

# A look at $W(\rightarrow ev) + 2$ jet sample: Reconstructable W Pairs

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Trying to follow the muon sample analysis shown in Dan's EWK presentation:

<http://indico.cern.ch/getFile.py/access?contribId=0&resId=1&materialId=slides&confId=127086>

# Candidate events

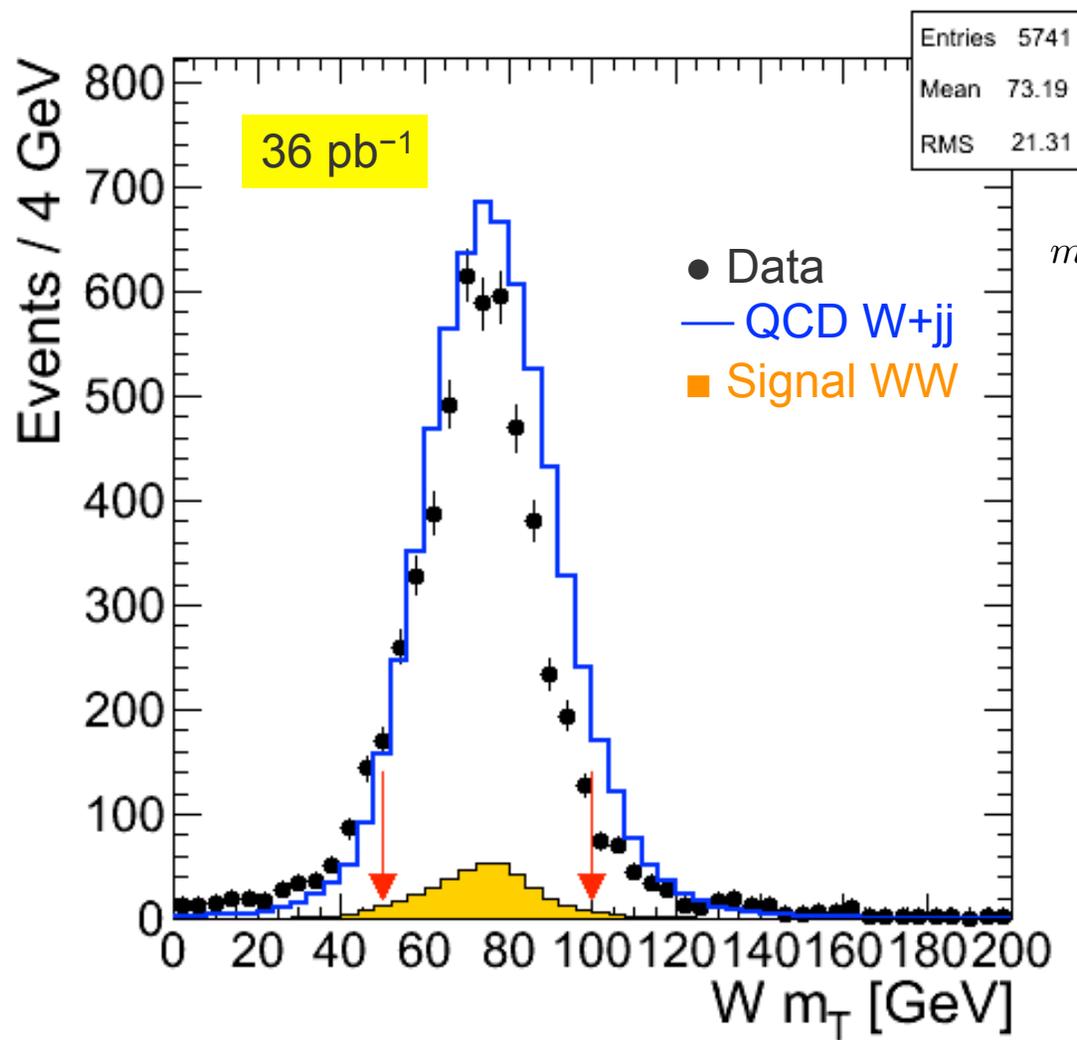


- ◆  $W \rightarrow e\nu$  reconstruction
  - GsfElectron passing tight WP80 criteria
  - Electron  $E_T > 25$  GeV
  - PF MET  $> 25$  GeV
  - Transverse mass in range 50–100 GeV
  - Z veto
- ◆ Require exactly two PF jets in the event
  - each jet with corrected  $p_T > 25$  GeV and  $|\eta| < 2.4$



# Cut flow: W transverse mass

Start with 4325  $W(\rightarrow ev)+jj$  events passing the criteria on last page.



