Improving Energy Resolution for the STAR Forward Calorimeter System

David Kapukchyan for the STAR Collaboration
University of California Riverside, Riverside, CA

June 29, 2022

Abstract

The STAR experiment at the Relativistic Heavy Ion Collider, RHIC, has recently installed and operated an upgrade to its forward detector capabilities at $2.5 < \eta < 4.0$ that consists of tracking (small thin gap chambers and silicon) and a forward calorimetry system (FCS) for RHIC Run 22 and beyond. The new detectors will be used to make novel measurements in cold QCD such as those related to the nucleon spin structure. This talk will focus on the FCS, which consists of a hodoscope preshower, a lead-scintillator electromagnetic calorimeter, and a steel-scintillator hadronic calorimeter. In addition, the FCS utilizes the latest electronics systems that allows for much greater energy resolution by recording fixed time snapshots of the readout signal, where several snapshots encompass a single collision. This allows the resulting data for a single event to contain the signals from multiple different collisions. This talk will discuss the algorithm being developed to distinguish the signals from each individual collision and how to disentangle the energy contribution from overlapping signals that arise either from multiple particles traversing the calorimeter in the same collision or signals from previous or post collision crossings that overlap with the triggered collision.