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May 2 2002

Looking at Shapes of Distributions in MC

Comparing the shape of distributions generated using different PDFs to discriminate between them.

For ratios we do not have to worry about the absolute integrated luminosity and do not have to worry about lost events...

Used the Herwig generator and the runMC executable in the mcProduction package. Configured to only do the event generation and saved "jet from outgoing parton" quantities.

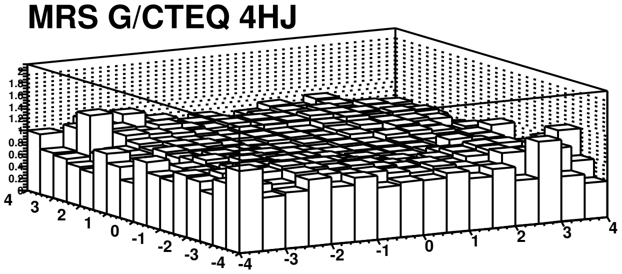
→ Still do not have a newer PDFlib linked in so we cannot look at newer PDFs.

Generated 500000 events with $p_T > 20$. Currently generating more with higher p_T cuts. Will combine samples in order to cover a wider E_T range with sufficient statistics.

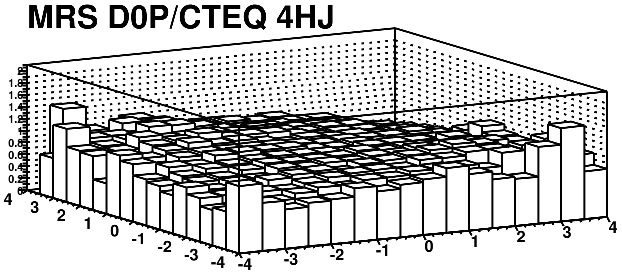
For some reason herwig in newer versions of the online code takes 10× longer...

Plotted Eta1 vs Eta2 for different PDFs and divided the distributions.

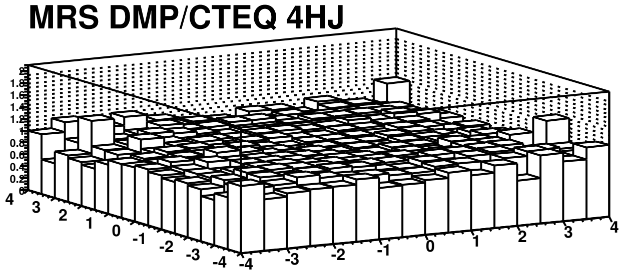
MRS G/CTEQ 4HJ



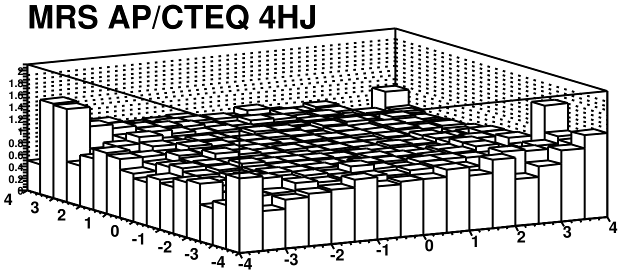
MRS D0P/CTEQ 4HJ



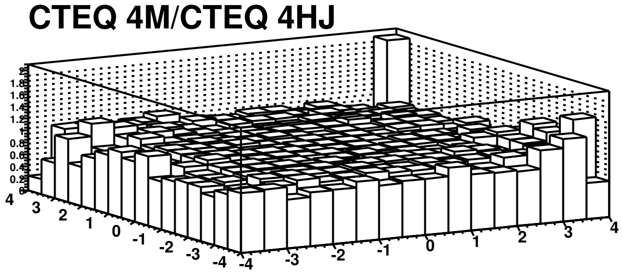
MRS DMP/CTEQ 4HJ



MRS AP/CTEQ 4HJ



CTEQ 4M/CTEQ 4HJ



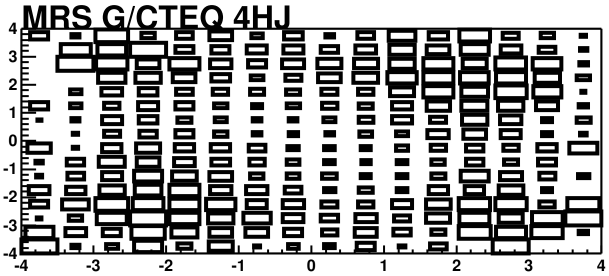
Can see some shape differences between PDFs.

