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Endcap Timing Layer of the CMS MIP Timing Detector for HL-LHC

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The High-Luminosity Large Hadron Collider (HL-LHC) will enable a more detailed exploration of new physics phenomena by significantly increasing collision rates, leading to pileup levels of approximately 200 simultaneous interactions. The CMS experiment will add a new detector, the MIP Timing Detector (MTD) to cope with these challenges. The MTD is designed to mitigate pileup effects by providing a precise timestamp with a resolution of 30-40 picoseconds for each particle, thereby ensuring sustained detector performance under HL-LHC conditions. The MTD is divided into two sections: the Barrel Timing Layer (BTL) and the End-cap Timing Layer (ETL), each utilizing different sensor and ASIC technologies to address the varying active surfaces, irradiation conditions, and installation requirements. The ETL, comprising two double-sided disks, utilizes Low-Gain Avalanche Diode (LGAD) sensors and the Endcap Timing Readout Chip (ETROC) to meet the unique demands of its environment. Prototyping of ETL modules is underway, with extensive validation tests including the ETROC system test and module assembly. This presentation will provide an overview of the ETL, focusing on module and sensor performance, recent achievements, and the project status.

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