

Study of Irradiated CNM 3D Sensors

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For the high luminosity upgrade of the LHC, the CMS experiment is considering implementing the innermost layers of its inner tracker with 3D pixels. This technology should allow the detector to operate safely at unprecedented fluences that can be as high as $O(2e16 \text{ Neq/cm}^2)$. In this study we present results of pixelated 3D sensors fabricated at IMB-CNM and interconnected to the RD53A demonstrator readout chip. The sensor plus chip ensembles were irradiated at the Fermilab irradiation test area with protons of momentum 400 MeV to fluences of approximately $1.3\text{-}2.0e16$ and measured in a test beam of 120 GeV protons. We show some preliminary results of the sensor performance, including the hit detection efficiency and position resolution as a function of bias voltage and angle. Sensor characterization measurements also include the IV curve and the charge collection profiles inside a pixel cell for orthogonal incidence at full depletion.

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