



ID de Contribution: 1

Type: Poster

GPUs for fast triggering and pattern matching at the CERN experiment NA62

jeudi 6 mai 2010 10:00 (1 minute)

The NA62 experiment at the CERN SPS aims at measuring an ultra-rare decay of the charged kaon (K^+ in $\pi^0 \nu \bar{\nu}$); The signal is very small with respect to the background then the trigger is a crucial part for such an experiment. The very innovative approach presented here aims at exploiting the parallel computing power of commercial GPUs (Graphics processing unit) to perform fast computations in software in the early trigger stages. With the steady reduction of GPU latencies, and the increase in link and memory throughputs, the use of such devices for real-time applications in high-energy physics data acquisition and trigger systems is becoming ripe. A pilot project within NA62 aims at integrating GPUs into the central L0 trigger processor, and also to use them as a fast online processors for computing trigger primitives. Several TDC-equipped sub-detectors with sub-nanosecond time resolution will participate to the first-level NA62 trigger (L0), fully integrated with the data-acquisition system, to reduce the readout rate of all sub-detectors to 1 MHz. The online use of GPUs would allow the computation of more complex trigger primitives already at this first trigger level. We describe the architecture of the proposed system and present the performances achieved to perform online recognition of rings from a RICH detector with sub-nanosecond time resolution. The challenges and the prospects of this promising idea will be discuss.

Please indicate "poster" or "plenary" session. Final decision will be made by session coordinators.

plenary

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Classification de Session: Poster Session 2 (Summary)

Classification de thématique: Pattern recognition and data analysis