



Contribution ID: 5

Type: **Poster**

Calibration and performance monitoring of the LHCb Vertex Locator

Thursday 24 May 2012 13:30 (4h 45m)

The LHCb experiment is dedicated to searching for New Physics effects in the heavy flavour sector, precise measurements of CP violation and rare heavy meson decays. Precise tracking and vertexing around the interaction point is crucial in achieving these physics goals.

The LHCb VELO (VERTex LOcator) silicon micro-strip detector is the highest precision vertex detector at the LHC and is located at only 8 mm from the proton beams. The high spatial resolution (up to 4 microns single hit precision) is obtained by a complex chain of processing algorithms to suppress noise and reconstruct clusters. These are implemented in large FPGAs, with over one million parameters that need to be individually optimised. Previously we presented a novel approach that has been developed to optimise the parameters and integrating their determination into the full software framework of the LHCb experiment. Presently we report on the experience gained from regular operation of the calibration and monitoring software with the collision data taken in 2011 by the LHCb experiment. Both the VELO performance and its impact on the physics results will be detailed.

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Session Classification: Poster Session

Track Classification: Event Processing (track 2)