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Paving the way to reconstruct the 5D information of the CMS HGCAL detector at the HL-LHC

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To maintain and improve physics performance under the harsher conditions of the high luminosity LHC phase from 2026, the CMS collaboration has designed a novel endcap calorimeter that uses silicon sensors to achieve radiation tolerance, with the additional benefit of a very high readout granularity. In regions characterised by lower radiation levels, small scintillator tiles with individual SiPM readout are employed. A novel reconstruction approach is being developed to fully exploit the granularity and other significant features of the detector like precision timing, with a view to deployment in the high pileup environment of HL-LHC. An iterative reconstruction framework (TICL) has been put in place, and is being actively developed. The inputs to the framework are clusters of energy deposited in individual calorimeter layers delivered by a density-based algorithm which has recently been developed and tuned. In view of the expected pressure on the computing capacity in the HL-LHC era, the algorithms and their data structured are being designed with GPUs in mind. Preliminary results show that significant speed-up can be obtained running the clustering algorithm on GPUs. In addition, machine learning techniques based on cutting-edge techniques are being investigated and integrated into the reconstruction framework. This talk will describe the approaches being considered and show first results.

I read the instructions

Secondary track (number)

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