Two-Particle Correlation Updates

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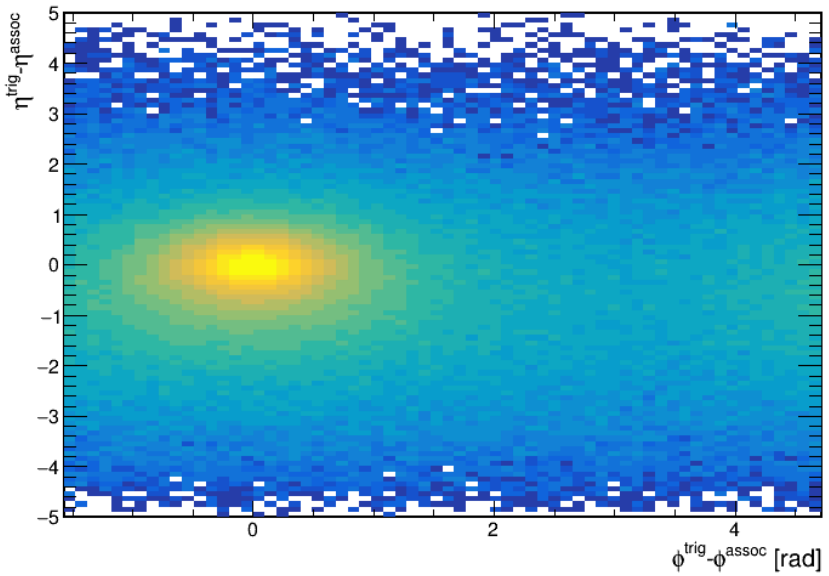
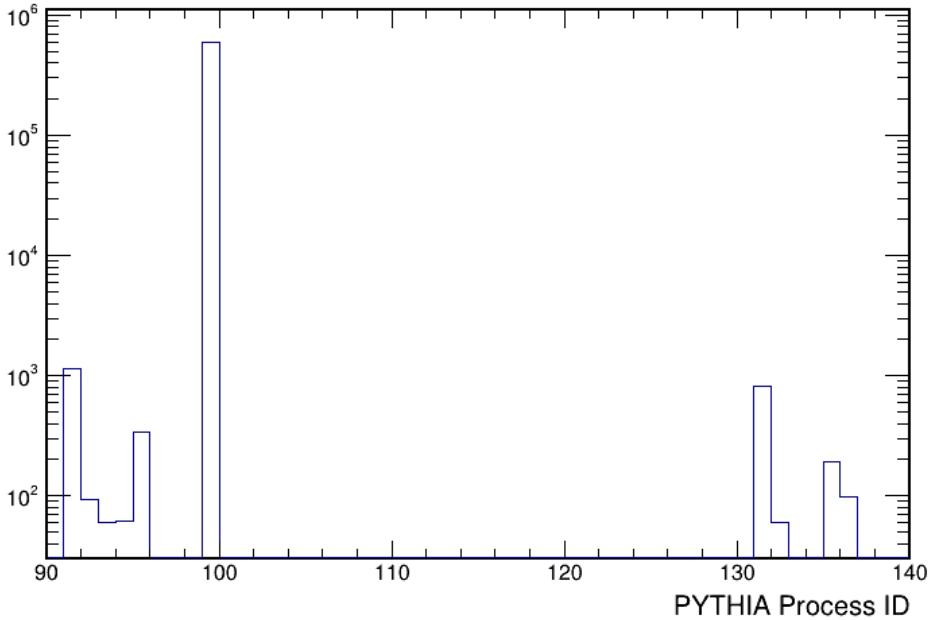
Two-Particle Correlations in PYTHIA



- 600k Events of 18x100 PYTHIA 6 with $Q^2 > 100$ GeV^2
- $p_T > 1$ GeV/c and $-3 < \eta < 2$ for charged hadrons
- Trigger is highest p_T, Associated is next highest p_T
- Single jet events dominate.

