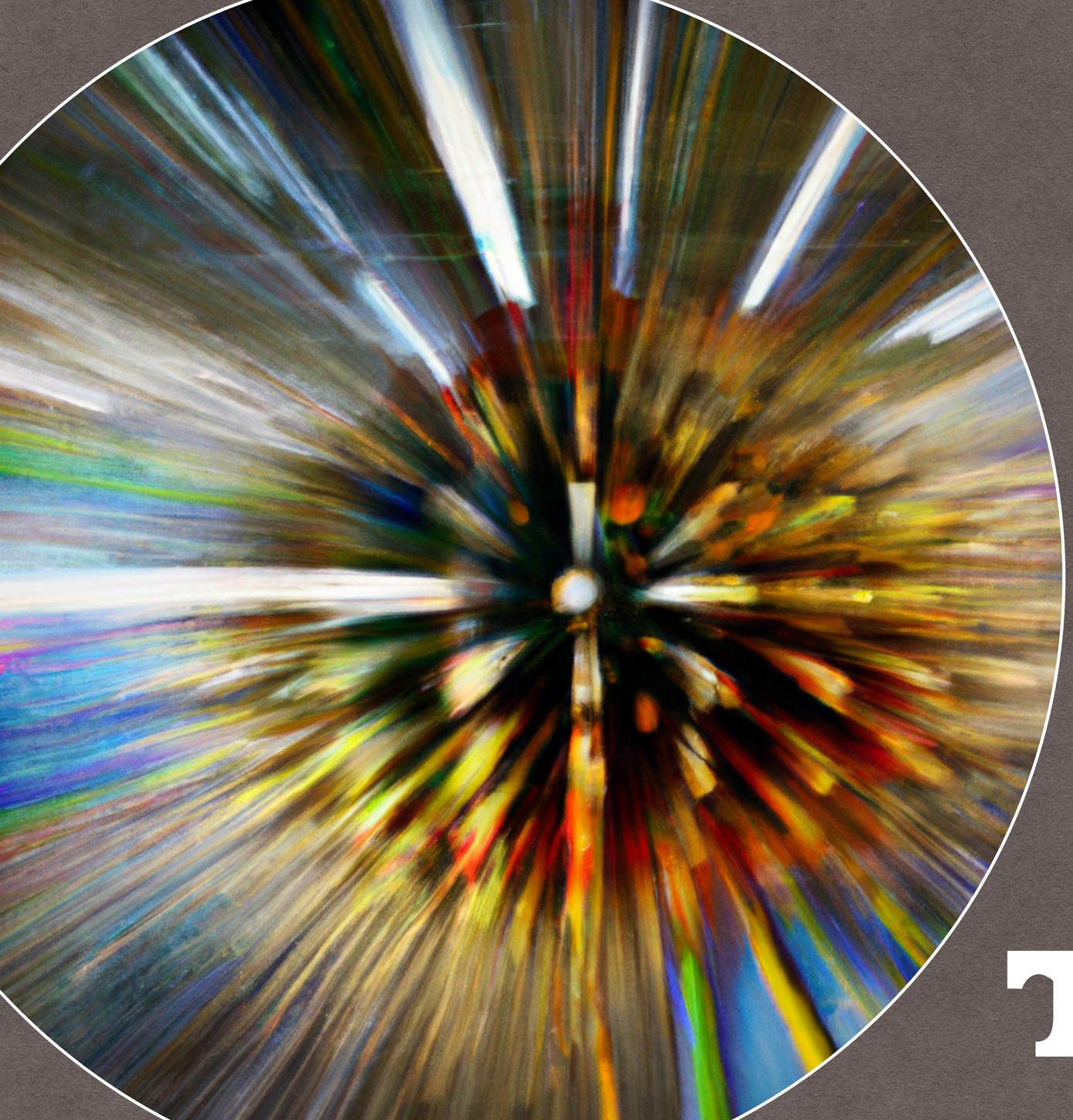


U.S. DEPARTMENT OF ENERGY | Office of Science

10 TeV MuCol

Electron Studies

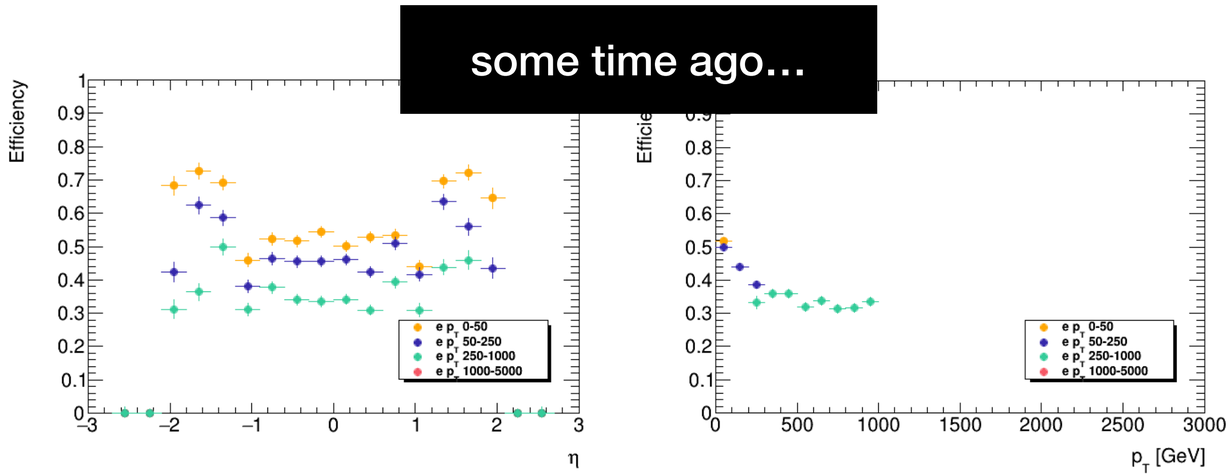
TOVA HOLMES, U. OF TENNESSEE

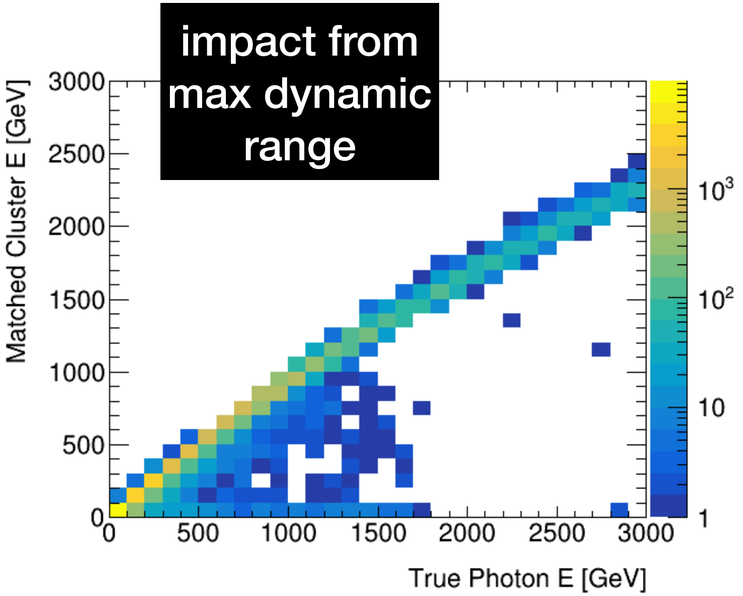
10 TEV MUCOL STUDIES

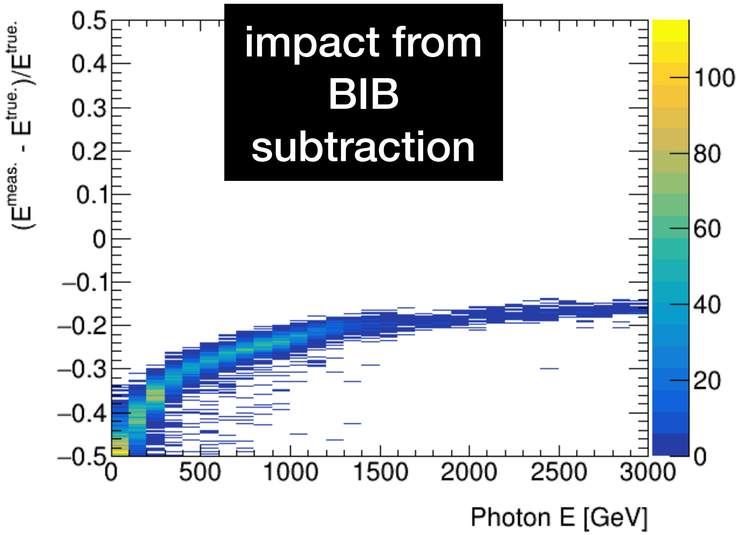
DECEMBER 14, 2023

Last time

- Dug into details of photon reconstruction
  - Included bib subtraction algorithm
