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Search for long-lived massive particles in events with displaced vertices and muons at sqrt(s) = 13.6 TeV using the ATLAS detector

We present a search for massive long-lived particles (LLPs) in events with displaced vertices and muons, using proton-proton collision data at sqrt(s) = 13.6 TeV recorded by the ATLAS detector. This study focuses on event signatures where LLPs decay within the ATLAS Inner Detector, producing displaced vertices and muon tracks. It is sensitive to an array of new physics scenarios, including electroweak-scale SUSY particles that decay via small R-Parity violating couplings. It leverages new capabilities of the ATLAS detector in Run 3 to reconstruct and trigger on displaced Standard Model objects. A dedicated secondary vertexing algorithm is employed to expand the fiducial volume for displaced vertices, enhancing sensitivity to shorter LLP lifetimes. Background contributions are estimated with fully data-driven techniques.

Secondary track

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