

# Charged jet EEC using ePIC e+p and e+Au simulation

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# Outline

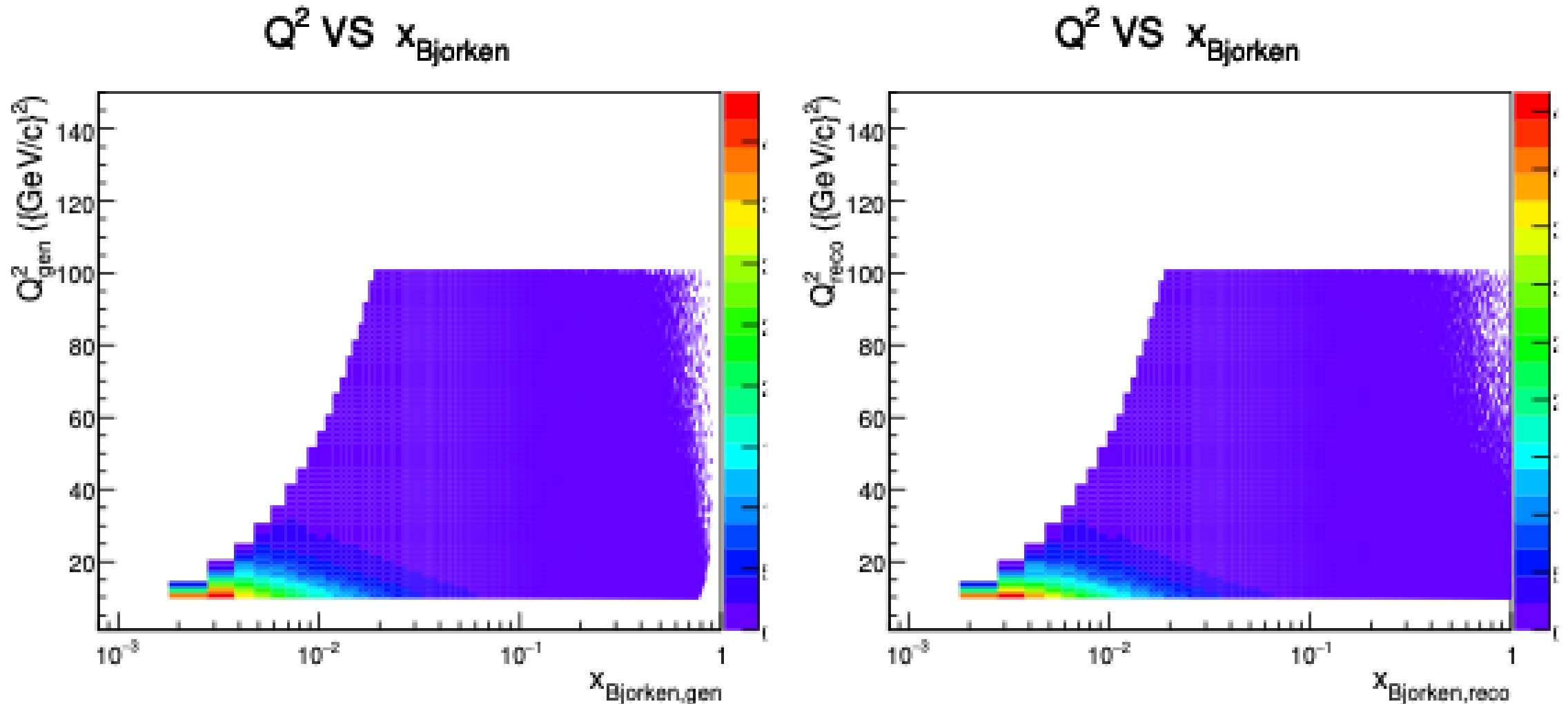
- Simulation samples and cut selections.
- Charged jet kinematics and EEC distributions in 10+100 GeV e+p simulation.
- Charged jet kinematics and EEC distributions in 10+100 GeV e+Au simulation.
- Summary

# Simulation sample and cut selection

- Simulation samples
  - Jet tree produced by Dener for 10+100 GeV with  $Q^2$  10-100 GeV<sup>2</sup> e+p and e+Au simulation in /gpfs02/eic/ddesouza/JetTrees/April2026.
  - Charged jet only, formed from tracks and jet R=1.0.
- Cut selection at the Truth and Reco. Level.
  - Jet is not from a single electron.
  - Jet  $p_T > 3$  GeV/c
  - Jet  $|\eta| \leq 2.5$
  - No. of constituents in jets  $\geq 3$
  - Track  $p_T > 0.2$  GeV/c

