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Young Scientist Forum : Online Track Reconstruction and Data Reduction for the Belle II Experiment using DATCON

Tuesday, 7 March 2017 12:15 (15 minutes)

The new Belle II experiment at the asymmetric e^+e^- accelerator SuperKEKB at KEK in Japan is designed to deliver a highest instantaneous luminosity of $8 \times 10^{35} \mathrm{cm}^{-2}\mathrm{s}^{-1}$. To perform high-precision track reconstruction, e.g. for measurements of time dependent CPV decays and secondary vertices, the Belle II detector is equipped with a DEPFET pixel detector (PXD) of high granularity, containing 8 million pixels in total. The high instantaneous luminosity and short bunch crossing times produce a large stream of online data in the PXD, which needs to be reduced significantly for offline storage. This is done using an FPGA-based Data Acquisition Tracking and Concentrator Online Node (DATCON), which uses information from the Belle II strip vertex detector (SVD) surrounding the PXD to carry out online track reconstruction, extrapolation back to the PXD, and to define Regions of Interest (ROI) on the PXD. This reduces the data stream approximately by a factor of ten with an ROI finding efficiency of >90% of PXD physics hits inside the ROI.

In this talk, I will present the current status of the FPGA-based implementation of the track reconstruction using the Hough transformation and the offline simulation.

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Track Classification: 9 : Real Time Pattern Recognition