Dijets and the Unintegrated Gluon Density

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Outline

→ Physics Goal

→ Reconstruction of Gluon Propagators

→ Control Plots 2000 Data

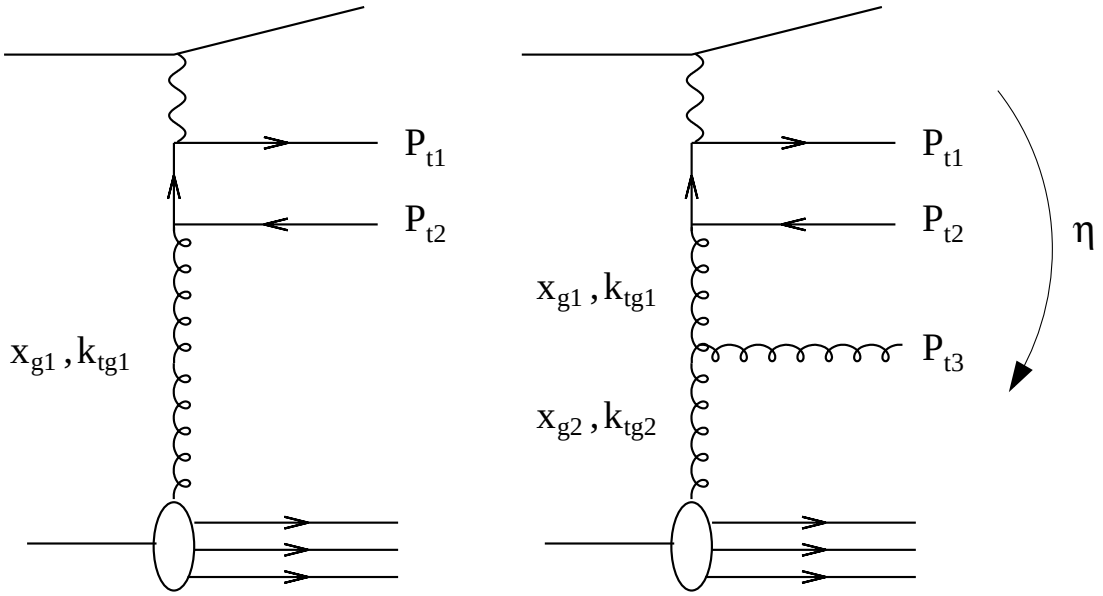
→ Dijet Rates 96/97 vs 2000

→ Summary & Outlook

Physics Goal

- Reconstruct x_g, k_{tg}^2 and $\bar{q}$, using DIS dijet events

$\Rightarrow$ Direct mapping of unintegrated gluon density $\mathcal{F}(x_g, k_{tg}^2, \bar{q}^2)$



$$P_{g1} = P_{j1} + P_{j2} - P_{\gamma}$$

$$x_{g1} = \frac{E_{g1}+|p_{zg1}|}{E_p+|p_{zp}|}$$

$$k_{tg1}^2 = p_{xg1}^2 + p_{yg1}^2$$

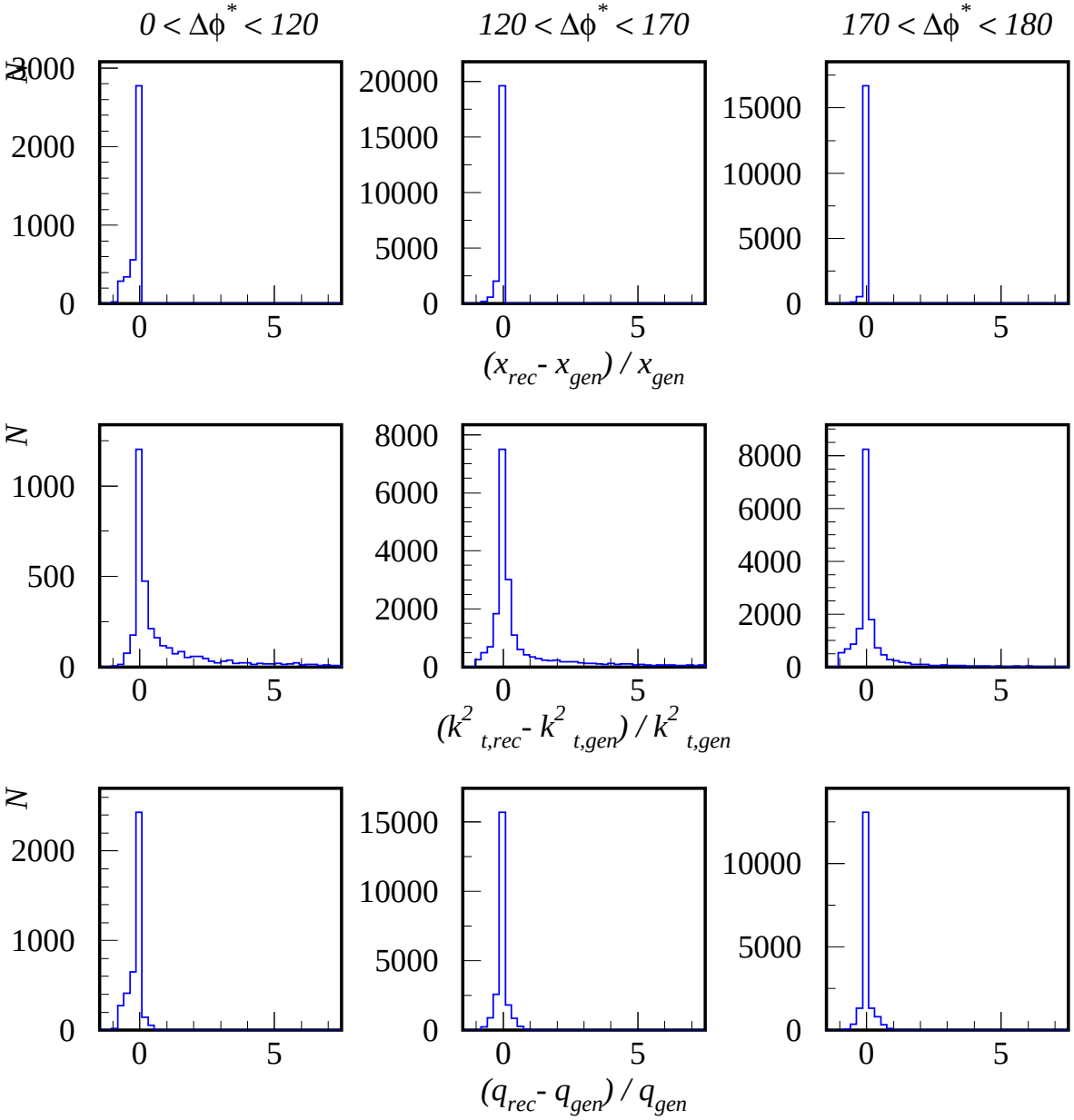
$$\bar{q}_{g1} = \frac{x_{g1} \cdot p_{\perp,j2}}{x_{j2}}$$