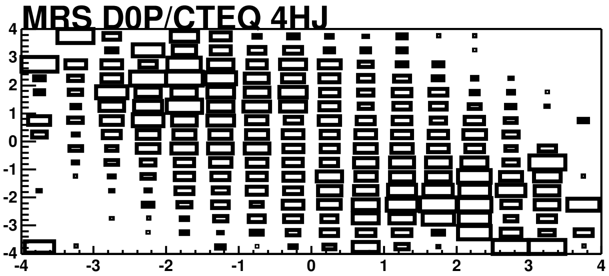
Look at regions for which the differences are larger.

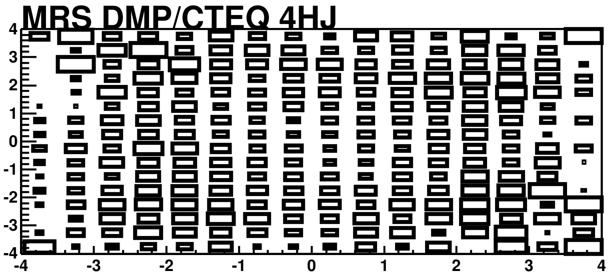
→ ratio of same side to opposite side.

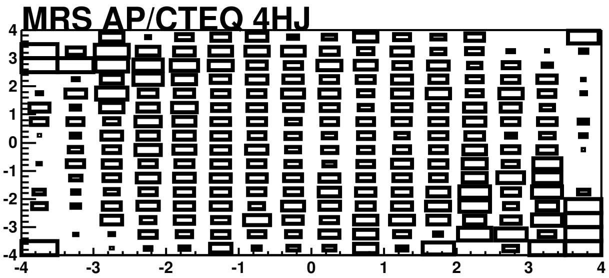
→ ratio of central to forward.

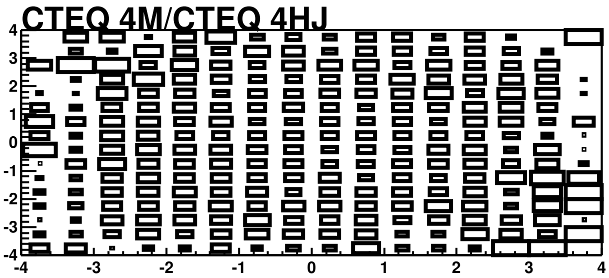
Limits of the histogram set to (0.8, 1.2) in order to emphasize differences of 20%.











