

Conditions database and calibration software framework for ATLAS Monitored Drift Tube chambers

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The size and complexity of LHC experiments raise unprecedented challenges not only in terms of detector design, construction and operation, but also in terms of software models and data persistency. One of the more challenging tasks is the calibration of the 375000 Monitored Drift Tubes, that will be used as precision tracking detectors in the Muon Spectrometer of the ATLAS experiment. An accurate knowledge of the space-time relation is needed to reach the design average resolution of 80 microns. The MDT calibration software has been designed to extract the space-time relation from the data themselves, through the so-called auto-calibration procedure, to store and retrieve the relevant information from the conditions database, and to properly apply it to calibrate the hits to be used by the reconstruction algorithms, taking into account corrections for known effects like temperature and magnetic field. We review the design of the MDT calibration software for ATLAS and present performance results obtained with detailed GEANT4-based simulation and real data from the recent combined test beam. We discuss the implementation of the conditions database for MDT calibration data in the framework proposed by the LHC Computing Grid (LCG). Finally, we present early results from detector commissioning with cosmic ray events and plans for the ATLAS Computing System Commissioning test in 2006.

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