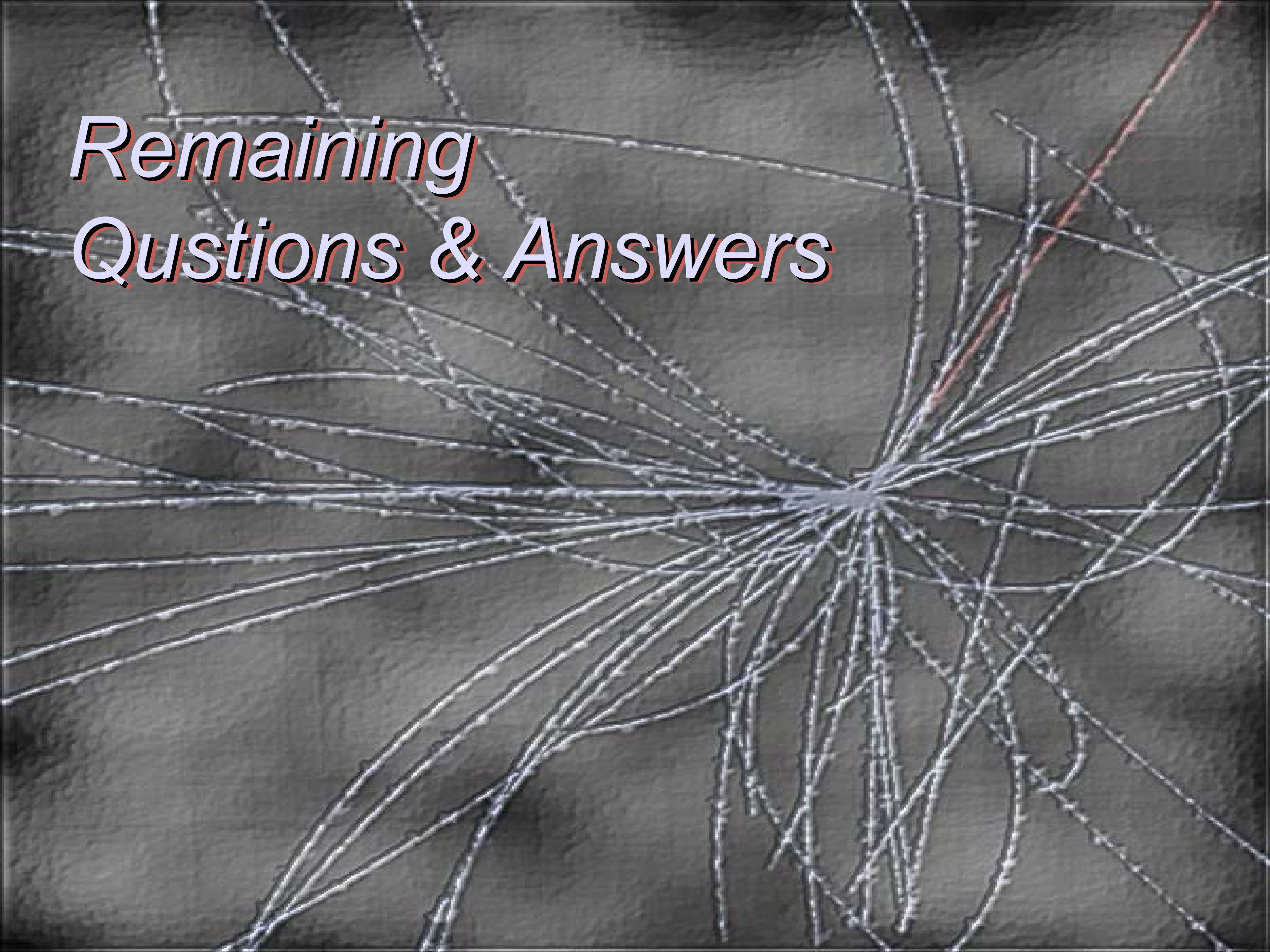
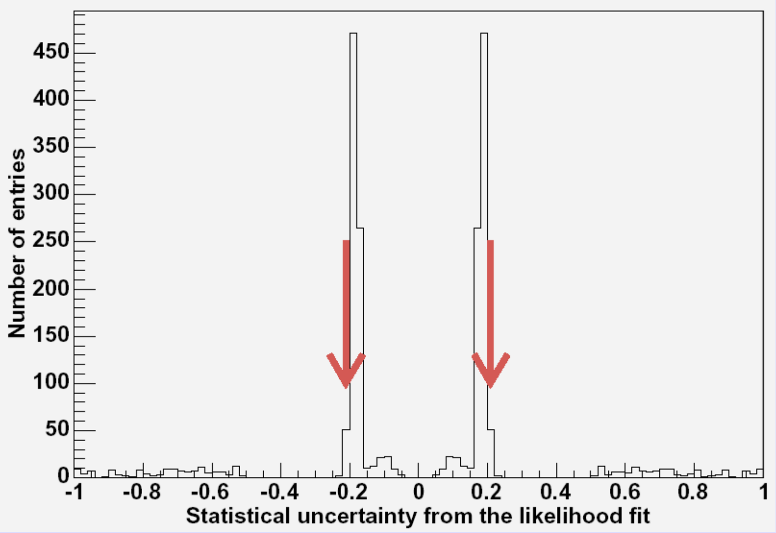
