

Properties of Events with a Rapidity Gap Between Jets in CDF

(The Rockefeller University)

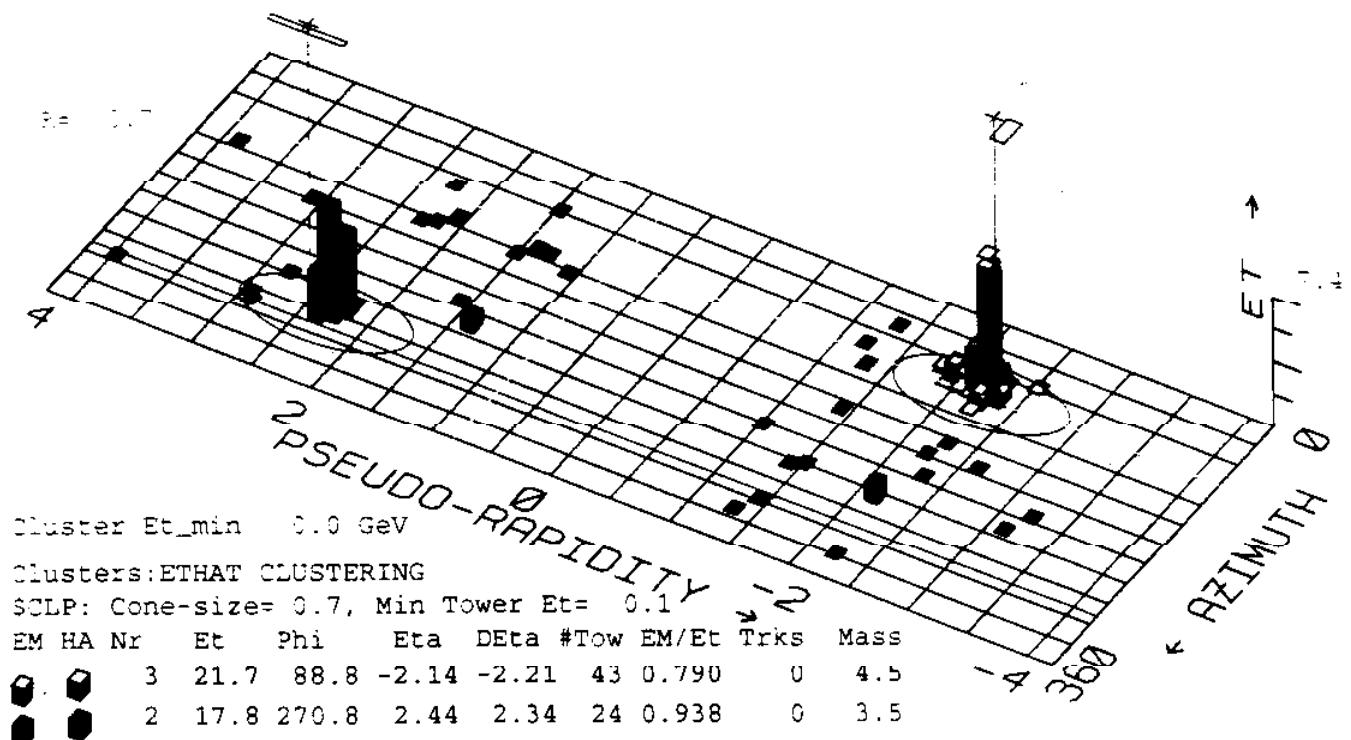
The CDF Collaboration

representing

presented by
Philip Melese

Run 61511 Evt 315901 HATTI.DST|FWDJET CCK496.DST;1 18AUG94 23:46:37 10-AUG-96

CLF: ETEM/ETTOT/ORG/NTW/PDAIS E transverse Eta-Phi LEST Plot
17.5 17.5 CLF 4 Max tower Et= 7.4 Min tower Et= 0.11 N clusters=
12.0/ 14.5/CLF/ 6 METS: Et_{total} = 281.6 GeV, Et_{scalar}= 47.6 GeV
Et(miss)= 4.4 at Phi_{miss} 236.0 Deg.

