propose a displaced-vertex search strategy for such a light neutralino with a single RPV coupling switched on,  $\lambda'_{111}$ , in the mass range  $10 \text{ GeV} < m_{\tilde{\chi}_1^0} < 230 \text{ GeV}$ . We perform Monte Carlo simulations and conclude that at the high-luminosity LHC, the proposed search can probe values of  $\lambda'_{111}$  down to two orders of magnitude smaller than current bounds and up to 40 times smaller than projected limits from monolepton searches.

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