

Performance of CMS high granularity calorimeter prototypes in testbeam experiments

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The present electromagnetic and hadronic calorimeters of the CMS experiment will be upgraded to cope up with the harsh radiation environment and pileup conditions posed by the high luminosity operations of LHC (HL-LHC) expected to start in 2026. CMS has opted for a sampling calorimeter, based on silicon and scintillator technologies, with unprecedented transverse and longitudinal segmentation to facilitate particle identification, particle-flow reconstruction and pileup rejection. As part of the ongoing development and testing phase of the HGCAL, prototypes of both the silicon and scintillator based calorimeter sections have been tested in 2018 in beams at CERN. We report on the performance of the prototype detectors in terms of stability of noise and pedestals, MIP calibration, longitudinal/lateral shower shapes, as well as energy linearity and resolution for electrons and pions. We compare the measurements with a detailed GEANT4-based simulation.

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