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The Iterative Clustering framework for the CMS HGCAL Reconstruction

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To sustain the harsher conditions of the high-luminosity LHC, the CMS collaboration is designing a novel endcap calorimeter system. The new calorimeter will predominantly use silicon sensors to achieve sufficient radiation tolerance and will maintain highly-granular information in the readout to help mitigate the effects of pileup. In regions characterized by lower radiation levels, small scintillator tiles with individual on-tile SiPM readout are employed. A unique reconstruction framework (TICL: The Iterative CLustering) is being developed within the CMS Software CMSSW to fully exploit the granularity and other significant detector features, such as particle identification and precision timing, with a view to mitigate pileup in the very dense environment of HL-LHC. The TICL framework has been thought with heterogeneous computing in mind: the algorithms and their data structures are designed to be executed on GPUs. In addition, fast and geometry agnostic data structures have been designed to provide fast navigation and searching capabilities. Seeding capabilities (also exploiting information coming from other detectors) dynamic cluster asking, energy regression and particle identification are the main components of the framework. To allow for maximal flexibility, TICL allows composition of different combinations of modules that can be chained together in an iterative fashion. A stable version of TICL has been already integrated in CMSSW and used for the CMS Phase-2 reconstruction in the context of the Phase-2 Upgrade of the CMS Data Acquisition and High Level Trigger Technical Design Report.

Significance

References

Speaker time zone

Compatible with Europe

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