

Pion Fitting Issue

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Outline

1 Pion Distribution Fitting

- Fitting Procedure
- Issues

2 To-Do

Fitting Procedure

- Fit **pion** and **electron** distributions in preshower energy
- **Pions**: Fit with convoluted **Landau** and **Gauss** functions
- **Electrons**: Fit with **Gauss** function
- Presented are fits done on **GEANT4** with:
 - **No PID** cuts (cuts used in E06-014 to select "good" pions or electrons)
 - **No trigger** cuts (cuts used to mimic E06-014 trigger)

Preshower Energy

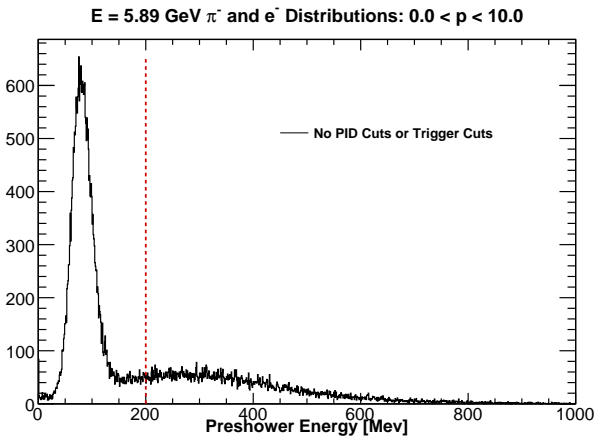


Figure: Preshower energy from GEANT4 simulation with no trigger or PID cuts applied.

Preshower Energy

Initial Pion Fit

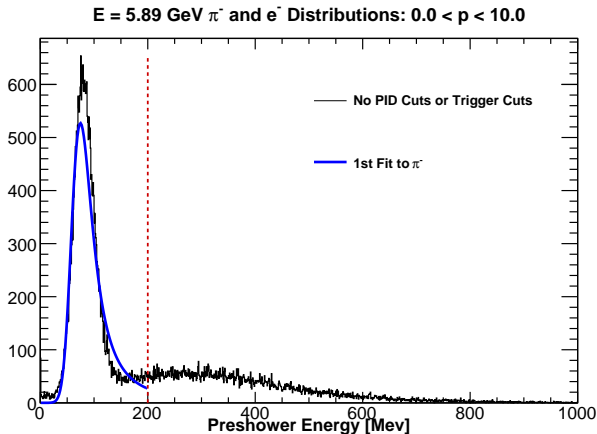


Figure: Initial fit to the pion distribution.

Preshower Energy

Initial Electron Fit

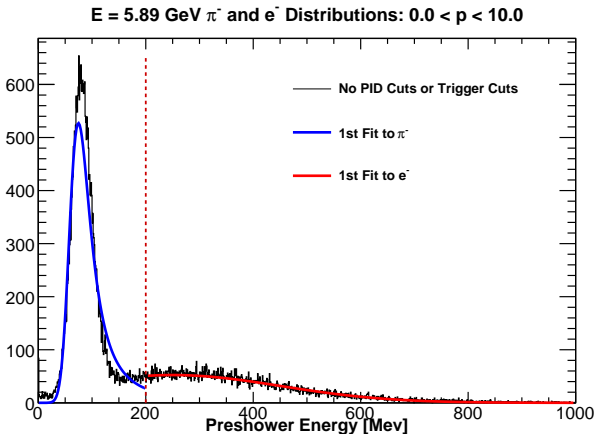


Figure: Initial fit to the electron distribution.

Preshower Energy

Total Preshower Fit

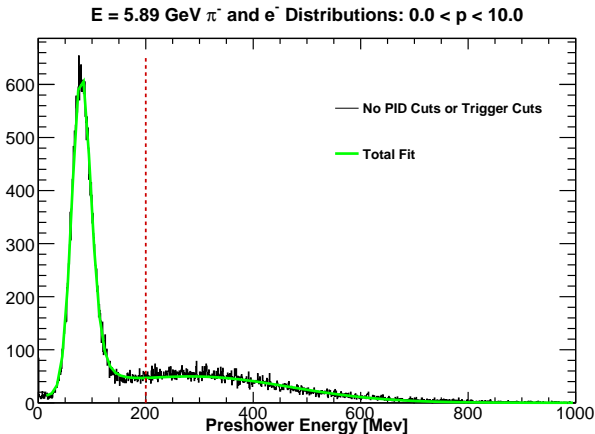


Figure: Fit to the total preshower energy using initial pion and electrons fits.

Preshower Energy

Final Electron and Pion Distributions

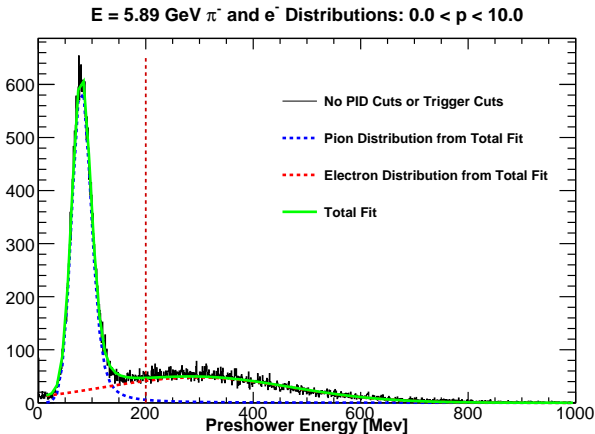


Figure: The fit to the total preshower energy is used to obtain the final pion and electron distributions.

