Kaon-LT Analysis Update
(High Q^2 HEEP COIN Analysis)

Ali Usman & Richard Trotta

Recall

- HeeP Coin aNalysis in progress for high Q^2 data.

- Richard – 10.6 GeV
  - $P_{HMS} = 6.59, P_{SHMS} = 4.84, \theta_{HMS} = 18.84, \theta_{SHMS} = 26.14$
- Ali – 8.2 Gev
  - $P_{HMS} = 4.37, P_{SHMS} = 4.67, \theta_{HMS} = , 25.78\ \theta_{SHMS} = 23.99$
- Ali – 6.2 GeV (New)
  - $P_{HMS} = 3.57, P_{SHMS} = 3.48, \theta_{HMS} = 27.27, \theta_{SHMS} = 28.56$

Issues with Emiss and Pmiss

- The distributions for missing variables were very broad for hcana as compared to the simc.

- The components of the Pmiss had different distributions between simc and data.

- This issue was noticed initially for high Q^2 Kaon-LT data.

Debug Test # 1
(Replay Comparison)

Replay Comparison

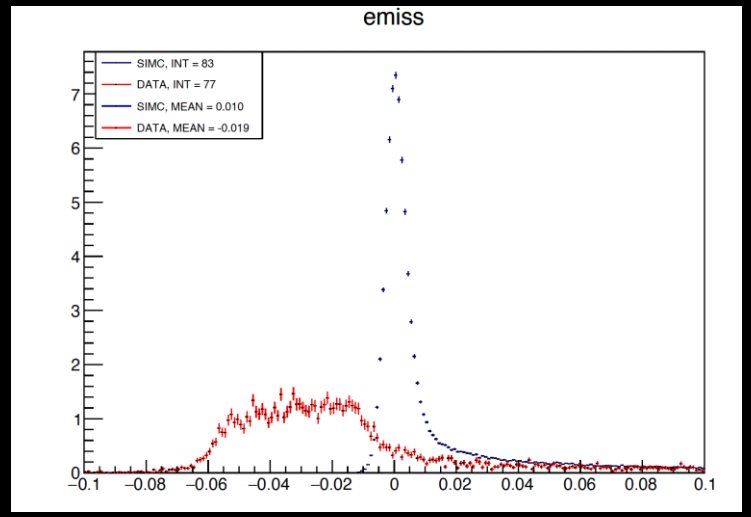
- Asked vijay to replay 8.2 GeV setting and processed it through our python analysis.

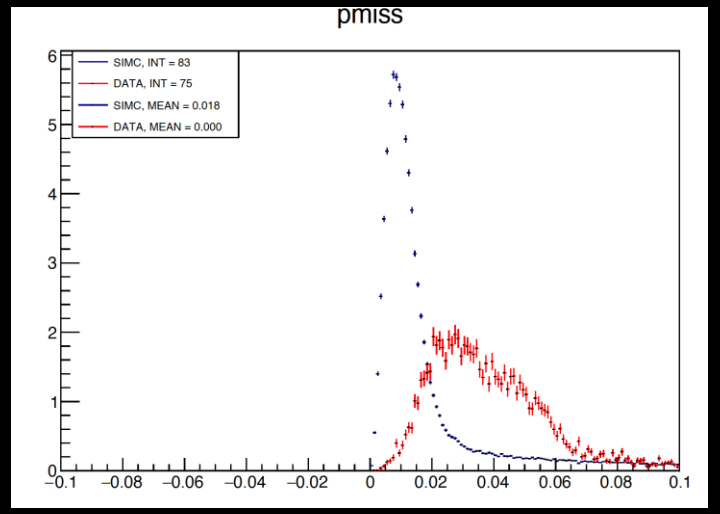
- Idea was to see if we get any differences between two replays.

- Results look very similar and no obvious differences.

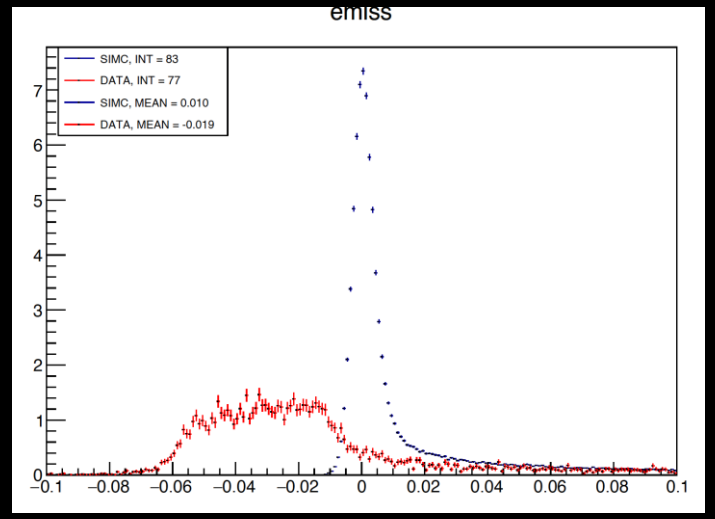
Replay Comparison (8.2 GeV)

