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Performance of Highly Irradiated SiPMs Coupled to LYSO:Ce Crystals for the CMS MTD Barrel Timing Layer

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The MIP Timing Detector (MTD) is a new detector being developed for the CMS upgrade for the High-Luminosity LHC era. The detector will bring the capability of precisely measuring the production time of particles produced in proton-proton collisions. In particular, the MTD will allow for the disentangling of the estimated 200 nearly simultaneous pileup vertices occurring in the interaction diamond at each bunch crossing during high-luminosity operation. The central Barrel Timing Layer of this detector will consist of an array of LYSO:Ce crystals coupled to SiPMs providing unprecedented timing resolution under such conditions. We report on the preliminary performance results of time resolution of the detector prototype measured in the laboratory and with test beam.

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