Update on Absolute Jet Energy Scale $\frac{\text{Energy}}{\text{Momentum}}$ Study

CDF Simulation Meeting

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with
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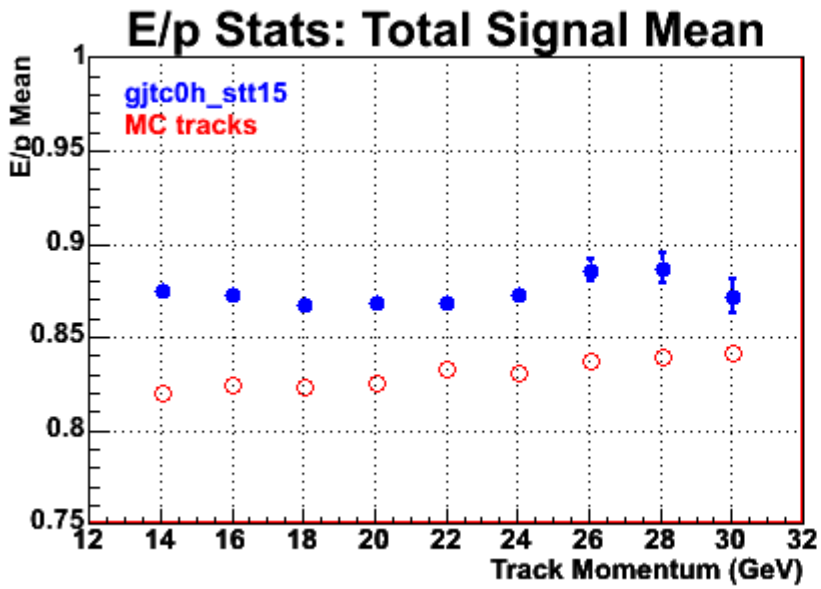
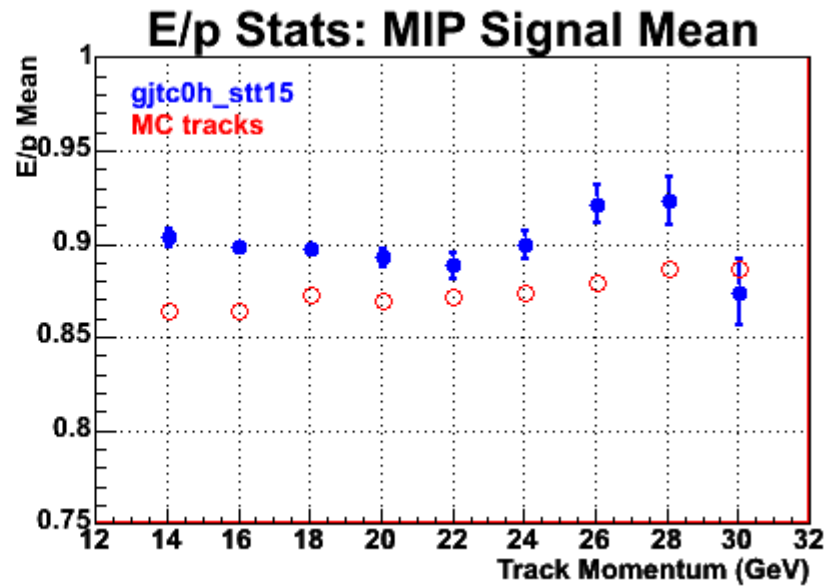
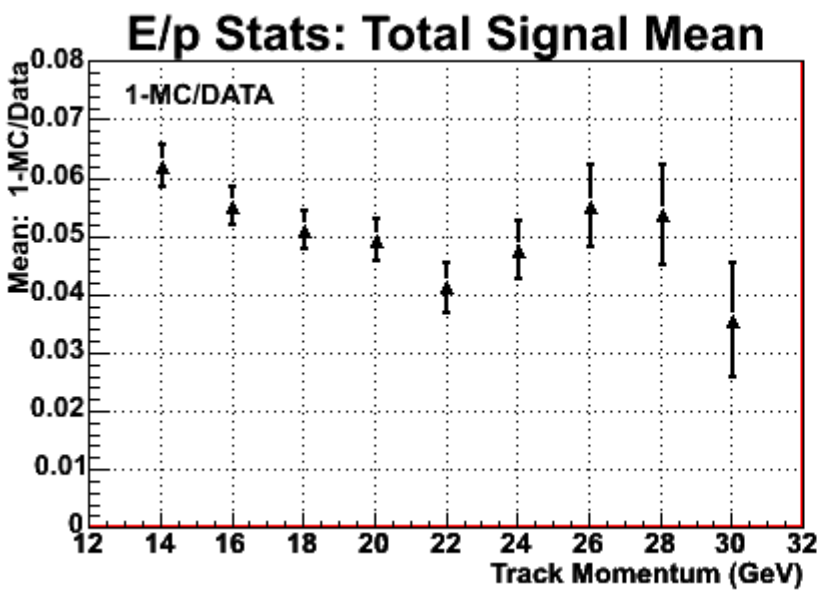
Introduction

