

2-Jet and 3-Jet Update

28 November 2007

CSC5 0-lepton meeting

Status of the Write-Up

OUTLINE of 2- and 3-Jet Section:

- Inclusive 2-Jet and 3-Jet Final States
 - 2- and 3-Jet Analysis using M_{eff}
 - Event Selection
 - Systematics
 - Results and Discussion
 - 2- and 3-Jet Analysis using m_{T2}
 - Event Selection
 - Systematics
 - Results and Discussion
 - Summary and Conclusions

There now exists a pretty much “complete” draft with text and (at least dummy) plots in each of these sections, including:

- cut flow tables/plots
- main results plots for 2- and 3-jet (M_{eff} and m_{T2}) in “final” style and current significance numbers
- main results plots showing BG systematics

Main challenge now is to make it more succinct (it’s too long at the moment!!!) and to make it read more “nicely” (and of course update plots/numbers as soon as we can)

Cut-Flow Tables

2-Jet analysis

QUESTION: are we keeping the cut flow numbers like in the table below, or will we scale to eg. 1 fb⁻¹?

CUT REMINDER

CUT1	≥ 2 Jets, $p_{T1,2} > 150, 100$ GeV, $ \eta < 2.5$
CUT2	$MET > \max(100\text{GeV}, 0.3 \cdot M_{\text{eff}})$
CUT3	$R_1 > 0.5$ rad, $R_2 > 0.5$ rad
CUT4	$ \phi(\text{Jet}_{1,2}) - \phi(MET) > 0.2$
CUT5	no isolated electron or muon

The R cuts may be dropped in the end but at the moment we are using them

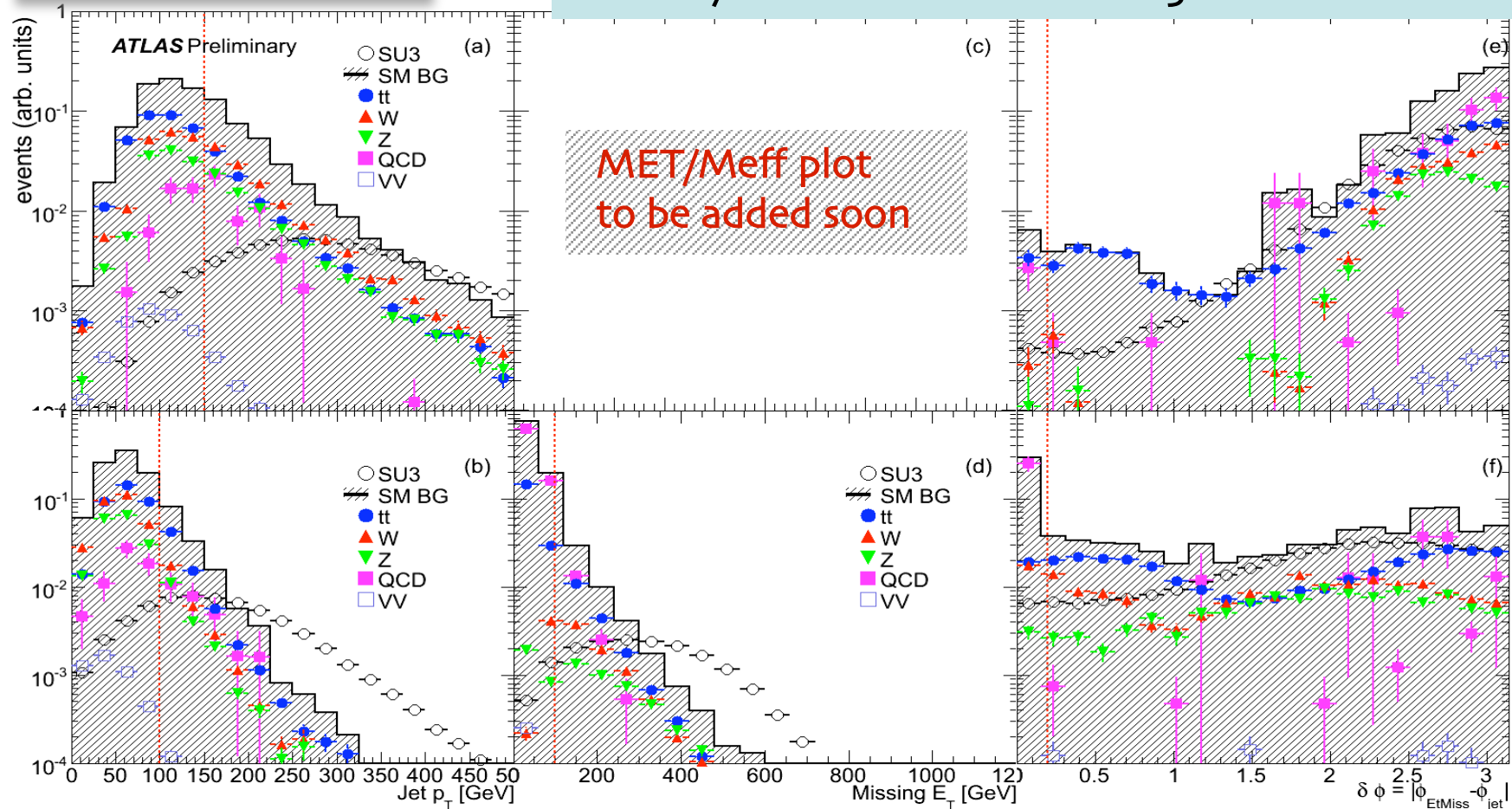
sample	events	Cut1	Cut2	Cut3	Cut4	Cut5
SU ₃	376950	280813	172783	164729	164265	138180
Dijet	71150	67835	163	47	36	36
Top	479450	67269	5730	4847	4798	3143
W	134500	11729	4622	3854	3845	2667
Z	49750	3826	1889	1751	1748	1701
Diboson	67800	992	75	69	67	40
SM BG	802650	151651	12479	11387	10494	7587

