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Construction and Test of New Precision Drift-Tube Chambers for High Counting Rates

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 MDT chambers, but have an order of magnitude 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. The construction of twelve chambers for the feet regions of the ATLAS detector is currently ongoing with the goal to install them in the winter shutdown 2016/17 of the LHC. Design and construction of the new sMDT chambers for ATLAS will be shown as well as measurements of their precision and performance.

Primary author: Mr SCHMIDT-SOMMERFELD, Korbinian (Max-Planck-Institut für Physik)

Co-authors: Dr MÜLLER, Felix (Max-Planck-Institut für Physik); Dr KROHA, Hubert (Max-Planck-Institut für Physik); Dr KORTNER, Oliver (Max-Planck-Institut für Physik); Mr NOWAK, Sebastian (Max-Planck-Institut für Physik)

Presenter: Mr SCHMIDT-SOMMERFELD, Korbinian (Max-Planck-Institut für Physik)