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# The ATLAS Muon Trigger

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CERN's Large Hadron Collider (LHC) is the highest energy proton-proton collider, providing also the highest instantaneous luminosity as a hadron collider. Bunch crossings occurred every 50 ns in 2012 runs. Amongst of which the online event selection system should reduce the event recording rate down to a few 100 Hz, while events are in a harsh condition with many overlapping proton-proton collisions occurring in a same bunch crossing. Muons often provide an important and clear signature of physics processes that are searched for, for instance as in the discovery of Higgs particle in year 2012.
The ATLAS experiment deploys a three-levels processing scheme at online. The level-1 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 (L2) trigger followed by an event filter (EF) 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. Trigger-specific algorithms were developed and are used for the L2 to increase processing speed for instance by making use of look-up tables and simpler algorithms, while the EF muon triggers mostly benefit from offline reconstruction software to obtain most precise determination of the track parameters. There are two algorithms with different approaches, namely inside-out
and outside-in tracking, which was used in trigger with conditional-OR to obtain maximum efficiency with least processing time.
This presentation gives a full overview of the ATLAS muon trigger system, summarizes the 3 years running experiences and reports about online performances for instance processing time and trigger rates as well as trigger efficiency, resolution, and other general performance.

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