

Preliminary look at DIS reconstruction and analysis

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3rd ECCE Simulation Workshop
July 8, 2021



Overview

- Analysis module for DIS reconstruction
- Testing on initial production samples:
 - Single-electron sample: resolution
 - Pythia SIDIS sample: kinematic distributions
- Summary and some question

Analysis module for DIS

- Goal: develop analysis module for DIS reconstruction
 - Run directly on fun4all/DST
(not post-processing of event evaluators)
 - Get truth and reconstructed information
 - Include multiple reconstruction methods

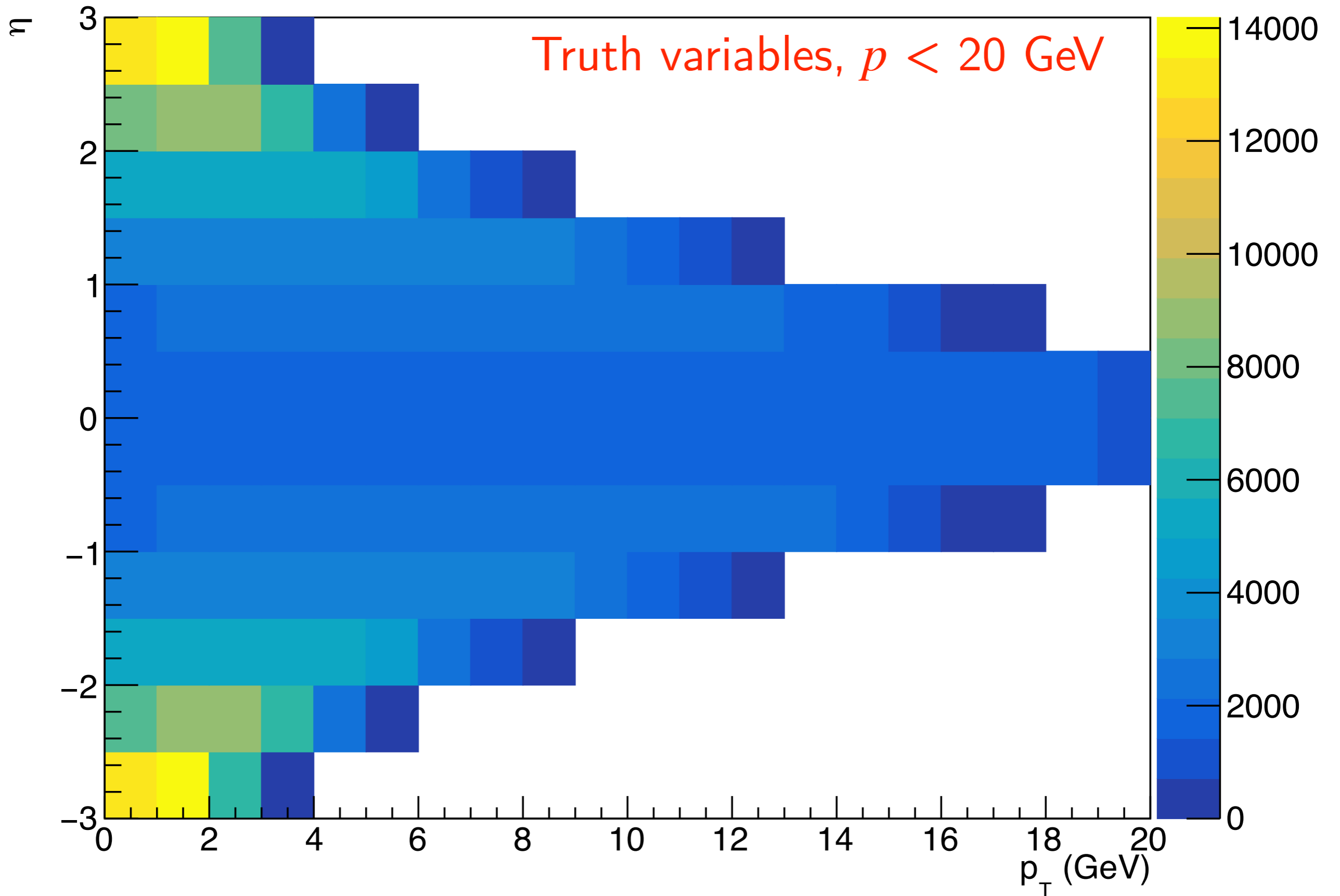
DISReconstruction module

- Module framework in place
- Currently only lepton reconstruction implemented
 - Looking at track node only
 - Truth track matching based on `Tracking_Eval`
 - Using `SvtxTrack` (instead of `SvtxTrack_FastSim`)
- Outputs kinematic variables (as well as track information)
- Need to implement...
 - Jacquet-Blondel and double angle reconstruction (require calorimeter information)
 - Actual PID (not truth PID)