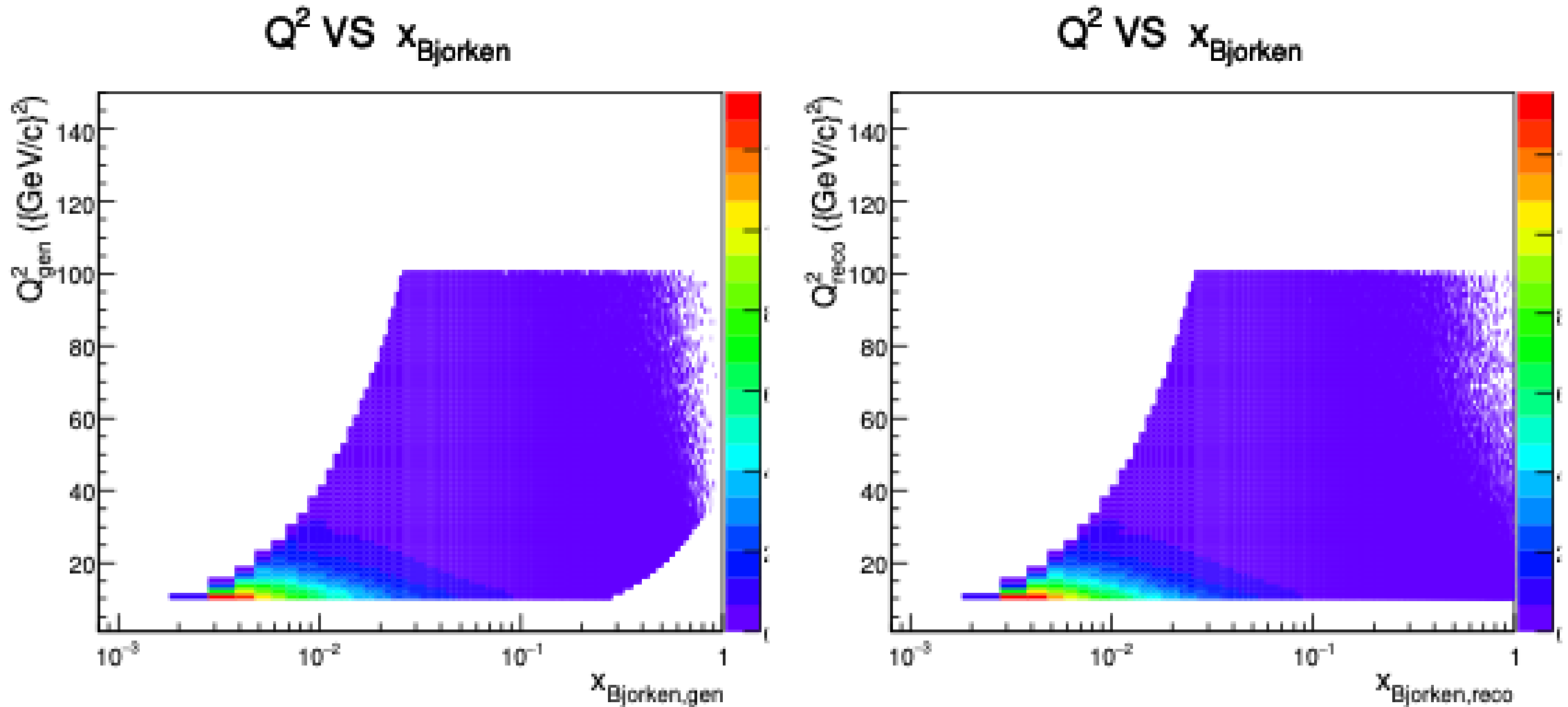
# $x_{\text{BJ}}$ - $Q^2$ kinematics in 63.2 GeV e+p simulation

- Left: generation level, right: reconstruction level



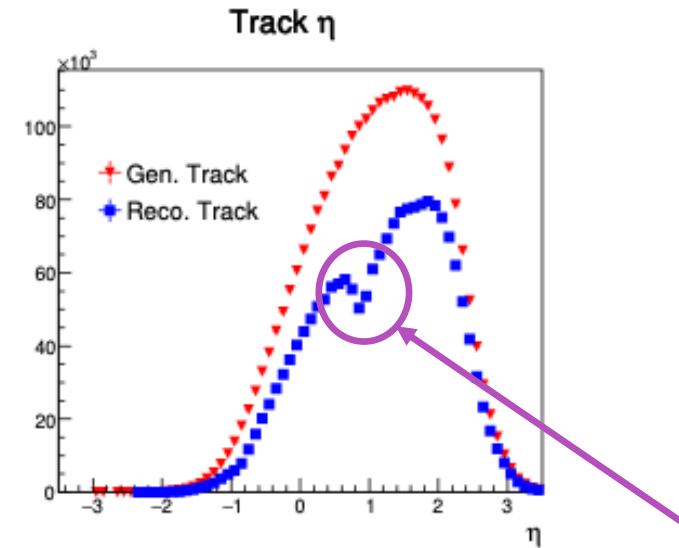
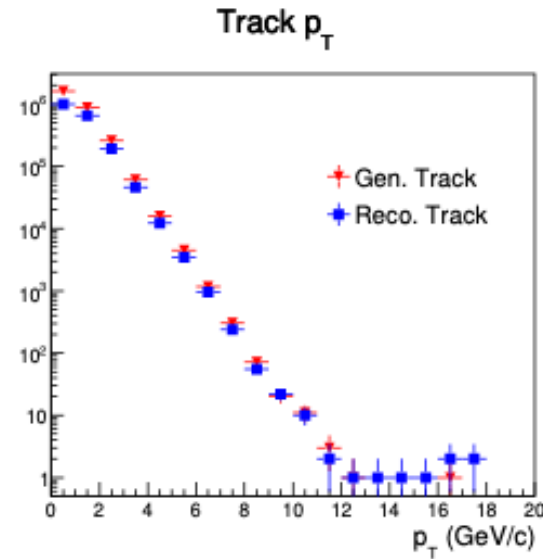
# $x_{\text{BJ}}\text{-}Q^2$ kinematics in 63.2 GeV e+Au simulation

- Left: generation level, right: reconstruction level



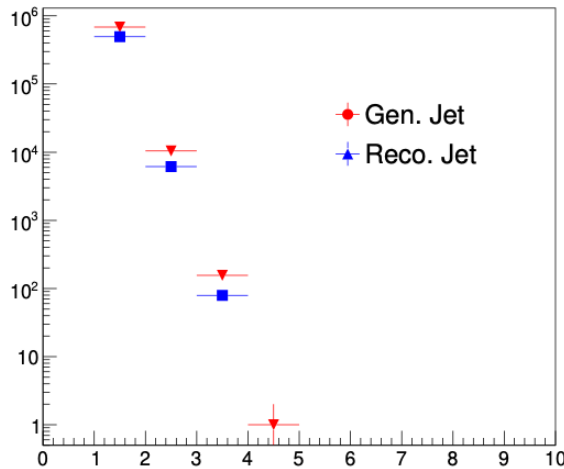
# 63.2 GeV e+p simulation ( $Q^2$ 10-100 GeV<sup>2</sup>)

- Track in jet kinematics:

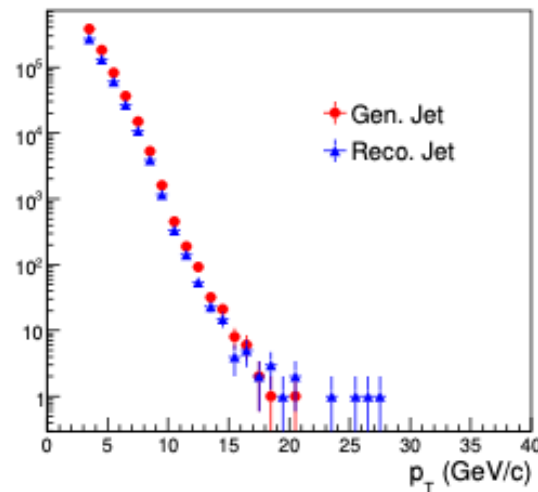


- Jet kinematics:

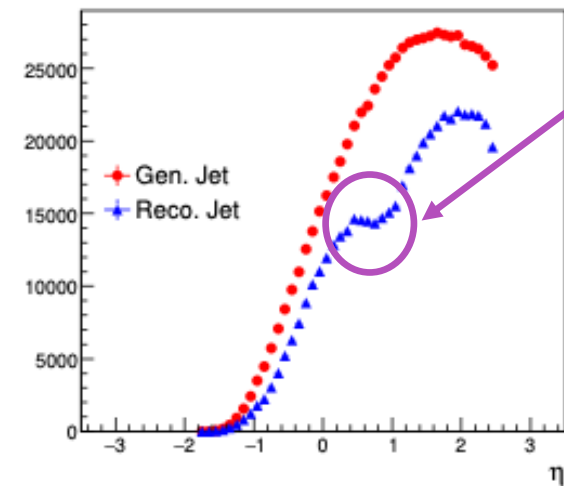
No. of jets



Jet  $p_T$



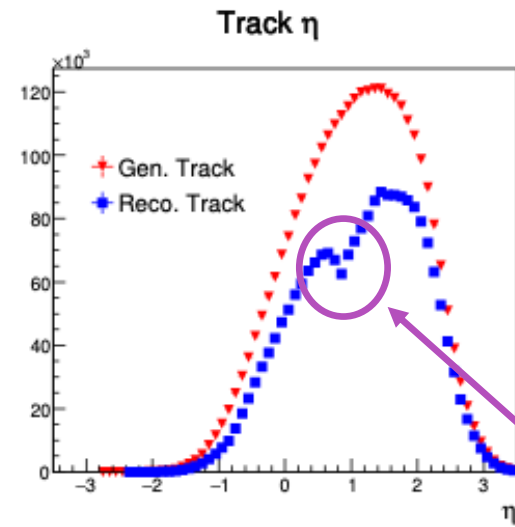
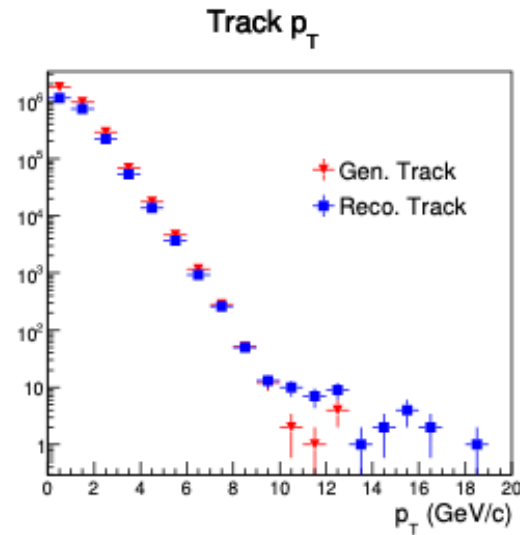
Jet  $\eta$



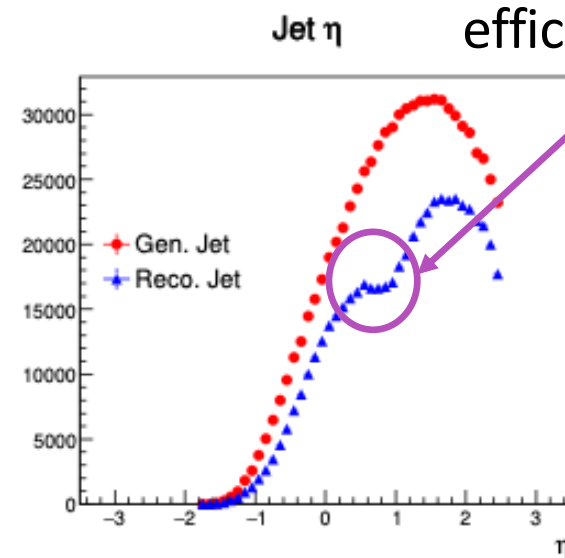
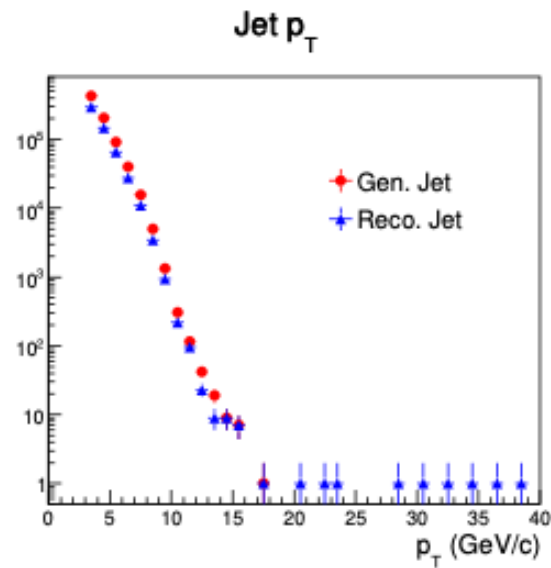
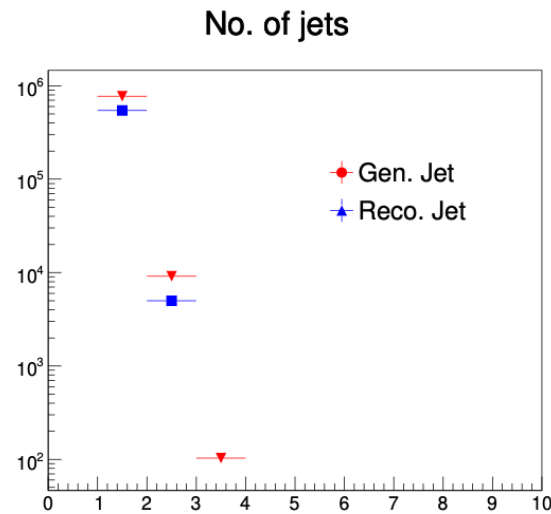
Low track reconstruction efficiency in this region?

