

Abstract Submitted
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LYSO:Ce Crystals & SiPM Sensors for the CMS MTD Barrel Timing Layer¹ MATTHEW JOYCE, Univ of Virginia, CMS COLLABORATION — 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). In particular, a new timing layer will measure minimum ionizing particles (MIPs) with a time resolution of ~ 30 ps and hermetic coverage up to a pseudo-rapidity of $|\eta|=3$. The precision time information from this MIP Timing Detector (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. The MTD will consist of a central barrel region and two end-caps. The central Barrel Timing Layer (BTL) will be based on LYSO:Ce crystals read out with silicon photomultipliers (SiPMs). The BTL will use elongated crystal bars, with double-sided read out (a SiPM on each end of the crystal), in order to maximize detector performance within the constraints of space, cost, and channel count. We will review the extensive R&D studies carried out to optimize the design of the BTL sensors and the test beam results in which the goal of 30 ps timing resolution has been achieved.

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