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Towards the validation and assembly of the CMS MTD Barrel Timing Layer

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For the High Luminosity era of the LHC, the accelerator will undergo a major upgrade to significantly increase the deliverable luminosity with respect to the current one. To withstand the harsh experimental conditions in terms of pileup and radiation at the HL-LHC and maintain the current excellent performance, substantial upgrades of the experiments are ongoing. In particular, the CMS upgrade will include a novel timing layer, the MIP Timing Detector (MTD), designed to measure the time of arrival of charged particles with a resolution of about 30-60 ps. The MTD will equip both the barrel and the endcap part of CMS. The sensor technology chosen for the central part of the MTD is based on LYSO:Ce scintillating crystals readout by silicon photomultipliers. In this talk we will present an overview of the Barrel Timing Layer (BTL) design and describe the optimization of the sensors. Prototype sensors were tested both in laboratory and at test beam, showing a time resolution performance compliant with the design goal. These results represent an important reference for the detector validation, which will shortly lead the CMS MTD collaboration to the assembly phase of the BTL.

Collaboration / Activity

CMS Collaboration

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