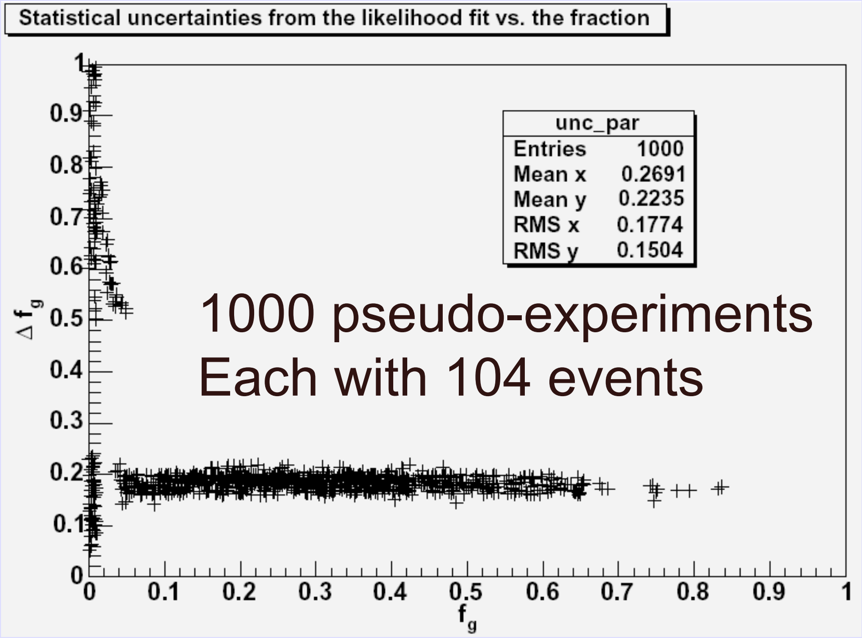
Remaining
Qustions & Answers



