Updated Diffractive ϕ Analysis Results

Maci Kesler

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Updates since IOP workshop:

eAu 10x100 GeV Diffractive ϕ Production

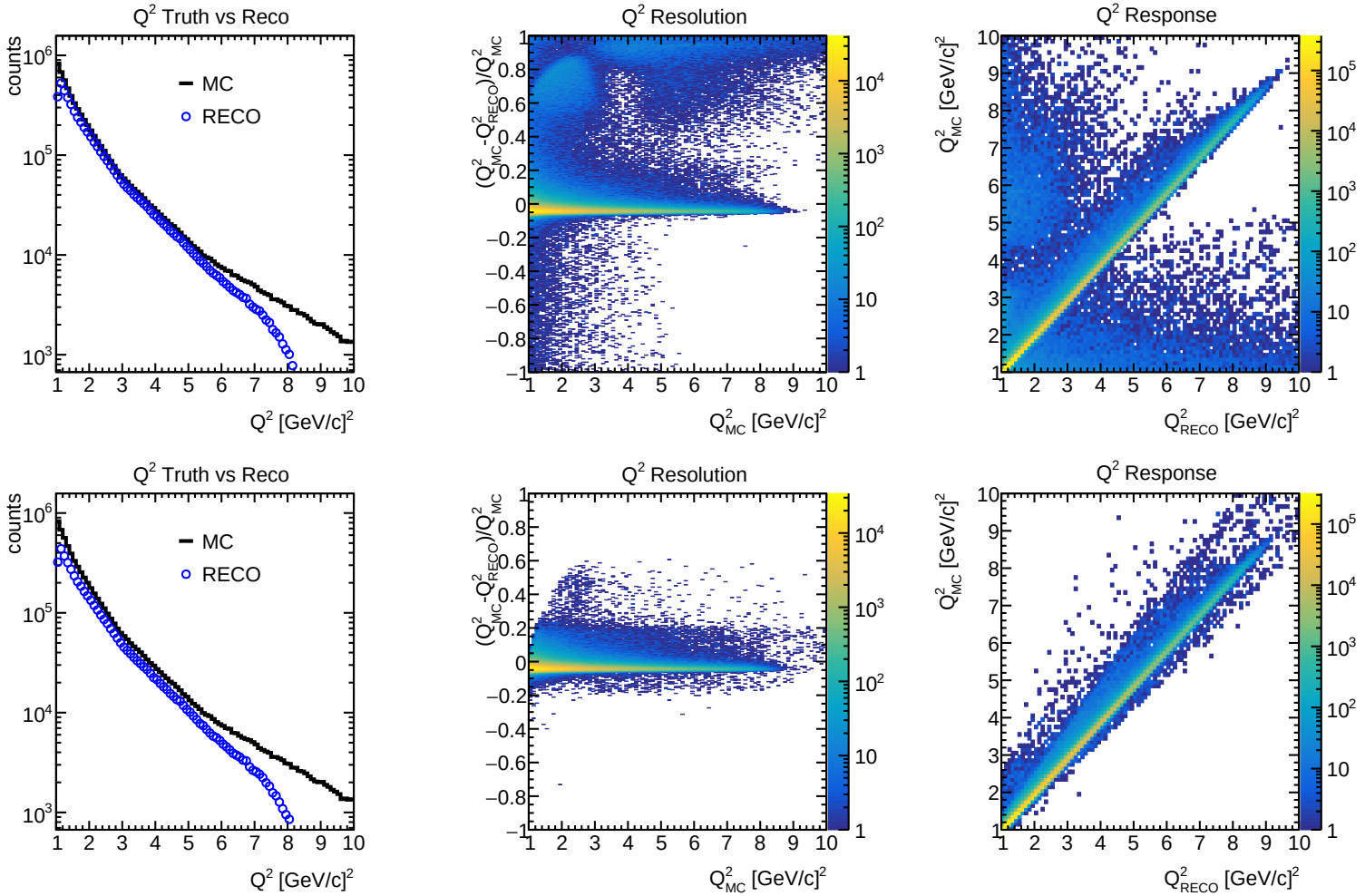
Changes:

- 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
- Changed e finder (more on this later)

Applied Cuts:

