

IFF projections and kinematic Studies update

Anselm Vossen

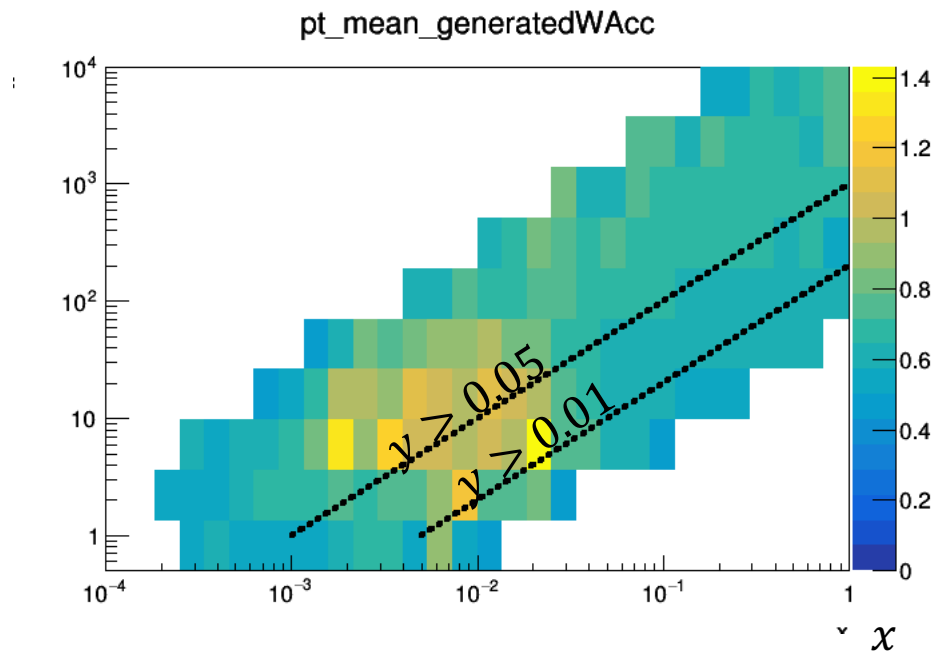
Duke

- Hadronic final state to improve kinematic reconstruction of hadrons
 - Use rec hadrons to reconstruct Breit Frame jets
- IFF projections

Reconstruction of kinematic quantities

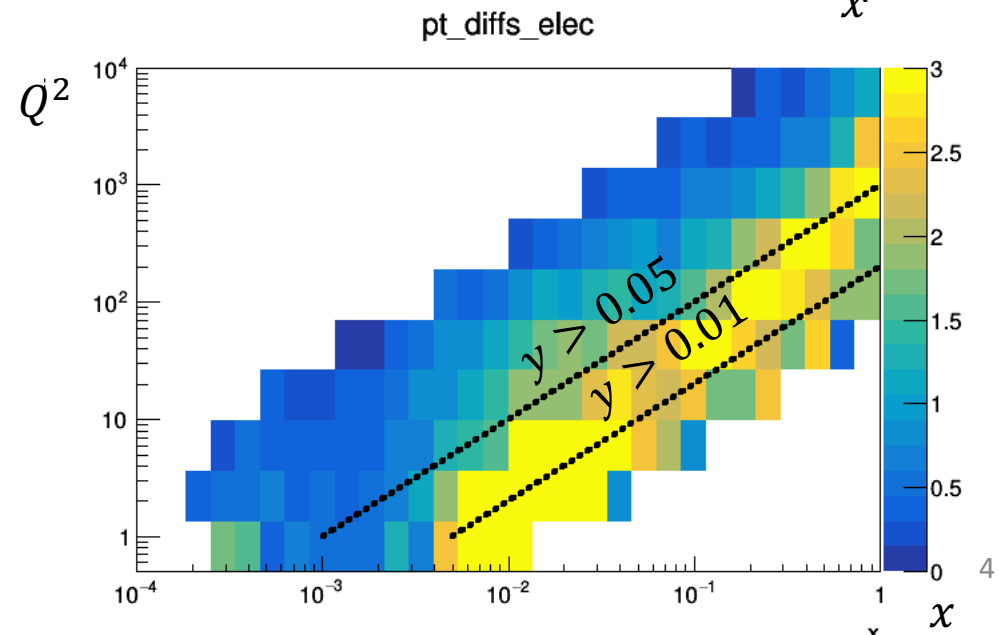
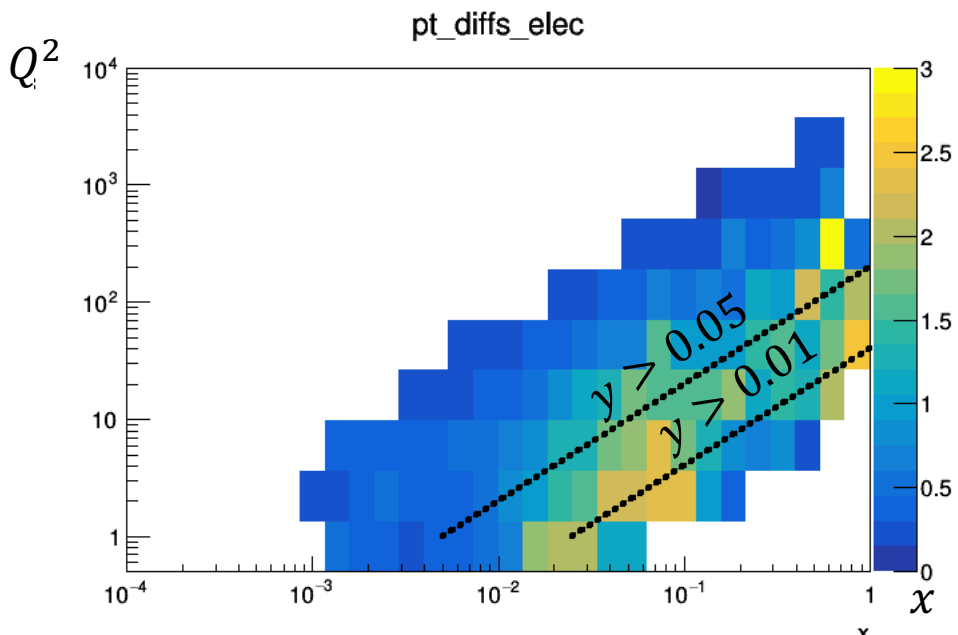
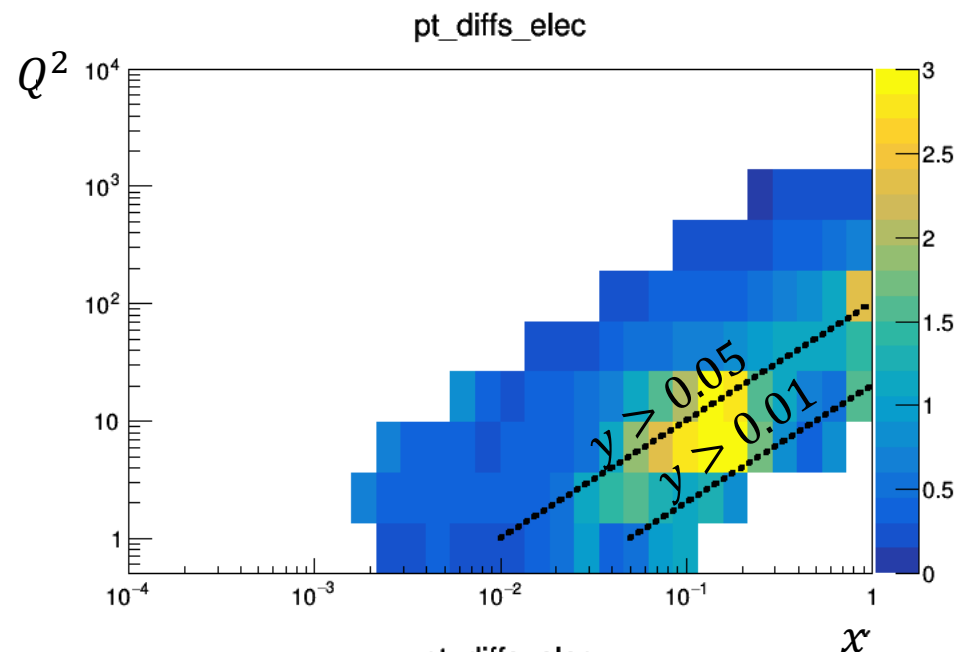
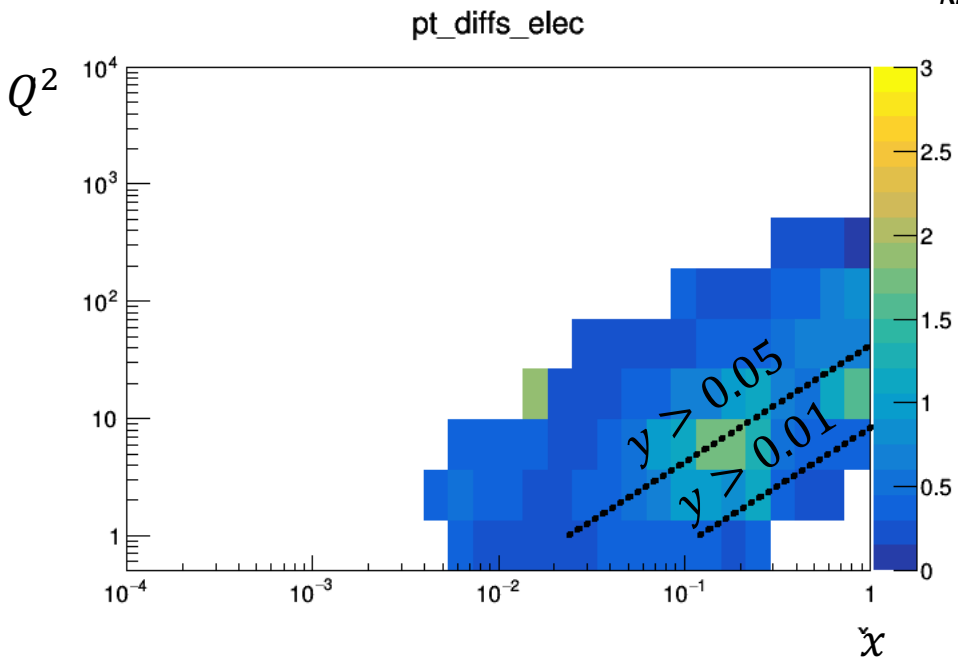
- To extract SIDIS variables, need to reconstruct q^μ
- Using hadronic final state, q_T is given by the p_T of the hadronic final state \rightarrow miss q_E , and q_Z
- Use $Q^2 = -q^\mu q_\mu$ and $y = \frac{P^\mu q_\mu}{P_\mu l_\mu} \rightarrow$ quadratic equation \rightarrow use smaller solution
- Differentiate cases
 - Elec: don't use hadronic final state
 - Hadronic: only use hadronic final state, Q^2 , y from JB method
 - Da: use q^2 , y from double angle method (needs lepton)
 - Mixed: q^2 from electron, y from JB
 - mostlyLepton: use q_T from hadronic final state, Q^2 , y from electron
 - trueBoost: use true boost in Breit frame, but smeared hadrons
 - generatedWAcc: use generated information, but only hadrons in acceptance
 - generatedWOAcc: use all

