



**Di-boson WW , WZ production in $W(\rightarrow l\nu)$
+jj events: status using 720 pb^{-1} data**

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Basic plan for summer conferences



- [1] Make m_{jj} invariant mass distribution from lepton+jets+MET events using ~ same selection criteria as used in CDF/DØ analysis. Done
- [2] Take all shapes from Monte Carlo and perform a fit to data extract normalization for W+jets and di-boson. Fix all other components.
 Under control, need to use larger W+jets MC sample
- [3] Plot the distribution: Data – [all components except di-boson]. We should clearly see the di-boson peak in right place and right magnitude.
 Done, under control
- [4] Compute acceptance and efficiency for our selection. Needed to compute cross section. work in progress
- [5] Estimate systematic uncertainty. work in progress

Event selection



Acceptance

- Tight lepton selection from top PAG
- Exactly two jets with $p_T > 30 \text{ GeV}$ (using PF2PAT cleaning)
- pf MET $> 25 \text{ GeV}$
- W transverse mass $> 40 \text{ GeV}$

Kinematic cuts to suppress W+jets:

- $p_T^{\text{dijet}} > 40 \text{ GeV}$
- $\Delta\eta (j1, j2) < 2.5$
- $\Delta\phi (j1, \text{MET}) > 0.4$

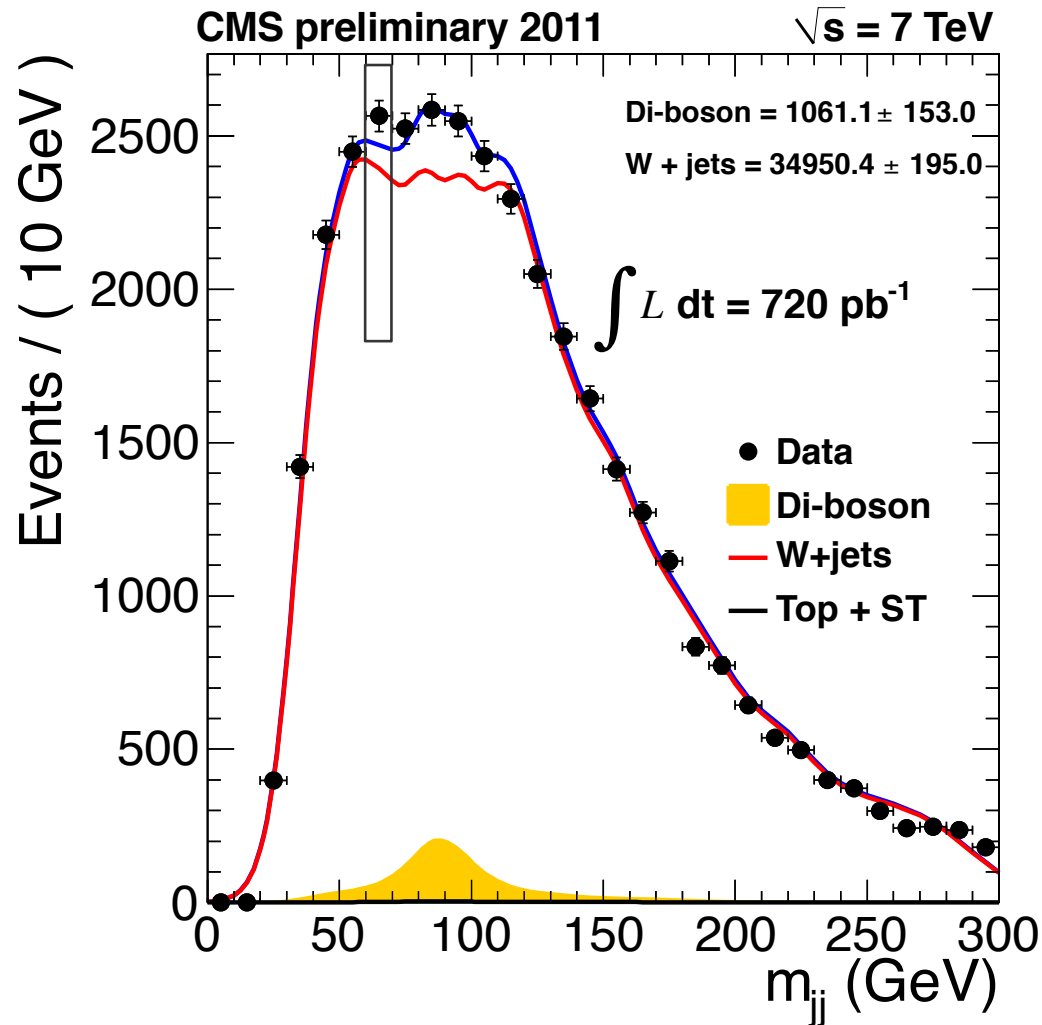
Now we are using same cuts as CDF / $D\emptyset$

