BigBite Analysis

Outlier event counts, event distribution and distribution gaps

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Outline

Energy vs Momentum Distributions

Positive Polarity: Positrons

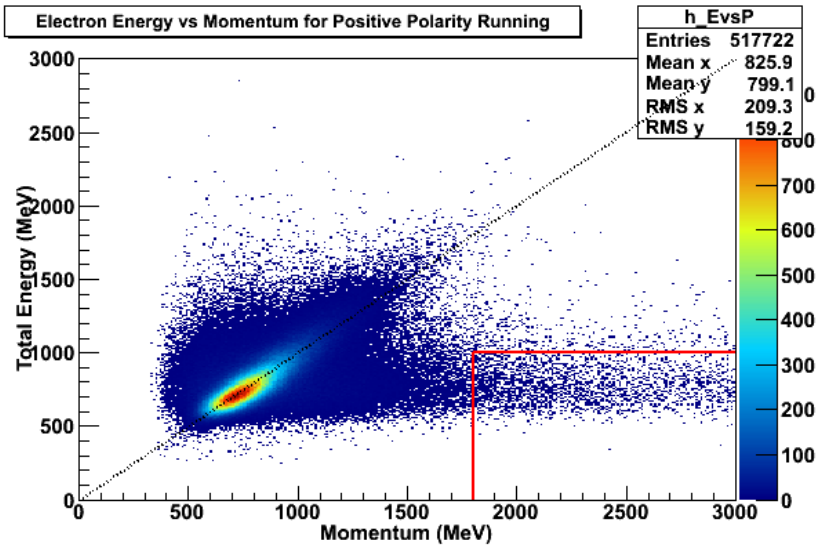


Figure: Energy vs momentum for positrons with BigBite in positive polarity. Dashed line is E=p.

Negative Polarity: Electrons

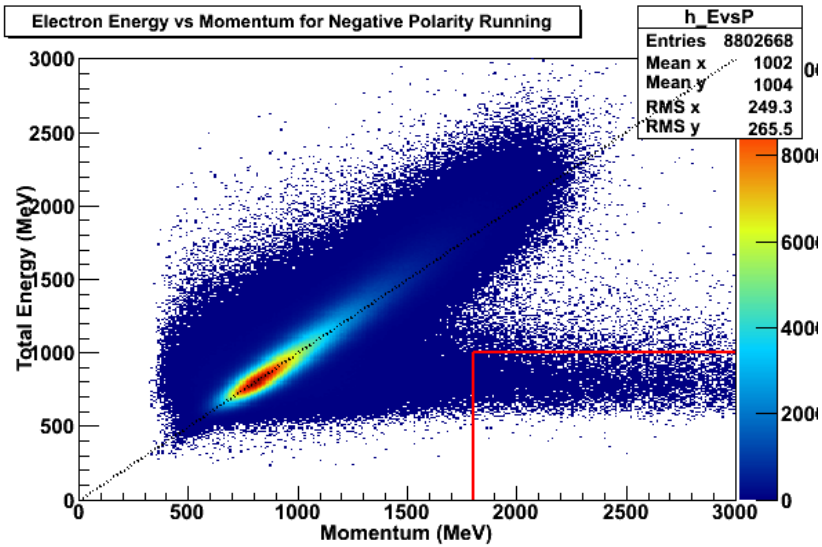


Figure: Energy vs momentum for electrons with BigBite in positive polarity. Dashed line is E=p.

