

Updated Diffractive ϕ Analysis Results

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eAu 10x100 GeV Diffractive ϕ Production

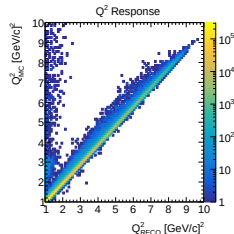
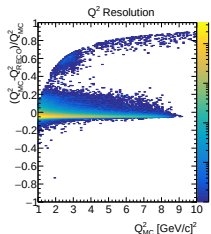
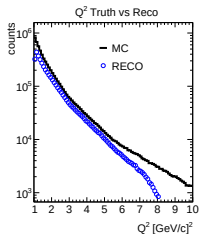
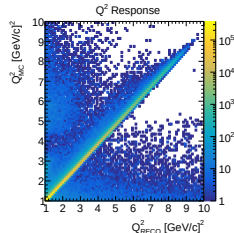
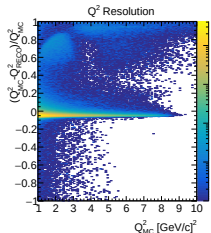
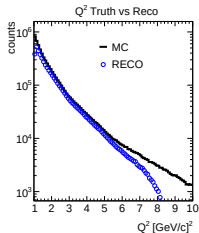
Changes:

- Fixed cuts $\rightarrow$ bug in code
- Fixed $E - p_z$ cut range to correspond to electron energy of 10 GeV (instead of 18 GeV)
- Fixed energy of Au
- Used realistic seeding $\rightarrow$ "ReconstructedChargedParticles" branch

Applied Cuts:

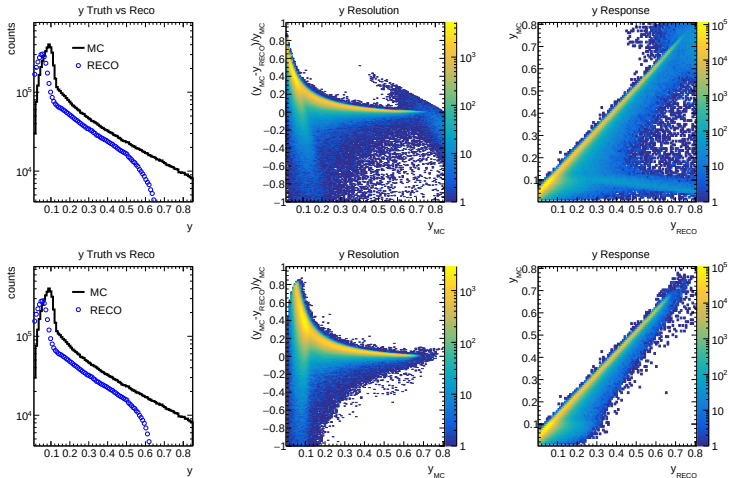
- $1 < Q^2 < 10 \text{ [GeV/c]}^2$
- $0.01 < y < 0.85$
- VM $|\text{Rapidity}_\phi| < 3.5$
- $|m_\phi - 1.02| < 0.02 \text{ [GeV/c}^2\text{]}$
- $15 < E - p_z < 25 \text{ [GeV]}$
- $0.8 < E/p < 1.18$

Q^2 Distribution



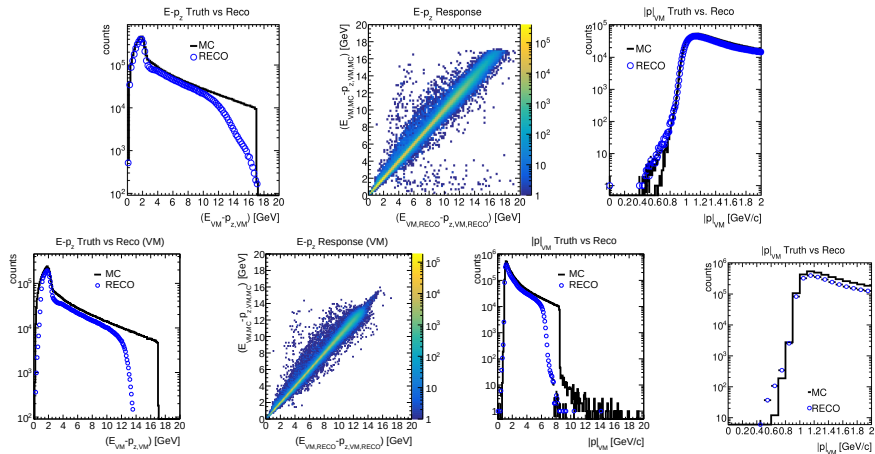
Top row: without cuts
Bottom row: with cuts

