

BigBite Analysis

4.7GeV Negative and Positive BigBite Polarity Cut Comparison

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04/21/2011

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For More Information

- These slides compare cuts from our 4.7GeV data set with BigBite in negative and positive polarity settings
- All plots shown have a cut that requires there to be at least one reconstructed track
- Other than the track cut, most plots have no other cuts applied unless specified
- For more information on the cut and why it is used see the d2n wiki page:
- https://hallaweb.jlab.org/wiki/index.php/Analysis_Tools

Beam Trips

Negative Polarity:

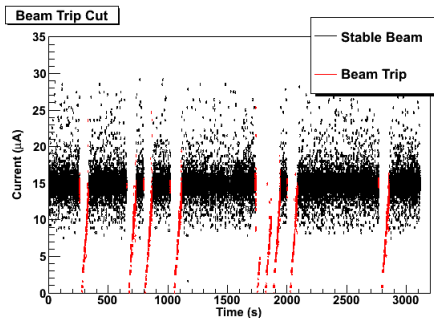


Figure: Shows the **negative** polarity beam trip cut for a particular run. Red points discarded

Positive Polarity:

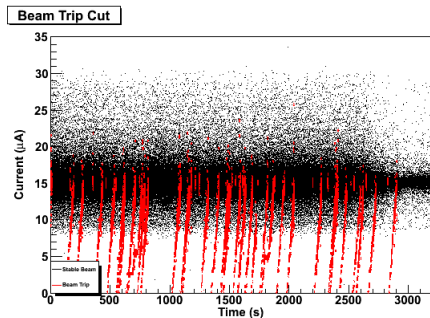


Figure: Shows the **positive** polarity beam trip cut for a particular run. Red points discarded.

Current

Negative Polarity:

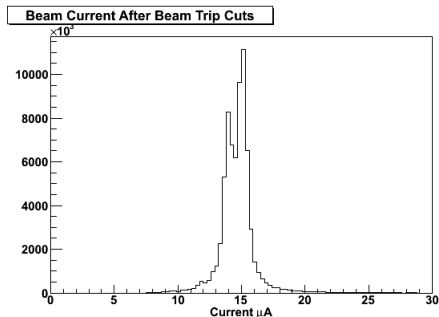


Figure: Shows the **negative** polarity current after beamtrip cut.

Positive Polarity:

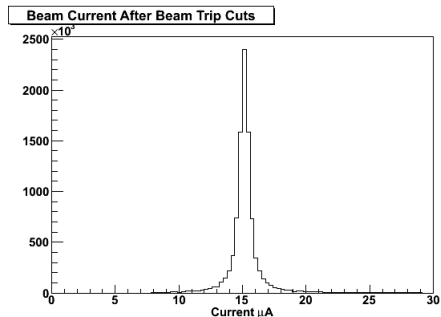


Figure: Shows the **positive** polarity current after beamtrip cut.

Beam Trips

Negative Polarity:

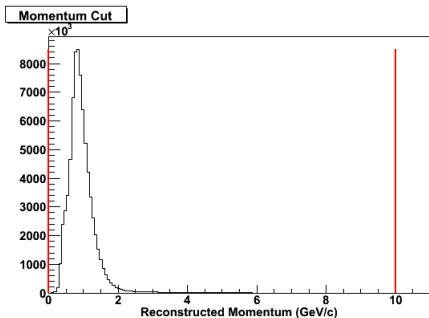


Figure: Shows the **negative** polarity reconstructed momentum. All events within the two red lines are accepted.

Positive Polarity:

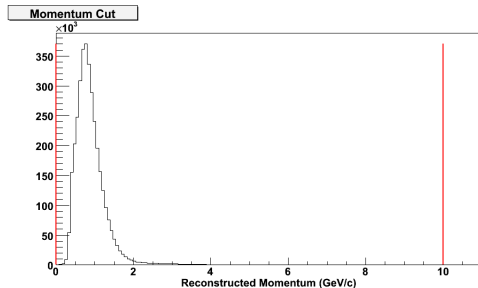


Figure: Shows the **positive** polarity reconstructed momentum. All events within the two red lines are accepted.

