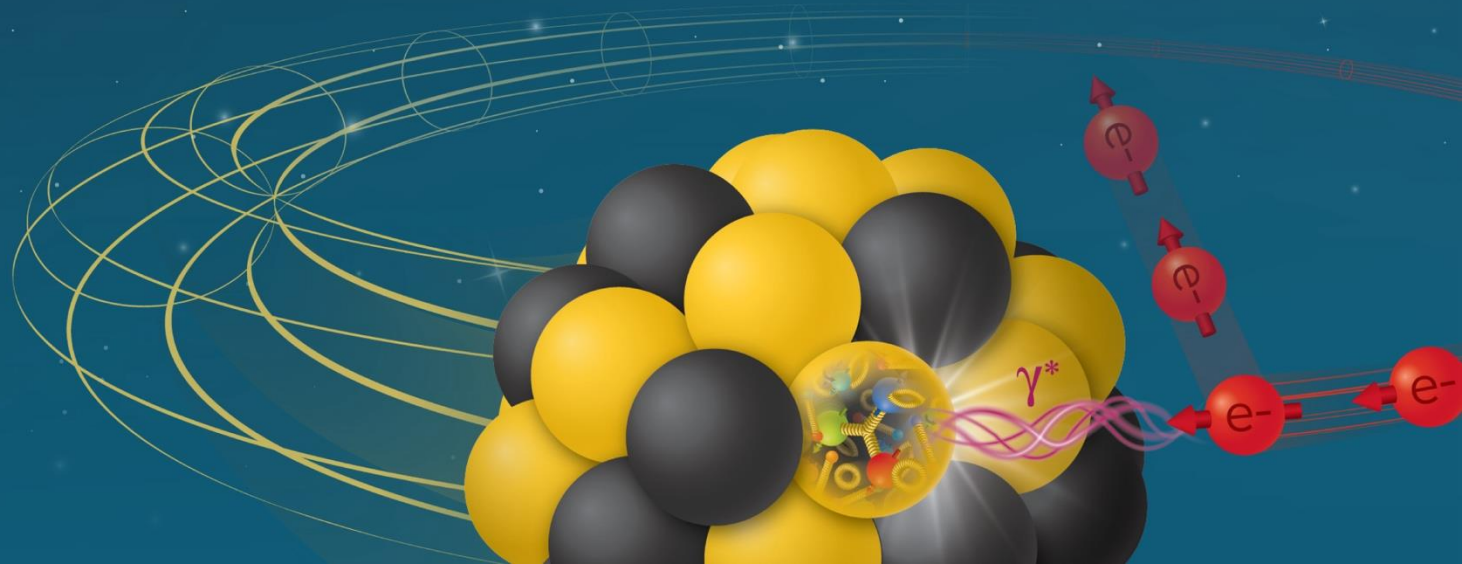
Considerations for Handling Analyses

Alex Jentsch (BNL)
ajentsch@bnl.gov

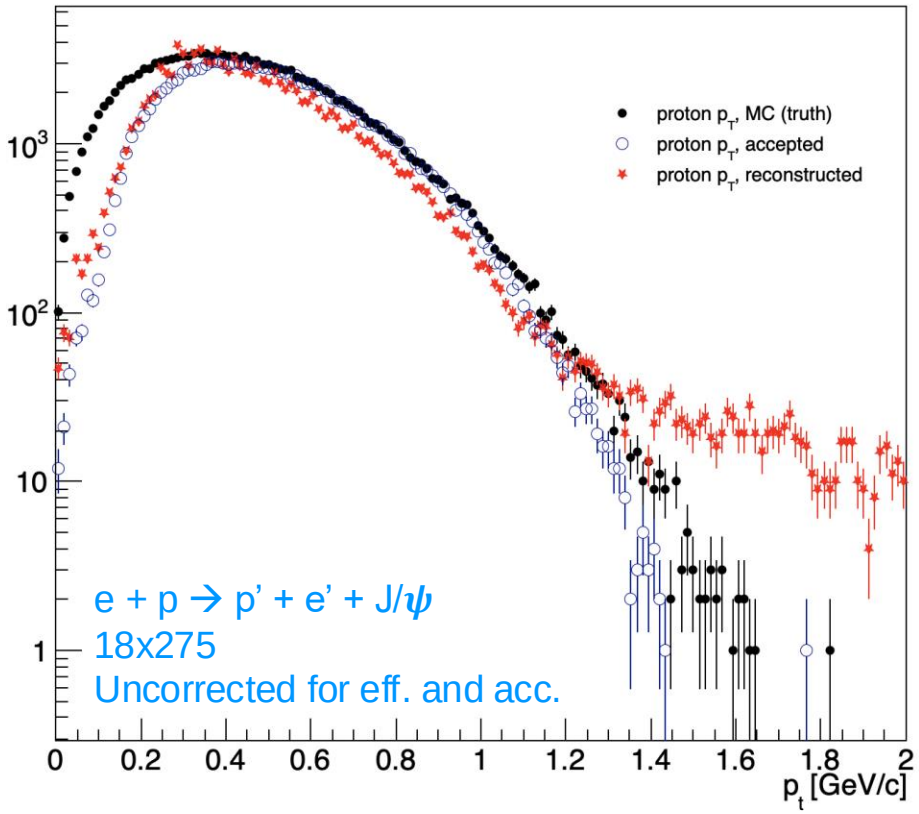
