

Achievements of the ATLAS Upgrade Planar Pixel Sensors R&D Project

Tuesday 3 September 2013 11:20 (20 minutes)

To extend the physics reach of the LHC, accelerator upgrades are planned which will increase the integrated luminosity from 730 to beyond 3000 fb⁻¹ and the pile-up per bunch-crossing by a factor 5 to 10. To cope with the increased occupancy and radiation damage, the ATLAS experiment plans to introduce an all-silicon inner tracker with the HL-LHC upgrade.

To investigate the suitability of pixel sensors using the proven planar technology for the upgraded tracker, the ATLAS Upgrade Planar Pixel Sensor R&D Project (PPS) was established comprising 19 institutes and more than 80 scientists. Main areas of research are the performance assessment of planar pixel sensors with different designs and substrate thicknesses up to HL-LHC fluences, the achievement of slim or active edges to provide low geometric inefficiencies without the need for shingling of modules and the exploration of possibilities for cost reduction to enable the instrumentation of large areas.

The presentation will give an overview of recent accomplishments and ongoing work of the R&D project, in particular testbeam results obtained with highly irradiated sensors, developments in the field of slim and active edges and first steps towards prototypes of future pixel modules.

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Session Classification: Session 3

Track Classification: Pixels (including CCD's) - Charged particle tracking