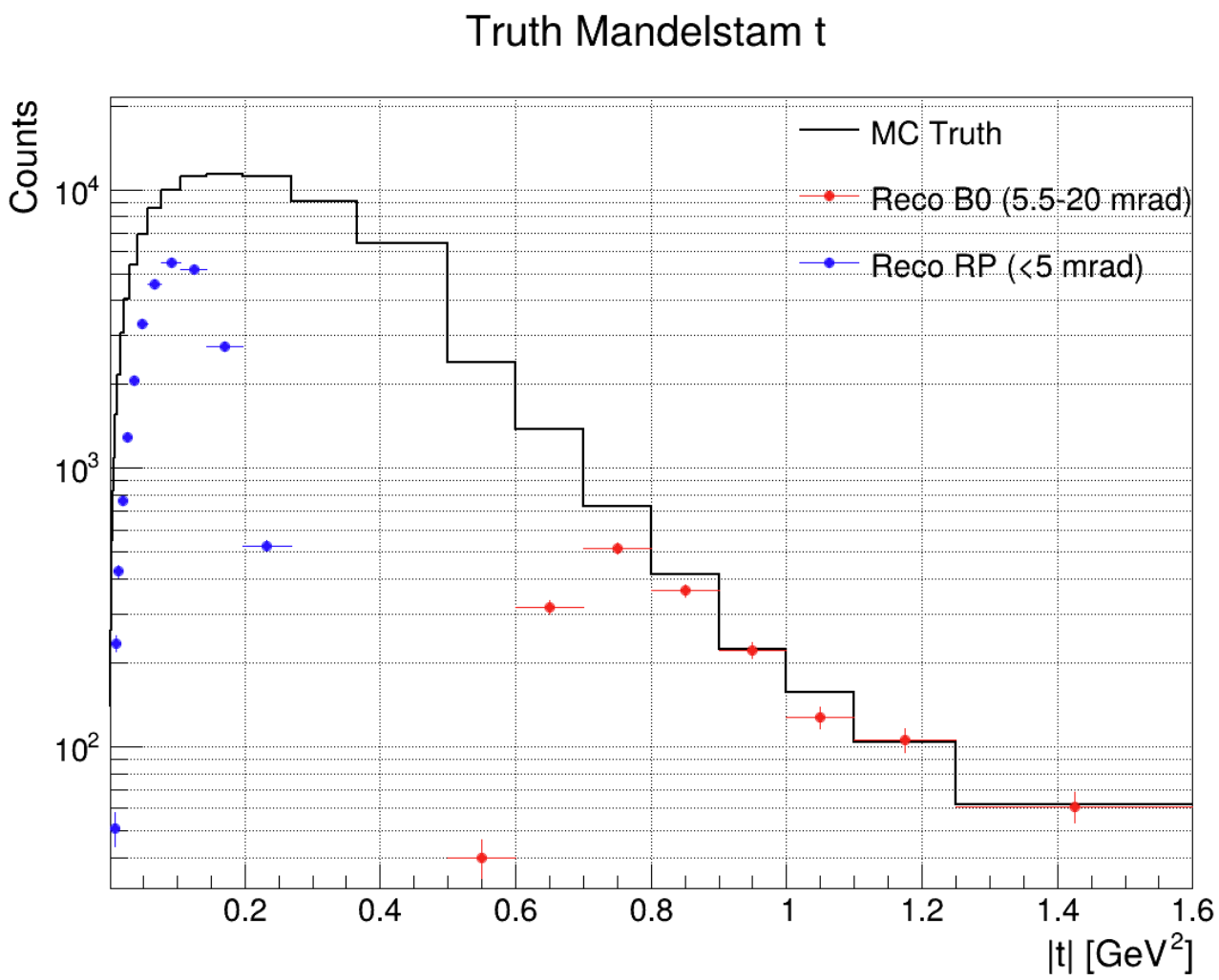
DPDF Meetings

Oct. 21

Follow up: '*t*' binning



Follow up: '*t*' resolution in RP

- Alex explained a new collection "ForwardRomanPotPolyReconstructed"
- It should be available soon, hopefully this same week
- It should make the reco better for RPs
- In his presentation he said that the current reco method should work well for *x_L~1* only

Hadi, according to what Alex showed today on the RPs reconstruction, if you cut at x_L>0.99 before doing the resolution plots, you should already get something good now.
