Two-Particle Correlations with Tracking

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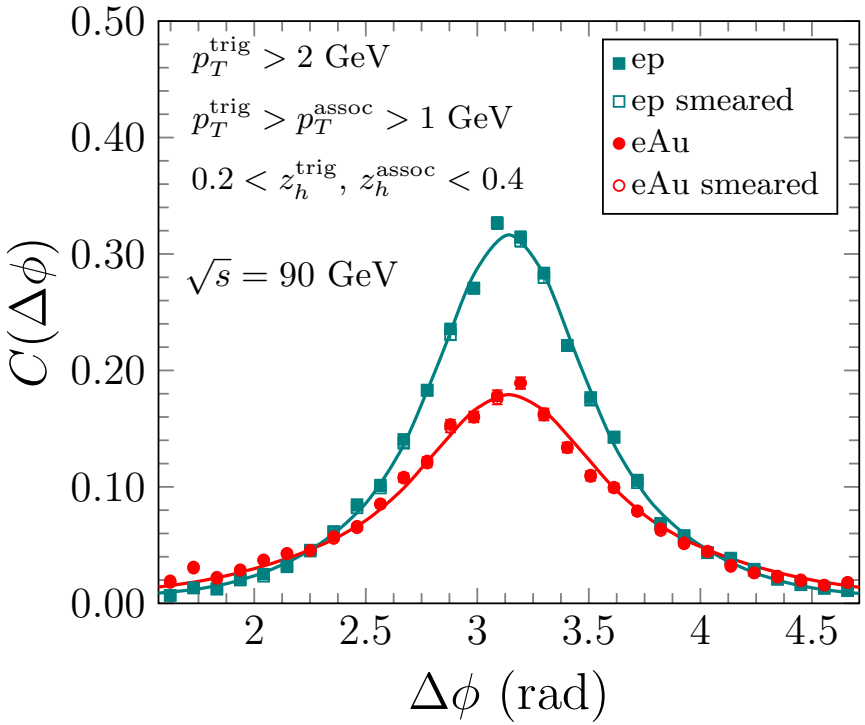
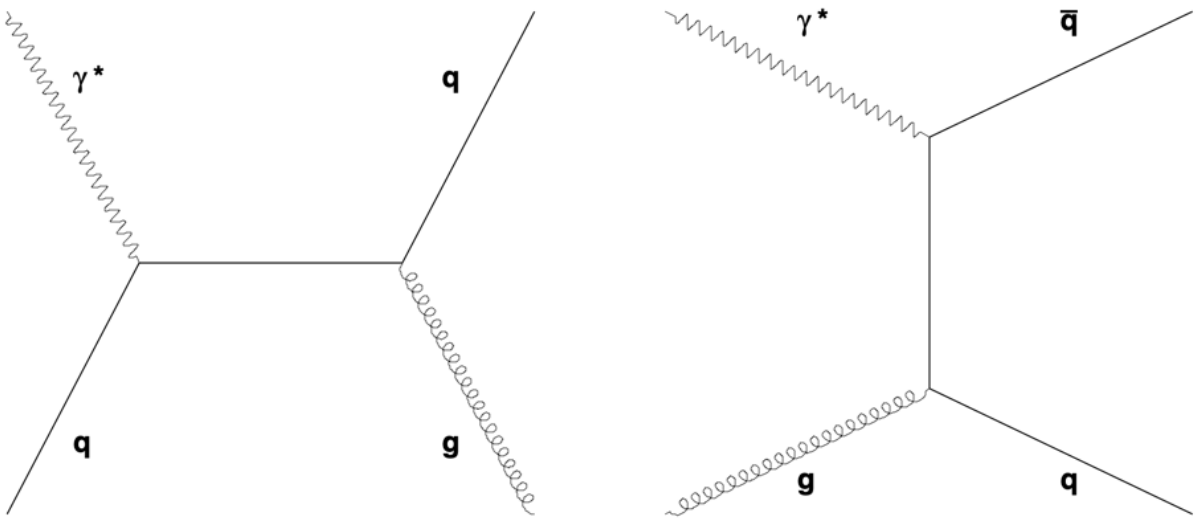
Goal: YR Fig. 7.63

- Figure 7.63 from the Yellow Report: two-particle correlations in e+A vs. e+p to study saturation.
- Can study cleanly measuring e.g. away-side yield vs. x for different Q^2 cuts.



