

Control Plots and Trigger Efficiencies

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Overview

- ▶ Changes since last time:
 - Minor bug in lepton weights fixed
 - Not showing/looking at signal region plots
- ▶ New “2D binned” trigger weights studied
- ▶ Looked into explanations for $\mu\nu$ shape disagreement

New Control Plots

- ▶ Cuts applied in all following plots are:
 - $\text{metnomu} > 90$, $\text{jet}_1 p_t > 50$, $\Delta\eta_{jj} > 3.6$, $\text{metnomu_significance} > 3$, $\text{jet}_{1,2}\eta < 4.7$,
 $\text{jet}_1\eta \cdot \text{jet}_2\eta < 0$, $m_{jj} \geq 800$, $\text{jet}_2 p_T > 40$,
 $\min(\Delta\phi(\text{alljets } p_T > 30, \text{metnomu})) > 1.0$
 - taunu region has additional $m_T > 20$

New Trigger Efficiency Method

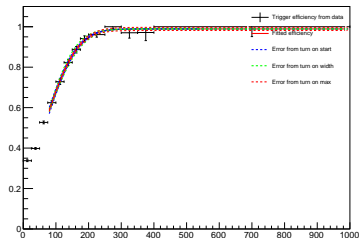
- ▶ Previously used 1D efficiencies
 - weight was product of fitted 1D weights for Jet 2 pt, met and mjj
- ▶ This ignores any correlations between variables
- ▶ New method is to measure met efficiency in bins of Jet 2 pt and mjj
 - Takes correlations into account
 - Binning increases statistical uncertainties

j2pt\mjj	0-600	600-800	800-900	900-1000	1000-5000
30-40	11	12	13	14	15
40-50	21	22	23	24	25
50-60	31	32	33	34	35
60-500	41	42	43	44	45

Trigger Efficiency Curves

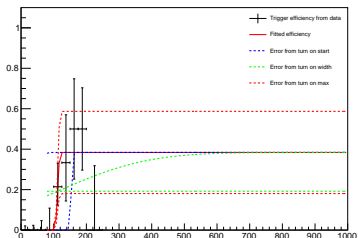
Good

j2pt 60-500 mjj 1000-5000



Not so good

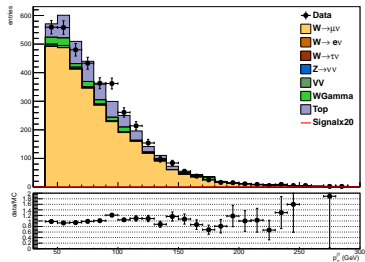
j2pt 40-50 mjj 900-1000



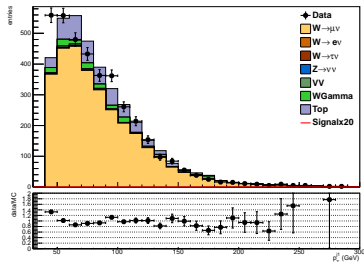
- ▶ Most fits look good
- ▶ A few bins have issues with numbers of events
- ▶ Some of the bins seem to slightly underestimate efficiency in the plateau