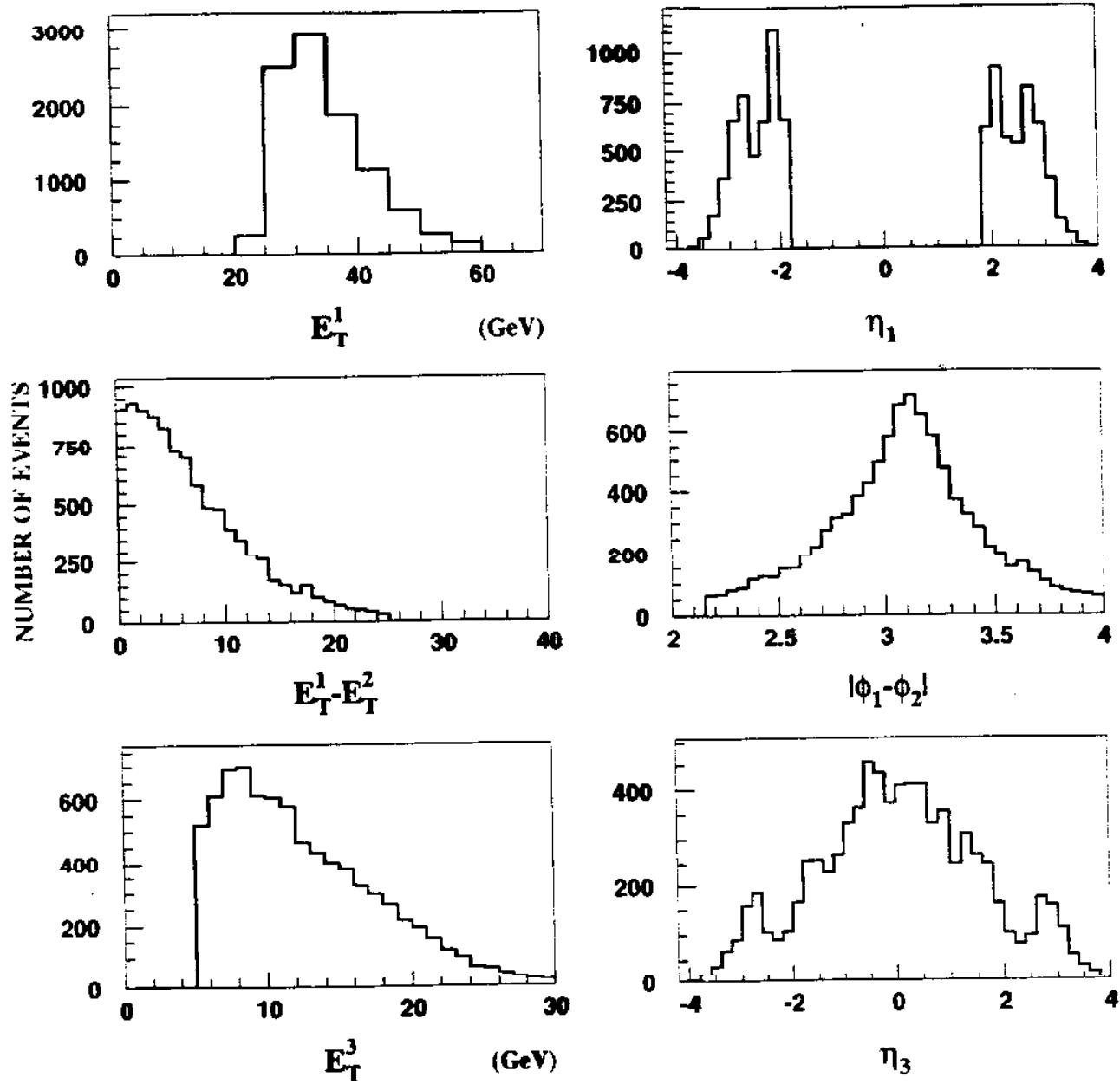


Data Set and Analysis Procedure

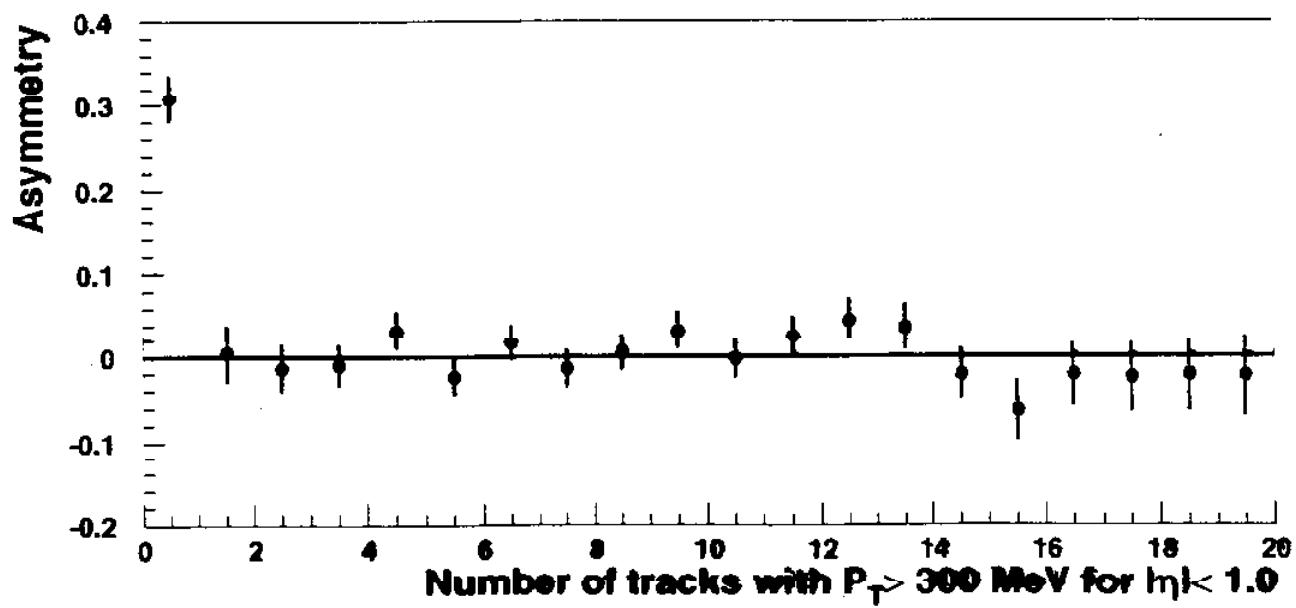
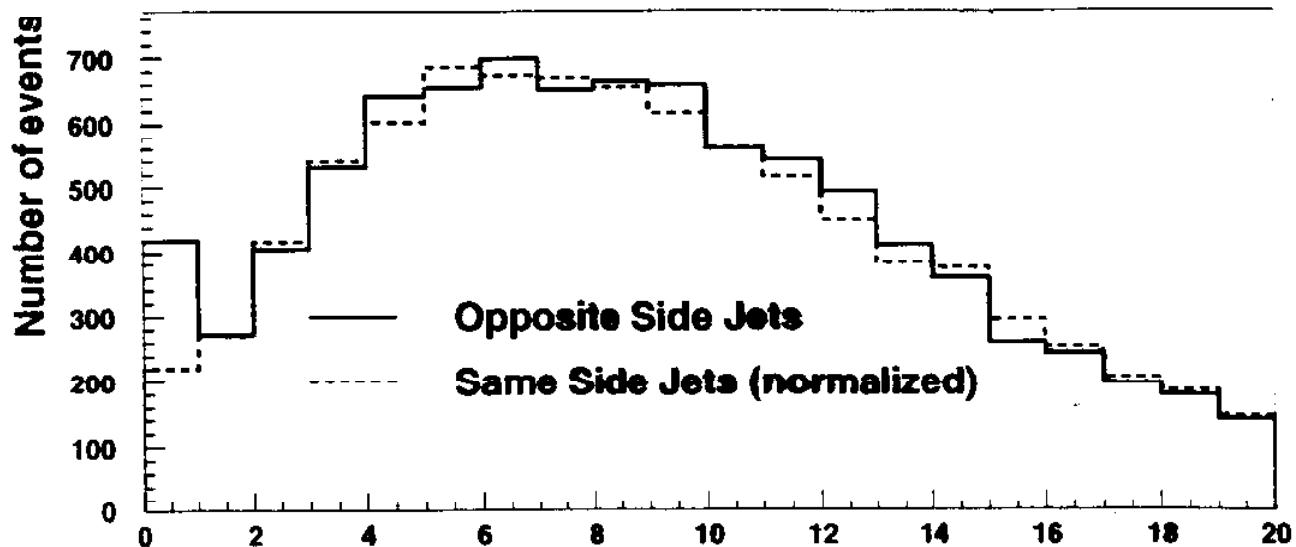
- Run 1B data 87 pb^{-1} with pre-scale factor equal to 40
- Jet $E_T > 20 \text{ GeV}$
- Jet $\eta > 1.8$
- Rapidity Gap Region: $-1.0 < \eta < 1.0$
- Use single vertex cut for single interaction events and correct for vertex efficiency
- Use Same-Side dijet track multiplicity as a template for normal QCD events