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

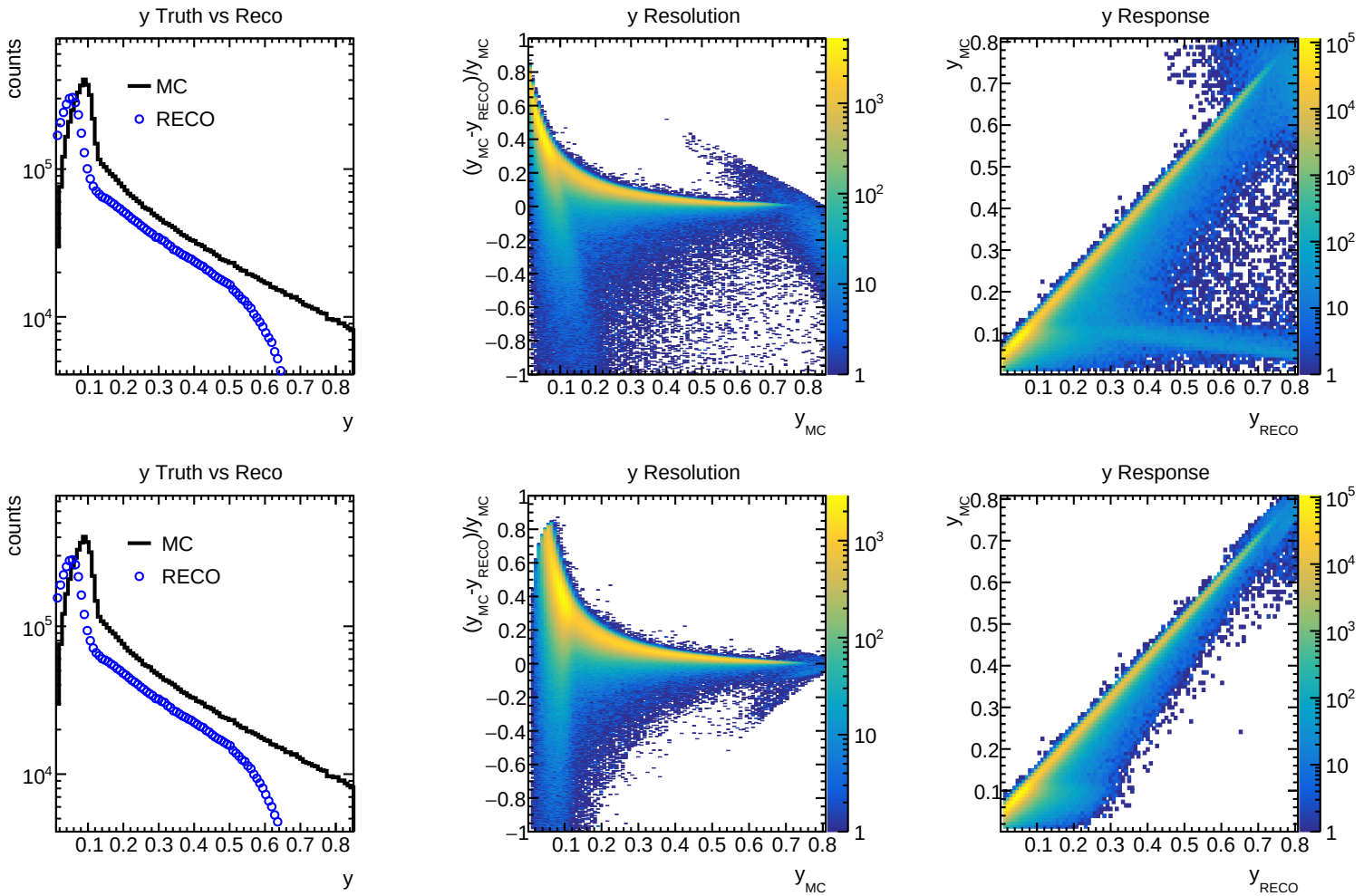
Q^2 Distribution



Top row: without cuts

Bottom row: with cuts

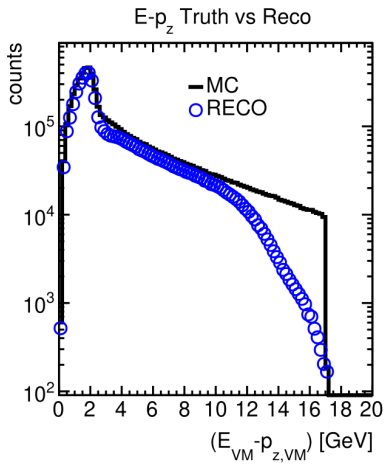
y Distribution

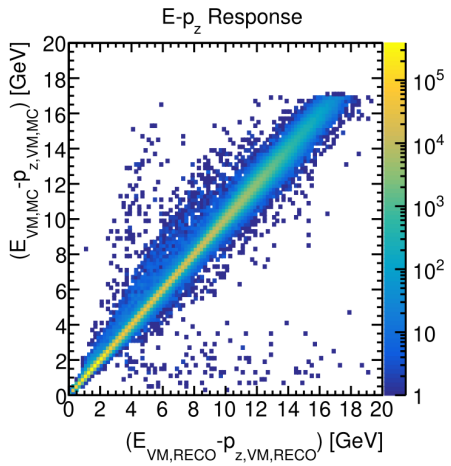


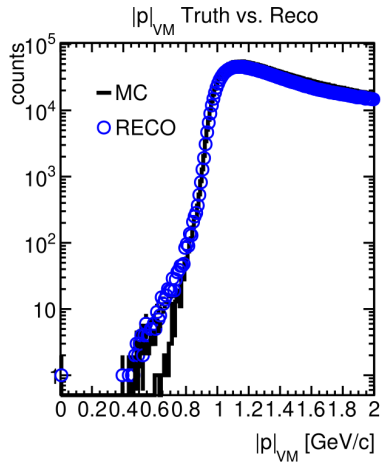
Top row: without cuts

