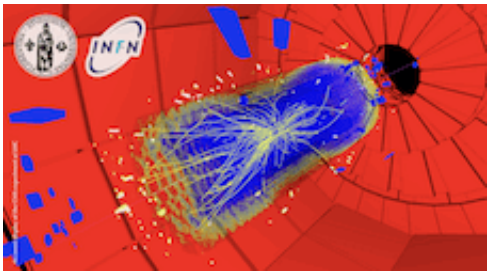

Contribution ID: **24** Type: **Talk**

Monitoring radiation damage in the ATLAS Silicon Tracker

Friday, 8 July 2011 12:40 (20 minutes)

The record breaking instantaneous luminosities of 10^33 cm-2 s-1 recently surpassed at the Large Hadron Collider generate a rapidly increasing particle fluence in the ATLAS silicon tracker. As the radiation dose accumulates, the first effects of radiation damage are now observable in the silicon sensors. A regular monitoring program has been conducted and reveals an increase in the silicon leakage current, which is found to be correlated with the rising radiation dose recorded by independent sensors within the inner detector volume. Such measurements are useful to validate the digitization model that has been developed to simulate radiation damage effects, including charge trapping, electric field modification and realistic signal induction on the electrodes. In the longer-term crystal defect formation in the silicon bulk is expected to alter the effective doping concentration, producing type-inversion and ultimately an increase the voltage required to fully deplete the sensor. Together with autonomous measurements of the depletion voltage, we present a track-based method that has been developed to estimate the depth of the depleted zone, allowing a continuous monitoring of the sensor performance. In the Pixel detector, Lorentz angle effects are reduced by a novel implementation of the method in the longitudinal pixel dimension.

Primary author: Dr GIBSON, Stephen (CERN)

Presenter: Dr GIBSON, Stephen (CERN)

Session Classification: DAY 3

Track Classification: Radiation Effects and Hardness