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Precision Timing with the CMS Barrel MIP Timing Detector

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 at the beginning of HL-LHC operation. The information provided by the MTD will help disentangle ~200 nearly simultaneous pileup interactions occurring in each bunch crossing at 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 crystal bars readout by SiPMs, one at each end of the bar. In this talk, we present an overview of the MTD BTL design and the recent test beam results demonstrating the achievement of the target time resolution of about 30 ps.

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