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Upgrades of the ATLAS Muon Spectrometer with sMDT Chambers

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The Monitored Drift Tube (MDT) chambers of the ATLAS muon spectrometer demonstrated that they provide very precise and robust tracking over large areas. Goals of ATLAS muon detector upgrades are to increase the acceptance for precision muon momentum measurement and triggering and to improve the rate capability of the muon chambers in the high-background regions when the LHC luminosity increases. Small-diameter Muon Drift Tube (sMDT) chambers have been developed for these purposes. With half the drift-tube diameter of the MDT chambers and otherwise unchanged operating parameters, sMDT chambers share the advantages with the MDTs, but have more than ten times higher rate capability and can be installed in detector regions where MDT chambers do not fit in. The chamber assembly methods have been optimized for mass production, reducing cost and construction time considerably and improving the sense wire positioning accuracy to better than ten microns. Two sMDT chambers have been installed in 2014 to improve the momentum resolution in the barrel part of the spectrometer. The construction of twelve chambers for the feet regions of the ATLAS detector has started. A just recently approved project foresees the replacement of the MDT chambers at the ends of the inner barrel detector layer with sMDTs making space for additional RPC trigger chambers and improving the rate performance. Design, construction and installation of the new sMDT chambers for ATLAS will be discussed as well as tests of their performance.

Collaboration

ATLAS Muon Collaboration

Primary author: Dr STELZER-CHILTON (PLACE HOLDER, SPEAKER TO BE DETERMINED), Oliver (TRIUMF)

Presenter: Dr FERRETTI, Claudio (University of Michigan)

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