Let's discuss more tomorrow.

'*t*' reco in RP

```
----------------------------
  Proton Mandelstam t Analysis
----------------------------

Input filelist: ./data/filelist.txt

No. of files: 1; no. of events: 100000
bin edges for t: 0 0.16 0.32 0.48 0.64 0.8 0.96 1.12 1.28 1.44 1.6
Finding beam particles...
Found beam energies 9.99922x100.028 GeV

=== ANALYSIS RESULTS ===
Truth protons found: 106467
B0 matched protons: 1775
RP matched protons: 26573
B0 matching efficiency: 1.66718%
RP matching efficiency: 24.9589%
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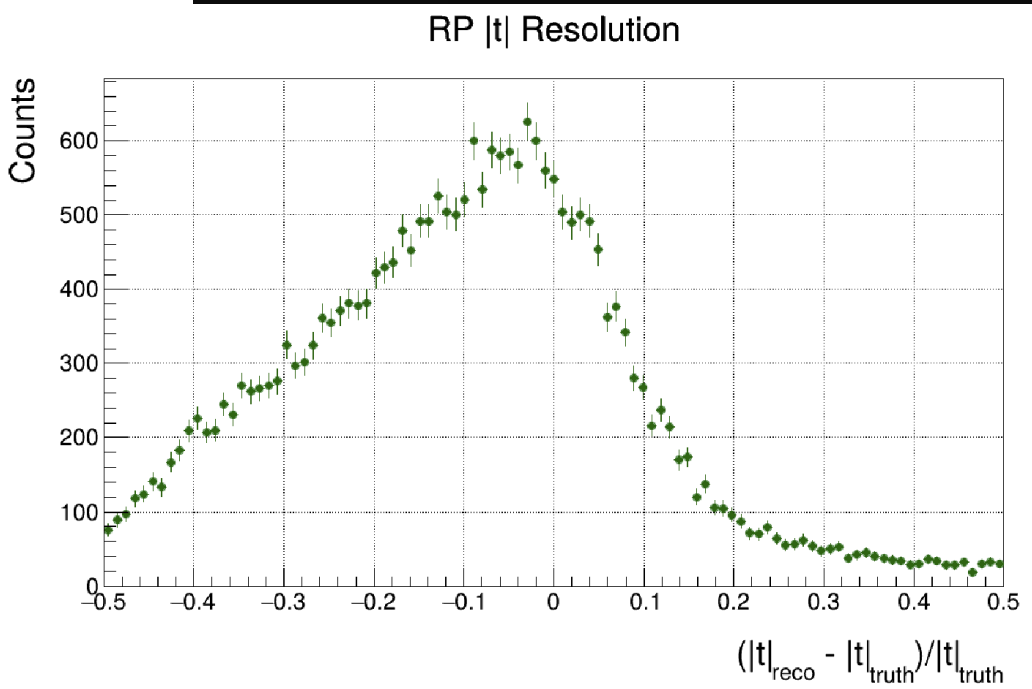
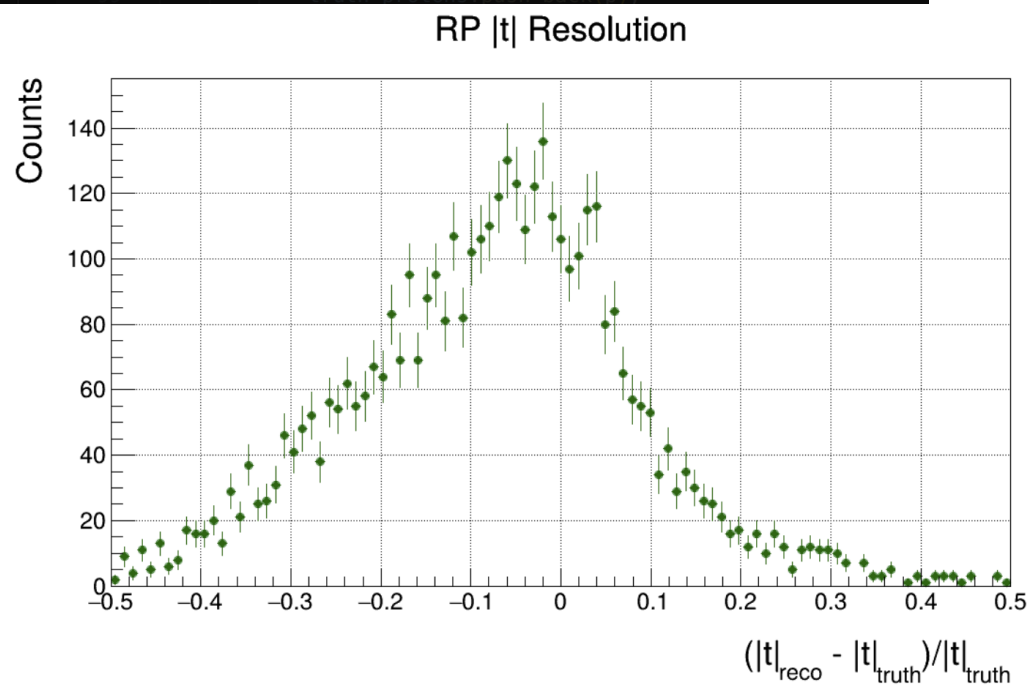
```
----------------------------
