Contribution ID: **414**   Type: **talk**

Hardware-based Tracking at Trigger Level for ATLAS: The Fast TracKer (FTK) Project

Friday 24 July 2015 12:30 (15 minutes)

Physics collisions at 13 TeV are expected at the LHC with an average of 40-50 proton-proton collisions per bunch crossing. Tracking at trigger level is an essential tool to control the rate in high-pileup conditions while maintaining a good efficiency for relevant physics processes. The Fast TracKer (FTK) is an integral part of the trigger upgrade for the ATLAS detector. For every event passing the Level 1 trigger (at a maximum rate of 100 kHz) the FTK receives data from the 80 million channels of the silicon detectors, providing tracking information to the High Level Trigger in order to ensure a selection robust against pile-up.

The FTK performs a hardware-based track reconstruction, using associative memory (AM) that is based on the use of a custom chip, designed to perform pattern matching at very high speed. It finds track candidates at low resolution (roads) that seed a full-resolution track fitting done by FPGAs. Narrow roads permit a fast track fitting but need many patterns stored in the AM to ensure efficient matching, wide roads allow for fewer patterns but combinatorics slow down the track fitting. To optimize this choice, the feature of variable resolution of the roads is implemented via ternary bits in the AM logic. An overview of the FTK system with focus on the pattern matching procedure will be presented. Furthermore, the expected performance and the integration of FTK within the ATLAS trigger system will be discussed.

Author: TDAQ SPEAKERS COMMITTEE, ATLAS (ATLAS)

Presenter: GRAMLING, Johanna (Universite de Geneve (CH))

Session Classification: Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling