ACAT 2010

Contribution ID : 39

Fast Parallel Ring Recognition Algorithm in the RICH Detector of the CBM Experiment at FAIR

Friday 26 Feb 2010 at 14:25 (00h25')

Content :

The Compressed Baryonic Matter (CBM) experiment at the future FAIR facility at Darmstadt will measure dileptons emitted from the hot and dense phase in heavy-ion collisions. In case of an electron measurement, a high purity of identified electrons is required in order to suppress the background. Electron identification in CBM will be performed by a Ring Imaging Cherenkov (RICH) detector and Transition Radiation Detectors (TRD).

Very fast data reconstruction is extremely important for CBM because of the huge amount of data which has to be handled. In this contribution, the parallel ring recognition algorithm is presented. Modern CPUs have two features, which enable parallel programming. First, the SSE technology allows using the SIMD execution model. Second, multi core CPUs enable to use multithreading. Both features have been implemented in the ring reconstruction of the RICH detector. A speed up factor of 20 has been achieved (from 750 ms/event to 38 ms/event) for an Intel Core 2 Duo processor at 2.13 GHz.

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Session classification : Friday, 26 February - Data Analysis - Algorithms and Tools

Track classification : Data Analysis - Algorithms and Tools

Type : Parallel Talk