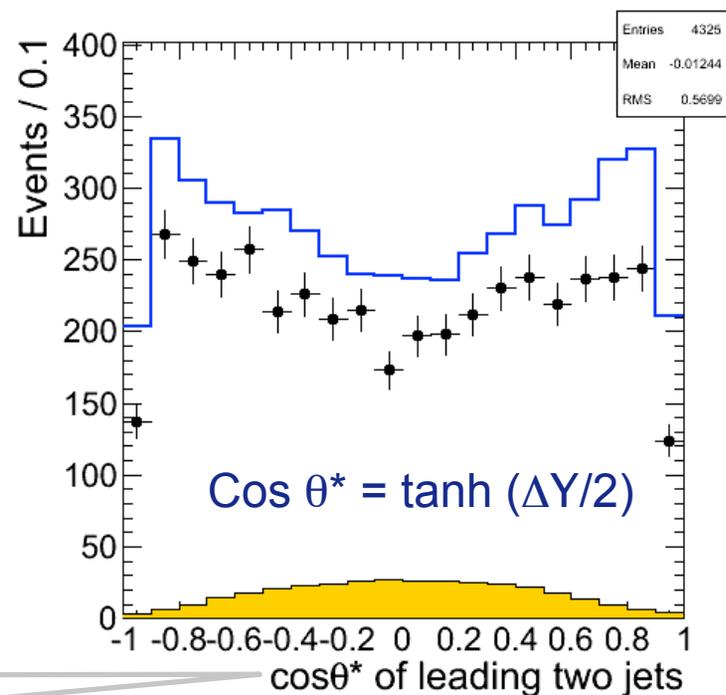
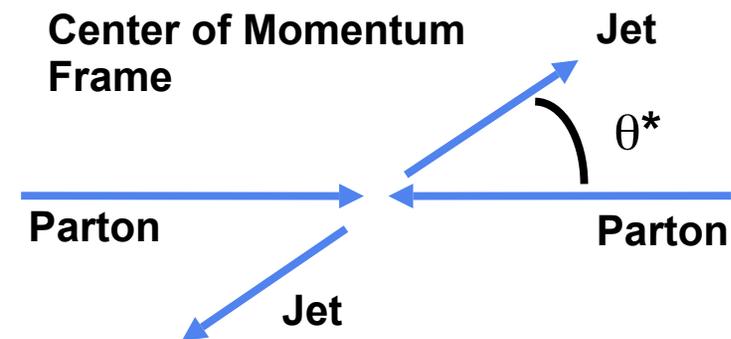
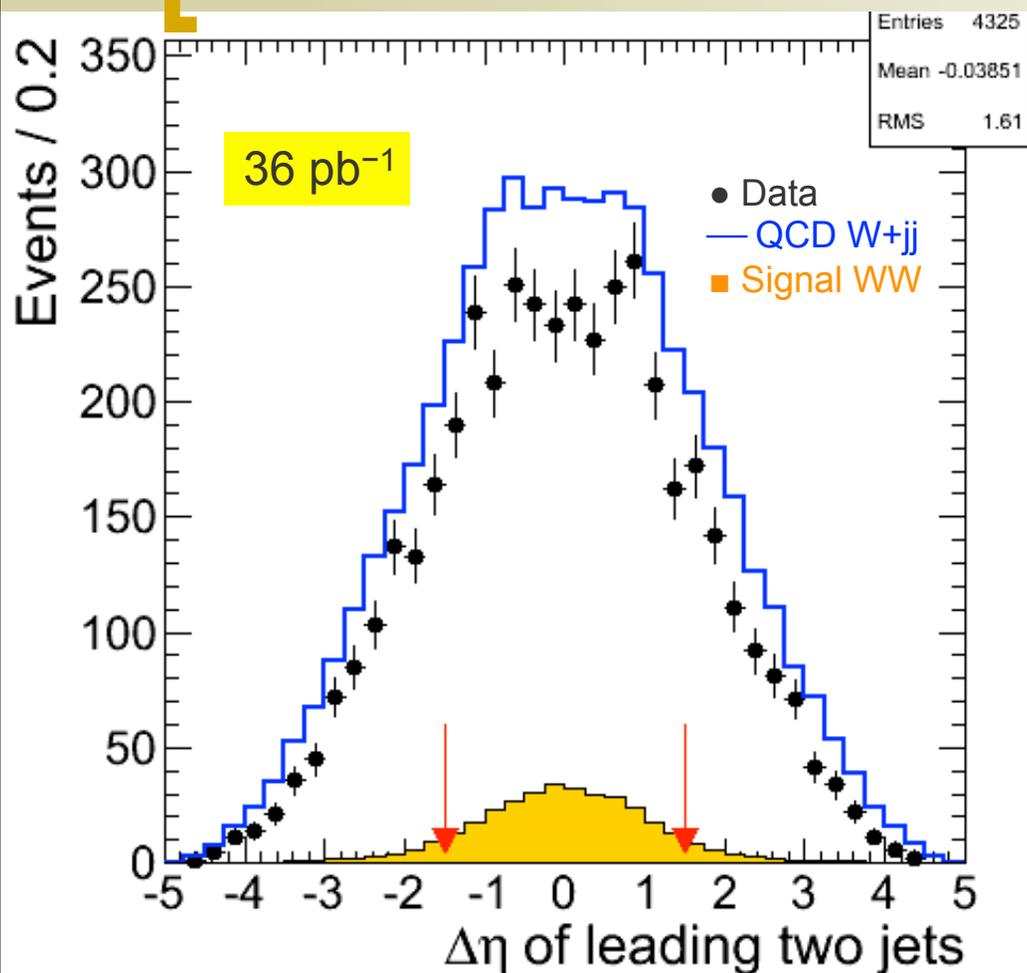
$$m_T = \sqrt{2E_T(e) \cdot mE_T \cdot (1 - \cos(\Delta\phi_e, mE_T))}$$