eA Study Group Meeting
Oct. 29th, 2024

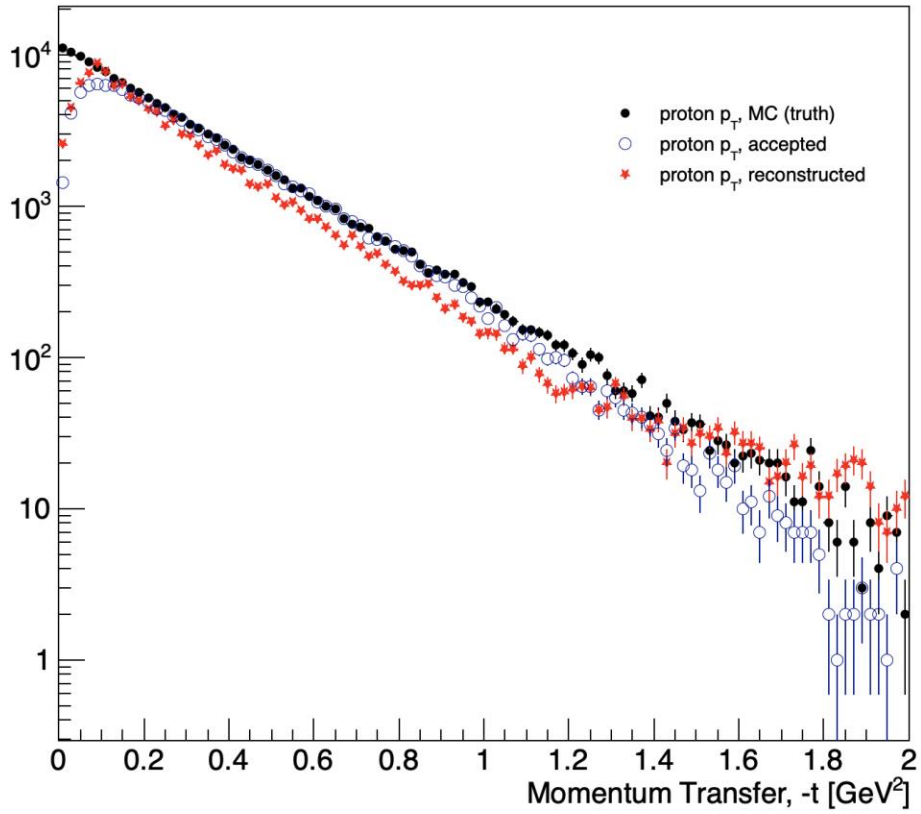


Electron-Ion Collider

Discussion

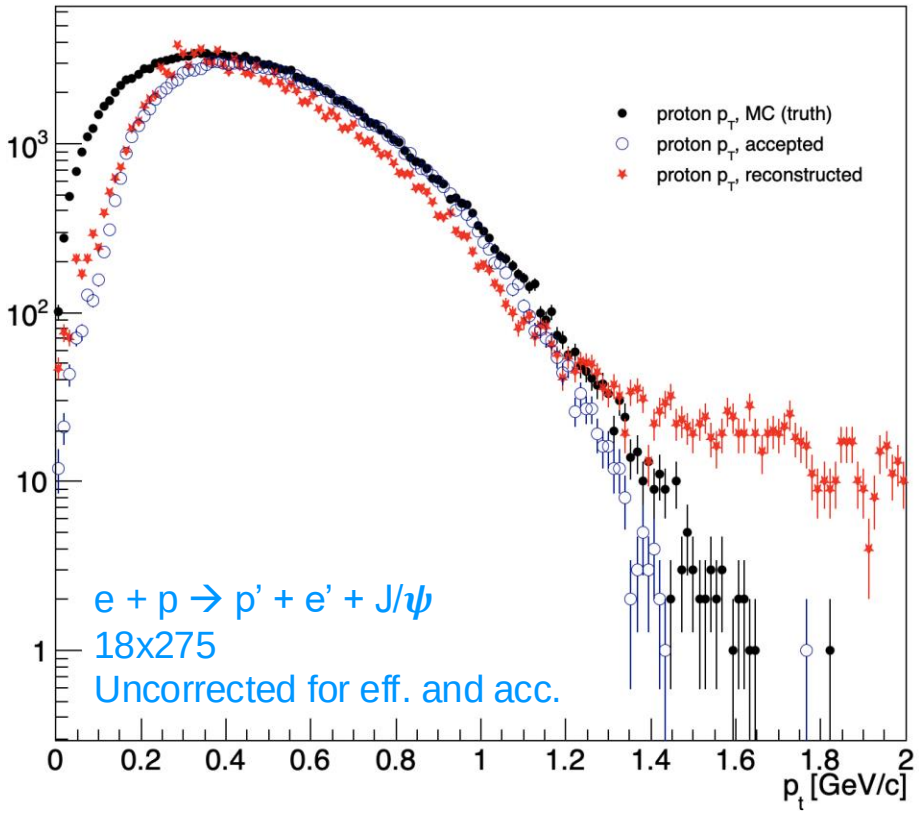
- Most plots coming from EICrecon analyses are simply “raw” plots → reconstructed kinematic variables taken directly from momentum information in output brances.

