8th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors, Taipei, Taiwan

Contribution ID: **37** Type: **ORAL**

Development of the silicon-microstrip super-module prototype for the HL-LHC

Tuesday 6 December 2011 11:50 (20 minutes)

The current ATLAS Inner Detector (ID) was designed to survive a luminosity of 2x1034 cm-2s-1 at the CERN LHC. Following the phase 2 of the LHC machine upgrade, called High Luminosity LHC (HL-LHC), the peak luminosity will reach 5x1034 cm-2s-1 and the delivered integrated luminosity will increase by a factor of 10. To maintain the tracking performance in a severe radiation environment (up to 1015 1MeV neutron equivalent at 38cm radius) and increased track occupancy, a new ID will be constructed, using silicon pixel and micro-strip technology.

Important micro-strip specifications include the sensor granularity, and a small material budget. Short strips of ˜2.4 cm length are considered for the three innermost layers while longer strip of about ˜9.6 cm is considered for the two outermost layers. The higher granularity requires investigating new powering and data transmission schemes to limit the material budget in the tracking volume.

A module granularity of about 10x10 cm2 is defined by the six-inch wafer sensor diameter and allows the construction of a "super-module"of up to 16 double-sided modules. This promising concept allows full Z-coverage while keeping high modularity and rework ability up to the last integration step during construction.

Prototype double-sided modules have been fabricated that meet the required performance specifications of signal gain and noise, as well as reasonable specifications of thermal management, material budget and mechanical stability.

A super-module concept has been investigated with demonstrators to prove the feasibility of a stiff but low material local support together with the end-insertion and locking mechanism to a barrel structure allowing a flexible integration.

This presentation will cover the super-module program R&D description, the key features, recent progress and future proposed developments towards the construction of a new ID for the ATLAS experiments.

Author: CLARK, Allan (University of Geneva)

Co-authors: FERRERE, D. (University of Geneva); LA MARRA, D. (University of Geneva); CADOUX, F (University of Geneva); BARBIER, G. (University of Geneva); IACOBUCCI, G. (University of Geneva); HANAGAKI, K. (Dept. of Physics, Osaka University); HARA, K. (University of Tsukuba); ENDO, M. (Depat. of Physics, Osaka University); POHL, M. (University of Geneva); WEBER, M. (Unuversity of Geneva); GONZALEZ SEVILLA, S. (University of Geneva); TERADA, S. (KEK); IKEGAMI, Y. (KEK); TAKUBO, Y. (KEK); UNNO, Y. (KEK)

Presenter: CLARK, Allan (University of Geneva)

Session Classification: Strips

Track Classification: Strips