

## **An Event-by-Event Comparison of Clustering Algorithms for Photon Detection in the STAR Endcap Calorimeter**

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The STAR detector at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory uses polarized proton collisions to determine the origin of the proton spin, using measurements such as neutral pion asymmetries. The Endcap Electromagnetic Calorimeter (EEMC) in the STAR detector is especially useful for detecting photons from  $\pi^0$  decays at forward angles. This latter measurement is obtained from the Shower Maximum Detector (SMD) in the EEMC where narrow crossed scintillator strips measure the energy deposited in them and can be used to identify the location of the photon shower. The electromagnetic shower most often deposits energy in a small number of adjacent strips that collectively form a “cluster.” This work has focused on a qualitative and quantitative comparison of two different clustering algorithms that were developed to reliably identify  $\pi^0$  events and to effectively discriminate against background cluster selection that produces false  $\pi^0$  signals. This comparative analysis will be presented and the strengths and weaknesses of the algorithms will be discussed.

### *Information about the Author:*

Billy is a senior physics major, mathematics and military leadership double minor from New Lenox, IL. Billy was inspired to pursue physics as a major from his high school physics teacher, a Valpo alumnus. After graduation, Billy is headed to Laughlin Air Force Base, TX to attend Undergraduate Pilot Training.

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