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CMS High Granularity Calorimeter for High Luminosity LHC

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The High Luminosity LHC (HL-LHC) will integrate about 10 times more luminosity than the LHC, posing significant challenges for radiation tolerance and event pileup on detectors, especially for forward calorimetry. As part of its HL-LHC upgrade program, the CMS collaboration is designing a High Granularity Calorimeter (HGCAL) to replace the existing endcap calorimeters. It features unprecedented transverse and longitudinal segmentation for both electromagnetic (CE-E) and hadronic (CE-H) compartments to facilitate particle-flow calorimetry. The fine structure of showers can be measured and used to enhance pileup rejection and particle identification, whilst achieving good energy resolution. The CE-E and a large fraction of CE-H will use Silicon sensors as active detector material. The lower-radiation environment will be instrumented with scintillator tiles with on-tile SiPM readout. The Silicon sensors will be of hexagonal shape, maximizing the available 8-inch circular wafer area. An overview of the HGCAL project is presented, summarizing motivation, the main engineering design choices and the R&D program.

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