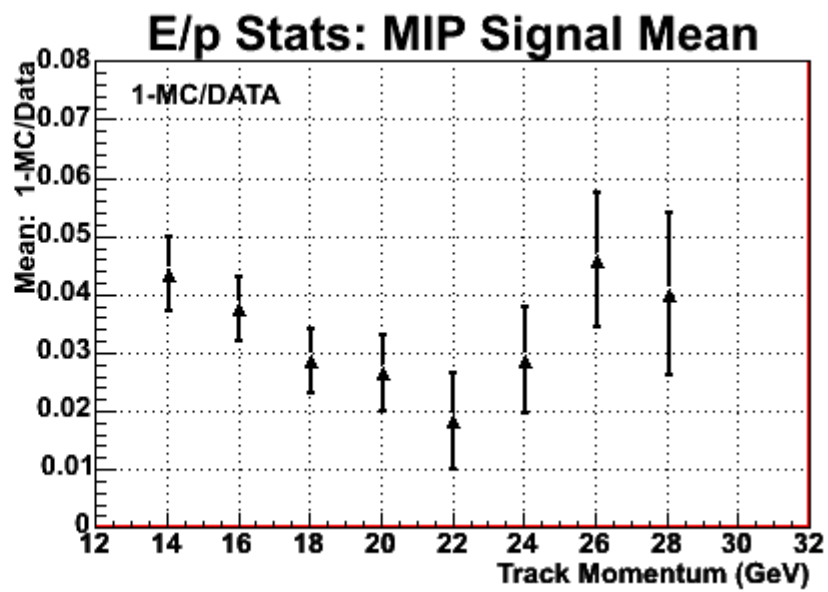
- Reminder: Study high momentum isolated tracks with momentum 14 GeV/c and up.
- Dataset is `gjtc0h_stt15` – MC fake tracks generated with v5.3.3
  - Single track trigger data taken over the summer.
- For each isolated tracks plot the:
  - EM (2x2), Hadron (3x3),
  - MIP (EM < 670 MeV), and Total (EM+Hadron) energy over momentum of track.
- Fit the Total and MIP distributions to a converging Gaussian
- Plot the mean (and sigma) of the Gaussian as a function of track momentum
- Energy/Momentum Study I presented two weeks ago showed E/p discrepancy of about 5% data greater than MC.
- Since then some changes have affected the results.