In the previous presentation I was using wrong angle which diluted the distribution

Just like in case of muon channel, Monte Carlo predicts more QCD background events than observed in data.

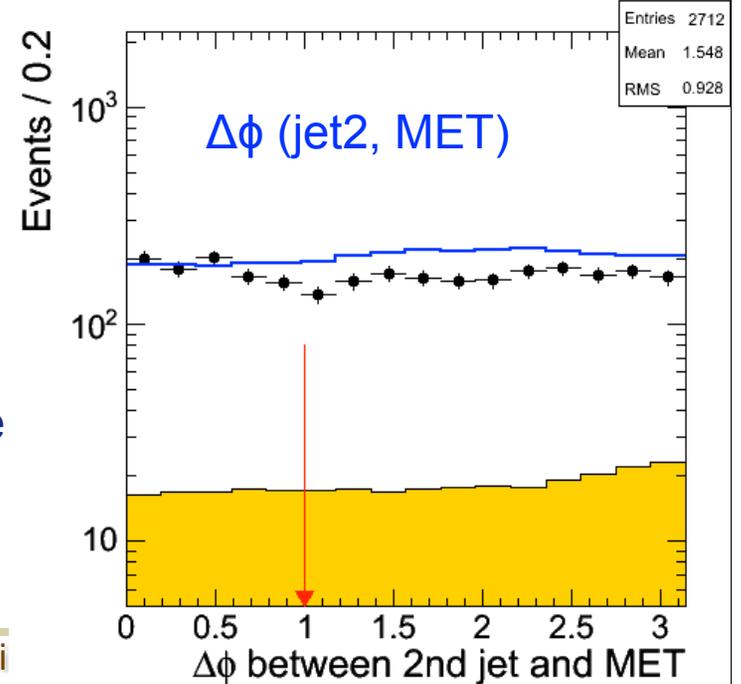
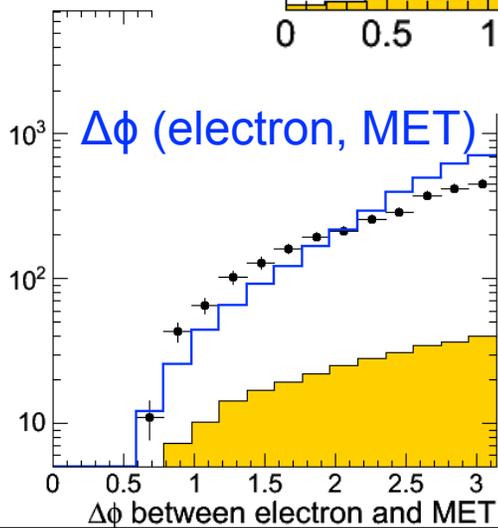
