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Test Beam Results of 3D pixel sensors for the Phase-2 CMS Tracker with the RD53A and CROC readout chips

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The High Luminosity upgrade of the CERN Large Hadron Collider (HL-LHC) will require new high-radiation tolerant silicon pixel sensors for the innermost layers of the CMS experiment tracking detectors, which should be capable of withstanding fluences up to 2.3×10^{16} neq/cm².

A comprehensive overview of the results obtained in beam test experiments with FBK and CNM 3D pixel sensors interconnected with the RD53A and CROC readout chips will be reported in this talk. RD53A is the first prototype chip issued from RD53 collaboration, while the CROC chip is the prototype full size version of the chip that will be mounted on the final detector.

The interconnected modules have been tested on beam at CERN and DESY, before and after irradiation up to an equivalent fluence of about 1.5×10^{16} neq/cm².

The 3D pixel sensors were made in the FBK and CNM foundries.

Analysis of collected data shows hit detection efficiencies around 98% measured after irradiation. All results are obtained in the framework of the CMS experiment R&D activities.

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