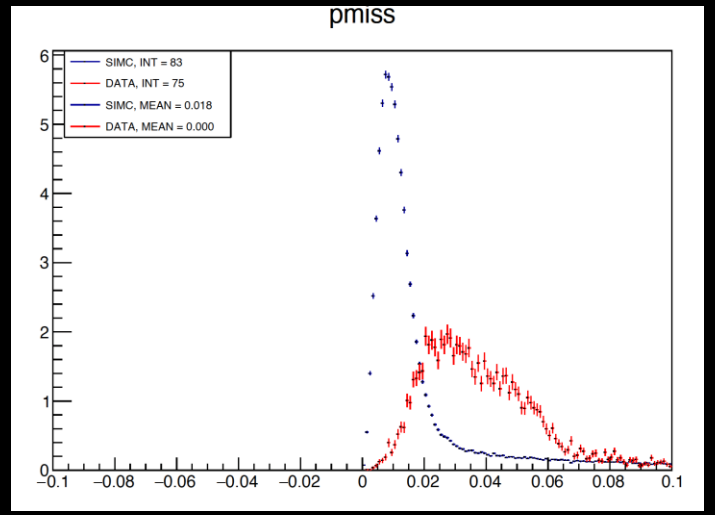
Ali/Richard





Vijay





Debug Test # 2
(Correlation Test)

Correlation Test

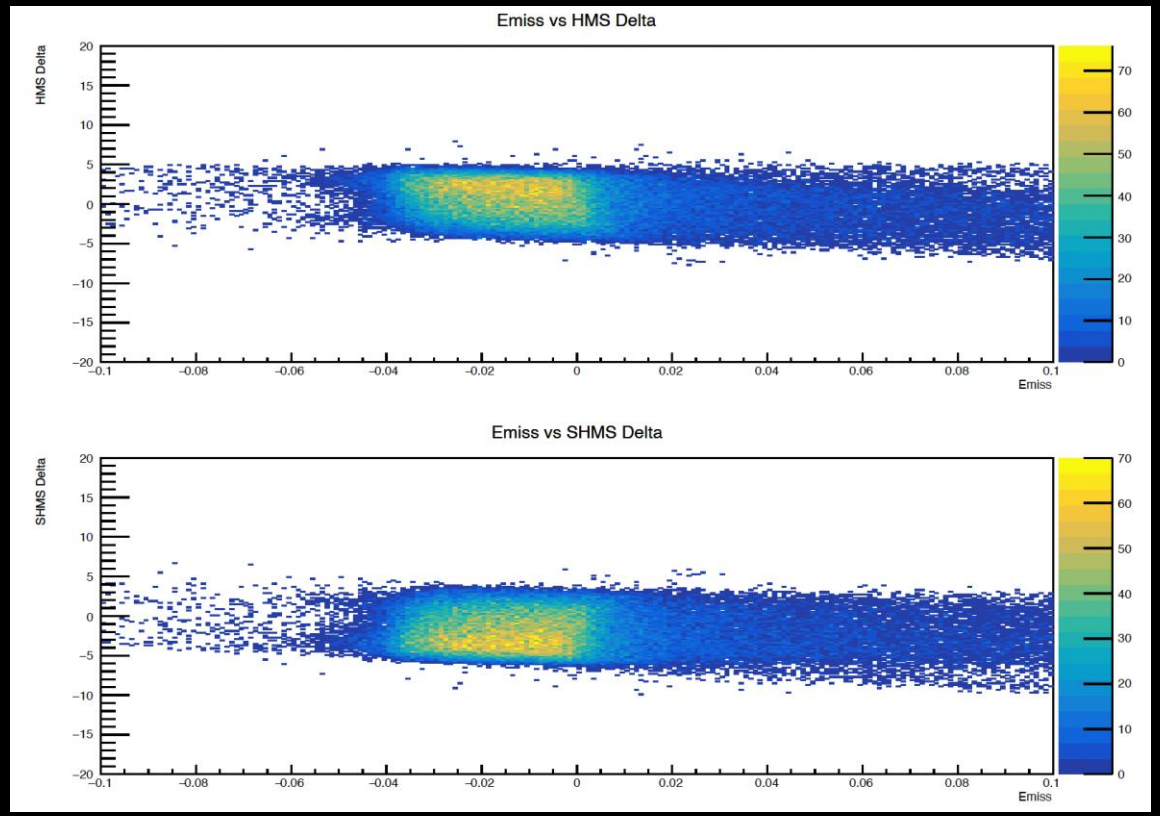
- Dave suggested to look at Delta vs Pmiss/Emiss variables.

- Stephen also suggested to look at these correlations to see if the python analysis is giving sensible results.