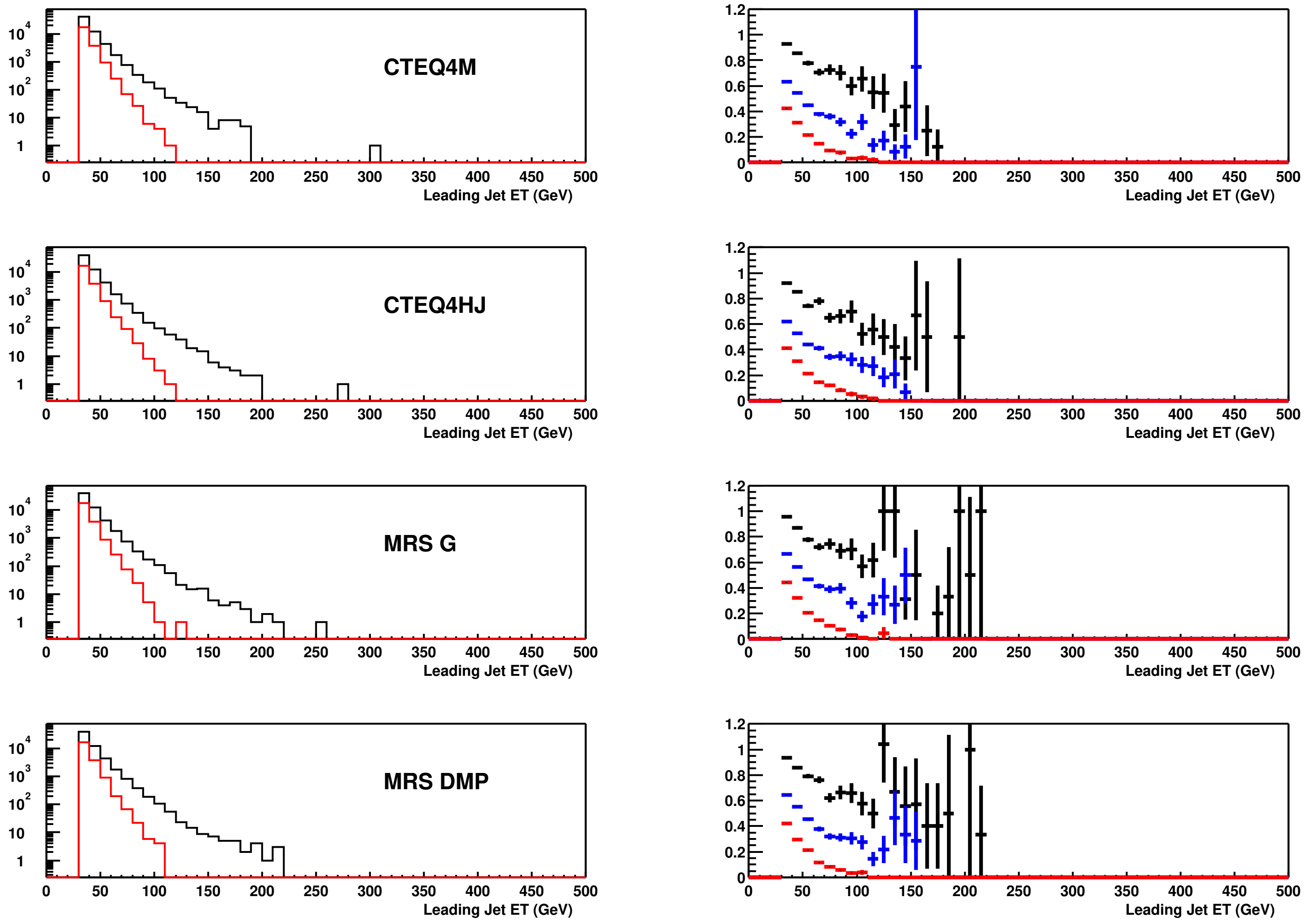
Normalize to one region and look for changes in a different region.

Inclusive lead jet Et distributions.

Right plot shows the central and forward regions.

