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Upgrade of the ATLAS Muon Spectrometer for Operation at the HL-LHC

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The High-Luminosity Large Hadron Collider (HL-LHC) will increase the sensitivity of the ATLAS experiment to low-rate high-energy
physics processes. In order to cope with the 10 times higher instantaneous luminosity compared to the LHC, the trigger system of
ATLAS needs to be upgraded. The ATLAS experiment plans to
increase the maximum rate capability of the first two trigger levels to
1˜MHz at 6˜μs latency and 400˜kHz at 30˜μs latency, respectively. This requires new trigger and read-out electronics for the RPC (resistive plate) and TGC (thin gap) trigger chambers, and the replacement of the read-out electronics of the MDT (monitored drift tube) precision chambers. The replacement of the MDT read-out electronics will make it possible to include their data in the first level trigger decision and thus to increase the selectivity of the first level muon trigger. The RPC trigger system in the barrel will have to be reinforced by the installation of additional thin-gap RPC with a substantially increased high-rate capability compared to the
current RPCs. This addition of RPCs will also increase the
acceptance of the barrel muon trigger from 75\% to 95\%.

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