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Precision Timing with the CMS MTD Barrel Timing Layer for HL-LHC

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The MIP Timing Detector (MTD) is a new sub-detector planned for the Compact Muon Solenoid (CMS) experiment at CERN, aimed at maintaining the excellent particle identification and reconstruction efficiency of the CMS detector during the High Luminosity LHC (HL-LHC) era. The MTD will provide new and unique capabilities to CMS by measuring the time-of-arrival of minimum ionizing particles with a resolution of 30-40 ps for MIP signals at a rate of 2.5 Mhit/s per channel at the beginning of HL-LHC operation. The precision time information provided by the MTD will reduce the effects of the high levels of pileup expected at the HL-LHC by enabling the use of 4D reconstruction algorithms. The central barrel timing layer (BTL) of the MTD uses a sensor technology consisting of LYSO:Ce scintillating crystal bars coupled to SiPMs, one at each end of the bar, read out with TOFHIR ASICs for the front-end. We present an overview of the MTD BTL design and show test beam results demonstrating the achievement of the target time resolution of about 30 ps.

In-person participation

Yes

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