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Displaced Tracking at a Muon Collider with Long-lived Staus

A future 10 TeV muon collider offers numerous opportunities to search for new fundamental particles. Long-lived particles (LLPs) are well-motivated by many open questions in physics and Beyond Standard Model theories. This study focuses on indirect detection of charged long-lived particles via displaced tracks. At a muon collider, beam-induced-background (BIB) can lead to background displaced tracks, making accurately reconstructing LLP displaced tracks challenging. In this study we consider a Supersymmetry benchmark model with long-lived staus, in which each stau decays to a tau and a Dark Matter particle. Displaced tracks from the stau decays are used to evaluate track reconstruction efficiency at varying levels of BIB rejection. This work gives insight into the tracking requirements and a possible analysis strategy to reject BIB background while maintaining sensitivity to LLPs.

Primary authors: LARSON, Mark (The University of Chicago); HUANG, Kane (The University of Chicago); FLICKER, Tate (The University of Chicago); ROZANOV, Leo (The University of Chicago); ROSSER, Benjamin (The University of Chicago); Prof. DIPETRILLO, Karri (The University of Chicago)

Presenter: LARSON, Mark (The University of Chicago)

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