Control plots - $\mu\nu$

Jet 2 pt - 1D trig weights

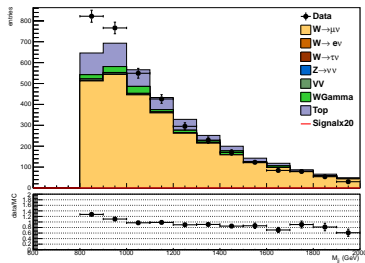


Jet 2 pt - 2D trig weights

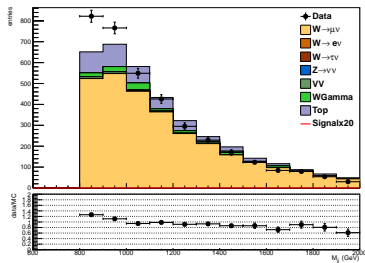


Control plots - $\mu\nu$

M_{jj} - 1D trig weights

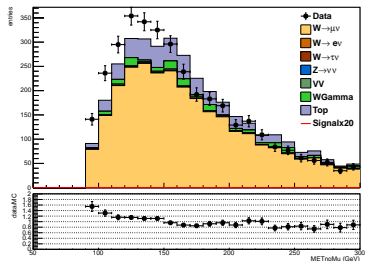


M_{jj} - 2D trig weights

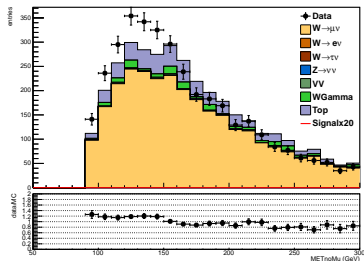


Control plots - $\mu\mu$

Metnomu - 1D trig weights



Metnomu - 2D trig weights

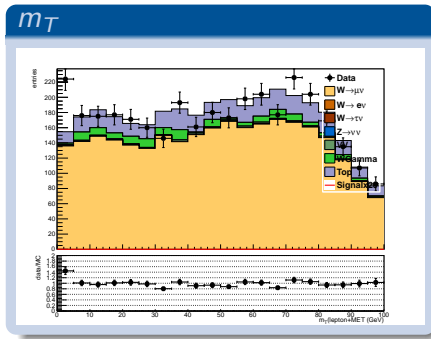


- Possible step visible at 150 GeV
- This is a bin boundary in the new trigger weights

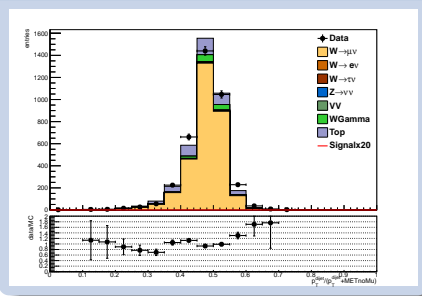
New Trigger Weight Summary

- ▶ New trigger weights improve met agreement and slightly degrade jet 2 pt agreement
- ▶ Other distributions appear relatively unchanged
- ▶ Now need to investigate other possibilities for $\mu\nu$ disagreement

Control plots - $\mu\nu$

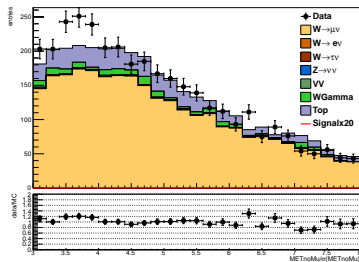


dijet-met pt fraction

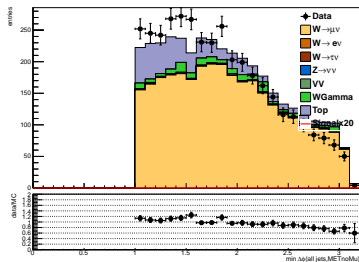


Control plots - $\mu\nu$

metnomu significance



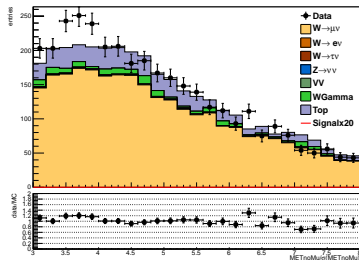
jet-met min $\Delta\phi$



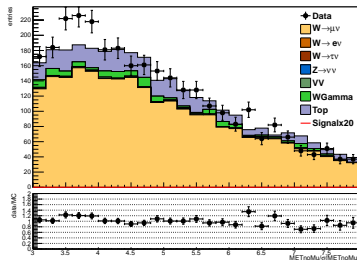
Try mt cut

- ▶ All plots show MC deficit in QCD region
- ▶ Try a transverse mass cut of 10 GeV