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

- 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

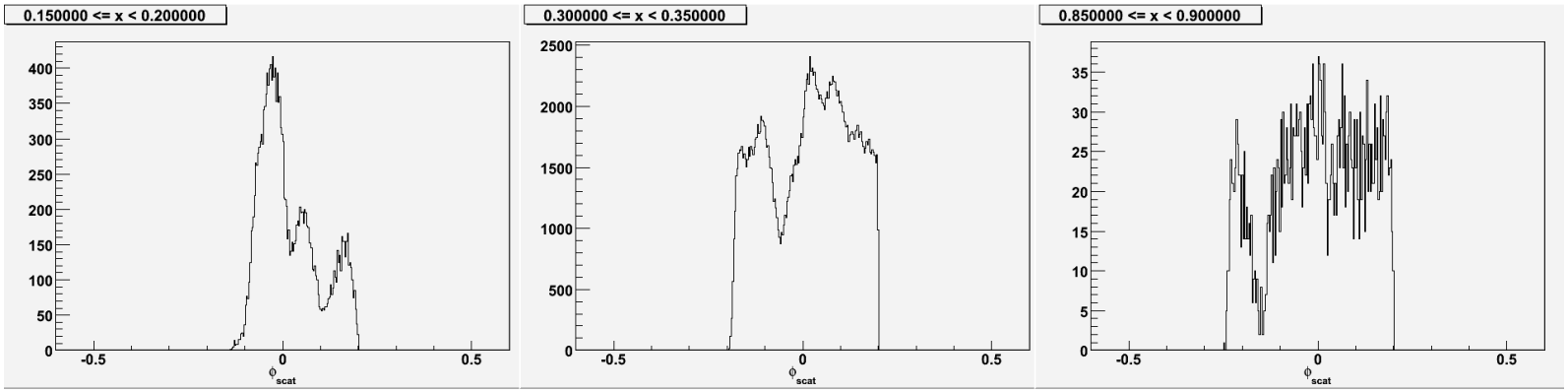
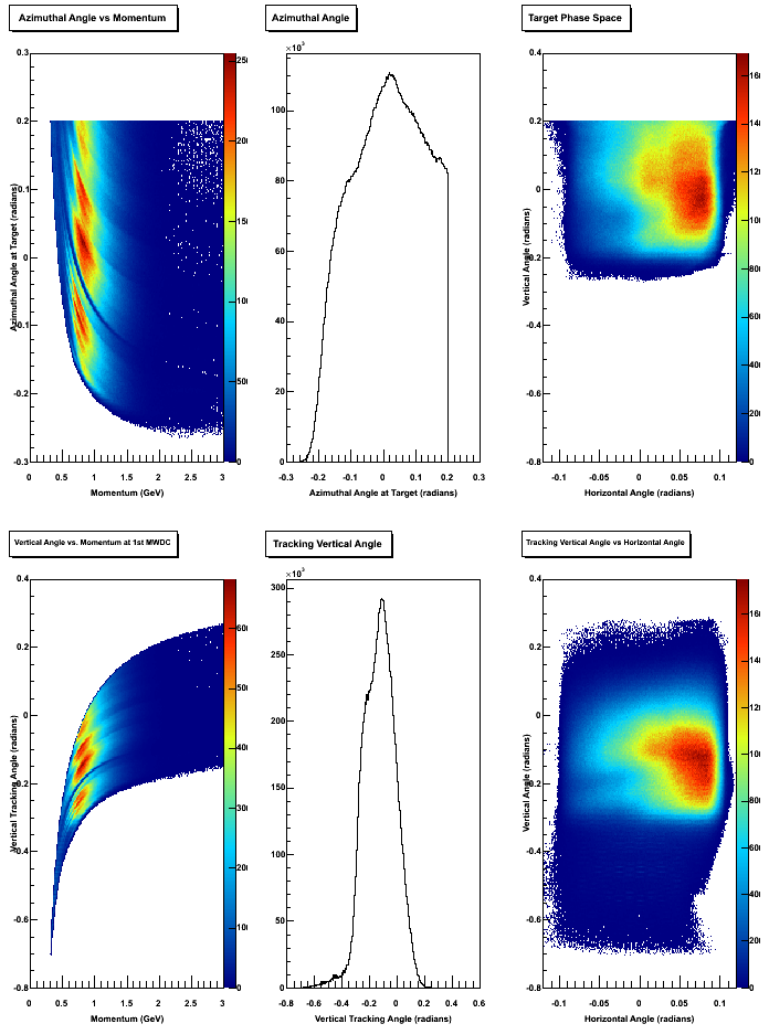