Current Cut-Flow Numbers for the Inclusive 2-Jet M_{eff} Analysis

Cut-Flow Plots

2-Jet analysis

Currently normalised to unit integrated BG - clearer?



Current Cut-Flow Plots for the Inclusive 2-Jet Meff Analysis

Cut-Flow Tables

3-Jet analysis

CUT REMINDER

CUT1	≥ 3 Jets, $p_{T1,3} > 150, 100$ GeV, $ \eta < 2.5$
CUT2	$MET > \max(100\text{GeV}, 0.25 \cdot M_{\text{eff}})$
CUT3	$R_1 > 0.5$ rad, $R_2 > 0.5$ rad —
CUT4	$ \phi(\text{Jet}_{1,2,3}) - \phi(MET) > 0.2$
CUT5	no isolated electron or muon

The R cuts may be dropped in the end but at the moment we are using them

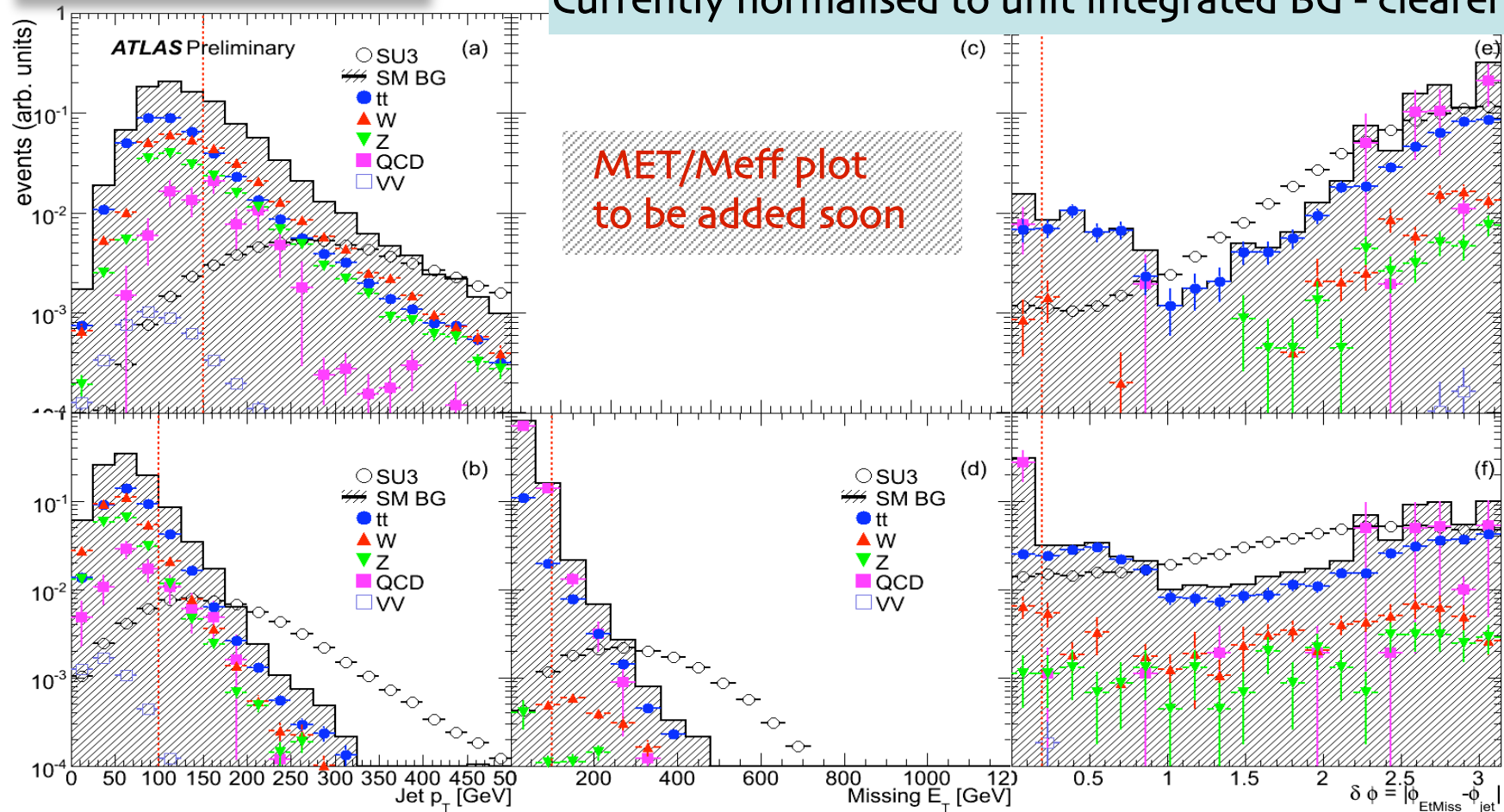