y Distribution



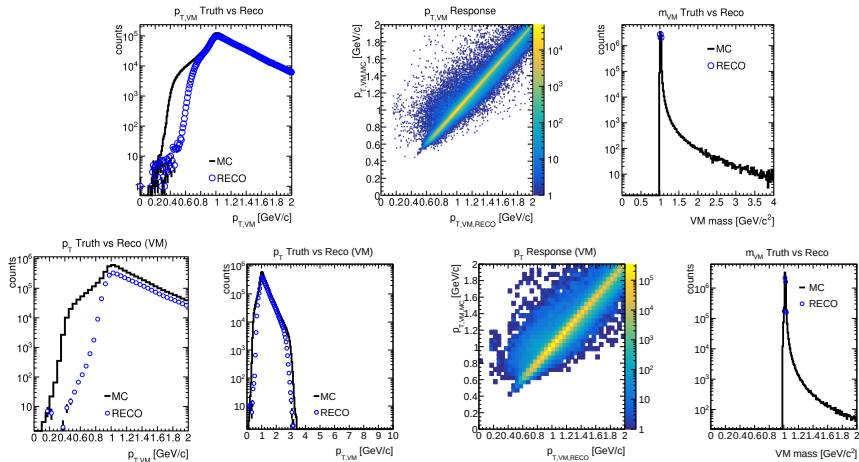
Top row: without cuts
Bottom row: with cuts

VM ($E - p_z$) and $|p|$ Distributions



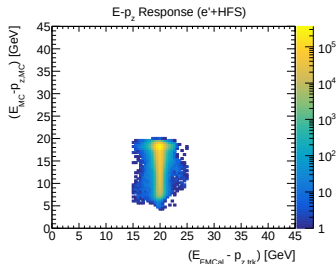
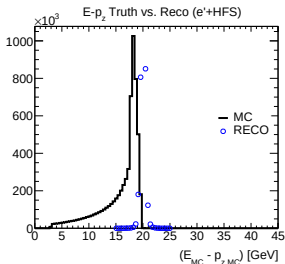
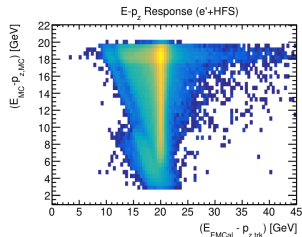
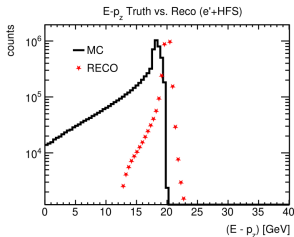
Top row: without cuts
Bottom row: with cuts

VM p_T and Mass Distributions



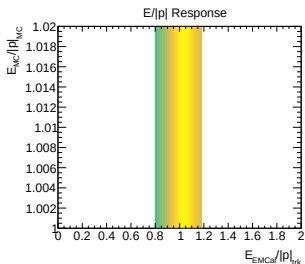
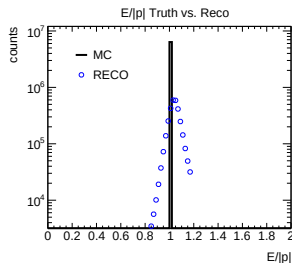
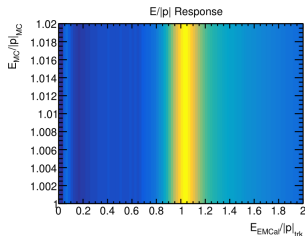
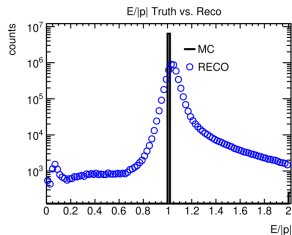
Top row: without cuts
Bottom row: with cuts

$E - p_z$ Distribution



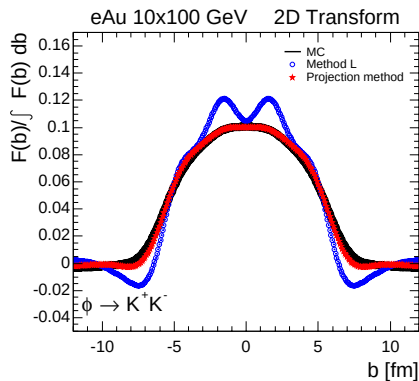
Top row: without cuts
Bottom row: with cuts