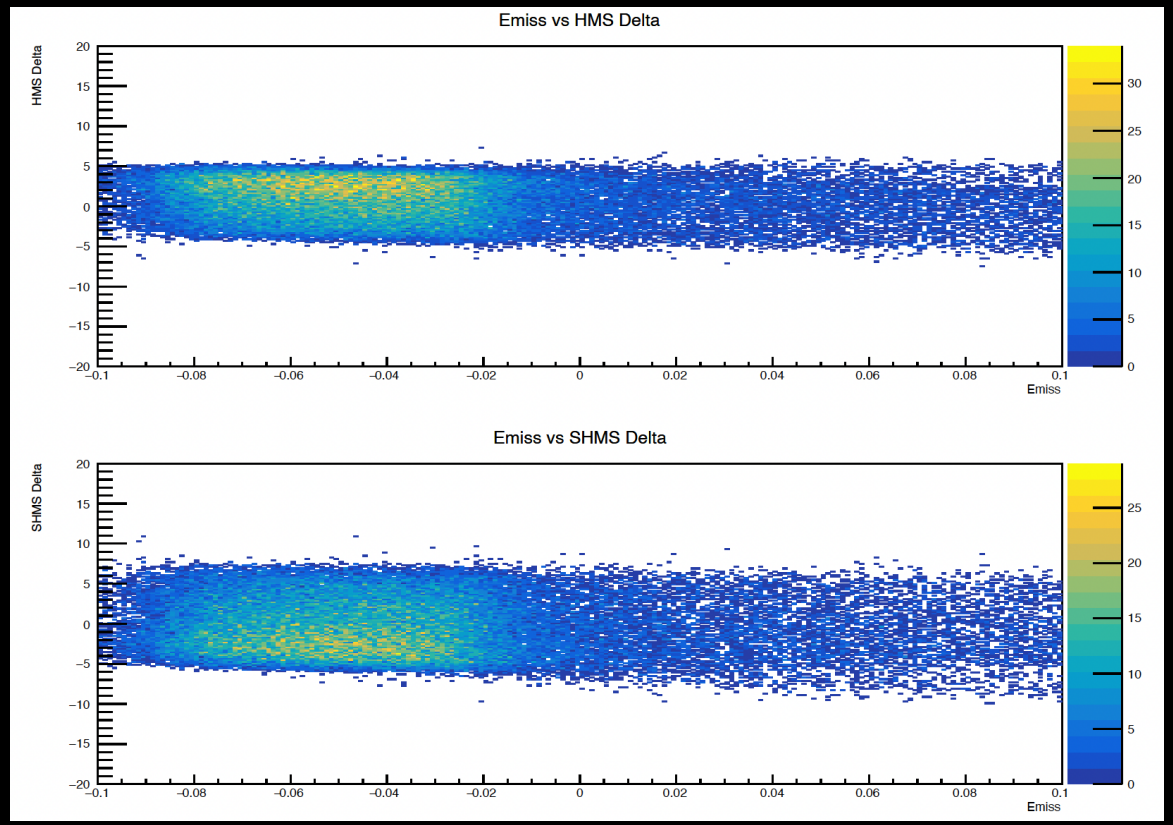
- 2D distributions for different beam energies were plotted.

Correlation Test

6.2 GeV



10.6 GeV



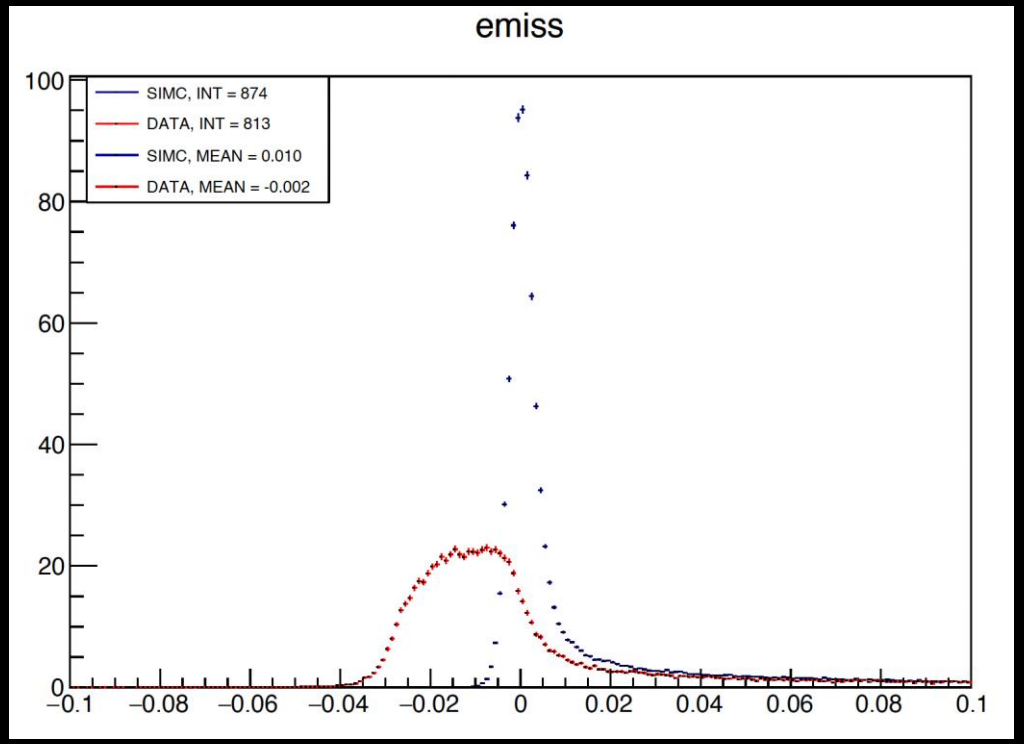
Debug Test # 3
(Low Q^2 Analysis)