metnomu significance - no mt cut

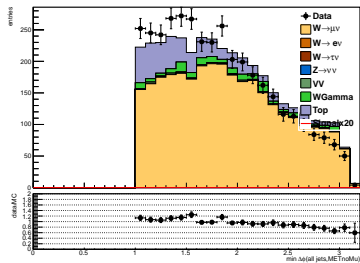


metnomu significance - $m_t > 10$ GeV

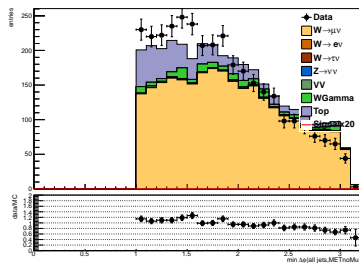


Try mt cut

mt - no mt cut



mt - mt > 10 GeV



- ▶ Minor improvement in metnomu
- ▶ Doesn't improve other distributions

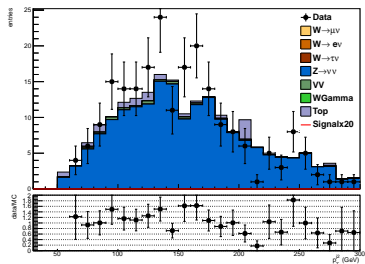
Conclusions

- ▶ New trigger weights give minor improvement
- ▶ M_{jj} consistently off in first two bins
- ▶ $M_{nu\bar{\nu}}$ still has shape disagreements
- ▶ Looks like MC deficits are in areas of $m_{T,miss}$ region where QCD would be expected
 - tried a transverse mass cut - no significant improvement
 - also tried tightening jet p_T cut for $m_{T,miss}$ region - no significant improvement

