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The Endcap Timing Layer detector for the CMS Phase-2 upgrade

For the Phase 2 upgrade, the CMS experiment foresees the installation of a MIP Timing Detector (MTD) to assign a precise timestamp to every charged particle up to pseudorapidity $|\eta| = 3$. The target timing resolution of MTD, 40 ps per track, will help to mitigate effects from the challenging pile-up conditions expected at the High-Luminosity LHC and empower the CMS detector with unique and new capabilities. To match the requirements on radiation tolerance and occupancy, the forward region of the MTD, $1.6 < |\eta| < 3$, will be equipped with Endcap Timing Layer (ETL) made by silicon Low-Gain Avalanche Diodes (LGADs) coupled to the Endcap Timing Read Out Chip (ETROC). We will present the current status of testing of the LGAD sensors, their qualification from beam tests, bench measurements, and the performance of the final ETROC design. Finally, we will discuss the challenges and the road map necessary to achieve a timely installation and operation of the ETL.

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