Testing on initial samples

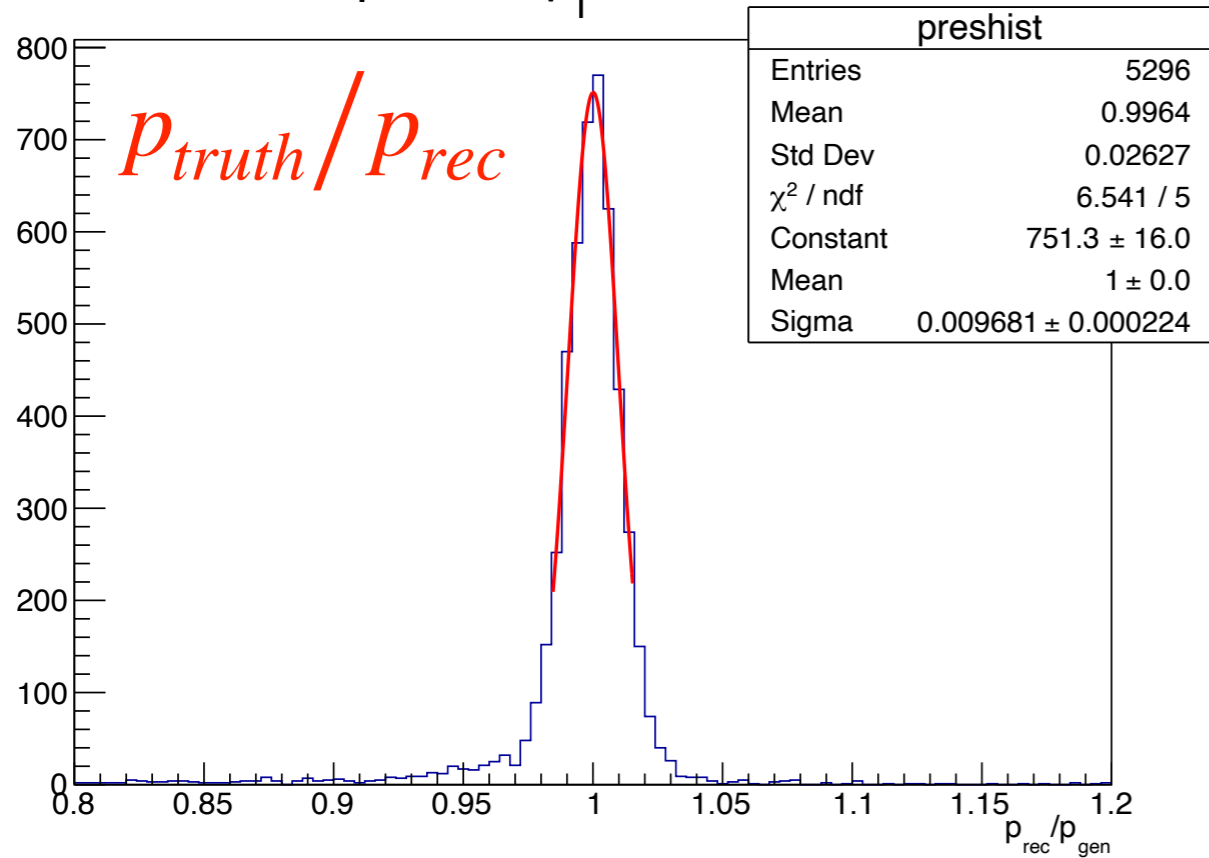
- Single-electron sample
 - Look at (p, θ, ϕ) resolutions in (η, p_T) bins
- ep 18x100 GeV SIDIS samples (low Q^2 , high Q^2)
 - Compare truth/reconstructed kinematic distributions
- Note this is a bit statistics-limited