# 63.2 GeV e+Au simulation ( $Q^2$ 10-100 GeV<sup>2</sup>)

- Track in jet kinematics:



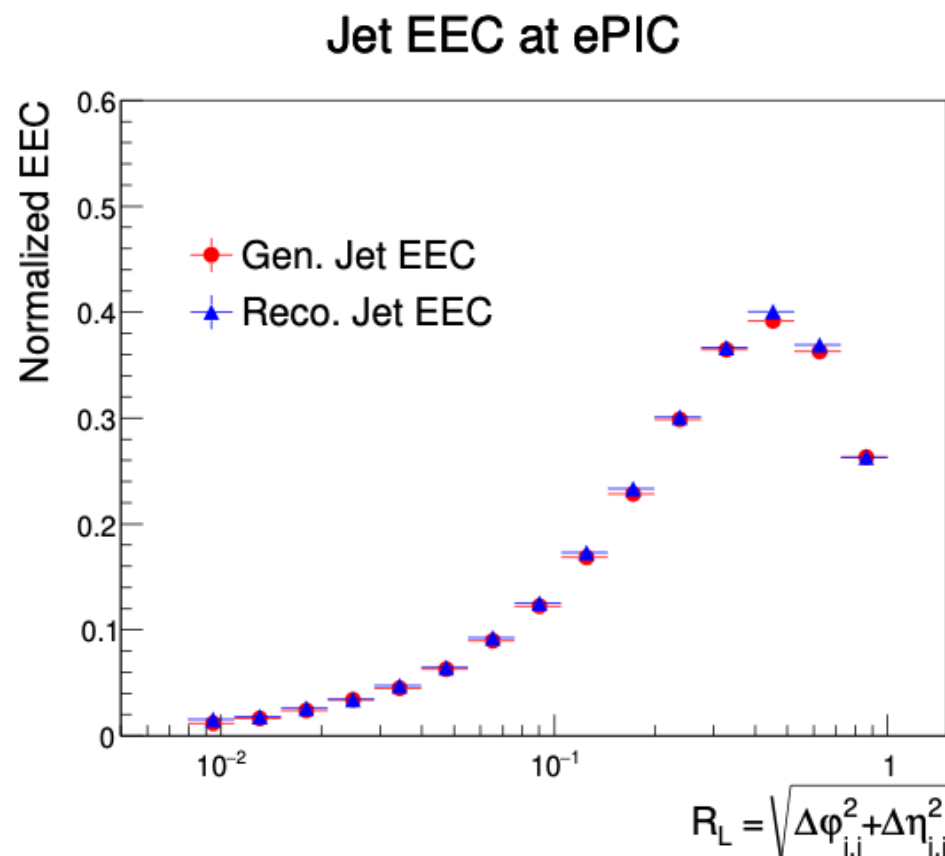
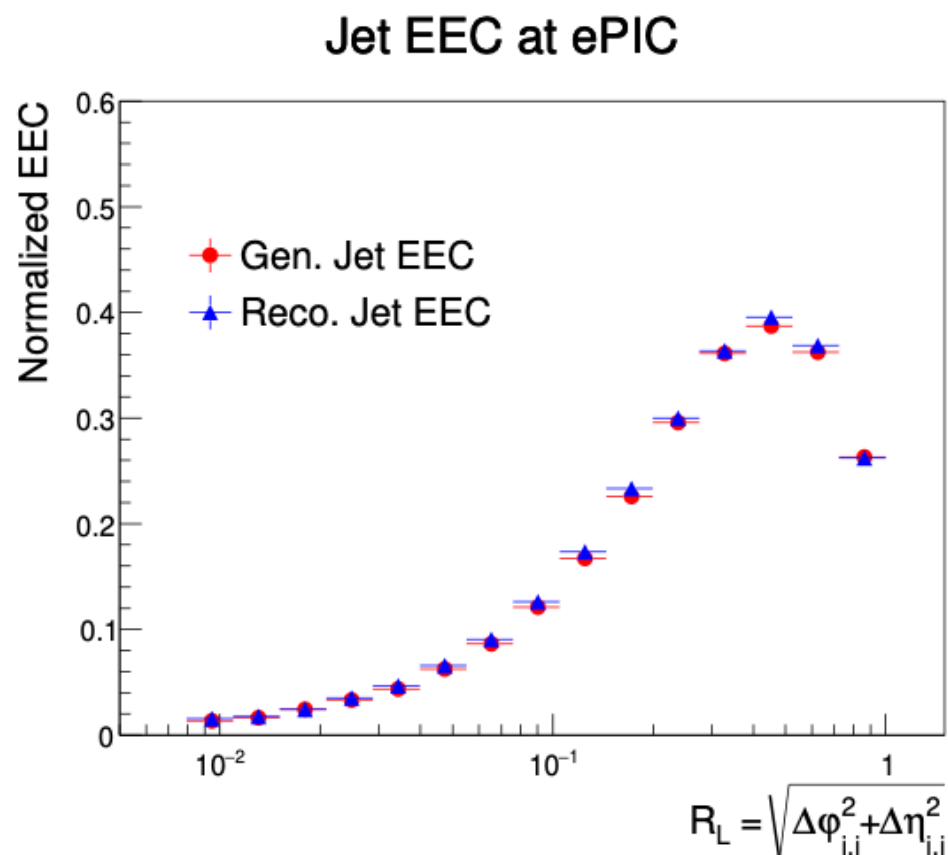
- Jet kinematics:



Low track reconstruction efficiency in this region.