sample	events	Cut1	Cut2	Cut3	Cut4	Cut5
SU ₃	376950	126541	74376	70205	66423	56302
Dijet	71150	37950	59	26	3	3
Top	479450	23595	1638	1345	1220	852
W	134500	1086	431	356	296	205
Z	49750	306	136	123	107	104
Diboson	67800	178	7	6	4	3
SM BG	802650	63115	2271	1856	1630	1168

Current Cut-Flow Numbers for the Inclusive 3-Jet M_{eff} Analysis

Cut-Flow Plots

3-Jet analysis

Currently normalised to unit integrated BG - clearer?



Current Cut-Flow Plots for the Inclusive 3-Jet M_{eff} Analysis

"Final Style" 2-Jet Meff Results

2-Jet analysis

CUTS1-5 applied

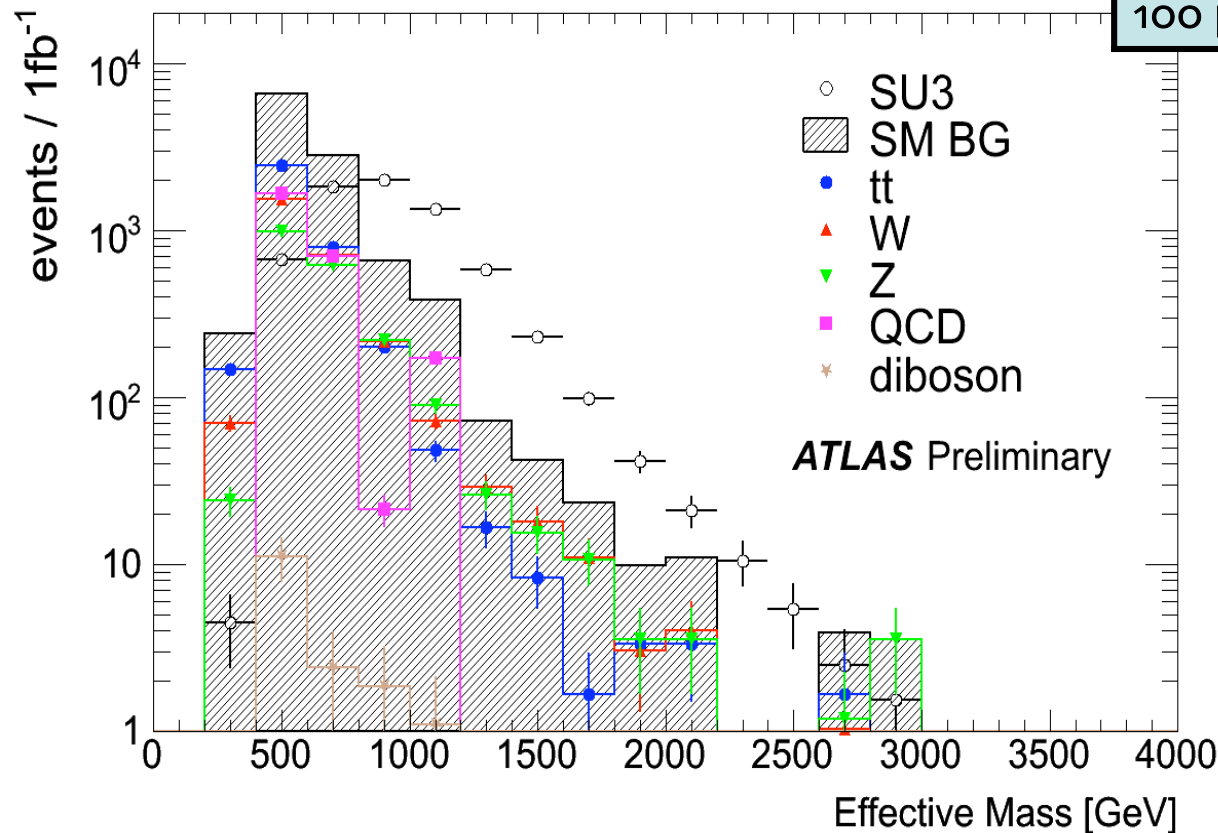
Meff > 800 GeV:

	S/B	$S/\sqrt{B}$	$S/\sqrt{S+B}$
1 fb ⁻¹	3.6	125	58
100 pb ⁻¹	3.6	40	18

Meff > 800 GeV (1fb⁻¹):

	$S/\sqrt{B}$	$S/\sqrt{S+B}$
SU1	64	38
SU2	1.7	1.7
SU3	125	58
SU4	170	70
SU6	43	29
SU8.1	66	39

QUESTION: are we going to say anything about other SUSY models? EG. some numbers for 1fb⁻¹



"Old-Style" (MuID, EtCone20 isolation, no trigger as yet)

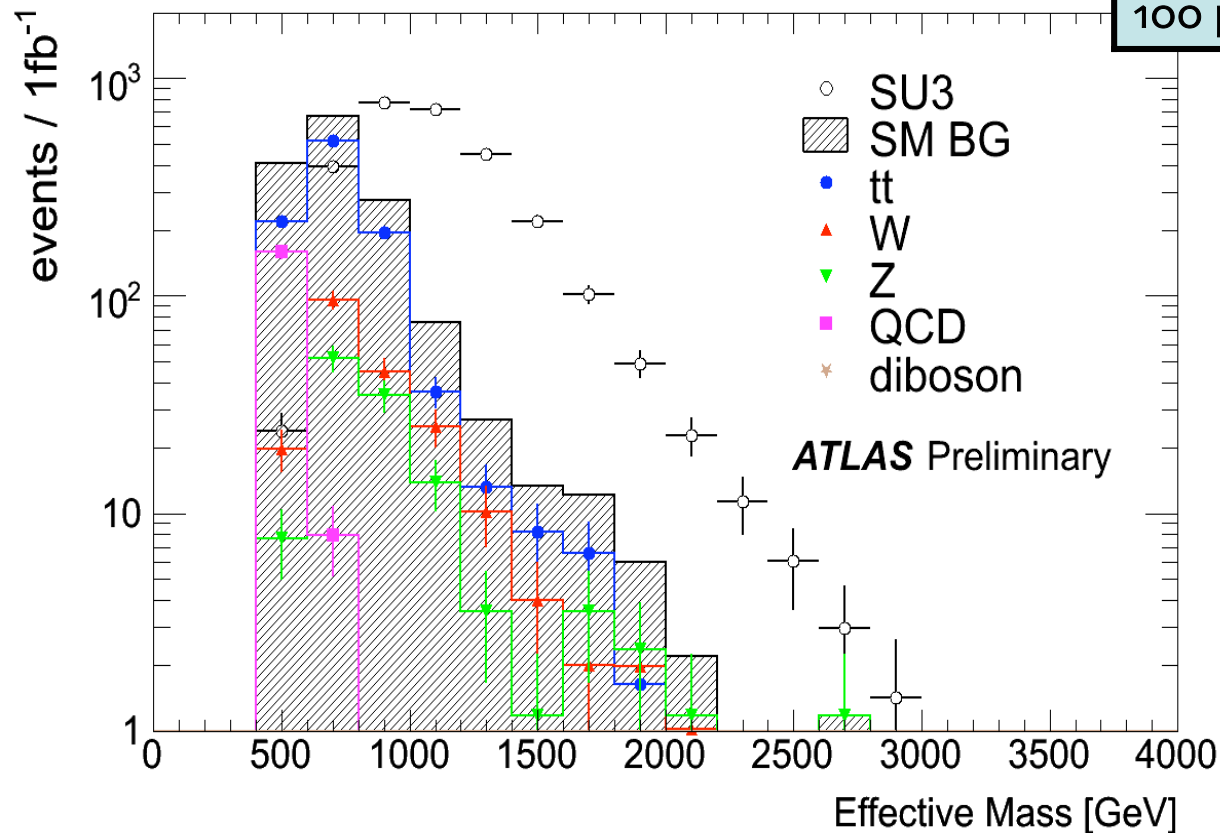