  - Increased the maximum dynamic range of ecal cells
  - Added calibration algorithm to correct energy measurements due to bib subtraction
- Question: has all of this improved our electron reco efficiency?

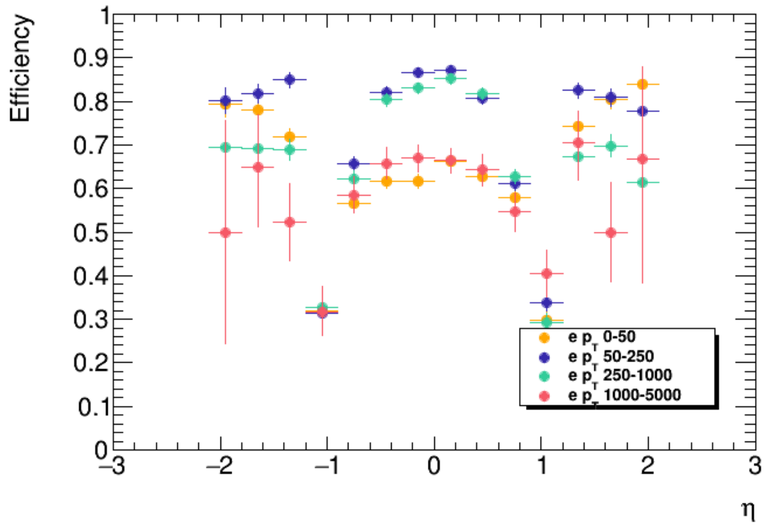


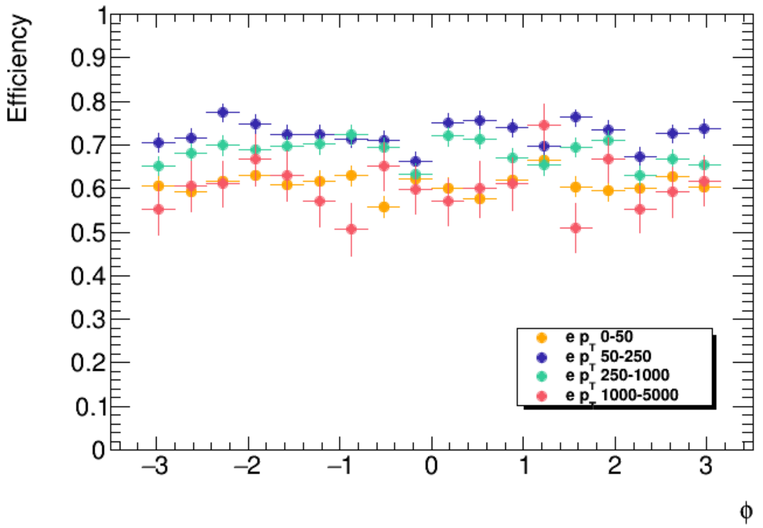


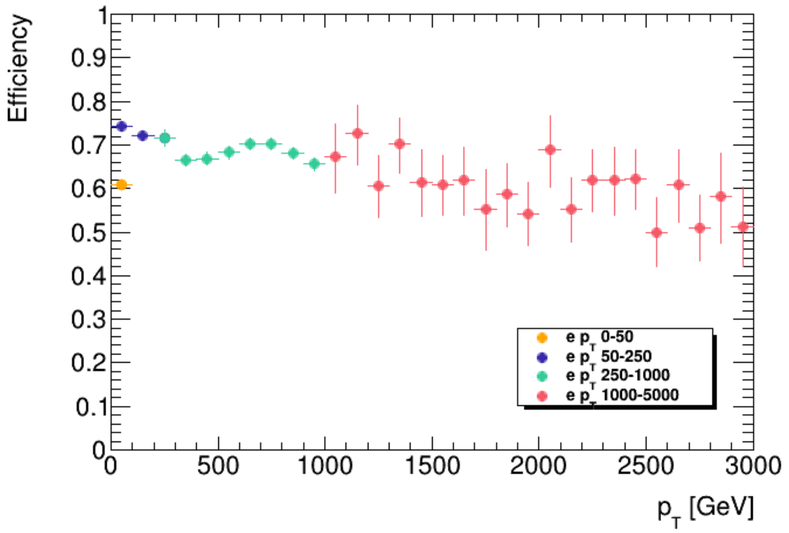


Updated Efficiencies

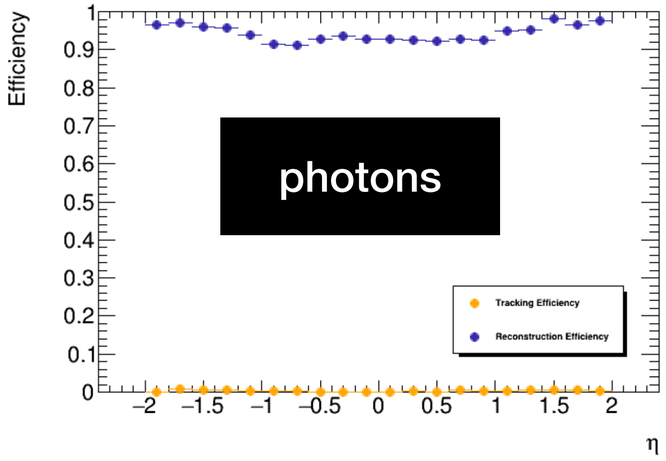
Efficiencies for pT w/i 20%, and reco'd as electrons





