

Precision survey of the readout elements of small-strip Thin Gap Chambers using collimated X-rays for the muon spectrometer upgrade of the ATLAS experiment

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For the LHC luminosity upgrade, the muon end-cap inner station of ATLAS detector will be replaced by New Small Wheels (NSWs) in 2020. The NSWs will effectively improve the online muon identification and maintain the current muon transverse momentum resolution despite the increased detector hit rates. The NSWs combine the Micromegas and small-strip Thin Gap Chambers (sTGC) technologies. The sTGC detector modules are arranged in wedges of 4 detector layers each counting up to 1000 readout strips used for precise muon trajectory measurements. The positioning of individual readout strips must be known to within 100 microns to satisfy the performance targets. Non-conformities of the sTGC strip-pattern are therefore measured on finished wedges using an X-ray gun precisely positioned at fixed reference points. The working principles and experimental procedure of this technique will be shown as well as validation studies based on measurements carried out on the early production of sTGC wedges.

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