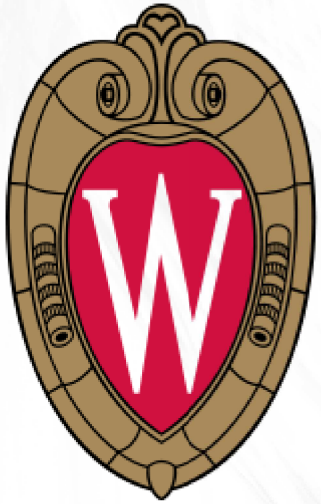
W W + 2 jets Analysis



THE UNIVERSITY of WISCONSIN MADISON

Will Parker

University of Wisconsin – Madison

10/10/11

W W + 2 Jets Analysis

- Printed tables of event yields
- Discovered extra scale factor on plots
- One discrepancy: Drell-Yan
- NN output shape doesn't match note
- Compared WWNLO and Alpgen jet variables
- Still haven't learned to do Si/noSi scaling, used Sergo's numbers for now
- Ratio of DY in ttCR to DY in whole sample is 1.07 %

Event Selection

- Exactly two leptons
  - Satisfy lepton trigger
  - Leading Et(Pt) > 20 Gev
  - Second Et(Pt) > 10 Gev
  - Z position within 4 cm of each other
  - Track Pt within $\Delta R=0.4$ < 10% of lepton Et(Pt)
  - M_ll > 16 GeV
- Met_spec > 25 Gev, > 15 Gev for electron-muon events
- 2 or more jets
  - Et > 15 Gev
  - $|\eta| < 2.5$
- Veto events with a tight secondary vertex btag

Event Yields

NN Template

Proc	Yield	+/-	Err
ttbar	244	+/-	35.8
DY	138	+/-	54.8
WW	49.7	+/-	9.68
WZ	9.92	+/-	1.89
ZZ	4.47	+/-	0.86
Wjets	62.5	+/-	12.5
Wγ	6.24	+/-	1.63
Bkgrd	515	+/-	67.4
ggH	4.26	+/-	2.2
WH	3.69	+/-	0.513
ZH	1.84	+/-	0.251
VBF	2.13	+/-	0.349
Sgnl	11.9	+/-	2.2
Data	494		

HWW Note

CDF Run II Preliminary $\int \mathcal{L} = 8.2\ \mathrm{fb}^{-1}$

$M_H = 165\ \mathrm{GeV}/c^2$

$t\bar{t}$	244 ±	36
DY	132 ±	53
WW	49.7 ±	9.7
WZ	9.9 ±	1.9
ZZ	4.47 ±	0.86
W+jets	62 ±	12
$W\gamma$	6.2 ±	1.6
Total Background	509 ±	79
$gg \to H$	4.3 ±	2.1
WH	3.69 ±	0.51
ZH	1.84 ±	0.25
VBF	2.13 ±	0.35
Total Signal	11.9 ±	2.5
Data	494	

AllSB-2JOS

Note: Wγ scaling had already been done

Before and After NN

Plotted yields

Proc	Yield
ttbar	262
DY	79.4
WW	43.9
WZ	8.90
ZZ	3.81
Wjets	80.1
Wγ	5.24
Bkgrd	483
ggH	4.24
WH	3.67
ZH	1.82
VBF	2.13
Sgnl	11.9
Data	487

Scale Factors

Proc	Scale
ttbar	264.0/244.1
DY	80.1/136.6
WW	44.4/49.7
WZ	9.0/9.9
ZZ	3.9/4.5
Wjets	82.0/62.5
Wγ	5.6/6.2

