

Control Plots

P. Dunne

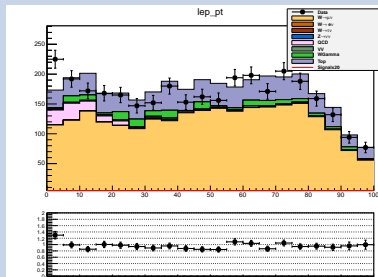
Overview

- ▶ First focus on agreement in control regions
 - This minimises effect of mismodelled QCD
- ▶ Investigation into m_T as top discriminant
- ▶ Added all jets $p_T > 30$ to the $\min\Delta\phi$ calculation
- ▶ Changes since yesterday:
 - Removed QCD from plots
 - Removed n_{nu} region plots
 - Fixed lepton weight bug
 - Rebinned t_{au} plots

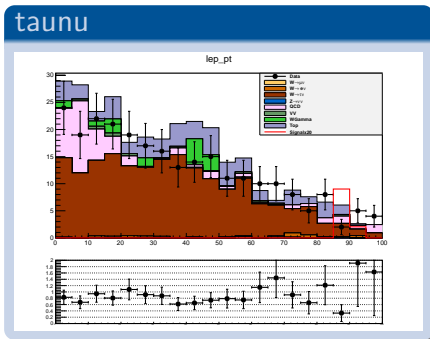
New Control Plots

- ▶ Cuts applied in all following plots are:
 - $\text{metnomu} > 90$, $\text{jet}_1 p_t > 50$, $\Delta\eta_{jj} > 3.6$, $\text{metnomu_significance} > 3$, $\text{jet}_{1,2}\eta < 4.7$, $\text{jet}_1\eta \cdot \text{jet}_2\eta < 0$, $m_{jj} \geq 800$, $\text{jet}_2 p_T > 40$
 - met , $\text{jet}_2 p_T$ and m_{jj} cuts chosen to be above highest trigger threshold and at at least 50% efficiency for run D trigger

- ▶ Top contamination of W regions is up to 30% in some regions



mT in W control regions

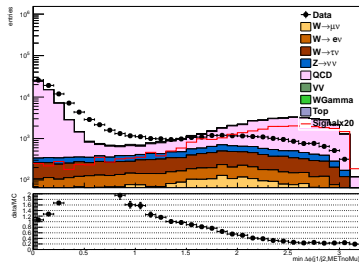


- ▶ mt doesn't seem to give any discrimination against top
- ▶ For tau does allow removal of QCD contamination
 - Have added an $m_T > 20 \text{ GeV}$ cut on tau control region

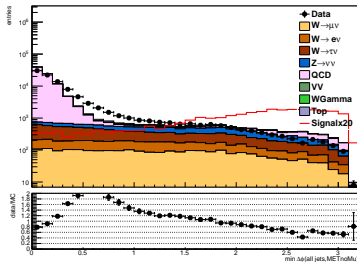
$\Delta\phi(j, met)$ variables - intro

- ▶ n.b. scale is different between plots
- ▶ Version with all jets $p_T > 30$ GeV has better data MC agreement
- ▶ QCD almost all moves to low values of variable

$\min(\Delta\phi(j_{1,2}, metnomu))$



$\min(\Delta\phi(all\ j(p_T > 30), metnomu))$



$\Delta\phi(j, met)$ variables - cut efficiency

Process	no cut	$j_{1,2} > 1.5$	all > 1.0
wel	2274	1123	1220
wmu	2718	1396	1523
wtau	6134	1976	2304
zvv	3924	2086	2559
vv	133	88	75
wg	421	248	209
top	1349	795	395
Signal	1488	1239	1313
Data	97100	14904	9524
Data-all bkg	80147	7692	1239

- ▶ All jets cut keeps more signal for an 80% reduction of QCD
 - Also reduces top by a factor of 2
- ▶ Propose moving to all jets cutting at 1

Data driven weights

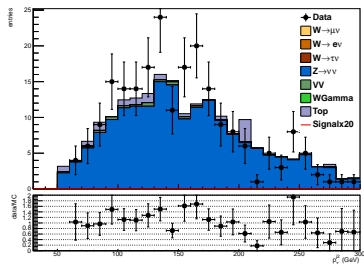
► W and Z normalised to:

- $N_C^{Data} = N_C^{Bkg} / N_C^{MC}$

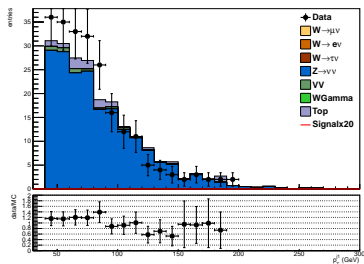
Background	Weight
$Z \rightarrow \nu\nu$	0.58
$W \rightarrow e\nu$	0.43
$W \rightarrow \mu\nu$	0.49
$W \rightarrow \tau\nu$	0.89

New control plots - mumu

Jet 1 pt

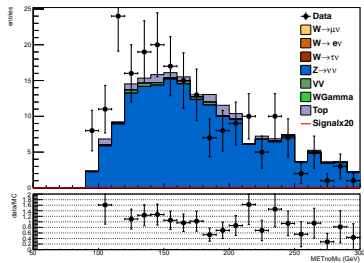


Jet 2 pt

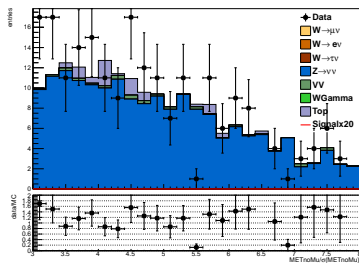


New control plots - mumu

MET_{nomu}

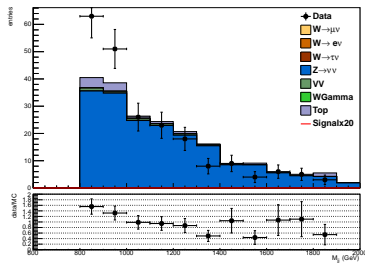


MET_{nomusig}

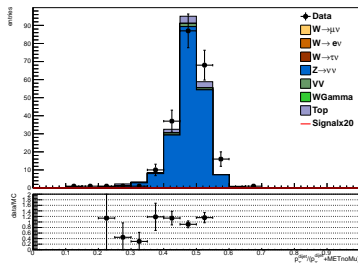


New control plots - mumu

Mjj

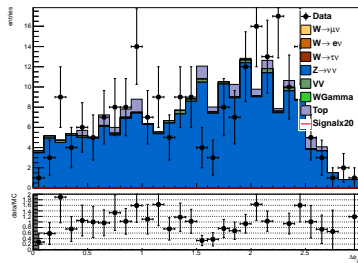


dijet-metnomu pt fraction

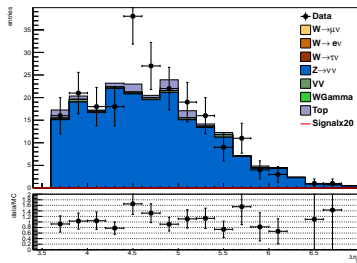


New control plots -mumu

Dphi_{ij}

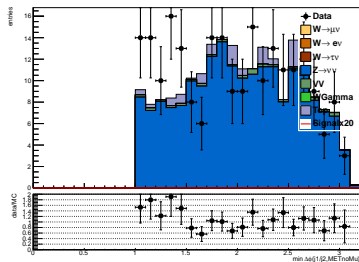


Detaj_j

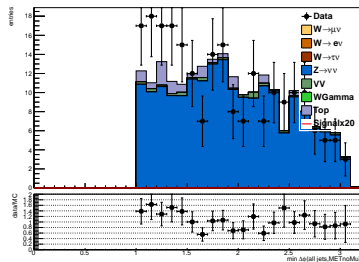


New control plots -mumu

Leading jets-met mindphi

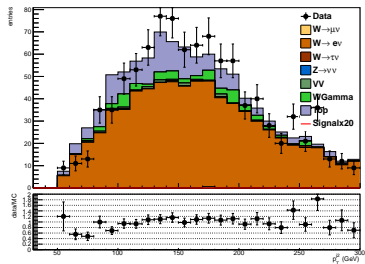


All jet-met mindphi