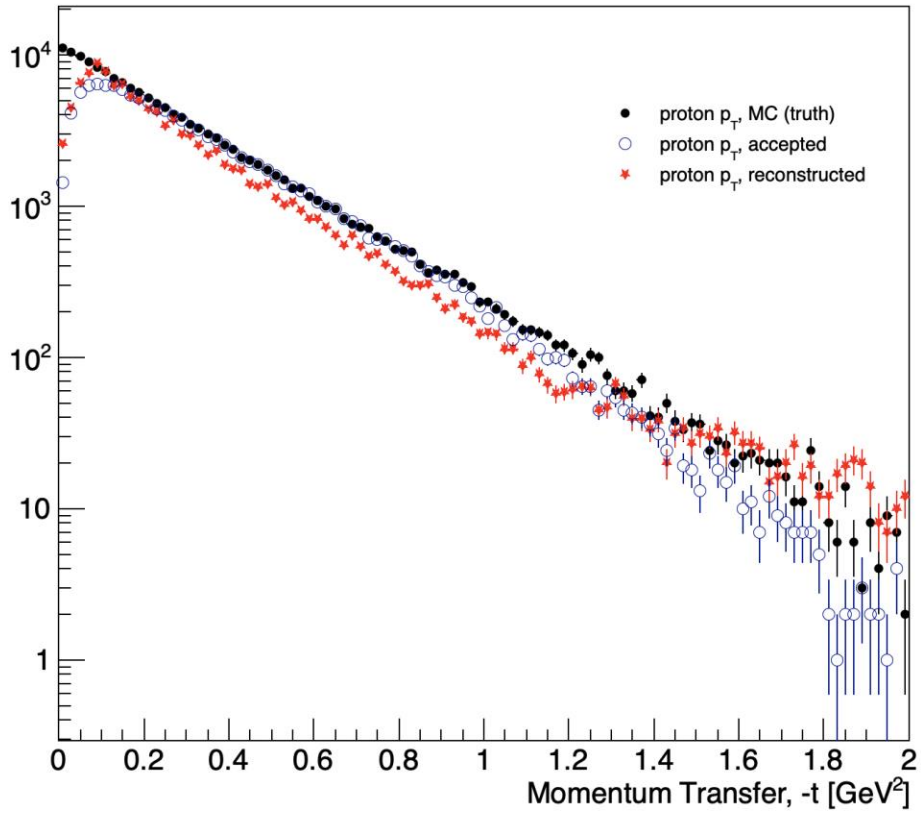




Discussion

- The main issue here is that the red points which represent the reconstructed information cannot be used for a real physics analysis as they are.





preTDR structure (how I see it)

