

Challenges of Particle Flow reconstruction in the CMS High-Granularity Calorimeter at the High-Luminosity LHC

The challenges of the High-Luminosity LHC (HL-LHC) are driven by the large number of overlapping proton-proton collisions (pileup) in each bunch-crossing and the extreme radiation dose to detectors positioned at high pseudorapidity. To overcome this challenge CMS is designing and implementing an endcap electromagnetic+hadronic sampling calorimeter employing silicon pad devices in the electromagnetic and front hadronic sections, comprising over 6 million channels, and highly-segmented plastic scintillators in the rear part of the hadronic section. This High-Granularity Calorimeter (HGCAL) will be the first of its kind used in a colliding beam experiment. Clustering deposits of energy over many cells and layers is a complex and challenging computational task, particularly in the high-pileup and high-event-rate environment of HL-LHC. These challenges and their solutions will be discussed in detail, as well as their implementation in the HGCAL offline reconstruction. Baseline detector performance results will be presented for electromagnetic and hadronic objects, and case studies demonstrating the advantages of fine longitudinal and transverse segmentation will be explored.

Author: CHLEBANA, Frank (Fermi National Accelerator Lab. (US))

Presenter: CHLEBANA, Frank (Fermi National Accelerator Lab. (US))

Session Classification: High Luminosity LHC