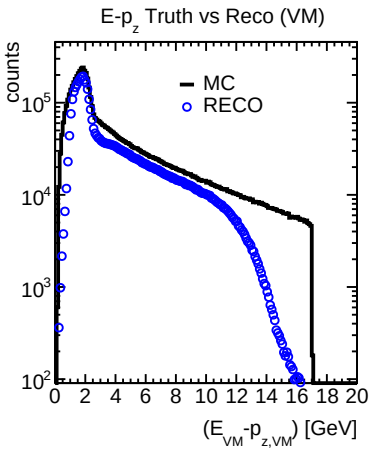
Bottom row: with cuts

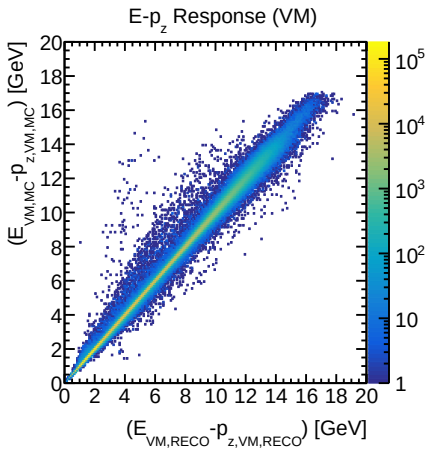
VM ($E - p_z$) and $|p|$ Distributions

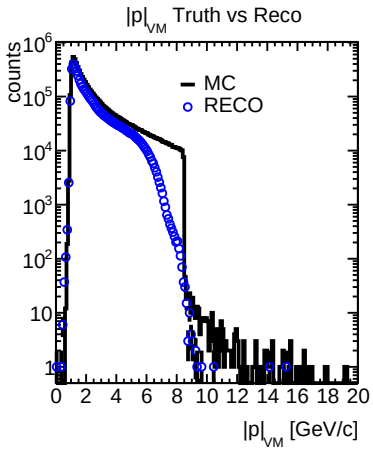


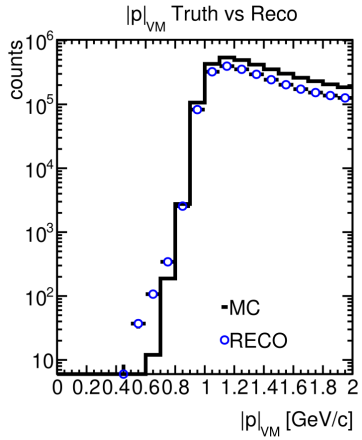








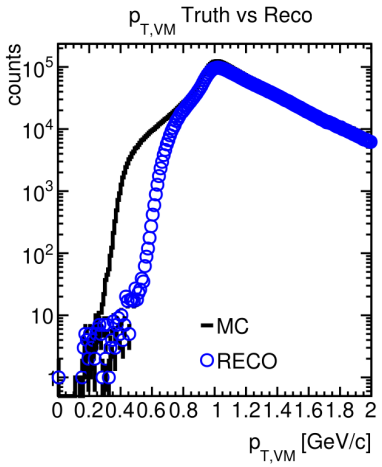


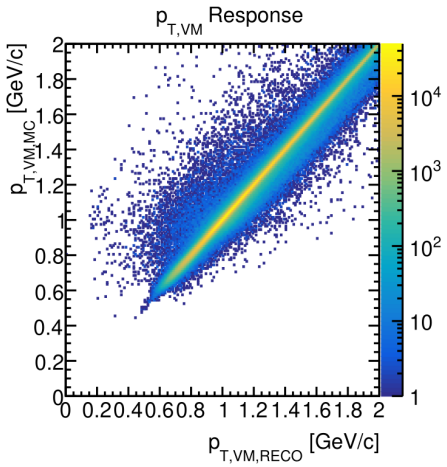