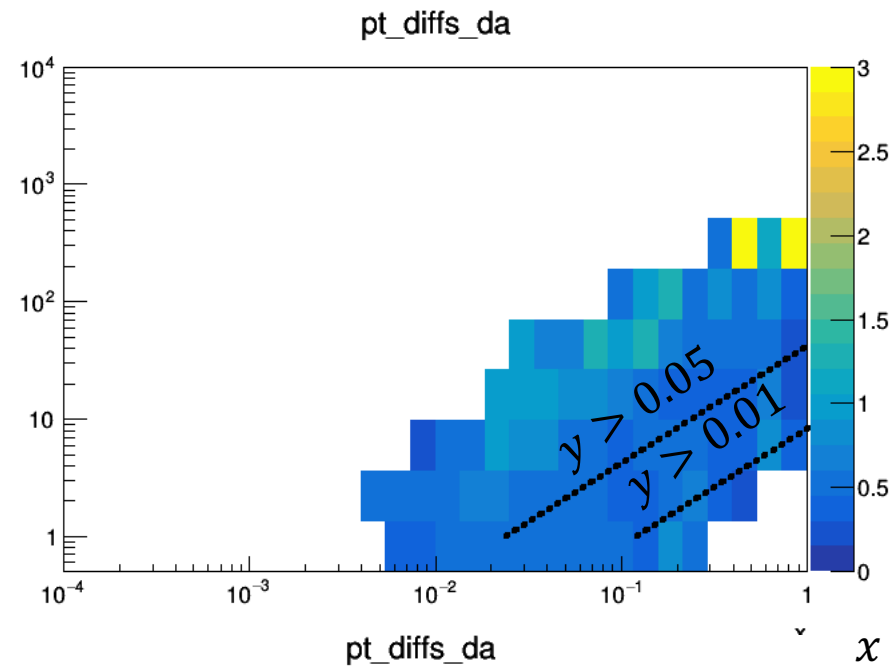
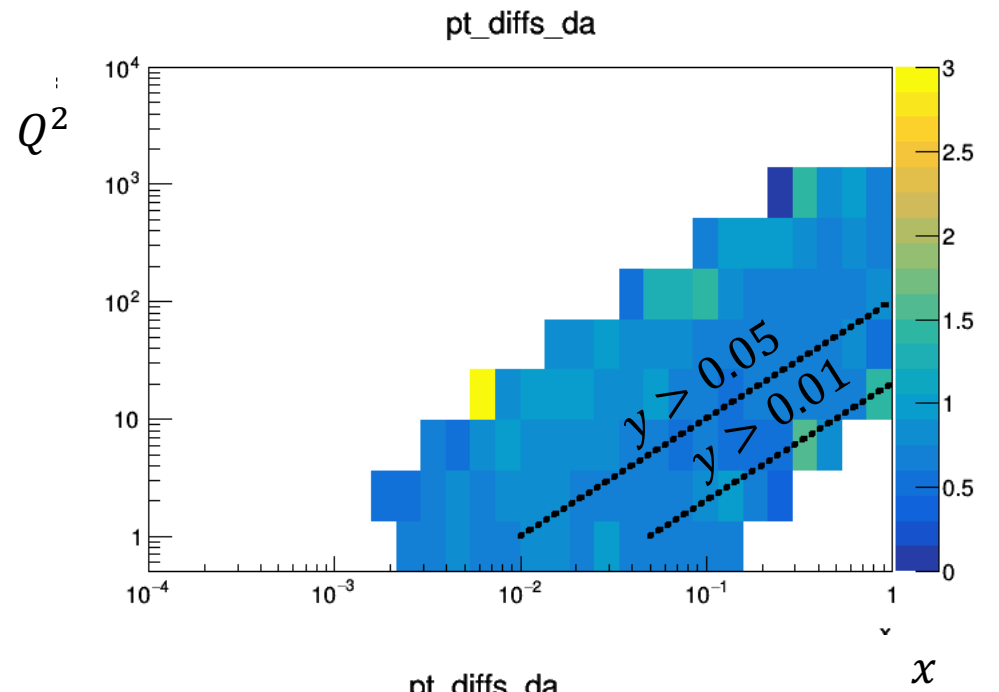
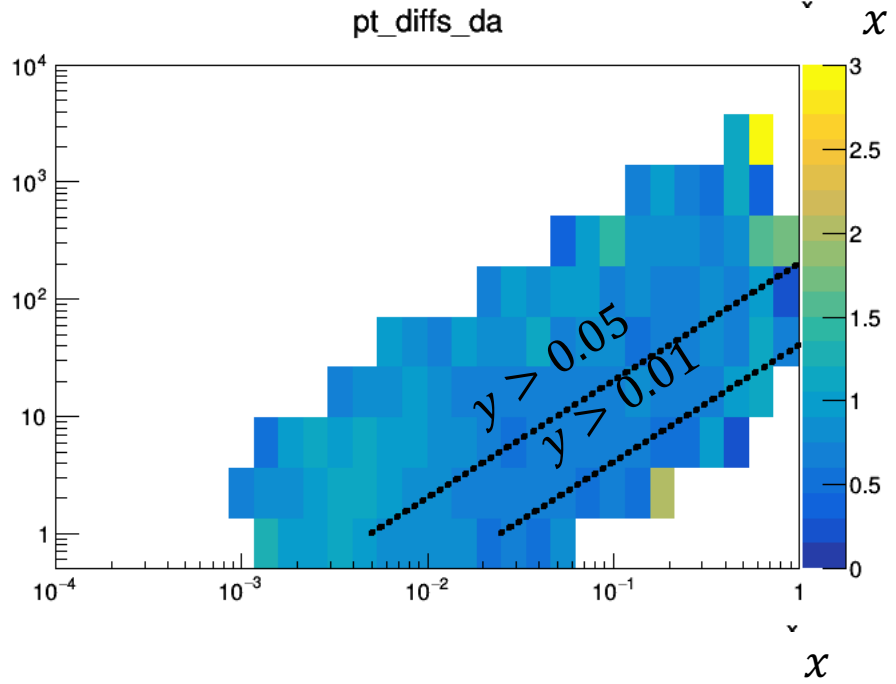
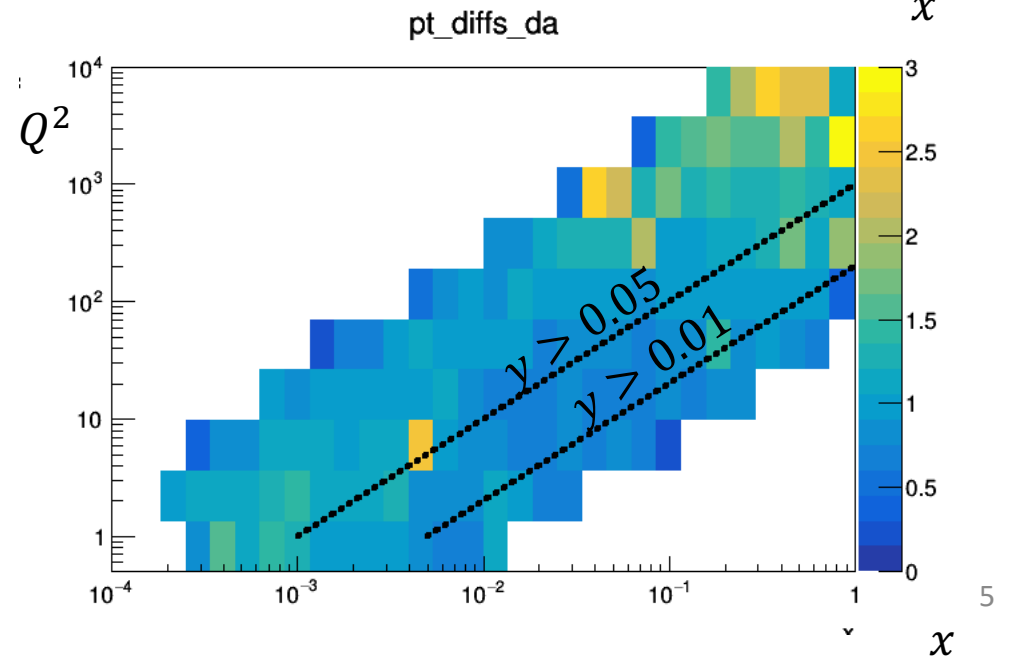
Hadronic p_T of hadron pair vs γ^*

