

LHCb Kalman Filter cross architectures studies

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The 2020 upgrade of the LHCb detector will vastly increase the rate of collisions the Online system needs to process in software, in order to filter events in real time. 30 million collisions per second will pass through a selection chain, where each step is executed conditional to its prior acceptance.

The Kalman Filter is a fit applied to all reconstructed tracks which, due to its time characteristics and early execution in the selection chain, consumes 40% of the whole reconstruction time in the current detector software trigger. This fact makes it a critical item as the LHCb trigger evolves into a full software trigger in the Upgrade.

We present acceleration studies for the Kalman Filter process, and optimize its execution for a variety of architectures, including x86_64 and Power8 architectures, and accelerators such as the Intel Xeon Phi and NVIDIA GPUs. We compare inter-architecture results, factoring in data moving operations and power consumption.

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Secondary Keyword (Optional)

Reconstruction

Tertiary Keyword (Optional)

Primary author: CAMPORA PEREZ, Daniel Hugo (Universidad de Sevilla (ES))

Co-author: POTTERAT, Cedric (Univ. Federal do Rio de Janeiro (BR))

Presenter: CAMPORA PEREZ, Daniel Hugo (Universidad de Sevilla (ES))

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