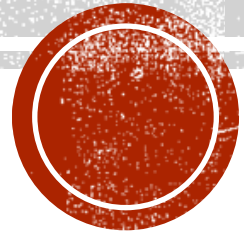
bHCAL Meeting – Neutron Calibration Update



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OVERVIEW

- Background studies status
  - Calibrations with DIS events with and without background

BACKGROUND OVERVIEW

- Using recommended central DIS production
  - 26.02.0, DIS, NC, $10\text{x}100\ \text{GeV}^2$, with and without background

- Efficiency vs. E (p) and η
  - First version implemented
  - Neutrons, protons, π^+

- Spatial resolution
  - First version implemented
  - Neutrons, protons, π^+

- Energy resolution vs. E and η
  - Now in progress
  - No results for now, one pass of DIS without background takes time, possibly due to high traffic at BNL EIC nodes (5+ hours)

CALIBRATION METHOD

- Calibration done in bins of neutron MC momentum:
  - $p_{n,1} = (1.0 \pm 0.1)\ \mathrm{GeV}/c, p_{n,2} = (1.5 \pm 0.1)\ \mathrm{GeV}/c, p_{n,3} = (2.0 \pm 0.1)\ \mathrm{GeV}/c$
  - Momentum range limited only up to $2\ \mathrm{GeV}/c$ due to low statistics of background sample
  - $E_{par,MC}$ for calibration taken as mean momentum of in given bin

- Method 2
  - $E_{calib} = A(E_{EMCAL} + BE_{bHCAL})$
  - Plot $(E_{EMCAL} + BE_{bHCAL})/E_{par,MC}$
    - First find B for which the distribution above has the smallest σ/μ
    - A is set as 1/mean of the distribution with optimal B

- Only initial setup, will be likely optimized:
  - Bin width and exact position
  - New calibration method from sPHENIX, once tested on single particle simulations

SUMMARY AND OUTLOOK

- Started setting up calibration framework for DIS events
  - Same calibration procedure as for single particle simulations
  - Using narrow bins in MC particle energy instead of discrete particle energies
    - Only up to $2\ \mathrm{GeV}/c$ due to limited momentum range due to low statistics in the background sample

- Outlook:
  - Will optimize workflow for limited computing resources to speed up turn-around
  - Implement sPHENIX calibration procedure
    - First for single particles, then for DIS
  - Optimization of DIS framework
    - Bin widths and positions
  - Can implement for charged hadrons
    - Full framework can use RC information only

THANK YOU FOR ATTENTION