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# Algorithms, performance, and development of the ATLAS High-level trigger

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The ATLAS trigger system has been used for the online event selection for three years of LHC data-taking and is preparing for the next run. The trigger system consists of a hardware level-1 (L1) and a software high-level trigger (HLT). The high-level trigger is currently implemented in a region-of-interest based level-2 (L2) stage and a event filter (EF) operating after even building with offline-like software. During the past three years, the luminosity and pile-up (number of collisions per beam crossing) has increased significantly placing escalating demands on the rejection and timing performace. The HLT algorithms advanced during this period to maintain and even improve performance. For the next run, the boundary between the L2 and EF will be removed, so that there is only one high-level trigger which can operate either on regions of interest or on the full event depending on the objects found in the event either by the L1 or by the HLT itself.

This talk will discuss the algorithms, performance and ongoing development work on the reconstruction of calorimeter objects electrons, photons, taus, jets, and missing energy), inner detector tracking, and muon reconstruction. Among the improvements is a new missing energy trigger which uses specialized sums of the calorimeter cells to access the calorimeter readout earlier than was previously possible with strict region-of-interest only L2 system. Another improvement is a jet scan algorithm which operates at L2 using the information from the L1 digitization, but applies a clustering algorithm (anti-kT ) similar to that used in the offline software. The jet and b-jet algorithms have been further developed to more closely resemble and include improvements from the offline software. Also discussed will be the work towards the merging of the two HLT levels in to a single level HLT, as well as operational experiences from the first LHC run.

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