Low Q^2 Analysis

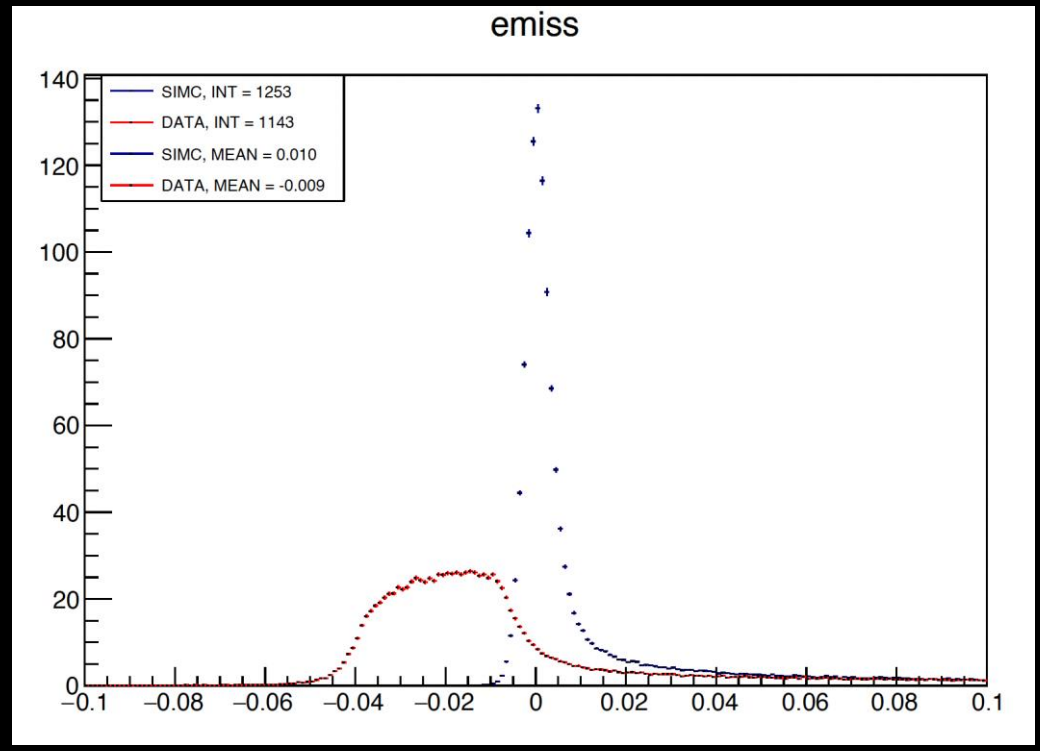
- A full analysis including replaying the data and and generating SIMC files were done using our analysis framework.
- Results show deviation from Vijay's analysis.
- Distributions are wider than expected.

Low Q^2 Analysis

3.8 GeV



4.9 GeV



Debug Test # 4
(High Q^2 Replication)

High Q^2 Replication

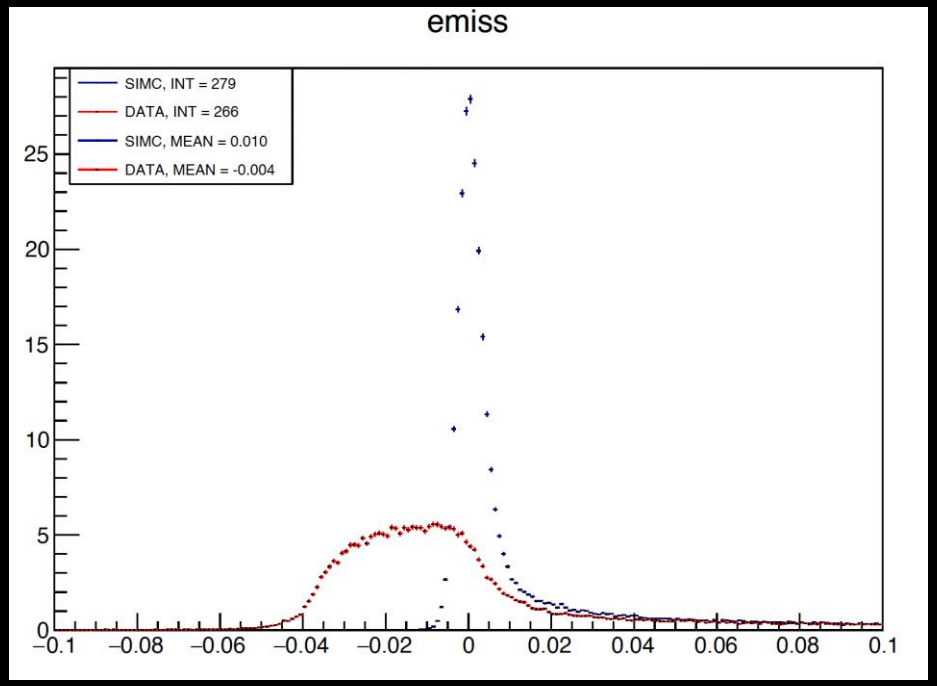
- Sent high Q^2 data, dummy and SIMC raw files to vijay to process through his analysis framework.