Figure: Azimuthal angle at the target for 3 different x bins

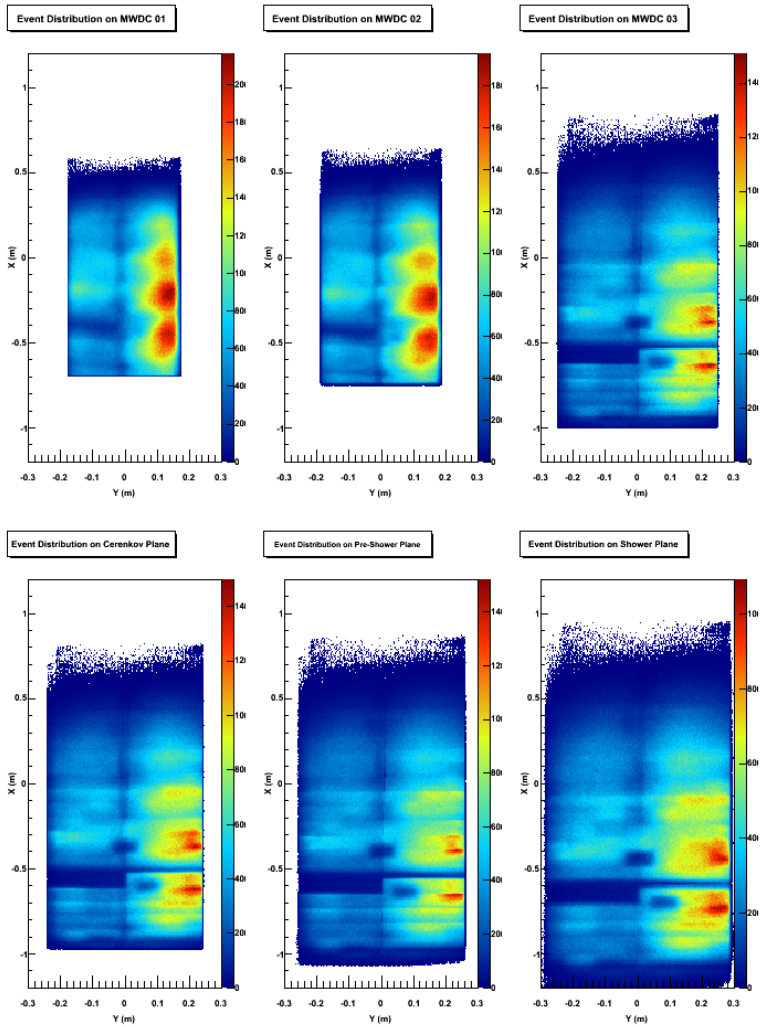
Vertical Angle and Phase Space

- 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)

