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Phase-2 Upgrade of the ATLAS L1 Central Trigger

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The ATLAS trigger system will be upgraded for the Phase 2 period of LHC operation. This system will include a Level-0 (L0) trigger based on custom electronics and firmware, and a high-level software trigger running on off-the-shelf hardware. The upgraded L0 trigger system uses information from the calorimeters and the muon trigger detectors. Once information from all muon trigger sectors has been received, trigger candidate multiplicities are calculated by the Muon-to-Central-Trigger-Processor Interface (MUCTPI). Muon multiplicity information is sent to the Central-Trigger-Processor (CTP) and trigger objects are sent to the L0 Global Trigger Processor (L0Global). In Phase 2, the CTP will be a newly designed and custom-built electronics system, based on the ATCA standard. It will employ a System-on-Chip (SoC) and optical serial inputs to receive trigger information from the Global Trigger and the MUCTPI system. The control and monitoring software run directly on the SoC, while the trigger logic runs on an FPGA. The CTP will need to allow a set of 1024 trigger items based on 1024 usable single-bit inputs, requiring updates in the trigger logic implementation, as well as the software for compiling the trigger conditions into FPGA configuration files. New features will also be introduced, such as delayed triggers. We will present the design and status of the Phase 2 L0CT system and its new features, including a view of the pilot Phase 1 upgrade, which paves the way for the upcoming upgrades.

Significance

Comprehensive overview on the Phase-2 upgrade of the Level 1 Central Trigger of ATLAS.

References

Experiment context, if any

ATLAS, CERN

Authors: KOULOURIS, Aimilianos (CERN); OH, Alexander (University of Manchester (GB))

Presenter: KOULOURIS, Aimilianos (CERN)

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