

Studies of radiation damage in the LHCb Vertex Locator after Run I.

Friday 13 June 2014 15:40 (20 minutes)

LHCb is a dedicated flavour physics experiment at the Large Hadron Collider at CERN. The Vertex Locator (VELO) is an important part of the LHCb tracking system, enabling precision measurements of beauty and charm mesons. It is the highest precision vertex detector at the LHC, featuring a single-hit resolution as good to $4\mu\text{m}$.

The VELO comprises 42 silicon micro-strip modules. A module is made of two oxygenated n+-on-n $300\mu\text{m}$ 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 $40\mu\text{m}$. The detector is also equipped with the only n-on-p sensors operating at the LHC.

The VELO operates in an extremely harsh radiation environment. A dose of 0.5×10^{14} 1 MeV neutron equivalent /cm² per fb⁻¹ of data is predicted at the tip of the sensors.

Radiation damage of the VELO sensors is monitored using three independent methods: trending of leakage currents as a function of temperature, study of the charge collection efficiency, and noise measurements as a function of bias voltage.

This talk covers the results obtained using the first two methods. No significant performance degradation after the Run I data taking period has been observed. The observed effects related to radiation damage are in agreement with expectations.

Authors: ON BEHALF OF THE LHCb VELO GROUP, . (.); OBLAKOWSKA-MUCHA, Agnieszka (AGH University of Science and Technology (PL))

Presenters: ON BEHALF OF THE LHCb VELO GROUP, . (.); OBLAKOWSKA-MUCHA, Agnieszka (AGH University of Science and Technology (PL))

Session Classification: Session