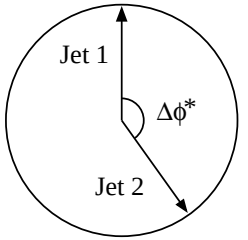
Reconstruction of Gluons

- Cascade v1.2
- Find jets on parton level in HCM (inclusive k_t)
- Reconstruct propagator & compare to gluon in eventlist
- Cuts:

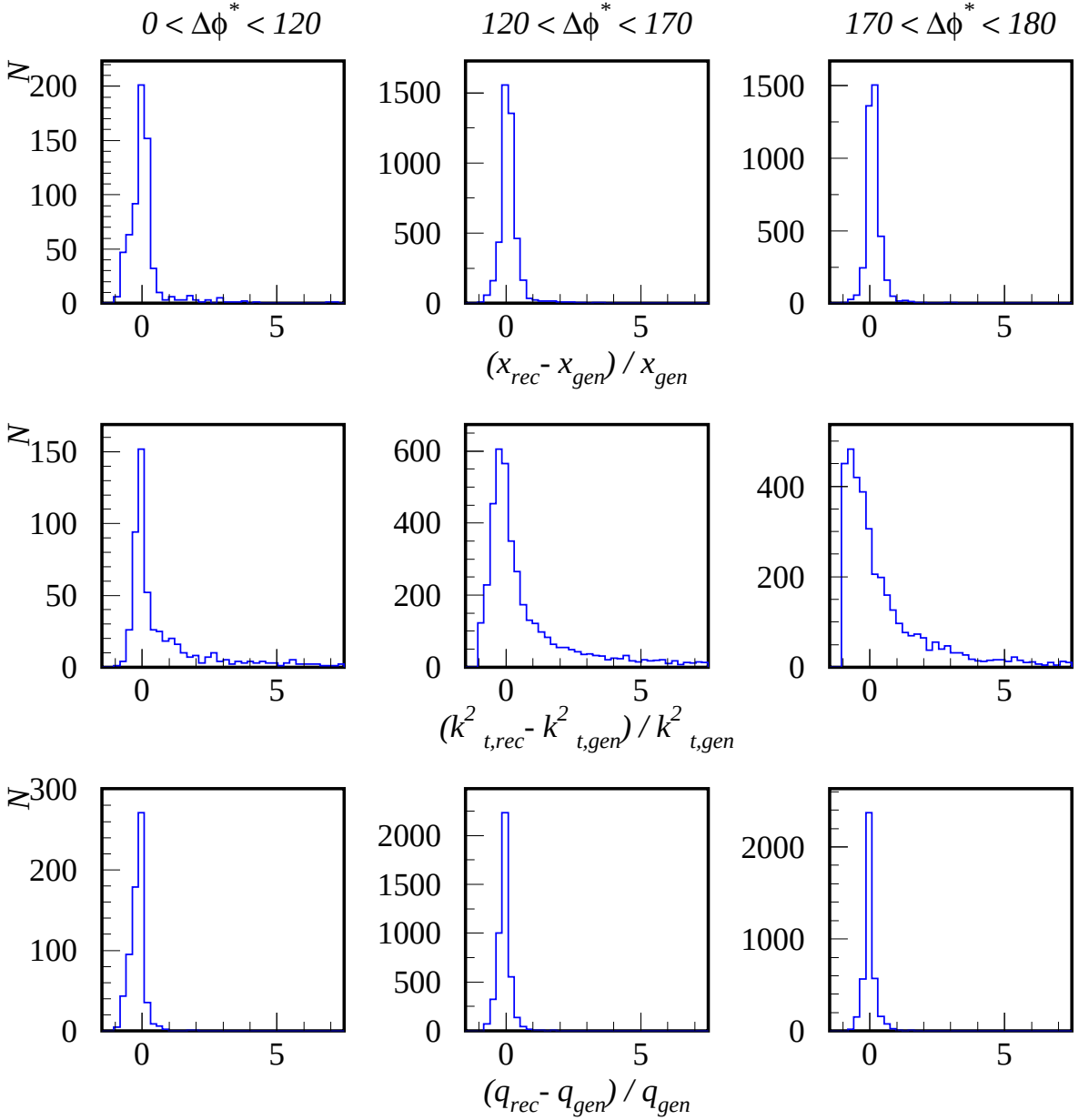
$$
\begin{aligned}
5\ \text{GeV}^2 < \quad & Q^2 \quad & < 100\ \text{GeV}^2 \\
0.1 < \quad & y \quad & < 0.7 \\
10^{-4} < \quad & x_{Bj} \quad & < 10^{-2} \\
9\ \text{GeV} < \quad & E_e & \\
156^\circ < \quad & \theta_e \quad & < 175^\circ \\
-1 < \quad & \eta_j \quad & < 2.5 \\
5\ \text{GeV} < \quad & E^*_{\perp j1,2} &
\end{aligned}
$$

