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The Fast (but not furious) Track trigger based on FPGAs and Associated Memory chips in ATLAS

The existing ATLAS trigger system, consisting of the hardware-based Level-1 trigger and the CPU-based High Level Trigger (HLT), was designed to sustain the LHC design luminosity. Triggering on several interesting physics signatures require or can significantly benefit from extensive usage of tracking detector. However, track reconstruction is very expensive in terms of processing time and therefore is limited to selected regions of interest identified by Level-1 trigger.

This approach has limitations, in particular in events with complex topology and hadronic decays. The Fast TrackKer (FTK) system eliminates those limitations by doing global track reconstruction at ~ 100 kHz rate after each Level-1 trigger accept decision. FTK moves track reconstruction into a hardware system with massively parallel processing. FTK makes use of associated-memory (AM) chips for pattern matching and FPGA's for track fitting. FTK architecture is based on several components performing different tasks: clustering and parallel distribution of pixel and silicon-strip hits in the system, pattern recognition and a two-step track fit procedure. The commissioning schedule foresees installation of the first FTK components in the ATLAS cavern by the end of 2015, whereas full input and output systems together with a fraction of other functional components forming full processing chain are scheduled for installation throughout 2016.

The talk will present physics motivation and examples of trigger chains using tracks processed by FTK. An overview of the hardware design and processing logic will be given in a digestible way. In addition, commissioning experience, current status and plans for integration into the ATLAS TDAQ system will be reviewed. We are currently in exciting times of putting the FTK system inside ATLAS and looking forward to start data taking with triggers based on FTK tracks!

Salle 101 - Bât. 200, Orsay

Thé et café seront servis 15 mn avant le séminaire

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