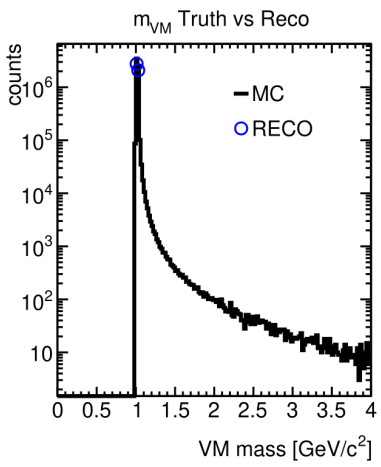
Top row: without cuts

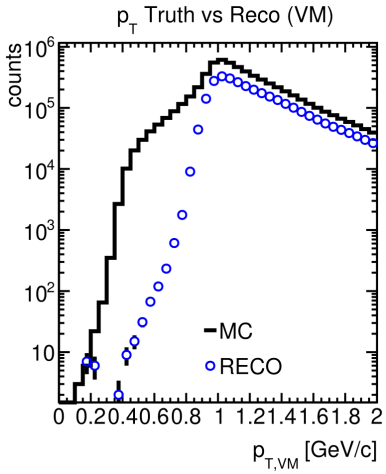
Bottom row: with cuts

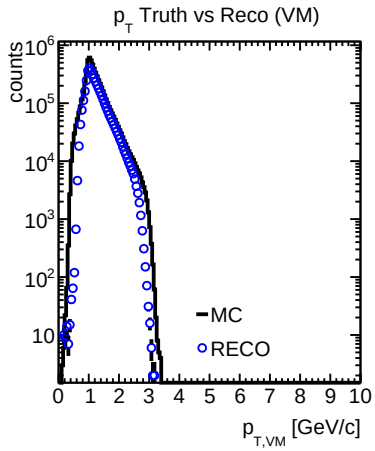
VM p_T and Mass Distributions

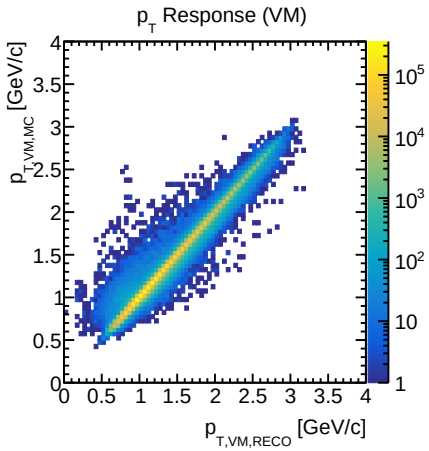


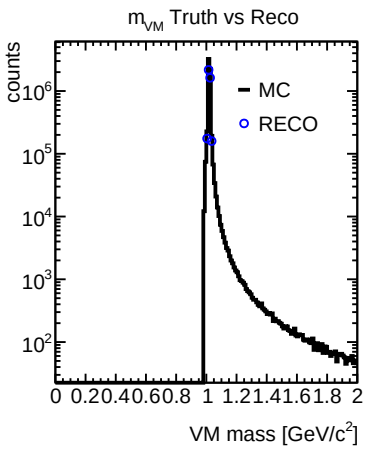