# Charged Jet EEC in 63.2 GeV e+p and e+Au simulation ( $Q^2$ 10-100 $\text{GeV}^2$ )

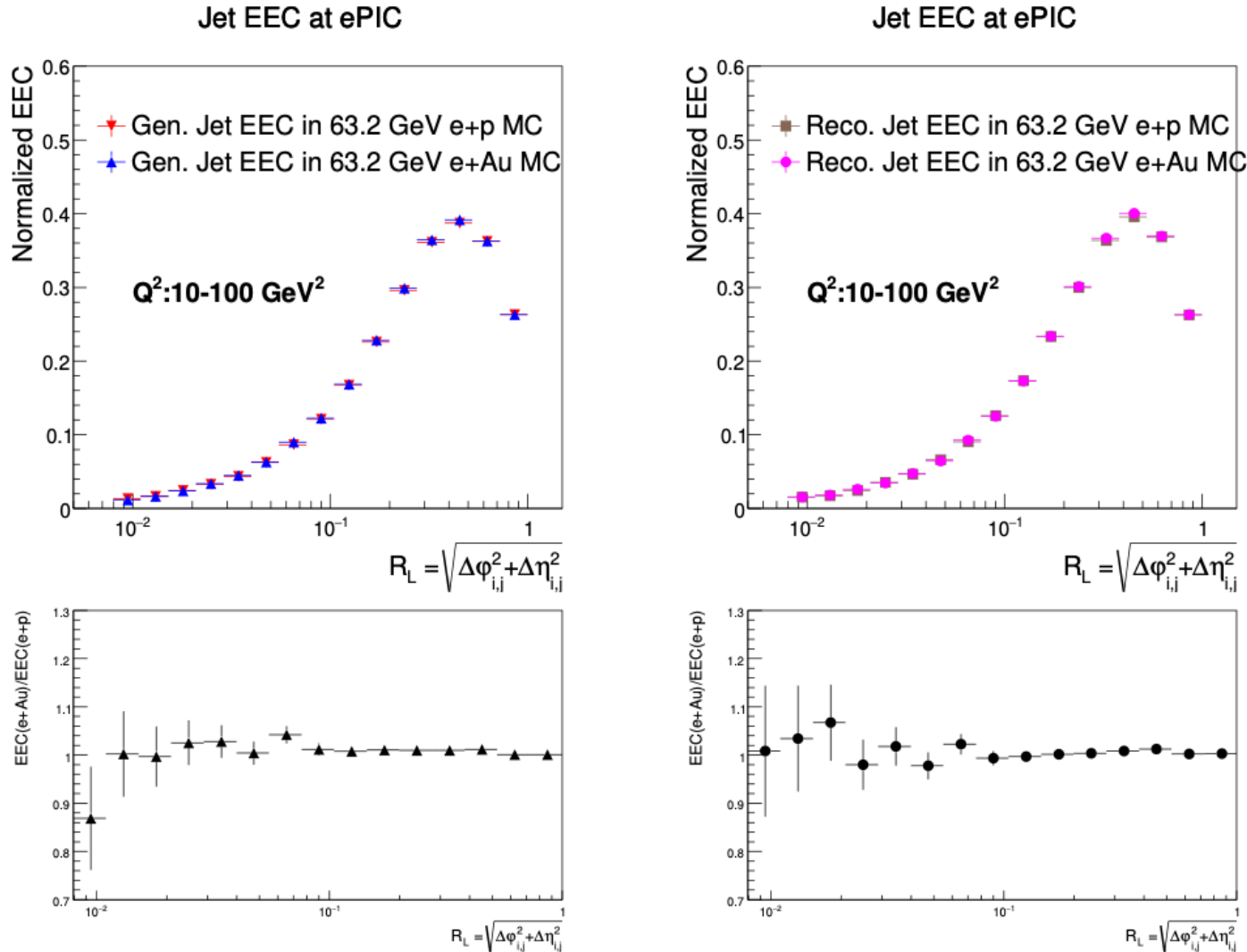
- Normalized charged jet EEC in 63.2 GeV e+p (left ) and e+Au (right) simulation with  $Q^2$  10-100  $\text{GeV}^2$ .



- No significant differences between Gen. and Reco. Level jet EEC distributions.

# Comparison of charged jet EEC between e+p and e+Au collisions

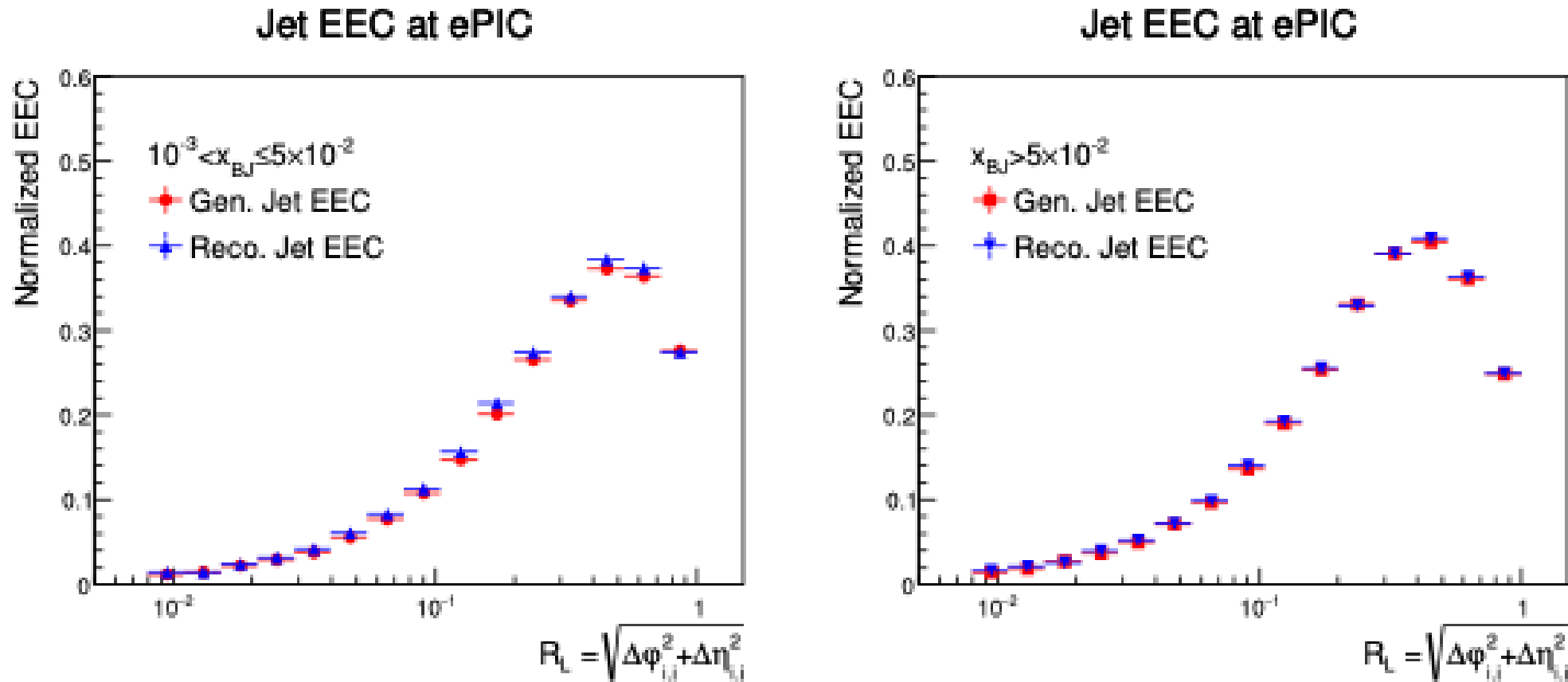
- Left: generation level: reconstruction level.



