Kalman Filter track reconstruction on FPGAs for acceleration of the High Level Trigger of the CMS experiment at the HL-LHC

Tuesday 10 July 2018 14:15 (15 minutes)

Track reconstruction at the CMS experiment uses the Combinatorial Kalman Filter. The algorithm computation time scales exponentially with pile-up, which will pose a problem for the High Level Trigger at the High Luminosity LHC. FPGAs, which are already used extensively in hardware triggers, are becoming more widely used for compute acceleration. With a combination of high perfor- mance, energy efficiency, and predictable low latency, FPGA accelerators are an interesting technology for high energy physics. Here, progress towards porting of the CMS track reconstruction is shown, using Maxeler Technologies'DataFlow Engines, programmed with their high level language MaxJ. The performance is compared to CPUs, and further steps to optimise for the architecture are presented.

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Session Classification: T1 - Online computing

Track Classification: Track 1 - Online computing