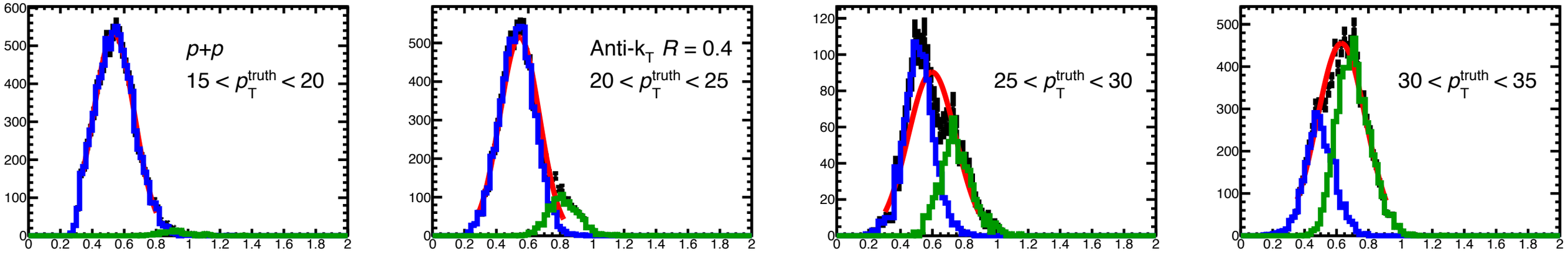
Summary of simulation input/output

- Updated set of HepMC Pythia7 QCD dijet events:
  - ➡ /sphenix/user/dvp/gen/QCD*XX*/, *XX*=7,10,15,25,35
  - ➡ filtered on R=0.4 p_T > 15, 20, 30, 40, 50 GeV jet in $|\eta|<0.45$
- New HepMC Pythia8 photon+jet events, 10k total:
  - ➡ /sphenix/user/dvp/gen/Photon35/
  - ➡ filtered on p_T^{γ} > 40 GeV, $|\eta^{\gamma}| < 0.85$, and at least one R=0.4 jet with p_T > 20 GeV, $|\eta^{jet}| < 0.45$, all at generator-level
- Output trees in /sphenix/user/dvp/sims/new-jet
  - ➡ *YY*-QCD*XX*-10k-v0.root and *YY*-Photon-10k-v0.root, for *YY*=*pp*,AuAu48,AuAu04
  - ➡ all plots shown here can be reproduced *exactly* from these

Response in QCD dijet events

- Funny behavior in *pp* traced to minimum seed jet p_T in HI-style jet reco
  - ➡ used to define exclusion regions in 2nd iteration, was set to >15 GeV
  - ➡ jets without seed have their energy included in the background estimate, causing over-subtraction ("self-energy bias")

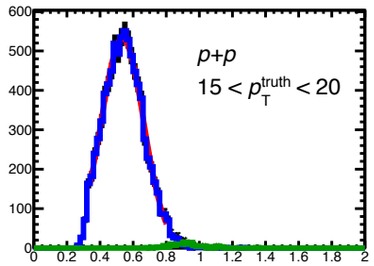
Response fits in pp, R=0.4 jets, first four p_T bins (plots by Jeff Ouellette):

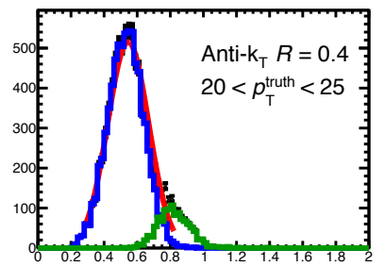


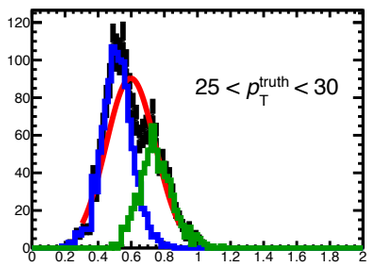
*…compare for jets **with** and **without** a nearby seed jet*