Jet Parameters OS Jets

CDF Preliminary

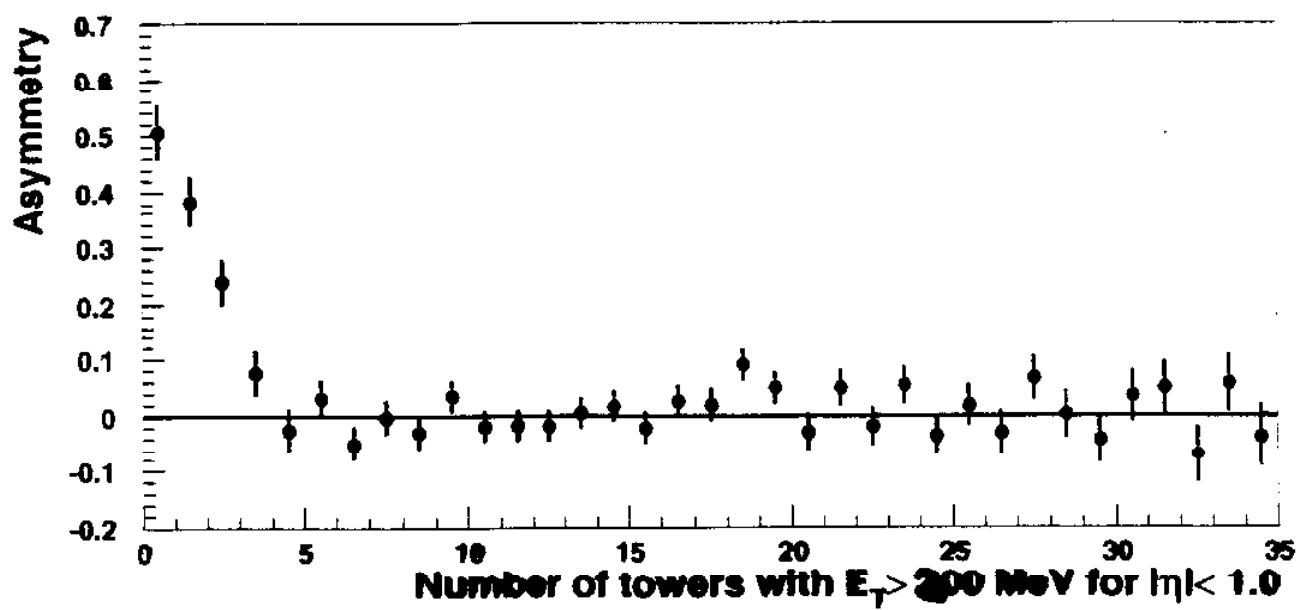
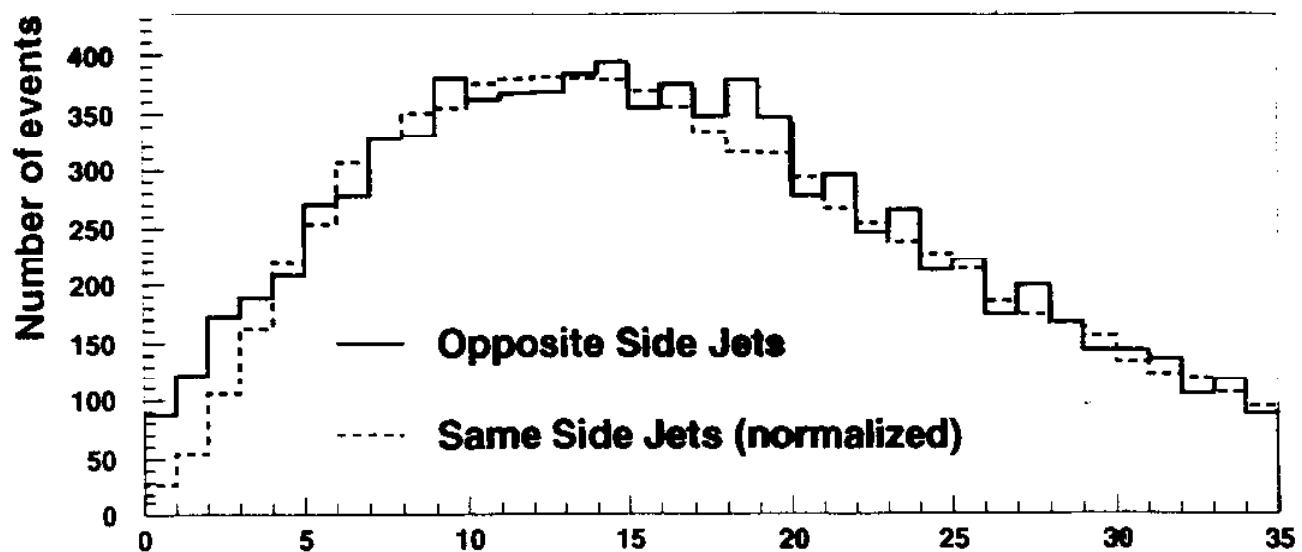