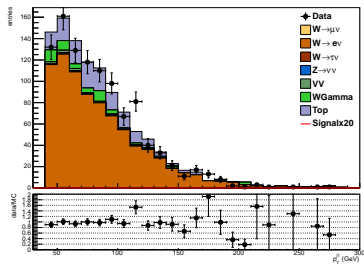


New control plots -enu

Jet 1 pt

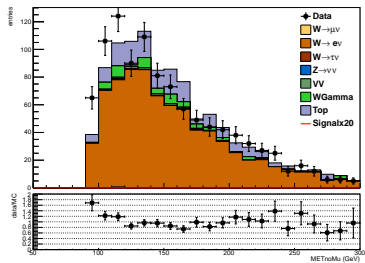


Jet 2 pt

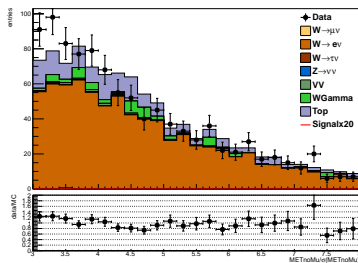


New control plots -enu

MET_{nomu}

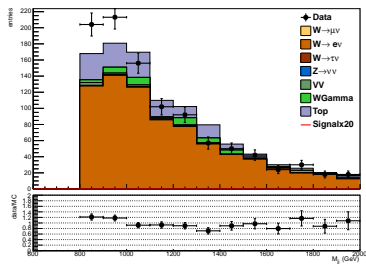


MET_{nomusig}

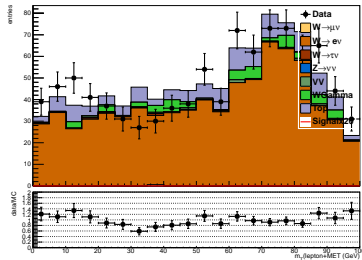


New control plots - enu

Mjj

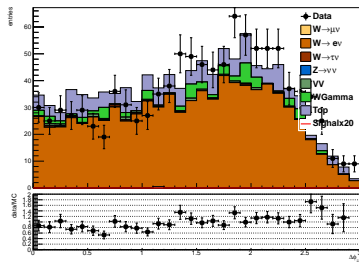


mt

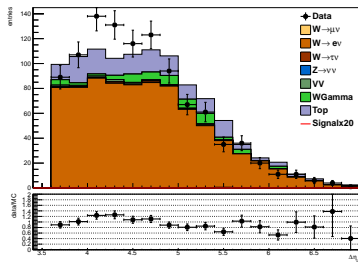


New control plots - $e\nu\mu$

Dijet Dphi

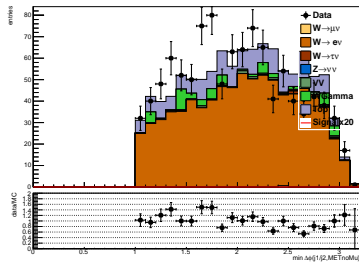


Detajj

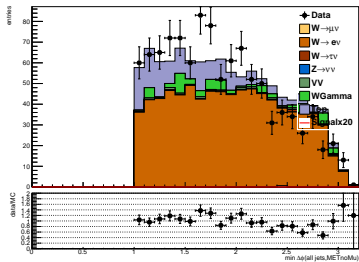


New control plots - enu

Leading jets-met mindphi

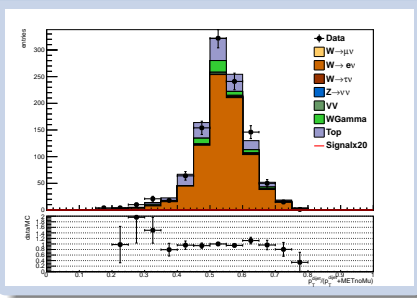


All jets-met mindphi



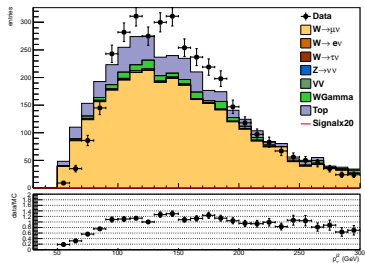
New control plots - enu

dijet-metnomu pt fraction

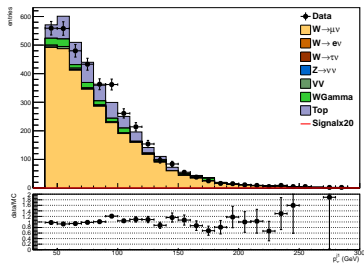


New control plots - $\mu\mu$

Jet 1 pt

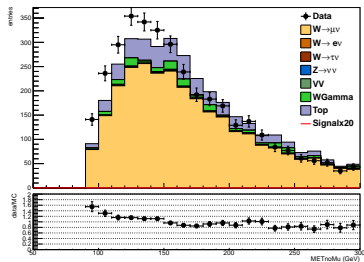