“Final Style” 3-Jet Meff Results

3-Jet analysis

CUTS1-5 applied

Meff > 800 GeV:

	S/B	$S/\sqrt{B}$	$S/\sqrt{S+B}$
1 fb ⁻¹	5.7	116	45
100 pb ⁻¹	5.7	37	14



Meff > 800 GeV (1fb⁻¹):

	$S/\sqrt{B}$	$S/\sqrt{S+B}$
SU1	53	28
SU2	3.4	3.2
SU3	116	45
SU4	207	62
SU6	40	23
SU8.1	57	29

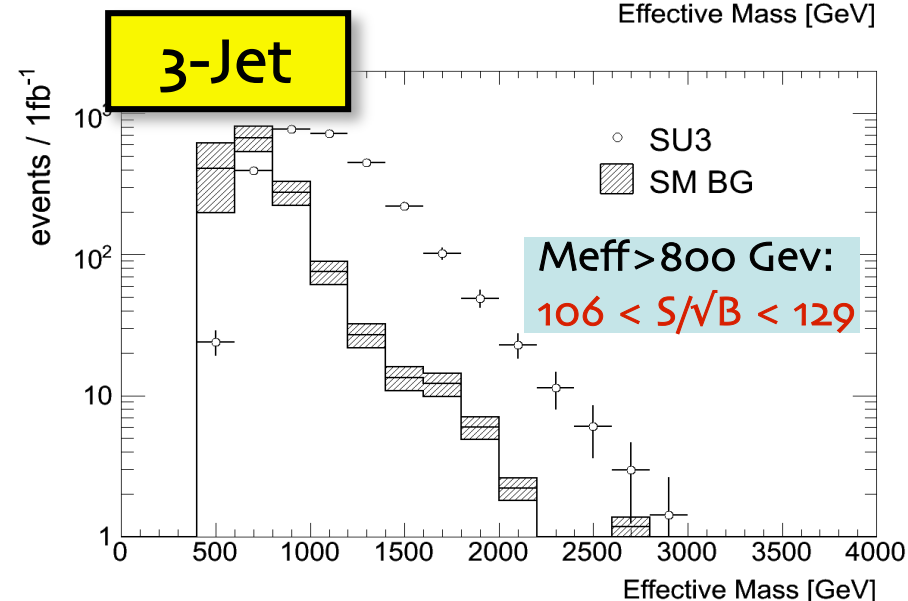
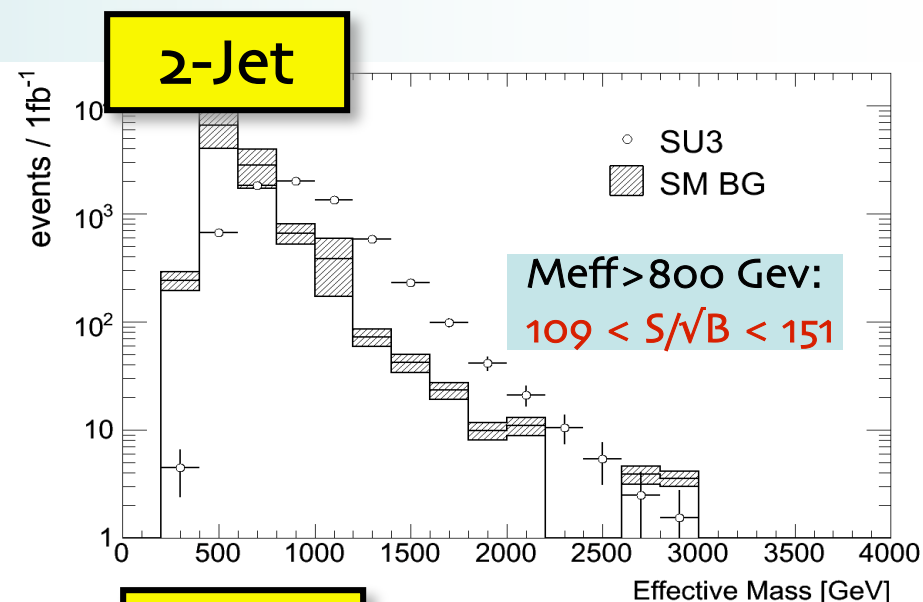
“Old-Style” (MuID, EtCone20 isolation, no trigger as yet)