Dijets in e+p and e+A Collisions

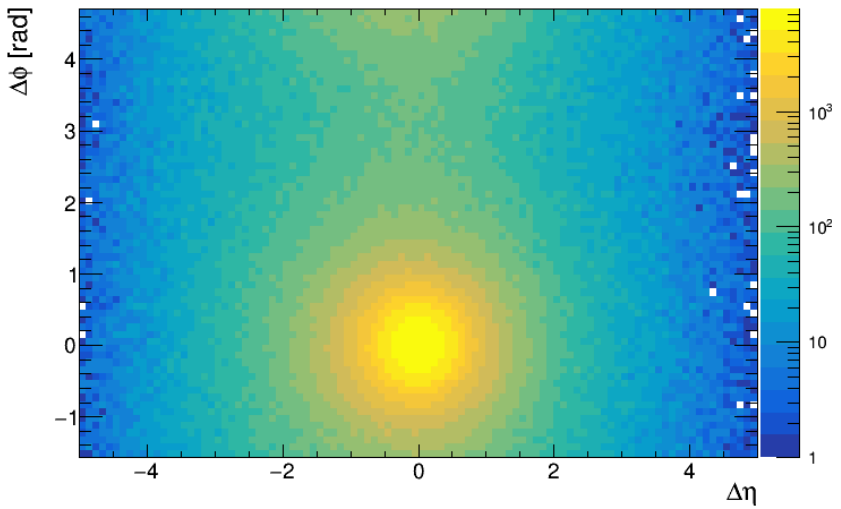


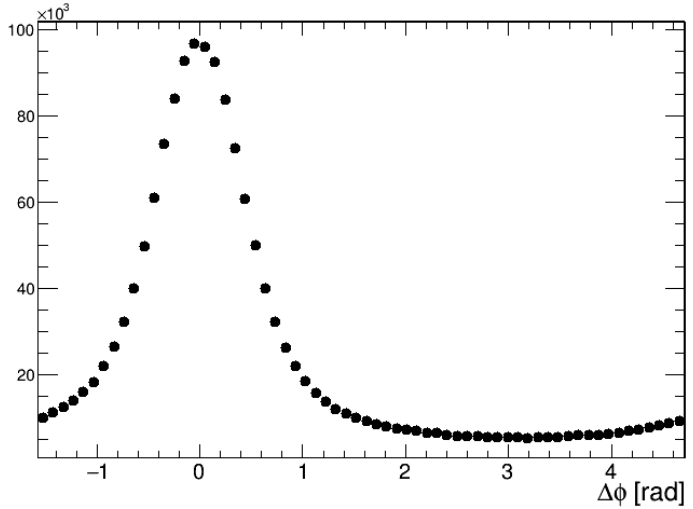
- At reasonably high Q^2 dijets are produced by LO QCD Compton scattering (left) and photon-gluon fusion (right).
- Photon-gluon fusion most direct probe of gluon wavefunction of the target in e+p and e+A Collisions
- Use dihadron correlations instead of dijets to measure lowest Q^2 jets

Simulation Samples

- Used `prod.2` `pythia6` SIDIS high-Q^2 Tracking Evaluator ntuples
- All tracks match a truth particle.
- Reject all tracks that match electrons (and positrons) i.e. charged hadrons only
  - Also naturally removes the scattered electron
- Boosted the reconstructed track p_T, η and ϕ from LAB to e+p head-on collision frame
- Binning in $p_T > 1$ GeV/c of each hadron.
- In principle, we should bin in Q^2, x, and z.