- Checked whether different analysis framework produce different results.

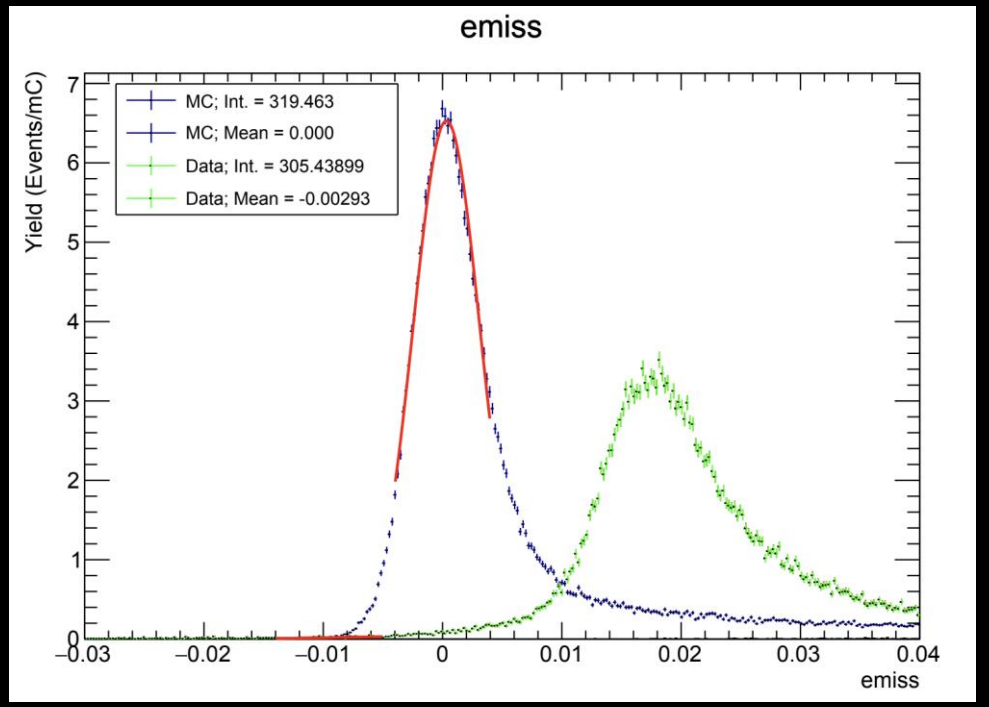
- Initial results were different but later on it was diagnosed that comparison was wrong.

High Q^2 Replication

Ali (6.2 GeV)



Vijay (6.2 GeV)
Wrong file used



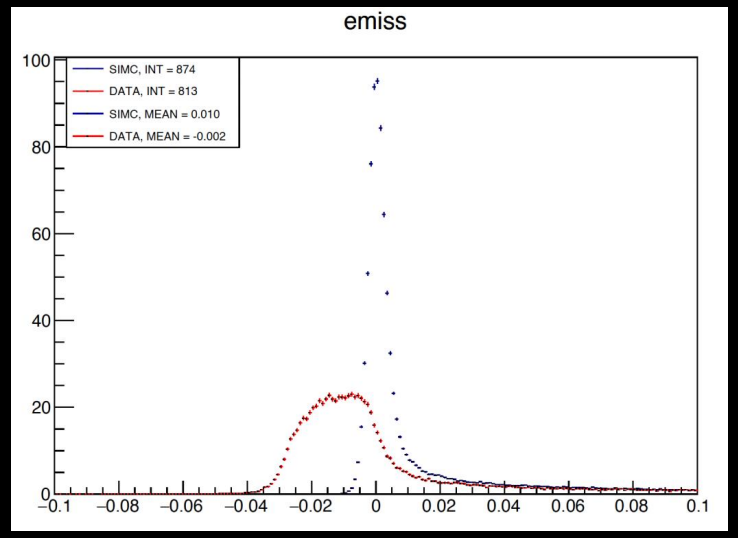
Debug Test # 5 ..... ∞
(The Stephen Kay Tests)