Shower X - Projected Track X

Negative Polarity:

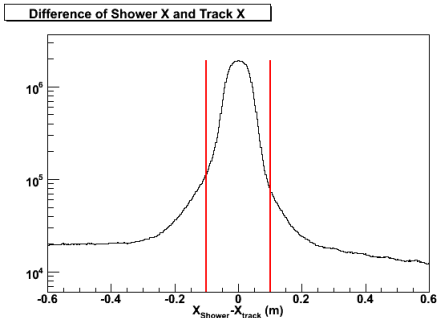


Figure: Shows the **negative** polarity difference between shower X to projected track X. All events within two red lines are accepted

Positive Polarity:

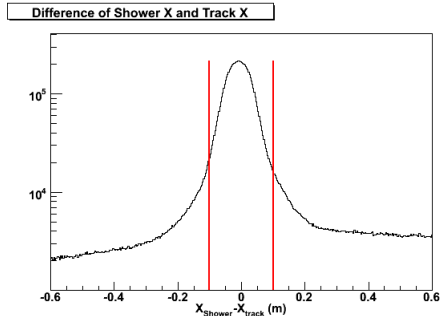


Figure: Shows the **positive** polarity difference between shower X to projected track X. All events within two red lines are accepted.

Shower Y - Projected Track Y

Negative Polarity:

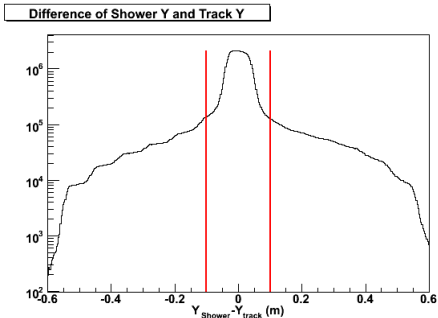


Figure: Shows the **negative** polarity difference between shower Y to projected track Y. All events within two red lines are accepted

Positive Polarity:

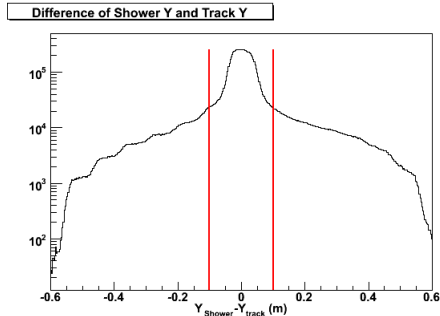


Figure: Shows the **positive** polarity difference between shower Y to projected track Y. All events within two red lines are accepted.

Projected Track X - Pre-Shower X

Negative Polarity:

Difference of Track X and Pre-Shower X Position

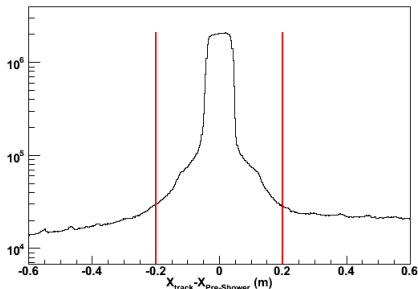


Figure: Shows the **negative** polarity difference between projected track X and pre-shower X. All events within two red lines are accepted

Positive Polarity:

Difference of Track X and Pre-Shower X Position

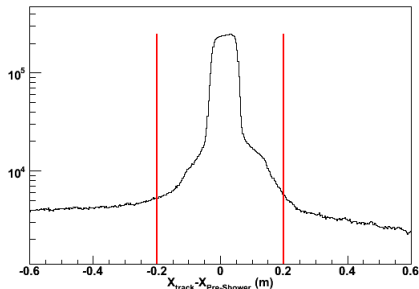


Figure: Shows the **positive** polarity difference between projected track X and pre-shower X. All events within two red lines are accepted.

