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The ATLAS Level-1 Trigger: Status of the System and First Results from Cosmic-Ray Data

The ATLAS detector at CERN's Large Hadron Collider will be exposed to proton-proton collisions from beams crossing at 40 MHz. A three-level trigger system will select potentially interesting events in order to reduce this rate to about 200 Hz. The first trigger level (LVL1) is implemented in custombuilt electronics and firmware. A trigger decision is made by the LVL1 Central Trigger Processor (CTP) reducing the incoming rate to less than 100 kHz. The total allowed latency including cable delays of the round trip from the detector systems to the CTP and back is less than $2.5\mu\text{s}$. The LVL1 decision is based on Calorimeter information and hits in dedicated Muon Trigger detectors. The final LVL1 trigger system is currently being installed in the experiment with an expected date for completion of August 2007. Cosmic-ray data are regularly recorded as an increasing fraction of the trigger system comes online. We present an overview of the LVL1 trigger system and report on the current status, including the commissioning process at the ATLAS experimental site. Emphasis is put on the integration of the CTP with the Calorimeter and Muon Trigger systems and the level-2 trigger. Moreover, we show analysis results of cosmic-ray data recorded in situ and verify, where possible, that the LVL1 trigger meets the requirements and will be ready for data taking.

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