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The ATLAS Muon Trigger at high instantaneous luminosities

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The ATLAS experiment at CERN's Large Hadron Collider (LHC) has taken data with colliding beams at instantaneous luminosities of *210^33 cm^-2 s^-1. The LHC targets to deliver an integrated luminosity 5-fb in the run period 2011 at luminosities of up to* 510^33 cm^-2 s^-1, which requires dedicated strategies to guard the highest physics output while reducing effectively the event rate.

The muon system is the largest sub-detector of the ATLAS experiment and has the capability to reconstruct muons in standalone mode, as well as in combination with the Inner Detector tracking systems. The L1 muon trigger system gets its input from fast muon trigger detectors. Fast sector logic boards select muon candidates, which are passed via an interface board to the central trigger processor and then to the High Level Trigger (HLT). The Muon HLT is purely software based and encompasses a level 2 trigger followed by an event filter for a staged trigger approach. It has access to the data of the precision muon detectors and other detector elements to refine the muon hypothesis.

The Muon HLT has successfully adapted to the changing environment of the low luminosity running of LHC in 2010 to the intensities encountered in 2011. The selection strategy has been optimized for the various physics analysis involving muons in the final state. This includes the use of isolation at the level 2 and event filter, combined trigger signatures with electron and jet trigger objects, and so-called full-scan triggers, which make use of the full event information to search for di-lepton signatures, seeded by single lepton objects.

This note reports about efficiency, resolution, and general performance of the muon trigger in the context of the physics goals of ATLAS.

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