BigBite Analysis

Misc. event ratios and 5-Pass Mom. Stability

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Outline

What Are Misc. Events

- Misc. events are events that show up at low energy and high momentum
- Misc. events energy and momentum not correlated

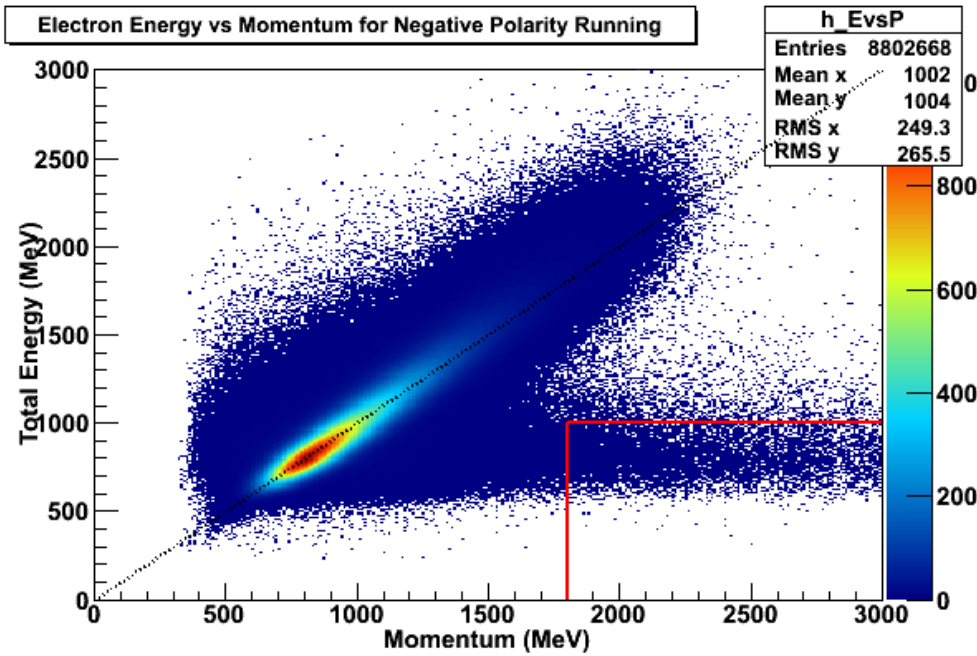

Figure: Energy vs reconstructed momentum

Where Are Misc. Events

- Cuts:
  - z-vertex, pre-shower, charge, valid optics
  - Energy < 1GeV
  - Momentum > 2GeV
- Misc. events dominate top region of the detector on the small angle side

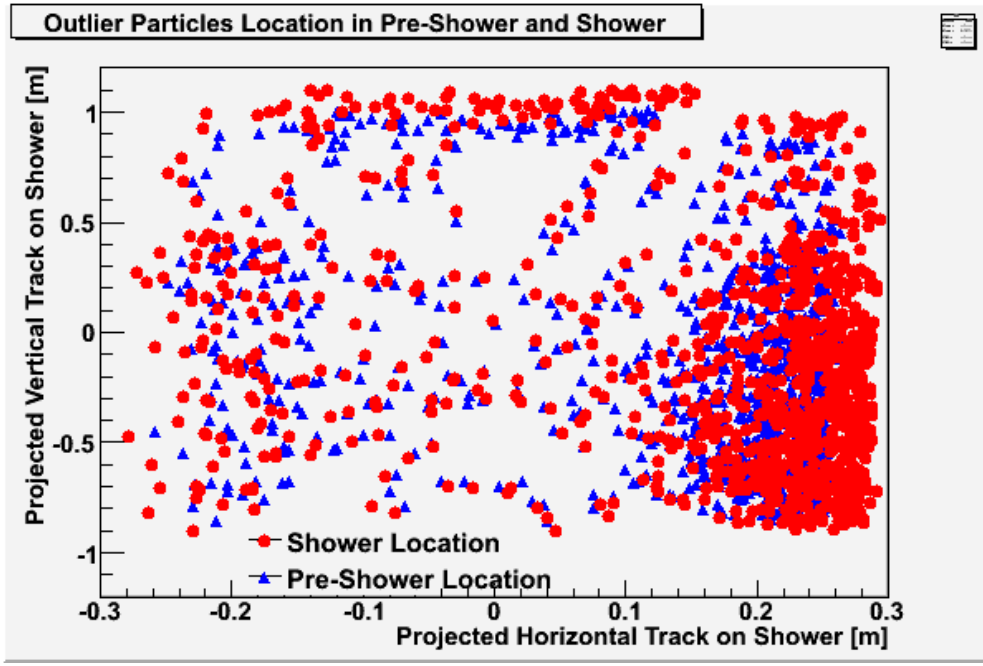

Figure: Tracks for misc. events projected onto the shower (red points) and the pre-shower (blue points)