  Proton Mandelstam t Analysis
----------------------------

Input filelist: ./data/filelist.txt

No. of files: 1; no. of events: 100000
bin edges for t: 0 0.16 0.32 0.48 0.64 0.8 0.96 1.12 1.28 1.44 1.6
Finding beam particles...
Found beam energies 9.99922x100.028 GeV

=== ANALYSIS RESULTS ===
Truth protons found: 14282
B0 matched protons: 412
RP matched protons: 4288
B0 matching efficiency: 2.88475%
RP matching efficiency: 30.0238%
```





'*x_L*' reco in RP

- I am a bit confused on what formula I should use for the x_L

where $P_T^2 = P_X'^2 + P_Y'^2$, and the fraction of the beam momentum retained by the final proton is

$$x_L = \frac{|\mathbf{P}'|}{|\mathbf{P}|} \simeq \frac{E_{p'}}{E_p},$$

PHYSICAL REVIEW D, VOLUME 65, 052001

Properties of hadronic final states in diffractive deep inelastic *ep* scattering at DESY HERA

In the LPS analysis, the longitudinal (p_Z) and transverse (p_X, p_Y) momenta of the scattered proton were measured. The fractional energy of the outgoing proton, x_L, was defined as $x_L = p_Z/E_p$, where E_p is the incoming proton energy. The variable t is given by

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NUCLEAR PHYSICS B
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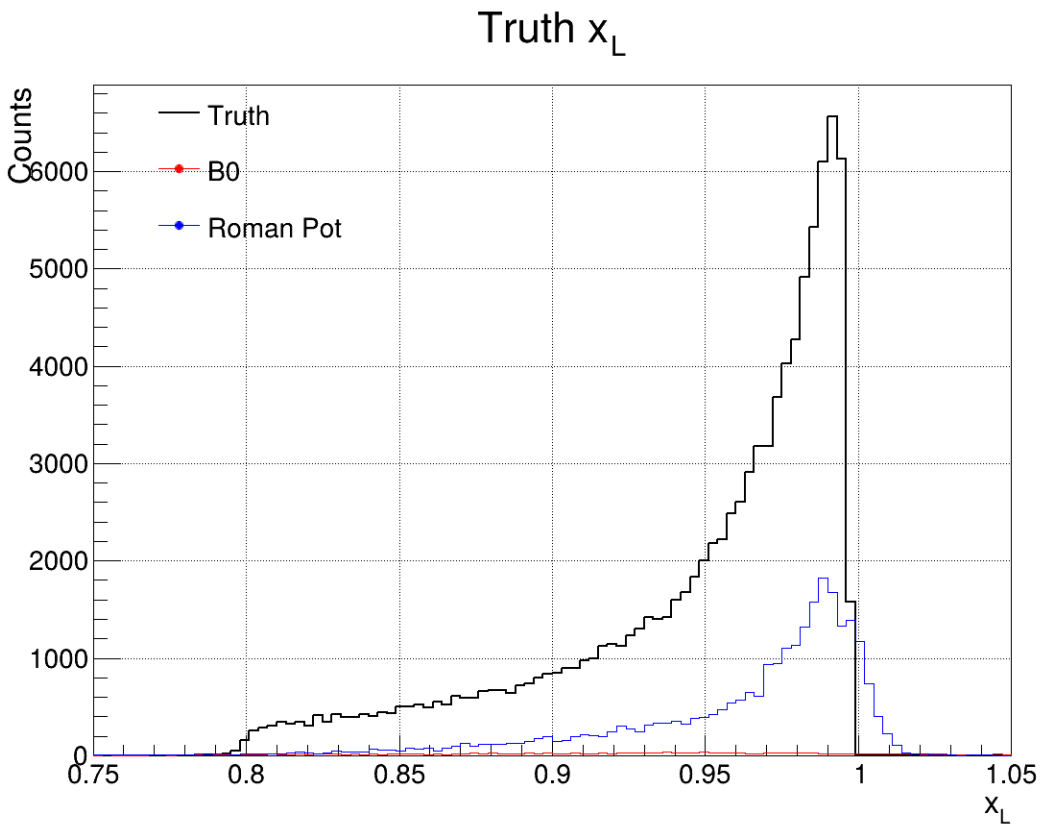
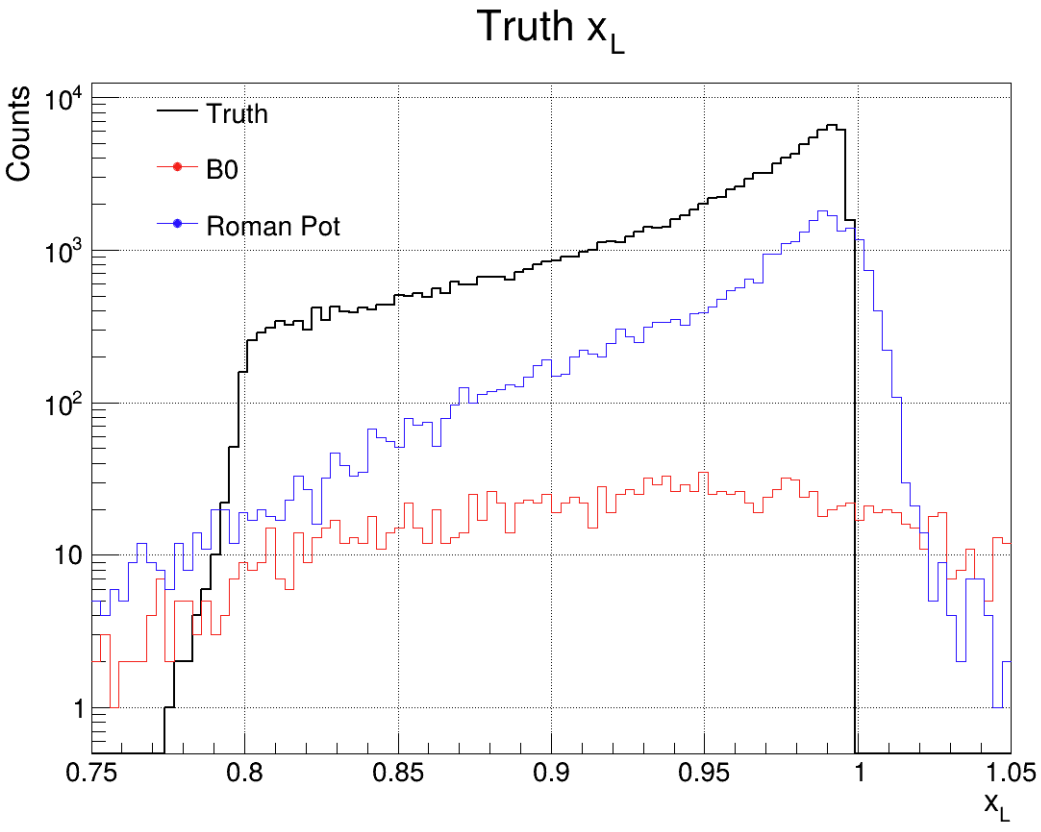
- Or simply *x_L = p'z/pz*?

