



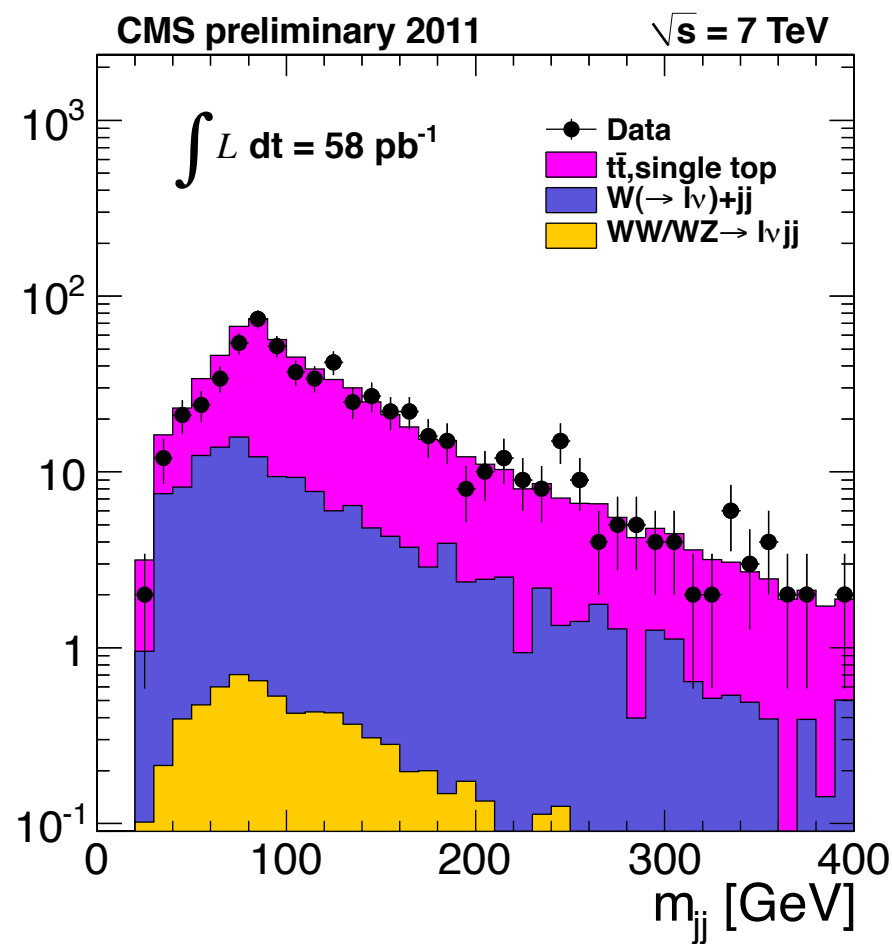
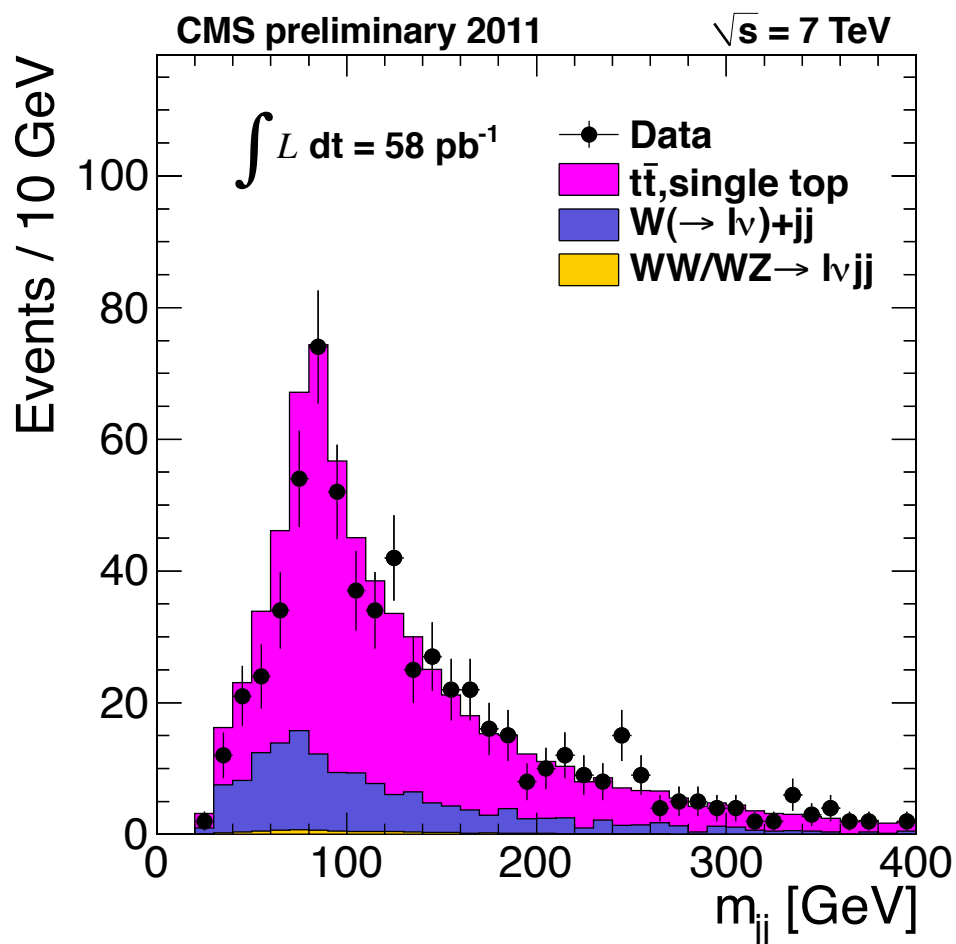
# A quick study of $W(\rightarrow ev) + jj$ events: reconstructed $m_{jj}$ distribution