Shower Misc/Inelastic Event Ratios

- Cuts:
  - 4-Pass Production Cuts except E/p
  - Misc: E<1.2GeV, E/p < 0.7
  - Inelastic: E>1.2GeV, 4-pass E/p cut
- Misc./Inelastic events = 0.0393 $\pm$ 0.0007

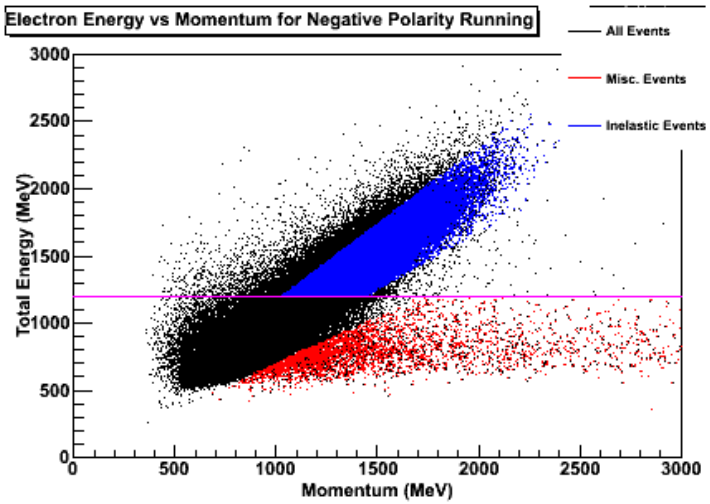

Figure: Tracks for misc. events projected onto the shower (red points) and the pre-shower (blue points)

Čerenkov Misc/Inelastic Event Ratios

- Looked at the misc/inelastic ratio for each Čerenkov ADC
- Cuts:
  - 4-Pass Production Cuts except E/p and Total Čerenkov cuts
  - CerTDC[pmt] && CerMir[pmt]
  - Misc: E<1.2GeV, E/p $<$ 0.7
  - Inelastic: E>1.2GeV, 4-pass E/p cut

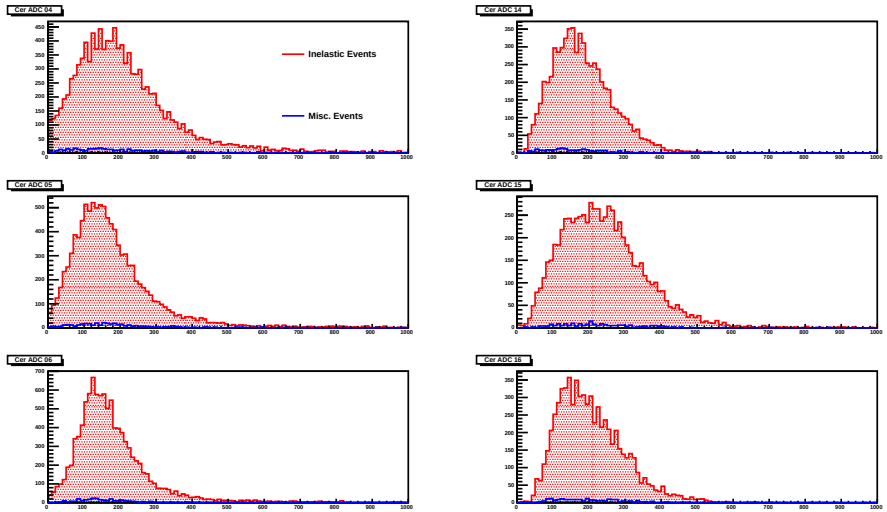

Figure: Tracks for misc. events projected onto the shower (red points) and the pre-shower (blue points)