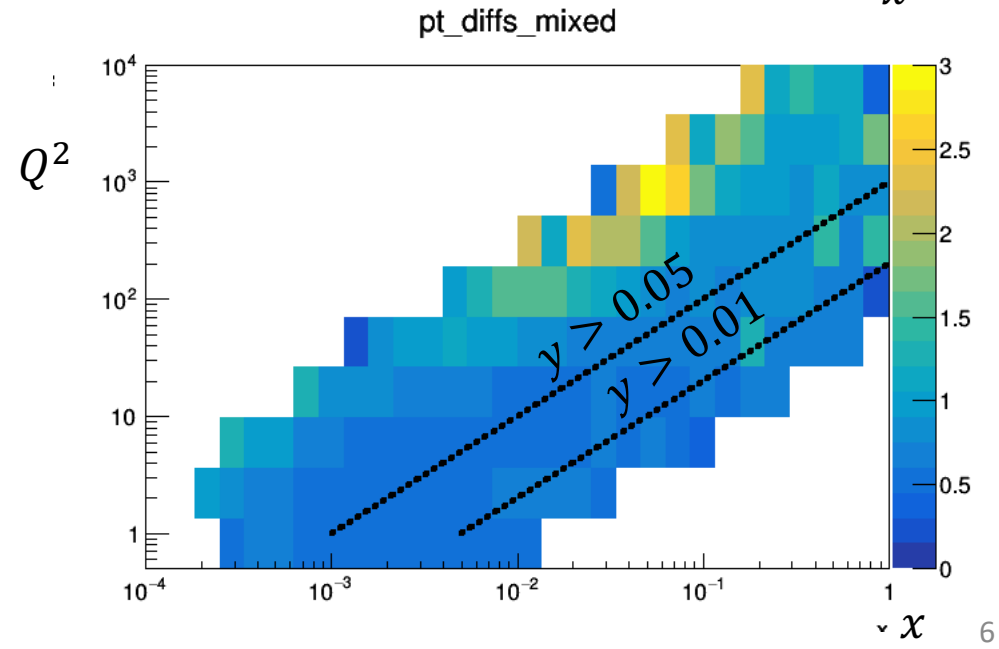
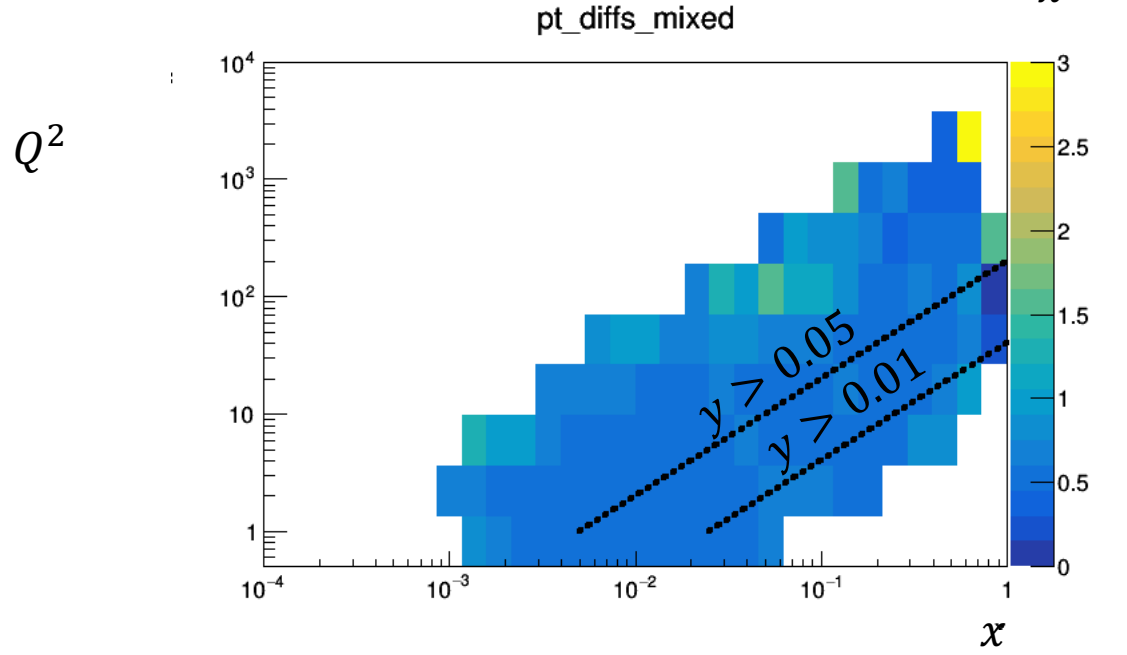
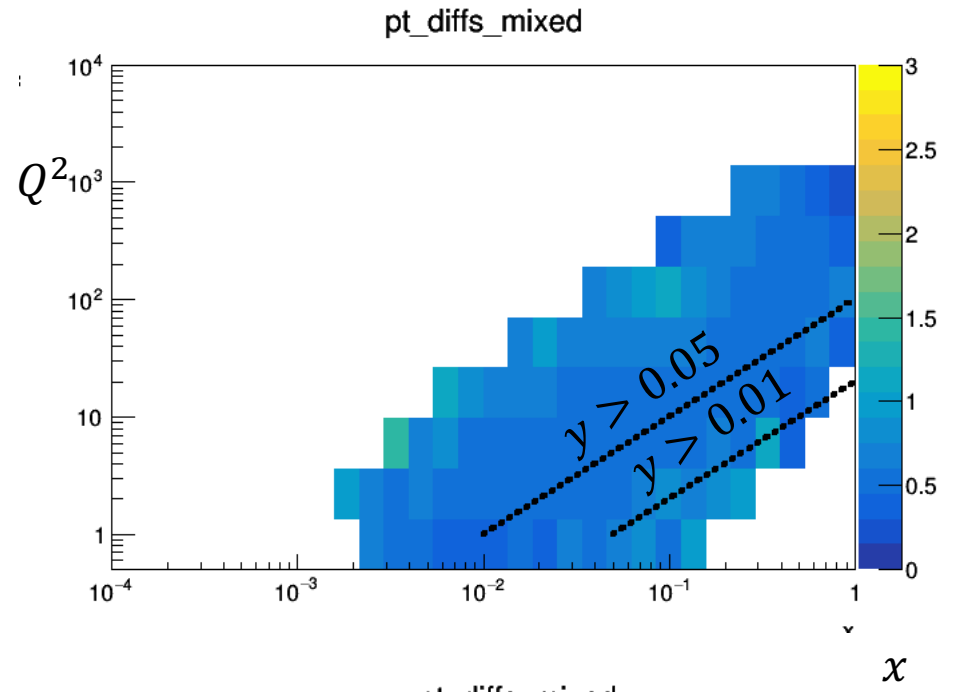
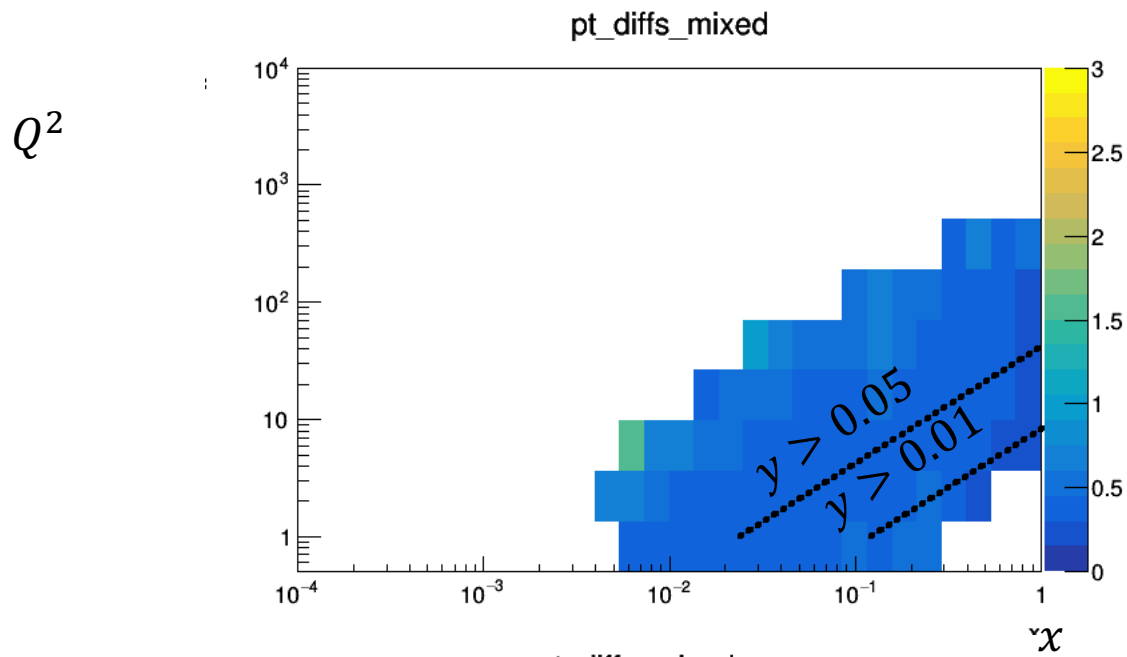


