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The MDT Trigger Processor upgrade for ATLAS Muons at the HL-LHC

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The Monitored Drift Tube (MDT) chambers Trigger Processor (MDT-TP) is a key component in the upgrade of the first-level muon trigger for ATLAS at the High-Luminosity LHC (HL-LHC). The selectivity of the current system is limited by the moderate spatial resolution of the trigger chambers: Resistive Plate Chambers (RPC) and Thin Gap Chambers (TGC). The MDT-TP incorporates the high-resolution MDT measurements to significantly improve the transverse momentum resolution of muon trigger candidates and to reduce the extra rate from mis-measured muons or accidental coincidences.

The MDT-TP is designed to have a fixed latency of 1.7 microseconds in response to the incoming muon trigger candidate.

The MDT-TP also provides the means to read out the MDT chambers. In addition to the trigger and readout, the MDT-TP is responsible for configuring the MDT front-end electronics.

The MDT-TP is expected to reduce the muon trigger rate by up to 70% while keeping a high-efficiency plateau of 95% for a single muon trigger with a transverse momentum threshold of 20 GeV.

This poster will describe the MDT-TP algorithms and their functionality, as well as progress with the hardware developments. First results from complete system tests will also be presented.

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