Performance and Calibration of the ATLAS Jet Trigger

ATLAS has been successfully collecting 7 TeV pp collision data from the LHC since 2010, at a rate that will ultimately reach 40 MHz for nominal LHC conditions. The ATLAS trigger system handles this enormous data flow, providing efficient rejection and maintaining an unbiased efficiency for rare signals.

It is organized in three levels that reduce the rate to approximately 200 Hz, by reconstructing and selecting high transverse momentum objects such as jets, taus, electrons, photons or missing transverse energy. The first level (L1) is implemented in custom made electronic modules, while the High Level Trigger (HLT), which comprises the second (L2) and third (Event Filter, EF) trigger levels, is based on software running in commercial computers.

High performance of the jet trigger is essential to achieve the physics goals of ATLAS and the ATLAS jet trigger is prepared to cover a wide variety of physics topics, ranging from QCD studies to SUSY searches. At the LHC, where jets are produced at a high rate and have jets as the main background, fast jet reconstruction and accurate calibration becomes the main challenge for the ATLAS jet trigger. It must accurately measure the jet energy to distinguish high pT jets from low pT ones. This is a particularly complex issue, especially with non-compensating hadronic calorimeters, such as the one used in ATLAS.

Here, we will present the challenges of the ATLAS jet trigger and describe its implementation and performance with 7 TeV data. We will also discuss possible improvements to this system.

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