Parton Level Resolution

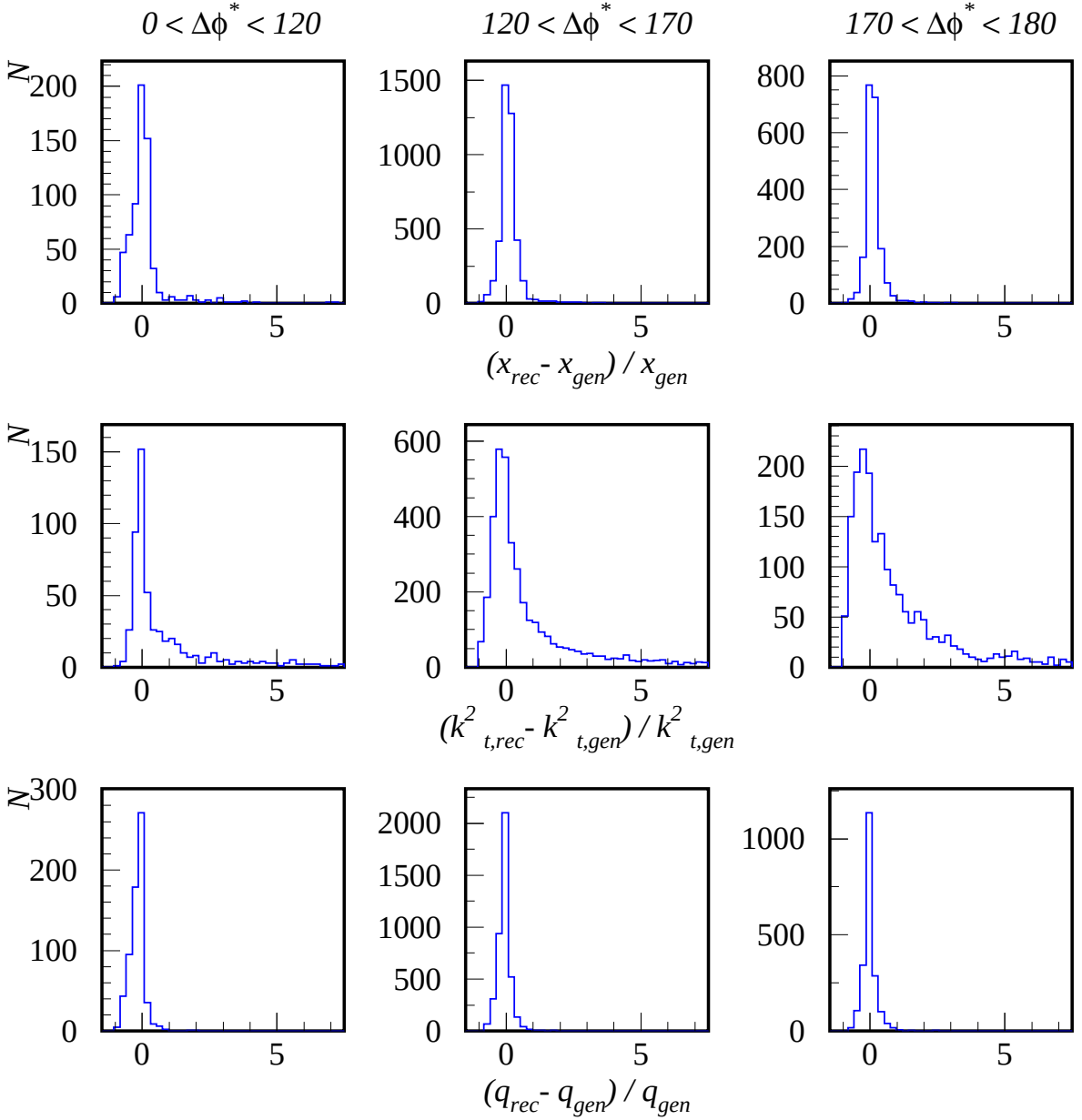




Hadron Level Resolution



Hadron Level Resolution $k^2_{t,rec} > 2$ GeV^2



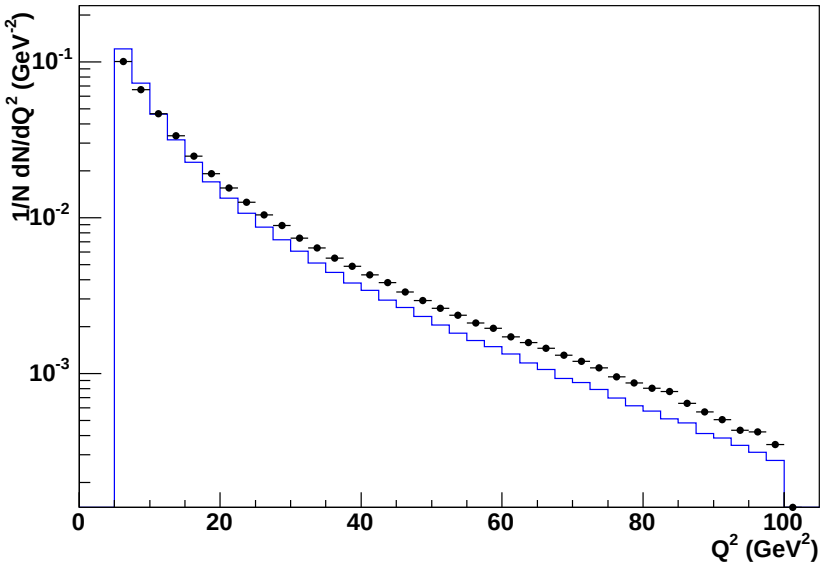
Control Plots 2000 Data

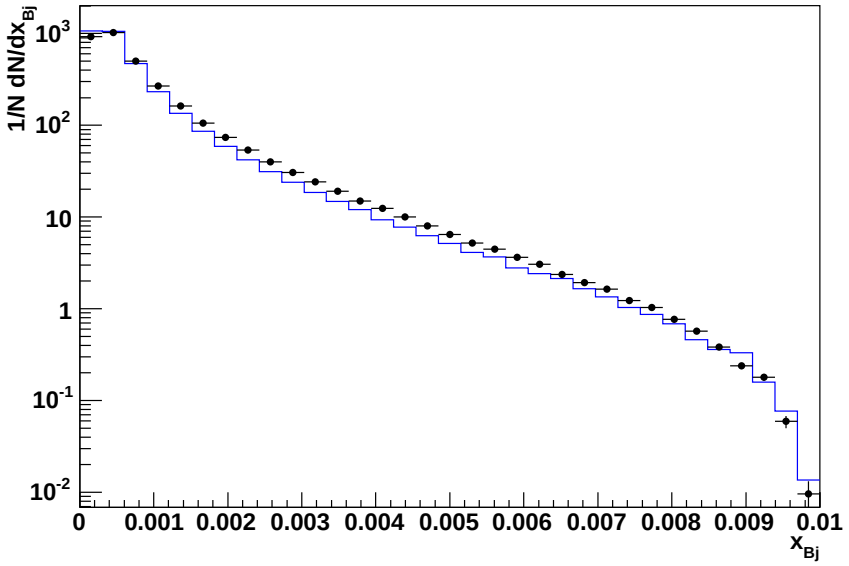
Selection

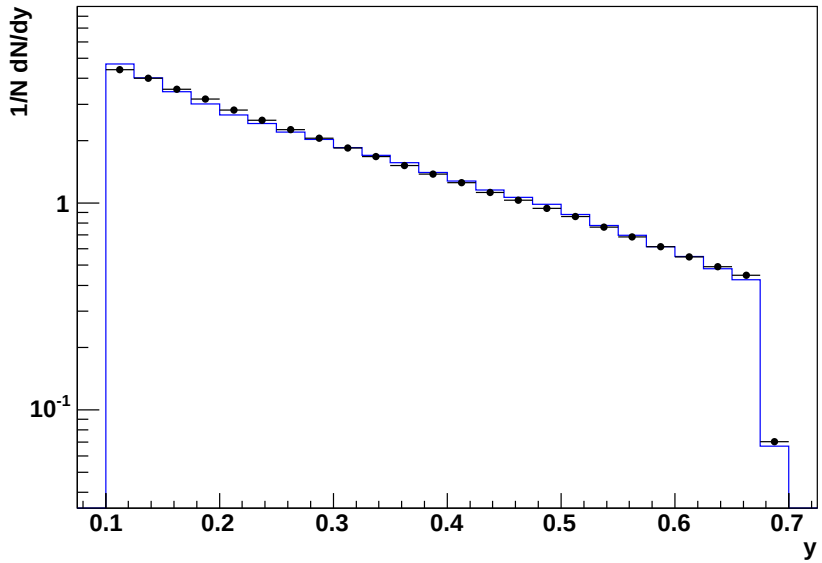
- 2000 Data vs Djangoh13 (CDM)
- Same cuts as R. Pöschl:

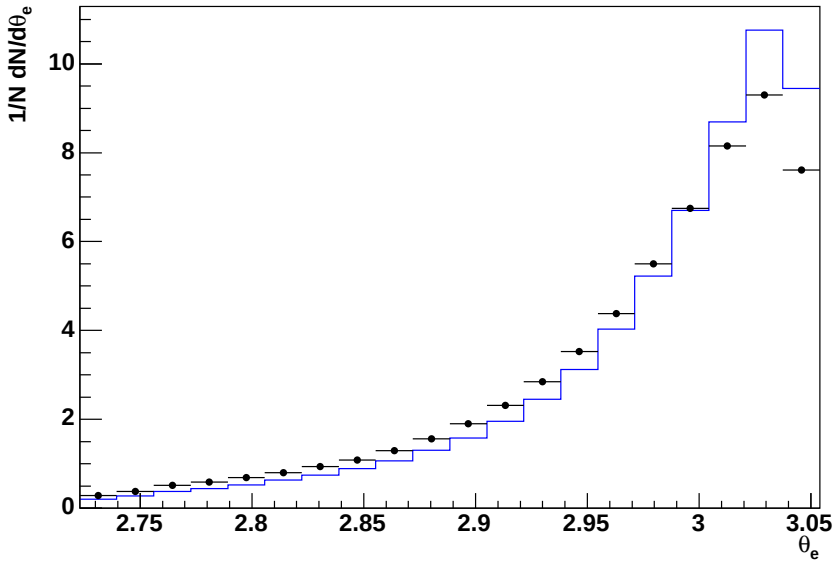
DIS Cuts			Dijet Cuts		
$5\ \text{GeV}^2 <$	Q^2	$< 100\ \text{GeV}^2$	$-1 <$	η_j	< 2.5
$0.1 <$	y	< 0.7	$7\ \text{GeV} <$	$E^*_{\perp j1}$	
$10^{-4} <$	x_{Bj}	$< 10^{-2}$	$5\ \text{GeV} <$	$E^*_{\perp j2}$	
$9\ \text{GeV} <$	E_e			Sort in $E^*_\perp$	
$156^\circ <$	θ_e	$< 175^\circ$			
$35\ \text{GeV} <$	$E - p_z$	$< 70\ \text{GeV}$			
	$\lvert z_{vtx} \rvert$	< 35 cm			
	R_{clus}	< 3.5 cm			
	E_{had}	$< 0.5\ \text{GeV}$			