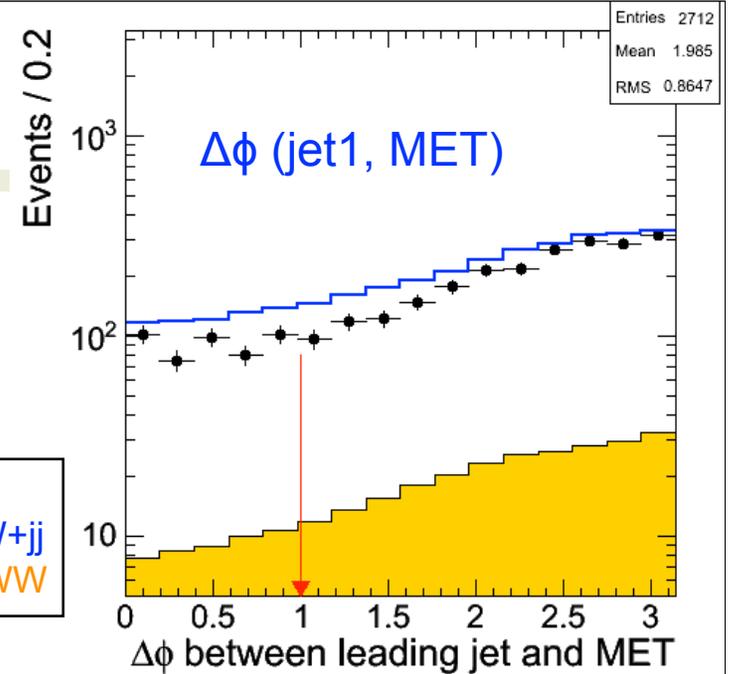
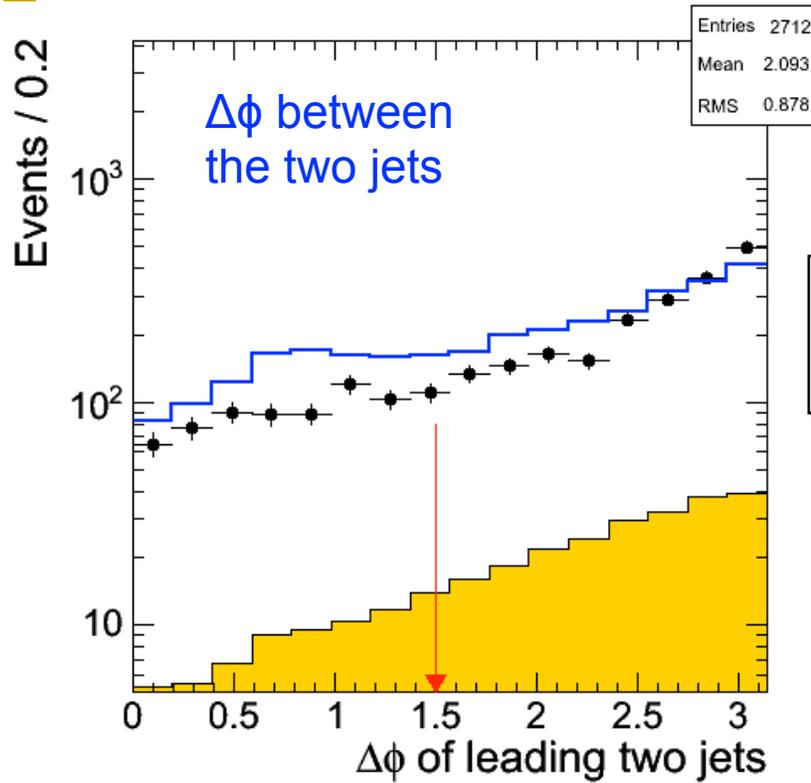


# Cut flow: $\Delta\eta$ between the two jets



I do not really understand the  $\text{cos}\theta^*$  distribution. Is this the effect of jet resolution, or I am using incorrect formula ?

