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Machine Learning for Event Reconstruction in the CMS Phase-2 High Granularity Calorimeter Endcap

The high-luminosity era of the LHC will offer greatly increased number of events for more precise Standard Model measurements and Beyond Standard Model searches, but will also pose unprecedented challenges to the detectors. To meet these challenges, the CMS detector will undergo several upgrades, including the replacement of the current endcap calorimeters with a novel High-Granularity Calorimeter (HGCAL). To make optimal use of this innovative detector, new and original algorithms are being devised. A dedicated reconstruction framework, The Iterative Clustering (TICL), is being developed within the CMS Software (CMSSW). This new framework is designed to fully exploit the high spatial resolution and precise timing information provided by HGCAL. Several key ingredients of the object reconstruction chain already rely on Machine Learning techniques and their usage is expected to further develop in the future. In the presentation, the existing reconstruction strategies will be presented stressing the role played by ML techniques to exploit the information provided by the detector. The areas where ML techniques are expected to play a role in the future developments will be also discussed.

AI keywords

simulation-based inference, anomaly detection

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