- Ratio of jet EEC in e+Au simulation over that in e+p simulation is close to 1 for  $R_L > 0.1$ .

# Charged jet EEC in different $x_{BJ}$ binning in e+p simulation ( $Q^2$ 10-100 GeV<sup>2</sup>)

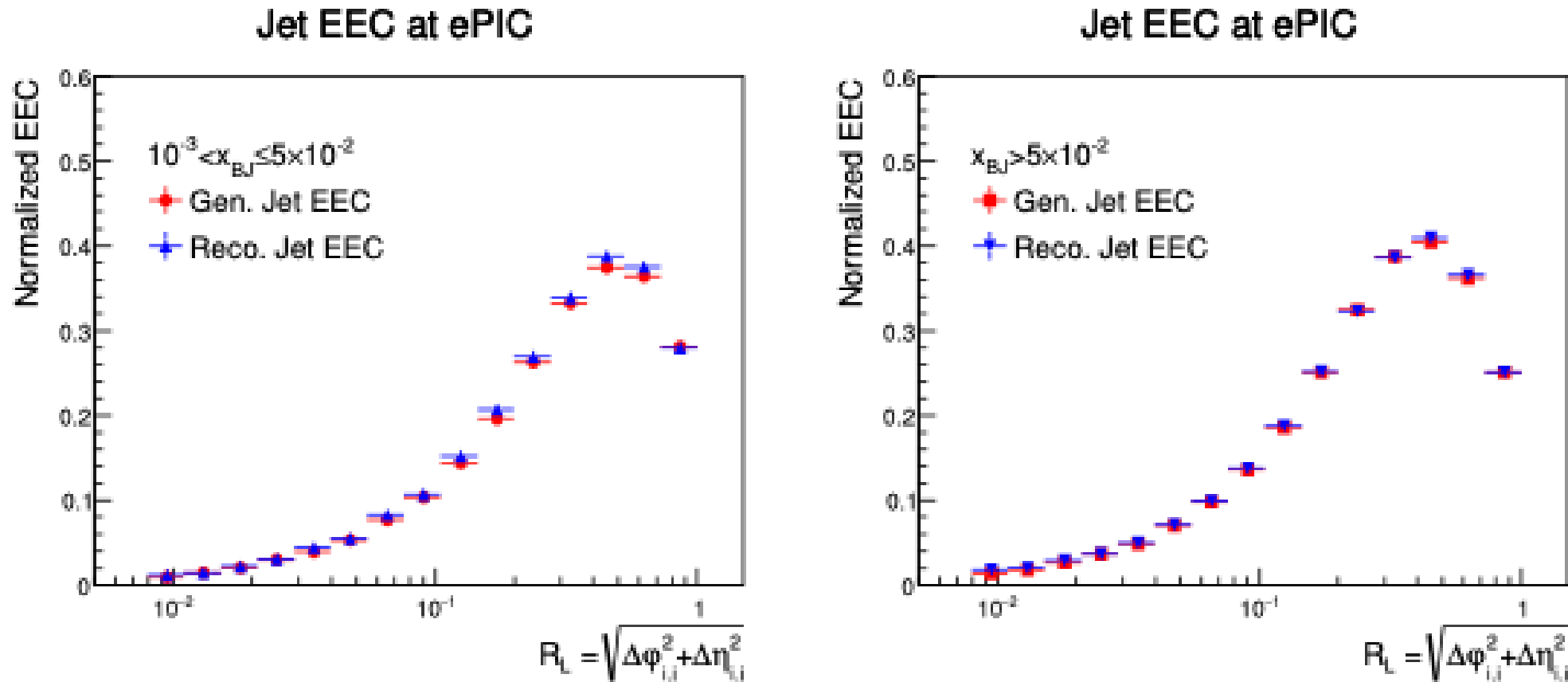
- Left:  $10^{-3} < x_{BJ} < 0.05$  (shadowing region), right:  $x_{BJ} > 0.05$  (dominated by anti-shadowing effects, see the  $x_{BJ}$ - $Q^2$  distributions).



- Good match between the generation and reconstruction level.