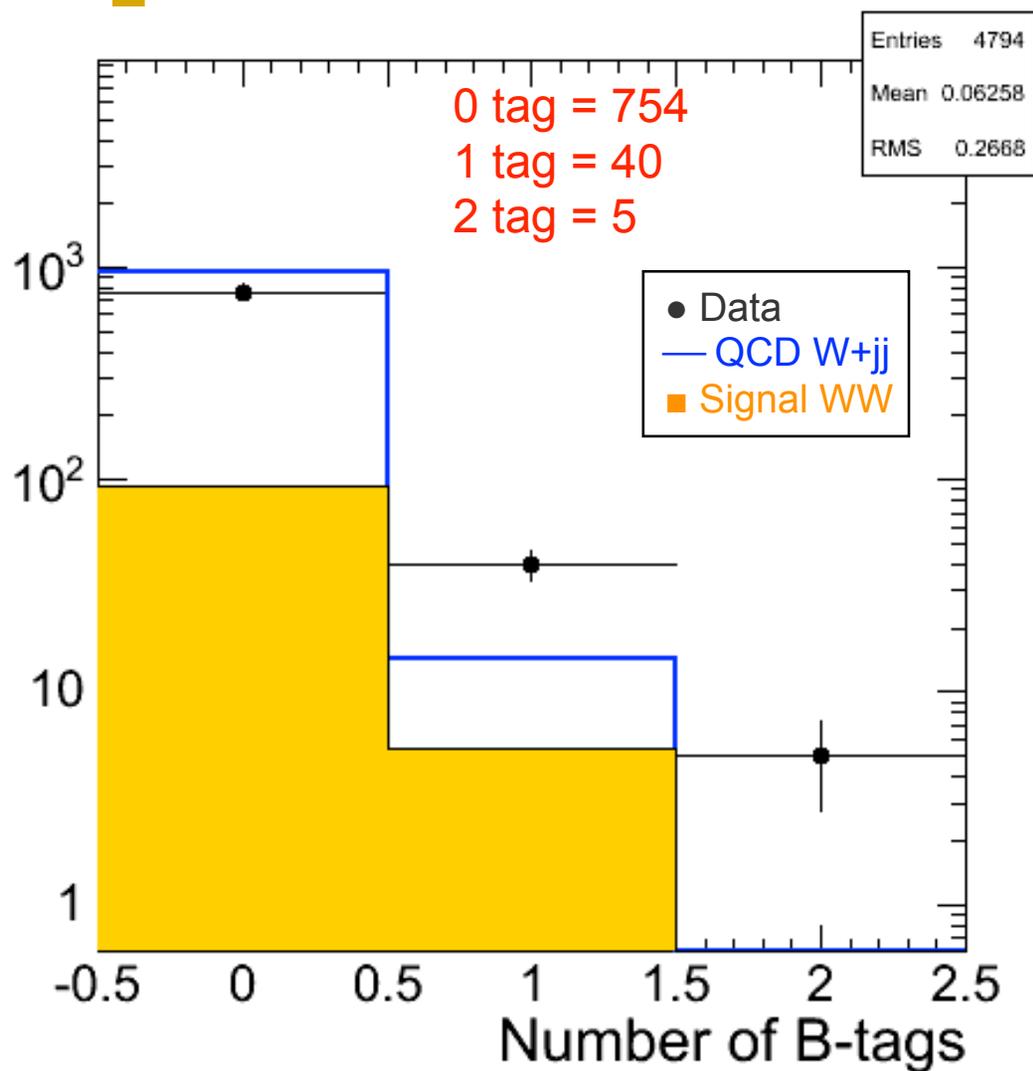
# Cut flow: angular information



Angular distributions provide little