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Architecture and performance of the ATLAS Inner Detector Trigger software

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The rising instantaneous luminosity of the LHC poses an increasing challenge to the pattern recognition algorithms for track reconstruction at the ATLAS Inner Detector Trigger. We will present the performance of these algorithms in terms of signal efficiency, fake tracks and execution time, as a function of the number of proton-proton collisions per bunch-crossing, in 2011 data and in simulation.

The strict time requirements at the Level-2 Trigger, where the average execution time per event is expected to be around 40 millisecs, make the pattern recognition particularly challenging. ATLAS has so far used both histogramming-based and combinatorial algorithms for the task of Level-2 track reconstruction. In light of the experience from the data taking in 2011, a new software framework is being developed that will provide a suite of configurable tools, based on modularising the existing code and increasing the re-use of components, to provide the optimal solution in the various trigger signatures at higher luminosities. This new framework, as well as the work to optimise the overall performance of the Inner Detector Trigger software, will also be presented.

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