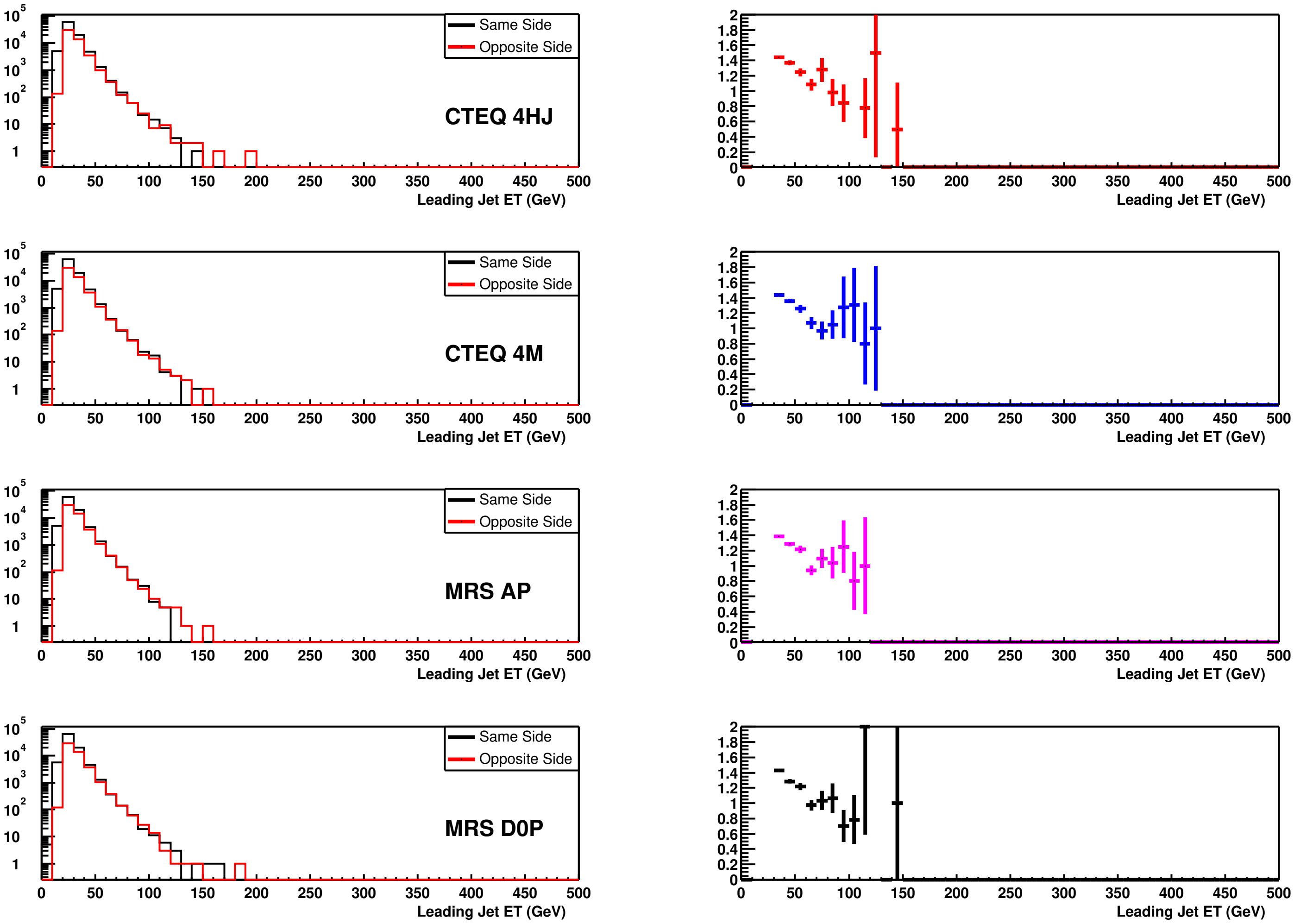
Left plot shows the ratio of the central η region to the forward η regions.

$0.1 < |\eta| < 0.7$
$0.7 < |\eta| < 1.4$
$1.4 < |\eta| < 2.1$
$2.1 < |\eta| < 3.0$