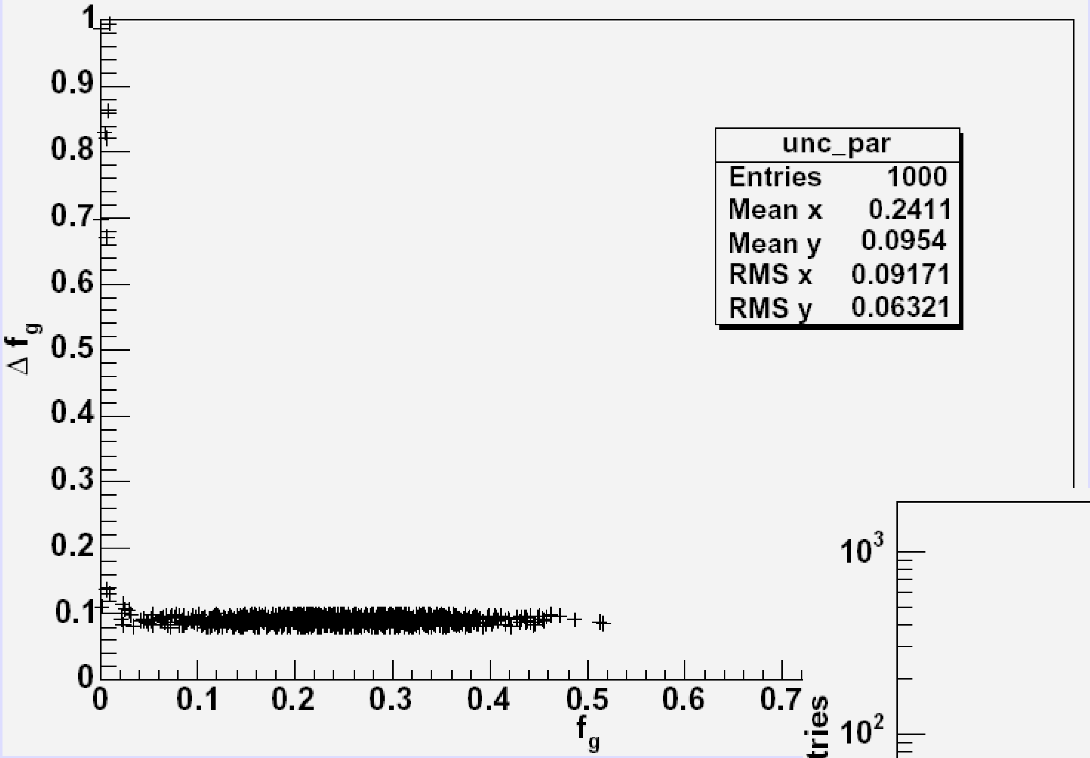
Pseudo-Experiments

- We looked at these more closely. These uncertainties correspond to sample fits returning very low gluon-rich fractions as you can see by looking at the scattered plot of the uncertainty vs. the gluon-rich fraction returned by the fit. You can find some examples for samples with very high and very low uncertainties on Q&A web page. These are due to statistical fluctuations which can be seen from the sample distributions provided as well as by comparing the statistical uncertainty distributions for 1000 pseudo-experiments for distributions with 104 events to distributions with 500 events. Comparing the scattered plot of the uncertainty vs. the mean fraction returned by the fit for pseudo-experiments with 500 events to that of the pseudo-experiments with 104, you can see that the far off instances are reduced dramatically. The area where the fit results appear to become unreliable are where for low statistics samples, the likelihood fit appears to become unstable when the fit prefers a solution that is near a physical boundary, fg=0. This is a feature that is relatively well-known. The fact that the problem largely disappears with higher statistics supports this interpretation. Therefore, we believe the fitter does a good job and is not problematic.

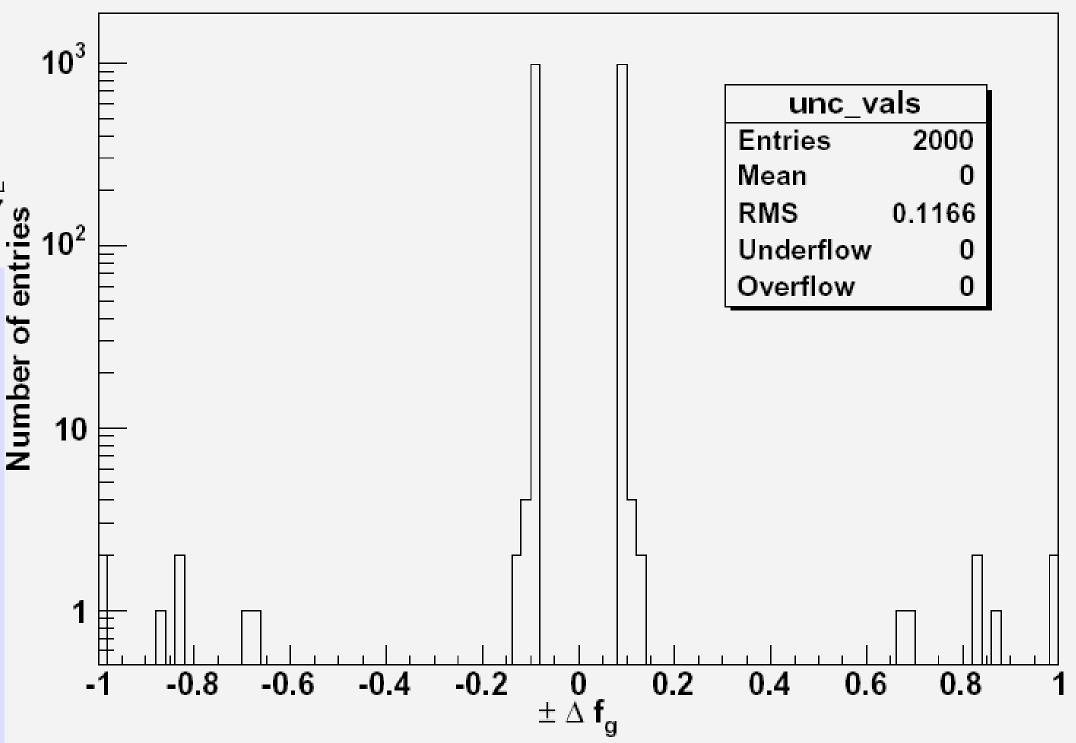




Pseudo-Experiments



1000 pseudo-experiments
Each with 500 events



qq → qq Fraction in Dijet

- We changed the qq → qq fraction of the dijet sample by +/-5%, using 32% or 22%. There was a change of +/-0.02 in the gluon-fraction of the sample and we add this as systematic uncertainty for this effect.

