20th International Conference on Computing in High Energy and Nuclear Physics (CHEP2013)

Contribution ID: **415** Type: **Oral presentation to parallel session**

Simulation and analysis of the LUCID experiment in the Low Earth Orbit radiation environment

Tuesday 15 October 2013 16:30 (20 minutes)

The Langton Ultimate Cosmic ray Intensity Detector (LUCID) experiment [1] is a satellite-based device that uses five Timepix hybrid silicon pixel detectors [2] to make measurements of the radiation environment at an altitude of approximately 660km, i.e. in Low Earth Orbit (LEO). The experiment is due to launch aboard Surrey Satellite Technology Limited's (SSTL's) TechDemoSat-1 in Q3 of 2013. The Timepix detectors, developed by the Medipix Collaboration [3], are arranged to form the five sides of a cube enclosed by a 0.7 mm thick aluminium covering, and will be operated in Time-over-Threshold mode to allow the flux, energy and directionality of incident ionising radiation to be measured. To understand the expected detector performance with respect to these measurements, the LUCID experiment has been modelled using the Allpix package, a generic simulation toolkit for silicon pixel detectors built upon the GEANT4 framework [4]. Furthermore, the anticipated data rates for differing space radiation environments (for example, during polar passes or when passing through the South Atlantic Anomaly) have been estimated. The UK's GridPP infrastructure was used to run the simulations and store the resultant datasets; a web portal was also developed to allow members of the LUCID Collaboration to easily specify the space radiation environment of interest, request the necessary simulation jobs and retrieve the results for local analysis. The results obtained have been used to confirm that the LUCID's data transmission allowance is sufficient, and also to validate the data transmission protocols that will be used when LUCID starts transmitting data towards the end of 2013.

Keywords:
LUCID
Pixel detector
Silicon detector
Space radiation
Timepix
GEANT4
Grid computing
GridPP

References:
[1] L. Pinsky et al., Radiation Measurements 46 (2011) 1610-1614
[2] X. Llopart et al., Nucl. Instr. Meth. A 581 (2007) 485-494
[3] http://medipix.web.cern.ch/
[4] A. Agostinelli et al., Nucl. Instr. Meth. A 506 (2003) 250-303

Author: Dr WHYNTIE, Tom (Queen Mary, University of London/The Langton Star Centre)

Co-author: LUCID COLLABORATION, The (The Langton Star Centre)

Presenter: Dr WHYNTIE, Tom (Queen Mary, University of London/The Langton Star Centre)

Session Classification: Event Processing, Simulation and Analysis

Track Classification: Event Processing, Simulation and Analysis