Stephen's Tests

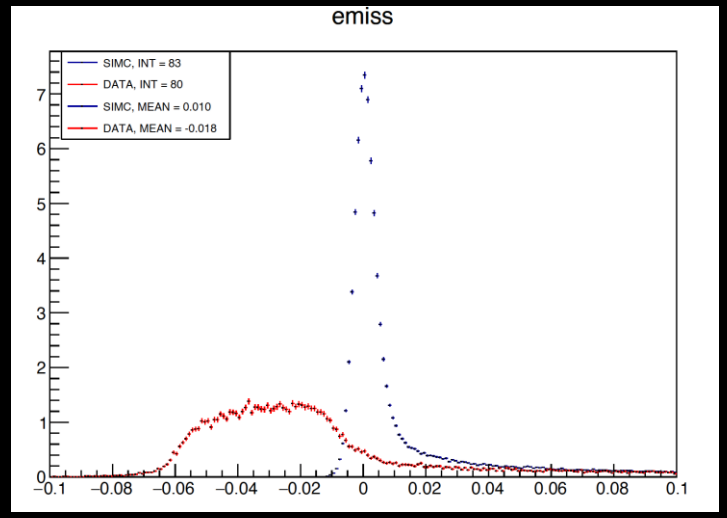
- Stephen kindly did a bunch of tests to diagnose this issue.
- All the previous tests were independently done again to double check things.
- Python analysis was working fine and problem appeared tp be at the replay level.
  - Final diagnosis showed wrong "gbeam.param" being used which caused the issue.

Stephen's Tests (Old)