Single electron



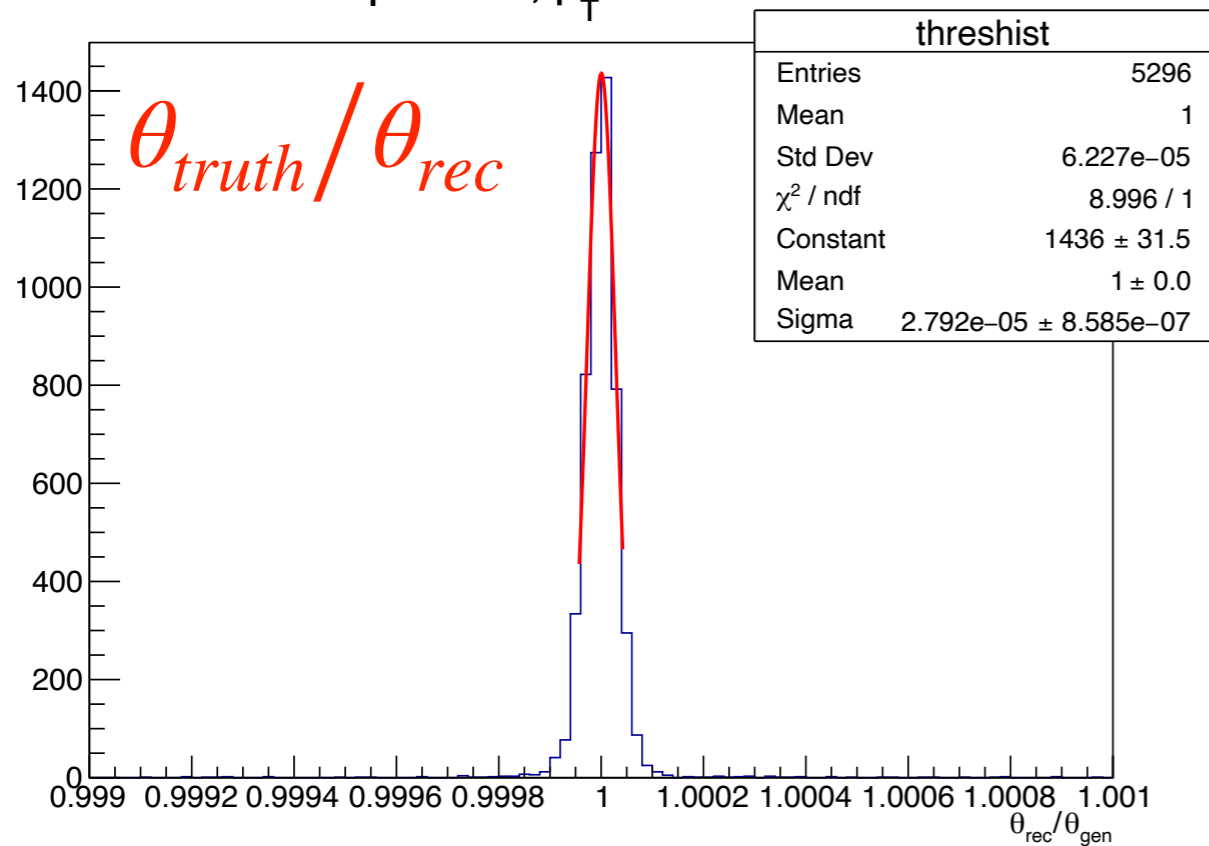
Quantifying resolution

$\eta = -1.75, p_T = 4.5 \text{ GeV}/c$

