

# BigBite Analysis

Outlier event counts, event distribution and distribution gaps

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05/26/2011

# Outline

- 1 Outlier Particles
- 2 Event Distributions At 4.7 GeV
- 3 Distribution Gaps
- 4  $A_1, A_2$  Resonance Comparison
- 5 What's Next

# Energy vs Momentum Distributions

## Positive Polarity: Positrons

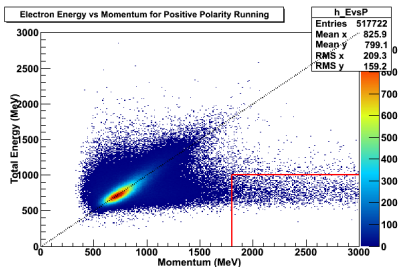


Figure: Energy vs momentum for **positrons** with BigBite in **positive polarity**. Dashed line is  $E=p$ .

## Negative Polarity: Electrons

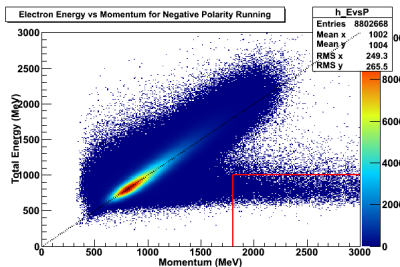


Figure: Energy vs momentum for **electrons** with BigBite in **positive polarity**. Dashed line is  $E=p$ .

# 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

- 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

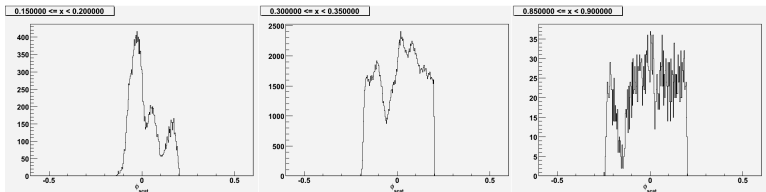
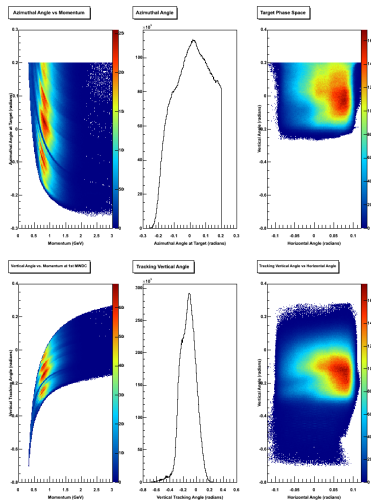


Figure: Azimuthal angle at the target for 3 different  $x$  bins

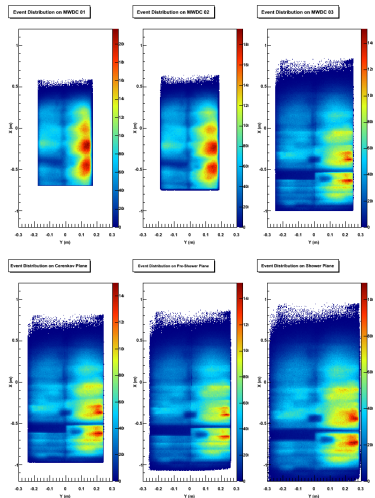
# Vertical Angle and Phase Space

- 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)

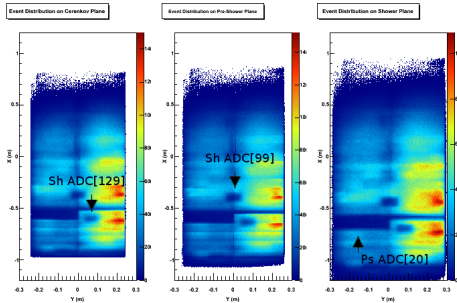


Figure: ID'd ADC locations



# 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

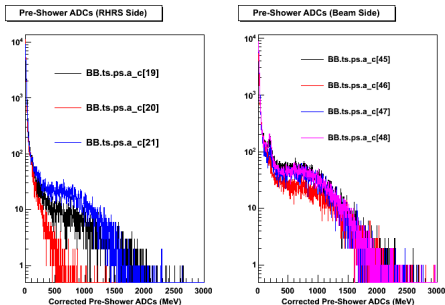


Figure: Pre-shower ADC[20] (large gap) and adjacent ADCs for run 2107.

# 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

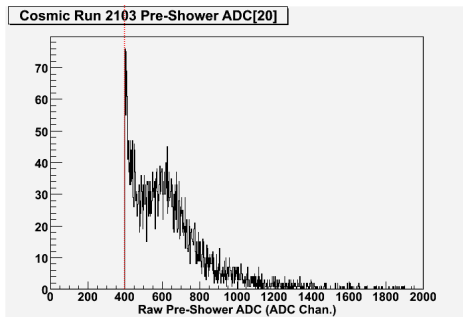


Figure: Cosmic run 2103 pre-shower ADC[20], pedestal value in DB drawn in red

# Smaller Gaps: Shower ADCs

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

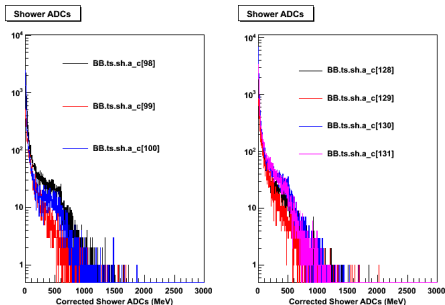


Figure: Shower ADCs (small gaps) and adjacent ADCs for run 2107.

# 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)
- **Shower ADCs** of smaller gaps **don't** look too bad
- Pre-shower/shower **ADC sums** are in the trigger maybe bad pre-shower block causing it?

# A<sub>1</sub>, A<sub>2</sub> Resonance Comparison

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

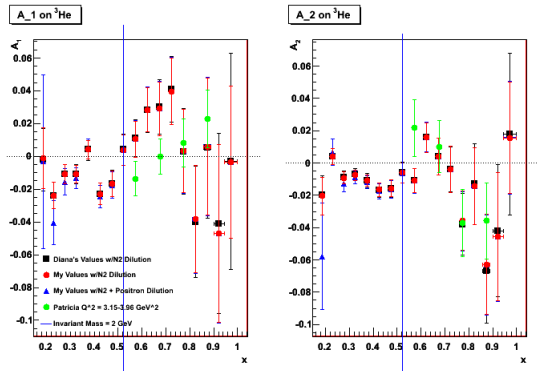


Figure: A<sub>1</sub> and A<sub>2</sub> on <sup>3</sup>He comparison at 4.7 GeV

# What's Next...

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