

Precision Timing with the CMS Detector

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The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive Phase II upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). A new timing layer is designed to measure minimum ionizing particles (MIPs) with a time resolution of ~ 30 ps and hermetic coverage up to a pseudo-rapidity of $|\eta| = 3$. This MIP Timing Detector (MTD) will consist of a central barrel region based on LYSO:Ce crystals read out with SiPMs and two end-caps instrumented with radiation-tolerant Low Gain Avalanche Detectors (LGADs). The precision time information from the MTD will reduce the effects of the high levels of pile-up expected at the HL-LHC, and will bring new and unique capabilities to the CMS detector. We present the current status and ongoing R&D of the MTD, including recent test beam results.

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