Systematics on SM BG

Sample	uncertainty (%)
Top	20
QCD	100
Z	16
W	20
Diboson	25

currently using same (preliminary) numbers as the 4-jet analysis - not quite right for us??

QUESTION: will these nos. be split into a “stat.” and “syst.” part? If so, we could at least scale the “stat.” part to our background numbers e.g. our 2-Jet analysis has many more control statistics by which to determine BGs



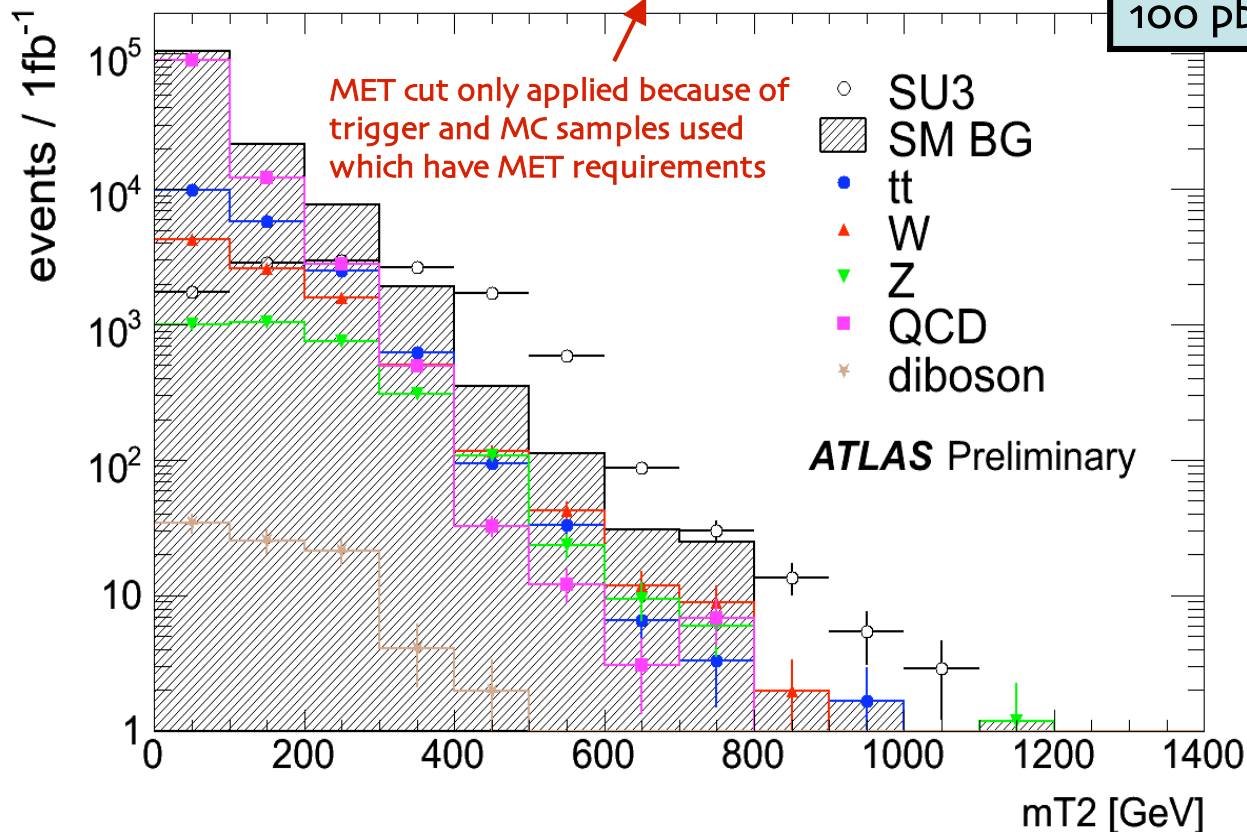
"Final Style" 2-Jet MT_2 Results

2-Jet analysis

only CUT1 applied
(+MET > 100 GeV)