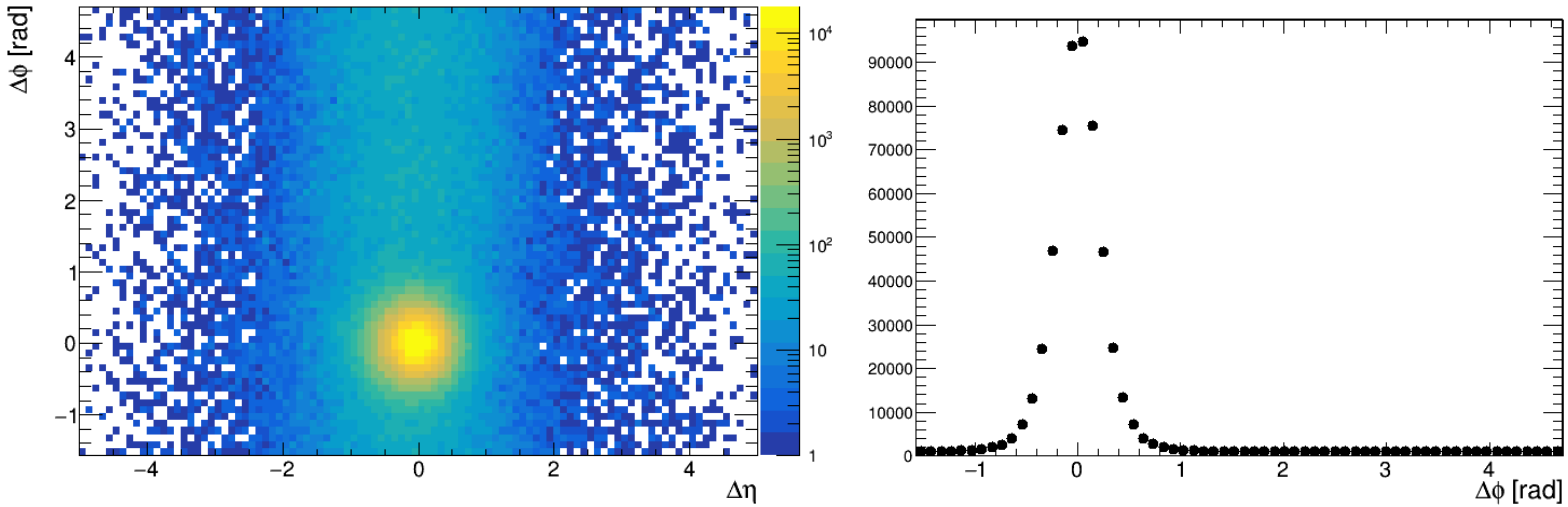
Example Dihadron Correlations





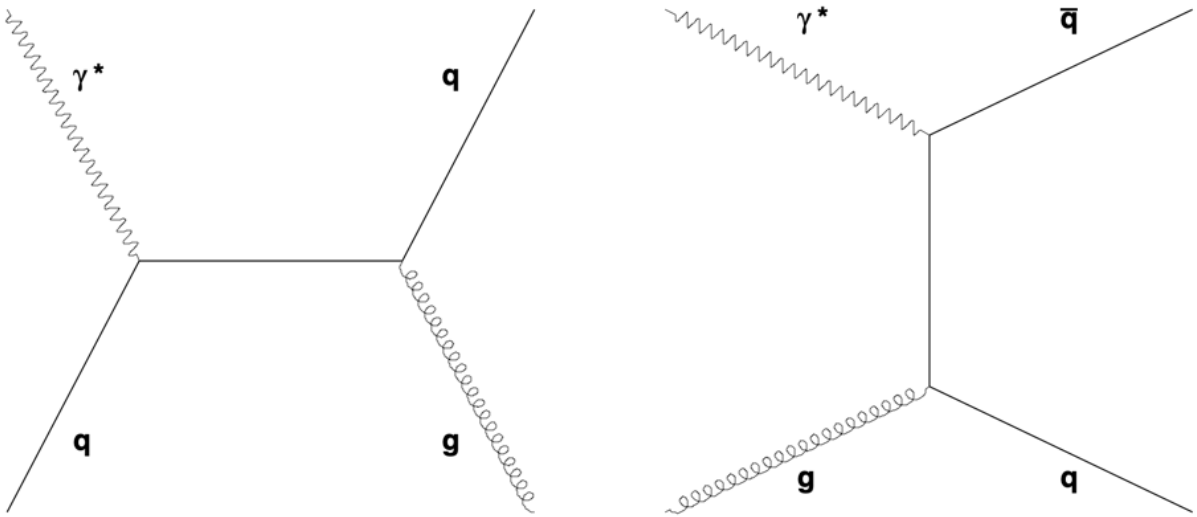
- 18x100 GeV e+p Collisions
- 1-1.5⊗1-1.5 GeV/c charged hadrons
- No away-side

Example Dihadron Correlations



- 18x100 GeV e+p Collisions
- 3-5$\otimes$2-3 GeV/c charged hadrons
- No away-side

PYTHIA Processes



- QCD Compton (left) `ISUB = 131, 132`
- Photon-gluon fusion (right) `ISUB = 135, 136`
- Are these turned on in the PYTHIA steering files?