

Planar n+-in-n pixel sensors for the ATLAS IBL upgrade

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ATLAS plans a first major upgrade of its pixel detector on the path to HL-LHC in form of the IBL: The insertion of a 4th pixel layer (Insertable B-Layer) is currently being prepared for 2013. This will enable the ATLAS tracker to cope with an increase of LHC's peak luminosity to about $3E34 \text{ cm}^{-2} \text{ s}^{-1}$ which requires a radiation hardness of the sensors of up to $5E15 \text{ n}_{eq} \text{ cm}^{-2}$.

As part of their qualification process planar sensors were irradiated up to the IBL end of life fluence of $5E15 \text{ n}_{eq} \text{ cm}^{-2}$ using low energy protons and reactor neutrons. Their performance was evaluated in lab based measurements and dedicated test beam campaigns. Results from these measurements will be presented.

Due to the unprecedentedly small mean sensor radius of only 3.2 mm from the beam, most of the IBL modules are mounted at fairly steep angles with respect to the eta coordinate which leads to large cluster sizes in z. To investigate the effect of this peculiarity, test beam measurements were performed at angles equivalent to realistic sensor positions close to the beampipe at $\eta=2.5$. The status of testbeam reconstruction and analysis will be presented and a first estimate will be given on the prospects of studying the active zone in highly irradiated sensors with high-eta/grazing angle measurements.

An production progress report of the sensors for the IBL will be given as well.

Primary authors: Mr RUMMLER, Andre (Technische Universitaet Dortmund (DE)); MUENSTERMANN, Daniel (CERN)

Presenter: MUENSTERMANN, Daniel (CERN)

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