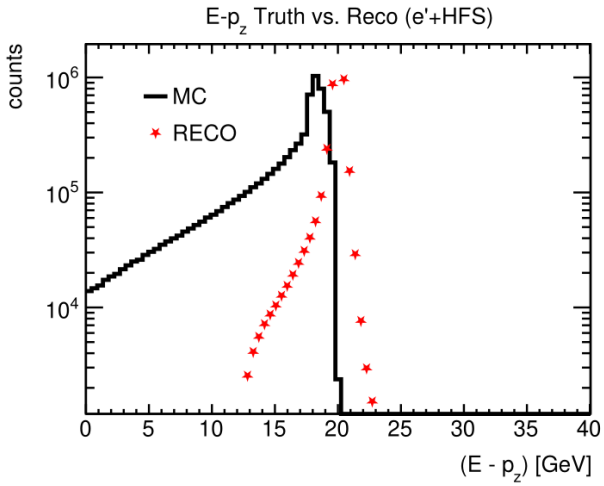


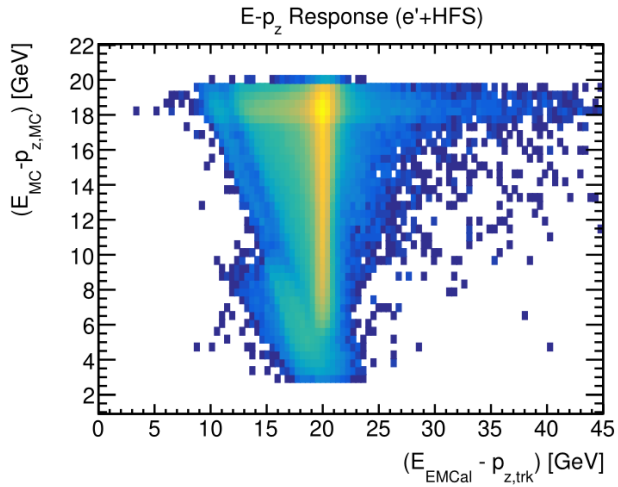


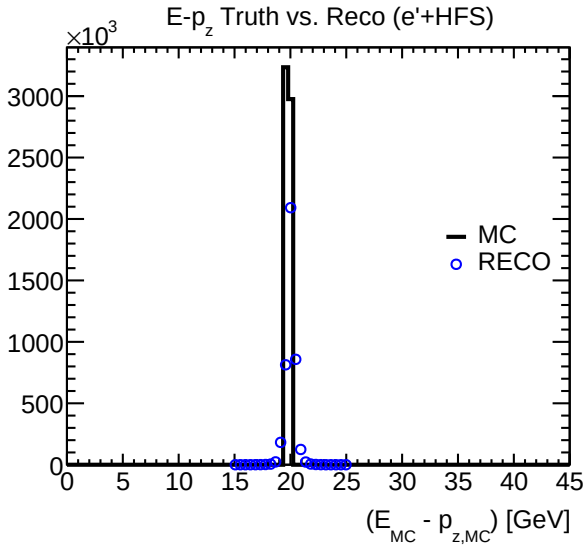
Top row: without cuts

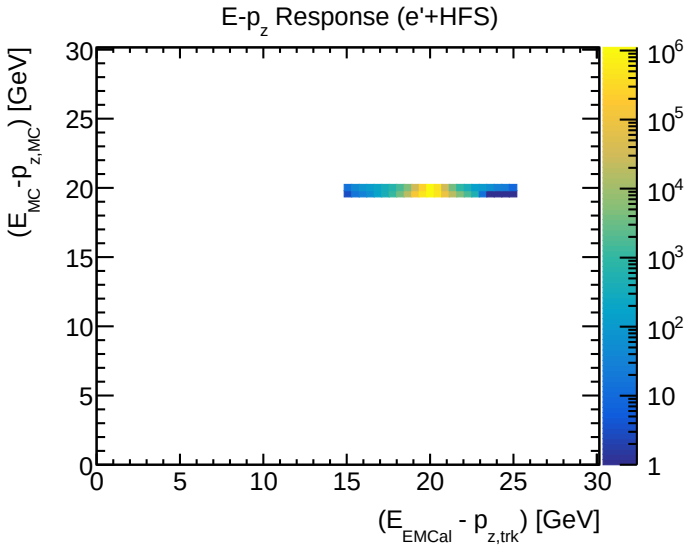
Bottom row: with cuts

$E - p_z$ Distribution





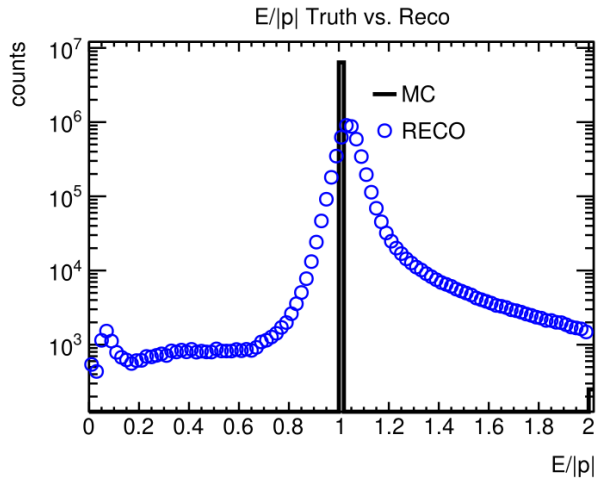


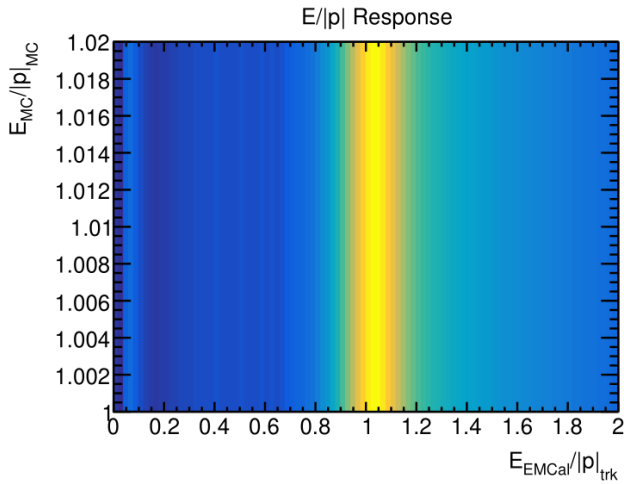


