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## Precision Timing at High-Luminosity LHC with the CMS MIP Timing Detector

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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 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 MTD will be composed of an endcap timing layer (ETL), instrumented with low-gain avalanche diodes, as well as a barrel timing layer (BTL), based on LYSO:Ce crystals coupled to SiPMs. In this talk we present an overview of the MTD design, describe the latest progress towards prototyping and production, and show test beam results demonstrating the achieved target time resolution.

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