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An update on the CMS High Granularity Calorimeter

Calorimetry in the upcoming High Luminosity LHC (HL-LHC) era has two enormous problems, particularly in the forward direction: radiation tolerance and unprecedented in-time event pileup. To overcome these problems, the CMS Collaboration is getting ready to replace its current endcap calorimeters with a high-granularity calorimeter (HGCAL), featuring a previously unrealized transverse and longitudinal segmentation, for both the electromagnetic and hadronic compartments, with 5D information (space-time-energy) read out. The current design uses silicon sensors for the electromagnetic section and high-irradiation regions of the hadronic section, while in the low-irradiation regions of the hadronic section plastic scintillator tiles equipped with on-tile silicon photomultipliers (SiPMs) are used. The full HGCAL will have approximately 6 million silicon sensor channels and over 200 thousand channels of scintillator tiles. This will facilitate particle-flow-type calorimetry, where the fine structure of showers can be measured and used to enhance particle identification, energy resolution and pileup rejection. In this talk we present the ideas behind the HGCAL, the current status of the project, the evolution of the detector systems with what is learned from the beam tests as well as the design and operation of test systems and the challenges that lie ahead.

Secondary track

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