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The SiPM-on-tile system of the CMS HGCAL

For the CMS High-Granularity Calorimeter (HGCal) for HL-LHC, scintillator tiles, readout with individual on-tile silicon photomultipliers (SiPMs), will be used where the radiation levels are expected to be less than $5 \times 10^{13} \text{ n/cm}^2$. The scintillator tiles will be mounted on highly-integrated “tileboards” (typical area $30 \times 30 \text{ cm}^2$) that host up to 108 tiles and their SiPMs, as well as front-end electronics, control and powering components. A dedicated LED system will be implemented to monitor stability effects. We present recent developments for the HGCal scintillator material and SiPMs, including quantification of the scintillator and SiPM radiation-damage impact, modeling of SiPM noise and its evolution with time, SiPM production testing and quality control plans, and tests of tileboards in laboratories and beam-tests.

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