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The updated ATLAS Jet Trigger for the LHC Run II

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After the current shutdown, the LHC is about to resume operation for a new data-taking period, when it will operate with increased luminosity, event rate and centre of mass energy. The new conditions will impose more demanding constraints on the ATLAS online trigger reconstruction and selection system. To cope with such increased constraints, the ATLAS High Level Trigger, placed after a first hardware-based Level-1 trigger, has been redesigned by merging two previously separated software-based processing levels. In the new joint processing level, the algorithms run in the same computing nodes, thus sharing resources, minimizing the data transfer from the detector buffers and increasing the algorithm flexibility.

The Jet trigger software selects events containing high transverse momentum hadronic jets. It needs optimal jet energy resolution to help rejecting an overwhelming background while retaining good efficiency for interesting jets. In particular, this requires the CPU-intensive reconstruction of tridimensional energy deposits in the ATLAS calorimeter to be used as the basic input to the jet finding algorithms. To allow this costly reconstruction step, a partial detector readout scheme was developed, that effectively suppresses the low activity regions of the calorimeter and significantly reduces the needed resources. In this paper we describe the overall jet trigger software and its physics performance. We then focus on detailed studies of the algorithm timing and the performance impact of the full and partial calorimeter readout schemes. We conclude with an outlook of the jet trigger plans for the next LHC data-taking period.

Oral or Poster Presentation

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