# Charged jet EEC in different $x_{BJ}$ binning in e+Au simulation ( $Q^2$ 10-100 GeV<sup>2</sup>)

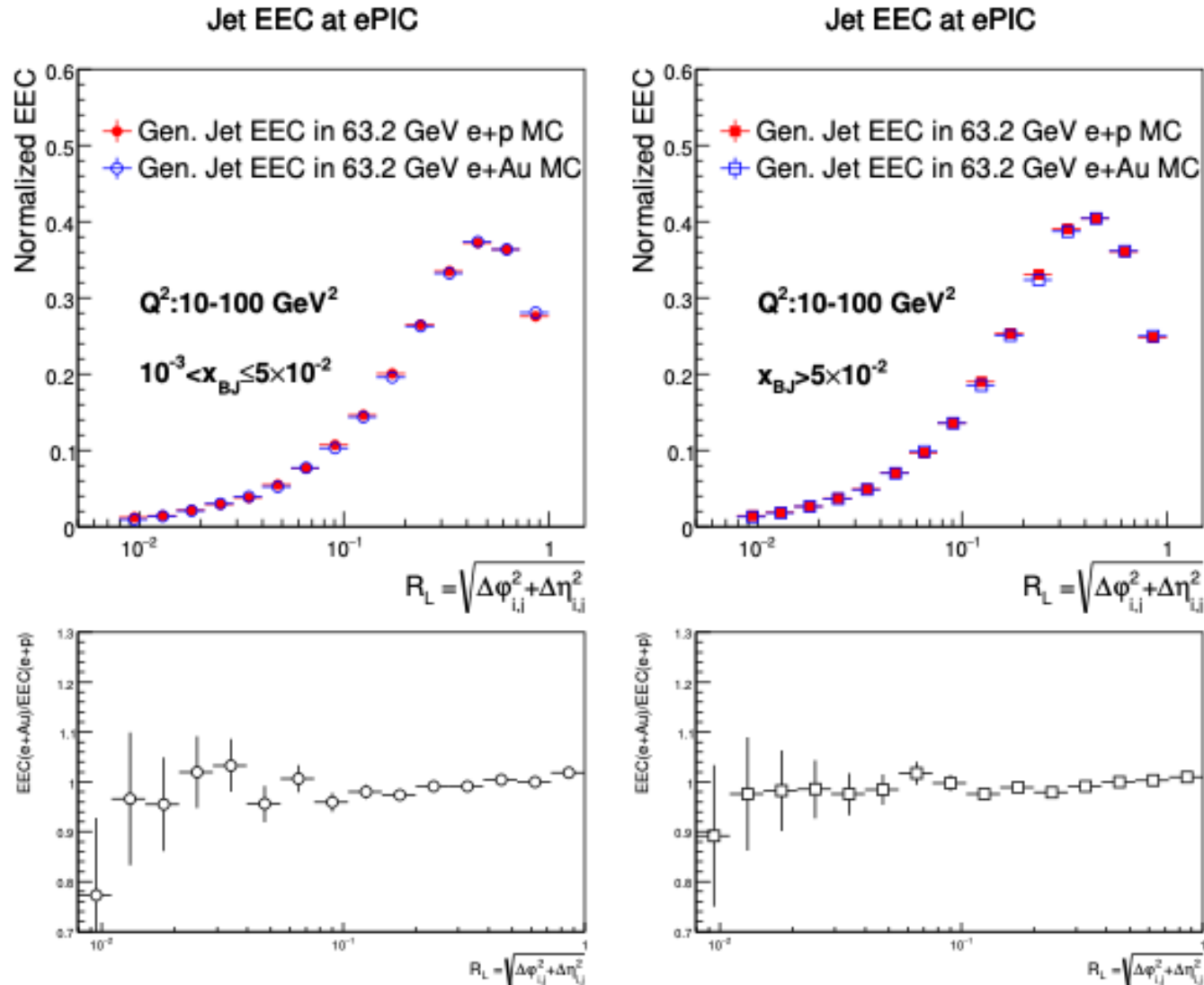
- Left:  $10^{-3} < x_{BJ} < 0.05$  (shadowing region), right:  $x_{BJ} > 0.05$  (dominated by anti-shadowing effects, see the  $x_{BJ}$ - $Q^2$  distributions).



- Good match between the generation and reconstruction level.

# Comparison of charged Jet EEC in 63.2 GeV e+p and e+Au simulation in different $x_{BJ}$

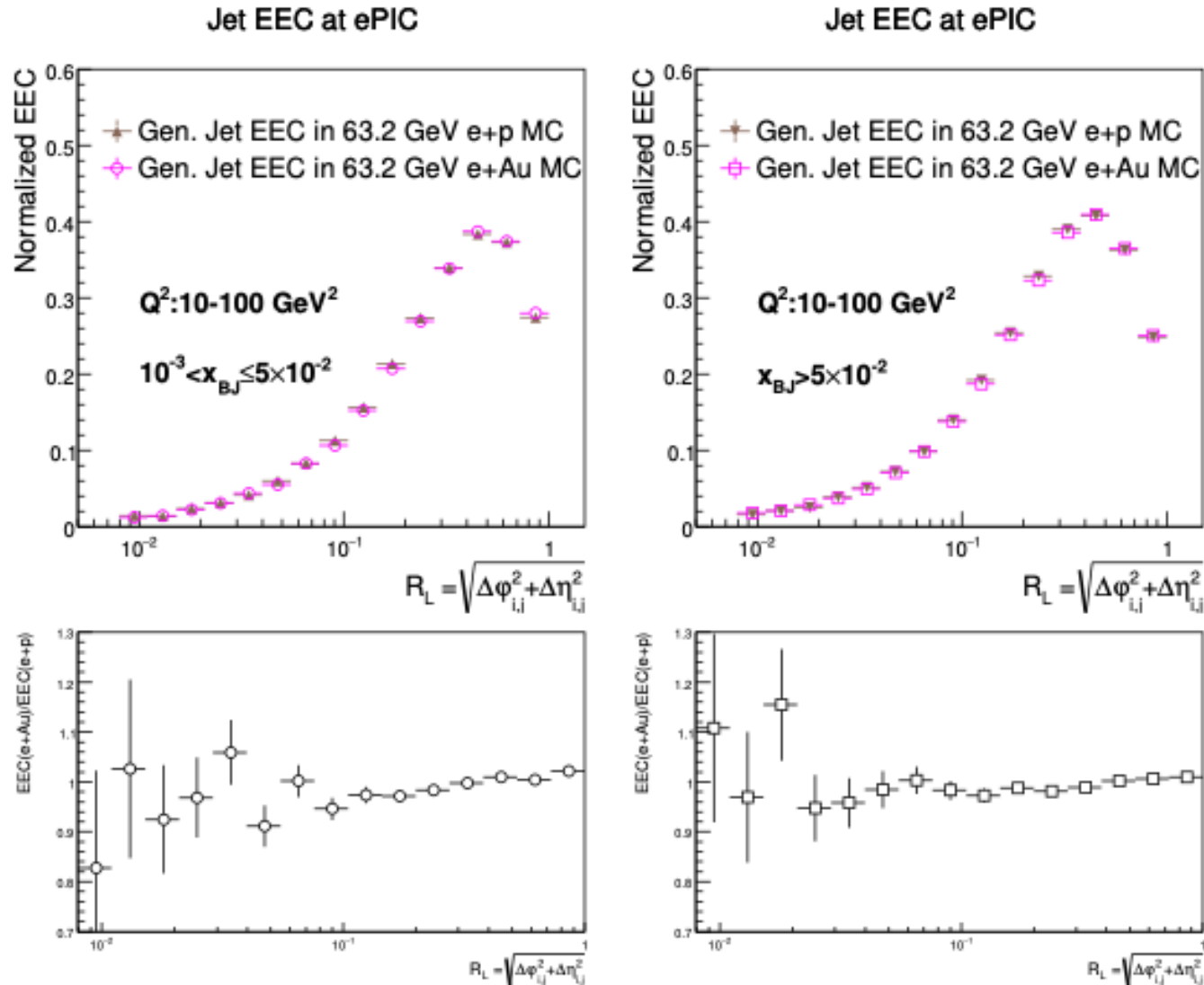
- Comparison in generation level.



