

BigBite Analysis

Bad Skim ROOT Files, BigBite Positive Polarity and Momentum Bin
Shower Calibrations

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Outline

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- 2 Positive Polarity Shower Calibration
- 3 Momentum Bin 4.7 GeV Shower Calibration
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Bad Skim ROOT Files

- When a ROOT file produces a **bad entry** during the skimming process...
 - All entries after the bad entry are identical
 - All bad entries have only one track ($BB.tr.n = 1$)
 - Because all bad entries have one track, plotting variables that store multi-track hits results in a discrepancy of histogram entries between the raw and skim ROOT files

Skim ROOT File Check

- All production Skim ROOT files have been checked for bad entries.
- About 30 Skim ROOT file runs showed discrepancy from Raw ROOT files
- Bad skim ROOT files have been re-skimmed
- Re-skimmed ROOT files now agree with raw ROOT files

4.7 GeV Positive Polarity Shower Calibration

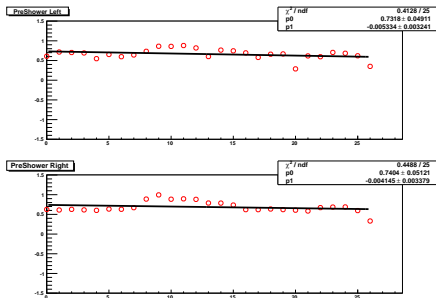


Figure: BigBite positive polarity pre-shower calibration constants.

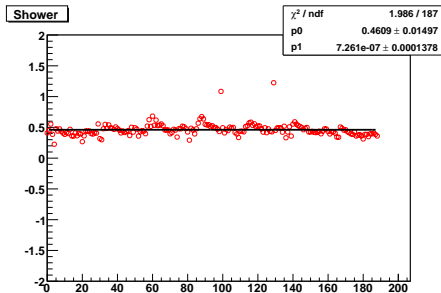


Figure: BigBite positive polarity shower calibration constants.

4.7 GeV Positive Polarity Shower Calibration

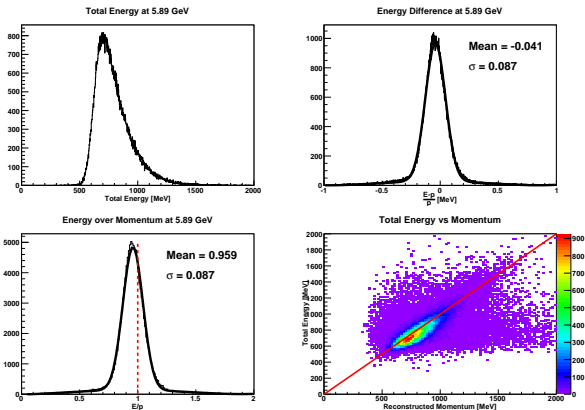


Figure: BigBite positive polarity shower calibration results. Upper left plot shows the total energy in pre-shower and shower. Upper right plot shows energy difference divided by momentum. Lower left plot shows E/p and lower right plot shows total energy vs momentum.

Shower Calibration using Momentum Bins

- To check if the shower calibration varies at different energies...
- Divided the 4.7 GeV runs into two momentum bins of 0-0.9 GeV and 0.9-2.0 GeV
- Pre-Shower/Shower calibration constants were computed for each of the two momentum bins
- Ideally both momentum bins should reproduce the same calibration constants

4.7 GeV Pre-Shower Calibration Constants

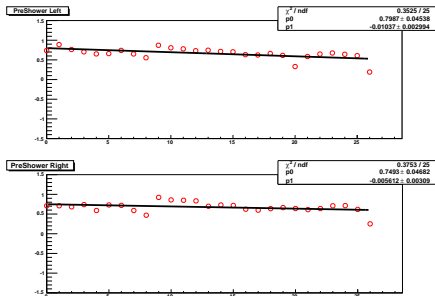
 $p < 0.9$ GeV

Figure: BigBite pre-shower calibration constants for particles with momentum less than 0.9 GeV.

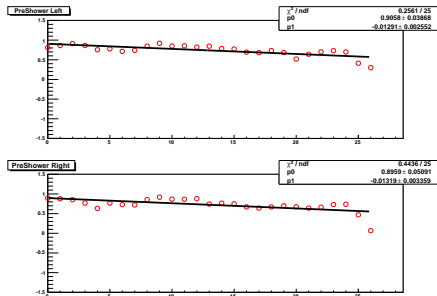
 $p > 0.9$ GeV

Figure: BigBite pre-shower calibration constants for particles with momentum greater than 0.9 GeV.

4.7 GeV Shower Calibration Constants

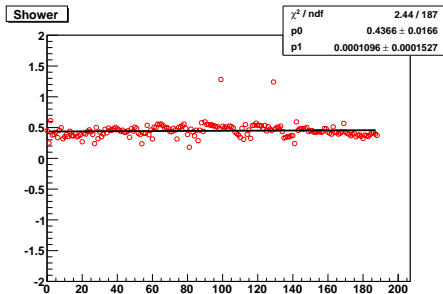
 $p < 0.9$ GeV

Figure: BigBite shower calibration constants for particles with momentum less than 0.9 GeV.

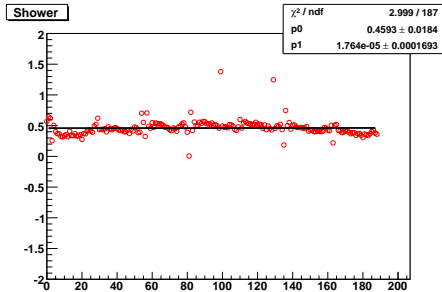
 $p > 0.9$ GeV

Figure: BigBite shower calibration constants for particles with momentum greater than 0.9 GeV.

Shower Calibration using Momentum Bins Summary

- The calibration constants in the pre-shower vary between the low and high momentum particles
- The calibration constants in the shower between the high and low momentum particles are very similar

What's Next

- Look more into in-plane angle shift
- Get systematic chamber density uncertainties
- Get EPR Polarizations

Shower/Pre-Shower Energy

4.7 GeV

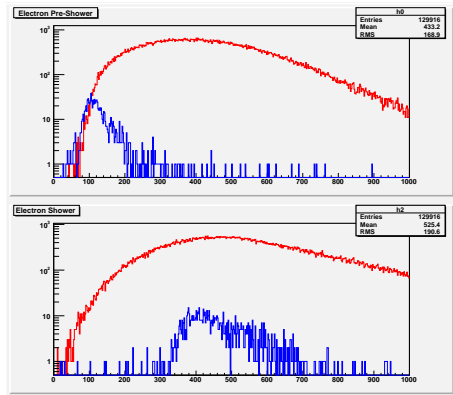


Figure: BigBite shower and pre-shower energy. The red histogram show electrons and the blue histogram shows pions.

5.9 GeV

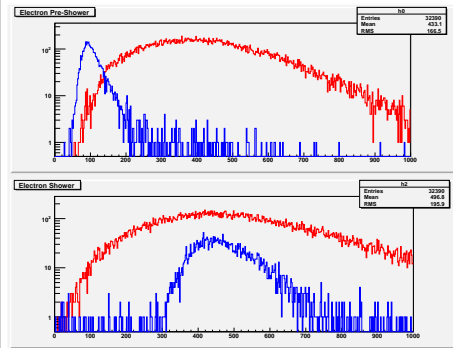


Figure: BigBite shower and pre-shower energy. The red histogram show electrons and the blue histogram shows pions.