E/p Distribution

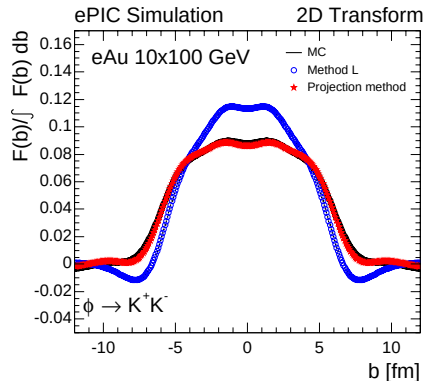


Top row: without cuts
Bottom row: with cuts

The Transformation

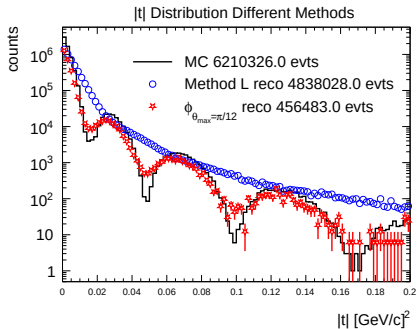


previous results

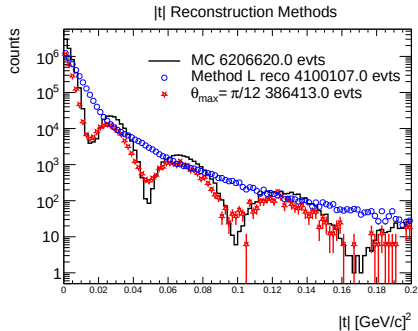


updated results

$|t|$ Reconstruction



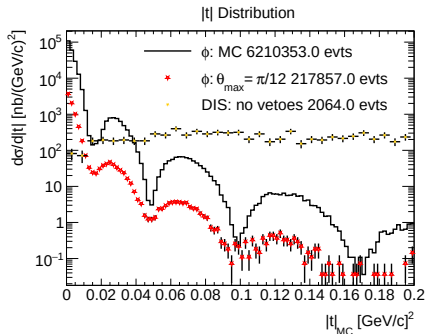
without cuts



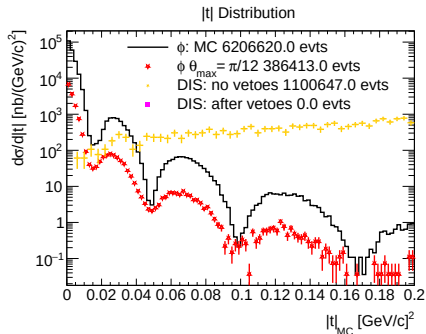
with cuts

- Projection method normalized by $\frac{\pi}{2}/\theta_{\max}$

DIS Background



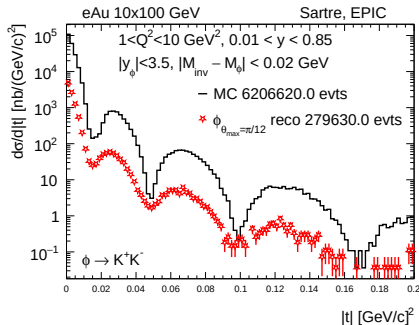
without cuts



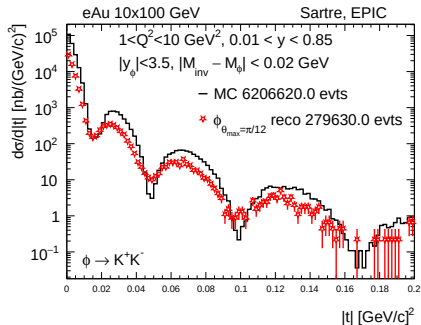
with cuts

- Total DIS events $\approx 5M$
- Combine all cuts and vetoes $\rightarrow$ **remove all background**
- Scaled by $\mathcal{L}_{int}^{-1} \Delta t^{-1}$

Results



no normalization



with normalization

- Scaled by $\mathcal{L}_{\text{int}}^{-1} \Delta t^{-1}$
- $\mathcal{L}_{\text{int}} = 0.014 \text{ fb}^{-1}$
- Projection method normalized by $\pi/2/\theta_{\text{max}}$

Status of Analysis

- **What has been done:**

- Accounted for workshop comments
 - Used realistic seeding
 - Fixed bugs on cuts in code
 - Error bars on transformation → still looking into this
- Updated git code & analysis note

- **What still needs to be done:**

- Add incoherent production
- Add ρ PID background study
- Add to Overleaf → follow style guide

- **What simulations still need to be ran:**

- eAu diffractive ϕ 10x100 BeAGLE (exclusive incoherent diffractive ϕ) files
- eAu diffractive ρ 10x100 Sartre (exclusive coherent diffractive ρ) files