Control Plots: DIS Sample

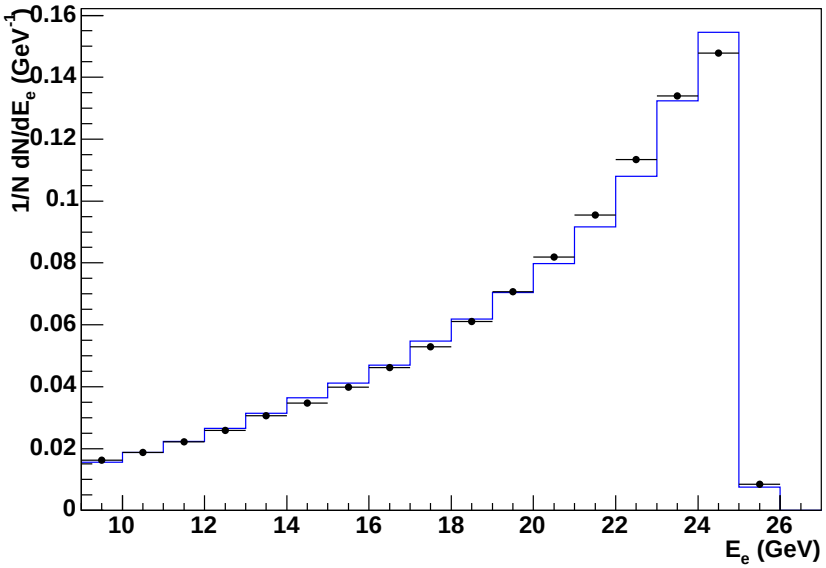


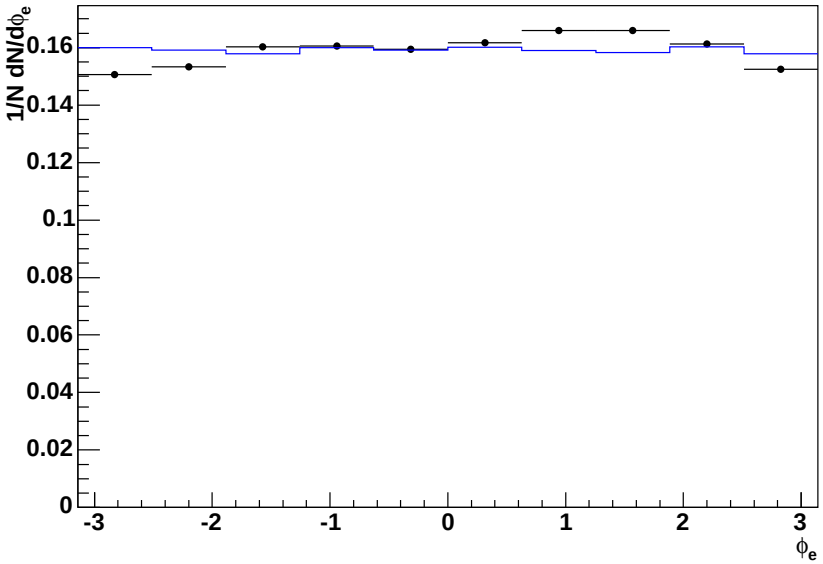


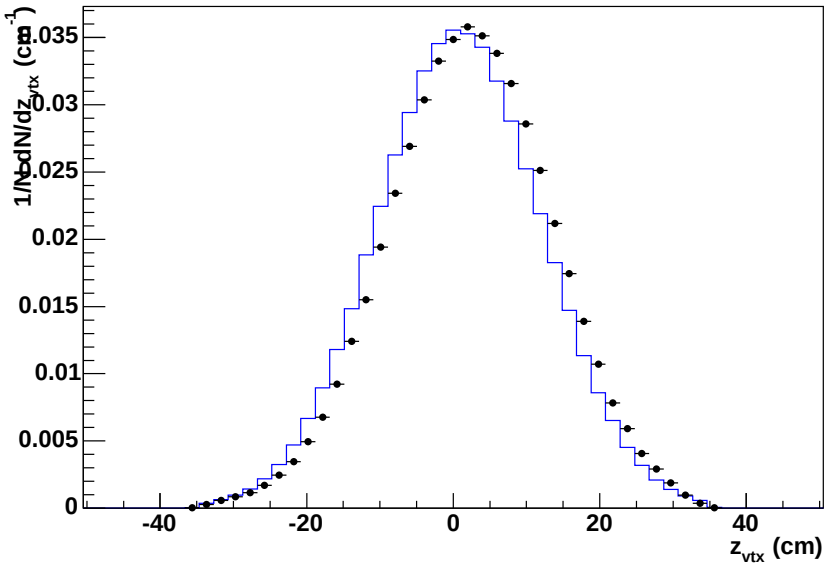


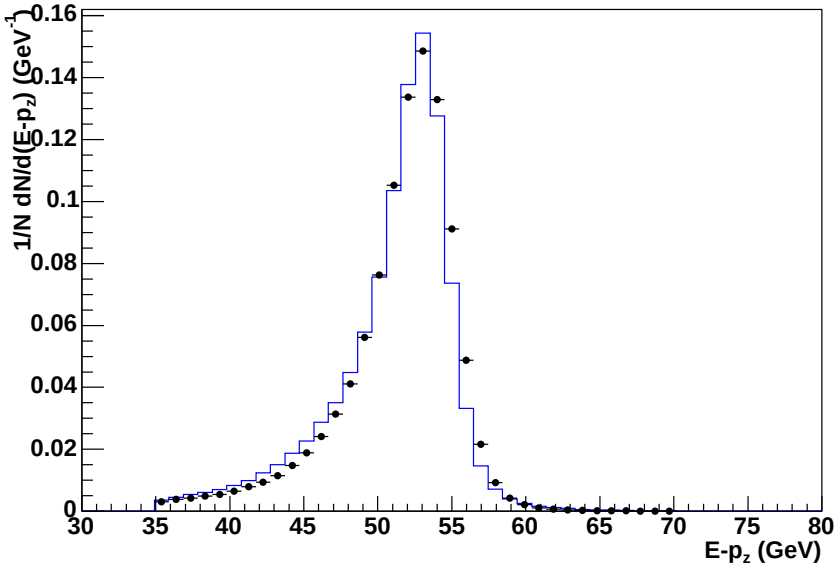


Control Plots: DIS Sample

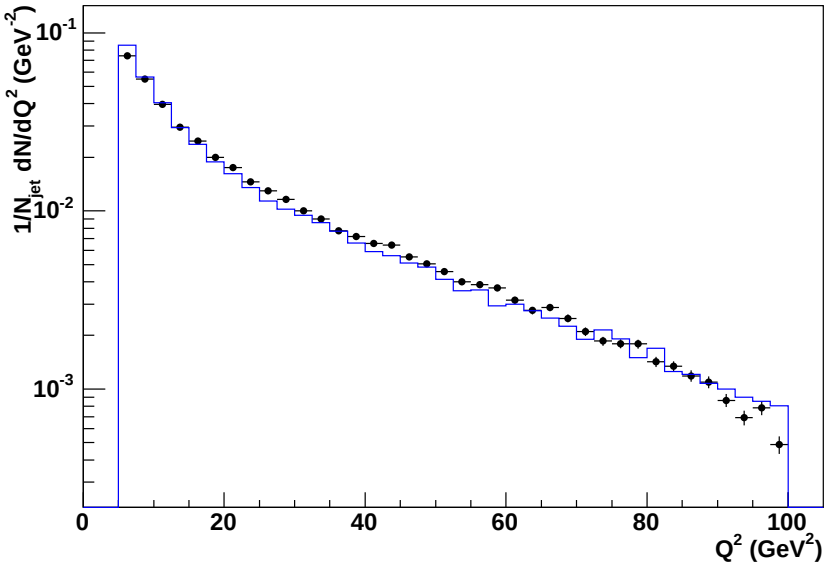