Previous Result – Towers 1-5





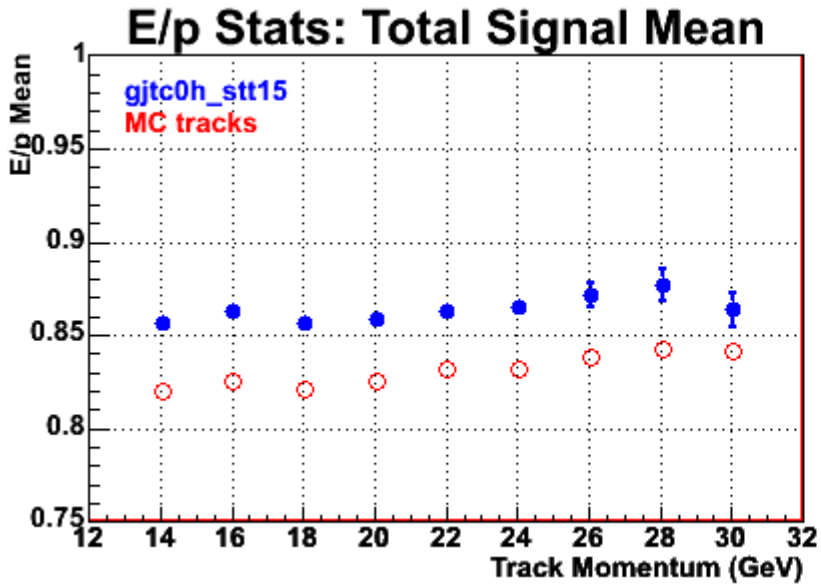


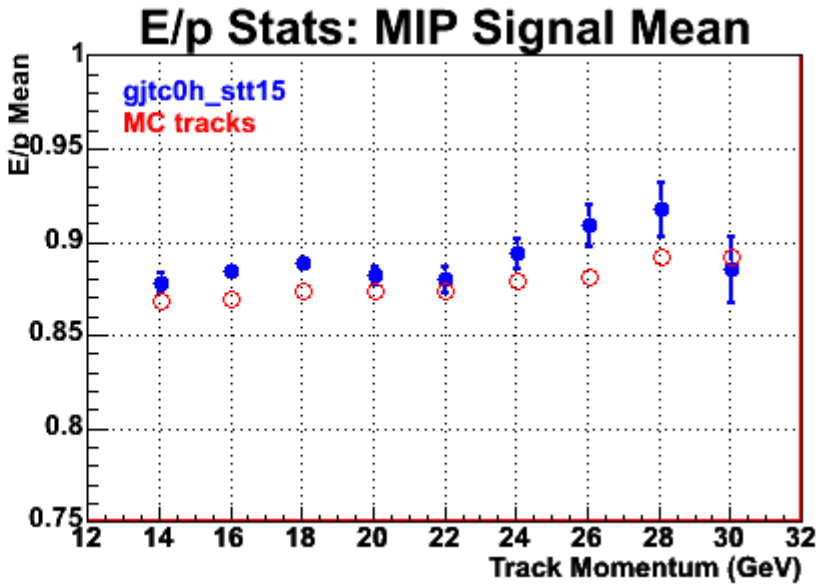


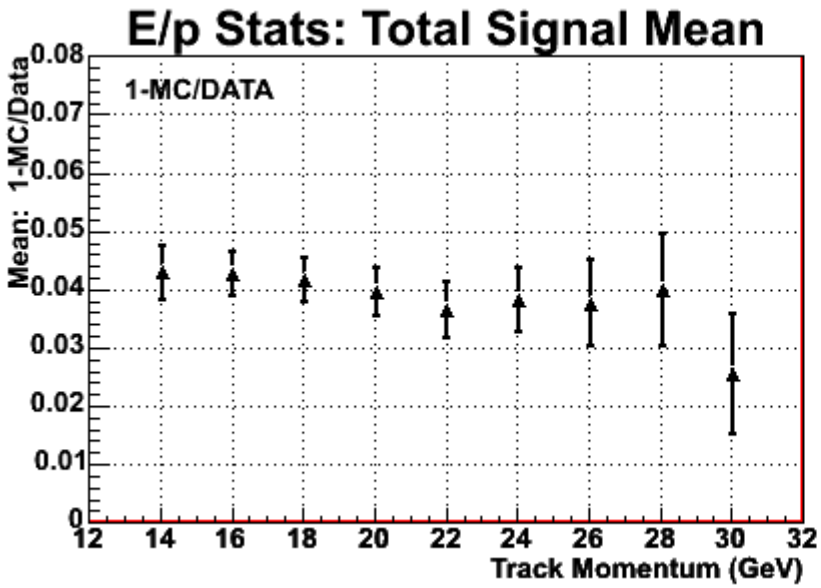
Changes made to analysis

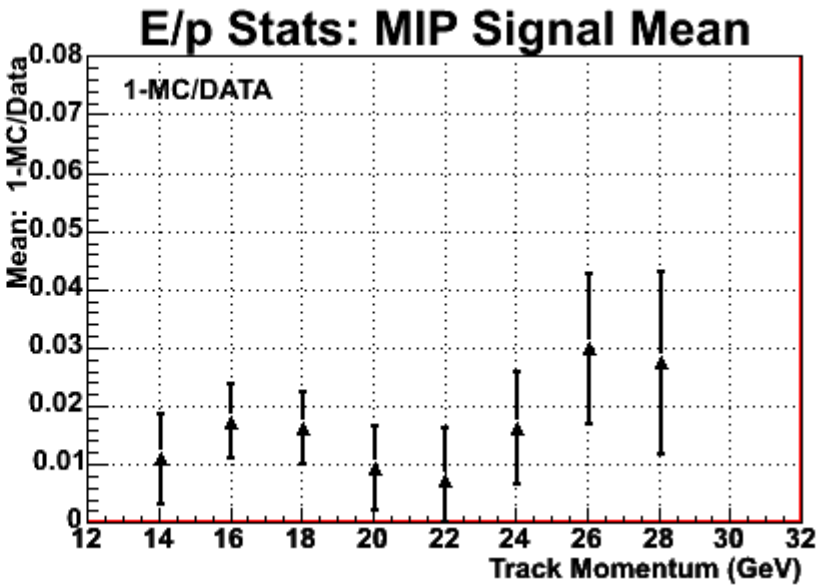
- To avoid tower 0, I use only towers 2 through 5.
- Background Subtraction (Total and MIP)
  - The average background in the calorimeter is not a Gaussian response.
  - We subtract the mean of the background distribution from the fitted mean derived from the converging Gaussian fit on the signal.
  - Point out this is still an approximation.
- Bug fixes – bad EM energies in previous results
- Made different plots for positively and negatively charged tracks.

New Results – Towers 2-5









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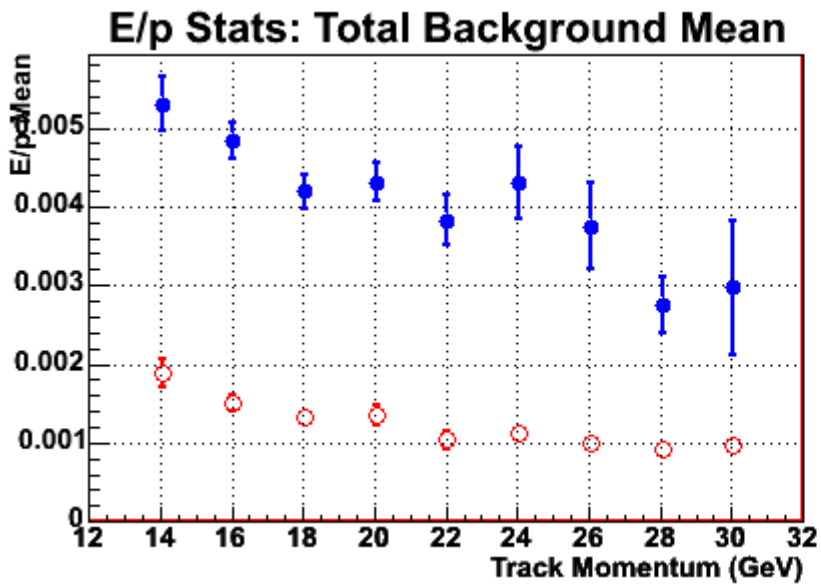

