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The CMS High Granularity Calorimeter for HL-LHC - a tracking detector for calorimetry

The CMS experiment at CERN will undergo significant improvements to cope with a 5-fold increase in instantaneous luminosity for the High Luminosity LHC (HL-LHC) era. In particular the endcap calorimetry will suffer from very high radiation levels and unprecedented event pile-up. The CMS HGCAL is being designed to replace the existing CMS endcap electromagnetic and hadronic calorimeters. It will be a sampling calorimeter, featuring unprecedented transverse and longitudinal readout and trigger segmentation for both electromagnetic (CE-E) and hadronic (CE-H) compartments. This will facilitate particle-flow calorimetry, where the fine structure of showers can be measured and used to enhance pileup rejection and particle identification, whilst still achieving good energy resolution. The CE-E and a large fraction of CE-H will use hexagonal silicon sensors as active detector material. The lower-radiation environment will be instrumented with scintillator tiles with on-tile SiPM readout. An overview of the HGCAL project will be presented, covering motivation, engineering design, readout and trigger concepts, and performance in beams and in simulation.

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