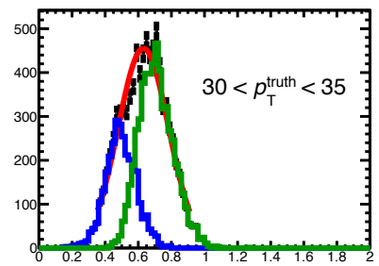
- Not a "bug", rather sensitivity to important parameter in HI-style jet reco
  - ➡ too high p_T^{seed} causes this self-energy bias at low-jet-p_T, as we see here
    - ➡ in, e.g. ATLAS, can be corrected for further at analysis level
  - ➡ too low p_T^{seed} excludes real background fluctuations from UE determination
  - ➡ proposal: rerun first few QCD slices for *p+p*, with lower p_T^{seed} minimum

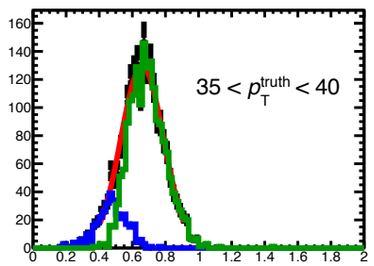
pp

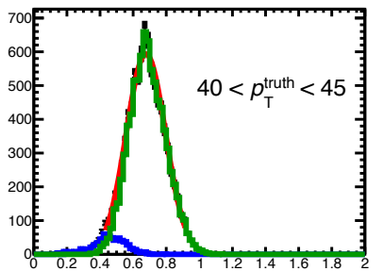


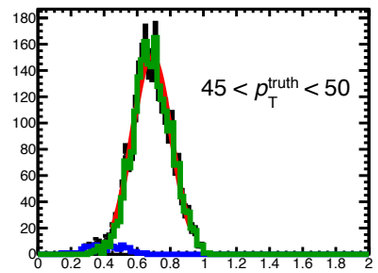


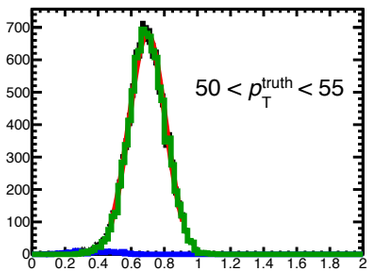


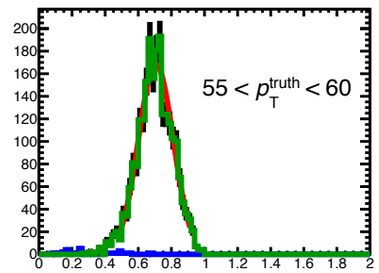




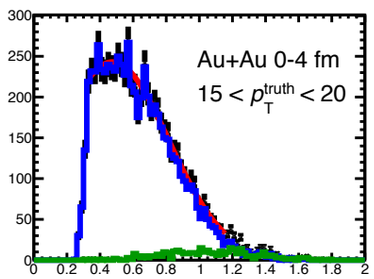


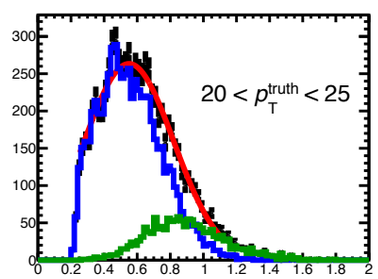


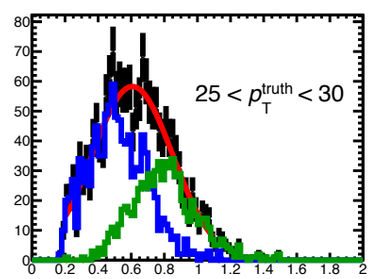


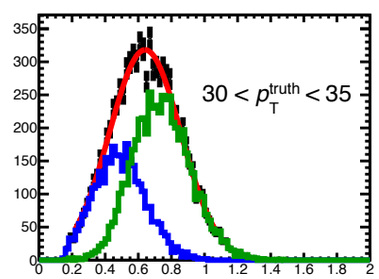


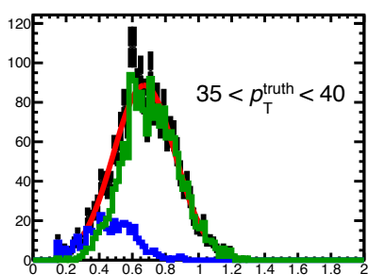