Projected Track Y - Pre-Shower Y

Negative Polarity:

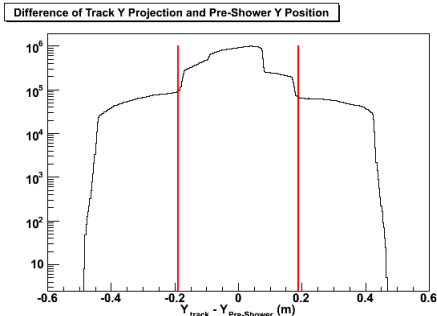


Figure: Shows the **negative** polarity difference between projected track Y and pre-shower Y. All events within two red lines are accepted

Positive Polarity:

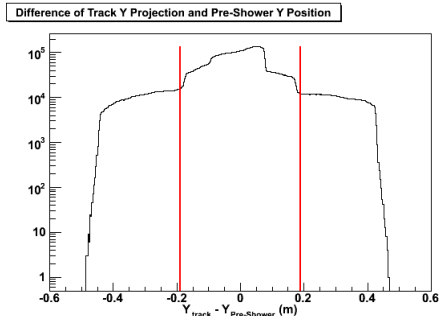


Figure: Shows the **positive** polarity difference between projected track Y and pre-shower Y. All events within two red lines are accepted.

$$\chi^2/N_{dof}$$

Negative Polarity:

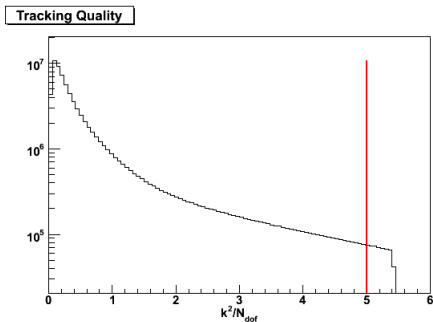


Figure: Shows the **negative** polarity tracking χ^2/N_{dof} . All events left of red line are accepted

Positive Polarity:

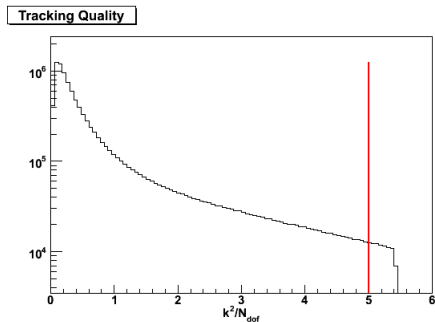


Figure: Shows the **positive** polarity tracking χ^2/N_{dof} . All events left of red line are accepted.

Z-Vertex Cut

Negative Polarity:

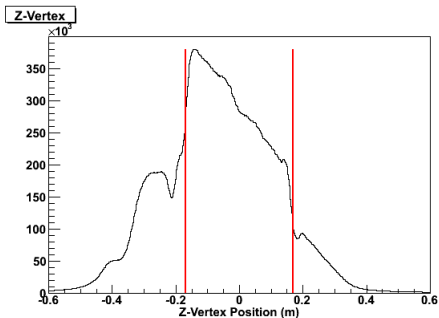


Figure: Shows the **negative** polarity z-vertex. All events within two red lines are accepted

Positive Polarity:

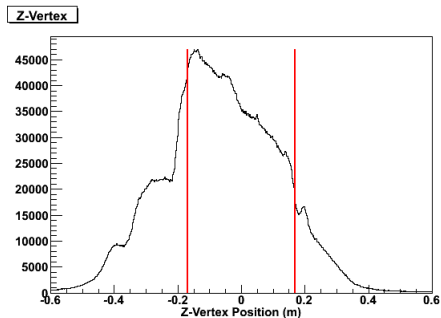


Figure: Shows the **positive** polarity z-vertex. All events within two red lines are accepted.