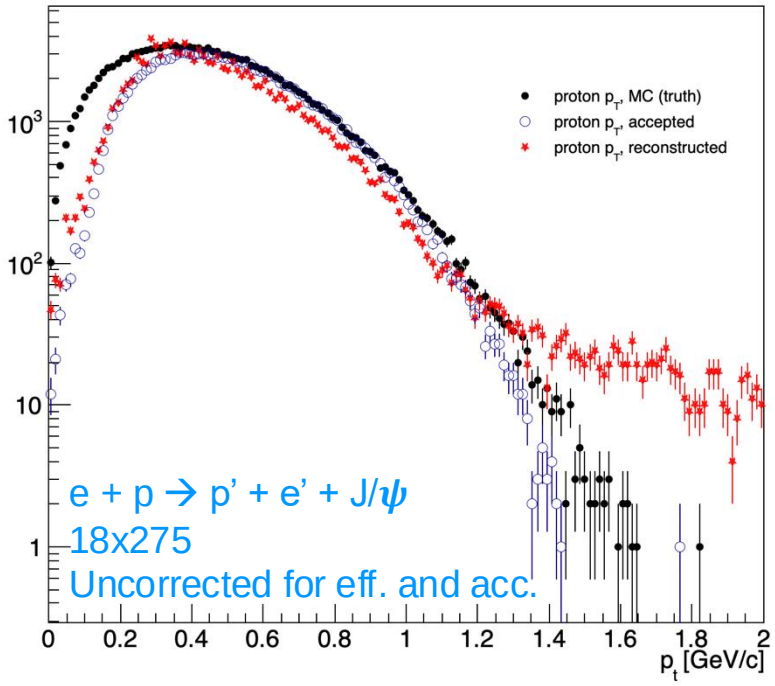
Detector sections

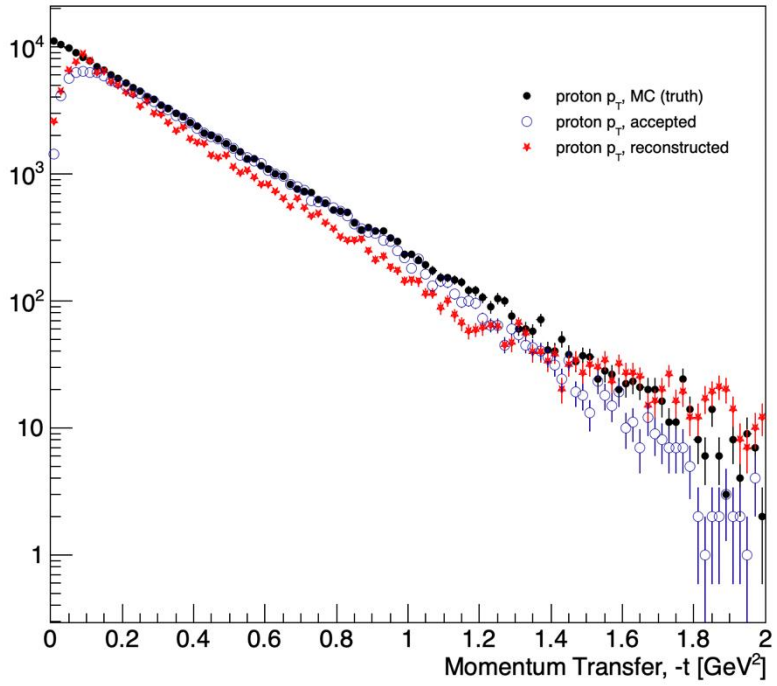
- Showing performance of detector in terms of acceptances, momentum resolution, etc.
- Plots not used by analysts for studying data, but to understand the detector response.
- Physical construction of detectors, etc.

Physics sections

- Studying the capabilities for a full physics analysis.
- Coverage in phase space, sensitivity of particular observables with given luminosity, etc.
- Plots should be corrected for detector effects to compare to other exeriments!
  - Or plots should be explicitly noted as “uncorrected for detector effects”.