Deep inelastic scattering with leading protons or large rapidity gaps at HERA

ZEUS Collaboration

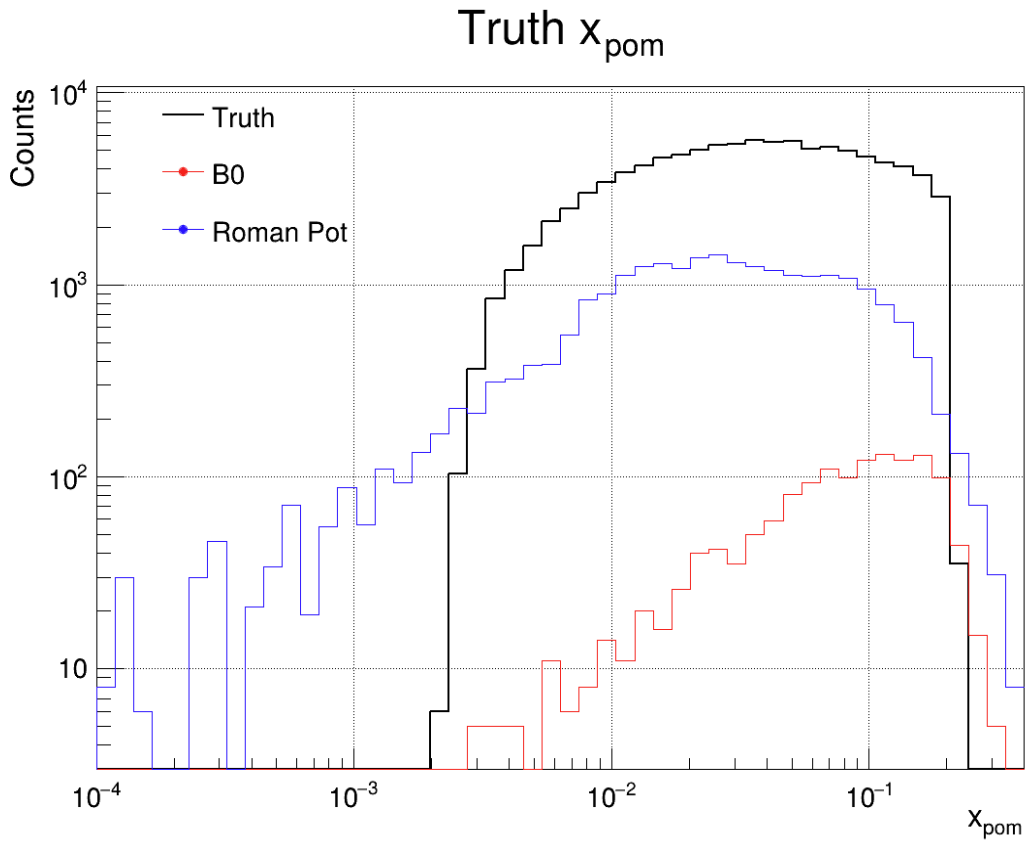
'*x_L*' reco


Truth x_L
Counts
Truth
B0
Roman Pot
6000
5000
4000
3000
2000
1000
0
0.75
0.8
0.85
0.9
0.95
1
1.05
x_L


Truth x_L
Counts
Truth
B0
Roman Pot
10^4
10^3
10^2
10
1
0.75
0.8
0.85
0.9
0.95
1
1.05
x_L

'*x_Pom*' reco

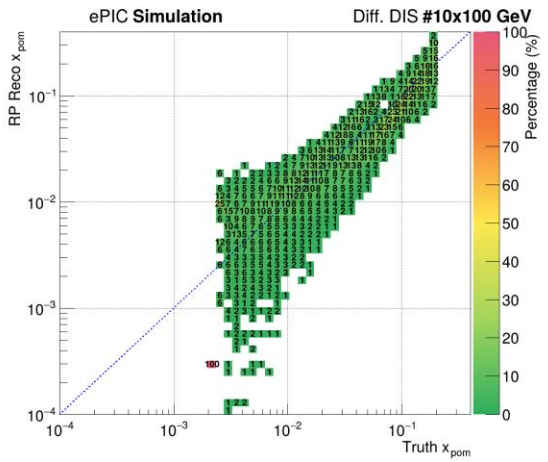
