

The ATLAS Level-1 Central Trigger

Friday, September 24, 2010 10:45 AM (25 minutes)

The ATLAS Level-1 trigger system is responsible for reducing the anticipated LHC collision rate from 40 MHz to less than 100 kHz. This Level-1 selection identifies jets, electrons/photons and muons, with additional triggers for missing and total energy. These inputs are used by the Level-1 Central Trigger to form a Level-1 Accept decision. This decision, along with clock and summary information, is then passed into the higher levels of the trigger system and sub-detectors. Results from commissioning the Central Trigger with cosmic rays and its performance during the first collisions will be shown.

Summary

The custom-built electronics of the ATLAS Level-1 Central Trigger receives inputs from the ATLAS Level-1 Triggers and the LHC. The Level-1 Triggers are separated into calorimeter, muon and forward triggers. The calorimeter triggers are based on coarse detector information to identify high-ET jets, electrons/photons and hadrons, along with missing and total energy. Dedicated muon and forward detectors provide triggers for different energy thresholds. These trigger inputs are combined to form a Level-1 accept which is then passed onto the higher levels of the trigger. The higher level trigger, consisting of PC farms, also receives trigger summary information from the central trigger to assist in the event selection. From the LHC itself the central trigger passes the bunch clock to all of the sub-detectors of ATLAS. We present how the trigger information, along with dead-time rates, are monitored and logged by the online system, to be used for physics analysis, data quality assurance and operational debugging. In preparation for proton beams, the ATLAS detector and the Level-1 trigger was commissioned by recording cosmic ray data. For proton beams, electrostatic button pick-up detectors were used to clock the arriving proton bunches, allowing fast timing in of the ATLAS detector. The first proton collision events were then triggered using signals from scintillator trigger detectors in the forward region. The performance of the level-1 trigger during the commissioning of the ATLAS detector with and without beams will be presented.

Primary author: STOCKTON, Mark (CERN)

Presenter: STOCKTON, Mark (CERN)

Session Classification: TOPICAL DAY: Performance of LHC detector and electronics under first beam conditions