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The ATLAS Upgrade Planar Pixel Sensors R&D Project: Status and Overview

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To investigate the suitability of pixel sensors using the proven planar technology for the upgraded tracker, the ATLAS Planar Pixel Sensor R&D Project was established comprising 18 institutes and more than 80 scientists. Main areas of research are

- performance assessment of planar pixel sensors at HL-LHC fluences to drive design and process improvements.
- establishment of reliable device simulations for severely radiation-damaged pixel detectors
- the exploration of possibilities for cost reduction to enable the instrumentation of large areas with pixel detectors

The presentation will give an overview of the most recent achievements of the R&D project, among them

- beam test results with planar sensors irradiated up to HL-LHC fluences at different eta angles providing new insight into efficiencies and cluster sizes under realistic b-layer conditions
- measurements obtained with irradiated n-in-p pixel assemblies of different thicknesses down to 100 μm and with special active/slim edges
- comparisons of these experimental findings with initial TCAD device simulations
- update on prototyping efforts for large areas: sensor design improvements, 6" wafer production yields, characterisations and rad-hardness confirmations.

On the base of these results, a discussion on the possible ways implementing planar pixel sensors in the different layers of the new ATLAS pixel system will be given.

Collaboration

The ATLAS Upgrade Planar Pixel Sensors R&D Project

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