discrimination between WW and QCD W+jj

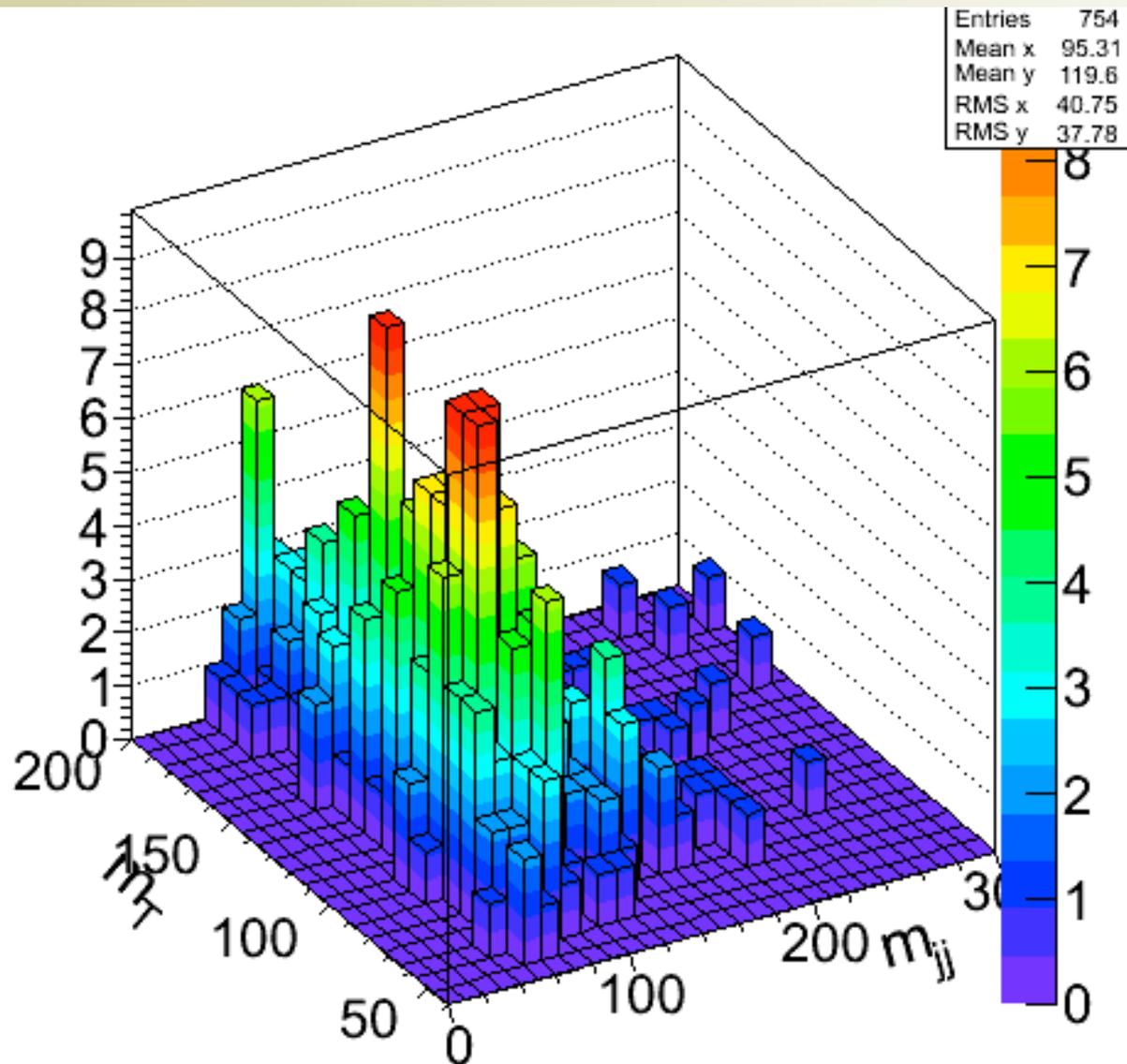


# Cut flow: veto B-tagged jets