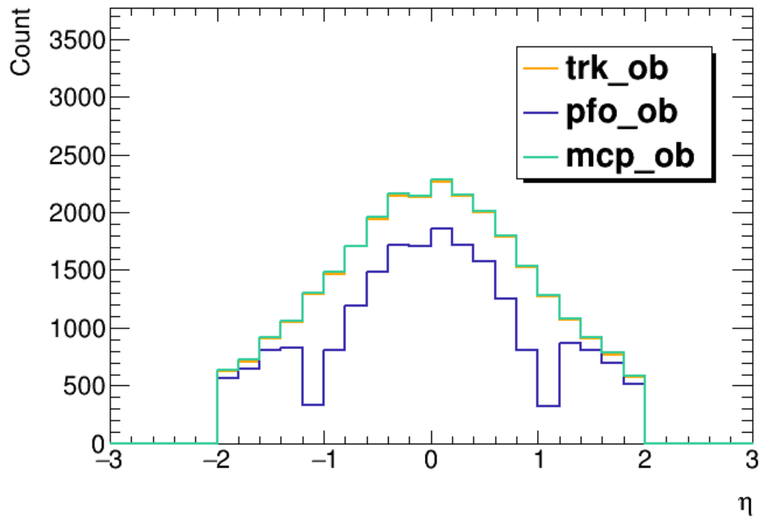


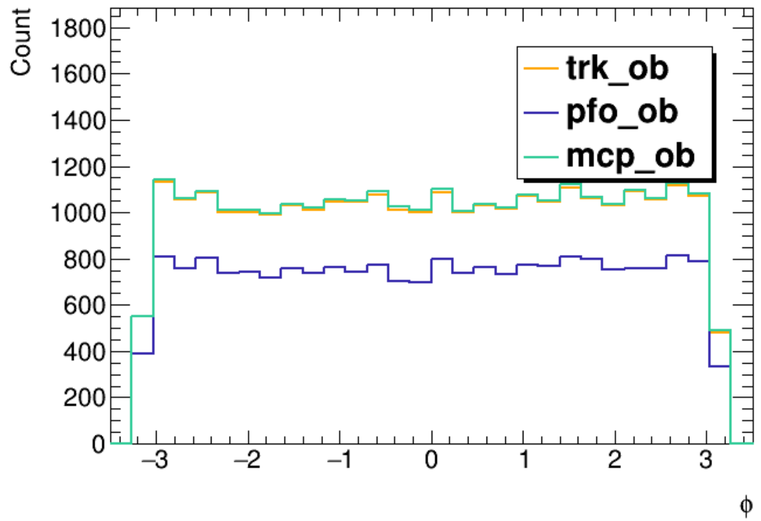
- Good improvement across the board, but some remaining issues:
  - Decreased efficiency at low pT in the barrel only
  - Decreased efficiency at high pT, everywhere
  - Dips in the transition regions (not seen in photons)

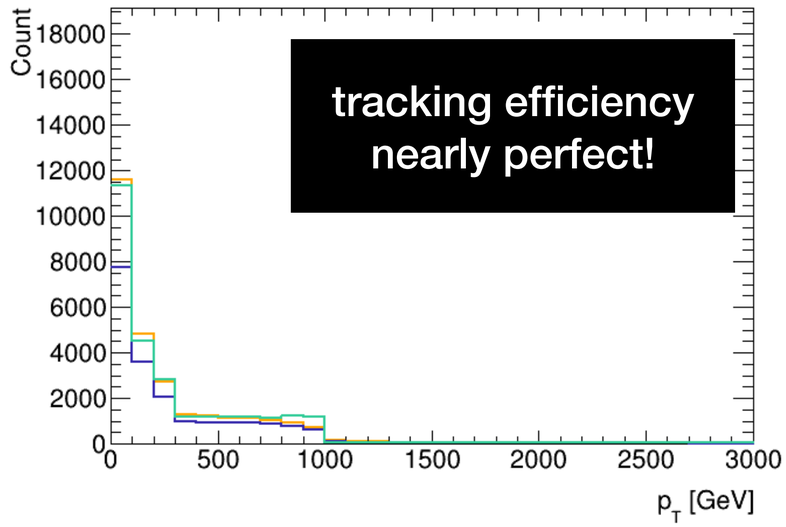


Updated Efficiencies - by stage

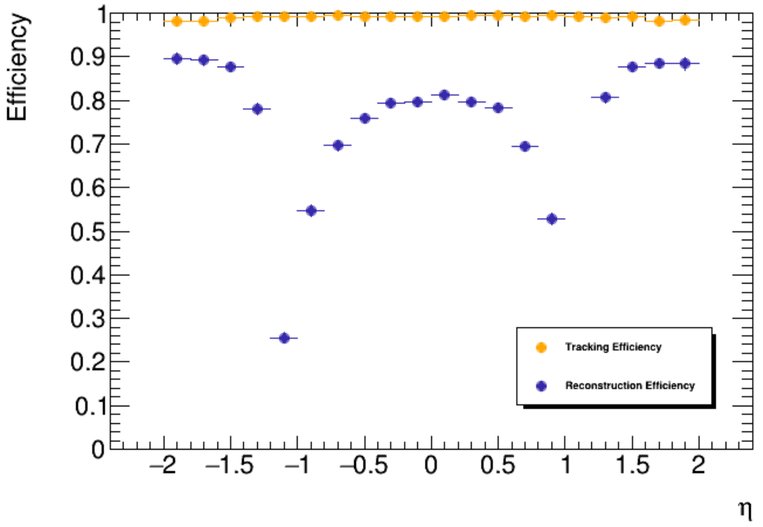
No matching criteria, just has to be a reco electron

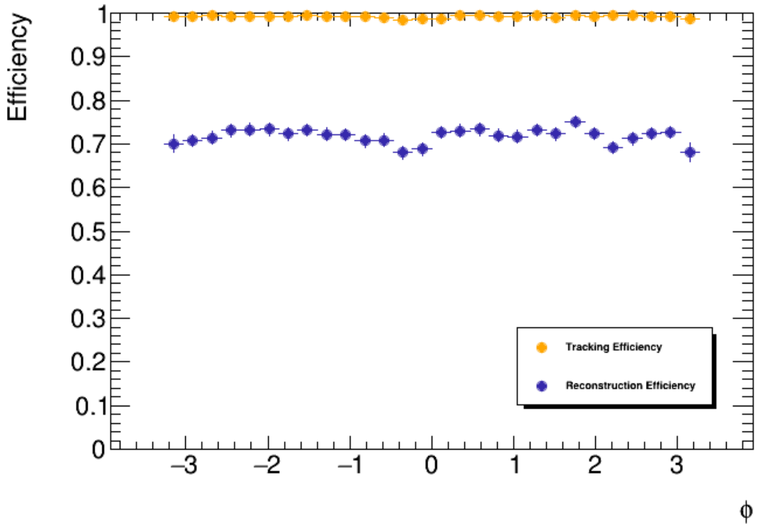


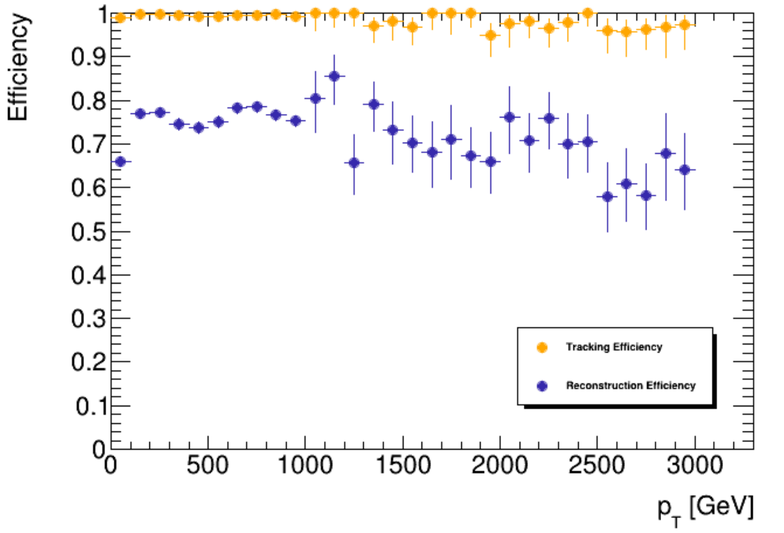




tracking efficiency nearly perfect!