Čerenkov ADC Misc/Inelastic Event Ratios:Results

ADC	Misc/Inelastic	ADC	Misc/Inelastic
01	0.060 ± 0.007	11	0.013 ± 0.004
02	0.053 ± 0.003	12	0.033 ± 0.003
03	0.052 ± 0.003	13	0.037 ± 0.004
04	0.042 ± 0.002	14	0.033 ± 0.002
05	0.043 ± 0.002	15	0.030 ± 0.002
06	0.035 ± 0.002	16	0.033 ± 0.002
07	0.028 ± 0.002	17	0.047 ± 0.003
08	0.028 ± 0.003	18	0.047 ± 0.005
Average	0.038		

Positive Polarity Shower Misc/Inelastic Event Ratios

- Cuts:
  - Looked at positrons with BigBite in positive polarity
  - 4-Pass Production Cuts except E/p
  - Misc: E<1.2GeV, E/p < 0.7
  - Inelastic: E>1.2GeV, 4-pass E/p cut
- Misc./Inelastic events = 2.264 $\pm$ 0.051

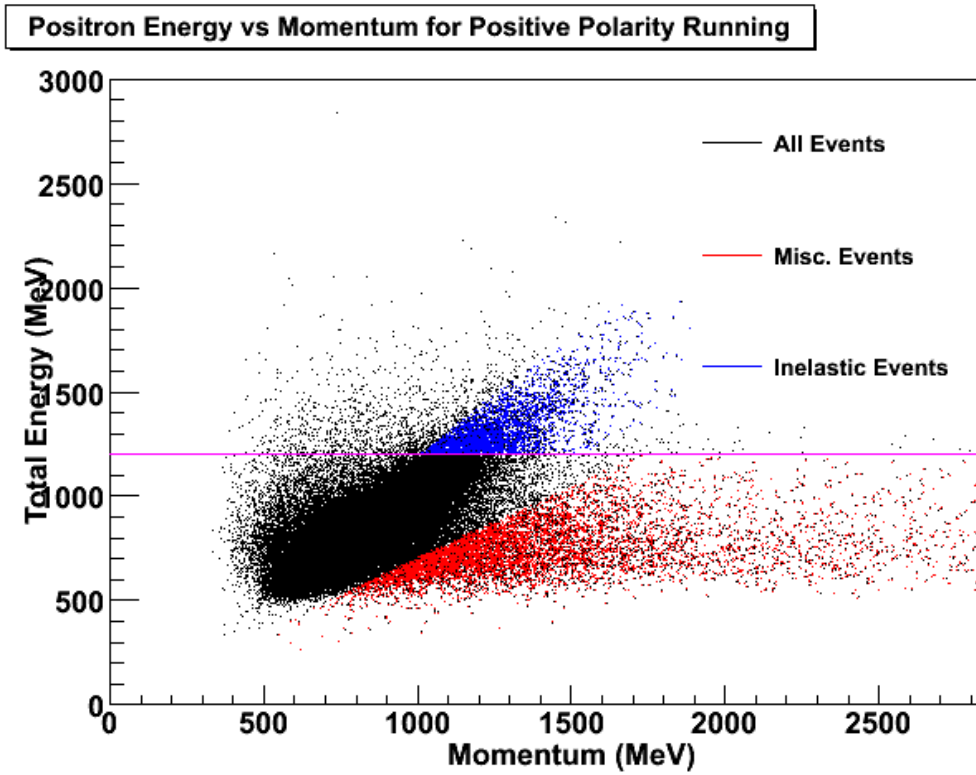

Figure: Tracks for misc. events projected onto the shower (red points) and the pre-shower (blue points)

Shower Misc/Inelastic Ratio with $1.5 < p < 2.0$ GeV

- Repeat shower ratios shown above, but look only at momentum bin
- $1.5 < p < 2.0$ GeV
- Negative Polarity Misc./Inelastic = 0.037 ± 0.001
- Positive Polarity Misc./Inelastic = 5.300 ± 0.392

5-Pass Momentum Stability (1)

- Find runs where shower HVs stayed the same, but shower thresholds changed
- Plot Momentum in Energy bin of 900 ± 50 MeV
- Runs 1479-1599, shower threshold = -120 mV
- Runs 1600-1719, shower threshold = -133 mV

5-Pass Momentum Stability (2)