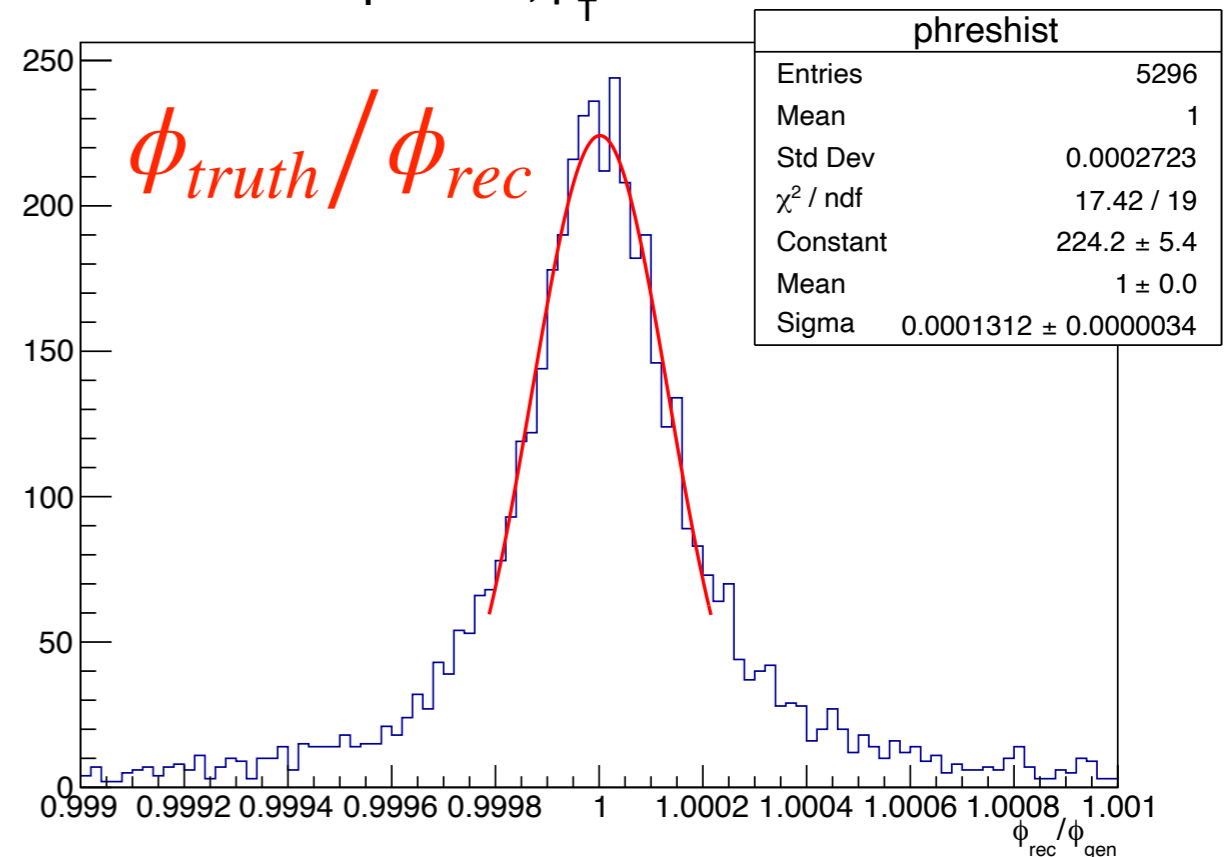


Get width of
Gaussian fit

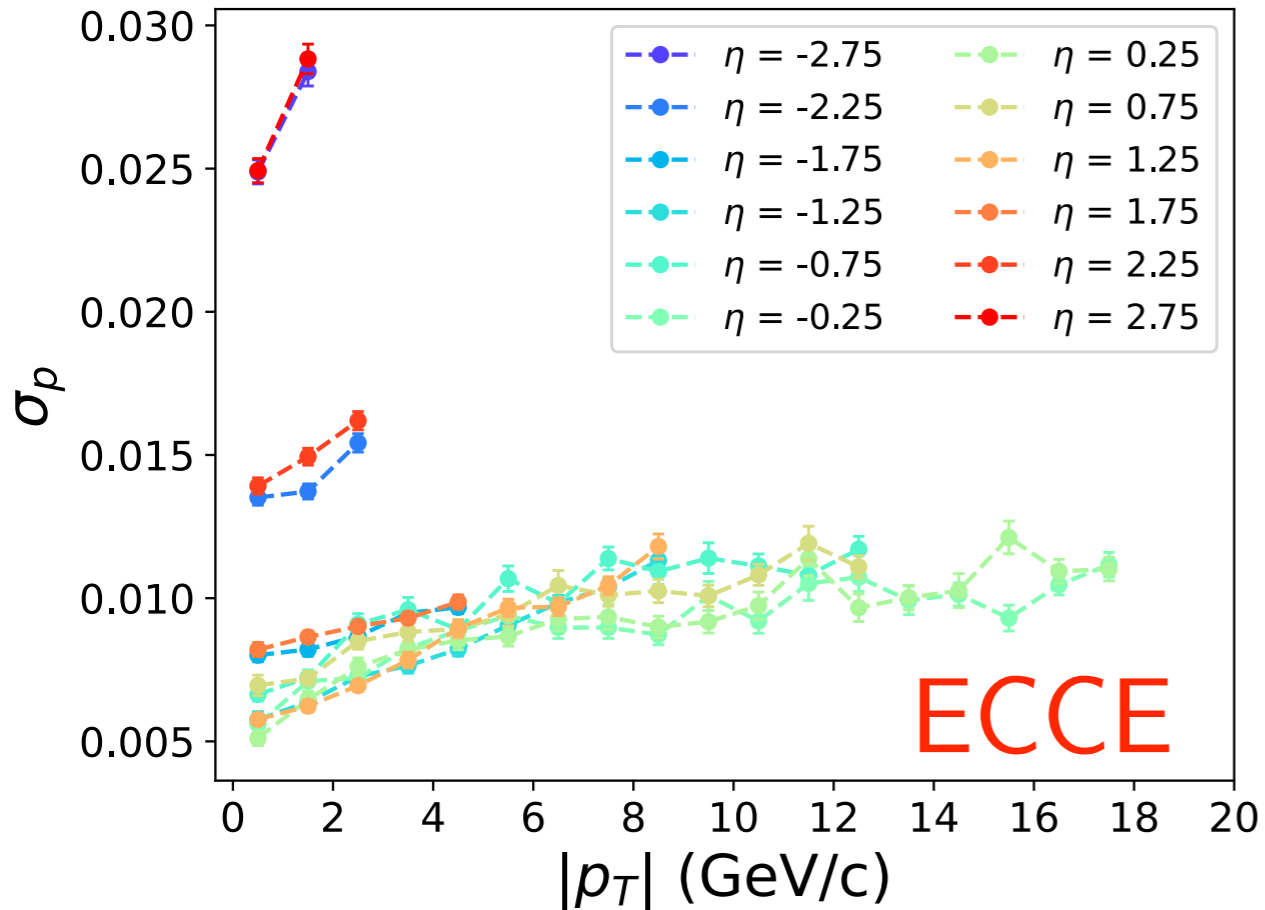
$\eta = -1.75, p_T = 4.5 \text{ GeV}/c$