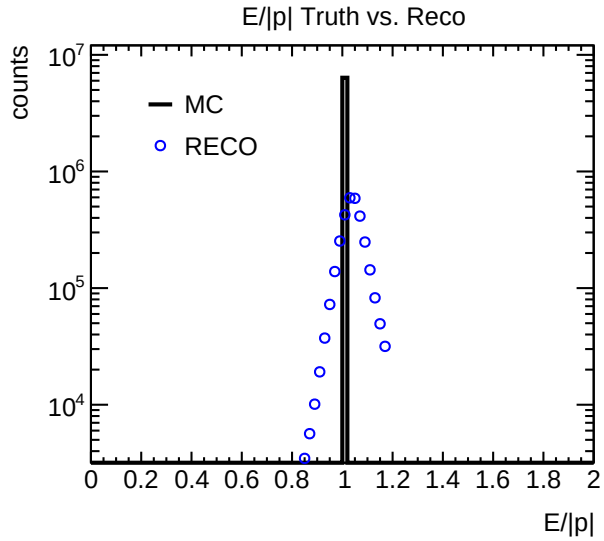
Top row: without cuts

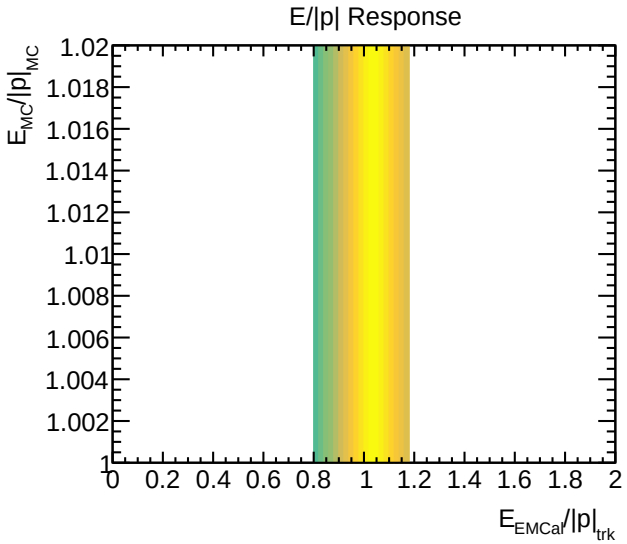
Bottom row: with cuts

E/p Distribution









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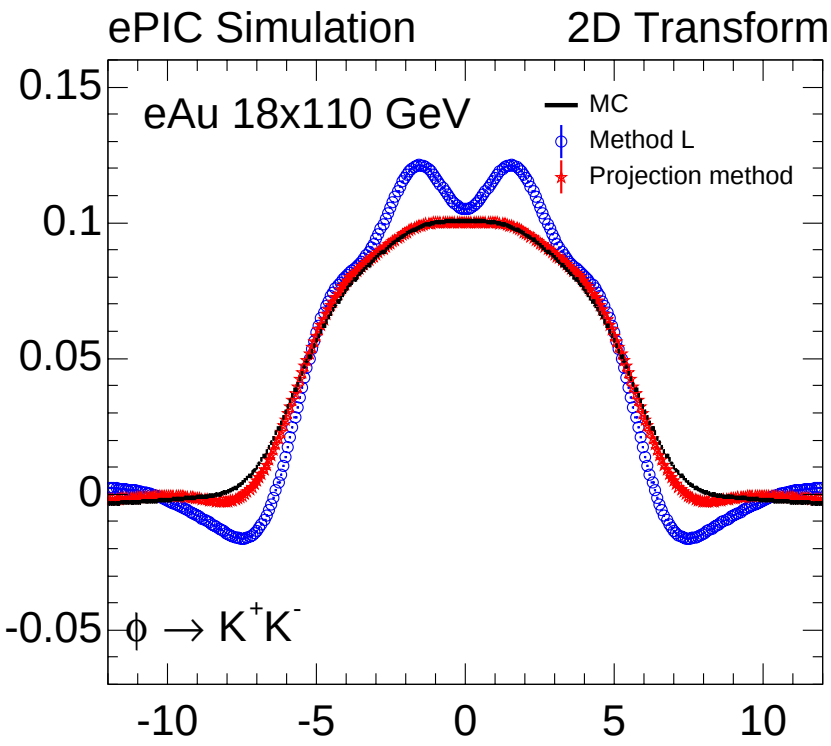
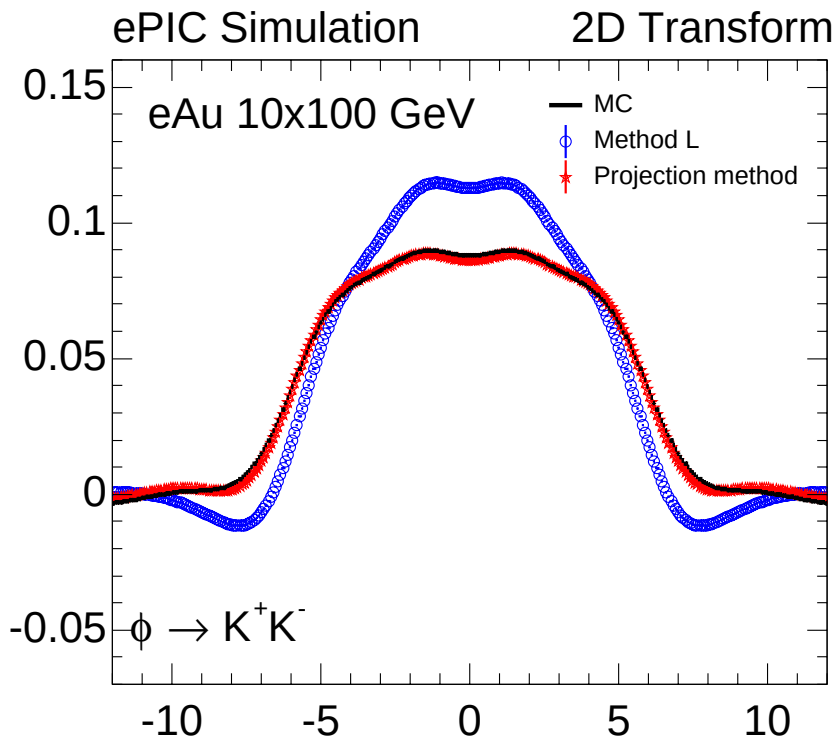
Bottom row: with cuts