Template yields

Proc	Yield	+/-	Err
ttbar	244	+/-	35.8
DY	138	+/-	54.8
WW	49.7	+/-	9.68
WZ	9.92	+/-	1.89
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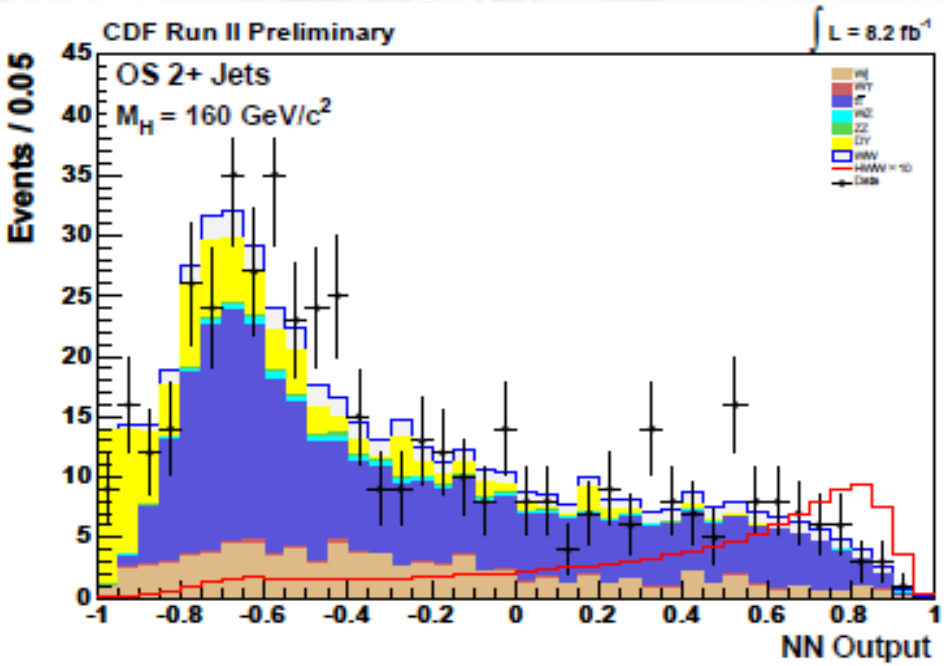
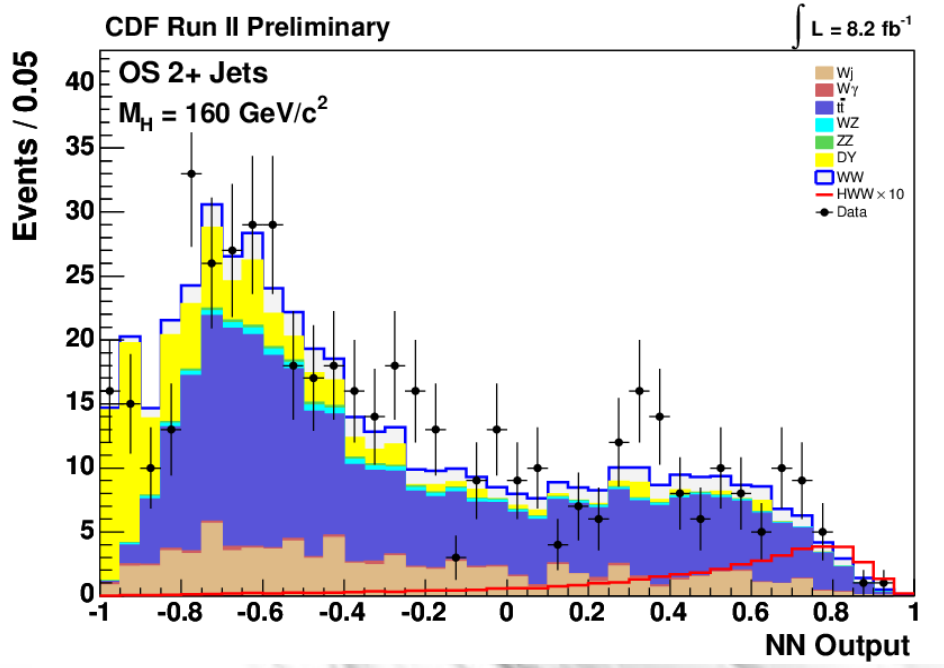
Data	494		