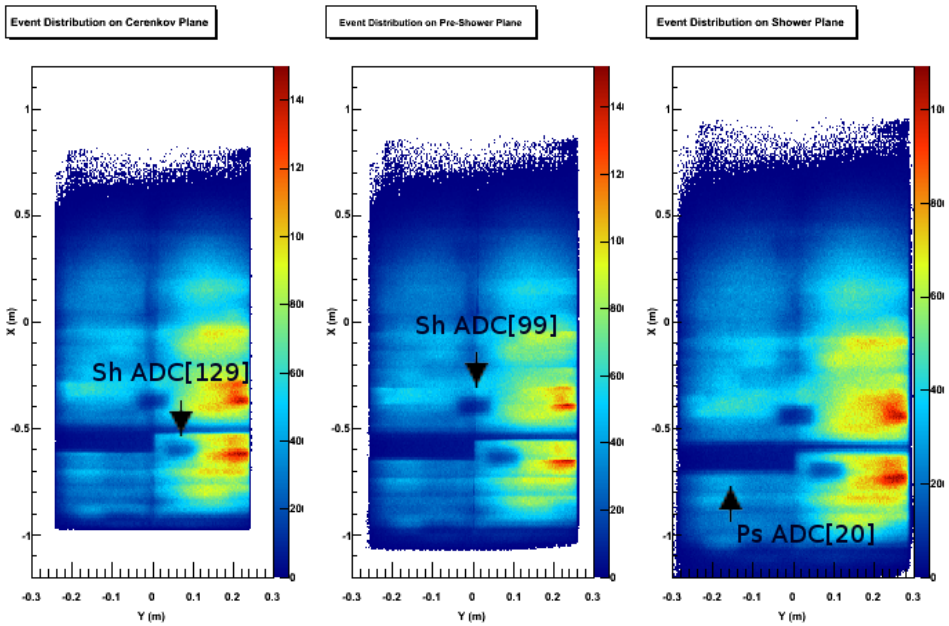


Figure: ID'd ADC locations

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

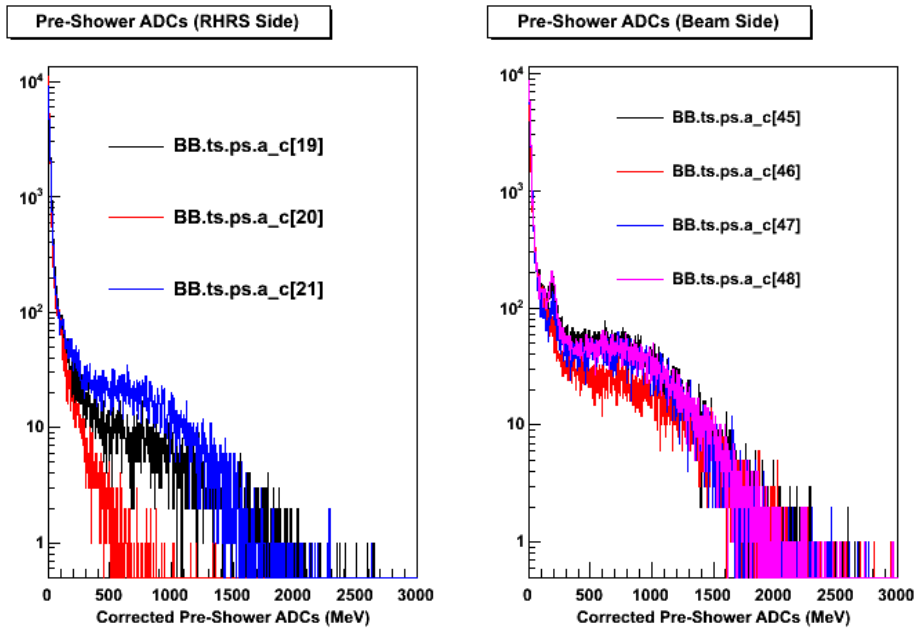


Figure: Pre-shower ADC[20] (large gap) and adjacent ADCs for run 2107.