Jet 2 pt

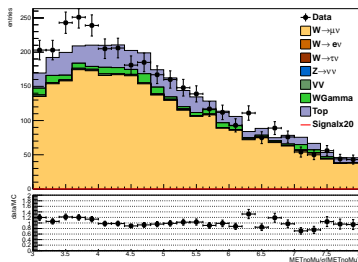


New control plots - $\mu\mu$

MET_{nomu}

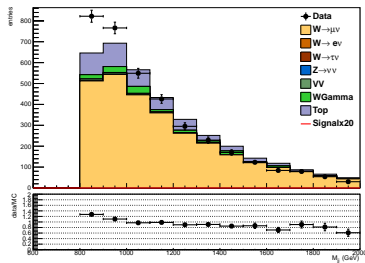


MET_{nomusig}

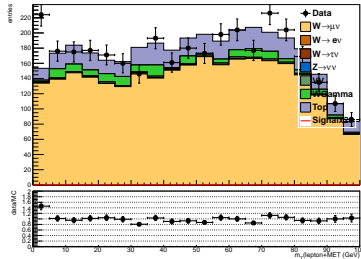


New control plots - $\mu\nu$

M_{jj}

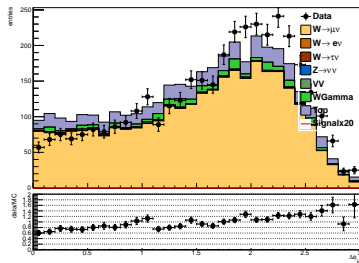


mt

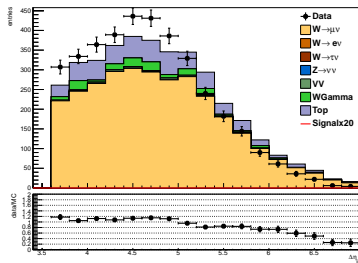


New control plots - munu

Dijet Dphi

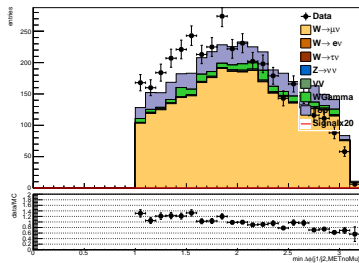


Detajj

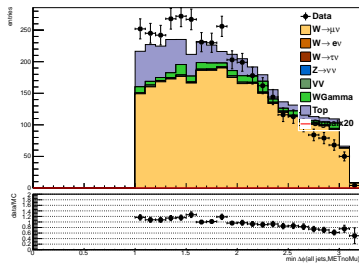


New control plots - $\mu\mu$

Leading jets-met mindphi

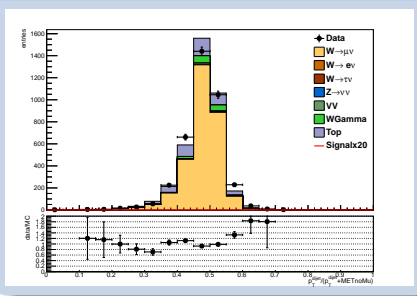


All jets-met mindphi



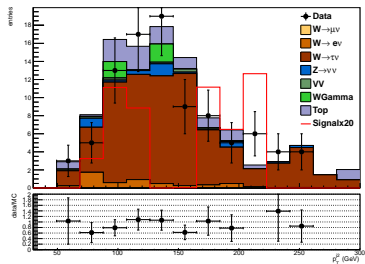
New control plots - $\mu\mu$

dijet-metnomu pt fraction

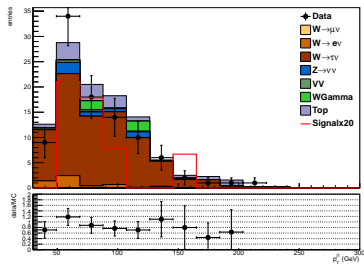


New control plots - taunu

Jet 1 pt

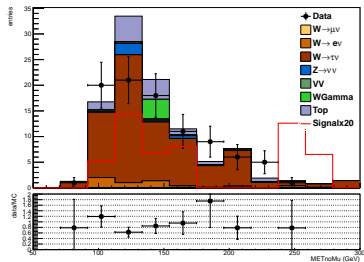


Jet 2 pt

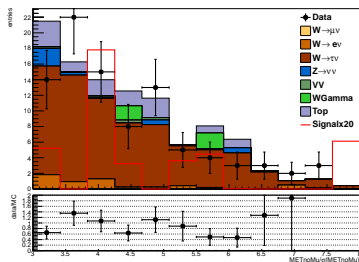