Neural Net Output

From Note

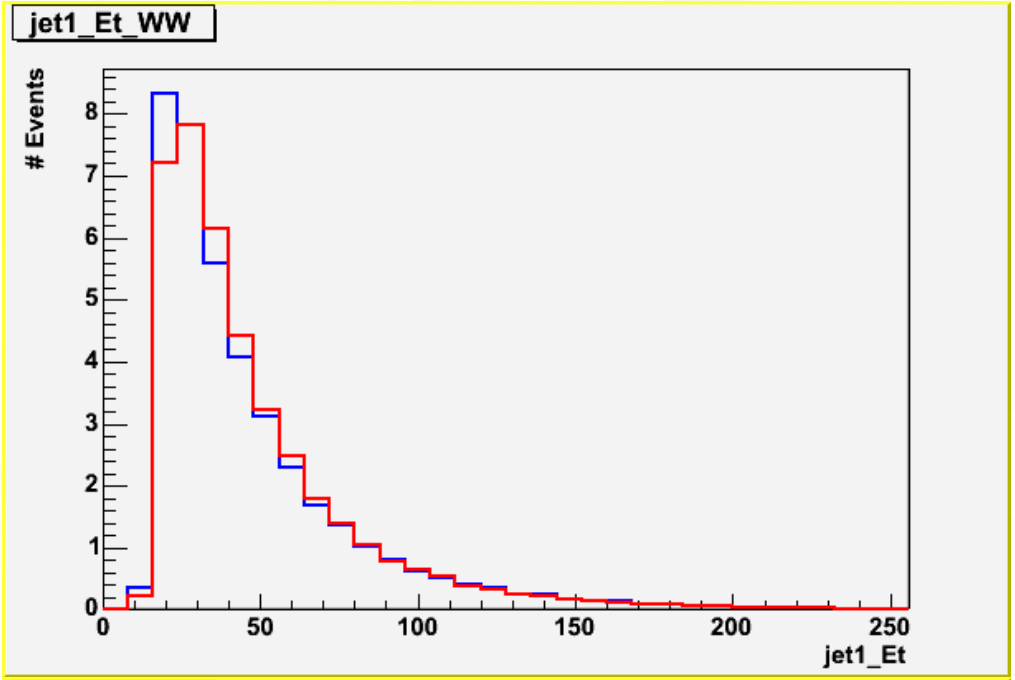


My Plot

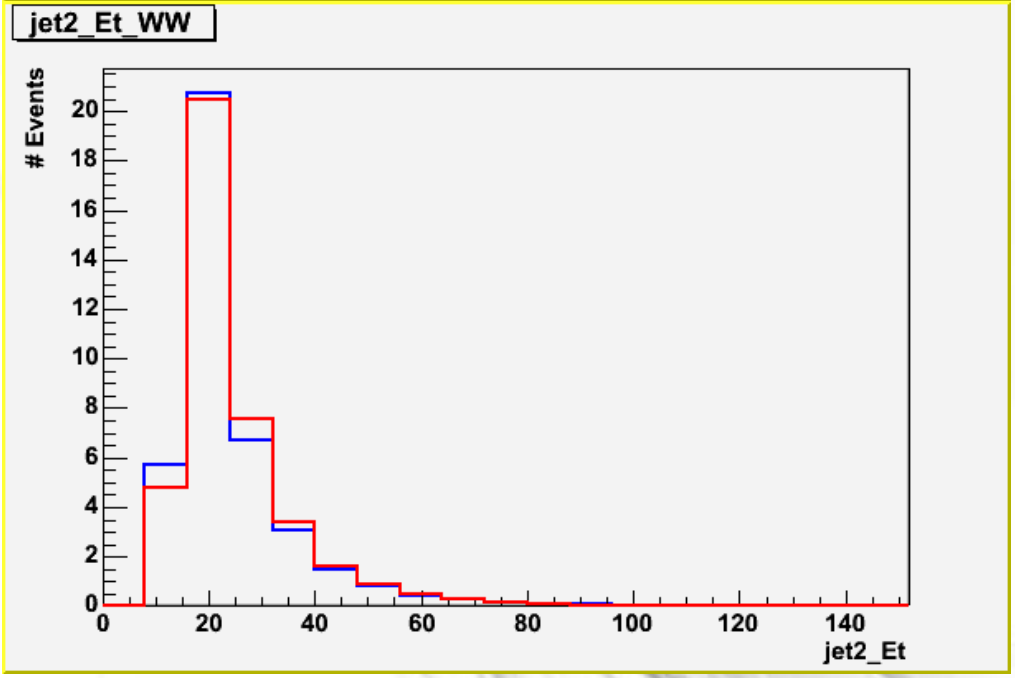


Alpgen and WWNLO Jet vars.

