

# Precision timing calorimetry with the CMS High Granularity Calorimeter

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The existing CMS endcap calorimeters will be replaced with a High Granularity Calorimeter (HGCal) for operation at the High Luminosity (HL) LHC. Radiation hardness and excellent physics performance will be achieved by utilising silicon pad sensors and SiPM-on-scintillator tiles with high longitudinal and transverse segmentation. One of the major challenges of the HL-LHC will be the high pileup environment, with interaction vertices spread not only in position, but also in time. In order to efficiently reject particles originating from pileup, precision timing information of the order of 30 ps will be of great benefit. In order to meet such performance goals, the HGCal will provide timing measurements for individual hits with signals above 12 fC (equivalent to 3-10 MIPs), such that clusters above 30 GeV will reach a timing resolution about 30 ps. Given the complexity and size of the system, this poses a particular challenge to the readout electronics as well as to the calibration and reconstruction procedures. We present the challenges for the front-end electronics design, results from prototype tests in laboratory and beam environments, as well as anticipated timing performance from simulation.

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