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## Search for displaced vertices of oppositely-charged leptons from decays of long-lived particles in $pp$ collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

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A search for long-lived particles decaying to an oppositely-charged lepton pair,  $\mu\mu$ ,  $ee$ , or  $e\mu$ , is presented using  $32.8 \text{ fb}^{-1}$  of  $pp$  collision data collected at  $\sqrt{s} = 13$  TeV by the ATLAS detector at the LHC.

Candidate leptons are required to form a vertex, within the inner tracking volume of ATLAS, displaced from the primary  $pp$  interaction region. No lepton pairs with an invariant mass greater than 12 GeV are observed, consistent with the background expectations derived from data. The result is interpreted in a supersymmetric model in which the lightest neutralino, produced via squark-antisquark production, decays to  $\ell^+ \ell'^- \nu$  ( $\ell = e, \mu$ ) with a finite lifetime due to the presence of R-parity violating couplings. Cross section limits are presented for specific squark and neutralino masses. For a 700 GeV squark, neutralinos with mass of 50–500 GeV and proper mean lifetimes corresponding to  $c\tau$  of 1 mm to 6 m are excluded. For a 1.6 TeV squark, 3 mm to 1 m are excluded for 1.3 TeV neutralinos.

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