- Mean values, 18x275

Shown here: $\frac{1}{N} \sum_{i=0}^N (p_{T_{pair}} - p_{T_{true}}) / p_{T_{true}}$

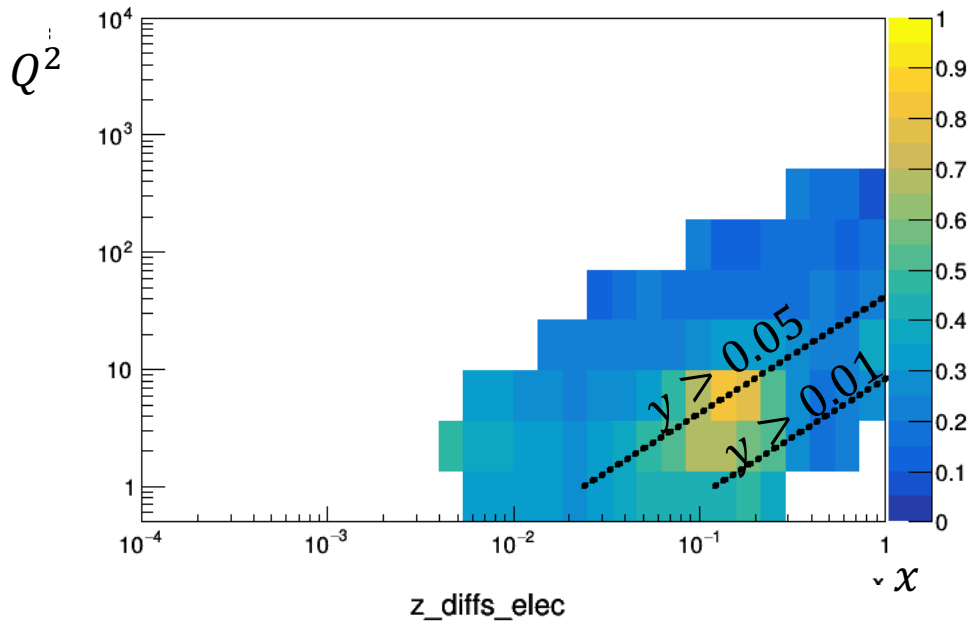


Q^2  Q^2  Q^2  Q^2 

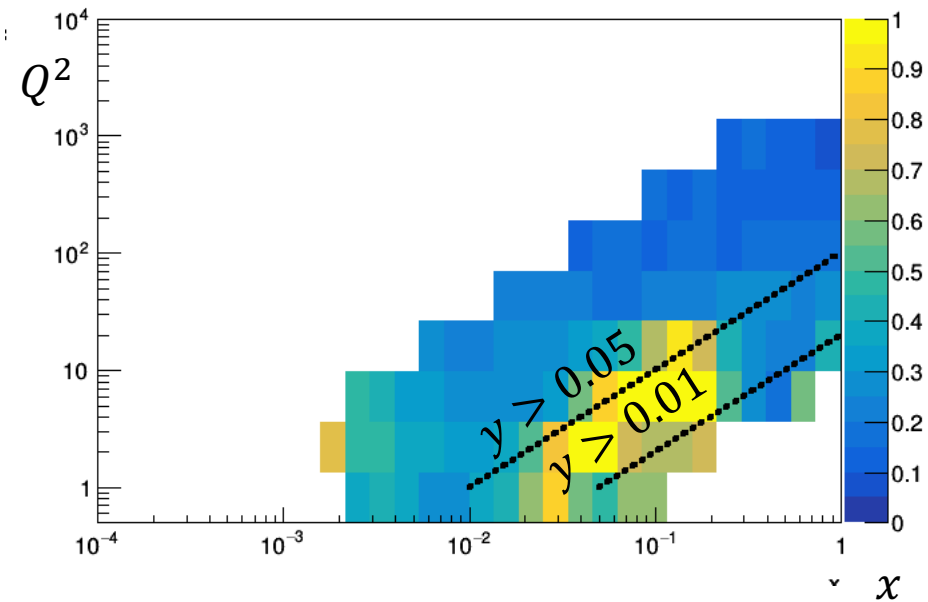


Shown here: $\frac{1}{N} \sum_{i=0}^N (z_{pair} - z_{true}) / z_{true}$