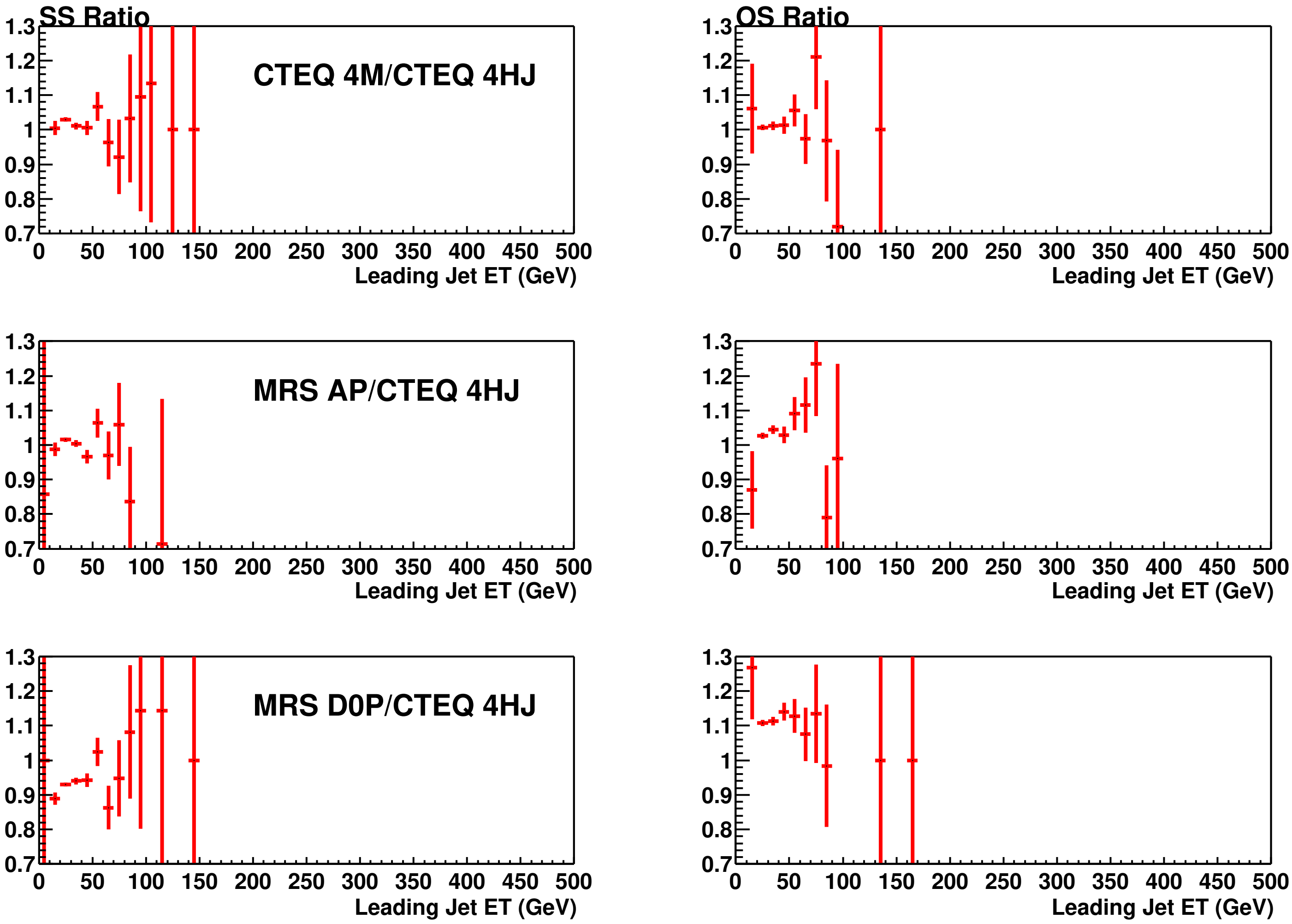


Same Side: two lead jets both have Eta on the same side of the detector and $\eta > 1$.

Opposite Side: two lead jets have Eta with opposite sign and $\eta > 1$.



Plotted the lead jet Et for SS and OS jets and divided distributions.



Next steps...

Combine MC samples in order to cover a wider E_T range.

Try to quantify the shape differences between PDFs.

Compare to data...

Looking at Recent Data

Updated Inclusive Jet Et plot for 13.7 pb-1 or data.

Used Physics table PHYSICS_0_02[6,xxx] and later (starting with run 134918) since these have the CLC requirement removed from the Jet triggers.

Processed data from several datasets:

```
gtst1c   134918 - 136995  2.1 pb-1
gtst1d   136997 - 138421  1.8 pb-1
gjet01   138425 - 143815
```

Had problems with a handfull of runs, need to go back to see if the data is readable.

Applied simple cuts to clean up the sample.