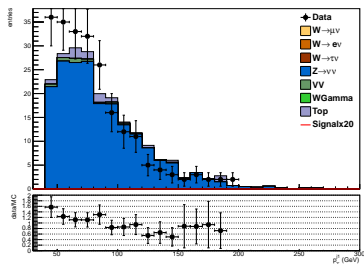
Backup

New control plots - mumu

Jet 1 pt

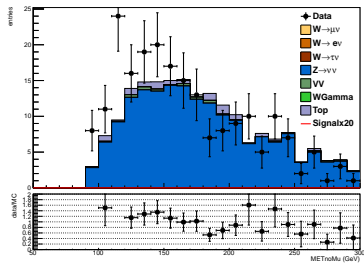


Jet 2 pt

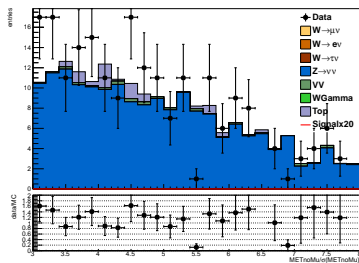


New control plots - mumu

MET_{nomu}

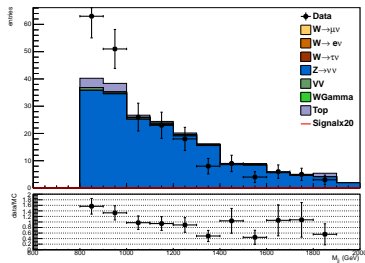


MET_{nomusig}

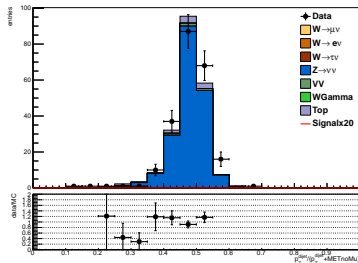


New control plots - mumu

Mjj

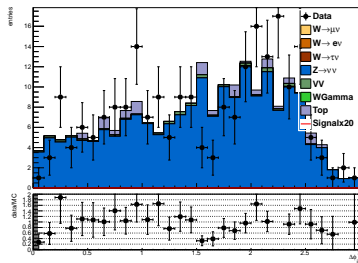


dijet-metnomu pt fraction

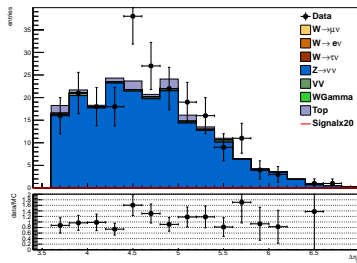


New control plots -mumu

Dphi_{ij}

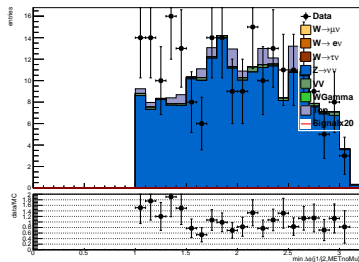


Detaj_j

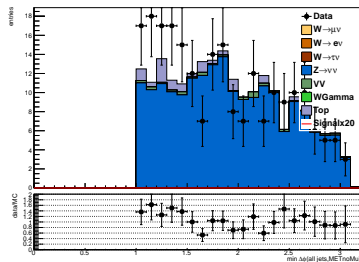


New control plots -mumu

Leading jets-met mindphi

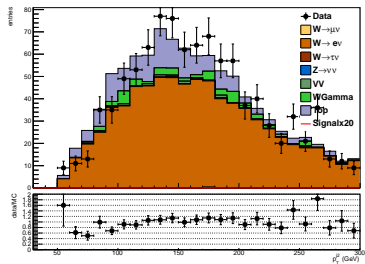


All jet-met mindphi

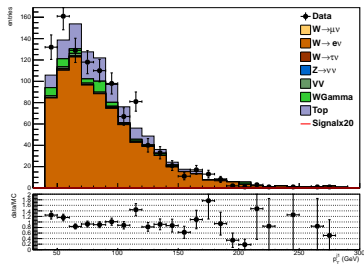


New control plots -enu

Jet 1 pt

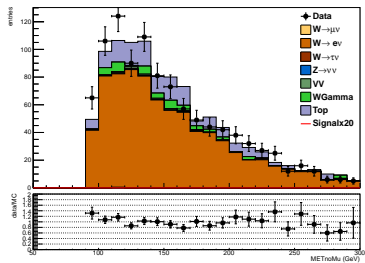


Jet 2 pt

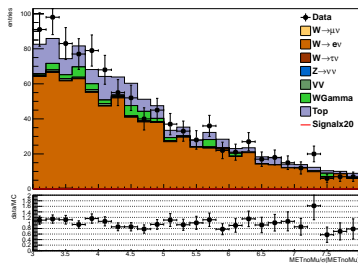


New control plots -enu

MET_{nomu}

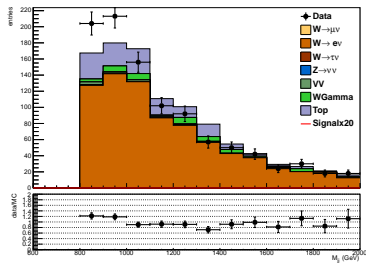


MET_{nomusig}