The Transformation



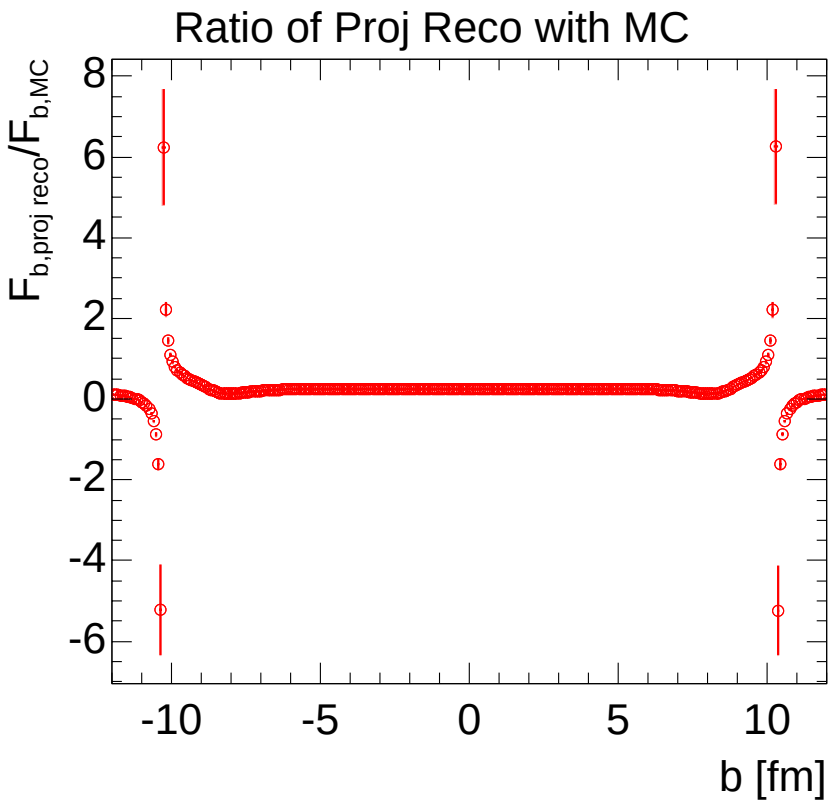
previous results



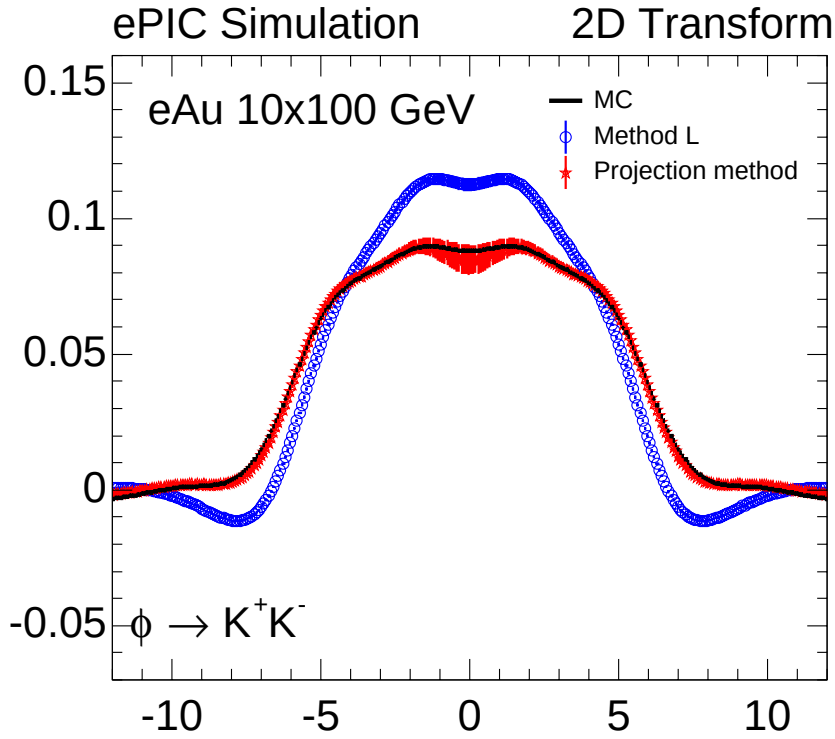
updated results

Previous results were from the wrong file and labeling → was from eAu 18x110 GeV

The Transformation pt.2

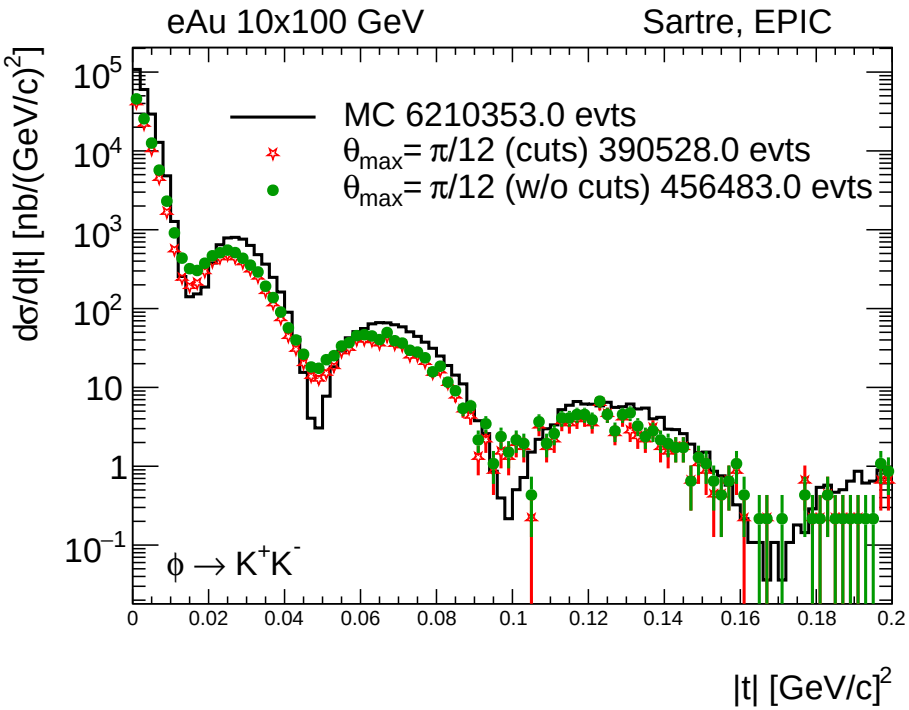


Ratio of Rec and MC



Scale up error by 20: error is small on previous slide $\rightarrow$ shows error bars are small

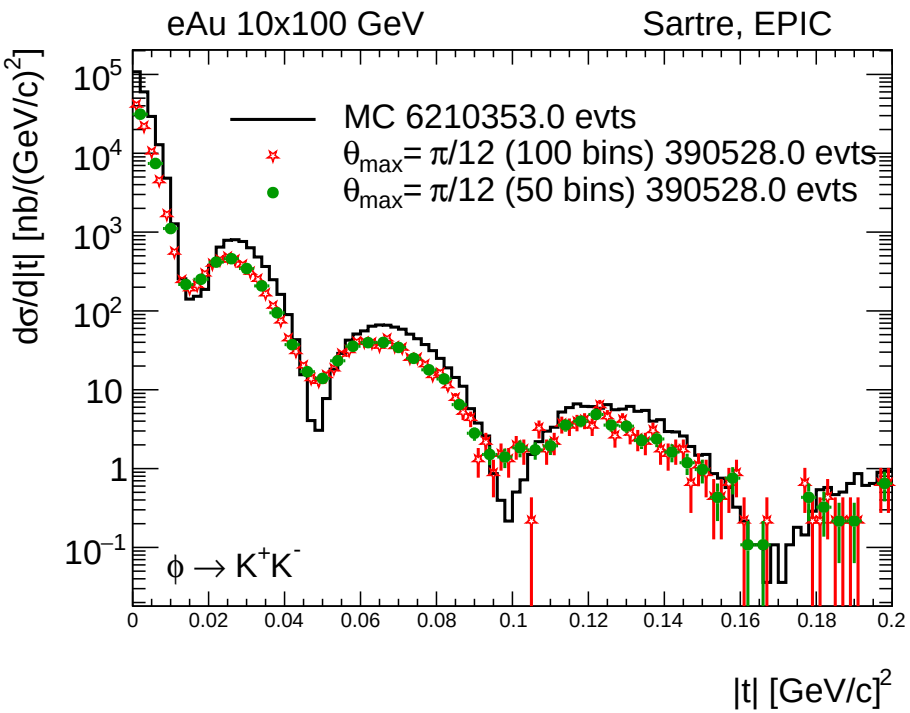
$|t|$ Reconstruction: Compare With and Without Cuts



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

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

$|t|$ Reconstruction: Compare Binning



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

Status of Analysis

- **What has been done:**
  - Accounted for workshop comments
    - Used realistic seeding
    - Fixed bugs on cuts in code
    - Error bars on transformation
  - Updated git code & analysis note
- **What still needs to be done:**
  - Add incoherent production
  - Add ρ PID background study
  - Add to Overleaf $\rightarrow$ 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