- Indication of charged jet EEC is slightly modified in the intermediate RL region in 63.2 e+Au simulation in the  $0.001 < x_{BJ} < 0.05$  region.

# Comparison of charged Jet EEC in 63.2 GeV e+p and e+Au simulation in different $x_{BJ}$

- Comparison in reconstruction level.



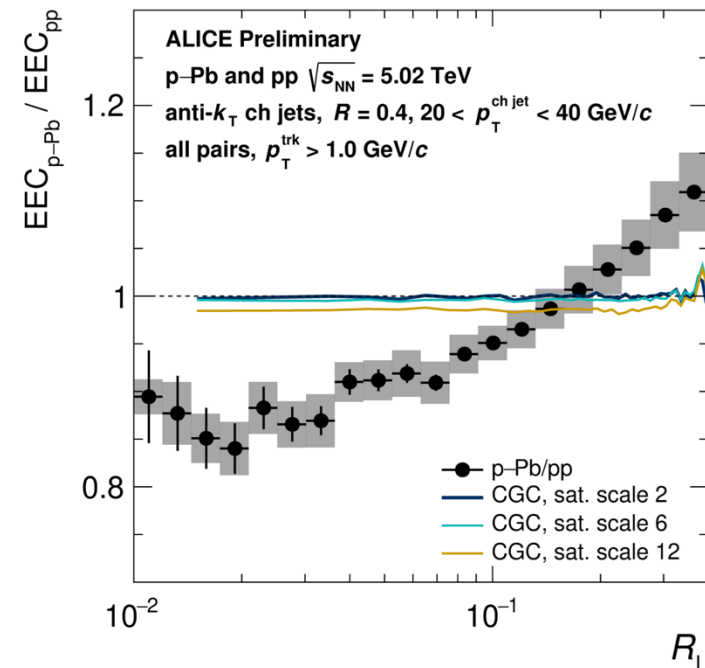
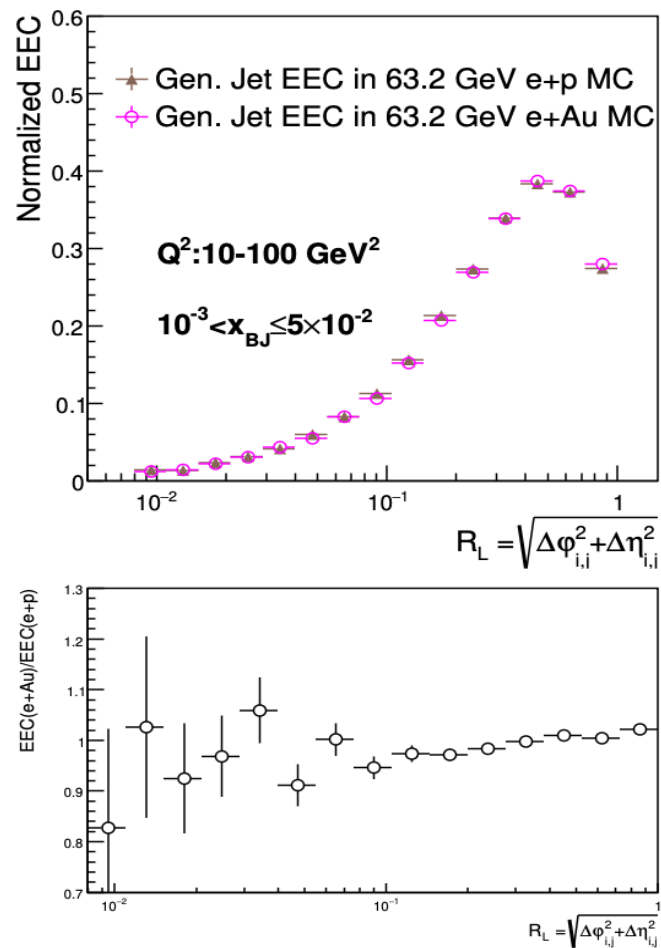
- Indication of charged jet EEC is slightly modified in the intermediate RL region in 63.2 e+Au simulation in the  $0.001 < x_{BJ} < 0.05$  region.

# Charged jet EEC ratio between e+p and e+Au collisions

- Charged jet EEC e+Au yields over e+p yields (left), charged jet EEC p+Pb yields over p+p yields measured by ALICE.

- Initial-state effects?
  - The slight modification in e+Au simulation is correlated with the difference between the EPS09 nPDF distribution and the proton PDF.
- Final-state effects?
- Track and jet selections?

Jet EEC at ePIC



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# Summary

- Jet EEC studies have been updated using the latest jet tree produced by Denner.
- Plan to check the Jet EEC for jet with different cone radii.