

BigBite Analysis

BigBite e^+/e^- Ratios and Čerenkov ADC Cuts on Pre-Shower

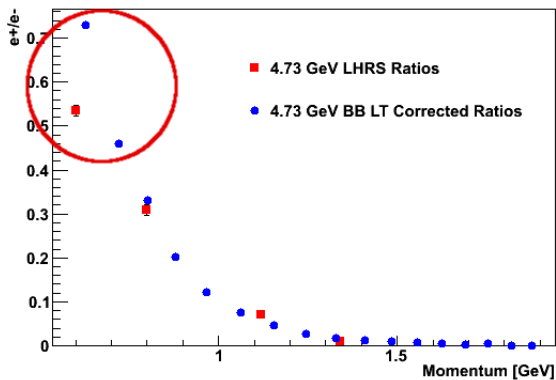
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Outline

- 1 BigBite e^+/e^- Ratios
- 2 Čerenkov ADC Cut on Pre-Shower

e^+/e^- Problem4.73 GeV e^+/e^- RatiosFigure: Ratios of e^+/e^- from BigBite and LHRS at beam energy of 4.73 GeV.

e^+/e^- Ratio Study

- Most noticeable difference is Bin size
- LHRs had momentum bins size of about 36 MeV at a central momentum of 600 MeV ($\pm 3\%$ of dp/p)
- BigBite was binned in x of bin width 0.05
- Plotting the momentum in each x bin, the momentum spans about 300 MeV
- I now binned counts in 30 momentum bins from 0.5 to 1.5 GeV
- New BigBite momentum bins have a width of about 33 MeV (on order with LHRs)

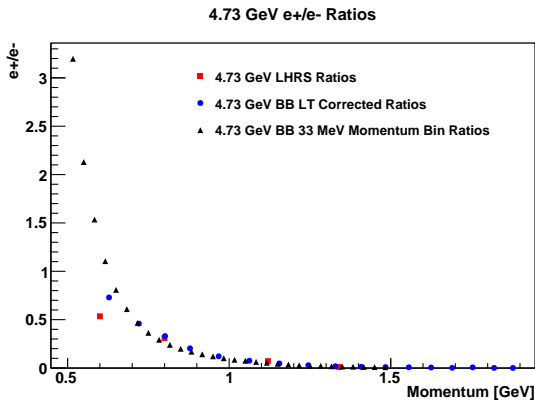
e^+/e^- 33 MeV Momentum Bins

Figure: Ratios of e^+/e^- from BigBite and LHRS at beam energy of 4.73 GeV.

e^+/e^- Summary

- Newly binned e^+/e^- ratios agree with previous BigBite ratios
- BigBite and LHRS still disagree at low momentum

Čerenkov Cuts on Pre-Shower

- Study how Čerenkov ADC cuts affects the pre-shower energy in a low momentum bin.
- Choose momentum bin of 0.6 ± 0.01 GeV
- Check Čerenkov TDC and ADC response in low momentum bin
- Apply various Čerenkov ADC cuts to the pre-shower energy and see how distribution changes

Čerenkov TDC Response

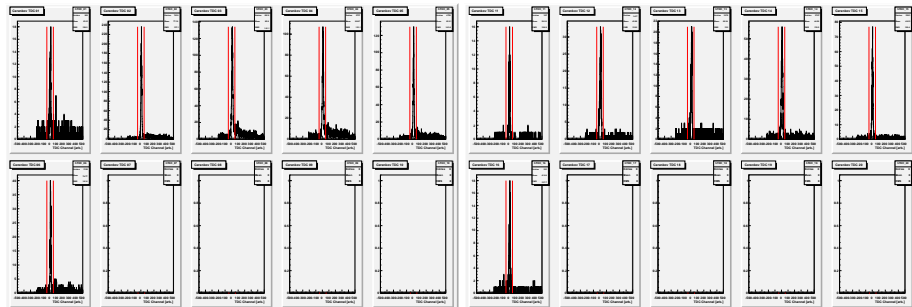


Figure: Beam line side TDCs in momentum bin of 0.6 ± 0.01 GeV. Red lines show TDC cut window

Figure: RHRS side TDCs in momentum bin of 0.6 ± 0.01 GeV. Red lines show TDC cut window

Čerenkov ADC Response

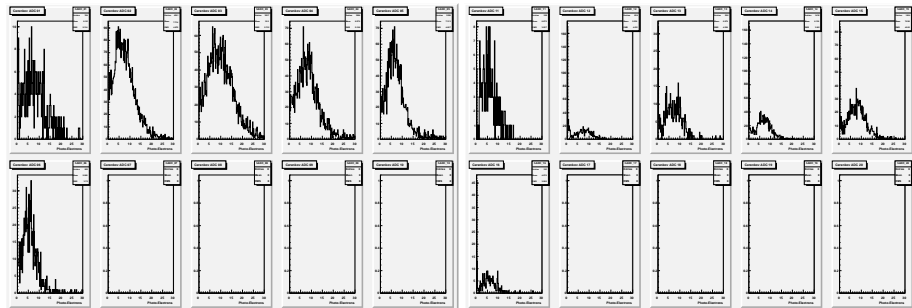


Figure: Beam line side ADCs in momentum bin of 0.6 ± 0.01 GeV.

Figure: RHRS side ADCs in momentum bin of 0.6 ± 0.01 GeV.

Forming Čerenkov Cuts

- Looked at 8 cuts on the pre-shower
- For each PMT form the cut:
 - Cuts 1-7
 - $(\text{TDC}[\text{pmt}] \ \&\& \ (\text{Mir}[\text{pmt}]) \ \&\& \ (\text{ADC}[\text{pmt}] > \text{pe}))$
 - where pmt runs from 1...20
 - pe runs from 0...6 photo-electrons
- The above 20 cuts then get ORed together to form the final Čerenkov cut
- Also looked at the Čerenkov cut with no ADC cuts:
 - Cut 8
 - $(\text{TDC}[\text{pmt}] \ \&\& \ (\text{Mir}[\text{pmt}] \ \&\& \ (\text{ADC}[\text{pmt}] > \text{pe})))$
 - where pmt runs from 1...20

Pre-Shower Energy with Čerenkov Cuts

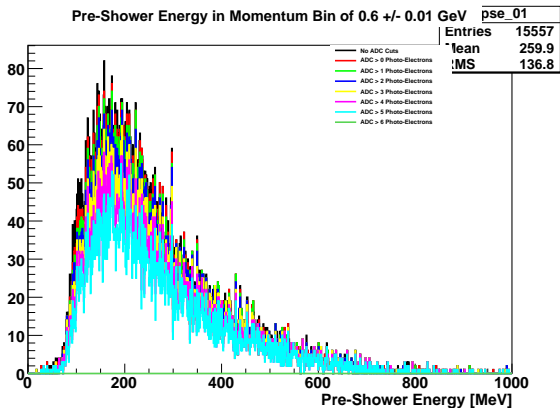


Figure: Shows the Čerenkov cuts on the pre-shower energy in momentum bin of 0.6 ± 0.01 GeV.

Čerenkov Cuts on Pre-Shower Summary

- The pion peak near 100 MeV decreases with higher Čerenkov ADC cuts
- The peak near 200 MeV also decreases with higher Čerenkov ADC Cuts (pion spill in from 100 MeV peak?)
- Pre-shower energy distribution looks the same as before Čerenkov ADC Cuts

What's Next

- Data quality checks on 2nd round replays:
 - MWDC stability
 - E/p
- Finalize TDC cuts (Pre-shower/Čerenkov)