Generating a 'Clean' pi^0 Spectrum in STAR

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The STAR detector at Brookhaven National Laboratory's Relativistic Heavy Ion Collider uses polarized proton collisions to investigate the origin of the proton spin, using measurements such as neutral pion (π^0) asymmetries. STAR's Endcap Electromagnetic Calorimeter (EEMC) is especially useful for detecting photons from π^0 decays at forward-angle scattering from ≈15 to ≈40 degrees above the beam direction. We identify π^0's by constructing invariant mass spectra from these photons. Large background contributions are present in these spectra and distort the true value of the π^0 invariant mass. By applying constraints (cuts) on parameters such as the opening angle of the photons in the reconstructed pair, decay vertex position, photon energy, and energy asymmetry, I have been able to produce a 'clean' π^0 spectrum with little background using the data from 2006. In the future, a 'clean' π^0 invariant mass spectrum can provide an avenue to calibrate the EEMC against the known pion mass. This method combined with our current calibration methodologies could improve understanding of the EEMC response, critical to our ability to investigate π^0 spin asymmetries. The results, along with a comparison to simulated Monte Carlo data, will be presented.

Information about the Author:
Billy Pochron is a senior physics major from New Lenox, Illinois. His summer research coincides with his current work on neutral pion asymmetries. Outside his work, Billy is anticipating being commissioned as a second lieutenant in the Air Force and will be stationed at Laughlin Air Force Base, Texas for pilot training.

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