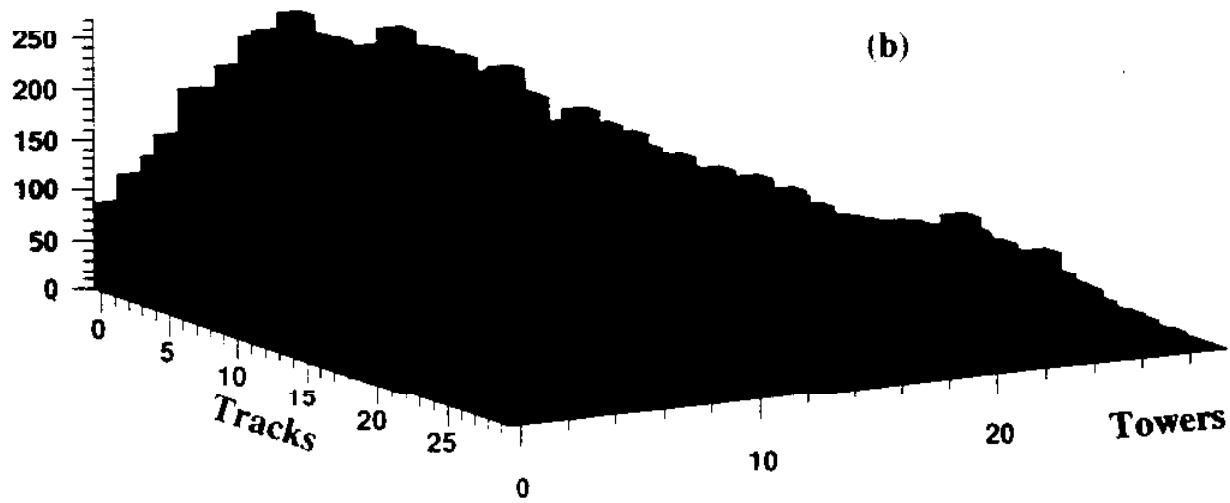
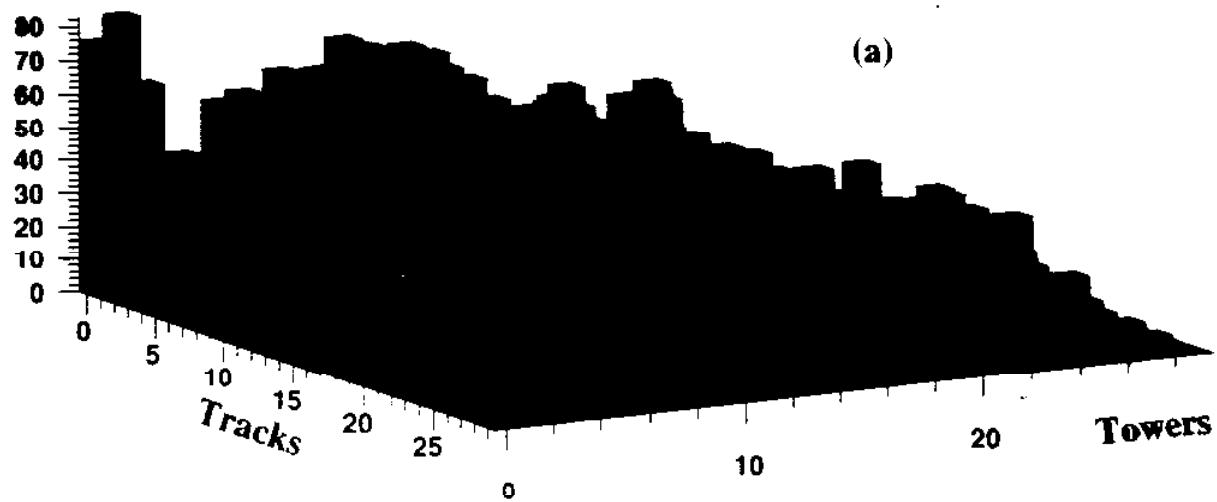
CDF Preliminary