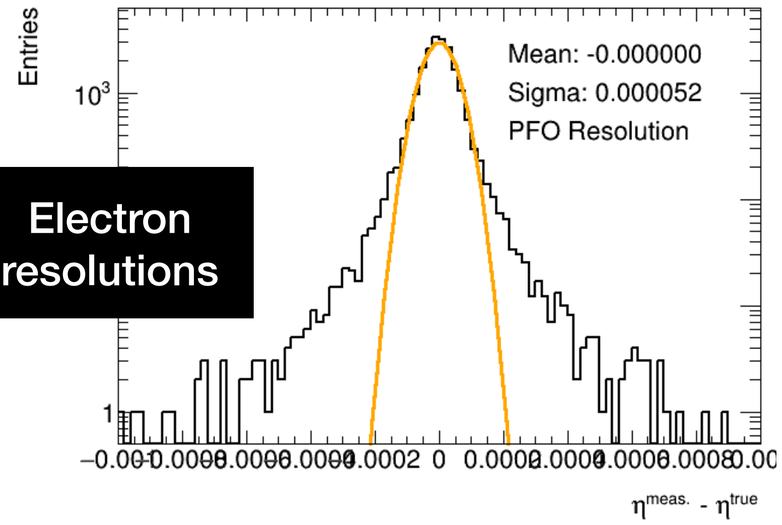


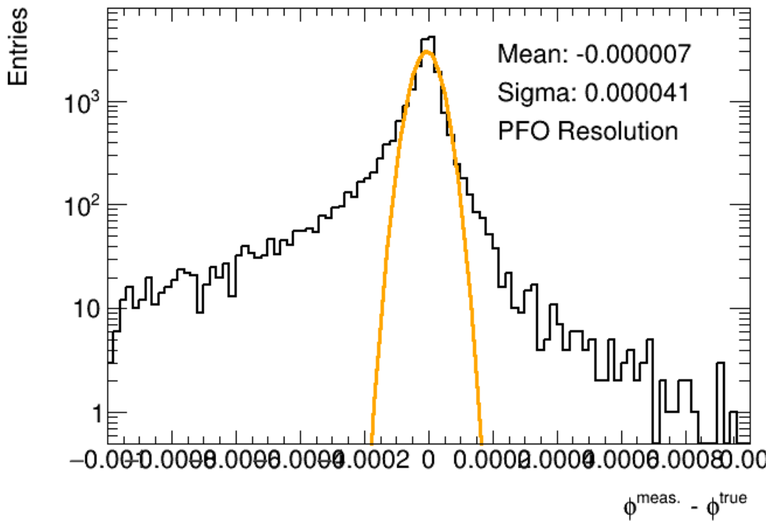


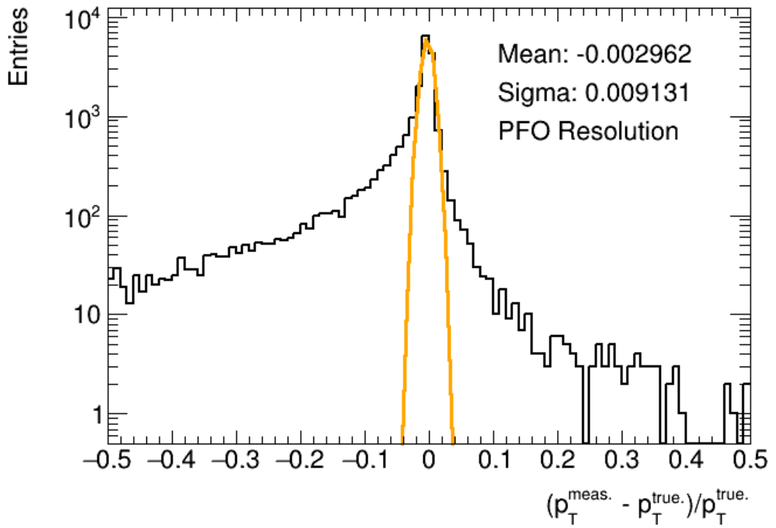
Updated Resolution

No matching criteria, just has to be a reco electron

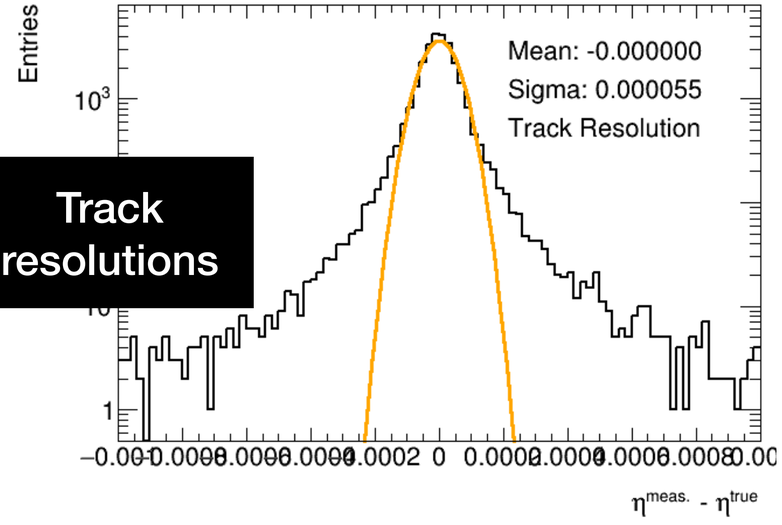
Electron resolutions

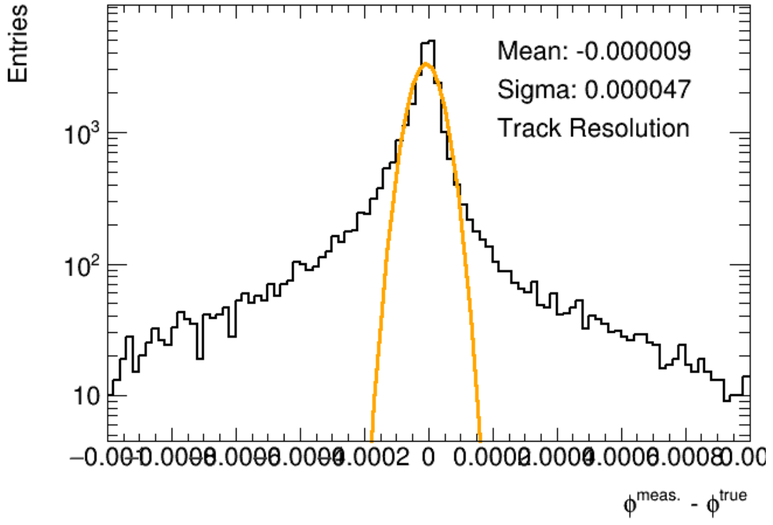


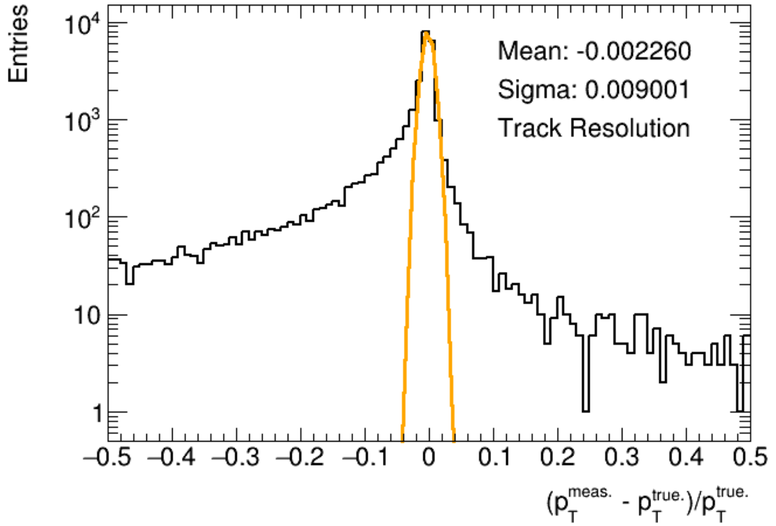