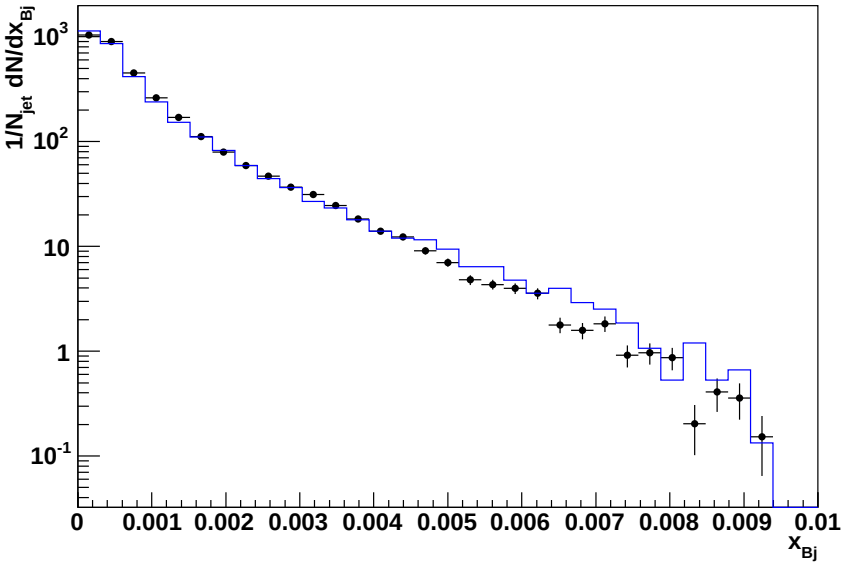


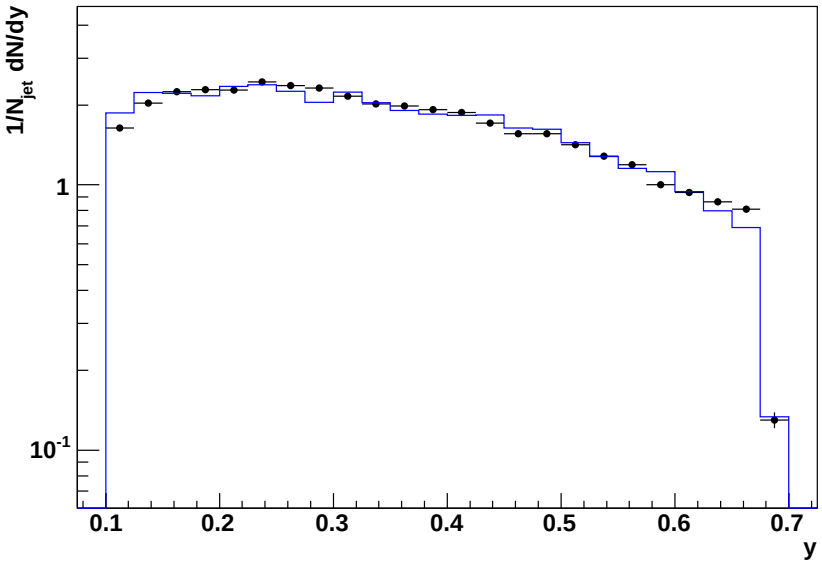


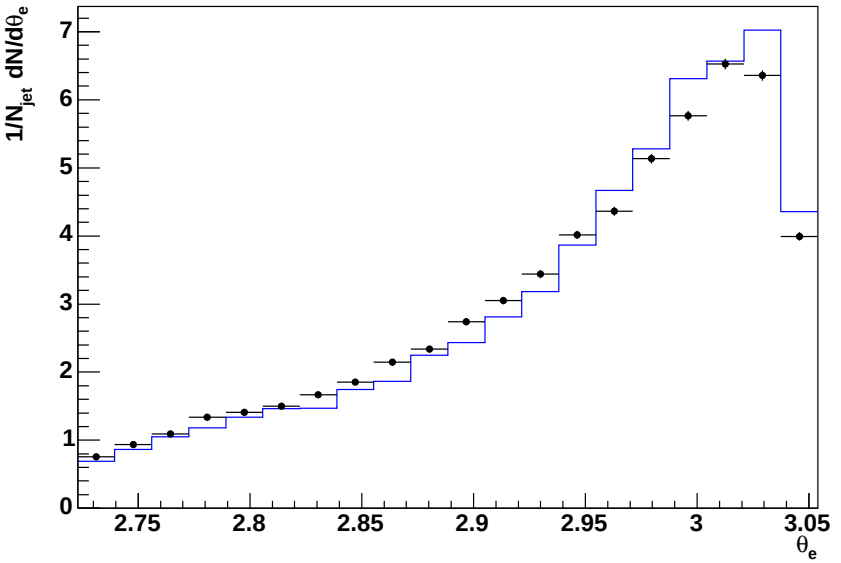


Control Plots: Dijet Sample

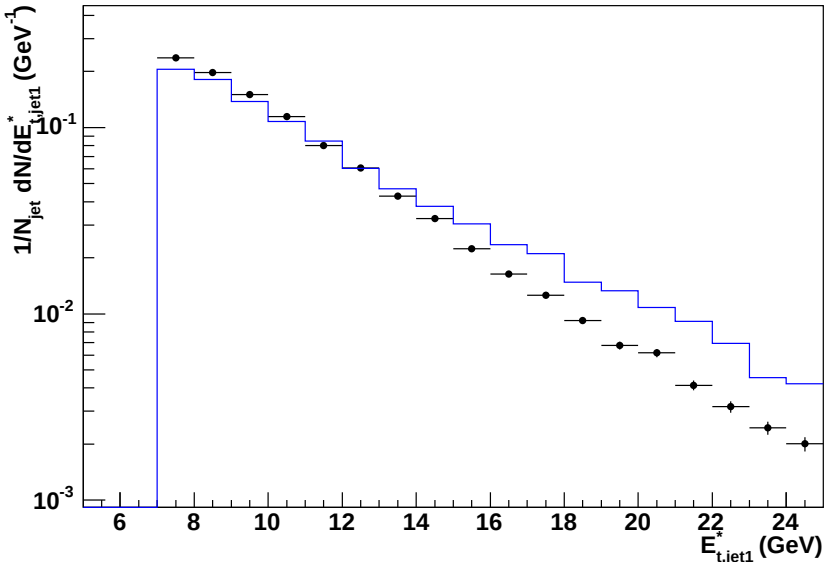


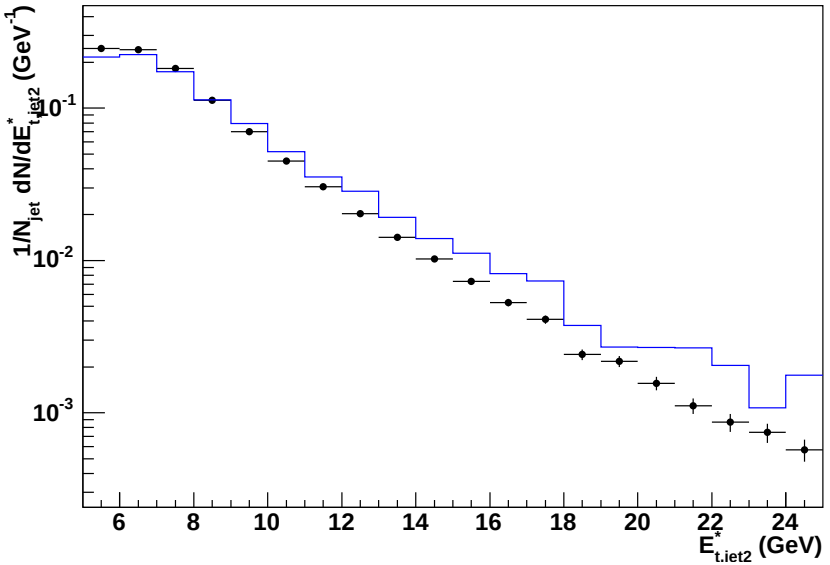