b=0-4fm

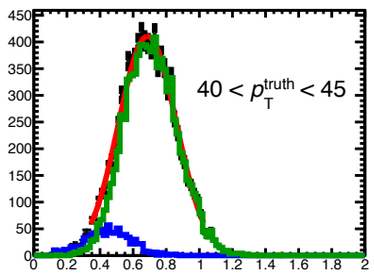


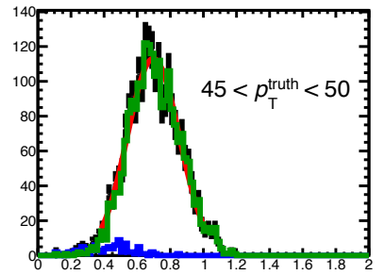


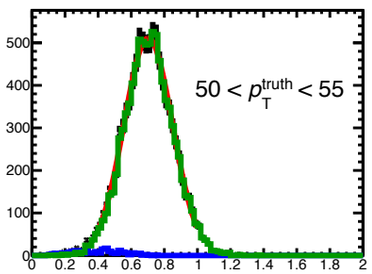


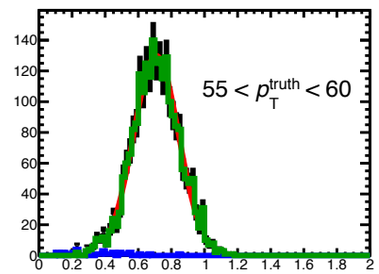




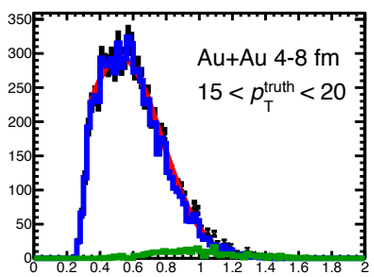


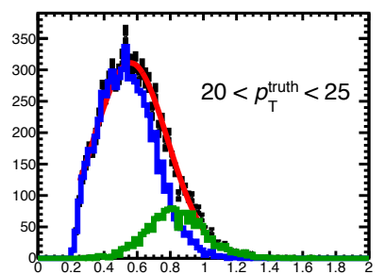


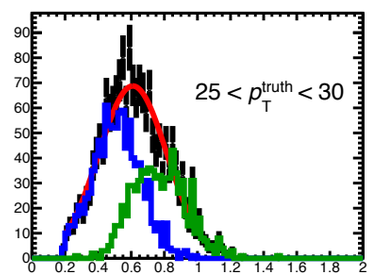


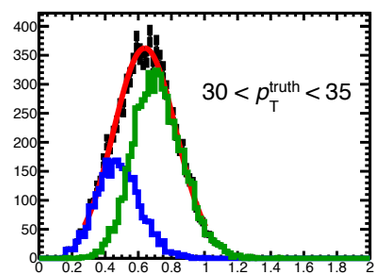


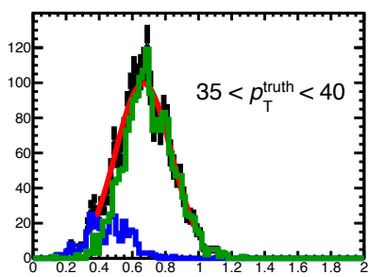
b=4-8fm