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

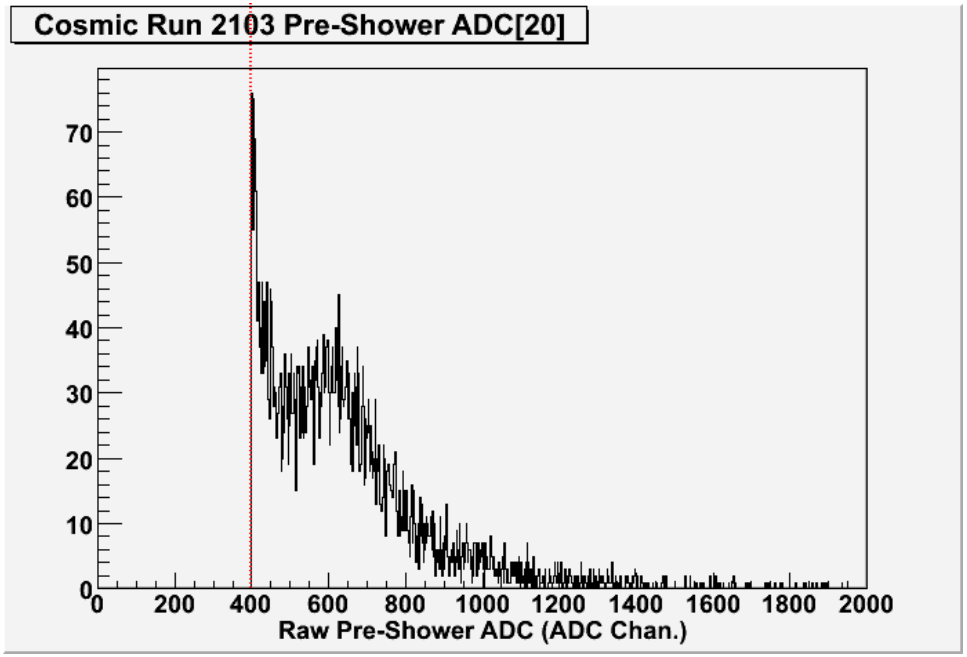


Figure: Cosmic run 2103 pre-shower ADC[20], pedestal value in DB drawn in red

Smaller Gaps: Shower ADCs

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

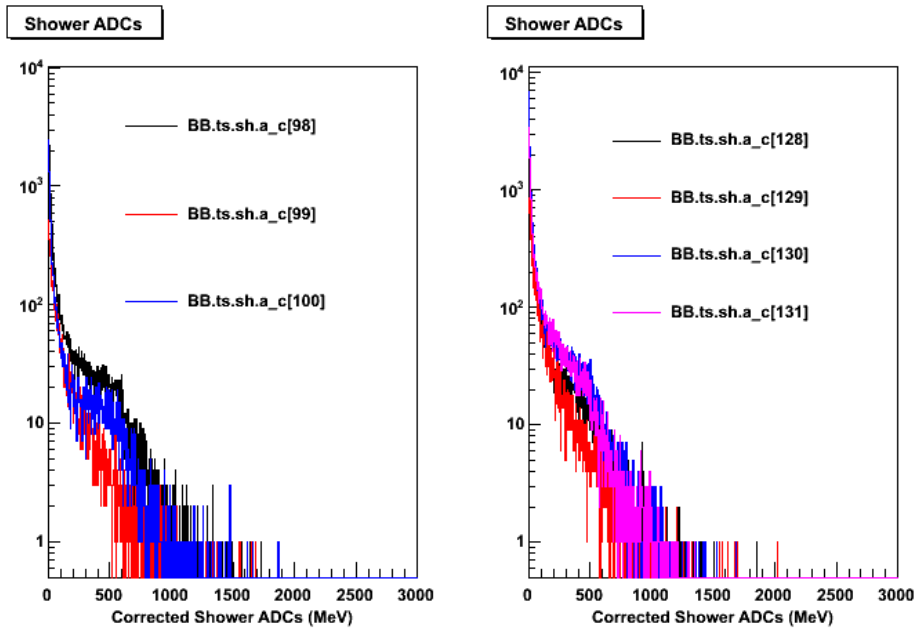


Figure: Shower ADCs (small gaps) and adjacent ADCs for run 2107.

A_1,A_2 Resonance Comparison

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

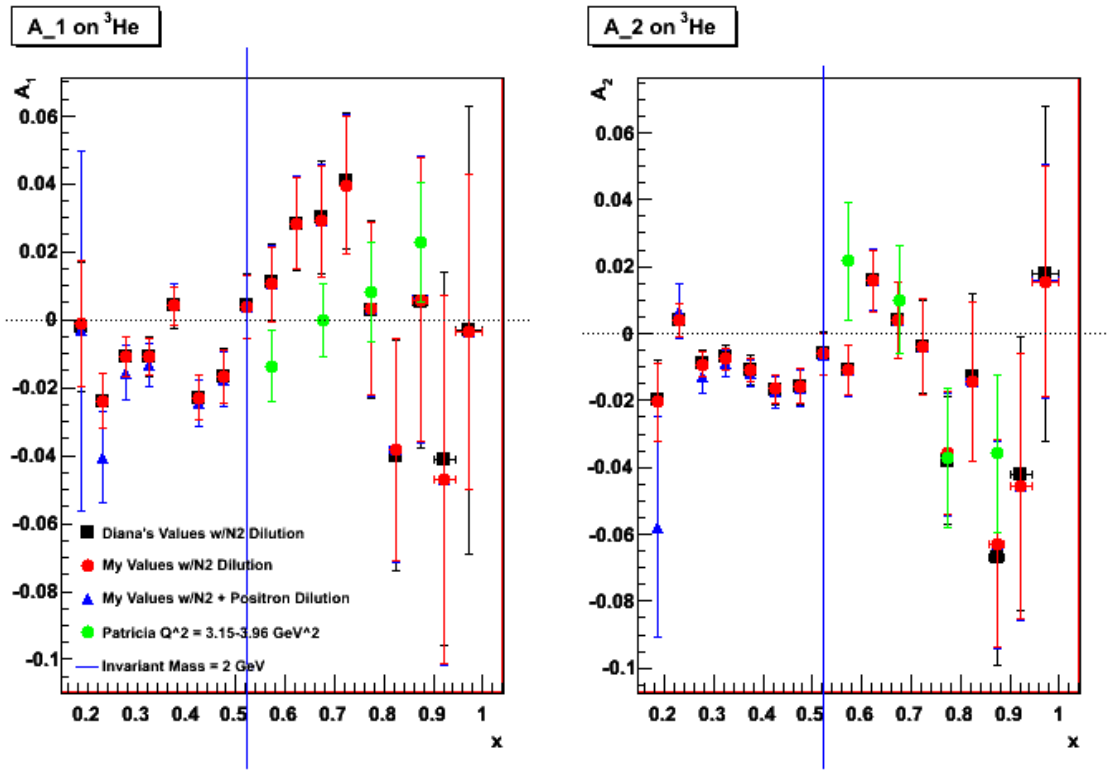


Figure: A_1 and A_2 on ^{3}He comparison at 4.7 GeV

Summary

- Charge normalized counts of outlying events in negative and positive polarity runs, disagree by $\sim$20%
- 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)
- Smaller gaps appear to be caused by bad shower ADCs (lower energy, but not as obvious as pre-shower case)
- Don't think we can fix gap, pre-shower/shower ADCs are in trigger

What's Next...

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