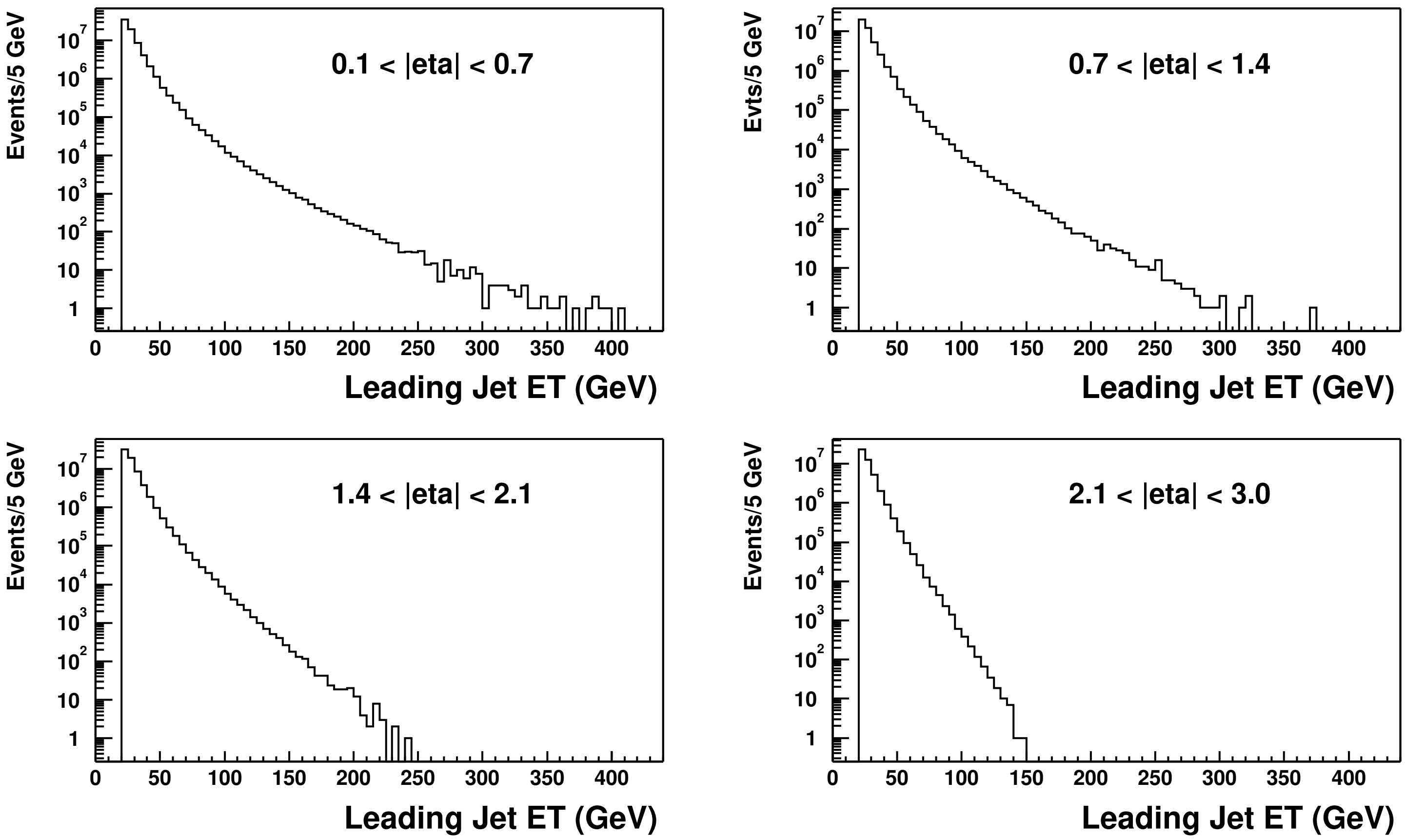
$ETot < 2000$

$MEtSig < 6$

$|Vz| < 60$

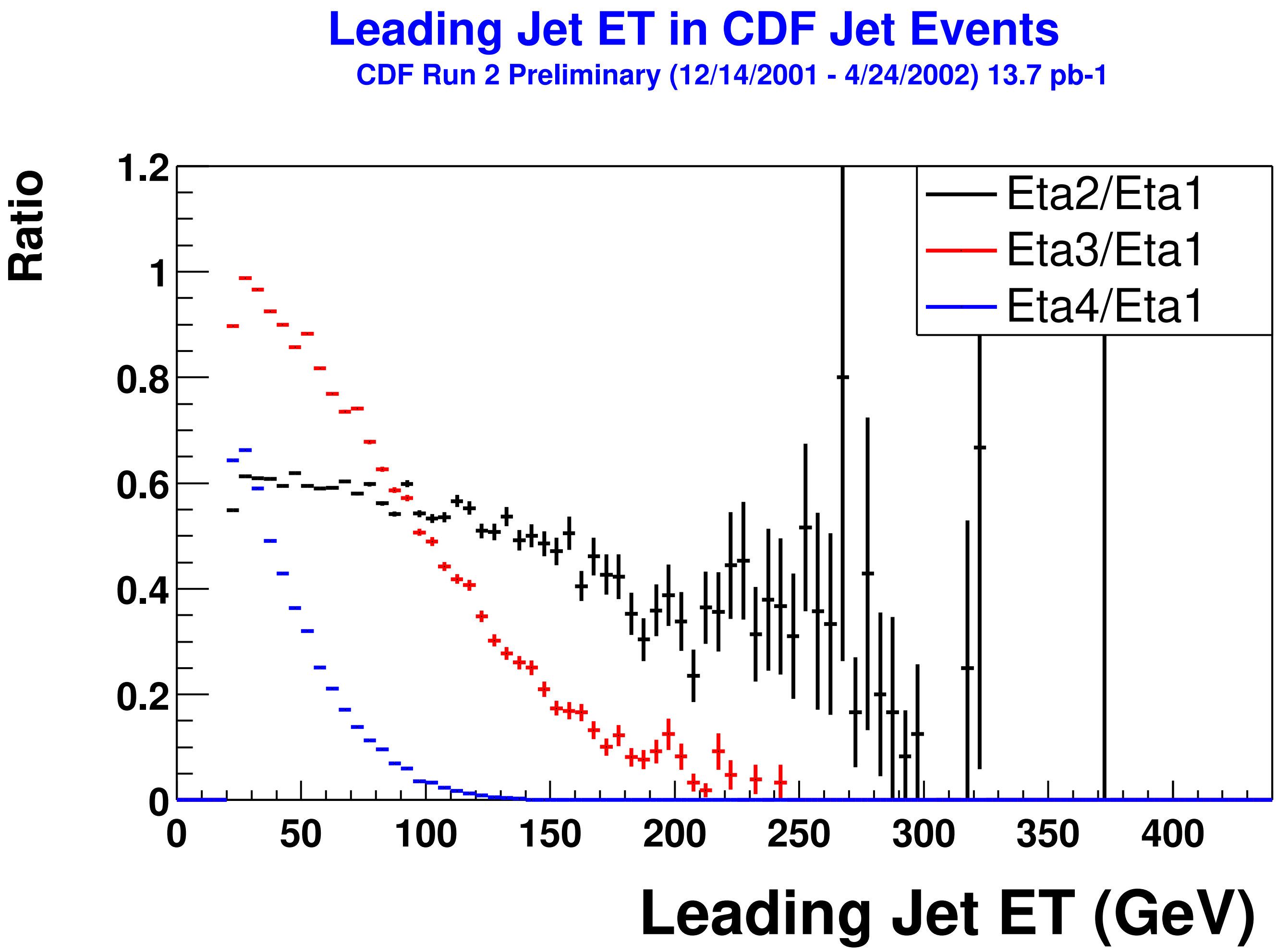
Leading Jet ET in CDF Jet Events

CDF Run 2 Preliminary (12/14/2001 - 4/24/2002) 13.7 pb-1



E_T of lead jet before vertex correction and without jet energy correction.

Ratio of the lead jet E_T distribution, forward/central η regions.