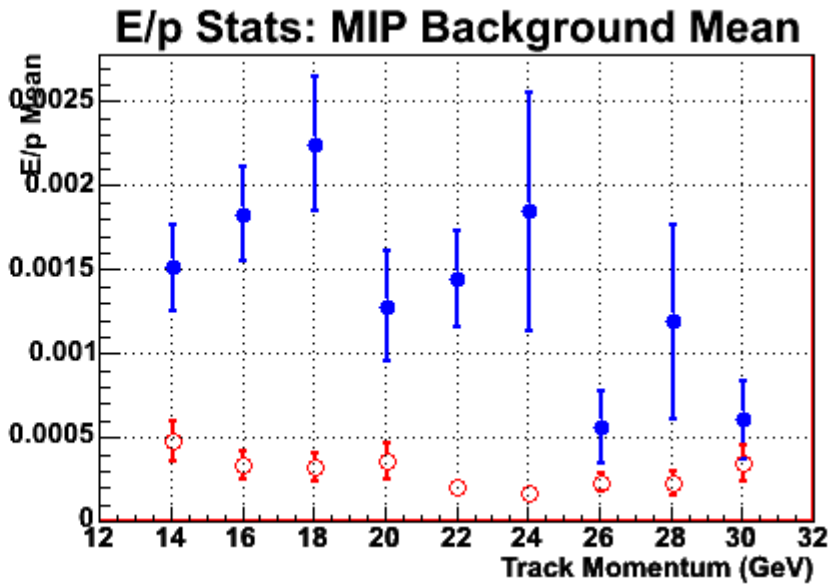

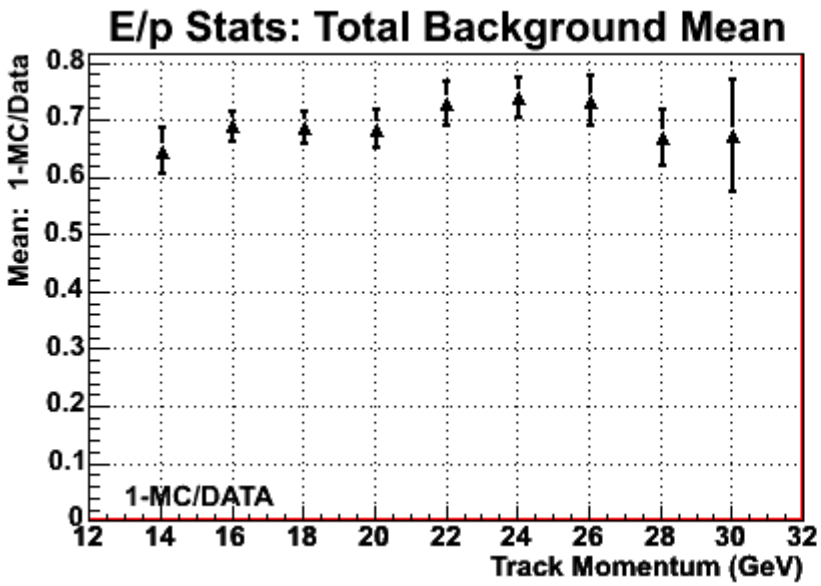

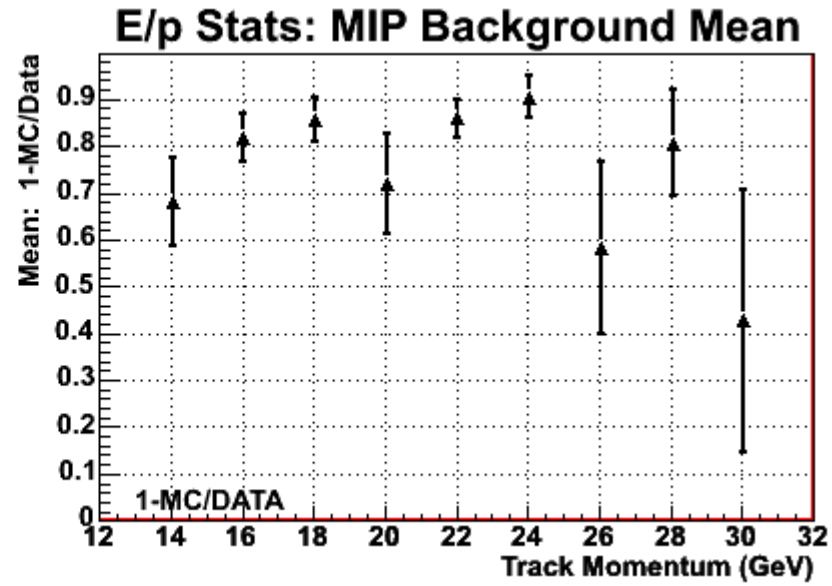

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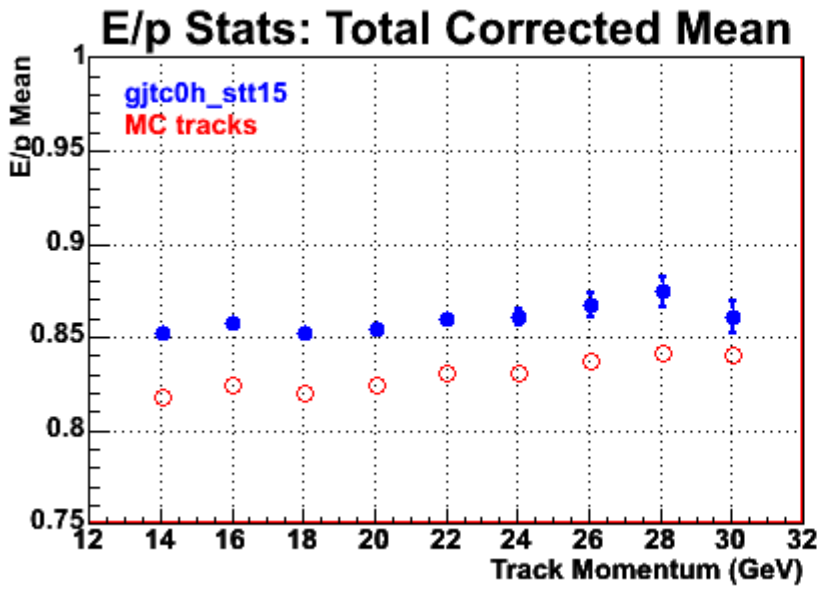
