

## Precision timing with the CMS MIP Timing Detector (MTD) for High Luminosity LHC

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The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing detector in CMS will measure minimum ionizing particles (MIPs) with a time resolution of ~30-60 ps. The precision time information from this MIP timing detector (MTD) will bring new capabilities to the CMS detector for precision measurement and searches of rare processes. The MTD will be composed of an endcap timing layer (ETL), instrumented with low-gain avalanche diodes and a barrel timing layer (BTL), based on LYSO:Ce crystals coupled to SiPMs, read out with dedicated ASICs. In this talk we present the motivations and an overview of the MTD design, describe the latest progress towards prototyping and production, and show test beam results demonstrating the time resolution achieved.

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