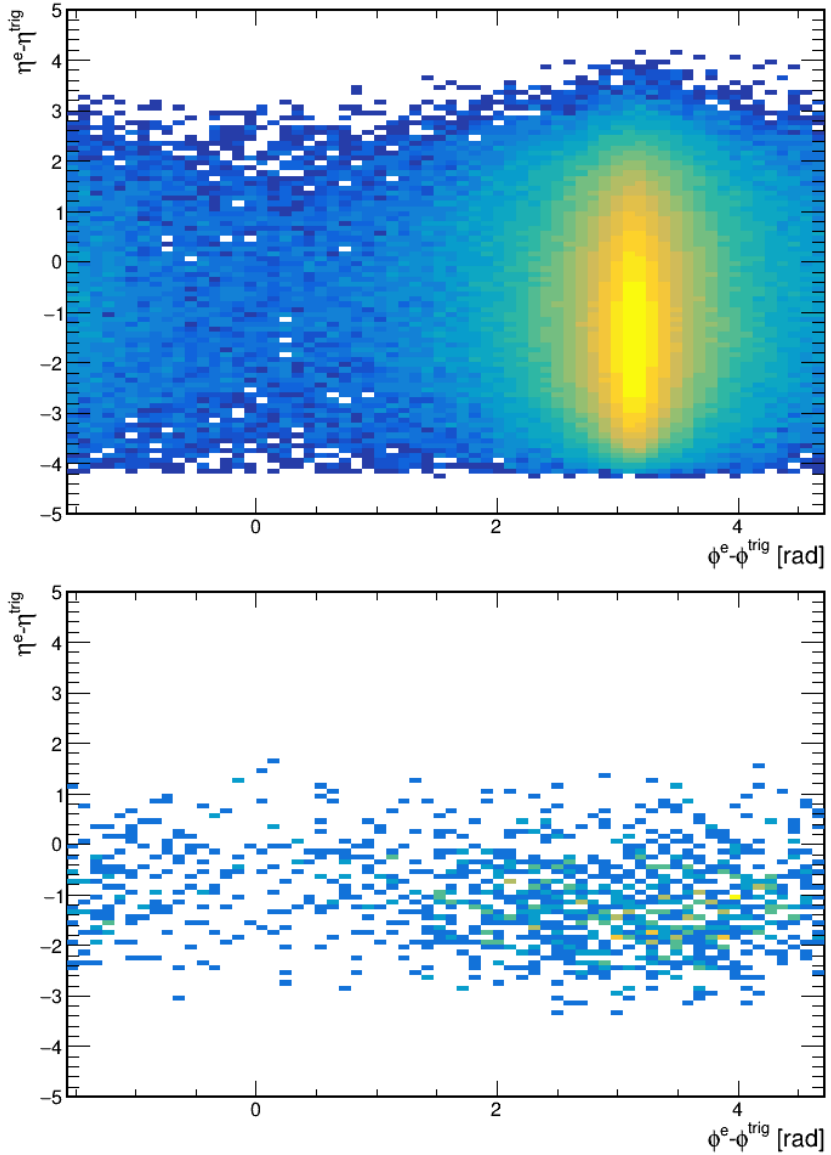
PYTHIA Processes



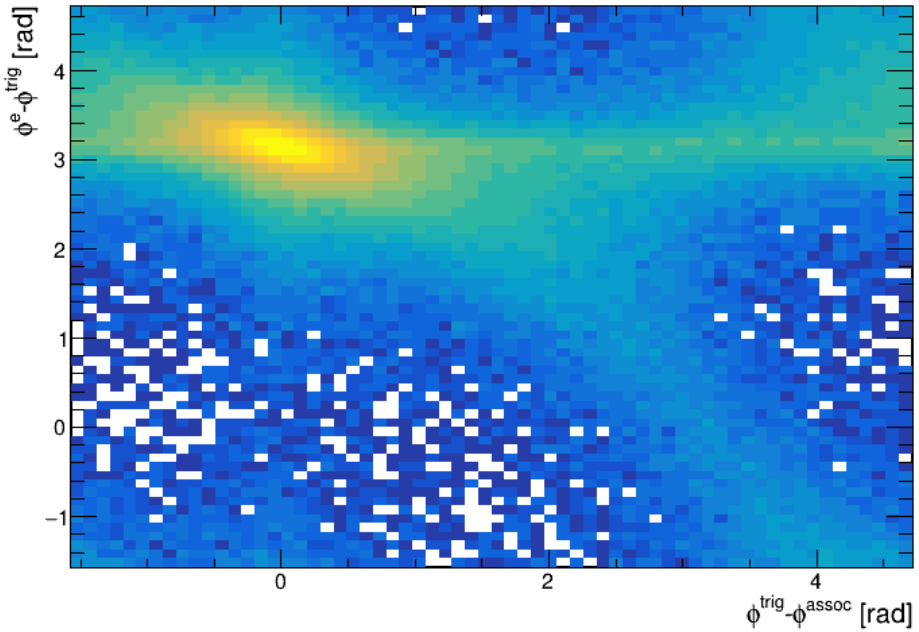
- 99 = LO DIS
- 91-95 = elastic, diffractive, and low-p_T processes
- 130-140 = QCD Compton, photon-gluon fusion processes
- QCD Compton and photon-gluon fusion $\sim$ 500x smaller than LO DIS for Q^2 >100 GeV^2.

Scattered electron-hadron Correlations

- Scattered electron correlation with trigger hadron looks like back-to-back dijet hadroproduction.
- Top: All processes. Bottom: QCD Compton + Photon-Gluon Fusion