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*Fermilab*

# $m_{jj}$ distribution top events: "out-of-box"



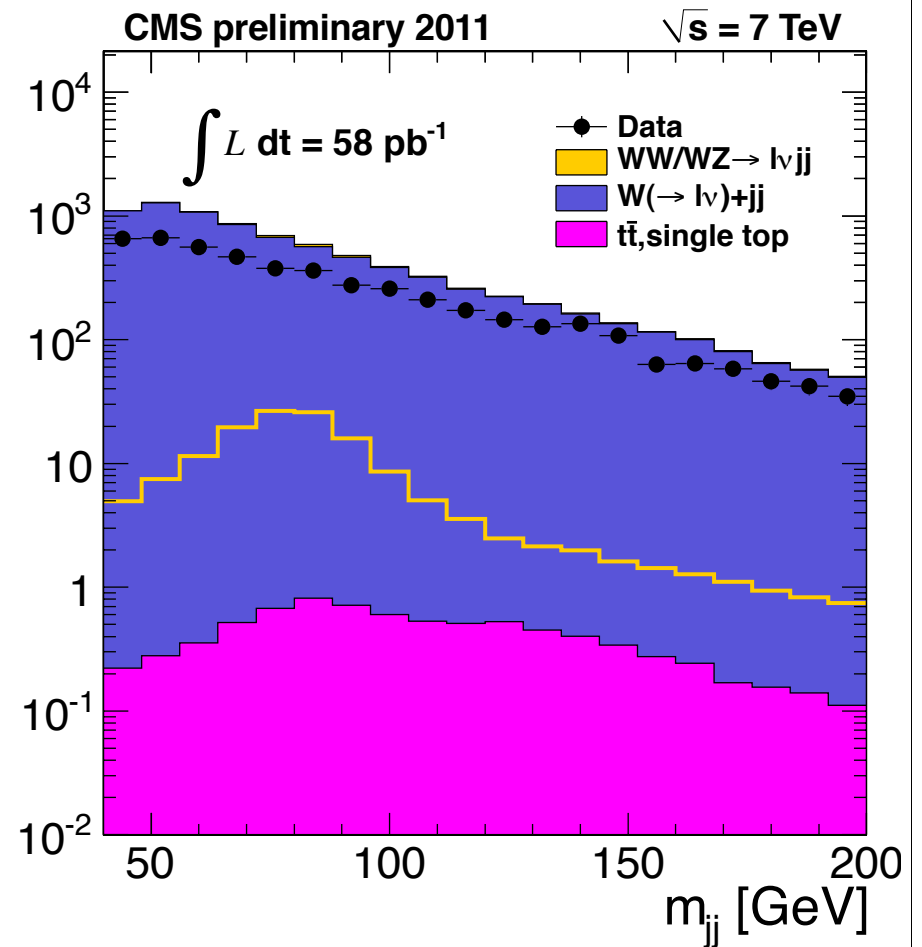
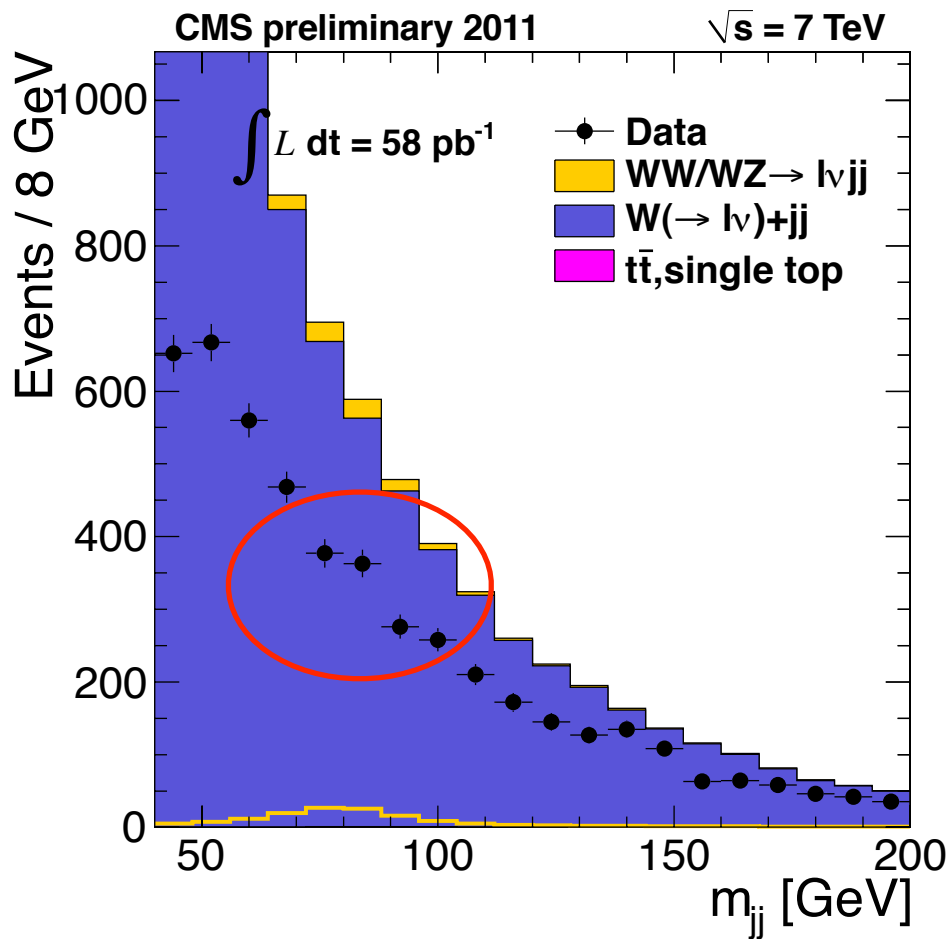
Just require  $\geq 4$  jets above  $p_T$  25 GeV,  $\geq 1$  b tag and leptonic W (Ele  $E_T > 30$  GeV, MET  $> 30$  GeV,  $m_T > 50$  GeV). Then plot  $m_{jj}$  of the two jets which are not b-tagged.