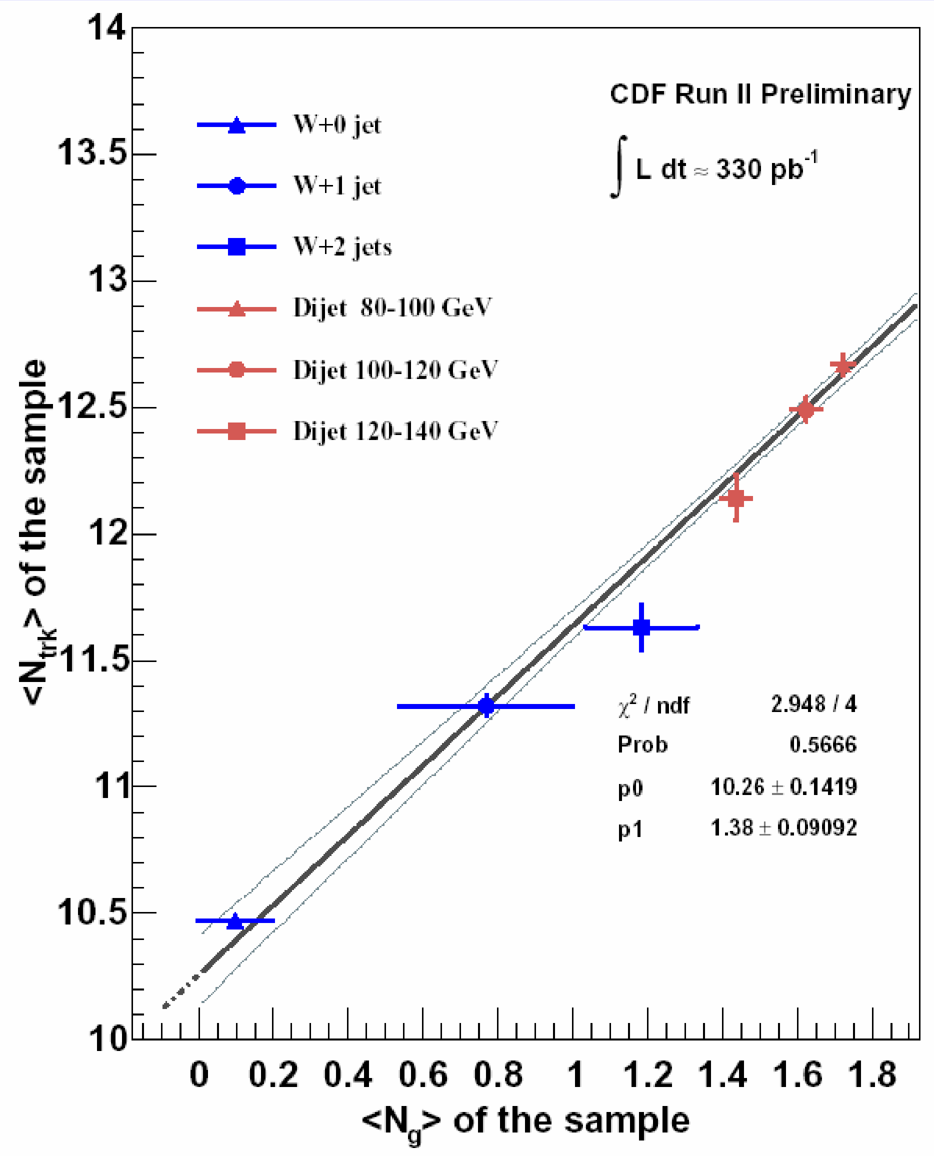
The mixed up parameterization

- The difference between the mixed up and the right parameterizations was not large, but I repeated the analysis with the right parameterization, the change in the result is 0.02.

Plots and Results to Bless…

Correlation between $<N_g>$ and $<N_{trk}>$

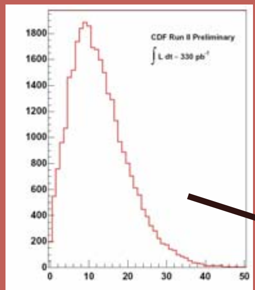
Sample	MC $<N_g>$	Data $<N_{trk}>$
W+0 jet	0.10 ±0.10	10.47±0.01
W+1 jet	0.77 ±0.23	11.32 ±0.04
W+2 jets	1.18 ±0.15	11.63 ±0.09
80-100 GeV	1.72 ±0.03	12.67 ±0.04
100-120 GeV	1.62 ±0.04	12.49 ±0.05
120-140 GeV	1.44 ±0.04	12.14 ±0.09



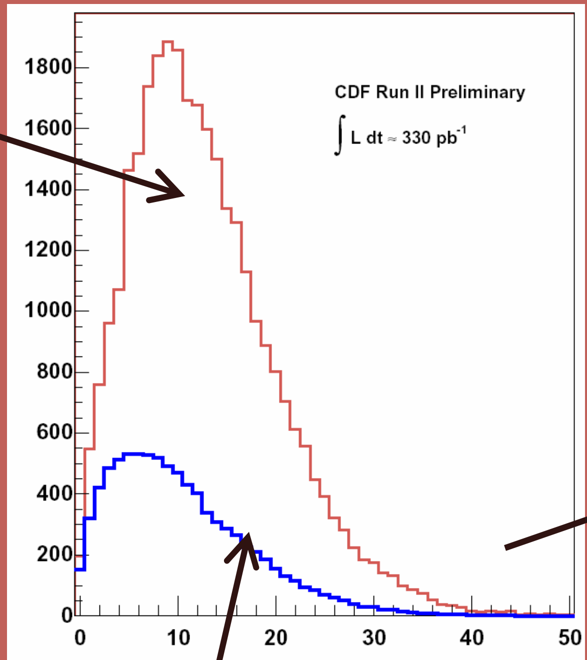
using the fit to find $<N_g>$ for other samples $<N_{trk}>$

