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ConformalTracking: a geometry agnostic tracking library

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ConformalTracking is an open source library created in 2015 to serve as a detector independent solution for track reconstruction in detector development studies at CERN. Pattern recognition is one of the most CPU intensive tasks of event reconstruction at present and future experiments. Current tracking programs of the LHC experiments are mostly tightly linked to individual detector descriptions or event processing frameworks. ConformalTracking does a pattern recognition in a conformal-mapped plane, where helix trajectories of charged particles in a magnetic field are projected into straight lines, followed by a Kalman-Filter-based fit in global space. At the core of the library lies a nearest neighbour search that is optimized by means of fast KDTrees and enhanced with a cellular automaton to reconstruct the linear paths. Being based exclusively on the spatial coordinates of the hits, this algorithm is adaptable to different detector designs and beam conditions. In the detectors at CLIC and FCCee, it also profits from the low-mass silicon tracking system, which reduces complications from multiple scattering and interactions. Full-simulation studies have been performed in order to validate the algorithm and assess its performances, also in the presence of beam-induced background. In this talk, recent developments and features of the track reconstruction chain as well as results for isolated tracks and complex events with background will be discussed.

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