# $m_{jj}$ distribution W+ $jj$ events: "out-of-box"



Just require =2 jets above  $p_T$  20 GeV, =0 b tag and leptonic W (Ele  $E_T > 30$  GeV, MET  $> 30$  GeV,  $m_T > 50$  GeV).





# Standard events selection

## ◆ $W \rightarrow e\nu$ reconstruction

- GsfElectron passing tight WP70 criteria,  $E_T > 30 \text{ GeV}$
- W transverse mass:  $m_T > 50 \text{ GeV}$
- PF MET  $> 30 \text{ GeV}$
- Z veto

## ◆ Require two PF jets in the event

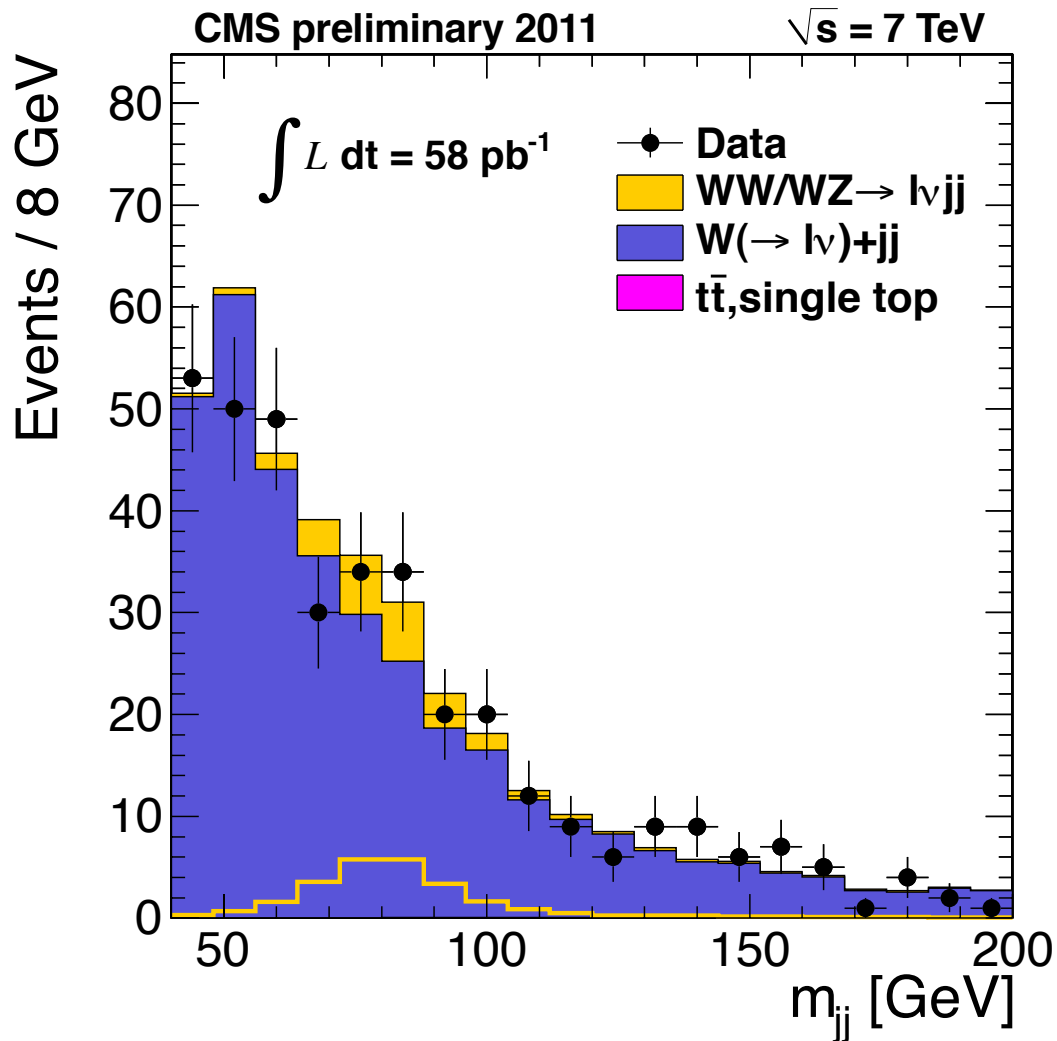
- each jet with corrected  $p_T > 20 \text{ GeV}$  and  $|\eta| < 2.4$
- $|\cos\theta^*| < 0.4$ ,  $|\Delta\phi(\text{jet1}, \text{jet2})| > 1.5$
- $|\Delta\phi(\text{jet1}, \text{MET})| > 0.6$
- $|\Delta\phi(W, W) - \pi| < 0.2$
- No b-tagged jets

