

Performance of 3D sensors produced at CNM and uniformly irradiated up to $2e16 n_{eq}/cm^2$

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The inner detector of the ATLAS experiment will be replaced by a completely new Inner Tracker (ITk) to exploit the performance of the High Luminosity upgrade of the LHC accelerator (HL-LHC). The new tracker will have to operate in an unprecedented radiation environment. In particular, the hybrid pixel detectors of the innermost layer of the ITk will need to survive a particle fluence of about $2e16 n_{eq}/cm^2$ before being replaced.

A novel 3D pixel sensor technology featuring thin active substrate and small pixel cells has been selected to instrument the innermost barrel layer and rings of the ITk. The performance in terms of hit efficiency and power consumption of 3D pixel sensors produced at CNM and uniformly irradiated up to $2e16 n_{eq}/cm^2$ have been investigated. Results obtained from the characterisation of 3D pixelated test structures as well as half-size sensors coupled to the RD53A prototype chip are presented.

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