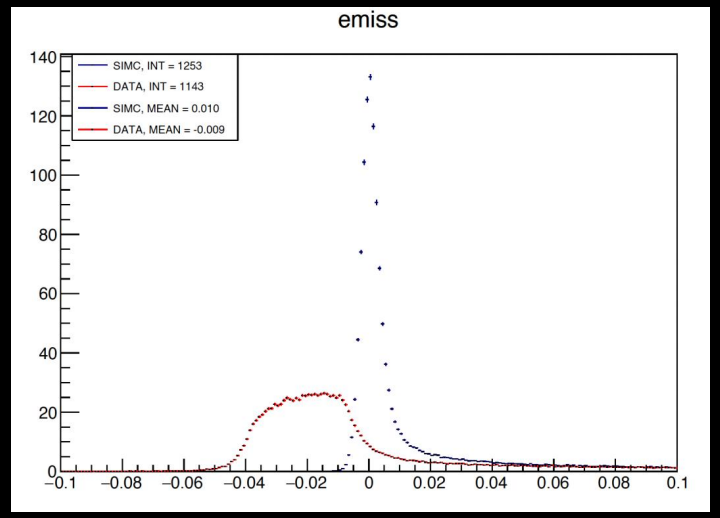
3.8 GeV



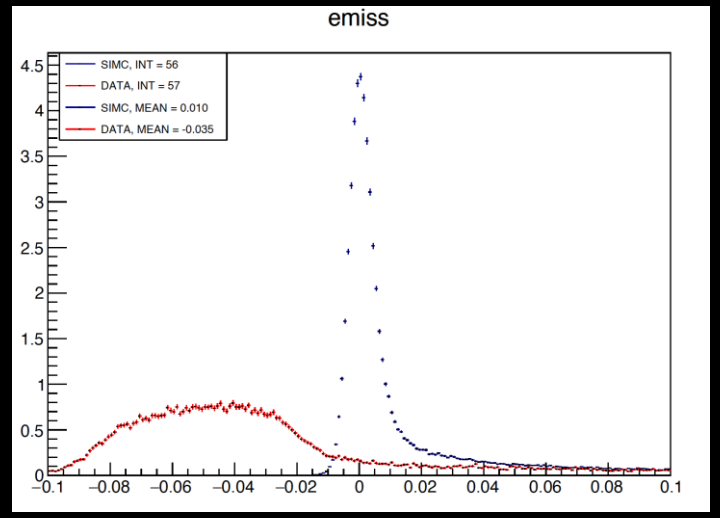
8.2 GeV



4.9 GeV

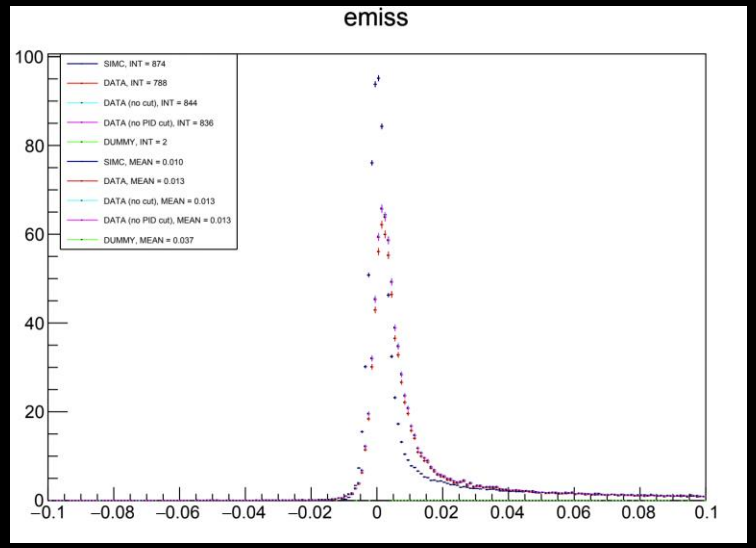


10.6 GeV

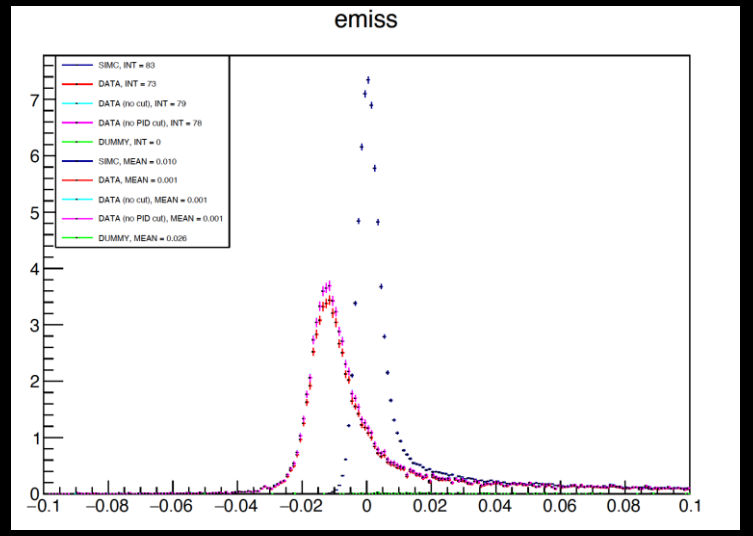


Stephen's Tests (New)