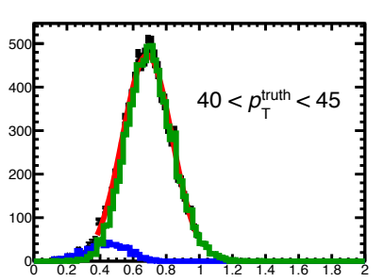


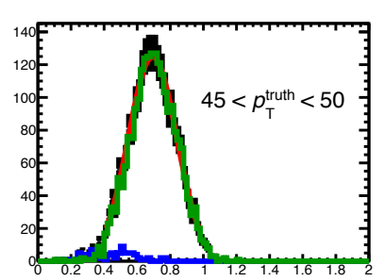


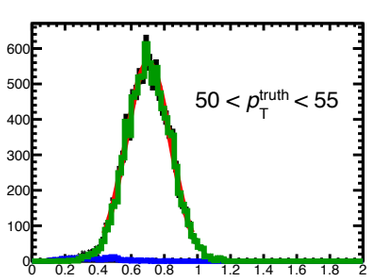


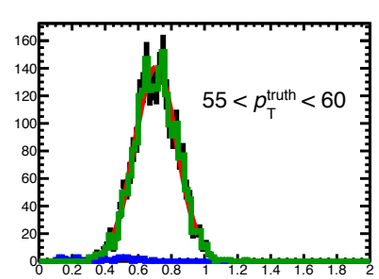












Gaussian fit

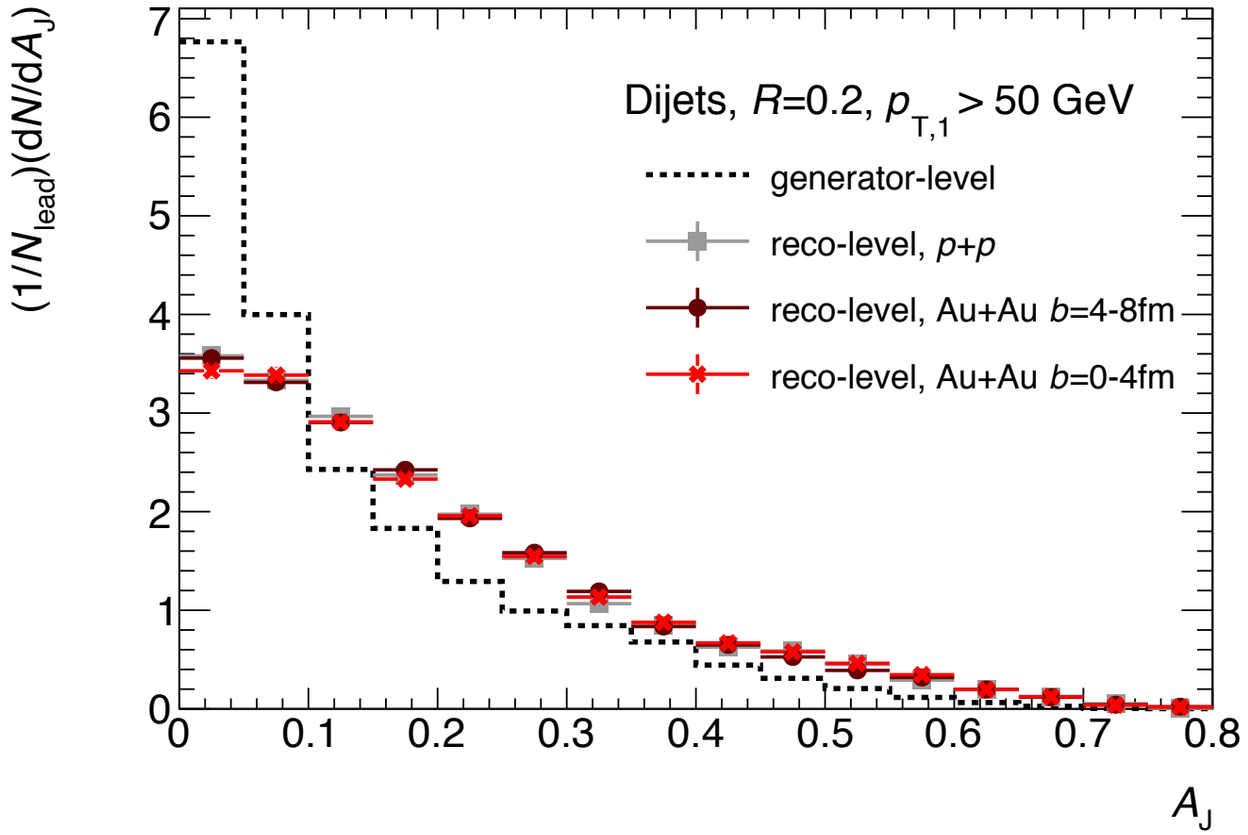
Non-seeded jets

Seeded jets

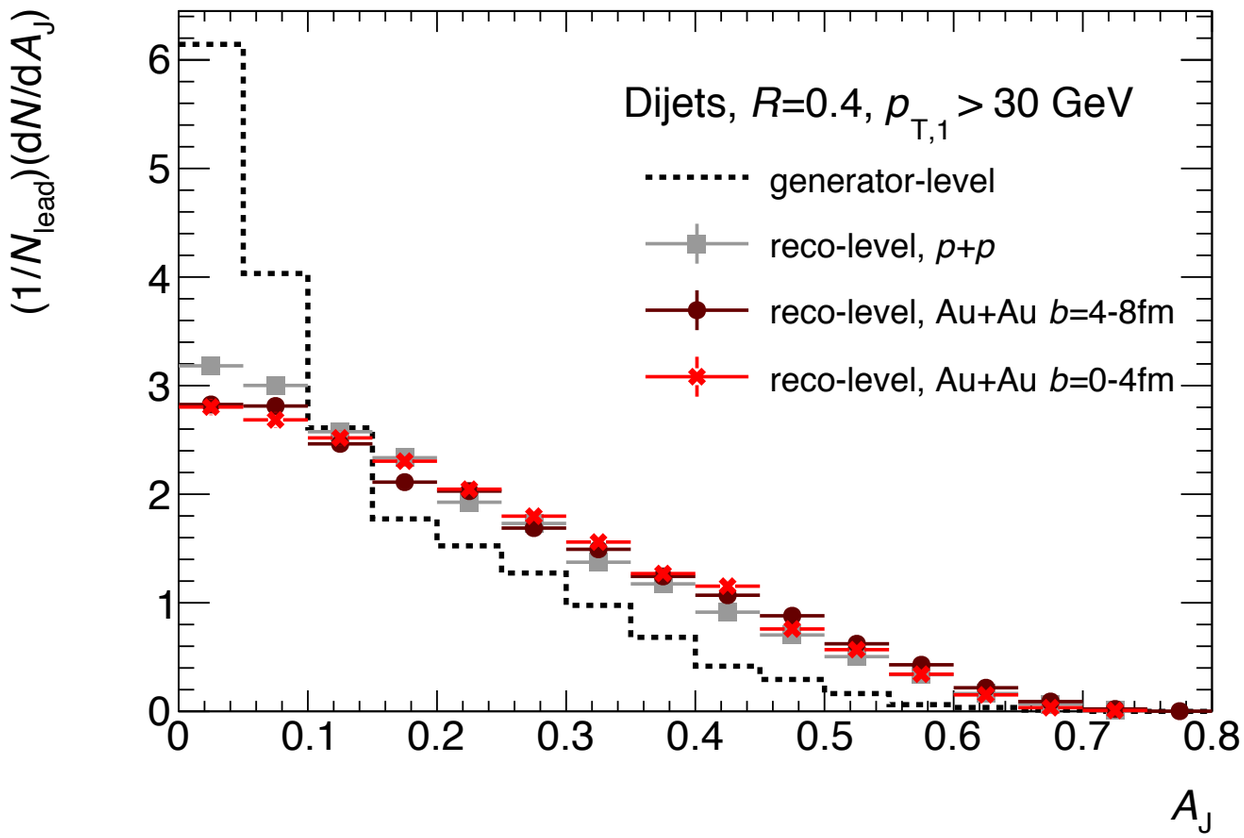
Dijet A_J distributions

- Updated dijet A_J distributions to have "full" (10k/QCD slice) statistics
- Now two cone size + p_T selections:

R=0.2, $p_{T,1}$ > 50 GeV: essentially no centrality-dependence at reco-level



R=0.4, $p_{T,1}$ > 30 GeV: visible but "small" centrality dependence



Photon+jet x_{Jg} distributions

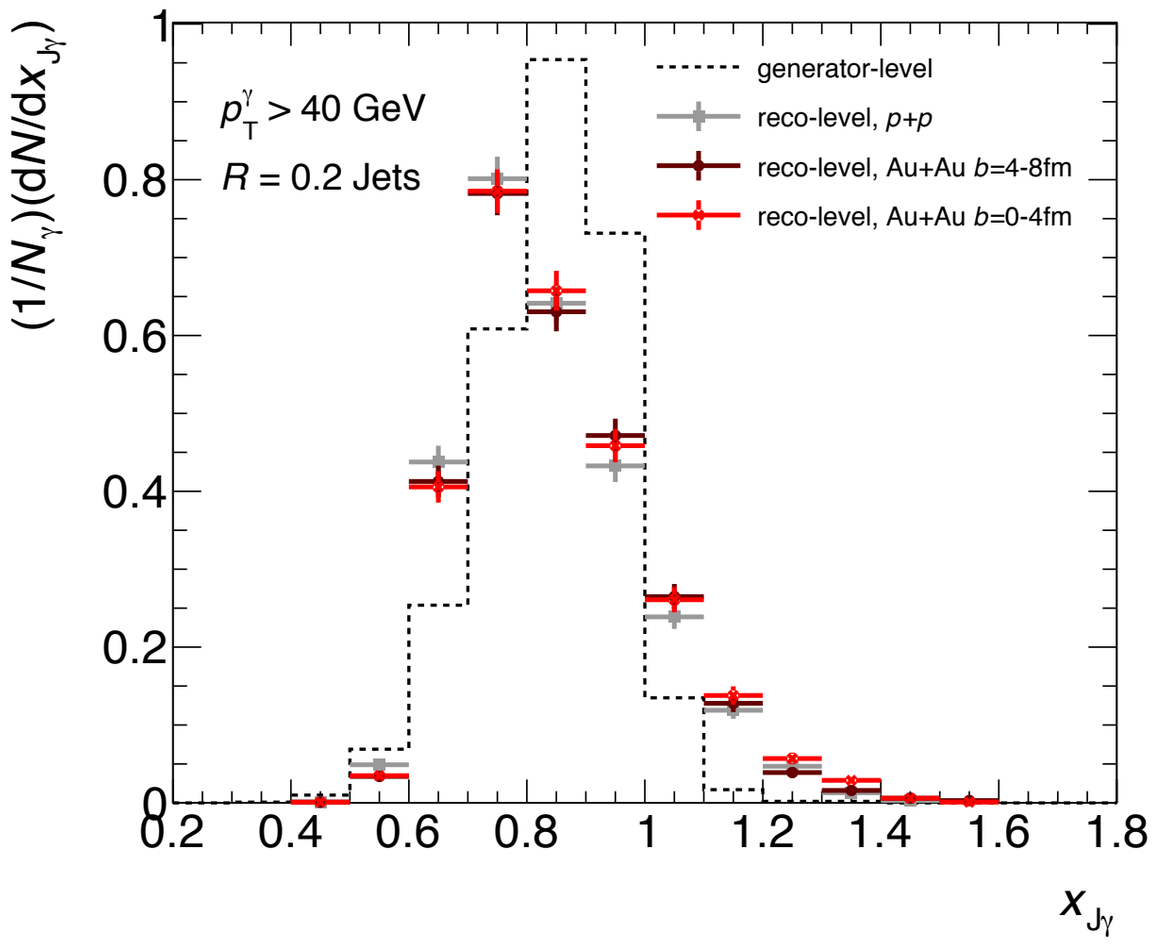
- Plots of $x_{Jg} = p_T^{jet} / p_T^{\gamma}$ by Kurt Hill (Colorado), two subtle details:

1. use truth photon (assume γ resolution strongly subdominant to that for jet)
2. apply multiplicative "calibration" such that $\langle x_{Jg} \rangle^{pp\text{-reco}} = \langle x_{Jg} \rangle^{truth}$

➡ e.g. assume we could use in situ photon+jet calibration in p+p

➡ otherwise, all reco-level x_{Jg} shifted left from EM-scale response

R=0.2: essentially no centrality-dependence at reco-level



R=0.4: visible but "small" centrality dependence