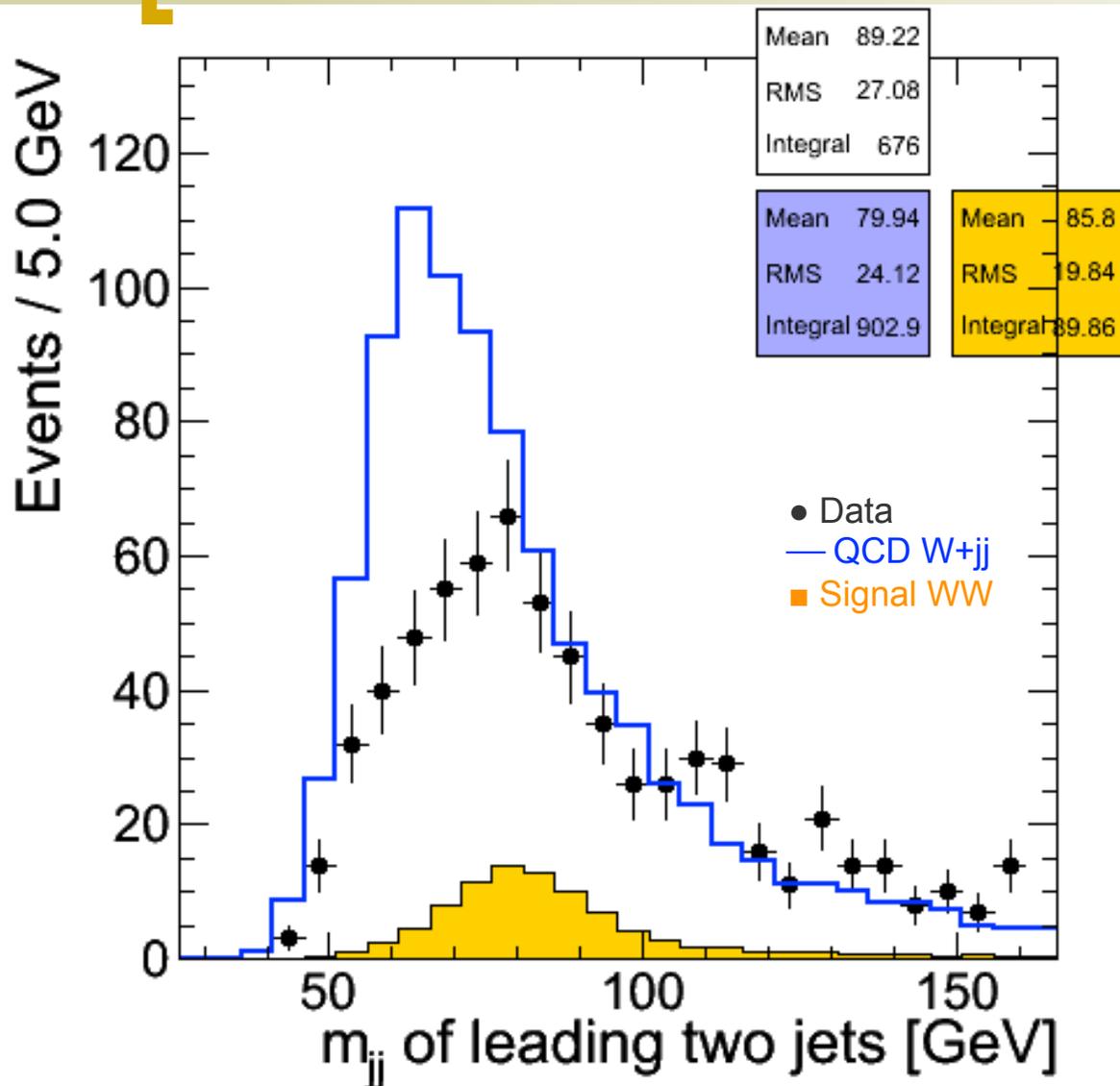
To remove top background  
keep only those events  
which have exactly 0 B-tags