Track resolutions



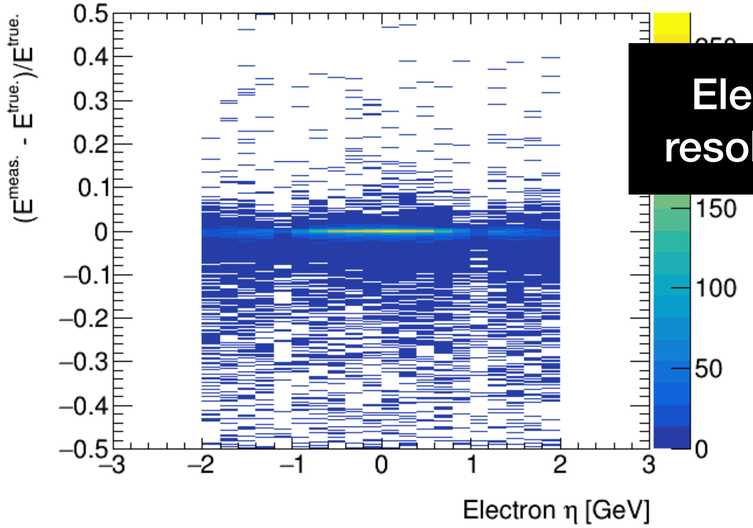


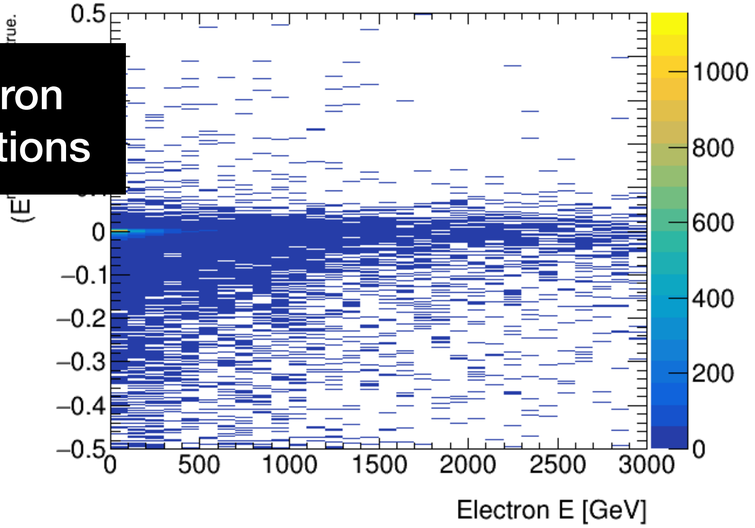


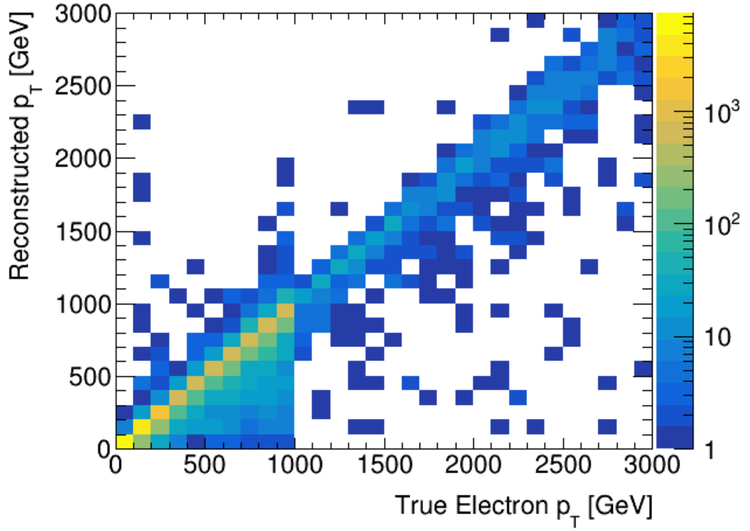
Updated Resolution Trends

No matching criteria, just has to be a reco electron

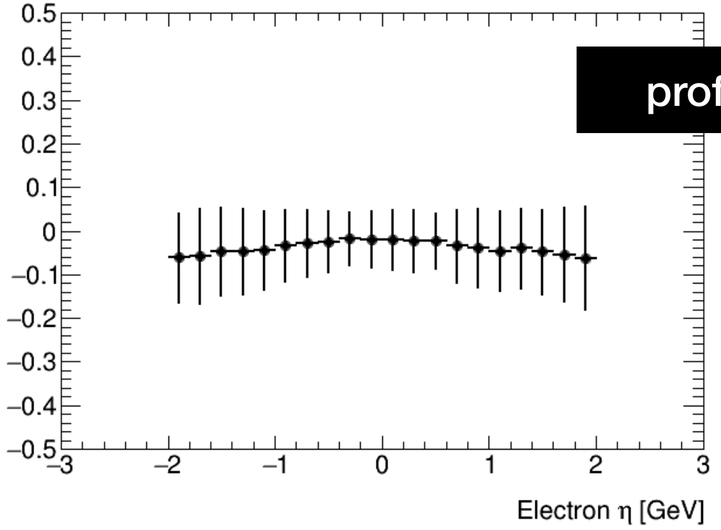
Electron resolutions

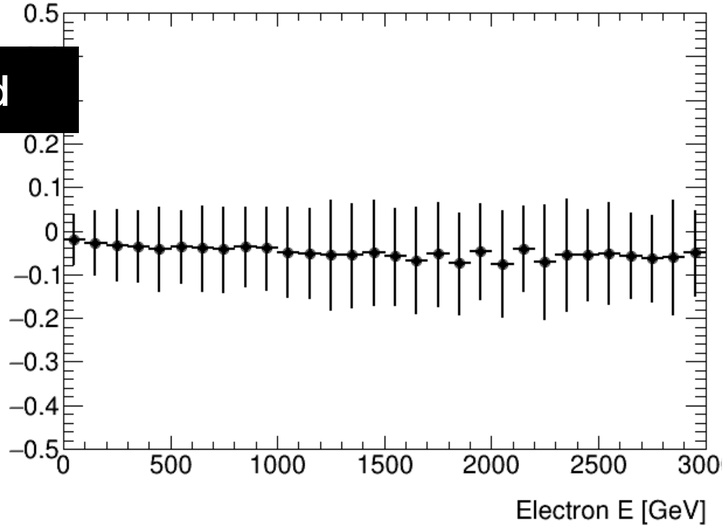


