

Reconstruction in an imaging calorimeter for HL-LHC

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The CMS endcap calorimeter upgrade for high luminosity LHC in 2025 uses silicon sensors to achieve radiation tolerance, with the further benefit of a very high readout granularity. Small scintillator tiles with individual SiPM readout are used in regions permitted by the radiation levels. A reconstruction sequence 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 clustering framework (TICL) has been put in place, and is being actively developed. The framework takes as input clusters of energy deposited in individual calorimeter layers delivered by an “imaging” algorithm which has recently been revised and tuned. Mindful of the projected extreme pressure on computing capacity in the HL-LHC era, the algorithms are being designed with GPUs in mind. Very significant speedup has recently been obtained for the clustering algorithm run on GPUs. Machine learning techniques are being developed and integrated into the reconstruction framework. This talk will describe the approaches being considered and show first results.

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