# W $m_T$ vs $m_{jj}$ lego plot





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

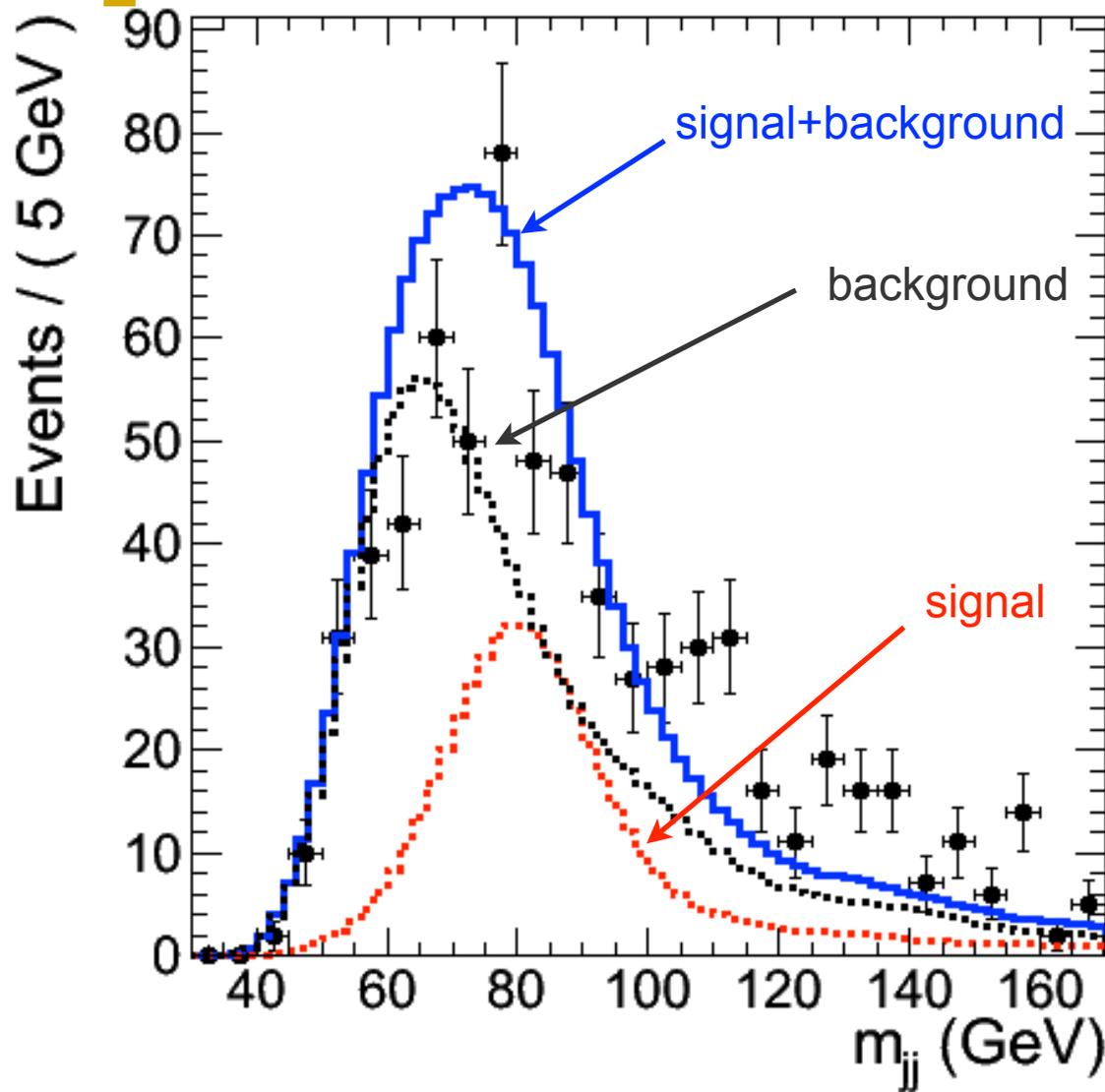


In the mass window 60–100 GeV, 427 events survive all our cuts. **Monte Carlo predicts 74 signal and 659 background events.**

I tried a simple template fit using the signal and background shape from MC. See next slide.



# Simple template fit



MINUIT gives:  
signal =  $215 \pm 45$   
background =  $466 + 49$   
                   $- 46$

Clearly, the fit quality is not satisfactory. Improving signal purity will help.

Further ideas ?

- cut harder on  $m_T$  ?
- any unexplored variable ?