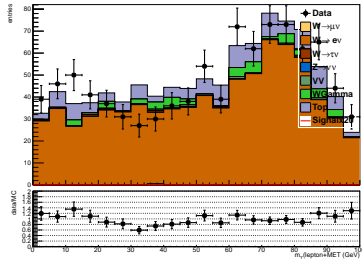


New control plots - enu

Mjj

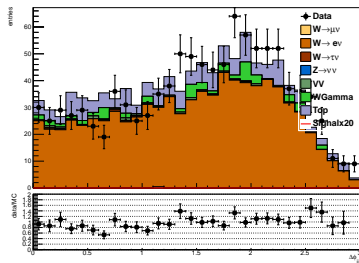


mt

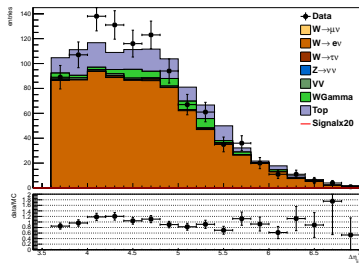


New control plots - enu

Dijet Dphi

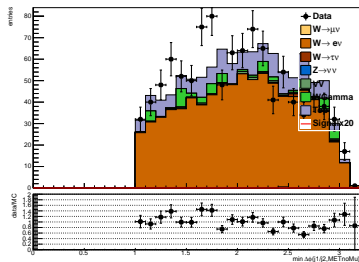


Detajj

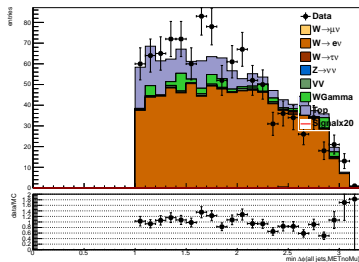


New control plots - $e\nu\mu$

Leading jets-met mindphi

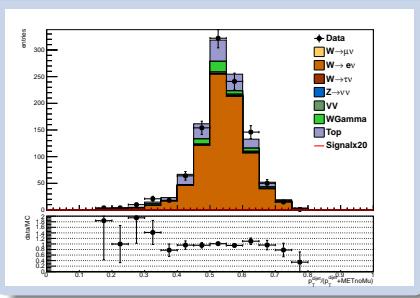


All jets-met mindphi



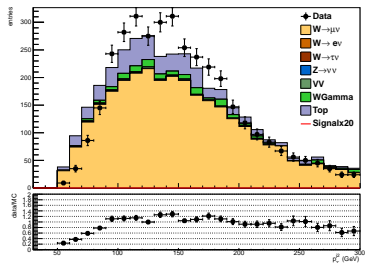
New control plots - enu

dijet-metnomu pt fraction

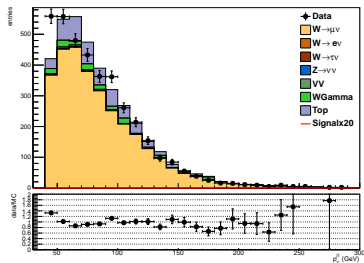


New control plots - $\mu\mu$

Jet 1 pt

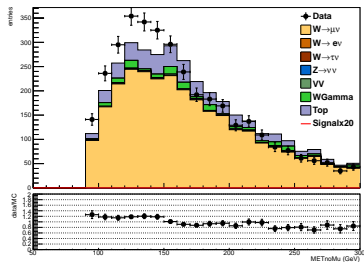


Jet 2 pt

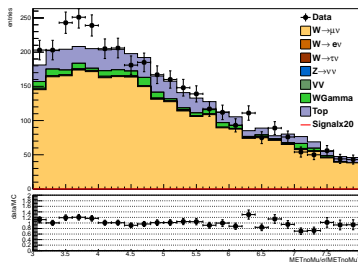


New control plots - $\mu\mu$

MET_{nomu}

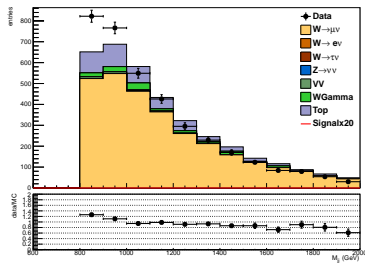


MET_{nomusig}

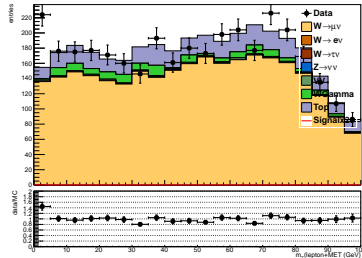


New control plots - $\mu\mu$

M_{jj}

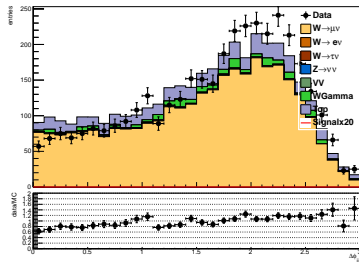


mt

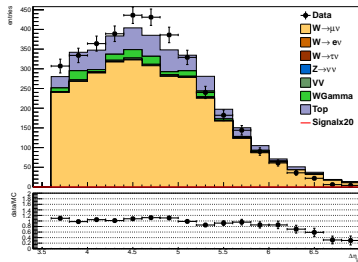


New control plots - $\mu\mu$

Dijet D_{ϕ}