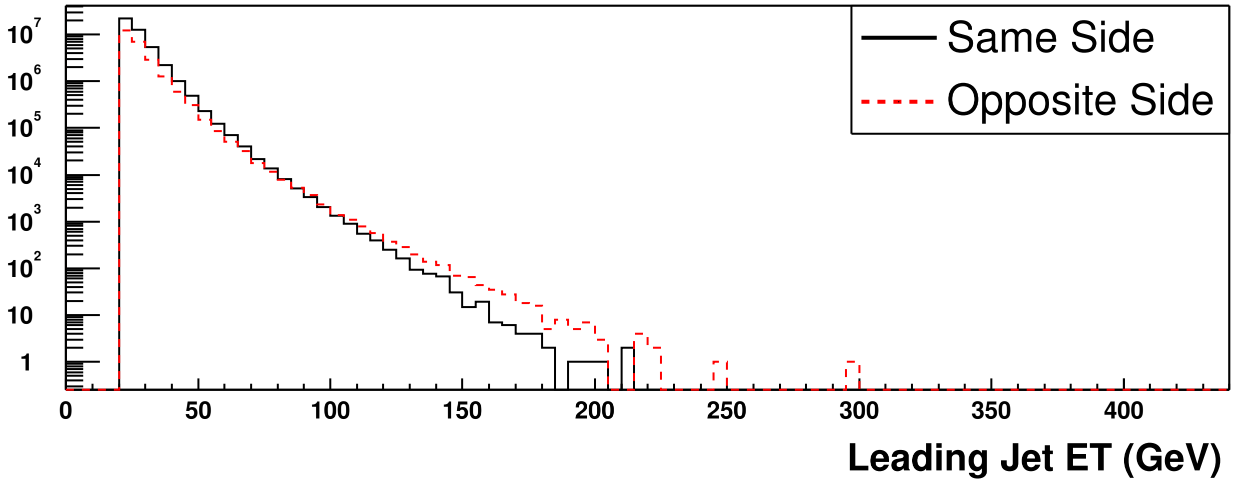


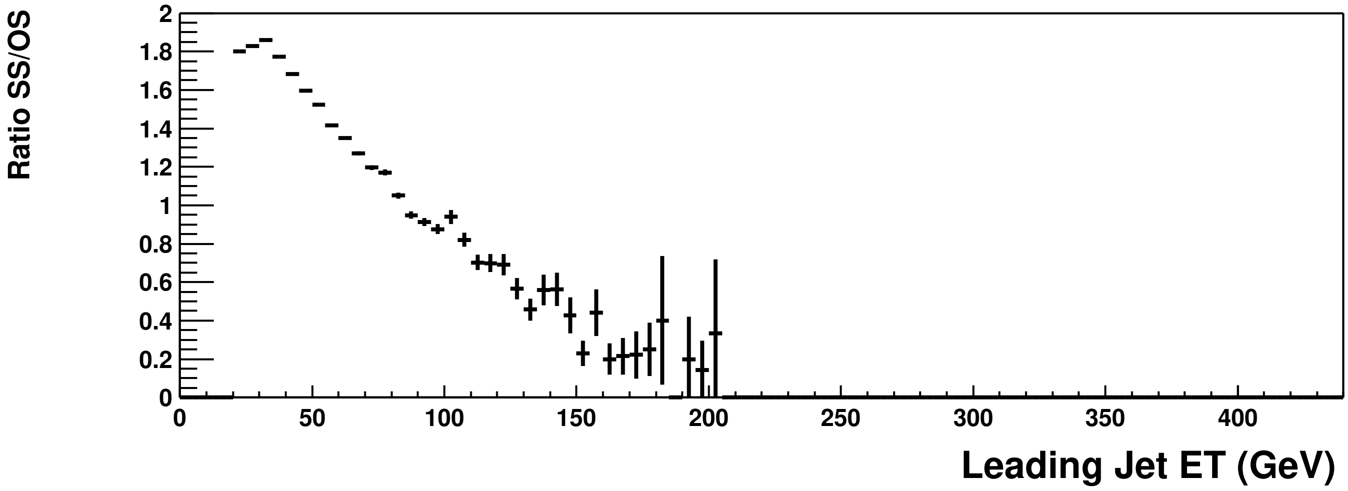
$0.1 < |\eta| < 0.7$
$0.7 < |\eta| < 1.4$
$1.4 < |\eta| < 2.1$
$2.1 < |\eta| < 3.0$

Ploted the E_T distribution with the requirement that there are two jets on the Same Side/Opposite Side of the detector.

Require $1.0 < |\eta| < 3.0$

Plotted ratio of the Same Side/Opposite Side lead jet E_T distribution.





Generated events with several minimum Et cuts
J20, J70, J100, J200.

Determined the number of events within the different ranges and weighted the events in order to get sufficient statistics over a wide Et range.