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High Granularity Calorimetry at the LHC: Challenges in energy and timing measurements

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The CMS Collaboration is preparing to build a replacement endcap calorimeters for the Phase II of the LHC. This new high-granularity calorimeter (HGCAL) is designed to operate in the harsh radiation environment at the HL-LHC, where the average number of interactions per bunch crossing is expected to exceed 140 simultaneous collisions and neutron fluences can achieve >10¹⁶ 1 MeV n_{eq}/cm². A total of approx. six million single sensors, distributed in 47 sampling layers, will be used to separate spatially and measure the energy and time of arrival of both electromagnetic and hadronic showers, providing adequate physics performance for the reconstruction of photons, taus and jets, essential objects for the physics programme of Phase II LHC. In this talk we review the status of the HGCAL project, the many lessons learnt so far, and the challenges ahead as the project enters its construction phase.

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