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Partitional Clustering Algorithms for Prompt-Photon Identification in the STAR Endcap Electromagnetic Calorimeter BENJAMIN BARBER, JASON WEBB, Valparaiso University, STAR COLLABORATION — Photon candidates are frequently identified in electromagnetic calorimeters utilizing hierarchical algorithms, whereby detector elements are clustered based upon a fixed set of clustering criteria, which a candidate cluster must satisfy to be considered. Imperfections in detector response and event-to-event fluctuations result in the rejection of true candidates. When searching for rare signals, such as prompt-photon production in pp collisions, such inefficiencies are undesirable. Partitional clustering is an alternative approach. Partitional clustering divides detector elements between a preset number of clusters based upon their distance to the cluster centers, and iterates until the position of the cluster centers converges. This approach is advantageous when $N_{clusters}$ is known. This research applies partitional clustering to the problem of π^0/γ discrimination in the STAR Endcap Electromagnetic Calorimeter (EEMC). The EEMC is a lead-scintillator sampling calorimeter, with a highly-segmented scintillator strip shower maximum detector (SMD). Partitional clustering algorithms, with $N_{clusters} = 2$, are applied to the SMD strips corresponding to large energy deposits in the EEMC. The clusters are used to calculate two-body decay kinematics. In simulation, invariant mass distributions show a good separation between prompt photons and π^0 background.

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