

## VETRA - offline analysis and monitoring software platform for the LHCb VELO

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The LHCb experiment is dedicated to studying CP violation and rare decays phenomena. In order to achieve these physics goals precise tracking and vertexing around the interaction point is crucial. This is provided by the VELO (Vertex Locator) silicon detector. After digitization, large FPGAs are employed to run several algorithms to suppress noise and reconstruct clusters. This is performed by a FPGA based processing board. An off-line software framework, VETRA, has been developed which performs a bit perfect emulation of this complex processing in the FPGAs. This is a novel development as this hardware emulation is not standalone but rather is fully integrated into the LHCb software to allow the reconstruction of full data from the detector. This software platform facilitates: developing and understanding the behaviour of the processing algorithms; optimizing the parameters of the algorithms that will be loaded into the FPGA; and monitoring the performance of the detector. This framework has also been adopted by the Silicon Tracker detector of LHCb. This framework was successfully used with the first 1500 tracks of data in the VELO obtained from the LHC beam in September 2008. The software architecture and utilisation of VETRA project will be discussed in detail.

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