Leading Jet Et



Second Jet Et



Notes:

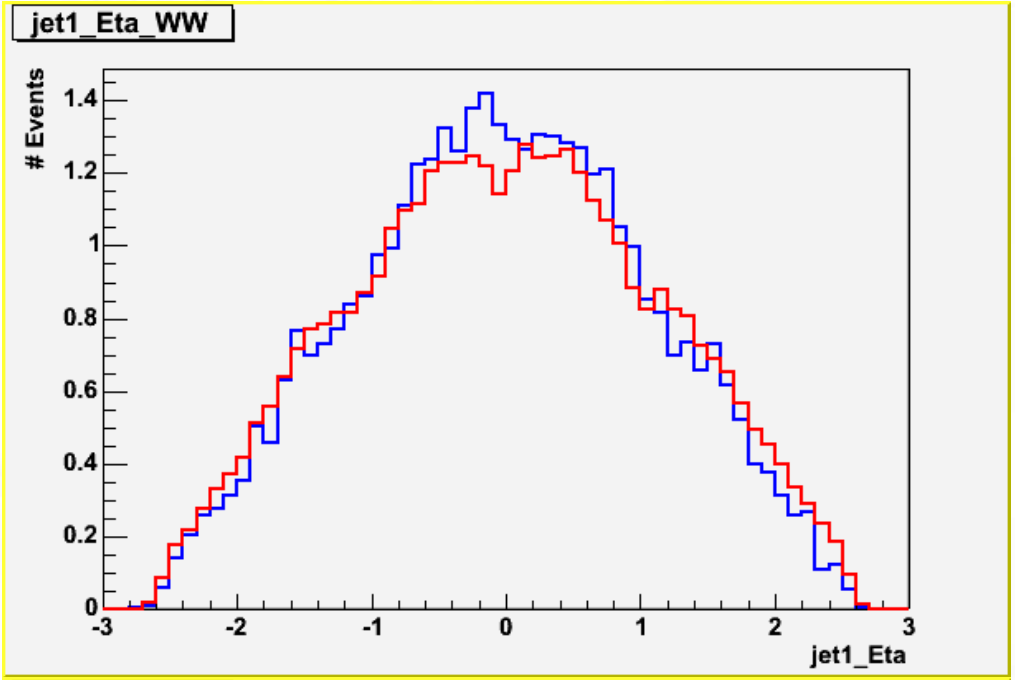
Red=WWNNLO

Blue=Alpgen

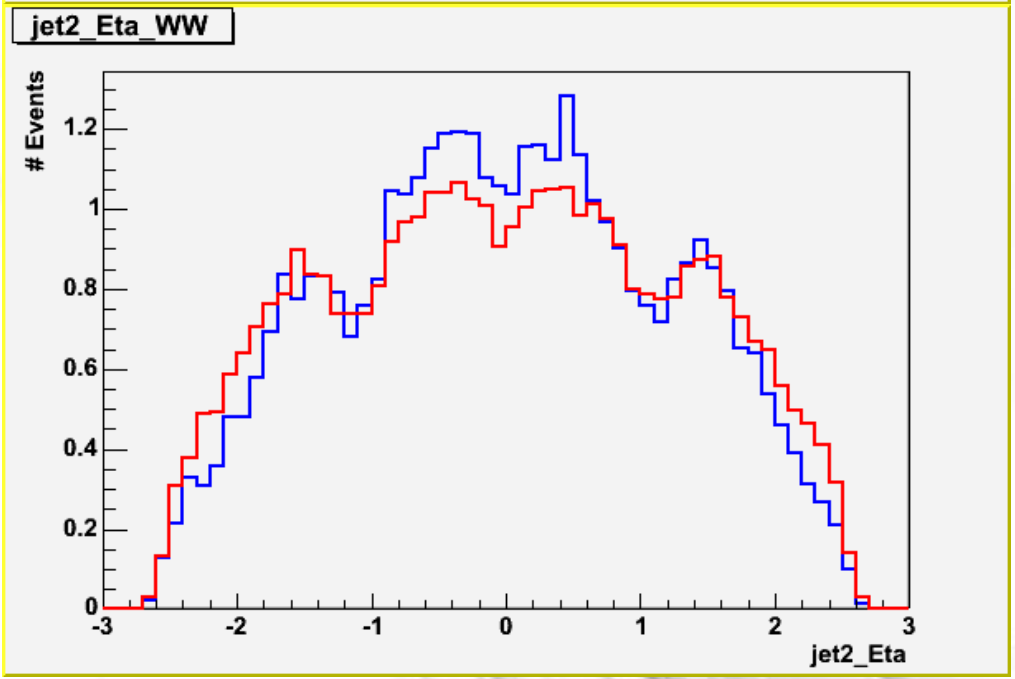
