Contribution ID: **115** Type: **Oral Presentation**

Performance of the LHCb Vertex Locator

Saturday 11 June 2011 09:30 (20 minutes)

LHCb is a dedicated experiment to study new physics in the decays of beauty and charm hadrons at the Large Hadron Collider (LHC) at CERN. The beauty and charm hadrons are identified through their flight distance in the Vertex Locator (VELO), and
hence the detector is essential for both the trigger performance and offline physics analyses. The VELO is the highest resolution vertex detector at the LHC.

The VELO is the silicon detector surrounding the LHCb interaction point, and is located only 7 mm from the LHC beam during normal operation. The VELO is moved into position for each fill of the LHC, once stable beams are obtained. The detector is
centred around the LHC beam during the insertion by the online reconstruction of the primary vertex position. The detector operates in an extreme and highly non-uniform radiation environment, and the effects of surface and bulk radiation damage have already been observed. The VELO consists of two retractable detector halves with 21 silicon micro-strip tracking modules each. A module is composed of two n+-on-n 300 micron thick half disc sensors with R-measuring and Phi-measuring micro-strip geometry, mounted on a carbon fibre support paddle. The minimum pitch is approximately 40 um. The detector is also equipped with one n-on-p module. The detectors are operated in vacuum and a bi-phase C02 cooling system is used to keep the sensors at -10 C. The detectors are readout with an analogue front-end chip and the signals processed by a set of algorithms in FPGA processing boards. The performance of the algorithms is tuned for each individual strip using a bit-perfect emulation of the FPGA code run in the full software framework of the experiment.

The VELO has been successfully operated for the first LHC physics run. Operational results show a signal to noise ratio of around 20:1 and a cluster finding efficiency of 99.5 %. The small pitch and analogue readout, result in a best single hit precision of 4 um having been achieved at the optimal track angle.

(Submitted on behalf of the VELO group, speaker will be identified once the talk is accepted)

Author: Dr LATHAM, Thomas (University of Warwick)

Presenter: Dr LATHAM, Thomas (University of Warwick)

Session Classification: Semiconductor Detectors

Track Classification: Semiconductor Detectors