- Bottom has much broader $\Delta\phi$ correlation
- In hadroproduction of jets expect 3-jets when two leading jets have $\Delta\phi > 2\pi/3$, i.e. the Mercedes angle.

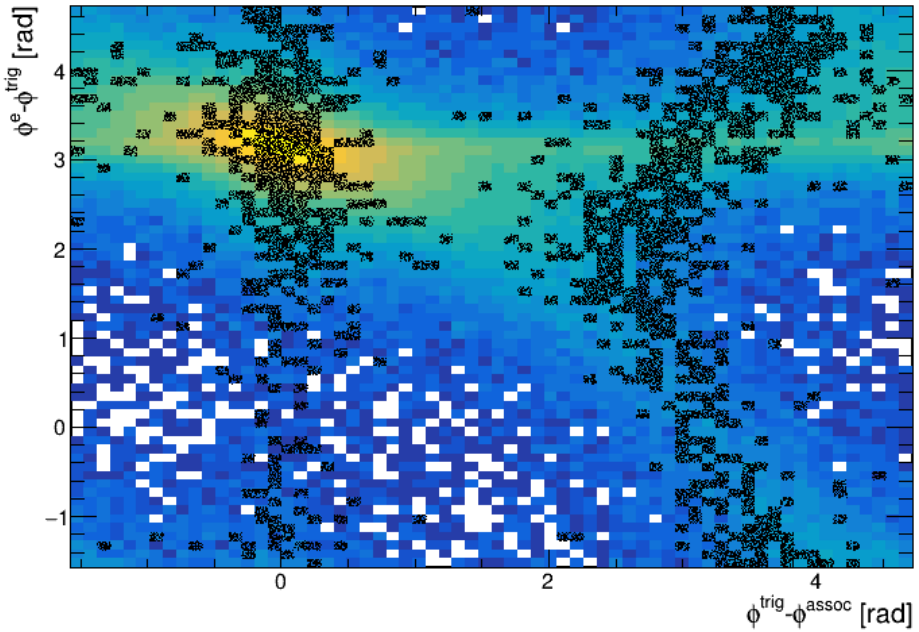


Three Particle Correlations: scattered electron + leading dihadrons



- When electron and leading hadron are not back-to-back, there is a larger dihadron $\Delta\phi = \pi$ distribution.
- This holds for the QCD Compton + Gluon Fusion processes (black histogram)

