Contribution ID: **17** Type: **not specified**

Research of Neutral Pion Reconstruction with Forward Meson Spectrometer at STAR/RHIC

Tuesday 22 May 2018 14:20 (20 minutes)

The forward meson spectrometer, FMS, is the most forward electromagnetic calorimeter at the STAR detector at RHIC, covering rapidity from 2.5 to 4.1. It is an electromagnetic calorimeter comprised of 1254 lead-glass cells of two different types in content and size. The FMS was built primarily to unravel the novel spin effects seen in transversely polarized proton collisions. These effects relate to the spin-orbit correlation of the partons in the proton to the spin of the proton, which is a consequence of the confined motion of partons in nucleons. The reconstruction of neutral pion in the FMS is essential to such purpose. The gain calibration of the FMS is solely based on the reconstruction of the mass of neutral pions at a fixed energy since there is no tracker or hadronic calorimeter around, which poses the complication that the calibration gets intertwined with the reconstruction algorithm. Also, in order to cover the kinematic region of interest, the FMS needs to measure pions energies as high as 80 GeV at center-of-mass enegies of 200 and 500 GeV. It was found that there was a strong correlation between the reconstructed neutral pion mass and its energy. It is due to the combination of biases in the photon finding, namely the energy and the opening angle of the decayed photons. The bias of the energy scale due to non-linear response of the lead glass was verified in detailed simulations of the light attenuation and a correction function could be established. The fitting of the electromagnetic shower shape was modified to include non-zero incident angles and non-zero vertex position. The reconstruction algorithm was optimized for clusters with two showers, especially when the separation of the two photons nears the physical limit in terms of the cell sizes. This talk will present details of all these improvements and their impact on the reconstruction of neutral pion with the FMS.

Secondary topics

Applications

Primary topic

Simulation and algorithms

Primary authors: ZHU, Zhanwen (Shandong University/ Brookhaven national Lab); Dr ASCHENAUER, Elke-Caroline (Brookhaven National Lab)

Presenter: ZHU, Zhanwen (Shandong University/ Brookhaven national Lab)

Session Classification: Session 7