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Muon Identification and Reconstruction with the ATLAS Detector

The ATLAS detector, currently being installed at CERN, is designed to make precise measurements of 14 TeV proton-proton collisions at the LHC, starting in 2007. Arguably the clearest signatures for new physics, including the Higgs Boson and supersymmetry, will involve the production of isolated final-stated muons. The identification and precise reconstruction of muons are performed using a combination of detector components, including an inner detector, comprising a silicon tracker, pixel detector, and transition radiation tracker, housed in a uniform solenoidal field, and a precision muon spectrometer, comprising monitored drift tubes and cathode strip chambers, triggered by resistive plate chambers and thin-gap chambers, and housed in a toroidal field.

We present current cross-detector reconstruction techniques used to exploit the strengths of the various detector components to best identify and measure muons in ATLAS, depending on their momentum and rapidity. Studies based on fully simulated GEANT4 events, using the complete detailed geometrical description of the detector are shown. We discuss recent developments in the combination of inner detector, muon spectrometer and calorimeter measurements, as well as developments in low transverse momentum muon identification. Preparations for LHC turn-on in 2007, including commissioning studies with cosmic rays and beam halo, are also discussed.

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Track Classification: Event processing applications