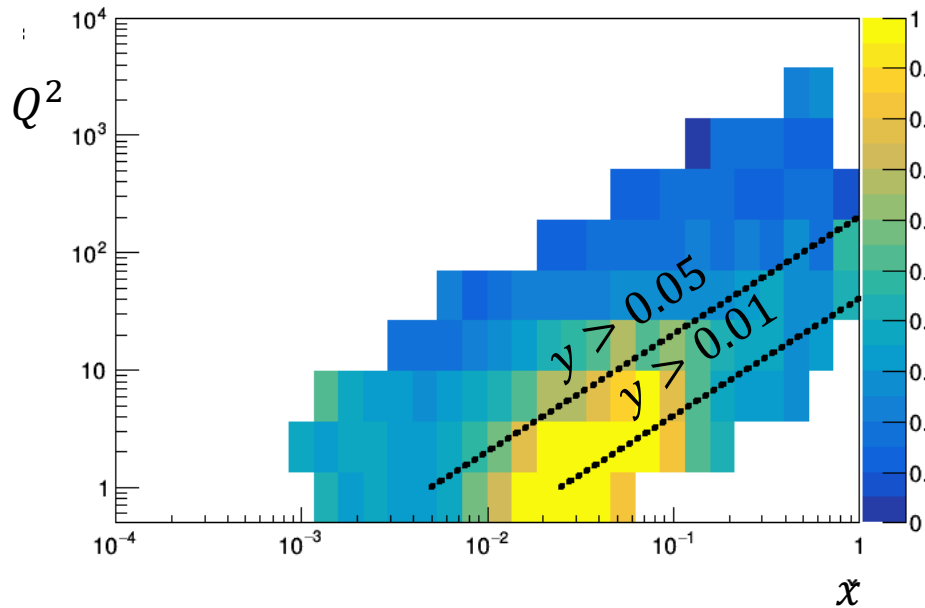
z_diffs_elec



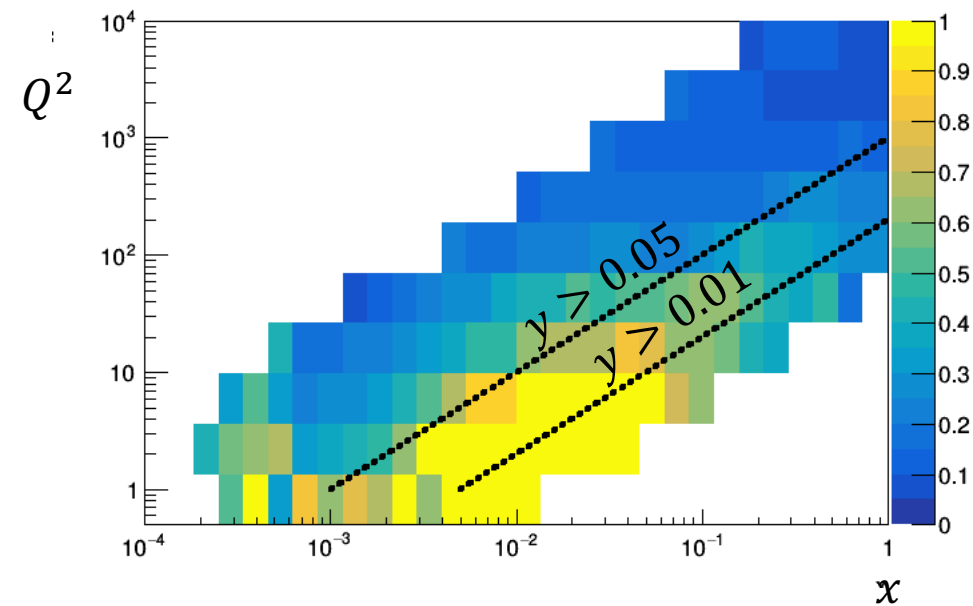
z_diffs_elec

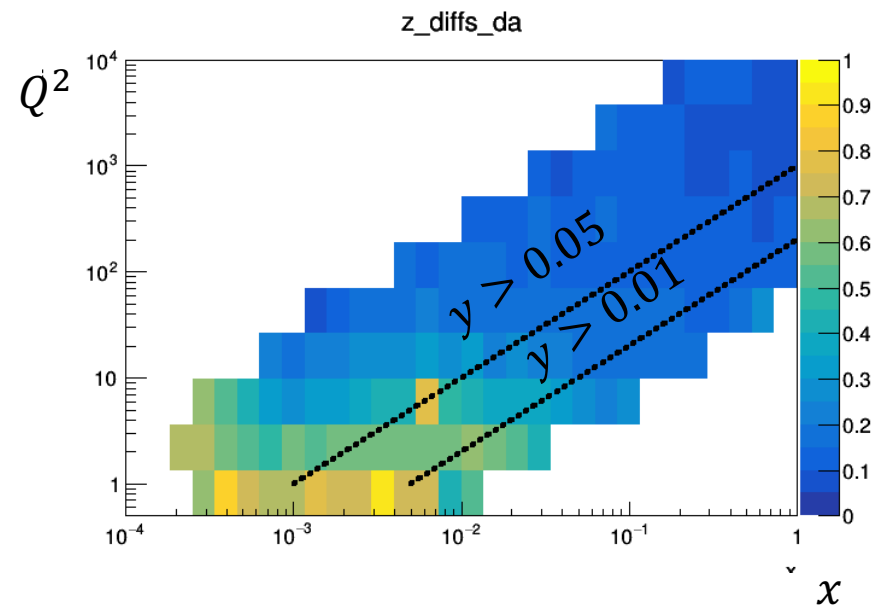
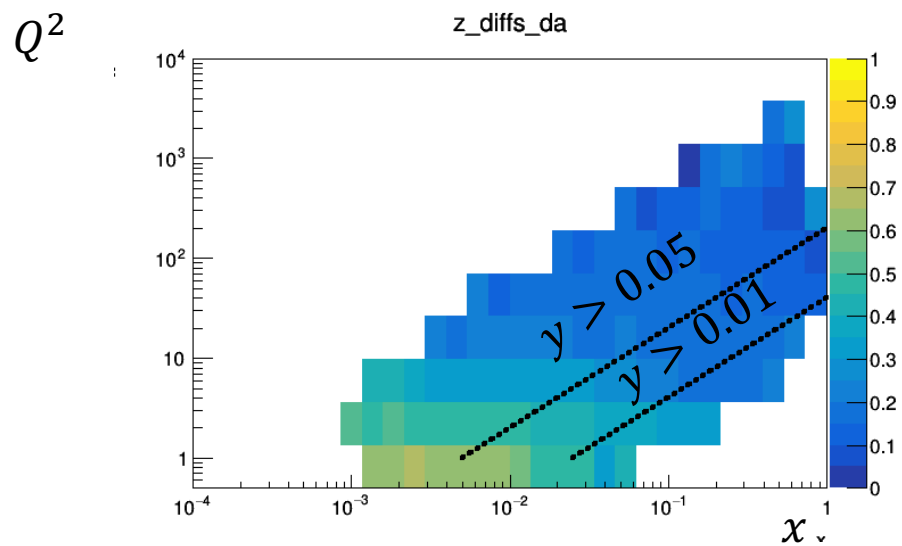
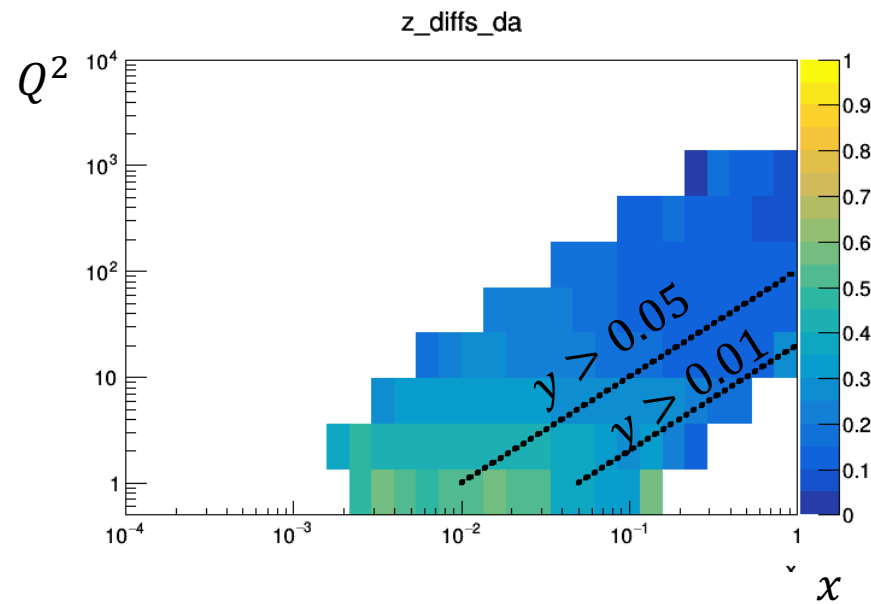
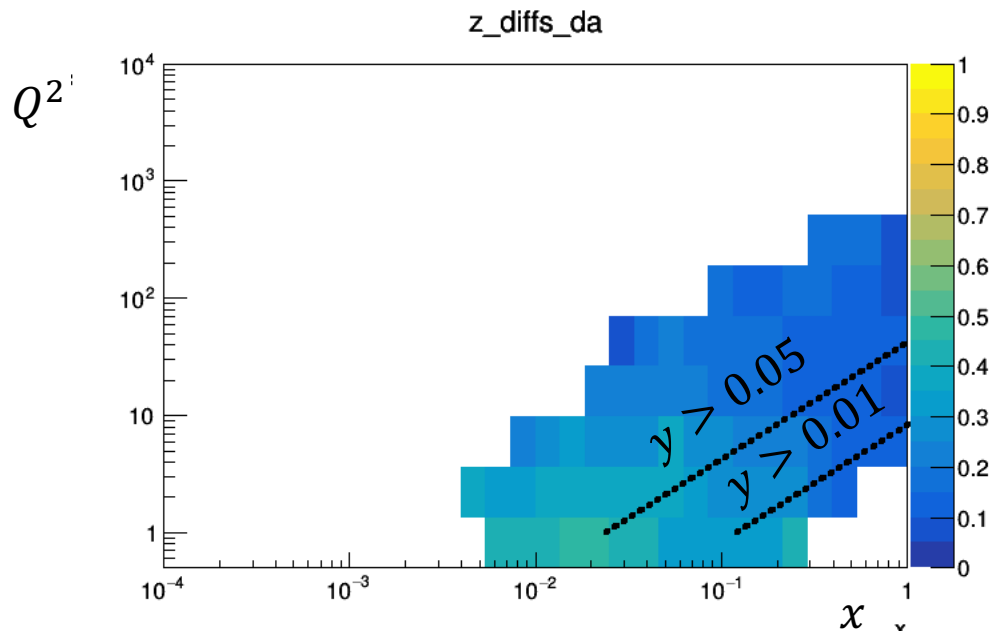


