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Type: Talk

Unconventional Tracking Techniques for Long-Lived Particle Searches in ATLAS

Friday, April 5, 2019 10:00 AM (25 minutes)

A variety of Beyond the Standard Model (BSM) theories predict new particles with macroscopic lifetimes of $c\tau \geq \mathcal{O}(1 \text{ mm})$ that could be created in proton-proton collisions at the Large Hadron Collider (LHC). Such theories often give rise to signatures that require dedicated tracking and vertexing techniques beyond conventional tracking algorithms. In this talk, a variety of unconventional tracking and vertexing techniques for long-lived particle searches in ATLAS will be discussed, including a secondary vertex algorithm for heavy neutral particles decaying to hadronic and leptonic final states within the ATLAS Inner Detector, a disappearing charged track reconstruction technique, which extends to trajectories with as few as three position measurements in the ATLAS pixel detector, and a new region-of-interest track seeding technique for low momentum tracking to target tracks originating from the long-lived charged particle decays within the Inner Detector. The performance of these unconventional tracking techniques will be discussed in the context of a variety of BSM theories in preparation for full Run 2 analyses with the ATLAS detector.

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Track Classification: 3: Advanced usage of tracks