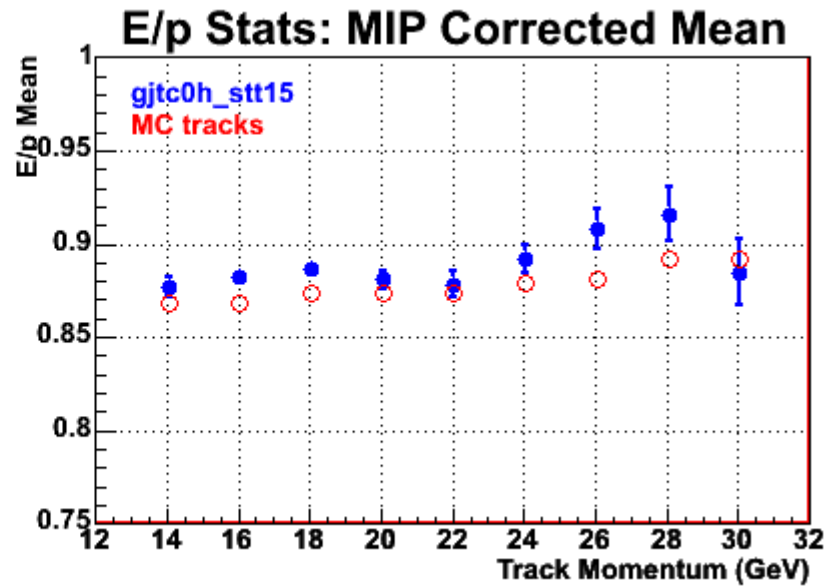
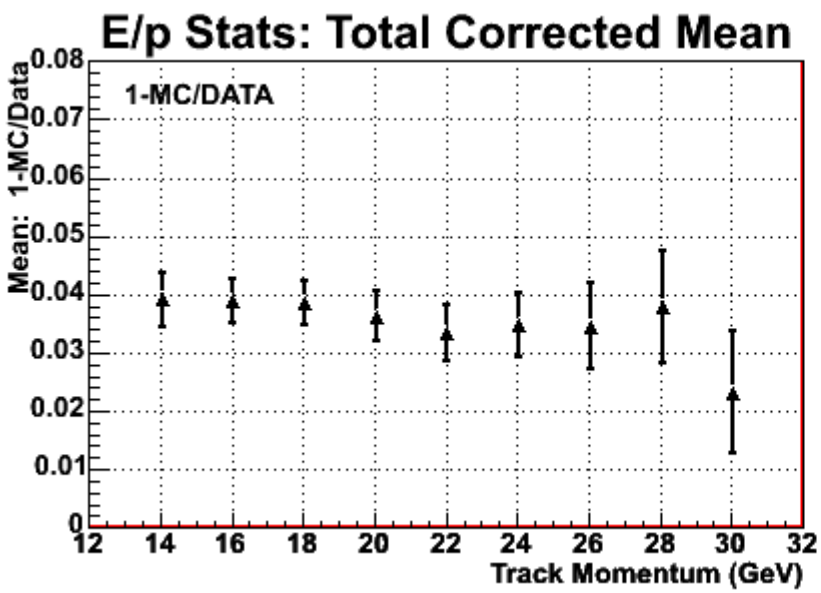
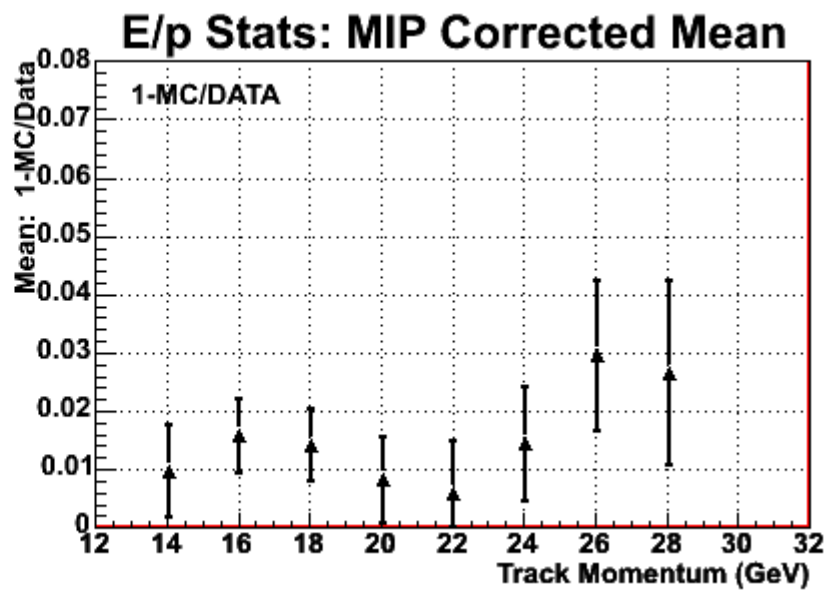
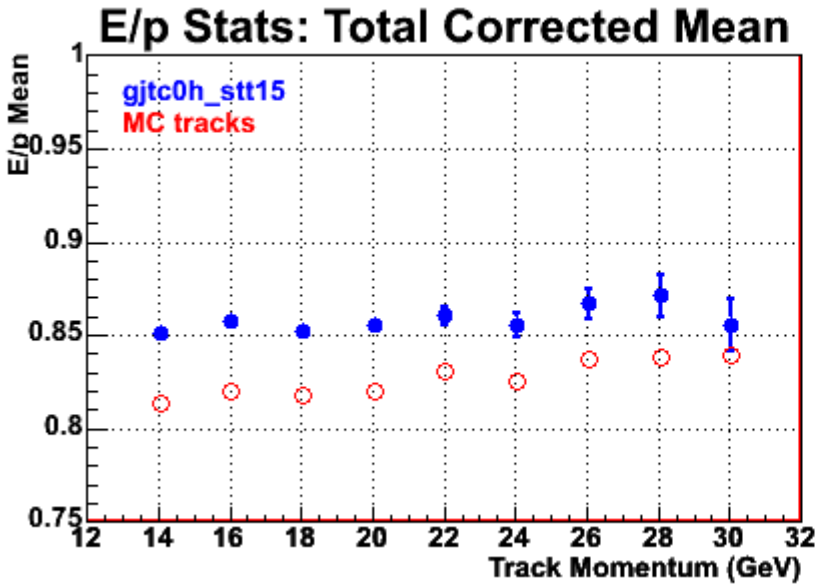


