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Tracking Performance of the ATLAS Fast Tracker (FTK)

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Particle physicists at the Large Hadron Collider (LHC) investigate the properties of matter at length scales one million times smaller than the atom by colliding together high-energy protons 40 million times per second and observing the decay products of the collisions. ATLAS is one of two general-purpose detectors that reconstruct the interactions and as part of a wide range of physics goals measures production of Higgs bosons and searches for exotic new phenomena including supersymmetry, extra dimension and dark matter.

Selecting the interesting collision events using hardware- and software-based triggers is a major challenge as reconstructing these collisions will only become more challenging as the LHC luminosity increases in future data. The ATLAS Fast Tracker (FTK) is a custom electronics system that performs fast FPGA-based tracking of charged particles for use in trigger decisions. In 2018, an FTK “Slice” covering a portion of the ATLAS detector was installed and commissioned using proton-proton collisions. This presentation will review the track-finding and track-fitting strategies employed by the FTK hardware and present the first tracking performance results for the FTK Slice in 2018 pp collisions data, including hit- and track-finding efficiencies, track parameter resolutions, and track purities.

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Track Classification: 6: Architectures and techniques for fast track reconstruction