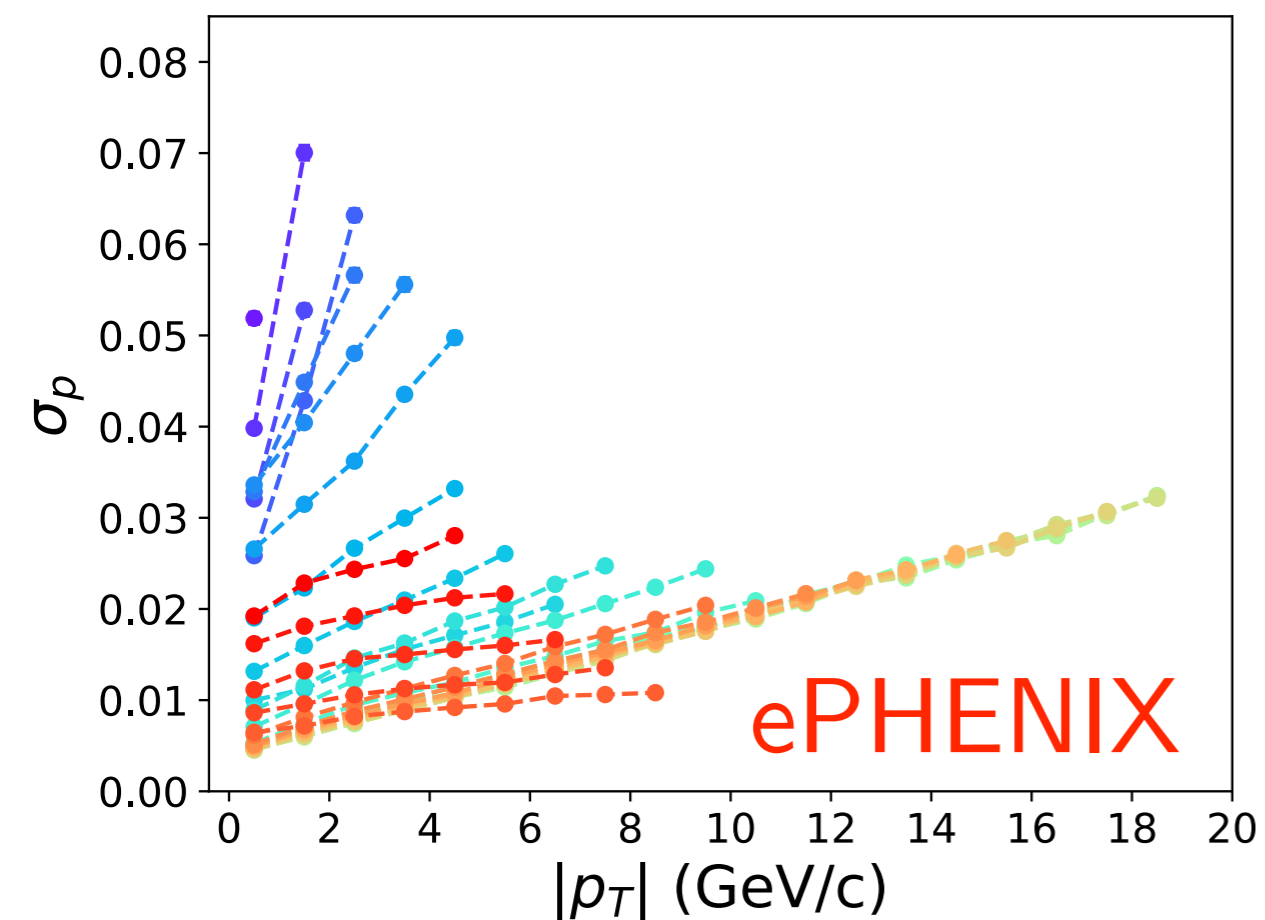
$\eta = -1.75, p_T = 4.5 \text{ GeV}/c$



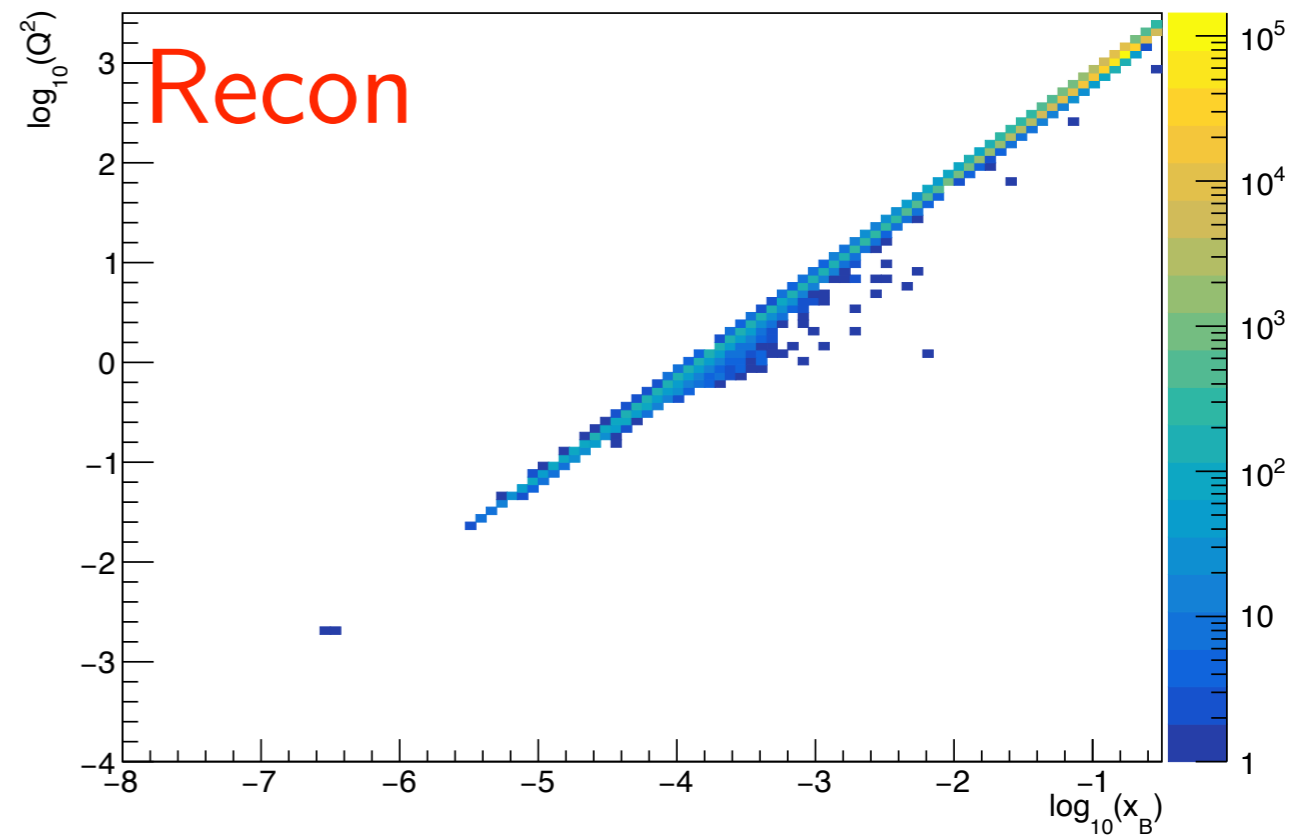
