Optimization of the Electron and Photon Selection in the ATLAS High Level Trigger

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Abstract:

The ATLAS experiment, which will begin collecting data at the Large Hadron Collider (LHC) in 2007, will face the challenge of efficiently selecting around one interesting event per million proton-proton occurring interactions at a bunch crossing rate of 40 MHz. This will be the task of the ATLAS Trigger, which is composed of a hardware-based First Level Trigger and a software-based High Level Trigger (HLT).

At the unprecedented centre-of-mass energy of 14 TeV, the background cross sections presently suffer from large uncertainties. Furthermore, the size and complexity of the LHC mean that the initial luminosity is presently not clear. A flexible and robust trigger is required to cope with these uncertain and rapidly-changing conditions.

This paper gives an overview of the initial set of triggers algorithms (know as a menu) used at the HLT for the selection of events containing high transverse momentum electrons and photons, including monitoring and calibration triggers. The studies performed and the tools used to optimize the initial HLT menu are described. Results from timing and performance studies in a dedicated test-bed are also shown, as well as studies of the impact of the trigger on standard physics analysis.

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