

New test beam results of HPK planar pixel sensors for the CMS Ph2 upgrade

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The new Inner Tracker CMS pixel detector for the High-Lumi upgrade of LHC will be designed to sustain and collect till to 1 MeV neutron equivalent fluence (ϕ_{eq}) of up to $2.3 \times 10^{16} \text{ cm}^{-2}$ for more than 3000 fb^{-1} of integrated luminosity. Various solutions are being evaluated in terms of pixel pitch, sensor designs, and vendors.

Planar n^+ -p sensors produced by Hamamatsu Photonics (HPK) with an active thickness of $150 \mu\text{m}$ and pixel pitches of 25×100 and $50 \times 50 \mu\text{m}^2$ are among these proposals. In 2017 a first production was characterized and in 2019 a new set of improved prototypes was produced. Sensors were coupled to the RD53A chips and the modules were irradiated at different fluences up to $2 \times 10^{16} \text{ cm}^{-2}$ and extensively tested in the DESY II test beam facility in the last 2 years.

This talk will present an overview of all the results obtained for this new production in terms of spatial resolution, hit efficiency, cluster breaking frequency at shallow angles and noise studies, together with a detailed comparison between the two main sensor designs available for that production (bricked and bitten).

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