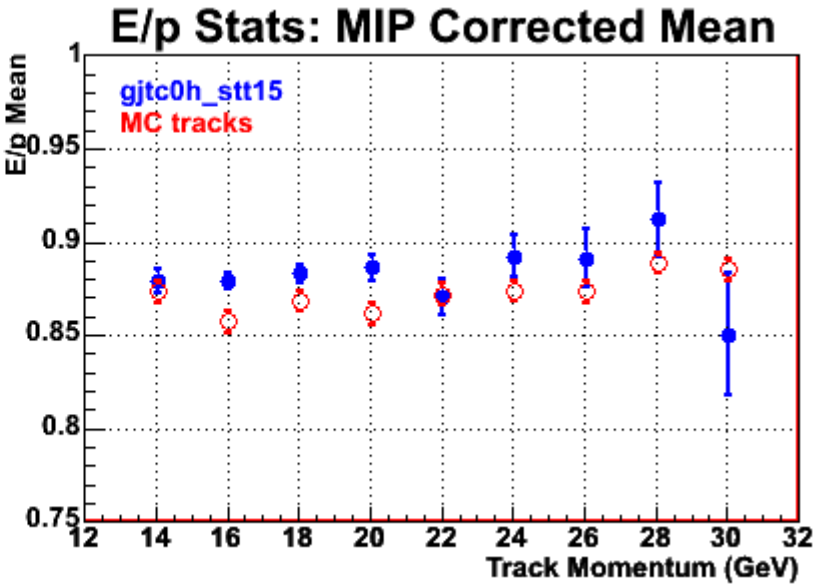


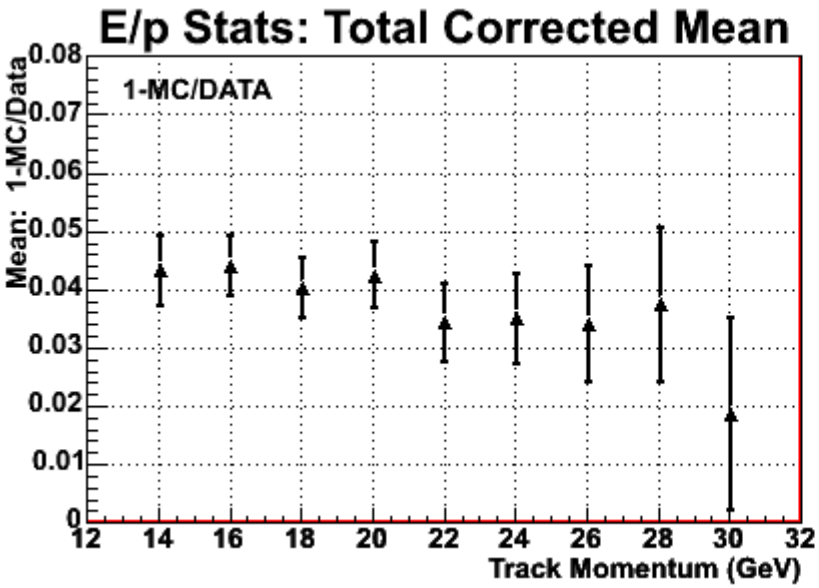


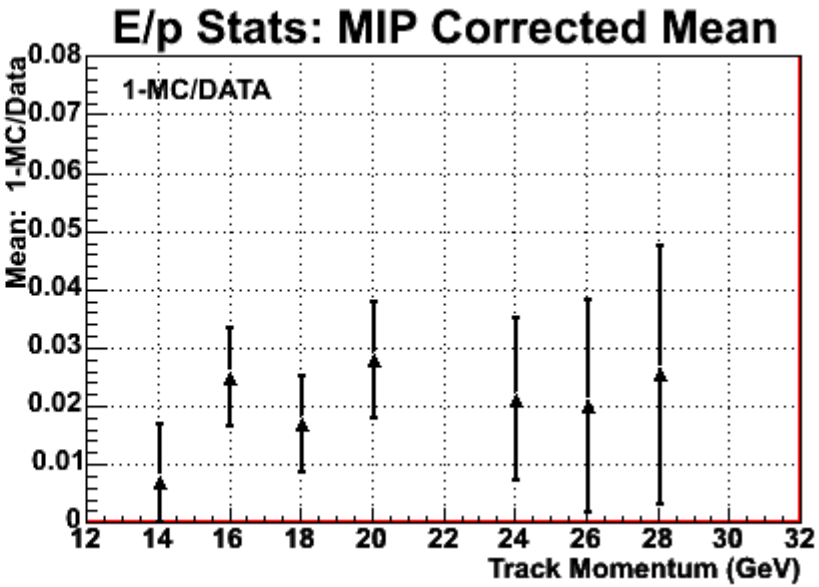


New Results – Towers 2-5 – Positive Tracks

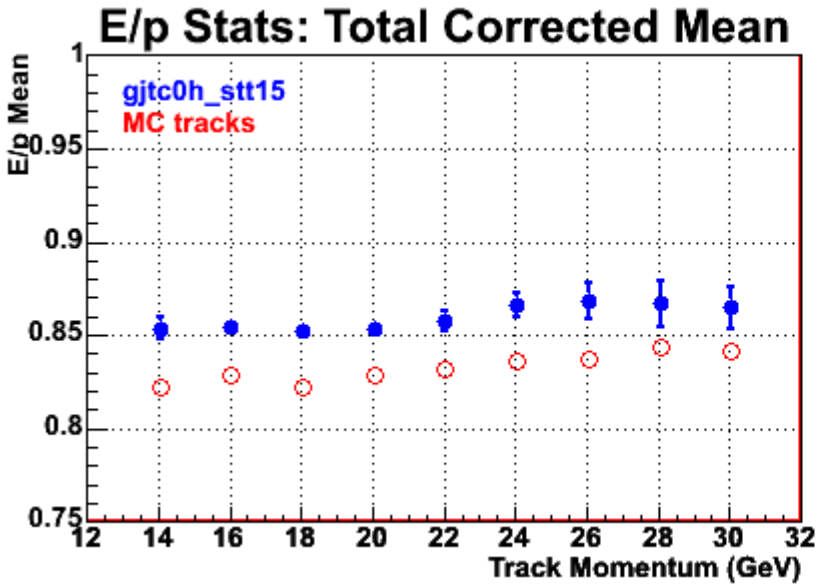


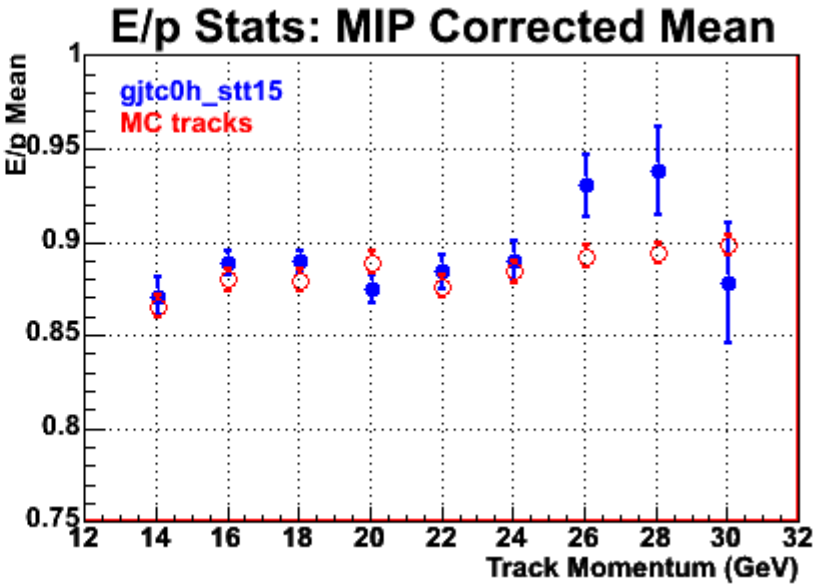


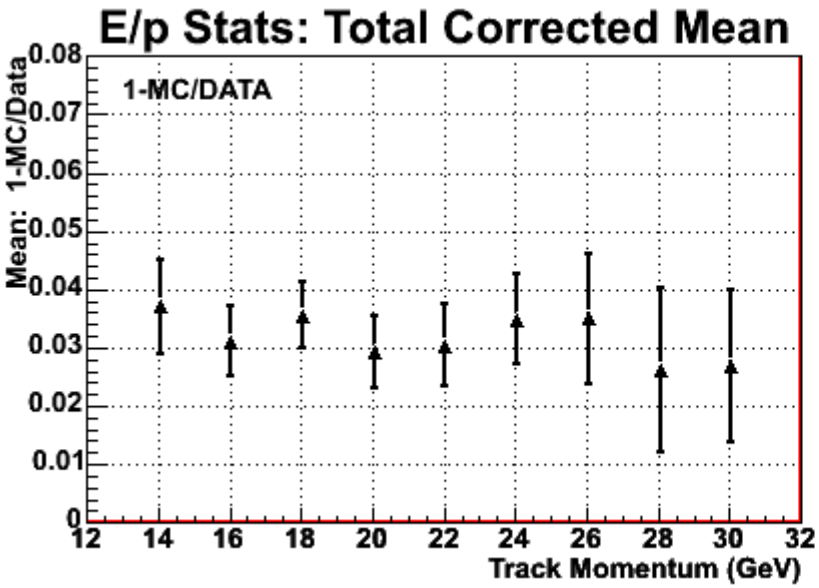


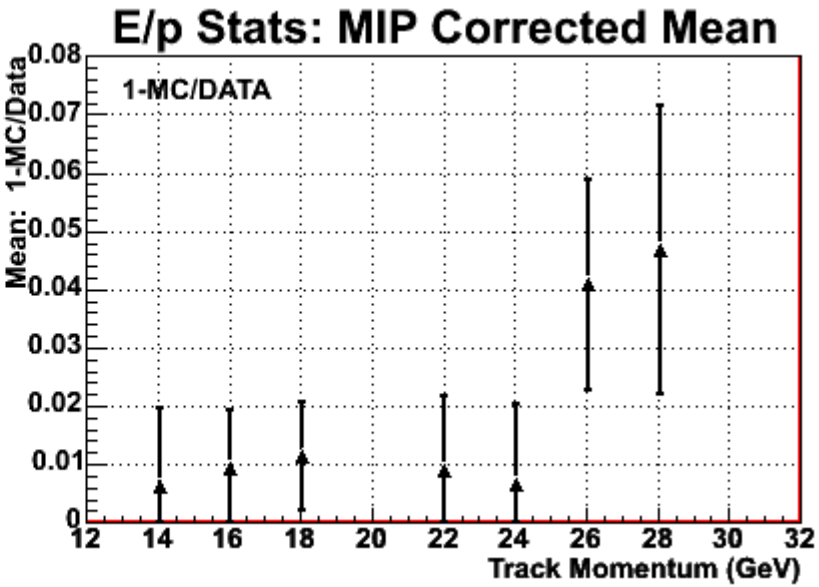


New Results – Towers 2-5 – Negative Tracks



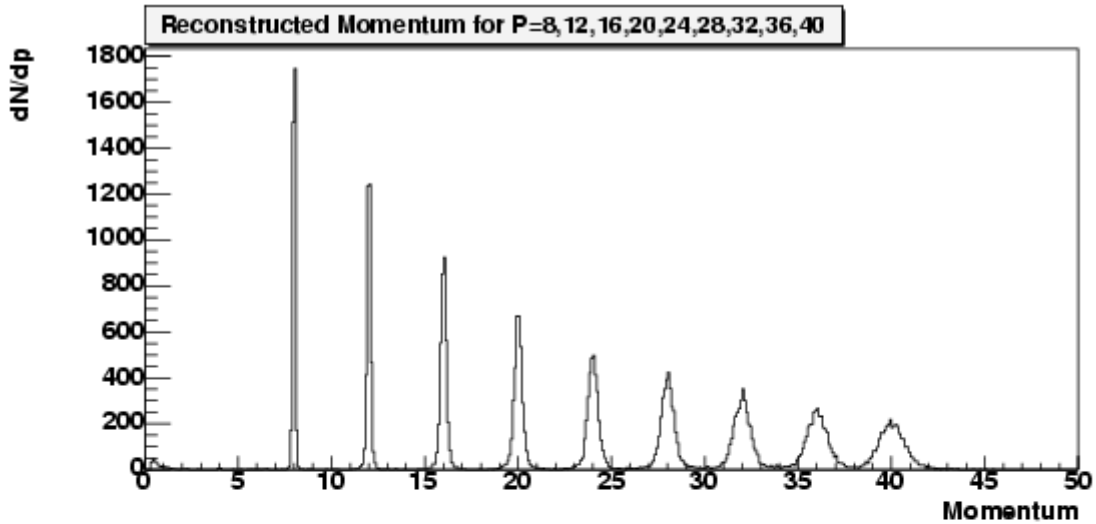