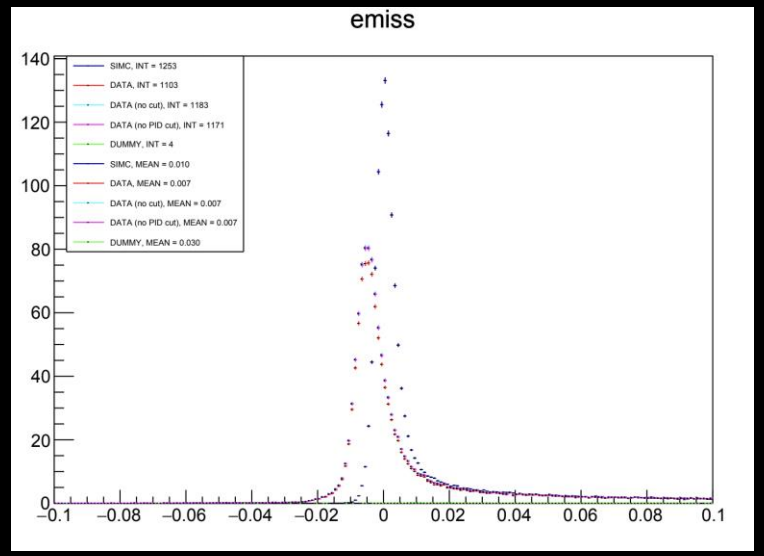
3.8 GeV



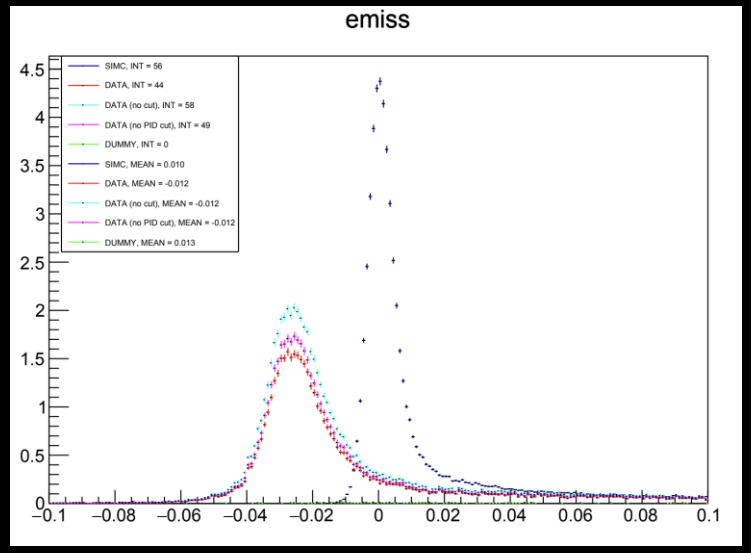
8.2 GeV



4.9 GeV

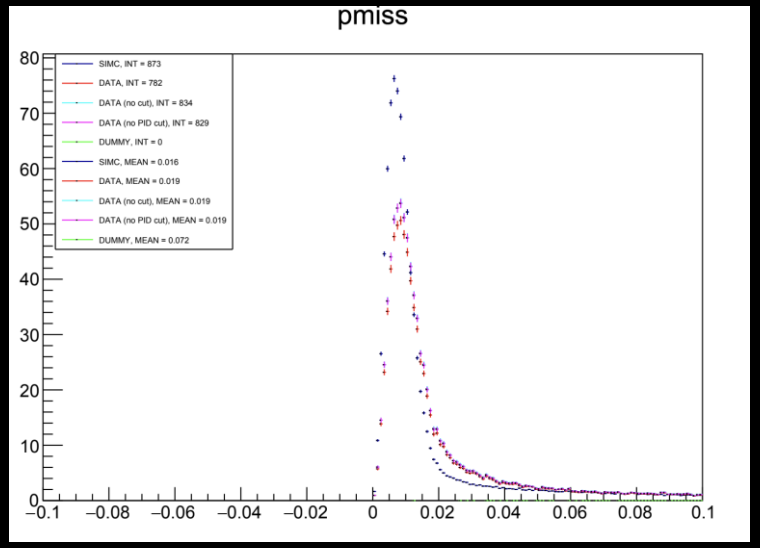


10.6 GeV

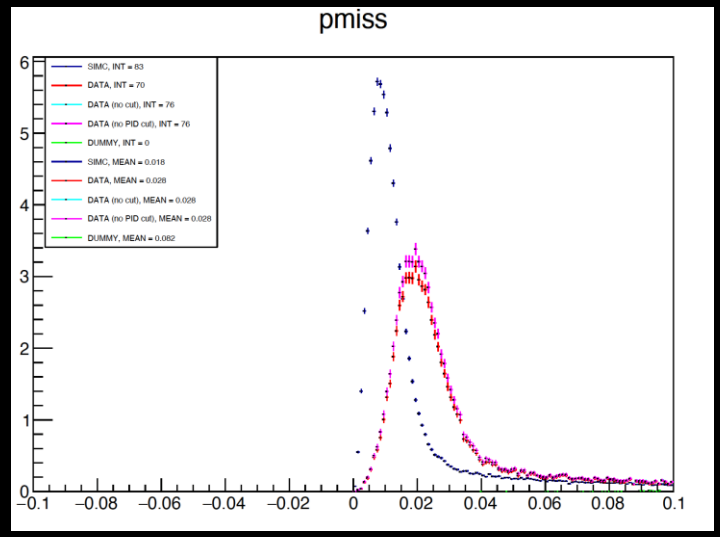


Stephen's Tests (New)

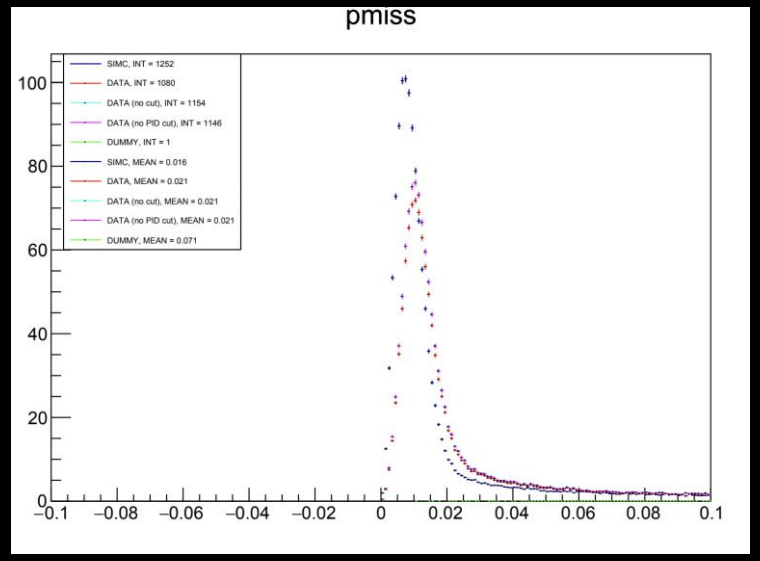
3.8 GeV



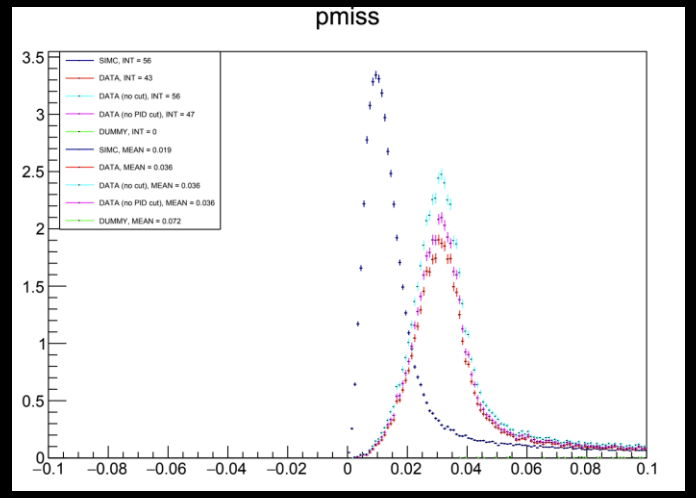
8.2 GeV



4.9 GeV



10.6 GeV



Summary & Outlook

- The issue for Pmiss and Emiss was at replay level due to difference in gbeam.param file.
- New results confirm that things are working fine with the correct file.
- Added new plots of theta and phi in the file from Stephen's study.
- Now we can move to the offset study which will hopefully be quick.