$MT_2 > 400$ GeV:

	S/B	$S/\sqrt{B}$	$S/\sqrt{S+B}$
1 fb ⁻¹	4.6	106	45
100 pb ⁻¹	4.6	34	14



$MT_2 > 400$ GeV (1fb⁻¹):

	$S/\sqrt{B}$	$S/\sqrt{S+B}$
SU1	75	36
SU2	1.8	1.7
SU3	106	45
SU4	62	32
SU6	50	28
SU8.1	69	34

mT2 analysis: even though few cuts, most BGs tend to have small mT2

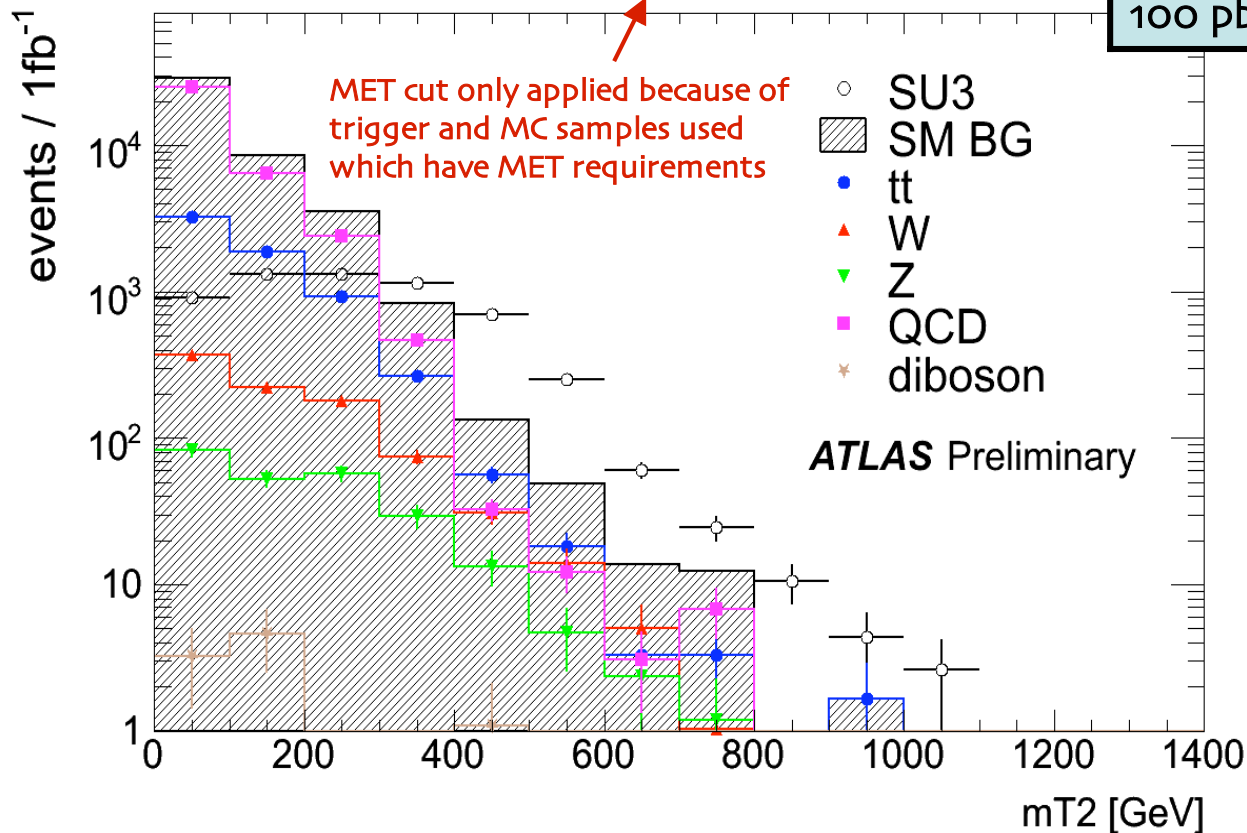
"Final Style" 3-Jet M_{T2} Results

3-Jet analysis

only CUT1 applied
(+MET > 100 GeV)

$M_{T2} > 400$ GeV:

