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Type: **Talk**

The ATLAS ITk Pixel Detector: status and road map

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At the High luminosity LHC, the expected instantaneous luminosity of up to $7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, a factor 7.5 larger with respect to the nominal LHC one, and the integrated luminosity increase by a factor 10 impose severe challenges for the ATLAS detector. The radiation is expected to reach unprecedented values, with non-ionizing fluence of $1 \times 10^{16} \text{ neq/cm}^2$ and ionizing dose of 5 MGy. To cope with the resulting increase in occupancy,

bandwidth, and radiation damage, the current ATLAS Inner Detector will be replaced by an all-silicon Inner Tracker (ITk), composed by a strip and a pixel system. The ITk Pixel Detector will consist of five-barrel layers and a number of rings resulting in about 13 m^2 of instrumented area with silicon hybrid detectors with angular coverage extended up to $|\eta| = 4$. The silicon hybrid detectors are modules composed by thin planar or 3D silicon sensors bump bonded to novel front-end ASICs and featuring radiation hardness. A fine segmentation enables the requested low occupancy. The data from the modules will be driven from the front-end chip to the opto-electrical conversion system with high-speed transmission parallel lines running at 1.28 Gb/s per data link. Tracking performance will be improved due to the reduced amount of material, thanks to light carbon fiber structures, CO₂-based cooling with thin Ti tubes walls, data link sharing and a novel serial powering scheme. The ITk pixel detector will operate at around -35 C and is designed also to sustain the expected large number of temperature cycles during its lifetime.

In this contribution, an overview of the ITk pixel detector project will be shown, from the design and the expected performance to prototyping, testing and qualification of the various components. The future challenges to overcome in the next years will be also presented.

Internet talk

No

Is this an abstract from experimental collaboration?

Yes

Name of experiment and experimental site

ATLAS

Is the speaker for that presentation defined?

Yes

Details

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