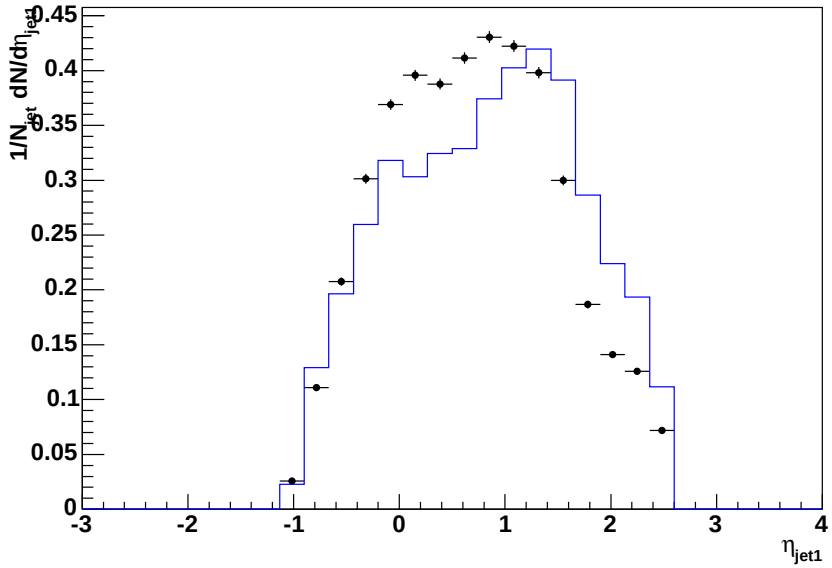


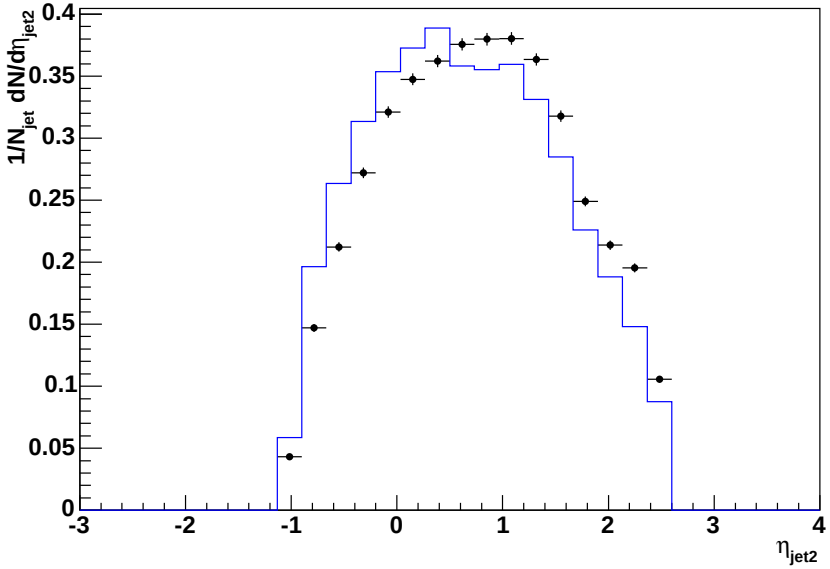


Control Plots: Dijet Sample



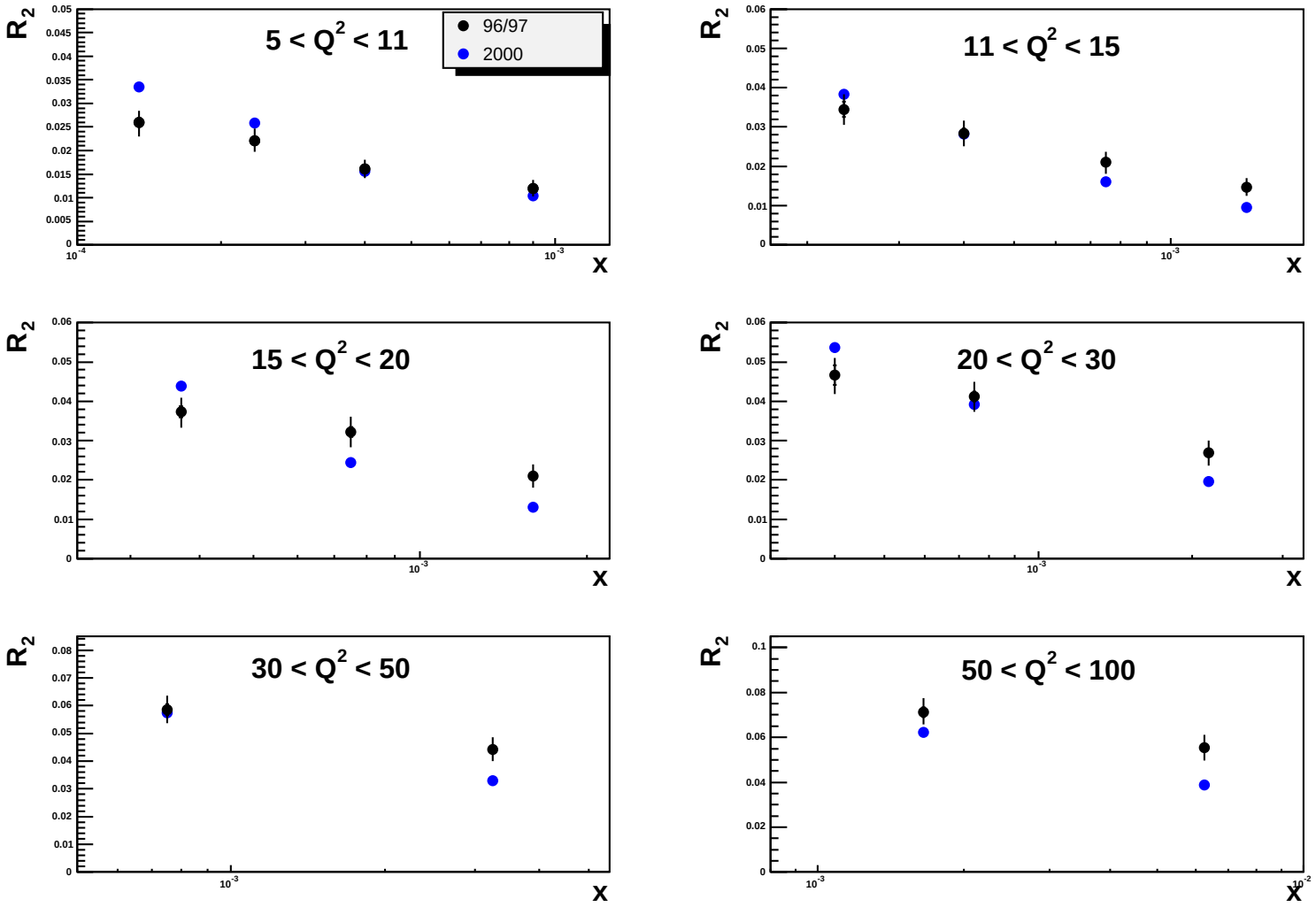






Dijet Rates 96/97 vs 2000

$$R_2 = \frac{\sigma_{2jet}}{\sigma_{DIS}}$$



Summary & Outlook

- Possible to Reconstruct Gluon Propagator using Dijets
- Control Plots Not Ok
- Dijet Rates Resonable
- Next:

    1. Reweight Q^2, z_{vtx} ?
    2. Control Plots using Rapgap
    3. x_g, k_{tg}^2, $\bar{q}$ resolution (Det$\rightarrow$Had)