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Calibration system for the CMS HGCAL SiPM-on-tileboard upgrade YI-MU CHEN, ALBERTO BELLONI, SARAH ENO, TIMOTHY EDBERG, YIHUI LAI, University of Maryland, College Park — The hadronic part of the CMS endcap's high granularity calorimeter (HGCAL) upgrade will include 240,000 scintillating tiles, each read out by a silicon photomultipler (SiPM) mounted on a circuit board known as a tileboard. This talk presents an automated SiPM calibration system to characterize the SiPMs after installation on tileboards but before scintillating tiles are installed. Our calibration system uses a 3D gantry to suspend a sub-nanosecond fast-pulsing light source directly above each SiPM mounted on HGCal tileboards. Vertical motion of the gantry controls the light intensity on the SiPMs through the inverse square law, over the 4 orders of magnitude that is the expected dynamic range of the HGCAL SiPMs. This allows the calibration system to measure both low-light noise and performance parameters, and the nonlinear response over the dynamic range of SiPM operation. The estimated data collection rate is one minute per SiPM, allowing for the calibration of all SiPMs in HGCAL in ∼4,000 operation hours.

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