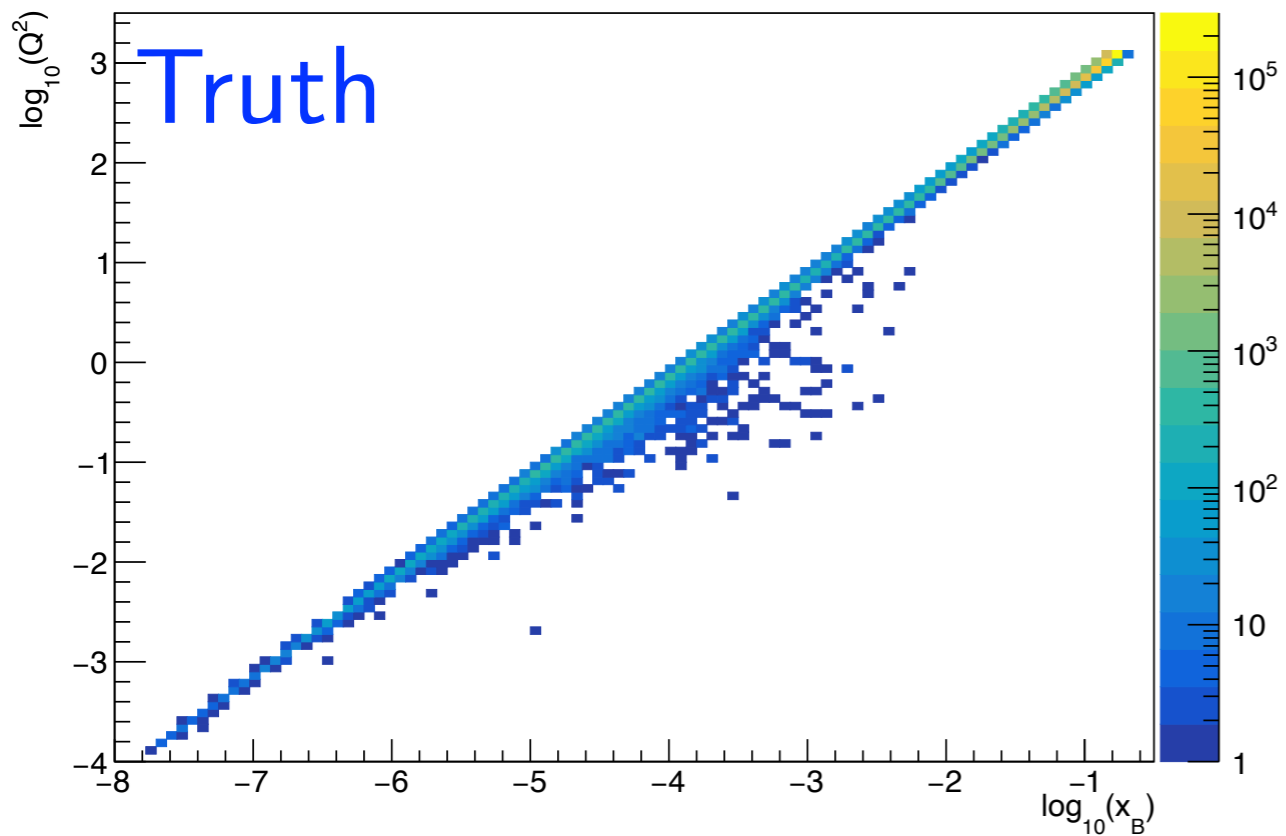
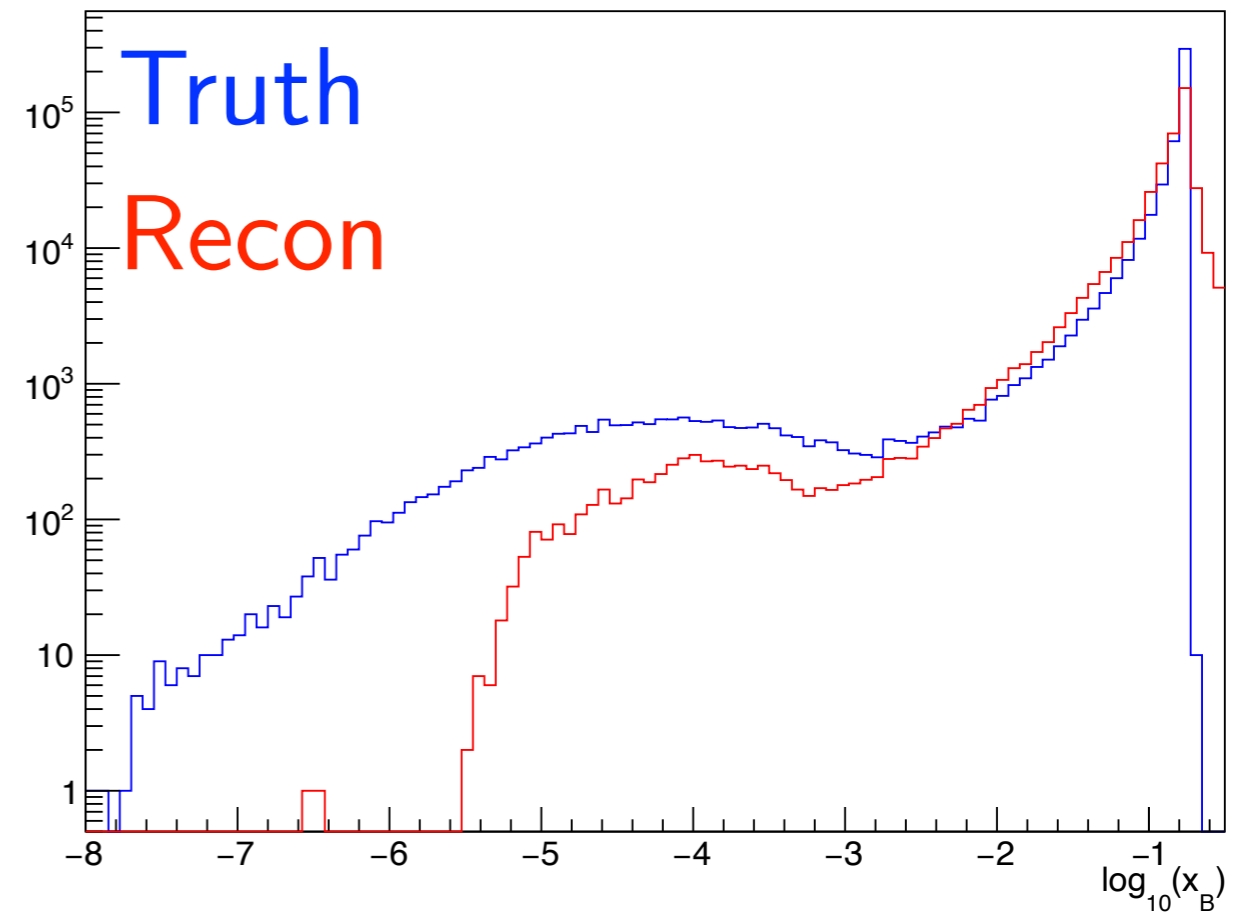
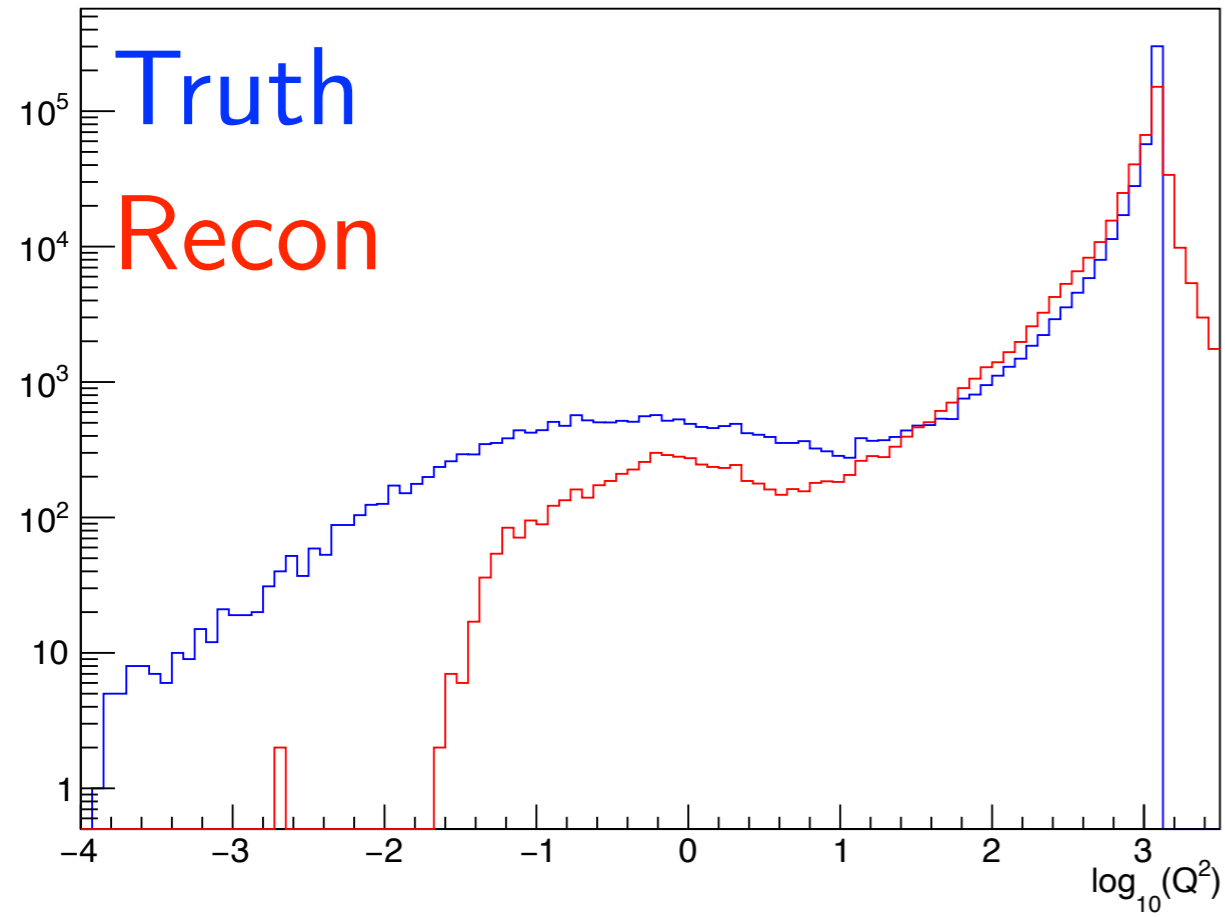
Comparison to previous study