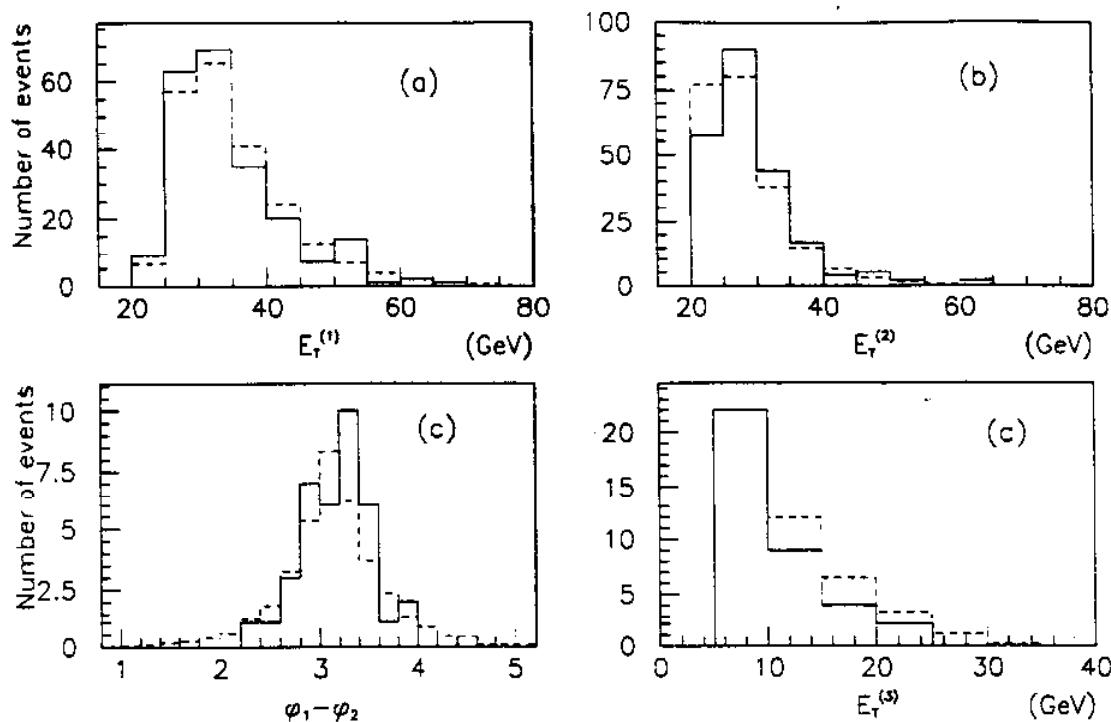


$$R = [1.13 \pm 0.12 \text{ (stat)} \pm 0.11 \text{ (syst)}] \%$$

CDF Preliminary







Comparison of distributions of rapidity gap (solid) and no-gap (dashed) events: (a) leading jet E_T ; (b) second jet E_T ; (c) difference of the azimuthal angles of the two leading jets; (c) third jet E_T . In (c) and (d) events with a third jet of $E_T > 5$ GeV in the region $|\eta| < 1.8$ are not included.

