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Overview of 3D- Silicon sensors development for ATLAS Pixel Upgrade

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An upgrade of LHC towards a 10 times higher luminosity will require tracking pixel detectors with unprecedented radiation tolerance. Furthermore the high track density will call for fast and high granularity pixel detectors with low radiation length and power consumption. Different types of solid-state sensors are being studied for ATLAS upgrade of tracking system within ATLAS Insertable B-Layer and High Luminosity LHC programs.

The Silicon 3D sensors which have been proposed and developed within ATLAS 3D Collaboration are potentially more radiation hard and have a faster charge collection than the standard planar sensor owing to the innovative electrode configuration. These new sensor represent an excellent candidate for the pixel sensor at ATLAS upgrade.

In the framework of ATLAS 3D Collaboration different technologies are carried out to obtain Silicon 3D sensors: (i) Full-3d with active edge by Stanford and Sintef and (ii) double side double column type (DDTC) with partial and fully penetrating electrodes in the substrate by FBK-irst and CNM.

With these technologies several sensors have been produced and tested with the ATLAS Pixel front-end chips.

We will describe recent development in these sensor technologies and will concentrate on recent results obtained with lab- and beam-tested devices

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