Arbitrary Normalization

Alpgen and WWNLO Jet vars.

Leading Jet Eta



Second Jet Eta



Notes:

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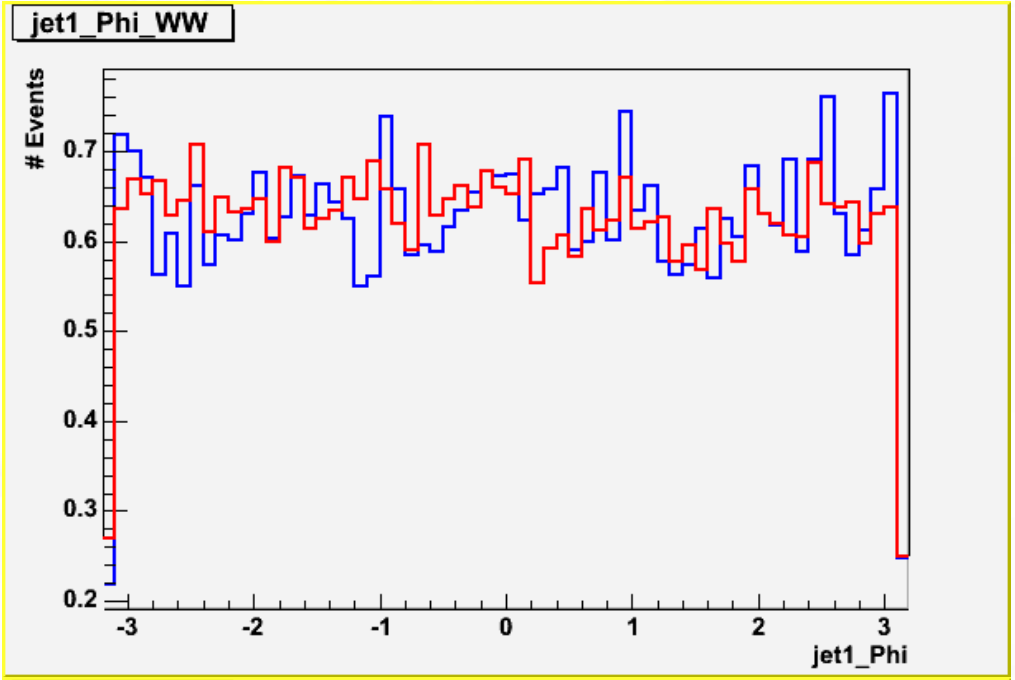
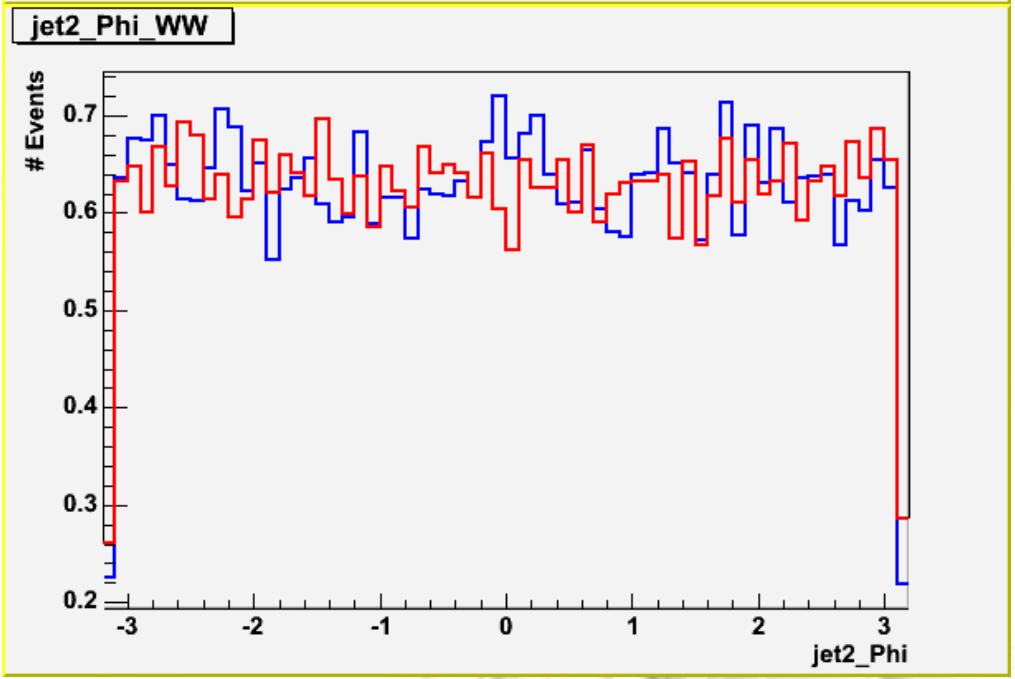
Arbitrary Normalization