CDF Preliminary (1V)

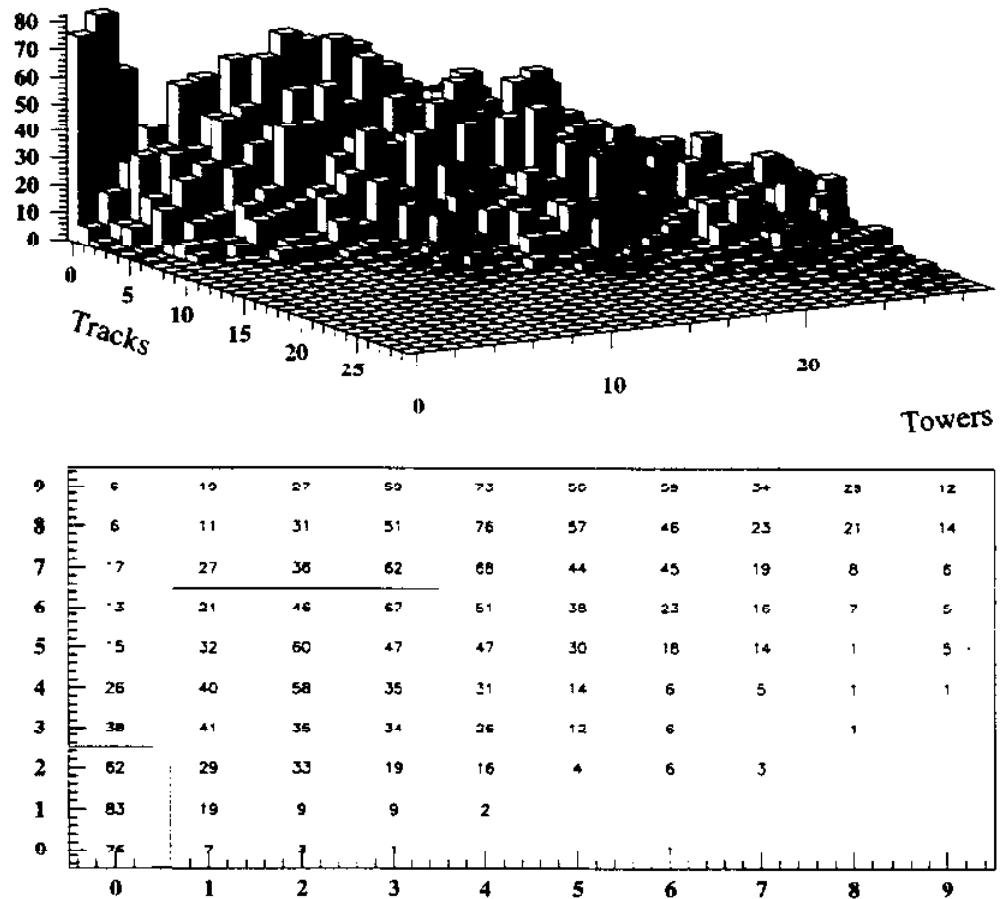
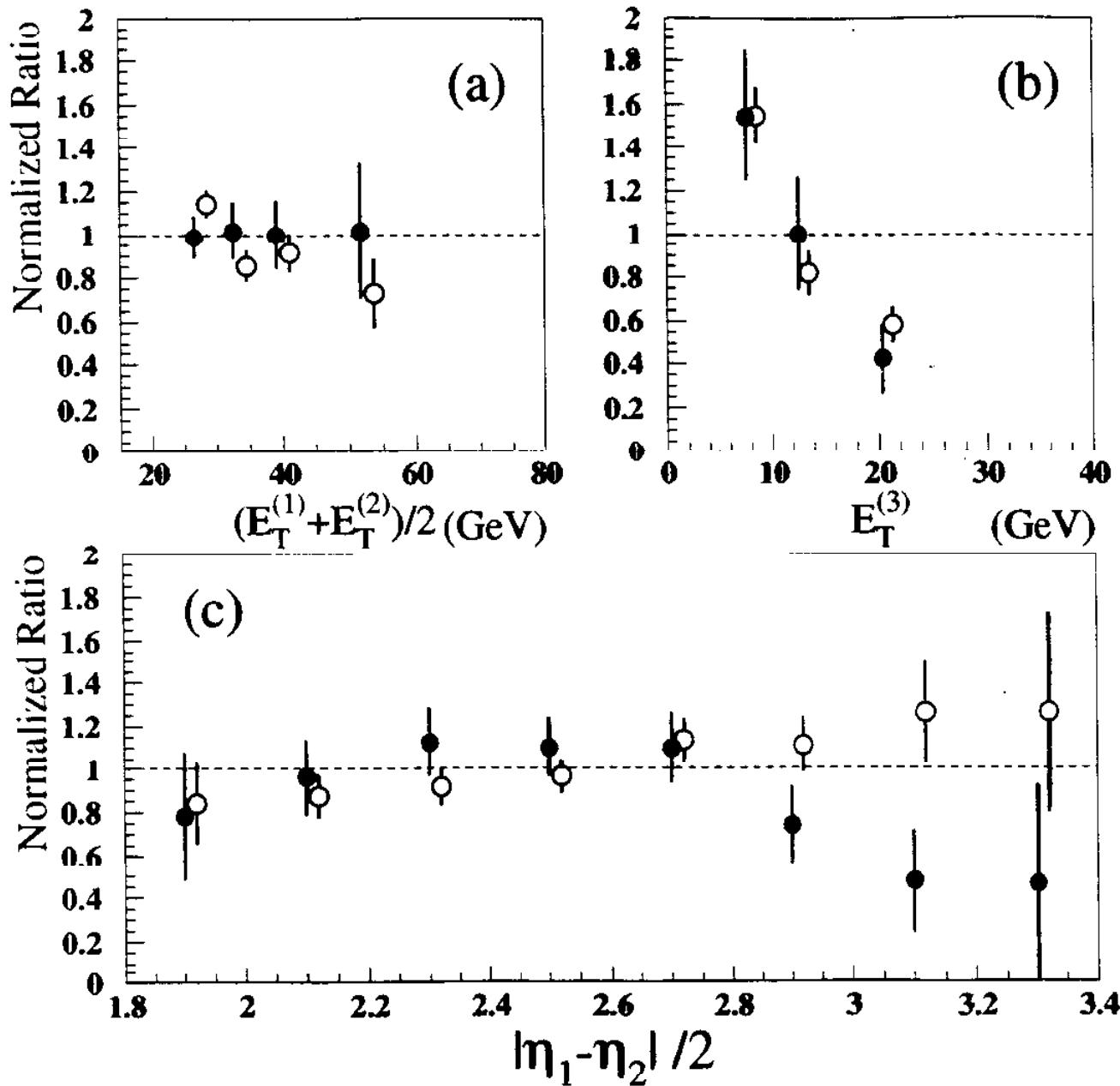


Figure 4: The correlation between the track and tower multiplicity distributions within $|\eta| < 1.0$ for OSjet events. The rapidity gap signal is concentrated in the bins with track=0 and towers=0,1,2. There are 221 events in these bins. We define the events with $N_{track} = 1, 2, 3$ and $N_{tower} < 7$ as a “background” event sample.



● gap/nogap comparison

○ background nogap

"gap" ~ 75% single
(25% bkgnd)

Conclusions

- We have measured the fraction of rapidity gap events using the run 1B data set and find it to be

$$R = [1.13 \pm 0.12(stat) \pm 0.11(sys)]\%$$

- The Jet-Gap-Jet events have lower underlying activity than normal QCD events (a selection bias ?):
 1. The JGJ events have lower ΣE_T .
 2. The underlying multiplicity in JGJ events is lower relative to normal dijet events in the jet region and beyond
 3. Only 22% of JGJ events have a third jet with $E_T > 5$ GeV as compared to 88% for normal events
- The JGJ signal is independent of the E_T of the leading jet.
- The rapgap/non-gap ratio of the η^* distribution drops at large value of η^* but statistics are limited to make a strong statement