- Same question which formula to use;
- Here is the result for *x_Pom = 1- x_L*

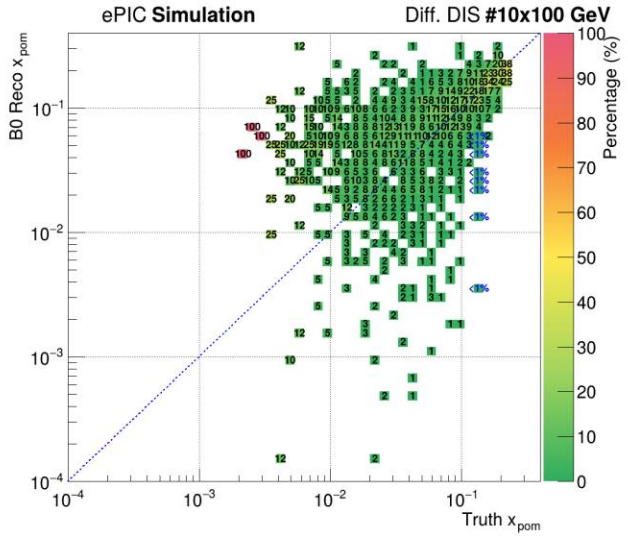


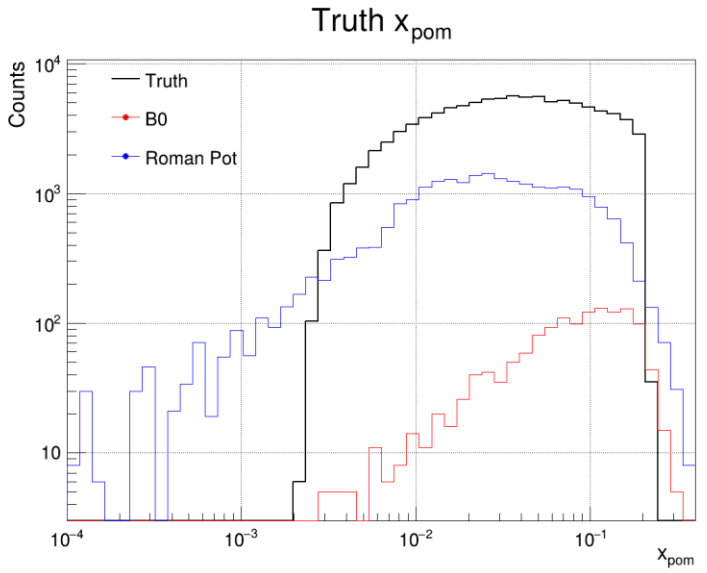
'*x_Pom*' binning

- From memory I think you suggested Log.
- The histo itself is such that you can get away with ~ 40 bins

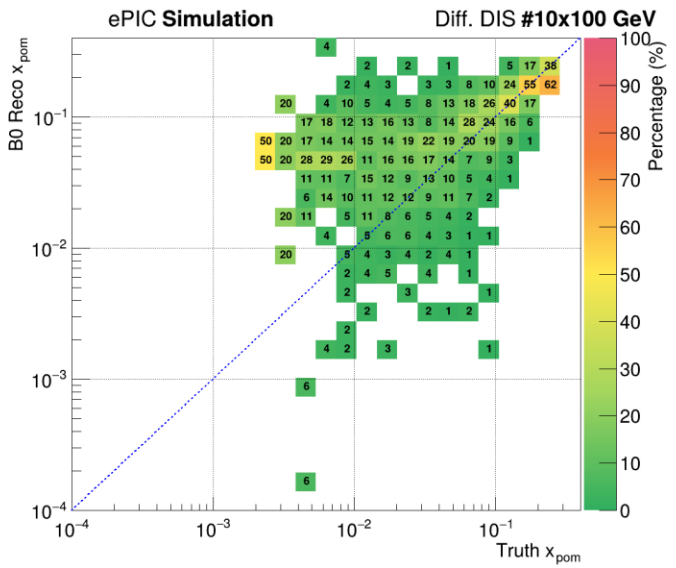
but the response matrix looks like this