Alpgen and WWNLO Jet vars.

Leading Jet Phi



Second Jet Phi



Notes:

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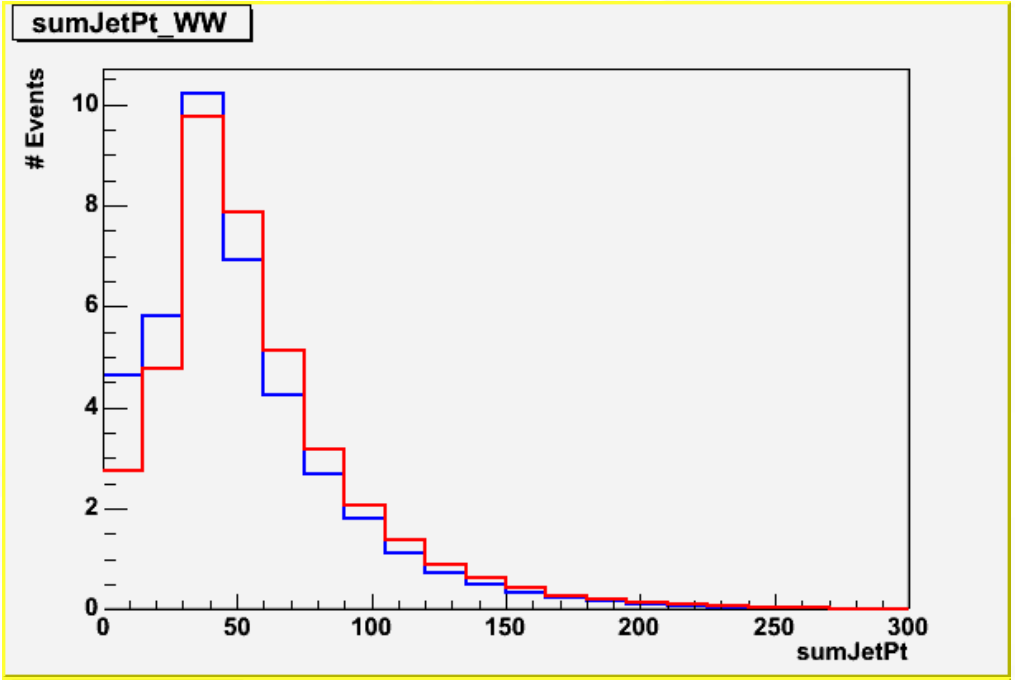
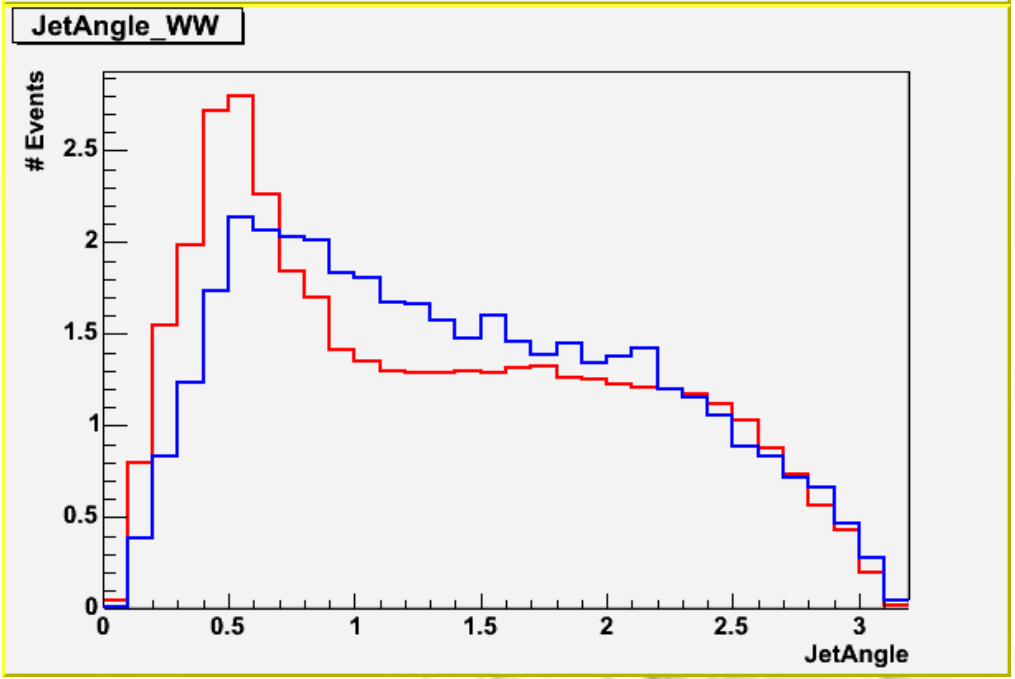
Arbitrary Normalization

Alpgen and WWNLO Jet vars.

Sum of first two jet Pt's



Opening angle of first two jets



Notes:

Red=WWNNLO

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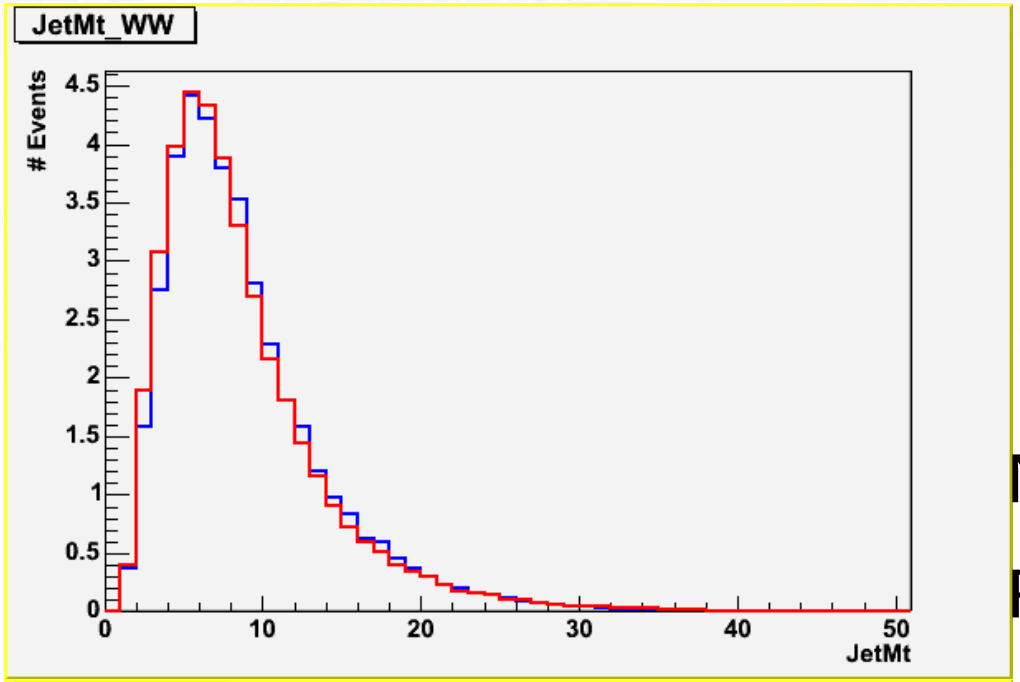
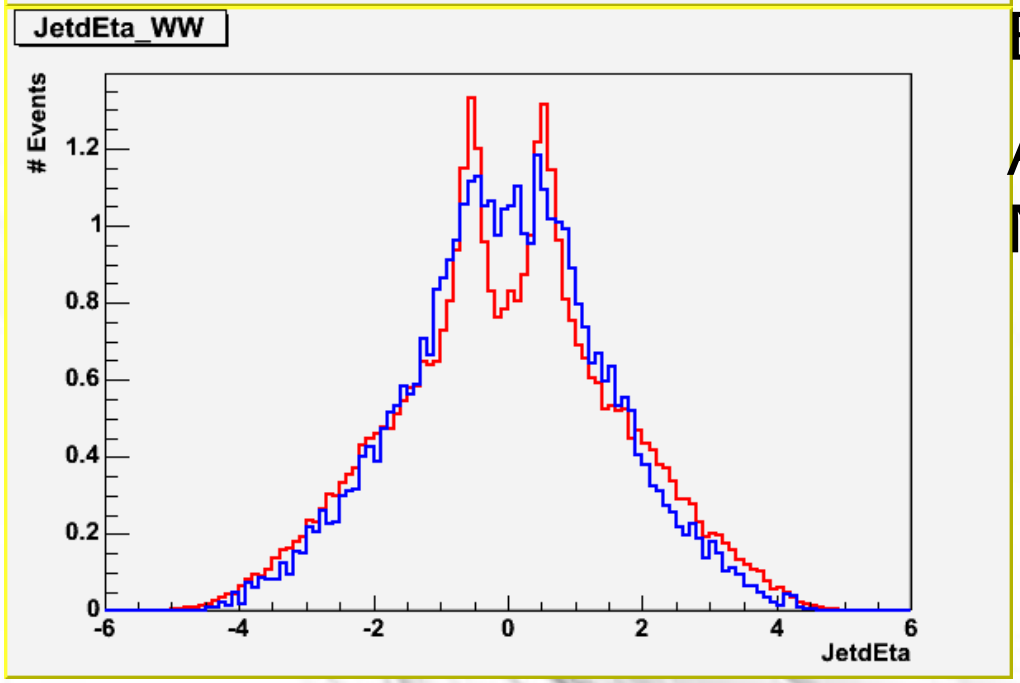
Arbitrary Normalization

Alpgen and WWNLO Jet vars.

Transverse mass of first two jets



$\eta(jet1) - \eta(jet2)$



Notes:

Red=WWNNLO

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Arbitrary Normalization

Next Steps

- Si/noSi scaling (still)
- Resolve NN discrepancies
- Fix Drell-Yan
- Understand scaling
- Calculate yield uncertainties?
- Sherpa is running