Sample	MC prediction	Fit result
140-160 GeV	1.26 ±0.04	1.19 ±0.04
160-180 GeV	1.13 ±0.04	1.06 ±0.05
180-200 GeV	0.99 ±0.07	0.93 ±0.05
200-220 GeV	0.92 ±0.10	0.75 ±0.07
220+ GeV	0.67 ±0.10	0.60 ±0.07

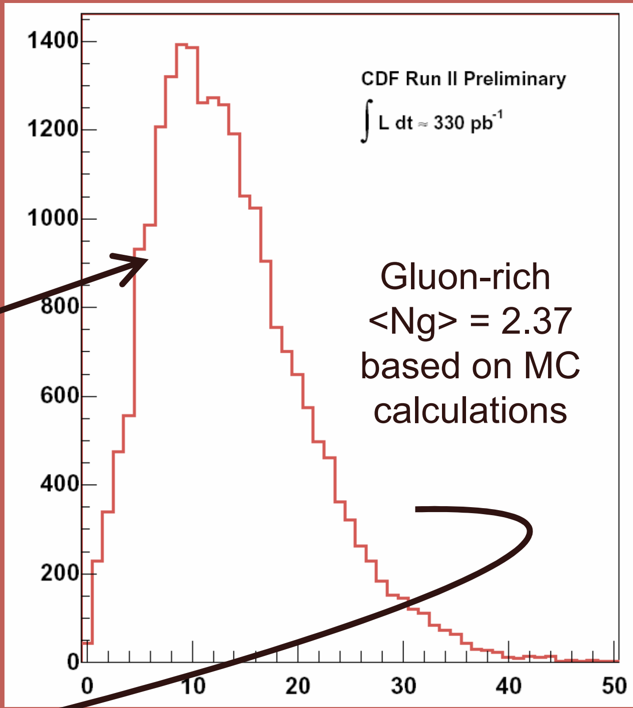
Gluon rich and 0-gluon distributions



DATA
dijet 80-100 GeV
Based on MC
27% $qq \rightarrow qq$
<Ng> = 2.37
for the rest

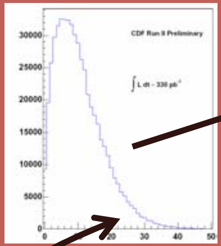


Subtract



Gluon-rich
<Ng> = 2.37
based on MC
calculations

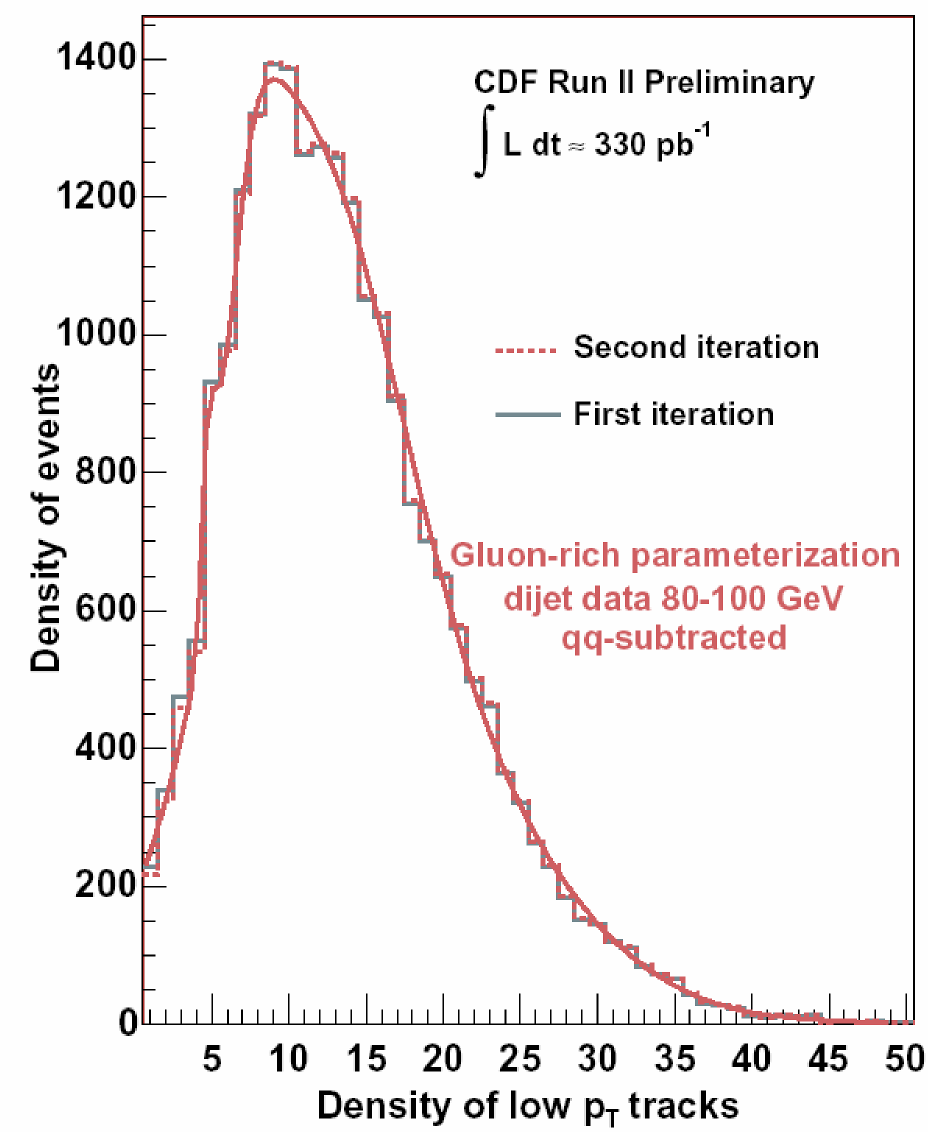
DATA
W+0 jet
Similar to
$qq \rightarrow qq$

