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Uncovering quirk signal with energy loss inside tracker

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A quirk propagating through a detector is subject to the Lorentz force, a new confining gauge force, and the frictional force from ionization energy loss. At the LHC, it was found that the monojet search and the coplanar search were able to constrain such a quirk signal. Inspired by the coplanar search proposed by S. Knapen et. al, we develop a new search that also utilizes the information of the relatively large ionization energy loss inside tracker. Our algorithm has improved efficiency in finding quirk signals with a wide oscillation amplitude. Because of our trigger strategy, the $Z(\to \nu\nu)$+jets process overlaid by pileup events is the dominant background. We find that the $\sim 100\ \text{fb}^{-1}$ dataset at the LHC will be able to probe the colored fermion (scalar) quirks with masses up to {2.1 (1.1) TeV}, and the color neutral fermion (scalar) quirks with masses up to {450 (150) GeV}, respectively.

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