New control plots - taunu

MET_{nomu}

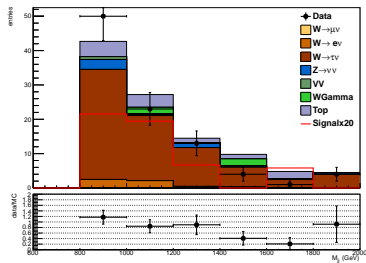


MET_{nomusig}

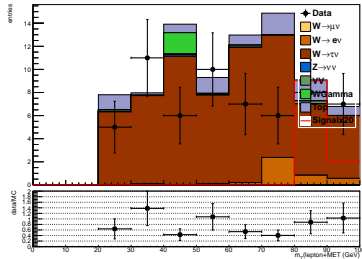


New control plots - taunu

Mjj

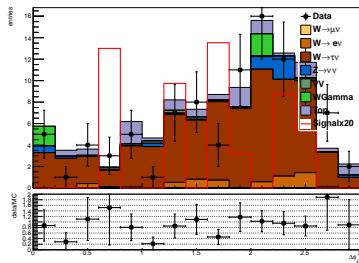


mt

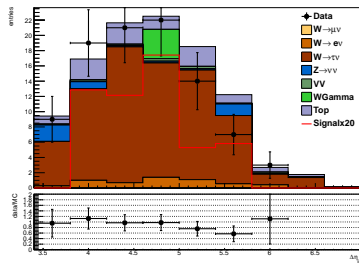


New control plots - taunu

Dijet Dphi

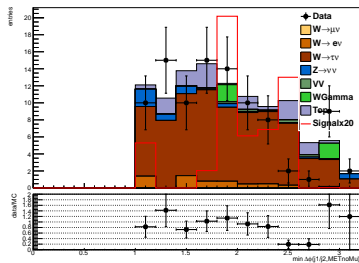


Detajj

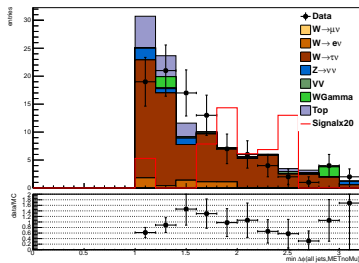


New control plots - taunu

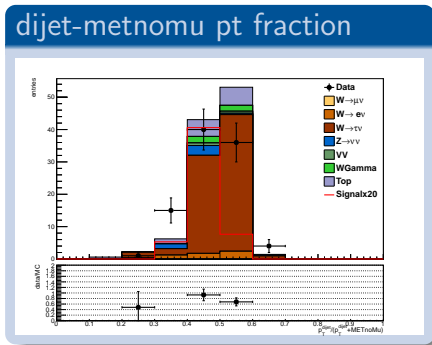
Leading jets-met mindphi



All jets-met mindphi



New control plots - taunu



Conclusions

- ▶ Focused on agreement in control regions
 - This minimises effect of mismodelled QCD
- ▶ New pre-selection proposed:
- ▶ m_T cut added to $\tau\nu$ to reduce QCD
 - could consider also adding to $\mu\nu$ region
- ▶ Added all jets-met $\Delta\phi$ cut
 - Significant improvement over leading jets-met $\Delta\phi$ cut

Backup