

Implementation of the ATLAS trigger within the ATLAS Multi-Threaded Software Framework AthenaMT

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We present an implementation of the ATLAS High Level Trigger (HLT) that provides parallel execution of trigger algorithms within the ATLAS multi-threaded software framework, AthenaMT. This development will enable the HLT to meet future challenges from the evolution of computing hardware and upgrades of the Large Hadron Collider (LHC) and ATLAS Detector. During the LHC data-taking period starting in 2021, luminosity will reach up to three times the original design value. In the following data-taking period (2026) upgrades to the ATLAS trigger architecture will increase the HLT input rate by a factor of 4-10, while the luminosity will increase by a further factor of 2-3.

AthenaMT provides a uniform interface for offline and trigger algorithms, facilitating the use of offline code in the HLT. Trigger-specific optimizations provided by the framework include early event rejection and reconstruction within restricted geometrical regions. We report on the current status, including experience of migrating trigger selections to this new framework, and present the next steps towards a full implementation of the redesigned ATLAS trigger.

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