Three Particle Correlations: scattered electron + leading dihadrons



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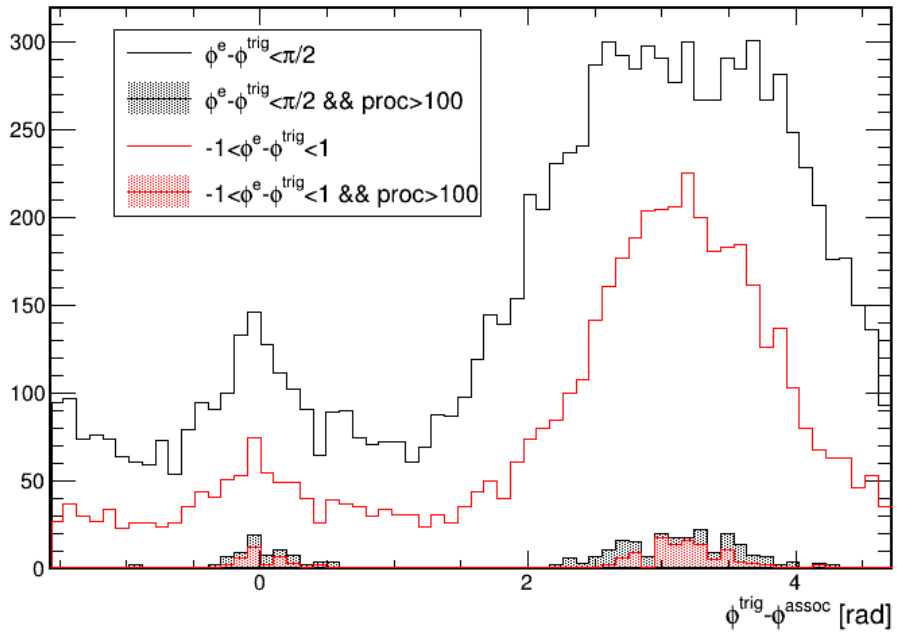
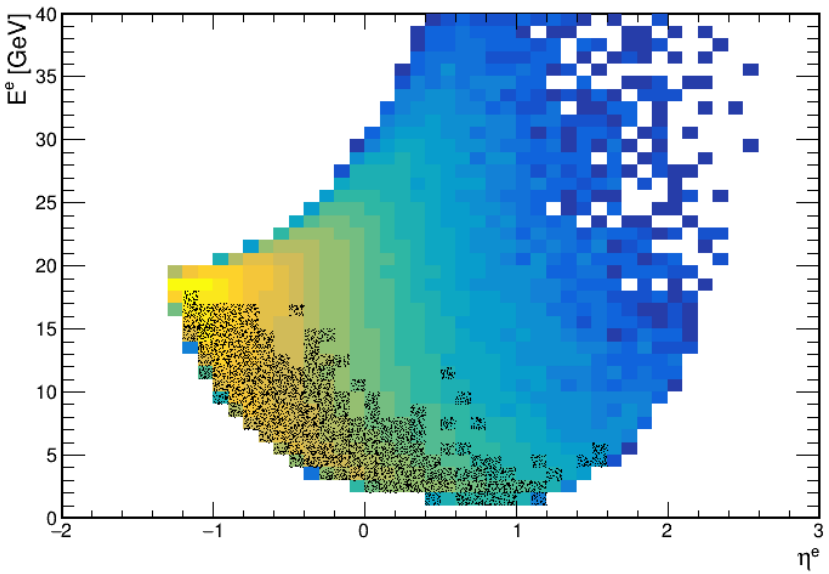
Isolating the Dihadron Signal

- Dihadron $\Delta\phi$ distribution for cuts on the ϕ separation between the leading hadron and scattered electron.
- More restrictive cuts on the leading hadron produces an away-side dihadron peak.
- The QCD Compton + Gluon Fusion process (filled histograms) are 500x smaller than the LO process.



Scattered Electron Energy



- Electron energy vs. η for all processes (colored histogram) and for QCD Compton + photon-gluon fusion (black histogram).
- The electron always loses energy for the QCD Compton + photon-gluon fusion process?

Summary

- There is a dihadron $\Delta\phi$ correlation signal within PYTHIA.
- But it is not dominantly from the LO α_S processes: QCD Compton + photon-gluon fusion.
- Need to understand further if this isn't just some momentum conserving splitting in PYTHIA?
- Fallback would be to run a small sample of DJANGOH, which does calculate LO α_S processes for both $e + p$ and e+A