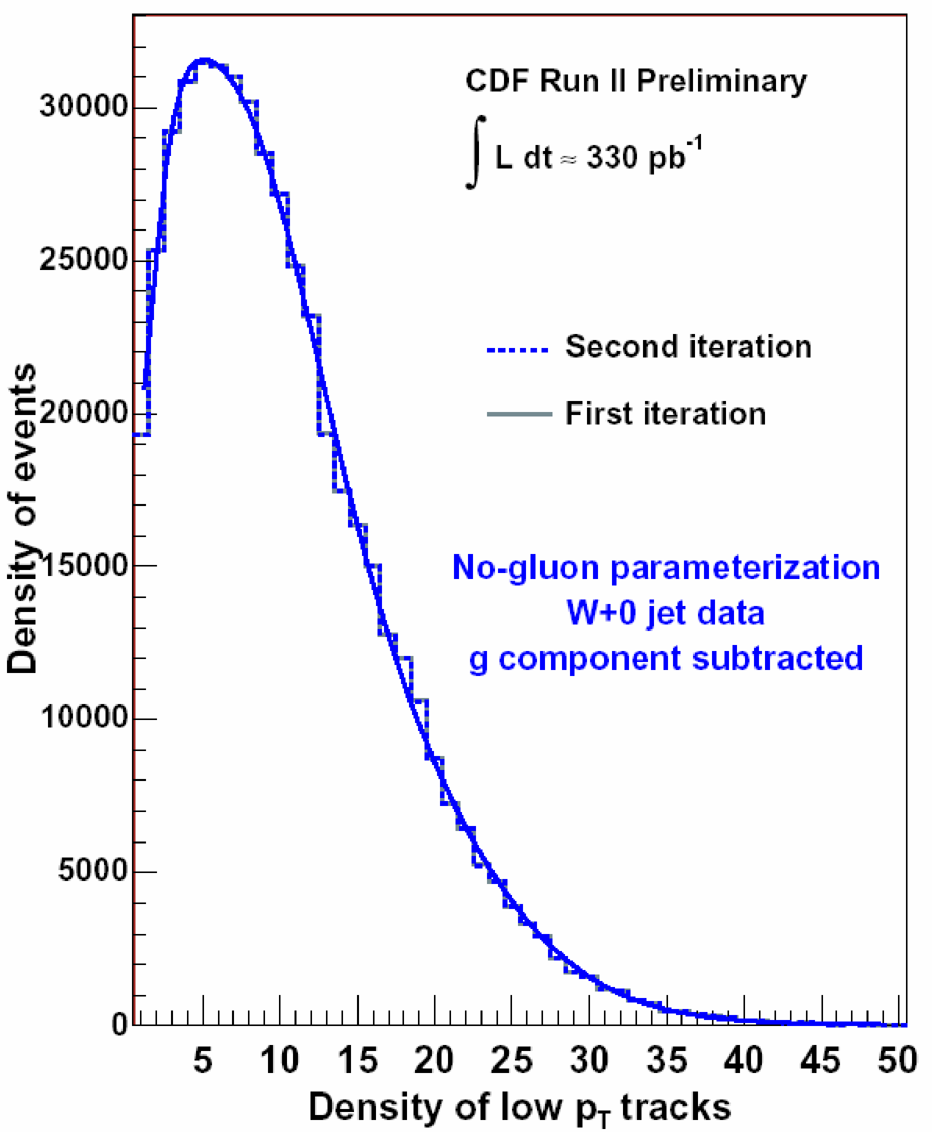


Normalized to dijet
80-100 GeV
Scaled by 0.27 to
represent $qq \rightarrow qq$