Apply standard  
“L2 L3” correction  
and “residual  
correction” in data

Using  $36 \text{ pb}^{-1}$  data from 2010 run,  $22 \text{ pb}^{-1}$  data from 2011

MC: W+jets: Madgraph, Top: Powheg, WW+WZ: Pythia  
(all with pileup conditions observed in 2010 data)

# $m_{jj}$ distribution for $W+jj$ events after cuts



Had to adjust JES by -10%

# observed events in data = 361

MC predicts:

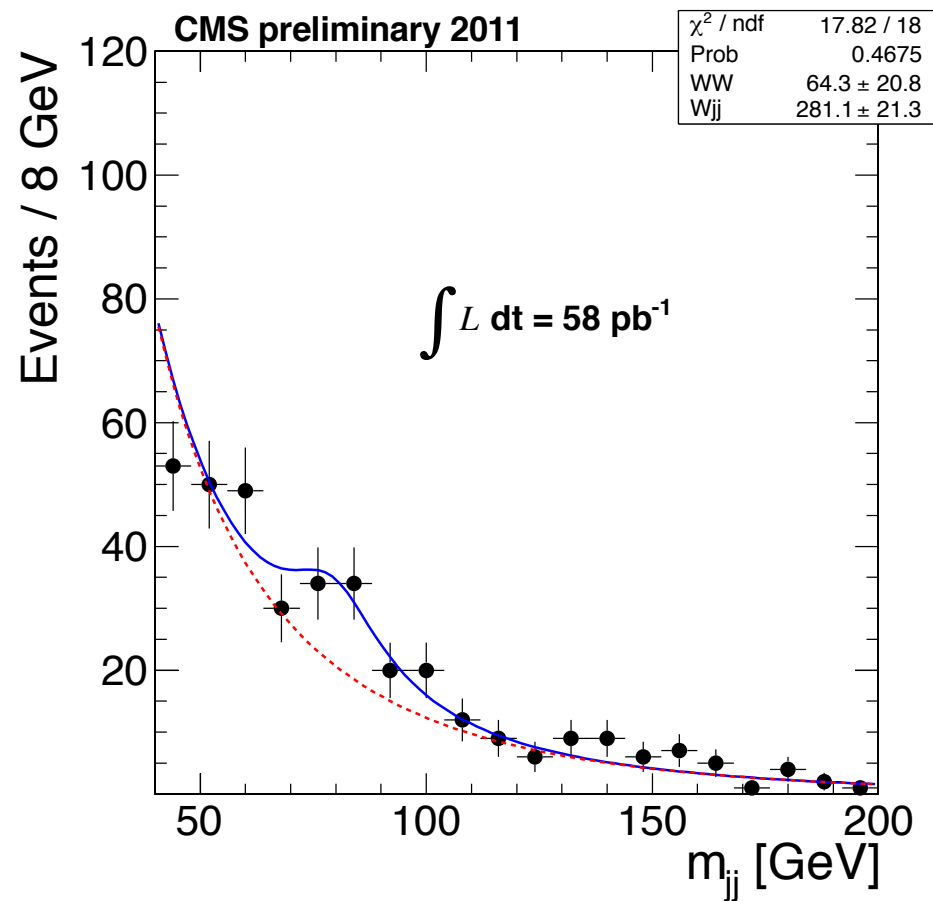
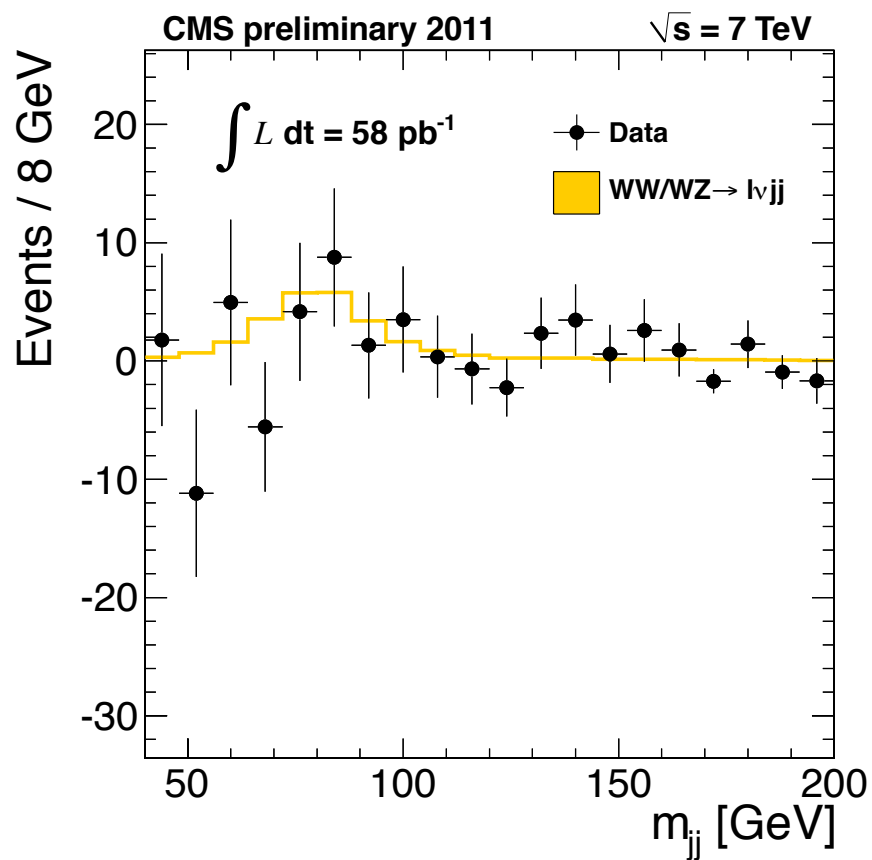
$W+jj = 348$

$T\bar{t}$ bar, single top = 1

$WW + WZ = 26$

LogY version of this plot  
on next slide  $\Rightarrow \Rightarrow \Rightarrow \Rightarrow$

# $m_{jj}$ after background subtraction



# Most urgent to-do list



- ◆ Implement angular variables used by Dan
  - Translated Dan's MATLAB code in C++
  - Working on plotting the distributions now
    - Jackson angle, angle between  $j_1$  and  $j_1+j_2$  system in CM frame, similarly for lepton in  $l+v$  frame
  - will hopefully improve S/B
  
- ◆ Pileup subtraction
  - fast jet area subtraction
  - perhaps responsible for shift in peak position
  
- ◆ Run over  $110 \text{ pb}^{-1}$  data