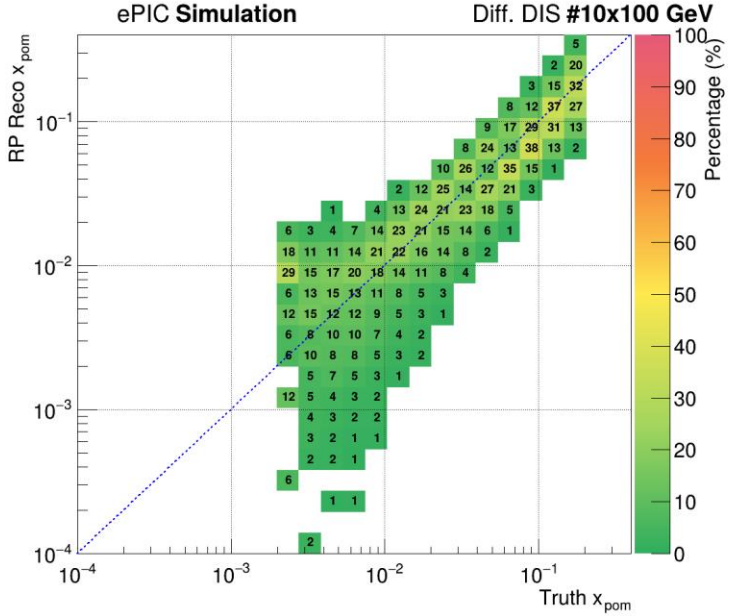


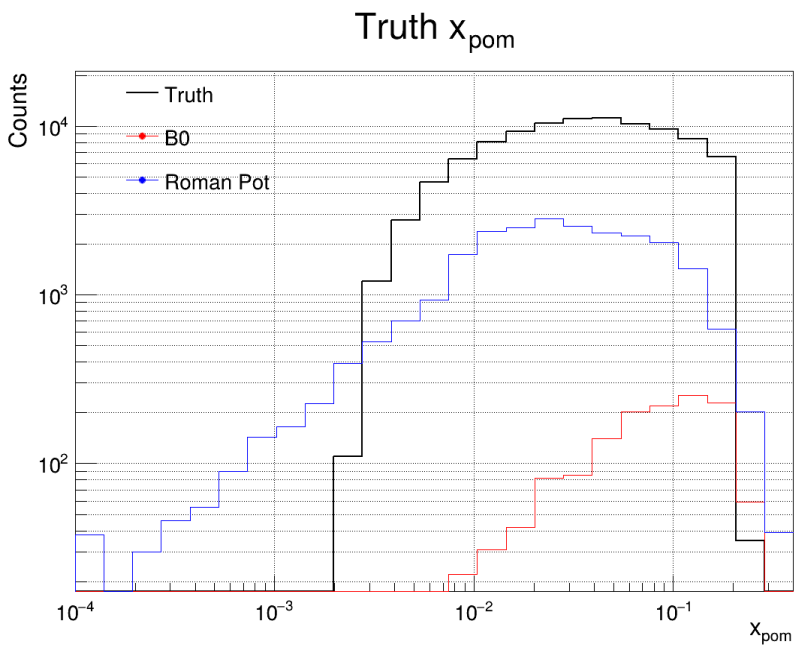




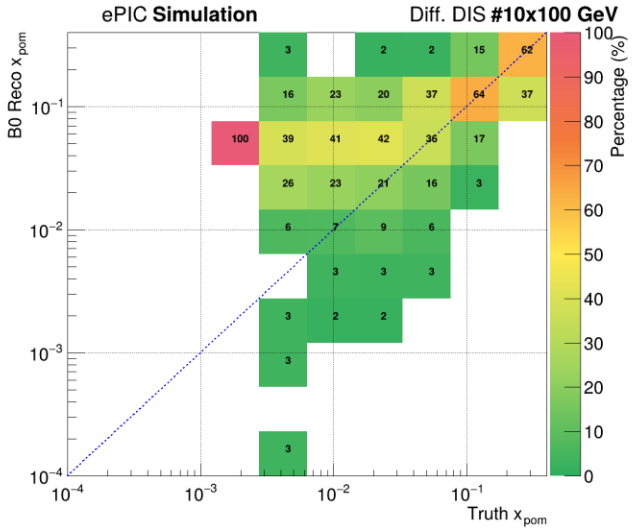
'*x_Pom*' binning ~ 20 bins

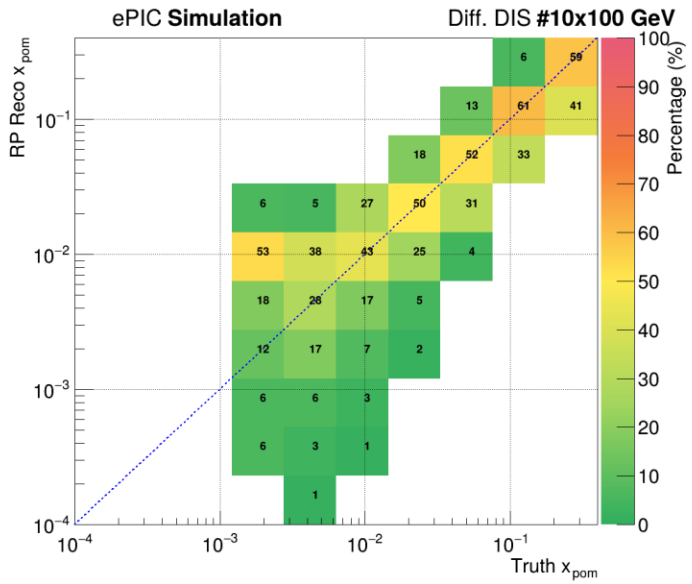


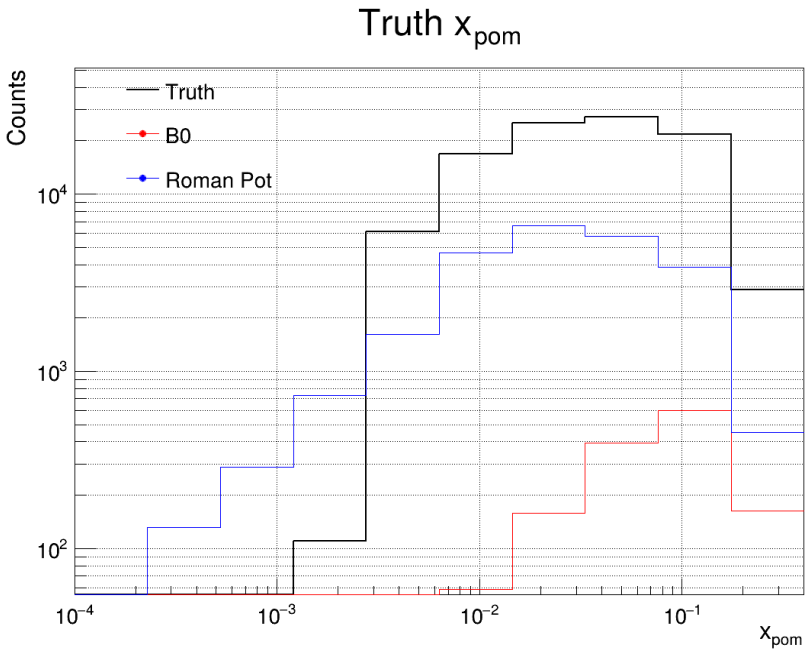




'*x_Pom*' binning ~ 10bins







Then the histo shows loss of detail , no?

Next;

- Is 't' ready ? Assuming the new fix from Alex and binned resolution, ready?
- Fix the *x_L* needed for *x_Pom if x_Pom = 1 – x_L* is good enouph
- Fix M2; we decided on the definition last week needed for *x_Pom* if the formula from *0812.2003(ZEUS)* is what should be implemented

- Cross section

$$x_{I\!P} = \frac{(P - P') \cdot q}{P \cdot q} = \frac{Q^2 + M_X^2 - t}{Q^2 + W^2 - M_p^2} ,$$

$$\beta = \frac{Q^2}{2(P - P') \cdot q} = \frac{Q^2}{Q^2 + M_X^2 - t} .$$