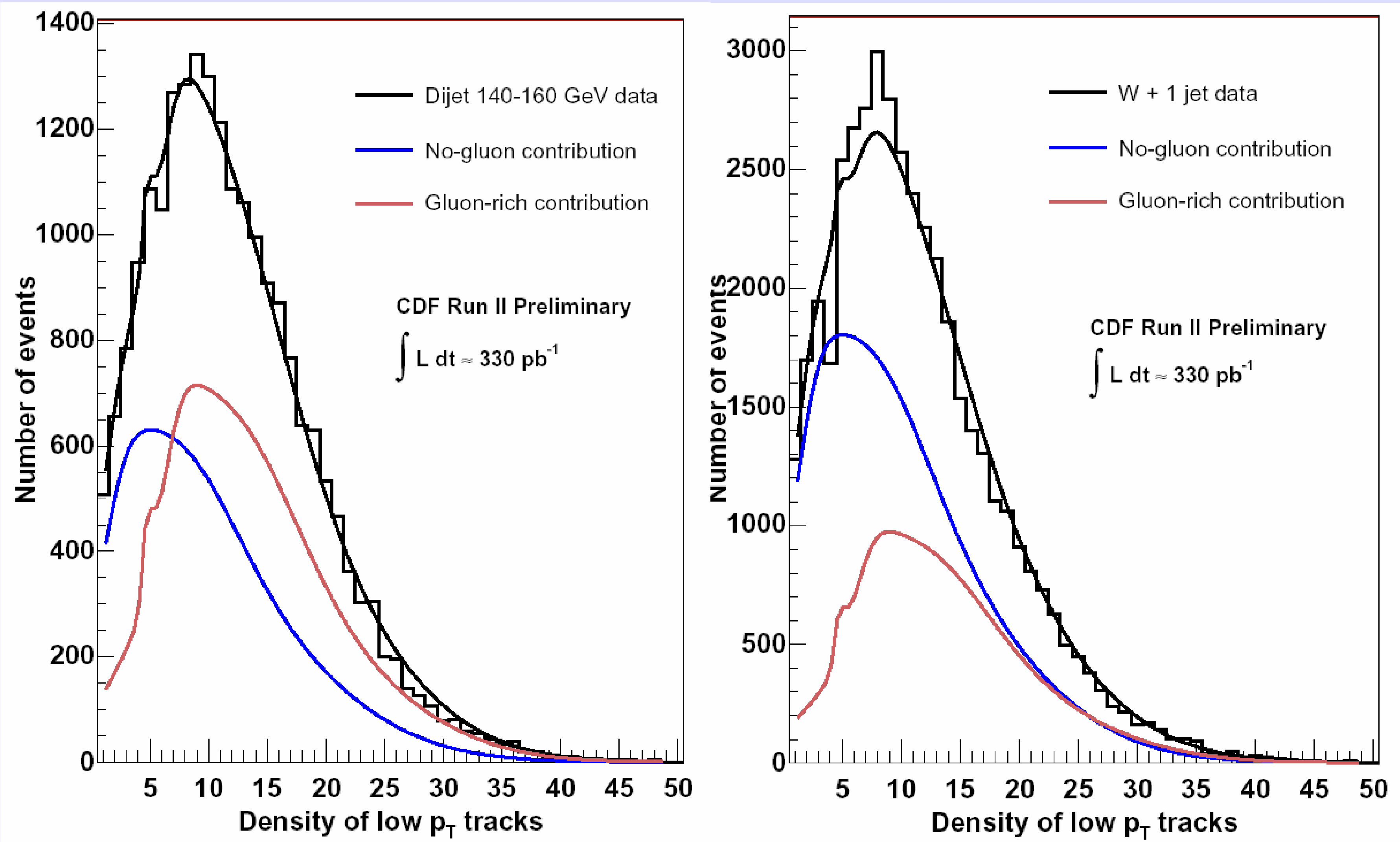
Iterate to subtract gluon contributions
from W+0 jet data distribution

