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Novel Silicon n-in-p Pixel Sensors for the future ATLAS Upgrades

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In view of the LHC upgrade phases towards HL-LHC the ATLAS experiment plans to upgrade the Inner Detector with an all silicon system.\

The n-in-p silicon technology is a promising candidate for the pixel upgrade thanks to its radiation hardness and cost effectiveness, that allow for enlarging the area instrumented with pixel detectors.\

We present the characterization and performance of novel n-in-p planar pixel sensors produced by CiS (Germany) connected by bump bonding to the ATLAS readout chip FE-I3.\

These results are obtained before and after irradiation up to a fluence of $1 \times 10^{16} \text{ n}_{eq} \text{ cm}^{-2}$. Charge collection and tracking efficiency studies have proven the functioning of this technology up to this fluence.\

It will be also presented an overview of the new pixel production, which is on-going at CiS for sensors compatible with the new ATLAS readout chip FE-I4 and featuring reduced thickness down to $150 \mu\text{m}$. These sensors will be used to investigate the radiation hardness of thinner detectors at HL-LHC fluences.\

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