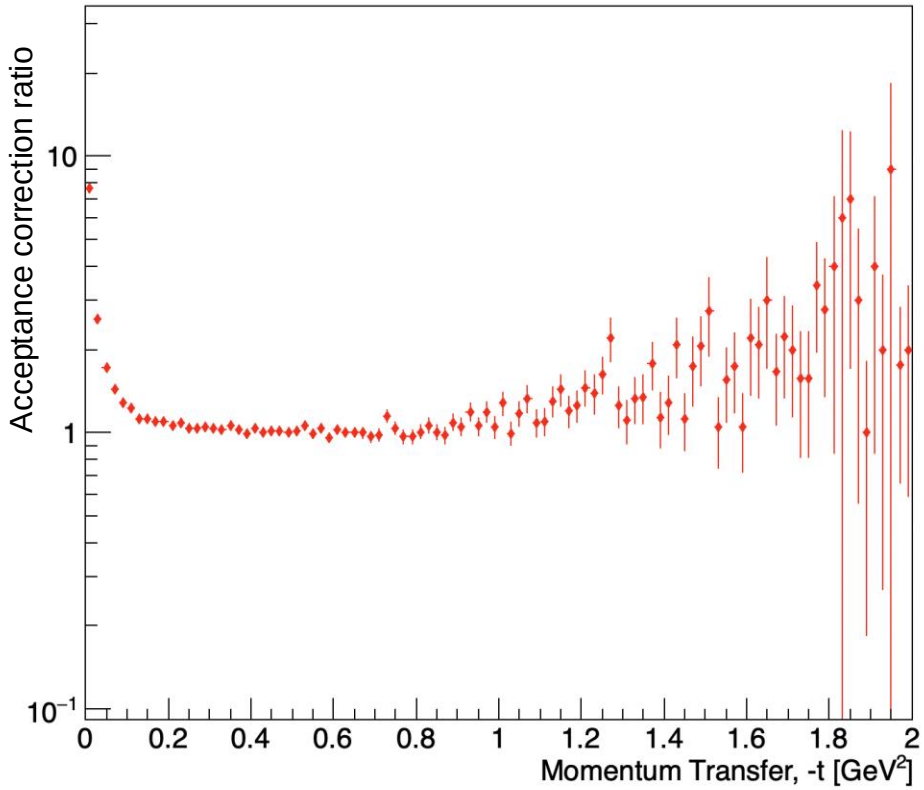
Back to those plots

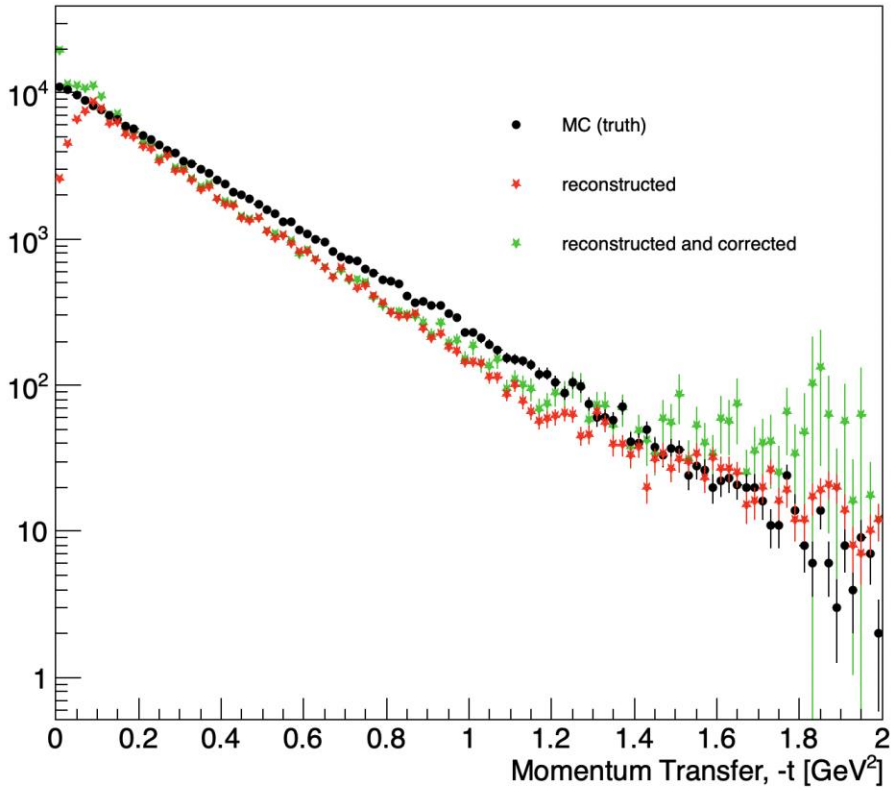




- Need to correct for detector acceptance and efficiency. If the plot is "uncorrected", it needs to be specified.
- Need to generate plots which show phase space coverage for measurements.
  - t-distributions alone don't tell us very much unless you plan to do a full fit + Fourier analysis.
  - Need to also show what we cover in x, Q2, etc. with full ePIC detector.