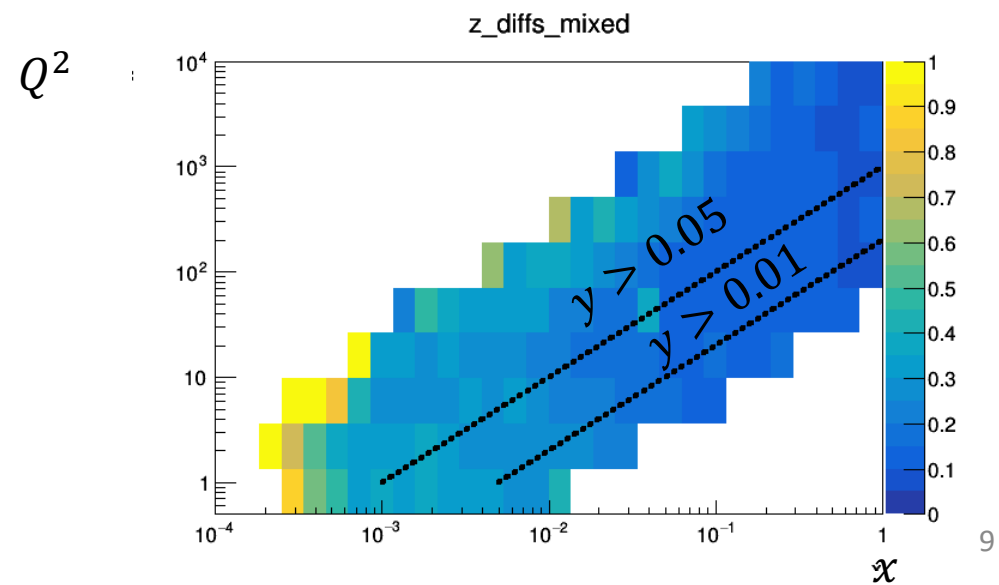
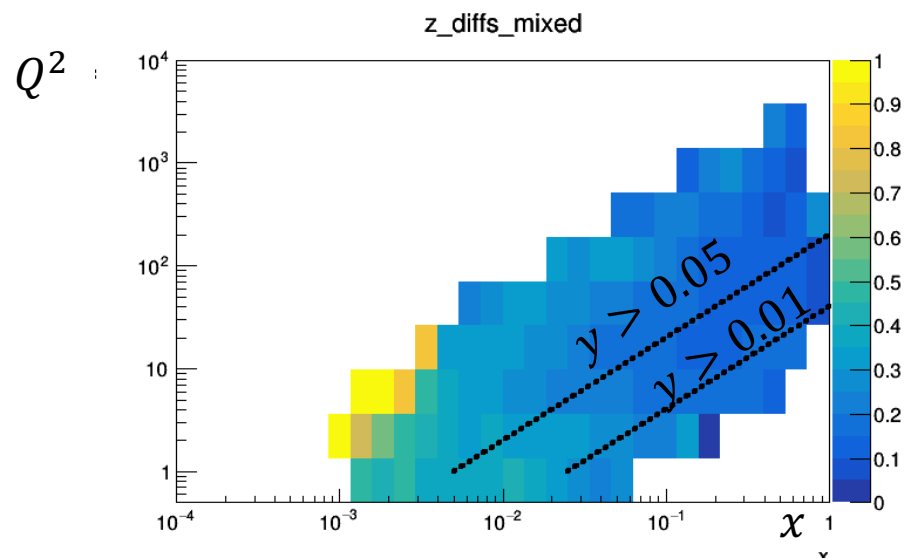
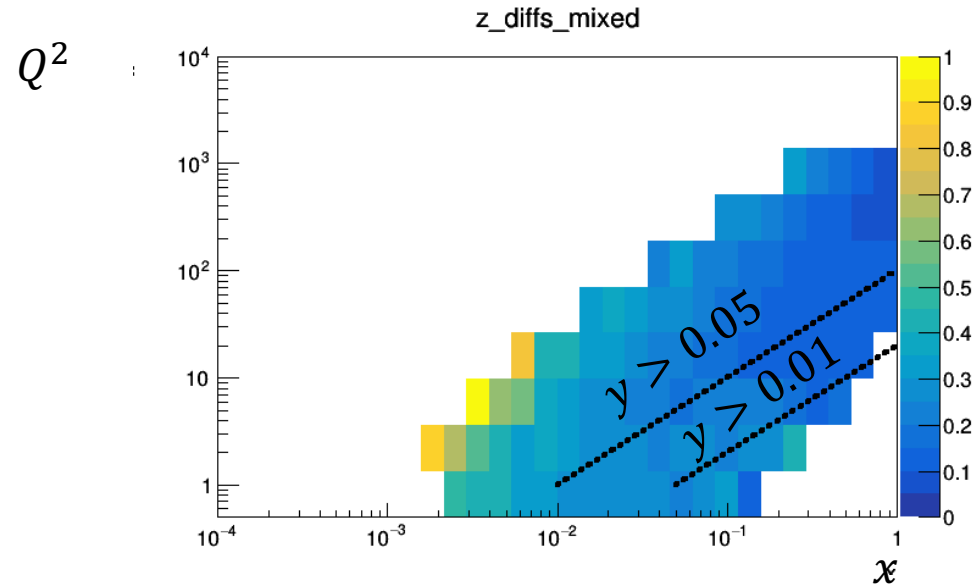
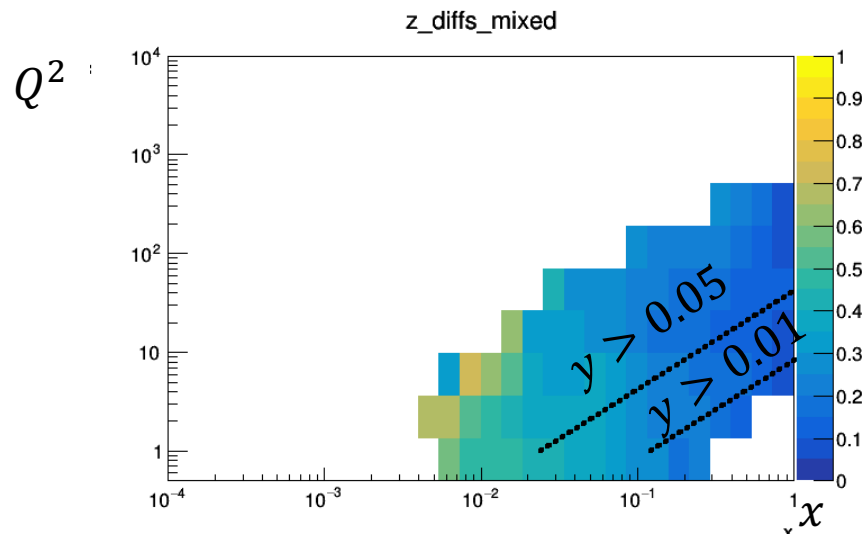
z_diffs_elec



z_diffs_elec

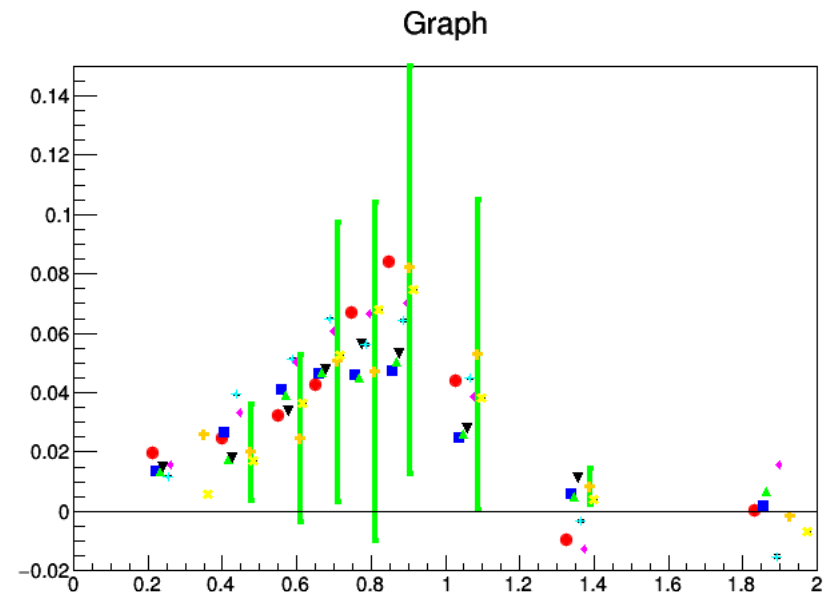






Faithfulness of asymmetry reconstruction

- Asymmetries shown here for $0.01 < y < 0.05$
- Little impact on asymmetry extraction (also shown in pulls)
- Consistent with observation that azimuthal angles are not impacted by the smearing as much

