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Performance Evaluation of Calorimeter Clustering Algorithms for Particle Tracking¹ ALEXANDRA BALLOW, ALINA LAZAR, BRIAN IS-BELL, Youngstown State University, KESUNG WU, ALEXANDER SIM, Lawrence Berkeley National Laboratory — The challenge of reconstructing tracks of particles produced in high energy collisions is mainly computational. With the ever-growing data from scientific experiments, it is imperative to have automatic ways to analyze that data. Combinatorics approaches currently used to track particles will become inadequate as the number of simultaneous collisions will increase in the next phase of the High Luminosity Large Hadron Collider (HLLHC). To reduce the complexity of combinatorial approaches we evaluate several iterative algorithms based on clustering algorithms to reconstruct particle trajectories. Specifically, we analyze clustering algorithms based on sparse binning and DBSCAN. The sparse binning algorithm separates the detector space into bins before performing the grouping step. This idea speeds up the algorithm but affects the accuracy. We ran a highperformance computing implementation of the proposed clustering approaches on a public dataset containing a large set of simulated collision events. The performance evaluation is done for three different clustering implementations in terms of average accuracy and computational speed.

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