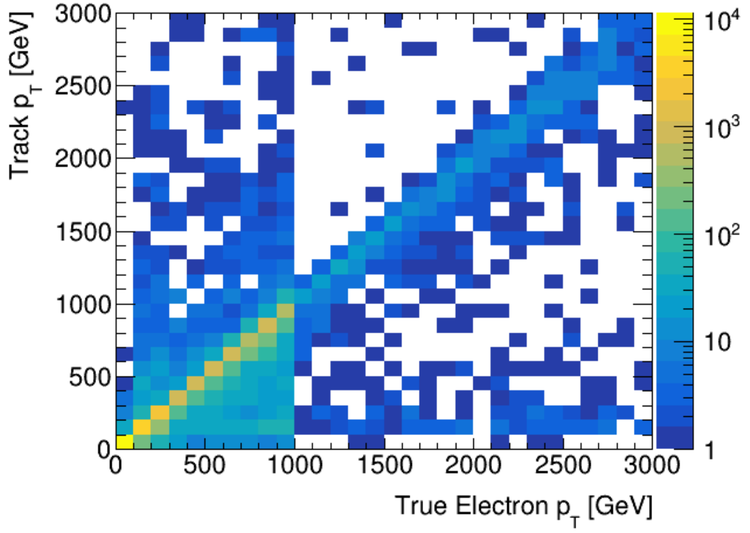




profiled

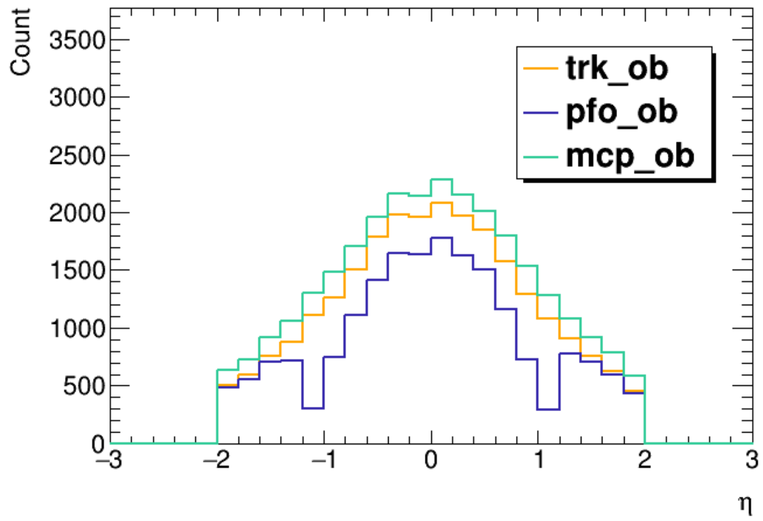


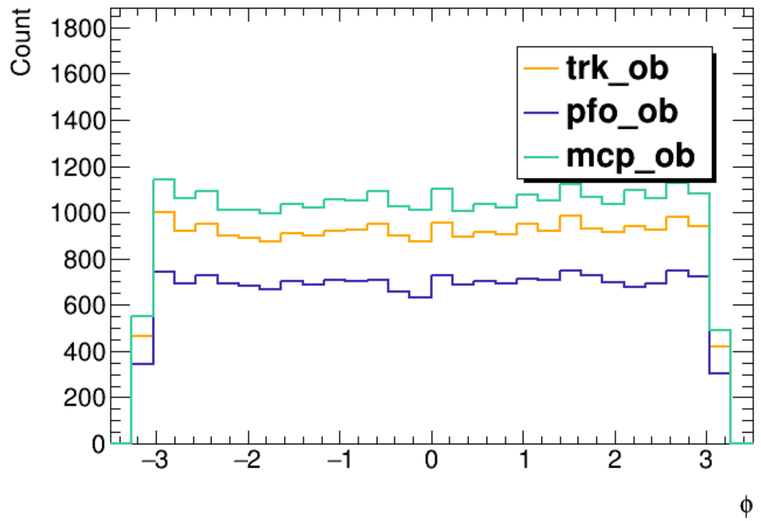


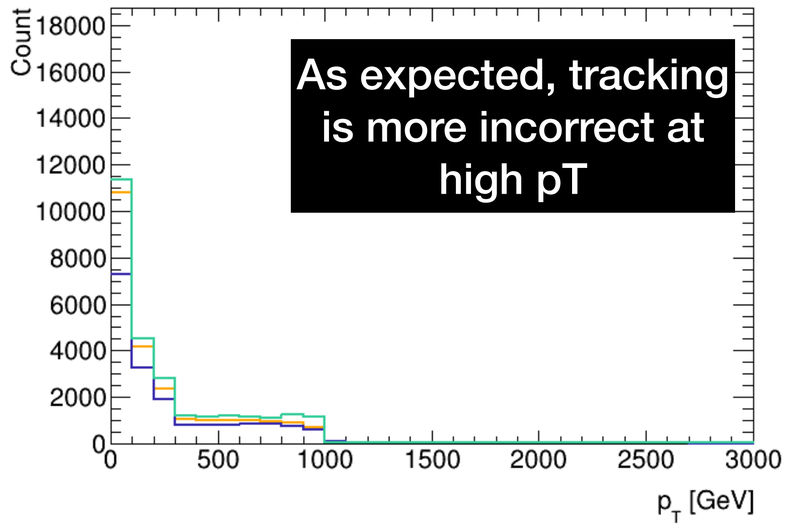


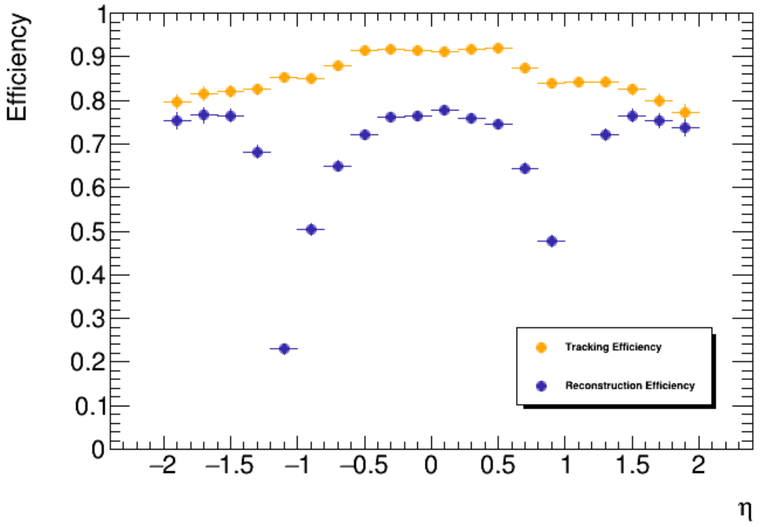
Updated Efficiencies - by stage

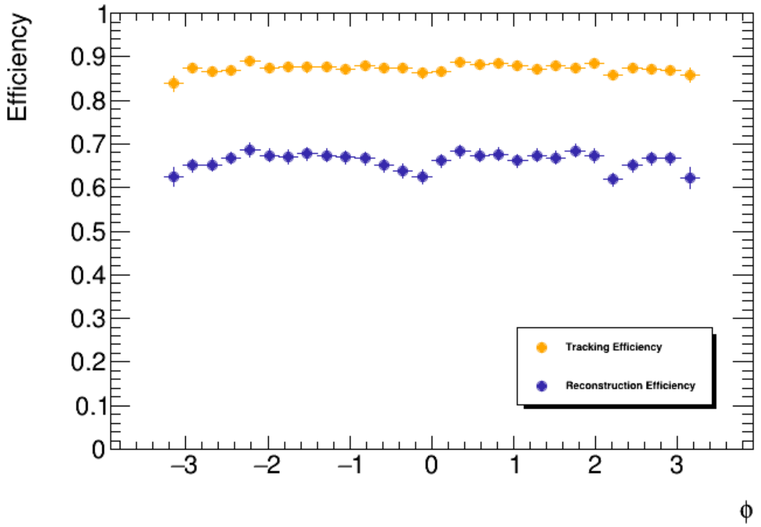
Efficiencies for pT w/i 20%, and reco'd as electrons