Issues with Pion Distribution Fit

- GEANT4 **tags** all particles thrown for each event
- Allows a check to see how many events were due to pions
- Check the number of pions that GEANT4 tagged to number of pions calculated from pion fits

Pion Count Comparison

Linear Scale

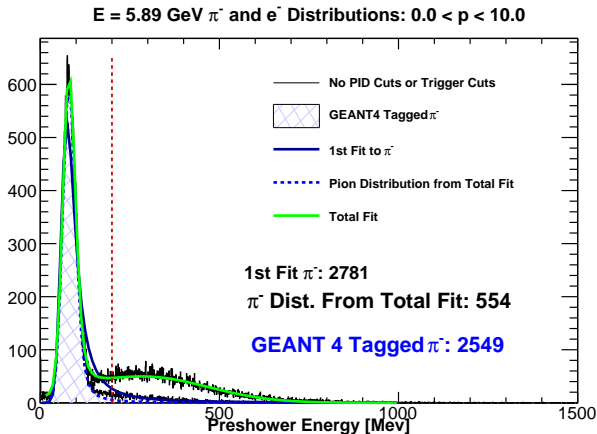


Figure: The comparison between pion fits and pions that were thrown during GEANT4 simulation (linear scale).

Pion Count Comparison

Log Scale

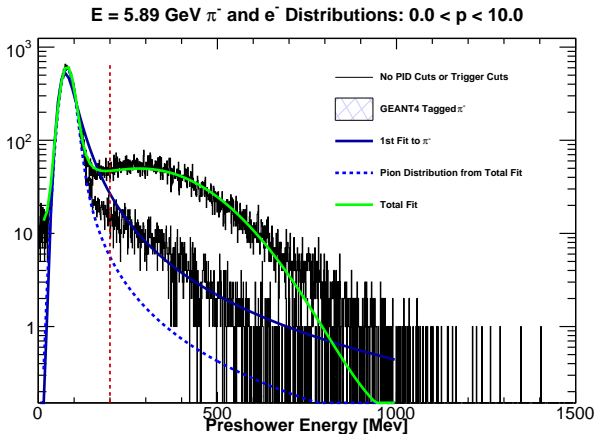


Figure: The comparison between pion fits and pions that were thrown during GEANT4 simulation (log scale).

Pion Count Comparison with Trigger Cut

Linear Scale

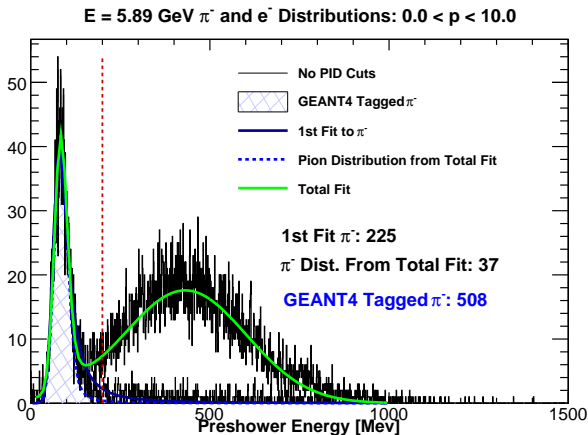


Figure: The comparison between pion fits and pions that were thrown during GEANT4 simulation, with the [trigger cut](#) applied (linear scale).

Pion Count Comparison with Trigger Cut

Log Scale

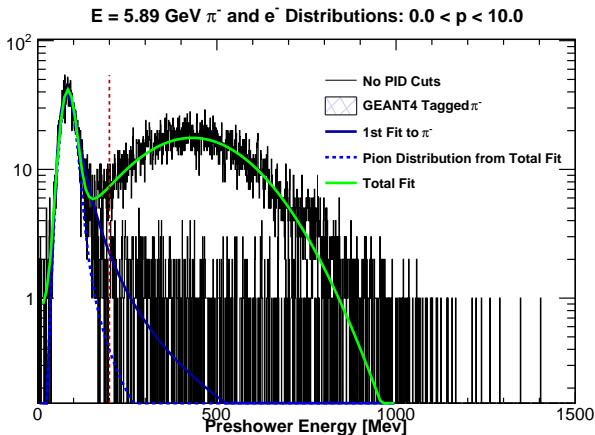


Figure: The comparison between pion fits and pions that were thrown during GEANT4 simulation, with the trigger cut applied (log scale).

Summary

- Can't seem to get a good fit to the pion distribution
- ?

To-Do

- Continue systematics
 - Continue working on Cut systematics study
 - Compute kinematic uncertainties (almost finished)
 - Apply DSSV uncertainty to $g_2^{3He, WW}$ calculation (\bar{g}_2)
 - Apply uncertainty from world g_1 and g_2 fits to low x d_2 calculation (< 1% uncertainty)
- Work on pion contamination