

Small-Strip Thin Gap Chambers and electronics performance for the Muon Spectrometer Upgrade of the ATLAS Experiment

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The largest phase-1 upgrade project for the ATLAS Muon System is the replacement of the present first station in the forward regions with the New Small Wheels (NSWs). The NSWs consist of two detector technologies: Micromegas (MM) and small-strip Thin-Gap Chamber (sTGC). The sTGC chambers will be used as both trigger and precision tracking muon detectors in the high background environment of the high luminosity LHC. The frontend electronics are implemented in about 2000 boards including the 4 custom-designed ASICs capable of driving trigger and tracking primitives to the backend trigger processor and readout system. The readout data flow is designed through a high-throughput network approach. The large number of readout channels, short time available to prepare and transmit trigger data, large volume of output data, harsh radiation environment, and the need of low power consumption all impose great challenges on the system design, integration and commissioning. The design, construction, performance and status of the ATLAS sTGC upgrade projects will be discussed, along with results from tests of the chambers with nearly final electronics with beams, cosmic rays and high-intensity radiation sources.

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