

The ATLAS Trigger System: Recent Experience and Future Plans

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This paper will give an overview of the ATLAS trigger design and its innovative features. It will describe the valuable experience gained in running the trigger reconstruction and event selection in the fastchanging environment of the detector commissioning during 2008. It will also include a description of the trigger selection menu and its 2009 deployment plan from first collisions to the nominal luminosity. ATLAS is one of the two general-purpose detectors at the Large Hadron Collider (LHC). The trigger system needs to efficiently reject a large rate of background events and still select potentially interesting ones with high efficiency. After a first level trigger implemented in custom electronics, the trigger event selection is made by the High Level Trigger (HLT) system, implemented in software. To reduce the processing time to manageable levels, the HLT uses seeded, step-wise and fast selection algorithms, aiming at the earliest possible rejection of background events. The ATLAS trigger event selection is based on the reconstruction of potentially interesting physical objects like electrons, muons, jets, etc. The recent LHC startup and short single-beam run provided the first test of the trigger system against real data. Following this period, ATLAS continued to collect cosmic-ray events for detector alignment and calibration purposes. Both running periods provided very important data to commission the trigger reconstruction and selection algorithms. Profiting from this experience and taking into account the ATLAS first year physics goals, we are preparing a trigger selection menu including several tracking, muon-finding and calorimetry algorithms. Using Monte Carlo simulated data, we are evaluating the impact of the trigger menu on physics performance and rate.

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