Parameterization





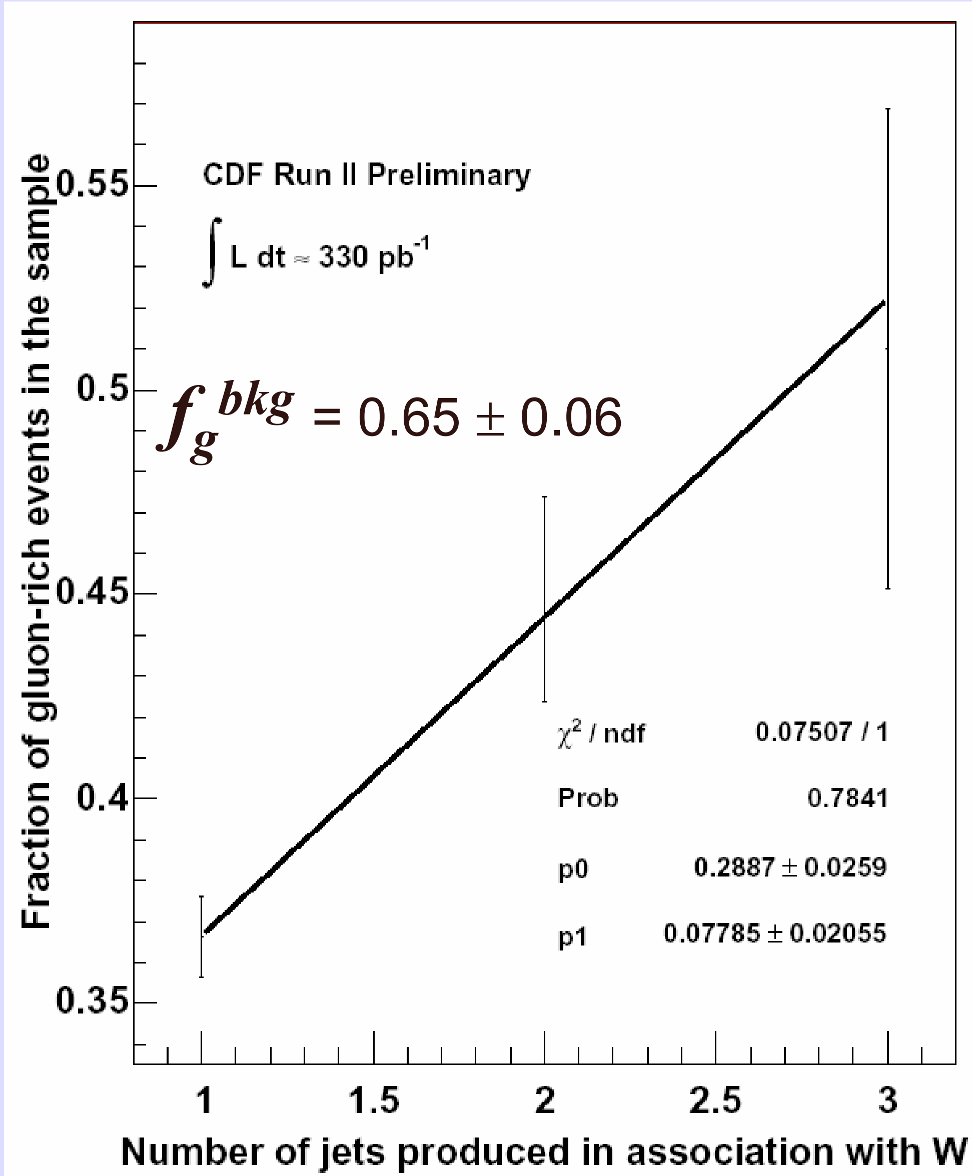
Two Sample Fits



Fit and MC values for different calibration samples

Sample	$\langle N_g \rangle$ from fit $2.37\ f_g$	MC $\langle N_g \rangle$
W+1 jet	0.87 ± 0.03	0.92 ± 0.08
W+2 jet	1.06 ± 0.05	1.33 ± 0.15
100-120 GeV	1.61 ± 0.03	1.62 ± 0.02
120-140 GeV	1.49 ± 0.05	1.44 ± 0.04
140-160 GeV	1.30 ± 0.03	1.26 ± 0.04
160-180 GeV	1.18 ± 0.03	1.14 ± 0.04
180-200 GeV	1.06 ± 0.05	0.99 ± 0.07
200-220 GeV	0.95 ± 0.07	0.92 ± 0.10
220+ GeV	0.76 ± 0.07	0.67 ± 0.10

Estimating gluon rich fraction in background



$$f_g^{bkg} = 0.65 \pm 0.06$$

gg and qq to ttbar Acceptance

	$gg\rightarrow tt$, $\geq$4 jets	$qq\rightarrow tt$, $\geq$4 jets
A_{tagged}	0.06 ±0.01	0.05 ±0.01

Used ttbar HERWIG MC with almost equal gg and qq fractions

Syetematic uncertainties

Type	Source	f_g^{bkg}	f_g	f_{bkg}	$A_{gg\to tt}/A_{qq\to tt}$
Quark-gluon composition	qq →qq fraction	±0.02	± 0.02	-	-
	K_T	+0.00 -0.02	±0.02	-	-
	QCD bkg composition	+0.00 -0.02	+0.00 -0.01	-	-
Track counting	Low ET cut	+0.02 -0.00	+0.00 -0.03	-	-
	Trk/jet correction	+0.00 -0.01	+0.03 -0.02	-	-
	Z vertex matching	-	-	-	-
Others	true pseudoexperiments comparison	±0.05			
	f_g^{bkg} estimate method	±0.13	-	-	-
	f_{bkg}			±0.02	
	PDF and MC	-	-	-	±0.04
Total		±0.14	±0.04	±0.02	±0.04

Result

- Using the values we found, and a background fraction of (13 ± 3)%, we get

$$f_g^{tt} = 0.28 \pm 0.25(stat) \pm 0.10(syst)$$

- And using a ttbar acceptance of 0.06 ± 0.01 and 0.05 ± 0.01 for gg fusion and ppbar respectively, we find

$$\frac{\sigma(gg \to t\bar{t})}{\sigma(p\bar{p} \to t\bar{t})} = 0.25 \pm 0.24(stat) \pm 0.10(syst)$$