BigBite Analysis

Outlier event counts, event distribution and distribution gaps

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Outline



2 Event Distributions At 4.7 GeV

3 Distribution Gaps

- A_1, A_2 Resonance Comparison
- 5 What's Next

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Energy vs Momentum Distributions

Positive Polarity: Positrons



Figure: Energy vs momentum for positrons with BigBite in positive polarity. Dashed line is E=p.

Negative Polarity: Electrons



Figure: Energy vs momentum for electrons with BigBite in positive polarity. Dashed line is E=p.

Particle Outlier Results

- Distributions have all cuts, except E/p applied
- Positive Polarity:
 - Total Events: 4144
 - Total Charge: 0.655 C
 - Total Charge Scaled Events: 6326/C
- Negative Polarity:
 - Total Events: 14959
 - Total Charge: 1.88 C
 - Total Charge Scaled Events: 7961/C
- About 20% more events in negative polarity setting
- Seems to support mis-tagged momentum

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- Last week I showed the azimuthal angle (vertical, out of plane angle) at the target
- When binned in x, there was a lot of structure
- So I took a look at the event distributions at various places



Figure: Azimuthal angle at the target for 3 different x bins

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Vertical Angle and Phase Space

- Top is distribution at the target
- Bottom is distribution of the 1st MWDC
- Left: Vertical angle vs Momentum
- Center: Vertical angle
- Right: Vertical angle vs horizontal angle



X Y Distributions at the Detectors

- Top is event distribution on mwdc
- Bottom is event distribution at Čerenkov, Pre-Shower and Shower



Gap Mapping to ADCs

- Identify gaps in x-y distributions
- Gaps appear to be caused by low pre-shower/shower ADCs
- Identify what ADCs are associated with gaps (done by cutting on individual ADCs and seeing how distributions behave)



Figure: ID'd ADC locations

Large Gap: Pre-Shower ADC[20]

- Look at ADC associated with the large gap in x-y distribution (on the RHRS side)
- Compare those around it to it as well
- Look at adjacent blocks (beam side) as well



Figure: Pre-shower ADC[20] (large gap) and adjacent ADCs for run 2107.

Large Gap: Pre-Shower ADC[20] Pedestal

- Use cosmic run 2103 to check pedestal of pre-shower ADC
- Cosmic run 2103: T1 trigger
- sh threshold -20mV , ps threshold -15mV



Figure: Cosmic run 2103 pre-shower ADC[20], pedestal value in DB drawn in red

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Smaller Gaps: Shower ADCs

- Smaller gaps look as though a shower block is not firing
- Shower ADCs associated with smaller gaps drawn below



Figure: Shower ADCs (small gaps) and adjacent ADCs for run 2107.

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Gap Summary

- Less structure in vertical angle when looking at all x-bins
- Slight shoulder in vertical angle caused by gap in event distribution
- Gap in event distribution caused by bad pre-shower ADC (obvious)
- Small shower-like gaps shower ADCs don't look too bad
- Pre-shower/shower ADC sums are in the trigger maybe bad pre-shower block cousing it?

A_1, A_2 Resonance Comparison

- Patricia: 4 data points with $3.15 < Q^2 < 3.96 \text{ GeV}^2$ in Resonance region
- d_2^n : 3.4 < Q^2 < 4.8 GeV²



Figure: A_1 and A_2 on ³He comparison at 4.7 GeV

- Continue work on understanding positrons
- Look at Dave's e+/e- ratio
- Start thinking what to show at JLab collaboration meeting