BigBite Fiducial and Azimuthal Angle Cut (plots have z-vertex cut applied)

Negative Polarity:

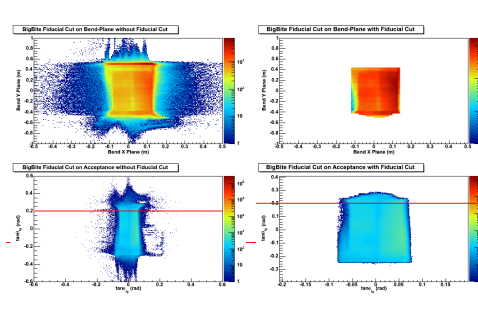


Figure: Shows the **negative** polarity BigBite vz-flag cut. Top two plots are plotted with Logz. In bottom plot cut also made on azimuthal angle (red line), all events below red line are accepted.

Positive Polarity:

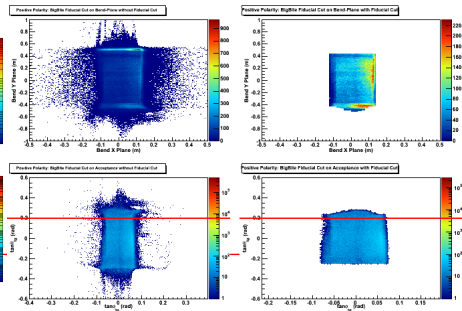


Figure: Shows the **positive** polarity BigBite vz-flag cut. In bottom plot cut also made on azimuthal angle (red line), all events below red line are accepted.

Rescattering Cut (plots have all cut except E/p. Also have $E < 1\text{GeV}$ and $p > 1.5\text{GeV}$)

Negative Polarity:

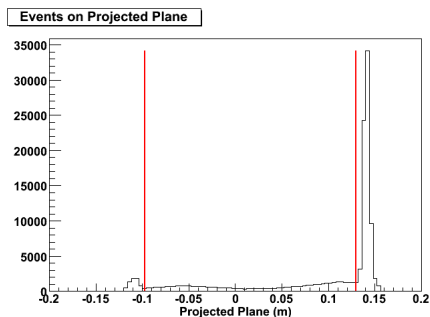


Figure: Shows the **negative** polarity BigBite re-scattering cut. All events in between the two red lines are accepted.

Positive Polarity:

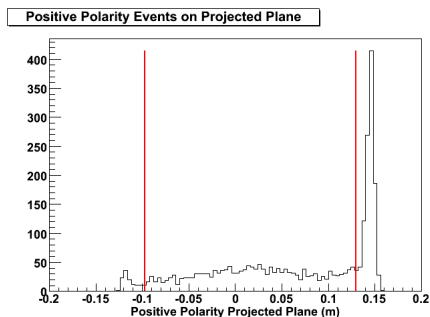


Figure: Shows the **positive** polarity BigBite re-scattering cut. All events in between the two red lines are accepted.

Charge ID Cuts

Negative Polarity:

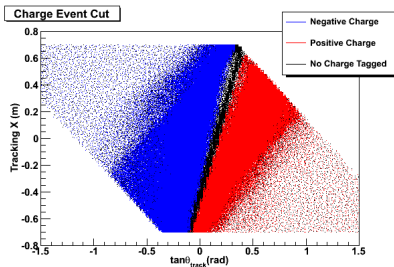


Figure: Shows the **negative** polarity BigBite charge separation. Blue particles (electrons) are the ones bent up into BigBite.

Positive Polarity:

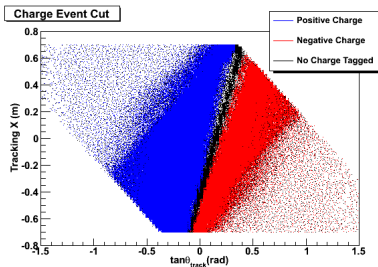


Figure: Shows the **positive** polarity BigBite charge separation. Blue particles (positrons) are the ones bent up into BigBite.

Charge ID Cuts

Negative Polarity:

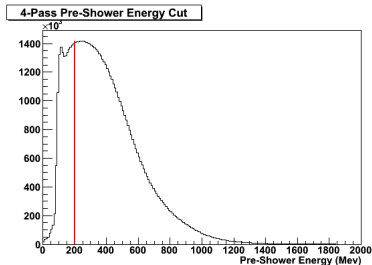


Figure: Shows the **negative** polarity BigBite per-shower energy. All events to the right of the red line are accepted.