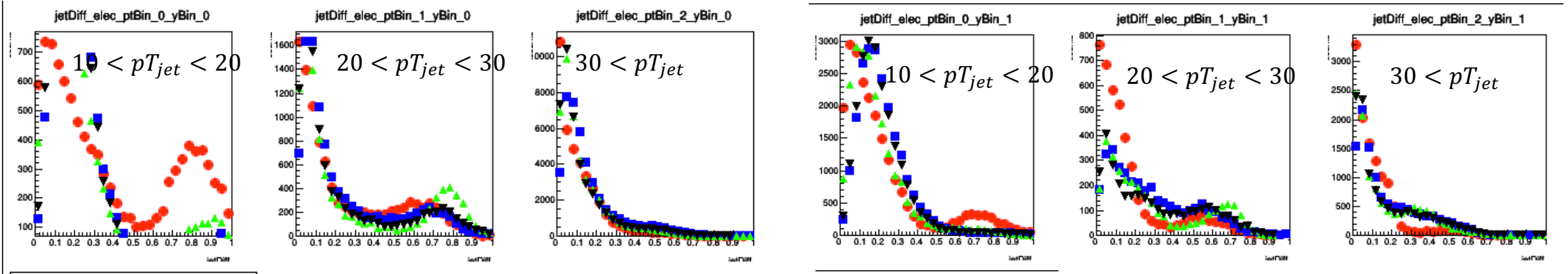


M

Jet Distances with Centauro – 18x275

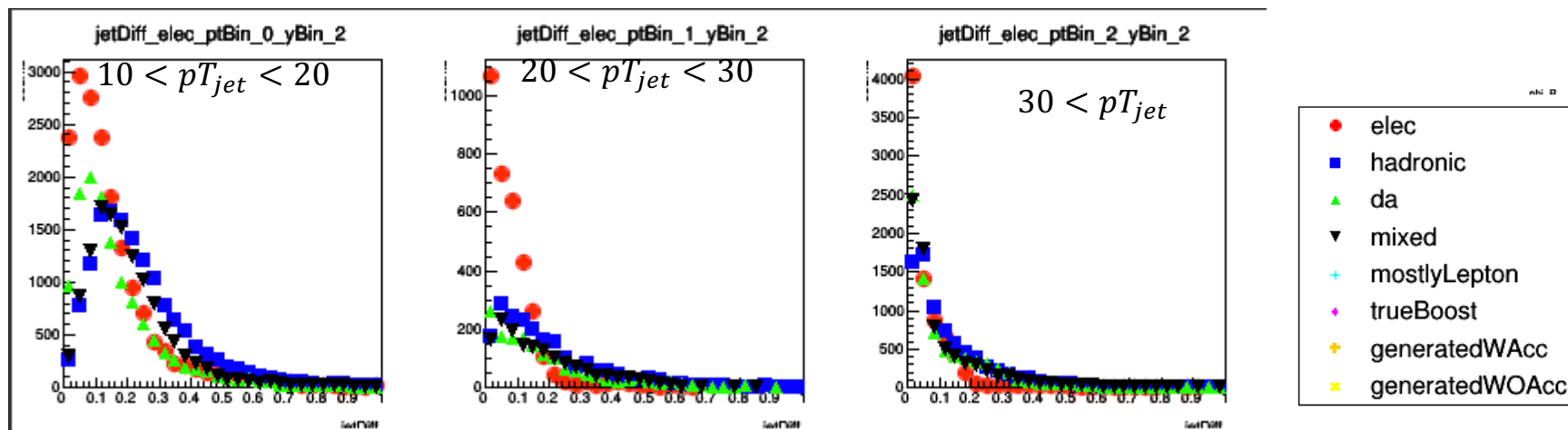
→ low y , low pT_{jet} hadronic methods can improve elec results

→ high pT_{jet} hadronic methods show reasonable resolution → should be able to do jets in Breit frame in charged current events



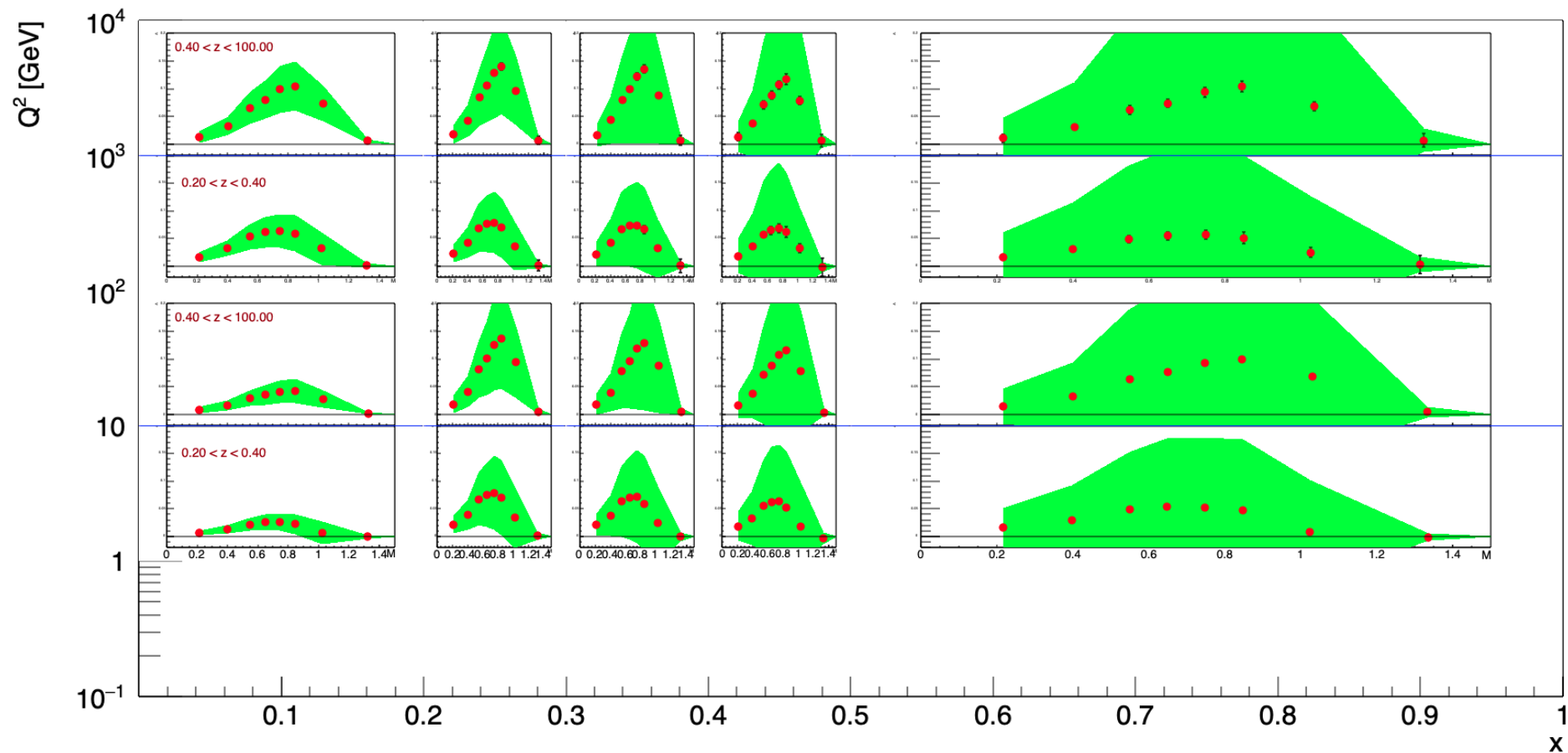
$0.005 < y < 0.05$

$0.05 < y < 0.1$



$y > 0.1$

IFF projections



$$18x275 + 10x100 + 5x100 + 5x41$$

- For acceptance studies, see Chris' previous presentations
- Pavia model, green bands are the 90% confidence interval determined from the replicas with the projected points using the mean
- Amplitudes are averaged over the events in the bin. Verified consistency with injected fits
- Plot above just an example, generated projections for fine grid as well
- Pythia8 with Dire

Outlook

- Charged/ π^0 statistical projections underway as well but no theory input

Backup

- 1.751858e-03mb @18x275, $Q^2 > 1.0$, 10M events
- 1.070938e-05mb @ 18x275, $Q^2 > 100.0$, 1M events
- 2.057948e-03mb @ 10x100 $Q^2 > 1.0$, 10M events
- 5.027307e-06mb @ 10x100 , $Q^2 > 100.0$, 1M events
- 2.539979e-03mb @ 5x100, $Q^2 > 1.0$, 10M events
- 6.976979e-06 mb @ 5x100, $Q^2 > 100.0$, 1M events
- 1.667915e-03 mb @ 5x41, $Q^2 > 1.0$, 10M events
- 7.637786e-06 mb @ 5x41, $Q^2 > 100.0$ 1M events