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Construction and Performance of the Precision Tracking Chambers for the ATLAS Muon Spectrometer Upgrade for High-Luminosity LHC

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For the operation at HL-LHC, the MDT chambers of the inner barrel layer (BIS) of the ATLAS muon spectrometer will be replaced by small-diameter Muon Drift Tube (sMDT) chambers which will be integrated with triplets of thin-gap RPC chambers in order to improve the acceptance and robustness of the barrel muon trigger system.
The sMDT chambers have half the drift tube diameter of the MDT chambers and about one order of magnitude higher background rate capability. The
construction of the 96 new sMDT chambers was performed between January 2021 and September 2023 at two production sites at a continuous rate of one chamber every two weeks. The sense wire positioning accuracy guaranteed by precision assembly jigs was measured to be around 5 μm over the whole construction period. Stringent performance tests had to be passed during the production which have been successfully repeated after delivery of the chambers to CERN. The chambers have been tested with the new MDT front-end ASICs developed for operation at HL-LHC which improve the spatial resolution of the drift tubes by 10% compared to readout with the legacy electronics.

Collaboration

ATLAS Muon

Role of Submitter

The presenter will be selected later by the Collaboration

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