Positive Polarity:

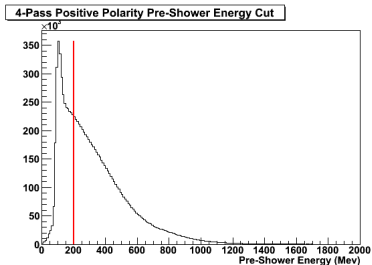


Figure: Shows the **positive** polarity BigBite per-shower energy. All events to the right of the red line are accepted.

E/p

Negative Polarity:

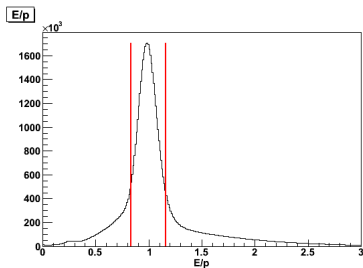


Figure: Shows the **negative** polarity BigBite E/p. All events in-between the red lines are accepted.

Positive Polarity:

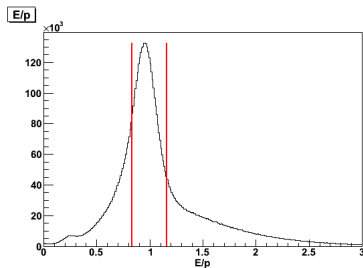


Figure: Shows the **positive** polarity BigBite E/p. All events in-between the red lines are accepted.

Beam-Side (Small Angle) Čerenkov TDC Cuts

Negative Polarity:

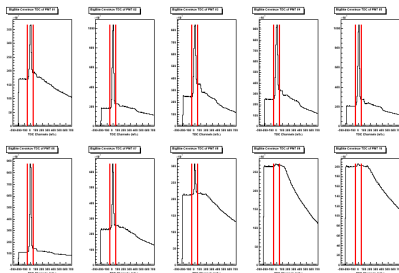


Figure: Shows the **negative** polarity BigBite beam side TDCs. All events in-between the red lines are accepted.

Positive Polarity:

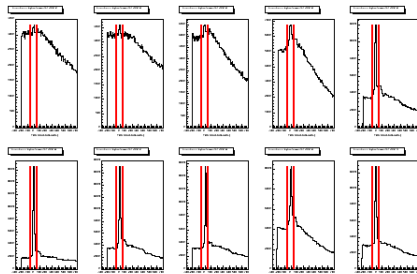


Figure: Shows the **positive** polarity BigBite beam side TDCs. All events in-between the red lines are accepted.

RHRS-Side (Large Angle) Čerenkov TDC Cuts

Negative Polarity:

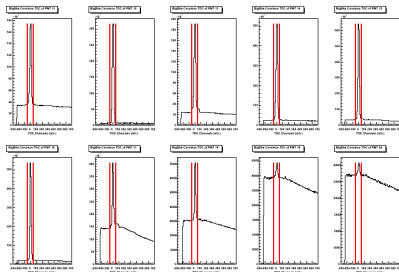


Figure: Shows the **negative** polarity BigBite RHRS side TDCs. All events in-between the red lines are accepted.

Positive Polarity:

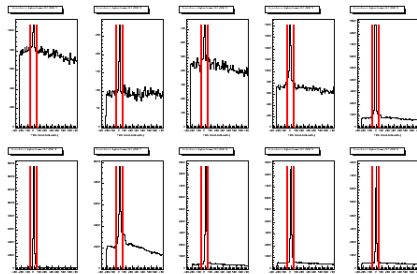


Figure: Shows the **positive** polarity BigBite RHRS side TDCs. All events in-between the red lines are accepted.

Summary

- Negative and Positive polarity cuts seem to agree well with each other.
- pre-shower energy and E/p differs the most between the two polarity settings
 - Pre-shower energy cut removes low lying energy particles.
 - May need to alter E/p cut for positive polarity?
- Still need to add in the Čerenkov mirror cuts.