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## A new generation of radiation hard 3D pixel sensors for the HL-LHC era

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The ATLAS experiment at Large Hadron Collider (LHC) will replace its inner tracker system to cope with the extreme particle fluence expected after the High Luminosity upgrade of the accelerator (HL-LHC).

The 3D silicon sensor technology has been selected as baseline to instrument the innermost layers of the pixel detector in the future ATLAS Inner Tracker (ITk).

A new generation of 3D pixel sensors with thin active substrates and small pixel cells of  $50 \times 50 \ \mu m^2$  and  $25 \times 100 \ \mu m^2$  produced at CNM in Spain, have been interconnected to the RD53A chip, the first prototype of ASIC for the HL-LHC.

Performance of these new 3D RD53A modules have been studied before and after uniform proton irradiations up to  $10^{16} n_{eq}/cm^2$ , i.e. a particle fluence close to the one required for the innermost layer of ITk.

The first results of the power dissipation and hit efficiency for 3D RD53A devices uniformly irradiated will be presented. The measurements revealed a superior radiation hardness of these novel pixel sensors with respect to previous generation of 3D devices.

## Submission declaration

Original and unpublished

Authors: TERZO, Stefano (IFAE Barcelona (ES)); GRINSTEIN, Sebastian (IFAE - Barcelona (ES)); PELLEGRINI, Giulio (Centro Nacional de Microelectrónica (IMB-CNM-CSIC) (ES)); MANNA, Maria (Centro National de Microelectronica - CNM-IMB-CSIC); QUIRION, David (IMB-CNM, CSIC)

Presenters: TERZO, Stefano (IFAE Barcelona (ES)); GRINSTEIN, Sebastian (IFAE - Barcelona (ES))

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