



The ATLAS Trigger Performance and Evolution

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During the data taking period from 2009 until 2011, the ATLAS trigger has been very successfully used to collect proton-proton data at LHC centre-of-mass energies between 900 GeV and 7 TeV. The three-level trigger system reduces the event rate from the design bunch-crossing rate of 40 MHz to an average recording rate of about 300 Hz. Using custom electronics with input from the calorimeter and muon detectors, the first level rejects most background collisions in less than 2.5 microseconds. Then follow two levels of software-based triggers. The trigger system is designed to select events by identifying muons, electrons, photons, taus, jets and B hadron candidates, as well as using global event signatures, such as missing transverse energy.

We give an overview of the strategy and performance of the different trigger selections based mainly on the experience during the 2011 LHC run, where the trigger menu needed quick adaptations to the continuous increase of luminosity throughout the year. Examples of trigger efficiencies and resolution with respect to offline reconstructed signals are presented and compared to simulation. These results illustrate that we have achieved a very good level of understanding of both the detector and trigger performance and successfully selected suitable streamed data samples for analysis. Furthermore, we describe how the trigger selections and overall trigger menu (like adding topological triggers, using isolation or using multi-variate techniques) have been re-designed and re-optimized to cope with the increased center-of-mass energy and pileup conditions foreseen in 2012. Initial experience and performance of the trigger running with 8 TeV center-of-mass energy collisions this year will also be described.

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