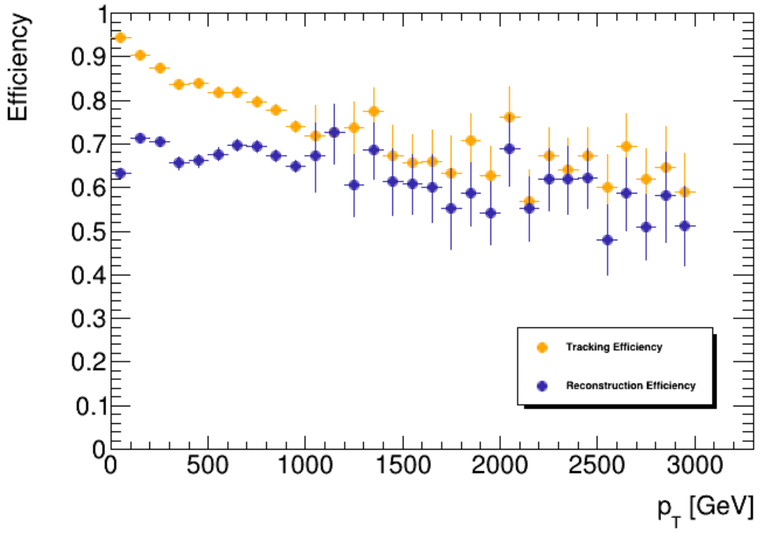








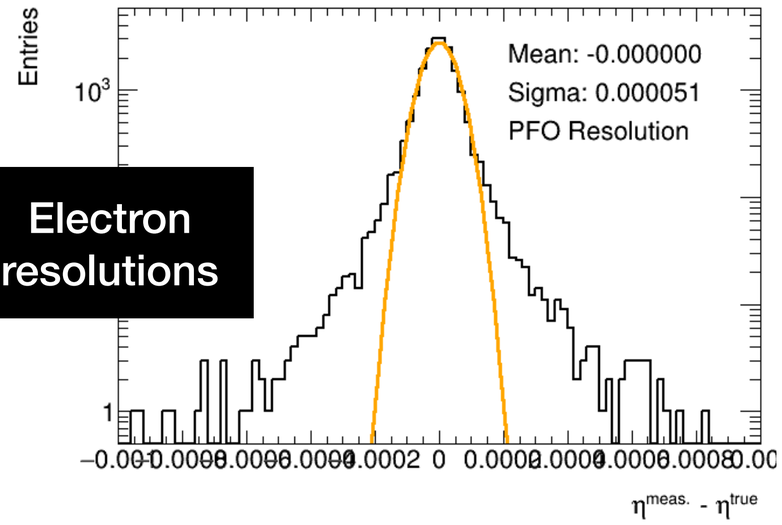


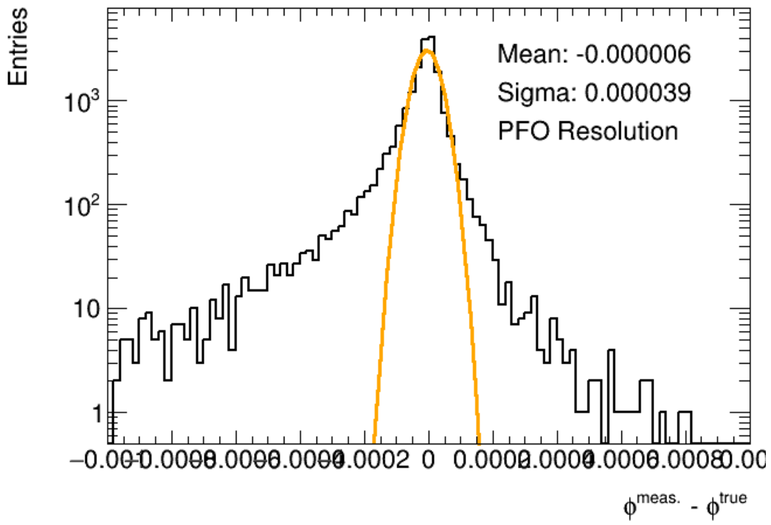


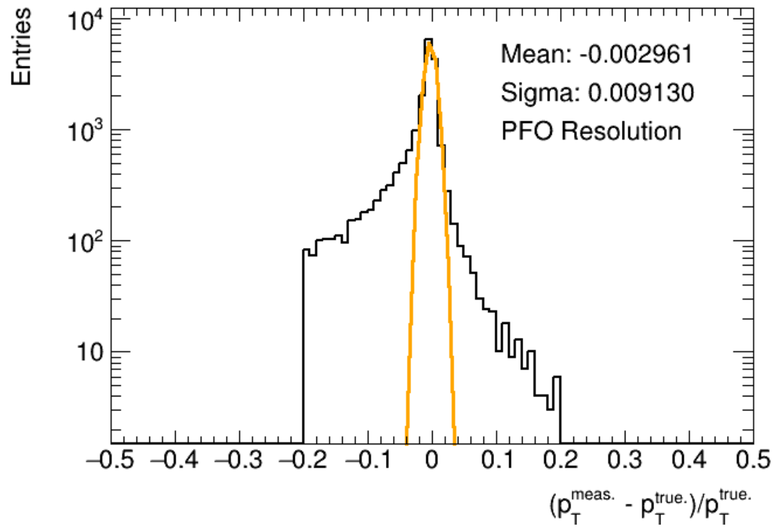
Updated Resolution

Efficiencies for pT w/i 20%, and reco'd as electrons

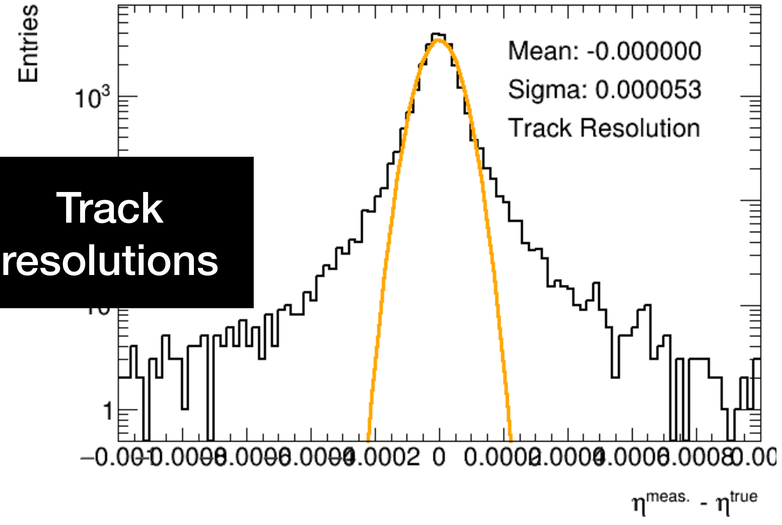
Electron resolutions

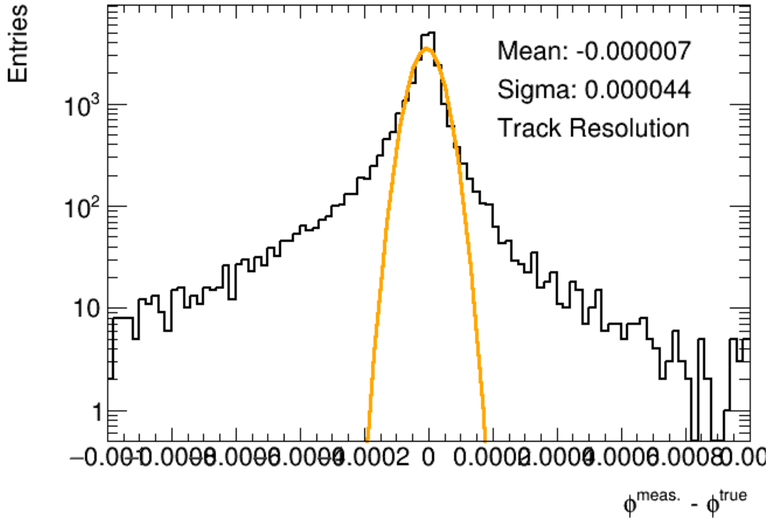


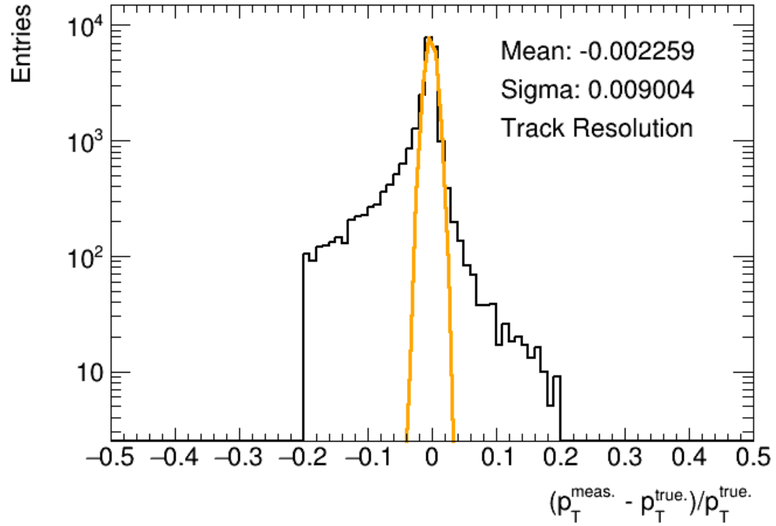




Track resolutions



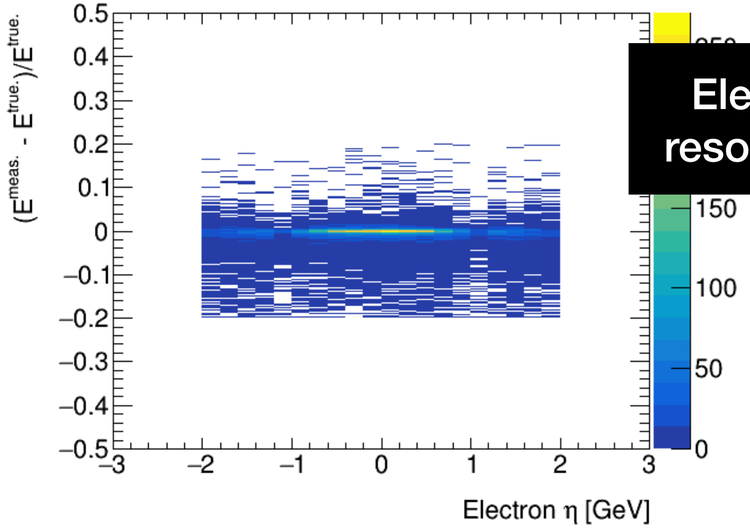


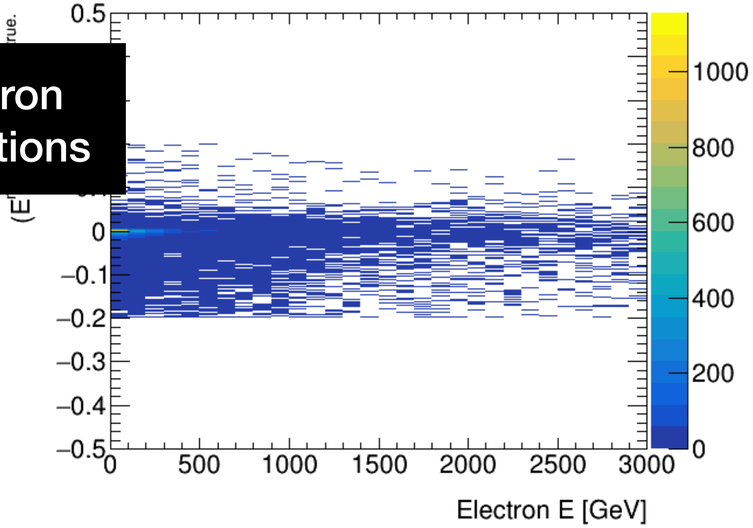


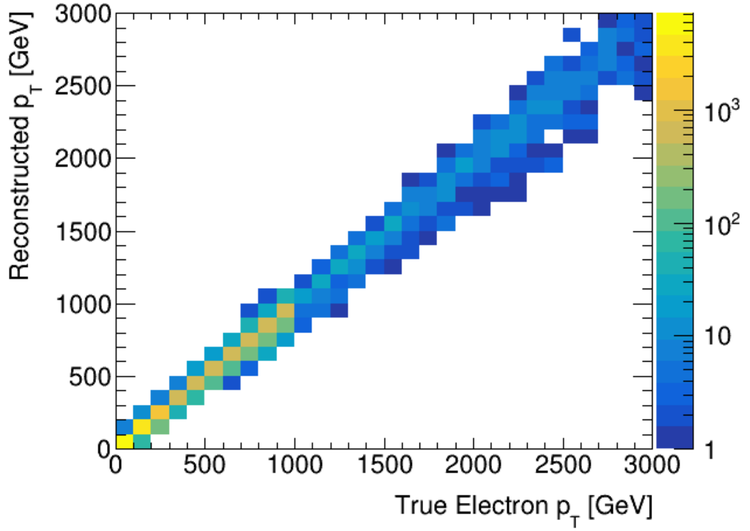
Updated Resolution Trends