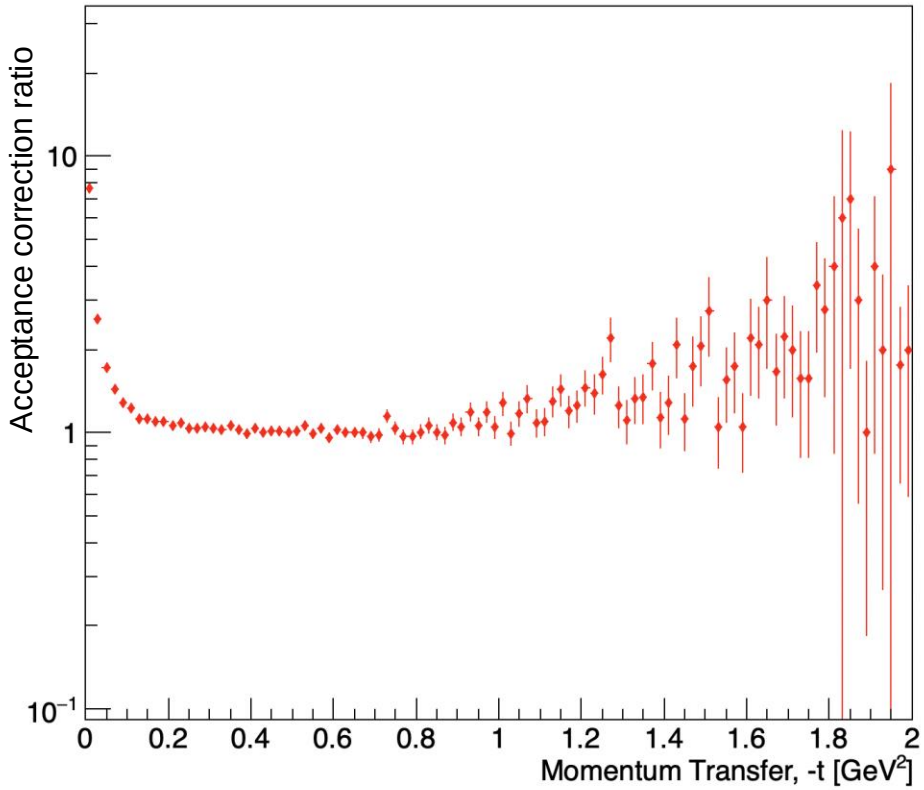
Back to those plots

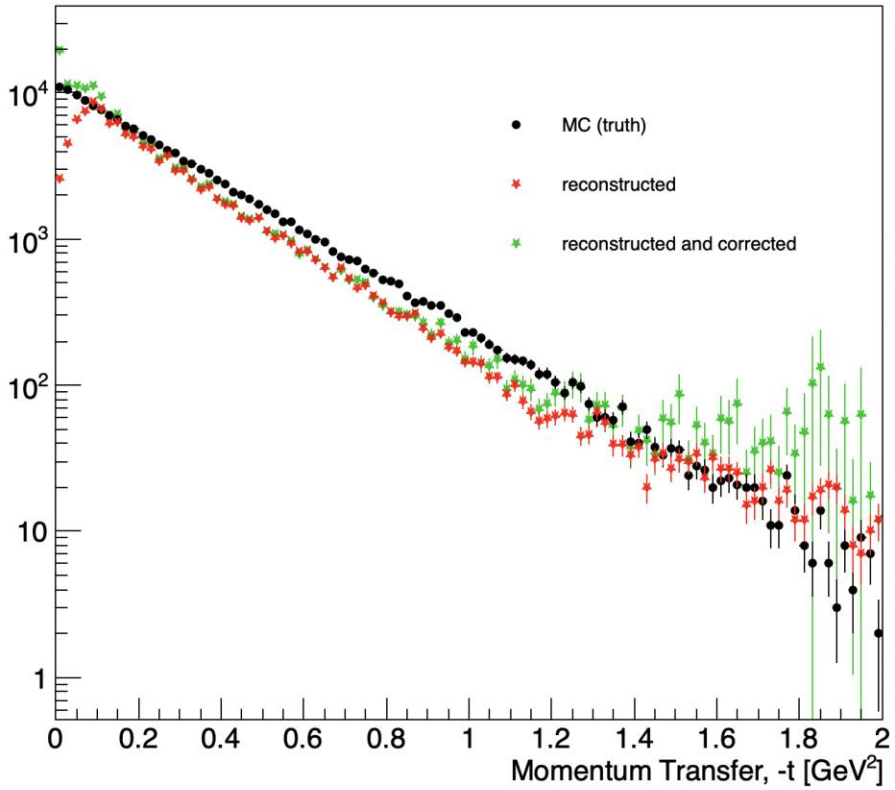




- Rough example of a “corrected” plot (right), where the acceptance has been corrected by taking the ratio of the acceptance and MC plots, and using the resulting distribution to apply a correction factor to the RECO plot.
  - Resulting bin migration is essentially only the remaining effect of smearing itself → will be improved with better reco and can potentially be improved with unfolding.

Back to those plots





- Similar discussion to be had for what “lumi” scaling to use.
  - Normally, produce “unreasonably large” amount of data, and then scale the errors to the appropriate lumi.
  - The assumed lumi needs to be noted on the plots, along with correctly scaled errors.