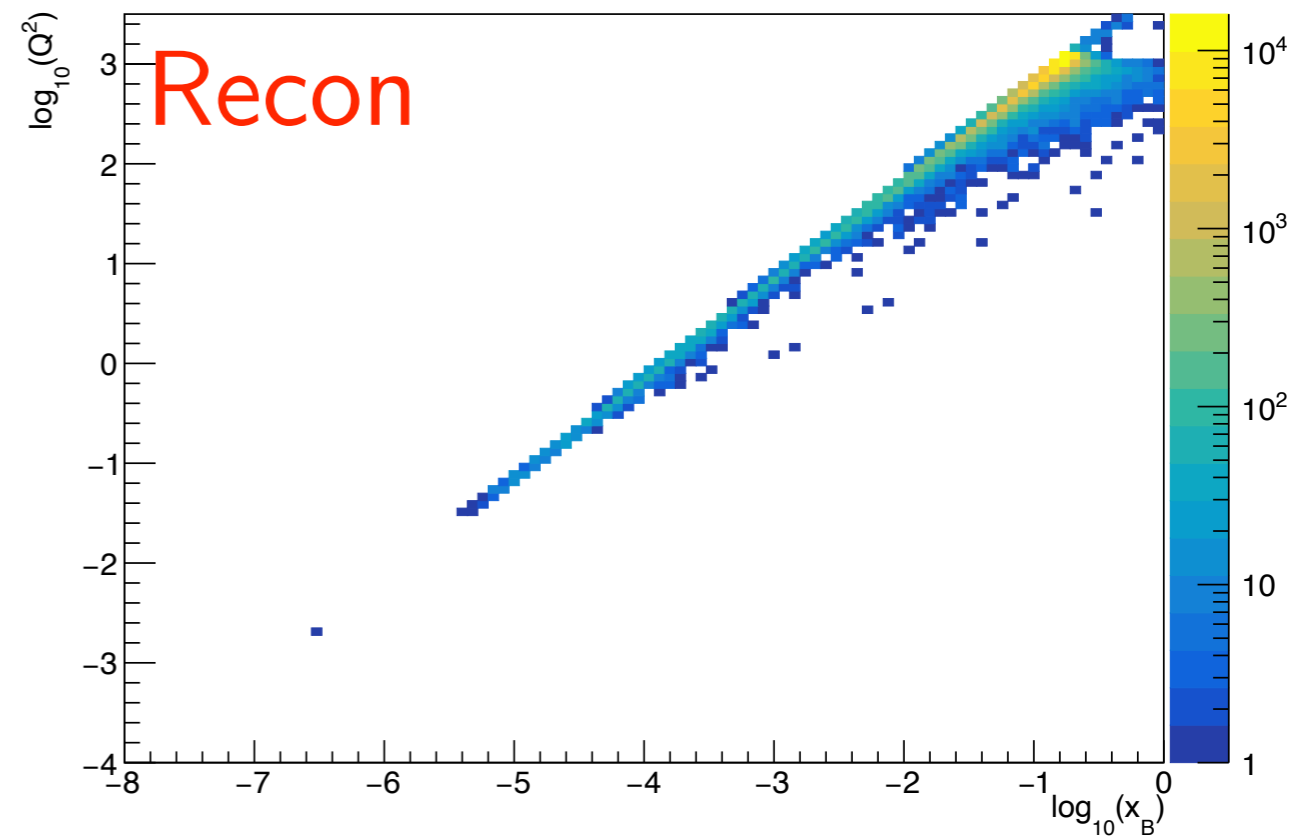
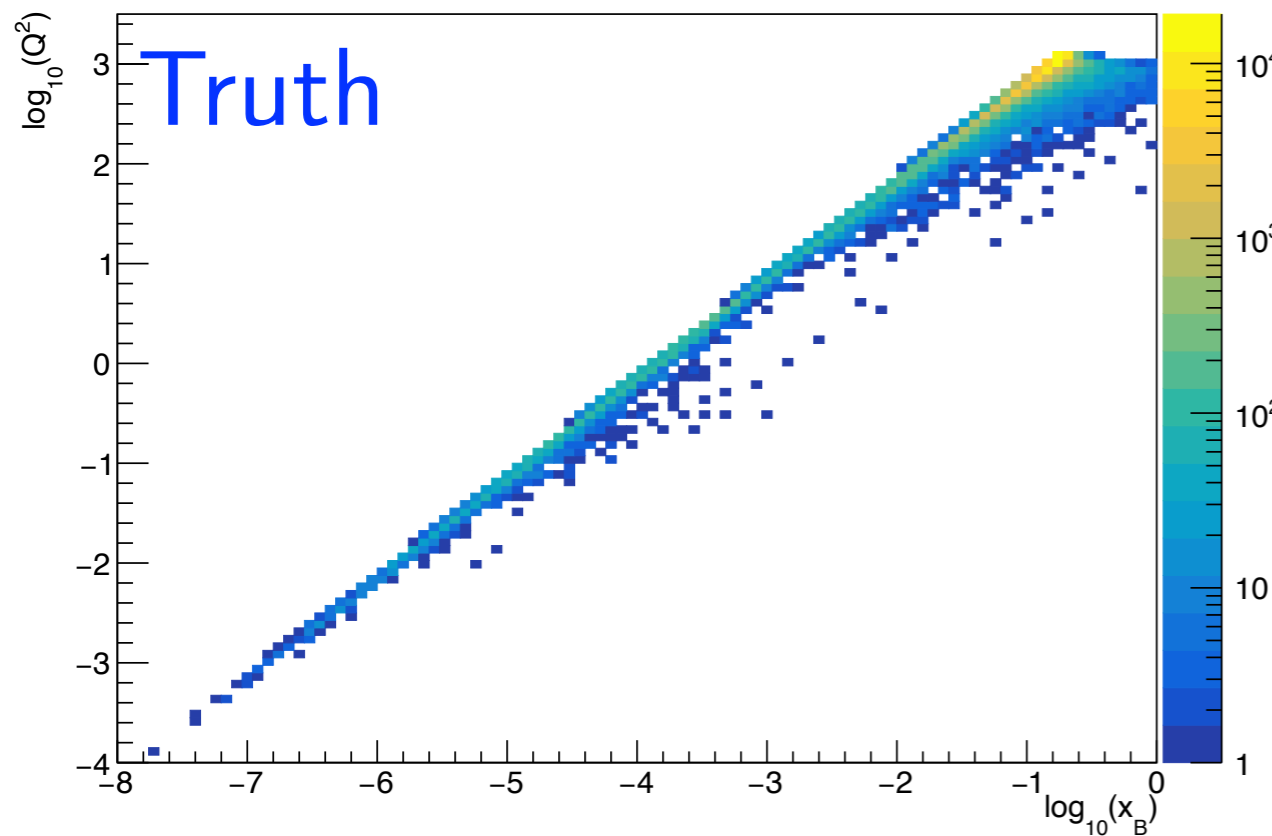
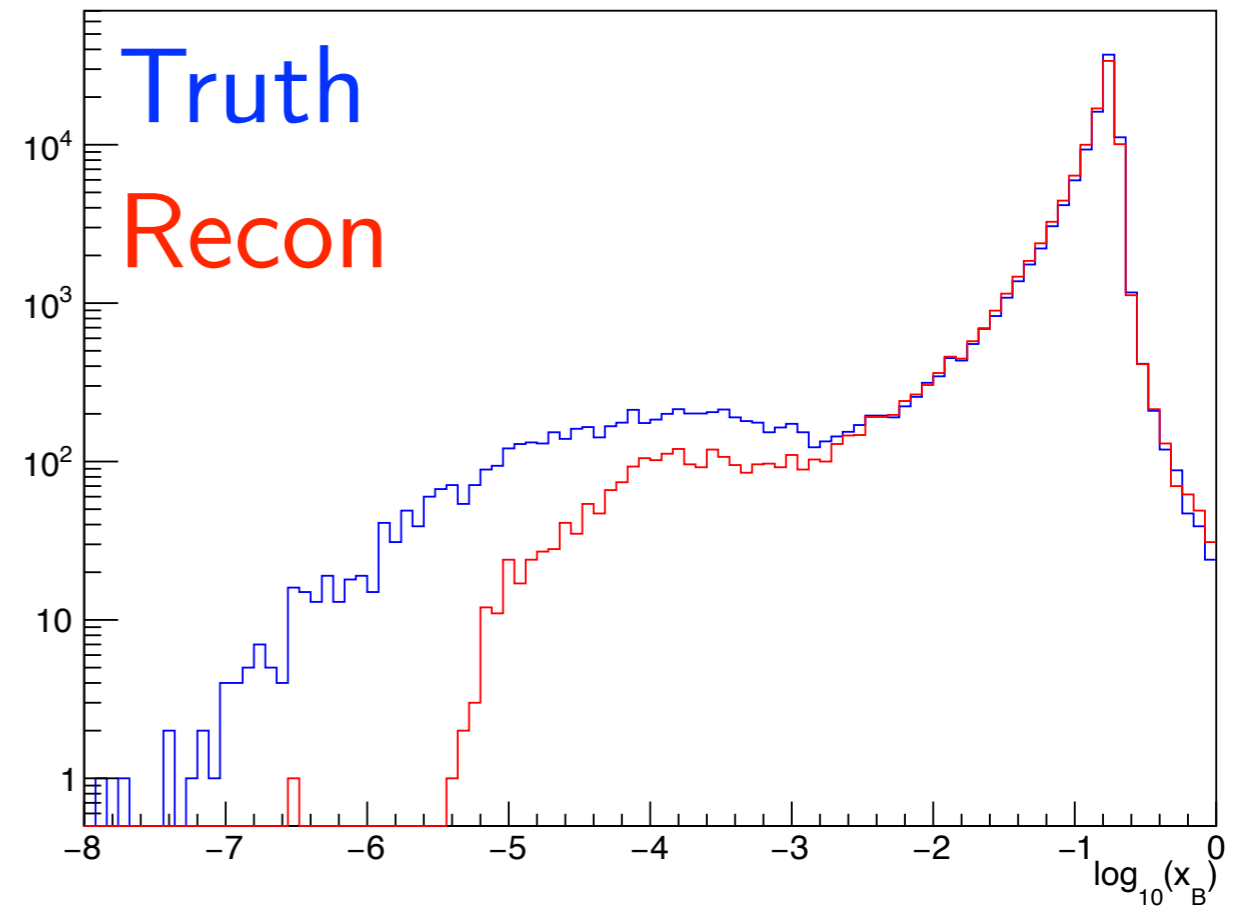
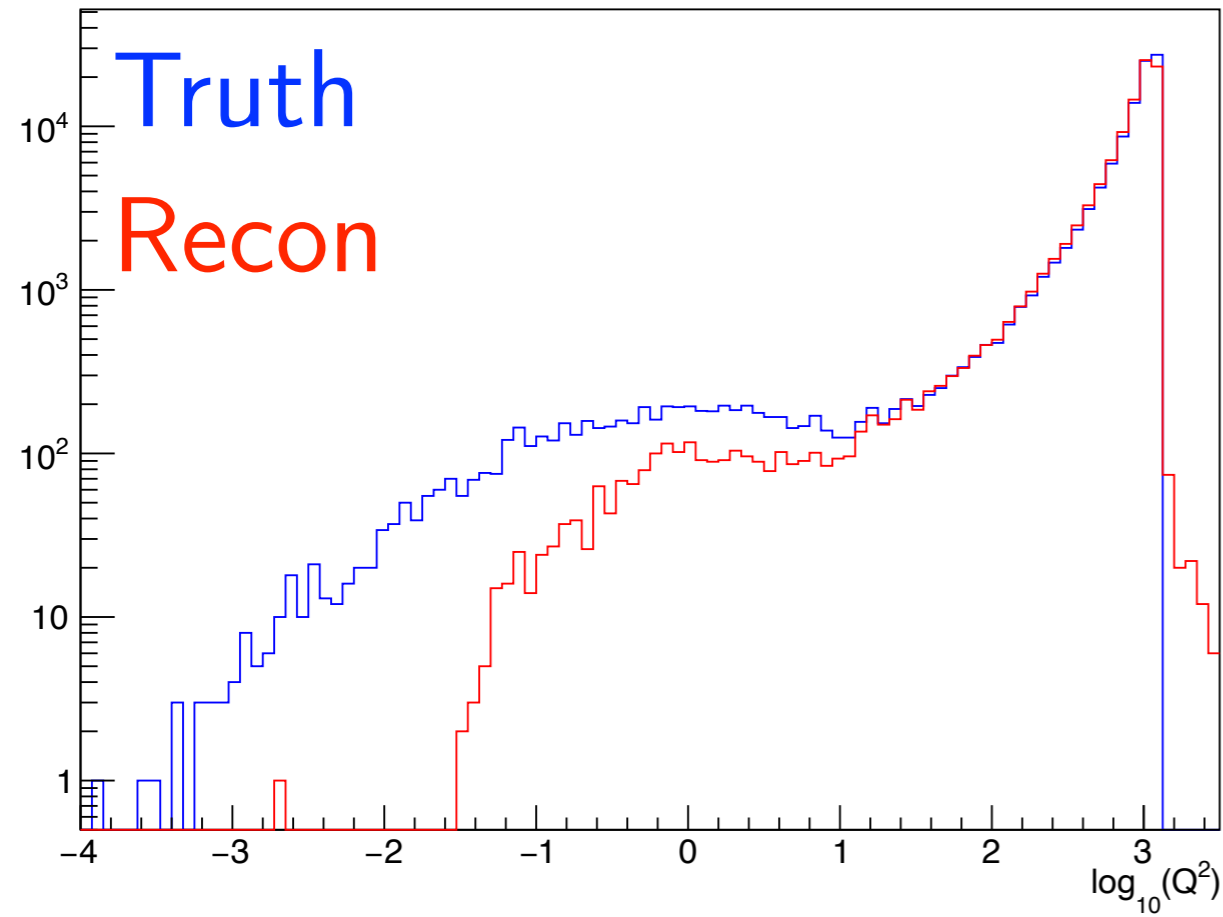
- ECCE June 2021 concept shows improved performance compared to previous study with ePHENIX



ep 10x100 SIDIS low Q^2 kinematics



ep 10x100 SIDIS high Q^2 kinematics



Summary and questions

- Implementing analysis module for DIS reconstruction
- Framework with lepton reconstruction in place
- Need to implement other reconstruction methods, PID, etc...

Questions

- Best practice for running analysis module on large number of DSTs?
- Advantage of analysis module vs. post-processing evaluator files?
- Empty single-electron files?