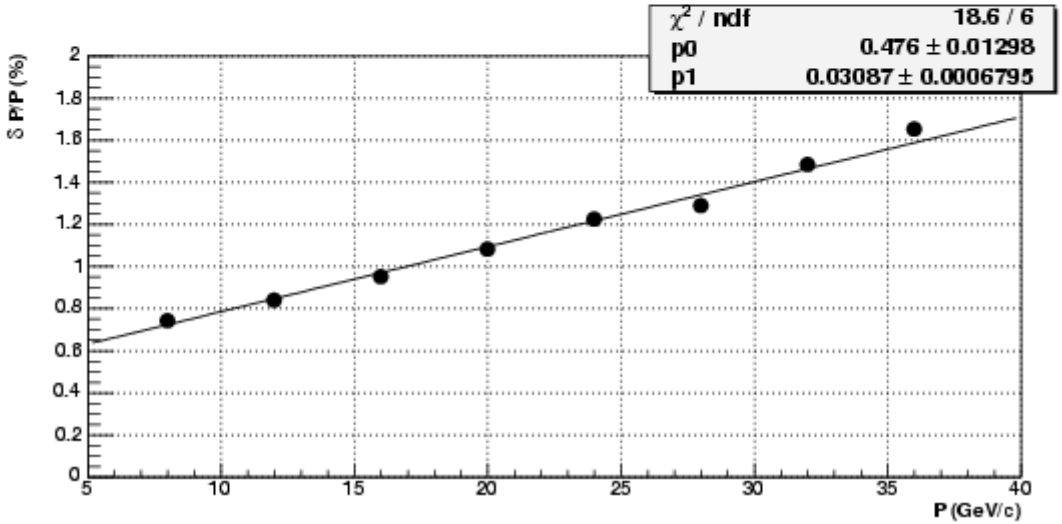




Momentum Resolution

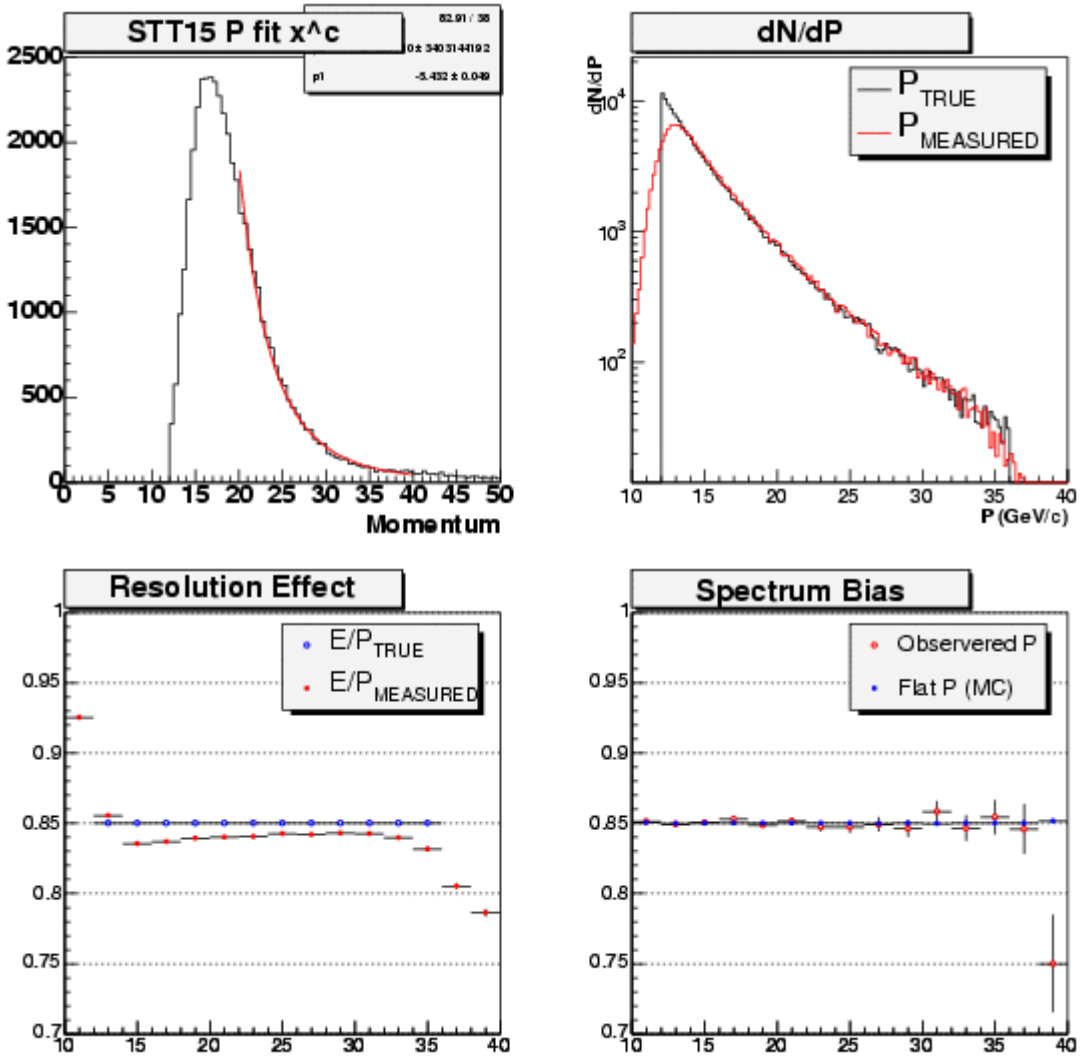
- For each momentum bin, plot the reconstructed momentum of the data.
- Fit each distribution with a Gaussian and plot the sigma as a function of momentum





Resolution Effects

- The effect of the momentum resolution is 3%-4%.
  - This affects both the MC and the data.
  - Effect is greatest near trigger threshold - something to be studied.
- Flat MC track spectrum does not affect the E/p results.



Summary and Plans

- The Total Corrected E/p has a flat 4% discrepancy while the MIP E/p has around a 1% difference.
- Positive and Negative tracks have very little difference.
- Still trying to generate v6 MC fake tracks with latest Gflash tuning
- Larger discrepancy in Total corrected signal a result of differences in the EM contribution