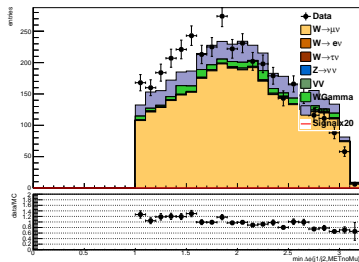


Detajj

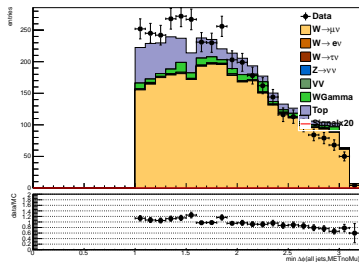


New control plots - $\mu\mu$

Leading jets-met mindphi

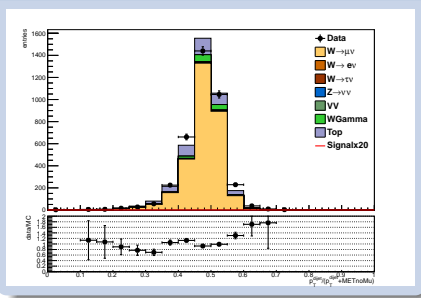


All jets-met mindphi



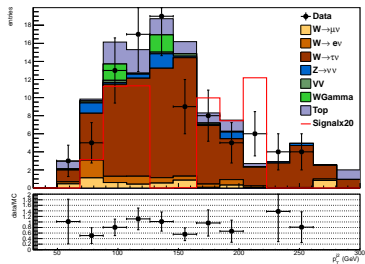
New control plots - $\mu\mu$

dijet-metnomu pt fraction

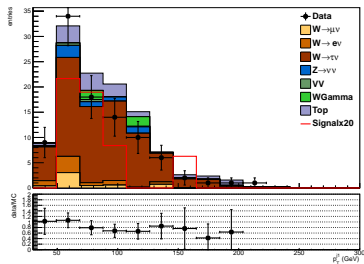


New control plots - taunu

Jet 1 pt

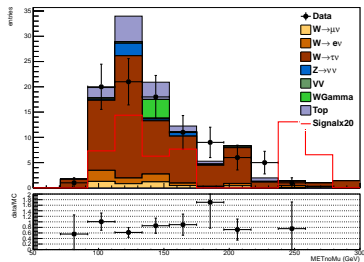


Jet 2 pt

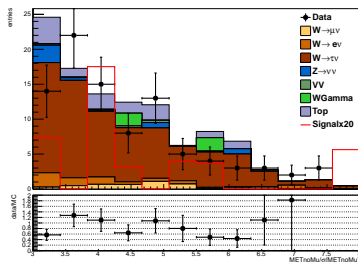


New control plots - taunu

MET_{nomu}

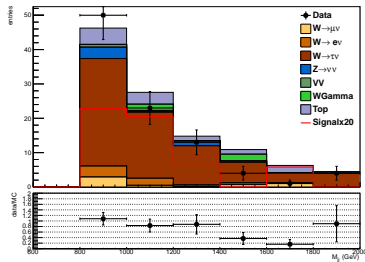


MET_{nomusig}

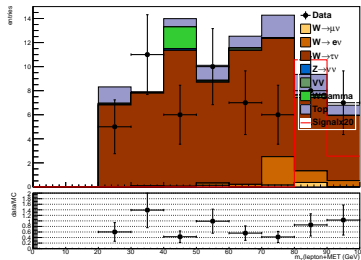


New control plots - taunu

Mjj

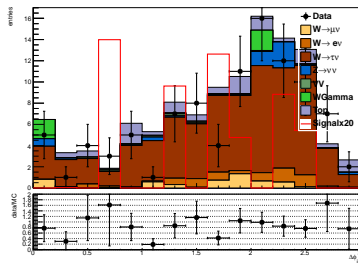


mt

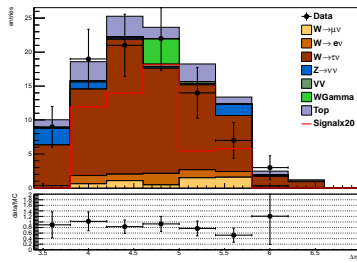


New control plots - taunu

Dijet Dphi

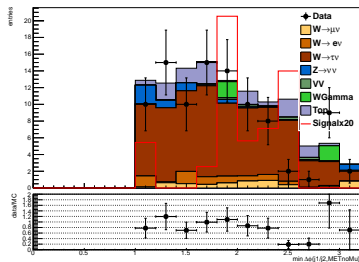


Detajj

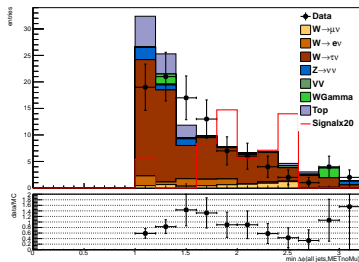


New control plots - taunu

Leading jets-met mindphi



All jets-met mindphi



New control plots - taunu