$\Delta p \sim 10$ MeV ($\sim 1\%$)

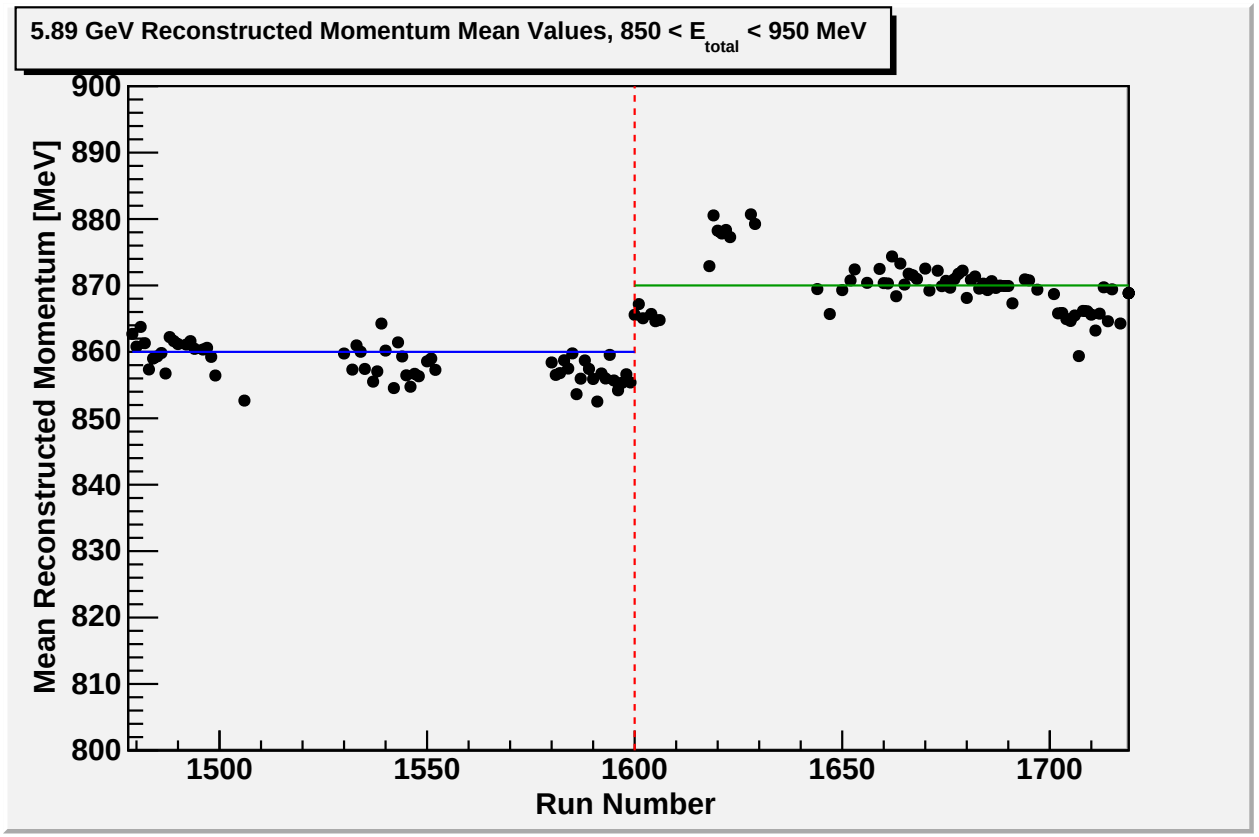

Figure: Momentum stability with energy bin of 900 $\pm$ 50 MeV. Red line marks shower threshold change. Blue line is at 860 MeV and green line is at 870 MeV.

5-Pass Momentum Stability(3)

- To see how much the mwdc calibration changes the momentum, I looked at the momentum of run 1449 before and after mwdc calibration
- MWDC values from U1 Plane
- Energy Cut of 900 $\pm$ 50 MeV

	Before Calibration	**After Calibration**
Drift-Time (ns)	88.58	85.11
Residual (μm)	319.33	286.29
Momentum (MeV)	829.74	830.82

What's Next

- Implement MWDC Calibrations into database and StartType
- Find shower HV changes and calibrate E/p and update database and StartType
- Show e+/e- ratio with live-time,pre-scale and charge corrections