Efficiencies for pT w/i 20%, and reco'd as electrons

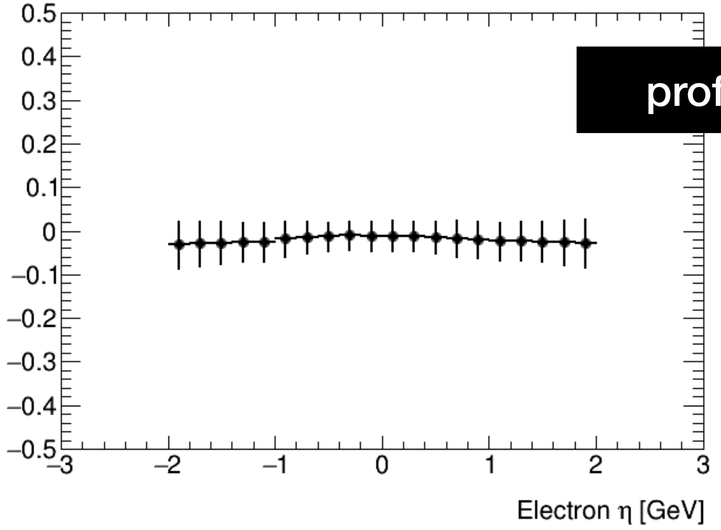
Electron resolutions

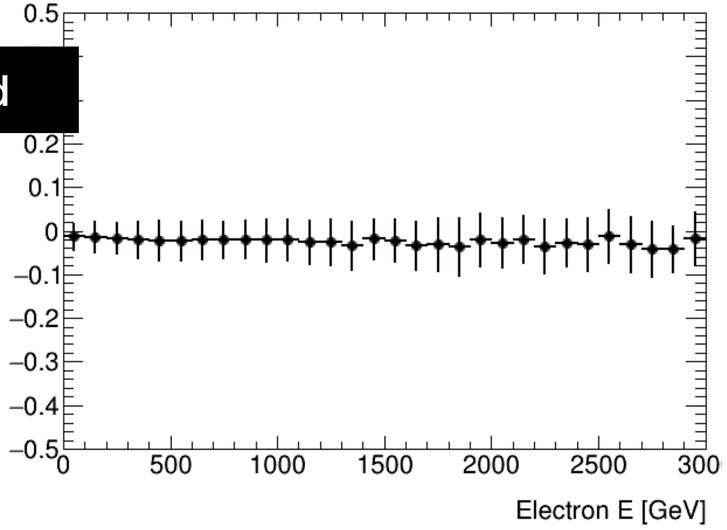


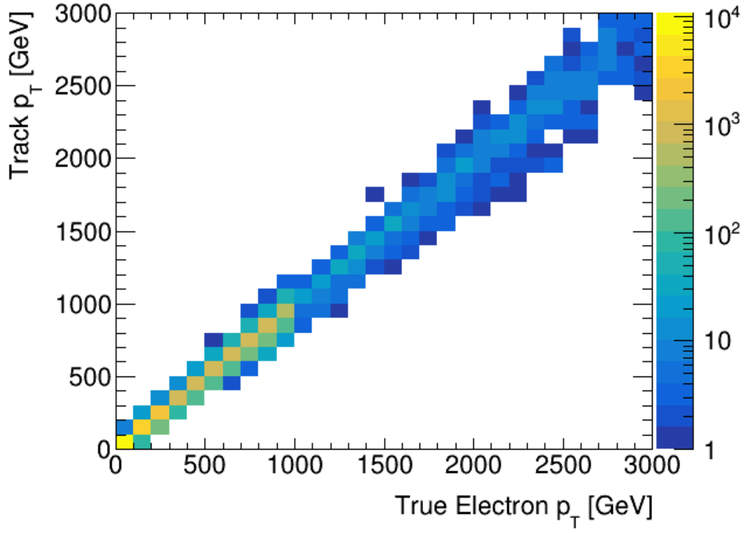




profiled







Conclusions and Next Steps

- Big improvements in efficiency from the latest improvements
- Resolutions look quite good, and energy scale has been corrected though not perfectly
- Next steps are to look further into the electron reconstruction algorithm
  - What is happening in the transition region?
  - Are there other fixes that can get efficiency closer to track reco?