

ATLAS Trigger Upgrade Plans for the High Luminosity LHC

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By 2026 the High Luminosity LHC will be able to deliver 14 TeV proton-proton collisions with an order of magnitude higher instantaneous luminosity than the original design, at the expected value of $7.5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$. The ATLAS experiment is planning a series of upgrades to prepare for this new and challenging environment, which will produce much higher data rates and larger and more complex events than the current experiment was designed to handle. The broad physics program planned for this fourth LHC run is driving the full upgrade plan, which will involve major changes in the detectors as well as in the trigger system. One key aspect driving the trigger system design is the need for rate reduction, which will be based on easily identifiable high momentum electrons and muons. However, hadronic final states are also becoming important for investigations of the full phase space of the Standard Model and beyond. This motivates the inclusion of both higher resolution first-level trigger information and a new hardware tracking system. This presentation will describe the baseline architecture established for the High Luminosity LHC, while also detailing the new system components and their interconnections.

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