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ATLAS FTK a - very complex - custom parallel supercomputer

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In the ever increasing pile-up LHC environment advanced techniques of analysing the data are implemented in order to increase the rate of relevant physics processes with respect to background processes.

The Fast Tracker (FTK) is a track finding implementation at hardware level that is designed to deliver full-scan tracks with p_T above 1GeV to the ATLAS trigger system for every L1 accept (at a maximum rate of 100kHz). In order to achieve this performance a highly parallel system was designed and now it is under installation in ATLAS. In the beginning of 2016 it will provide tracks for the trigger system in a region covering the central part of the ATLAS detector, and during the year it's coverage will be extended to the full detector coverage.

The system relies on matching hits coming from the silicon tracking detectors against 1 billion patterns stored in specially designed ASICS chips (Associative memory - AM06). In a first stage coarse resolution hits are matched against the patterns and the accepted hits undergo track fitting implemented at FPGA level. Tracks above the 1GeV threshold are delivered to the High Level Trigger within about 100 μ s. The resolution of the tracks coming from FTK is close to the offline tracking resolution and it will allow for reliable detection of primary and secondary vertexes at trigger level and improved trigger performance for b -jets and τ leptons.

This contribution will give an overview of the FTK system architecture and present the status of commissioning of the system. As well, a brief incursion in the expected performance of the FTK will be made.

Primary author: ANCU, Lucian Stefan (Universite de Geneve (CH))

Presenter: KIMURA, Naoki (Aristotle Univ. of Thessaloniki (GR))

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