	S/B	$S/\sqrt{B}$	$S/\sqrt{S+B}$
1 fb ⁻¹	5.0	73	30
100 pb ⁻¹	5.0	23	9



$M_{T2} > 400$ GeV (1fb⁻¹):

	$S/\sqrt{B}$	$S/\sqrt{S+B}$
SU1	49	24
SU2	2.5	2.3
SU3	73	30
SU4	57	26
SU6	38	20
SU8.1	48	23

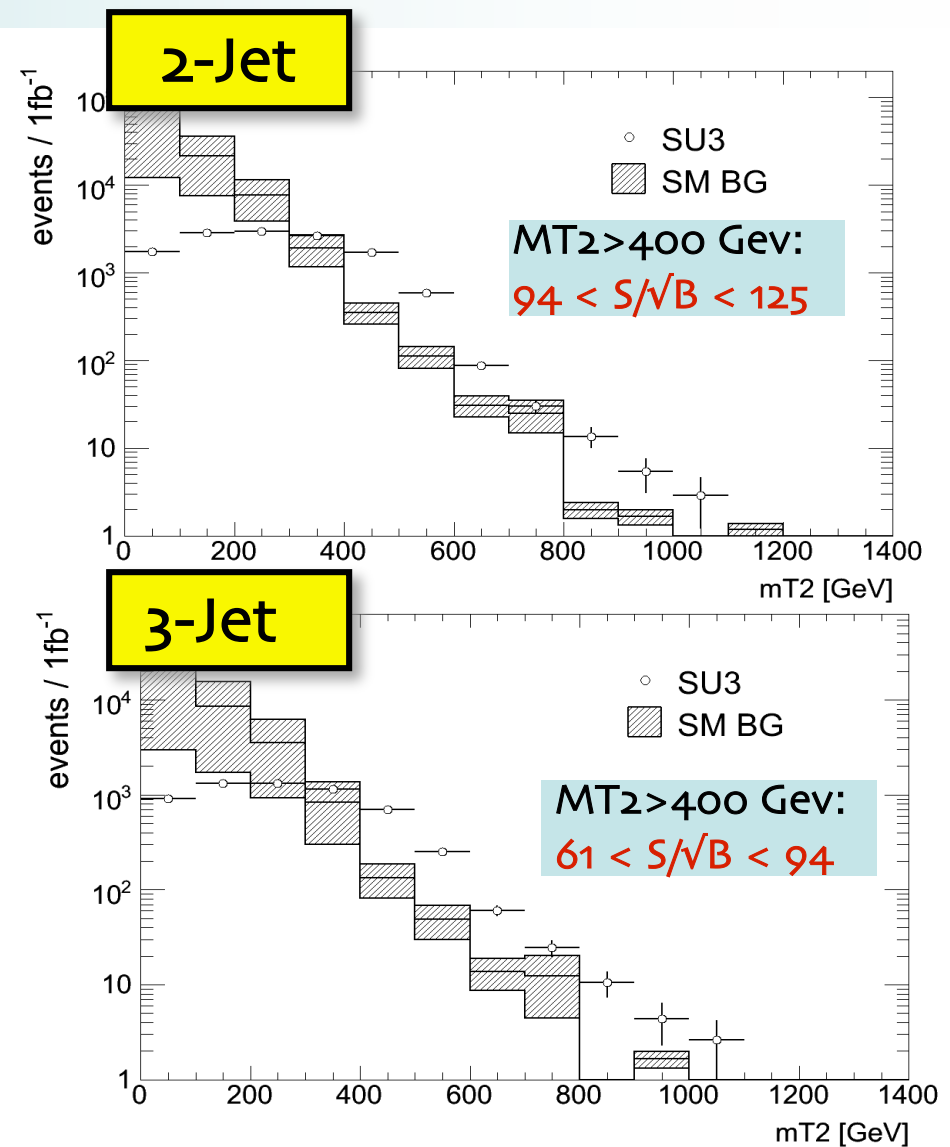
NOTE: 2 highest pT jets go into m_{T2} calculation

m_{T2} analysis: even though few cuts, most BGs tend to have small m_{T2}

Systematics on SM BG

Sample	uncertainty (%)
Top	20
QCD	100
Z	16
W	20
Diboson	25

these nos. used at the moment...



Quick Look at CAL Isolation

SO FAR: all plots shown use EtCone20

→ took a quick look at:

- 1) removing CAL isolation altogether
- 2) using EtCone45 instead

(Q: do we yet know if it's bugged or not?)

3-Jet examples (2-Jet equally similar)