Analyzed $\sim 720 \text{ pb}^{-1}$ of data so far.

Template fit to m_{jj} in W+2 jet events



e, μ data combined



MC predicts ~ 800 di-bosons.

$\sigma = 66 \text{ pb}$, BR = 0.22×0.7

Acceptance $\sim 0.45 \times 0.45$

Efficiency $\sim 0.7 \times 0.8$, Lumi = 720

Take shape from MC. Fit for the normalization. Blue curve shows the fit to data.

Few Wiggles in W+jets MC template from lack of MC statistics

As of today, we got $\sim 2 \text{ fb}^{-1}$ W+jets MC. This will help improve template.

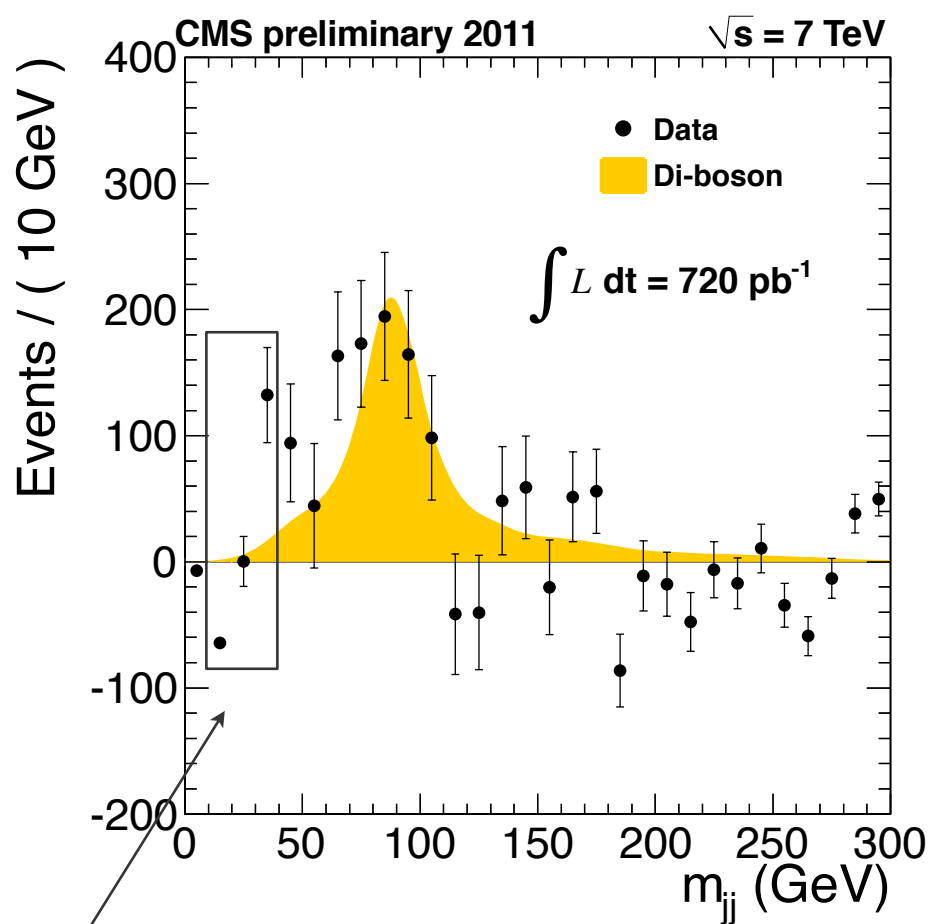
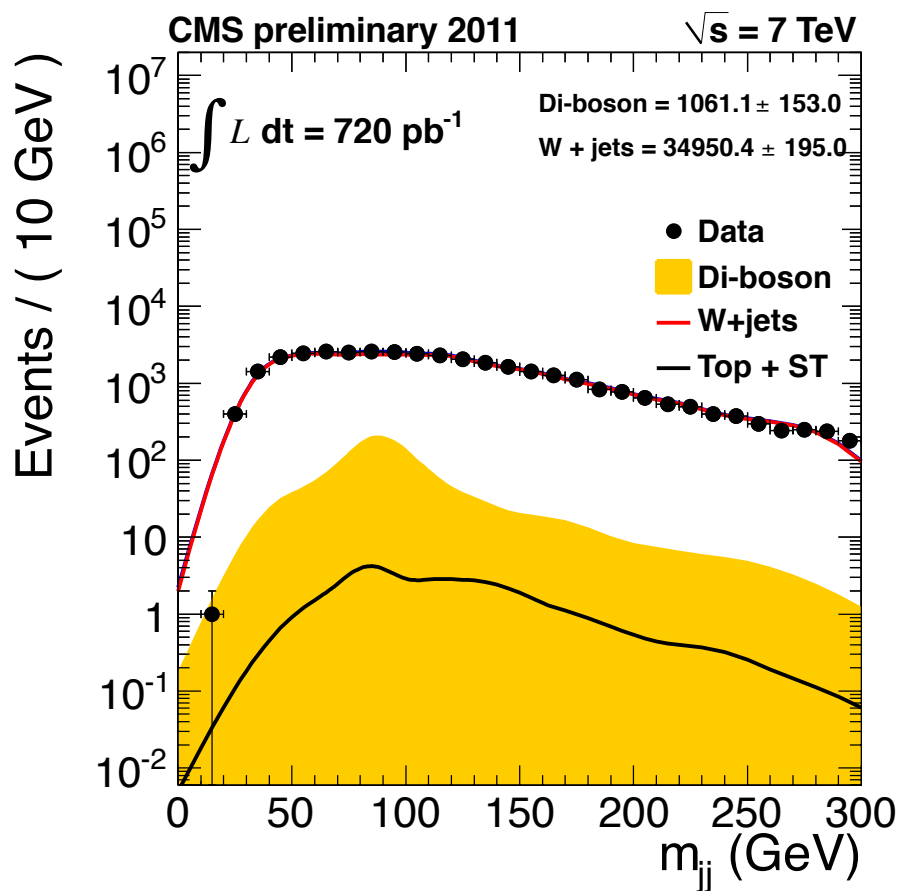
Background subtracted distribution on the next slide



After background subtraction

on the log scale

Background subtracted distribution



Work ongoing to improve modeling of the sharply rising rough edge in the spectrum

Documentation



We have started documenting the details of the analysis
CMS Analysis Note 2011/151

Available on CMS information server

CMS AN -2011/151



The Compact Muon Solenoid Experiment
Analysis Note

The content of this note is intended for CMS internal use and distribution only



24 April 2011

Study of WV production using $WV \rightarrow l\nu jj$ events
in pp Collisions at $\sqrt{s} = 7$ TeV

Ambitiously aiming to have first draft ready by next week.

List of systematics under consideration



[1.] Systematics from fit procedure. Need to study using pseudo expts.

[2.] Systematics from data modeling. Try various MCs to derive m_{jj} template and determine upper bound on uncertainty due to this shape. Also investigate uncertainty from NLO effects.

[3.] Include systematics in the likelihood

- JES/JER can be directly included as nuisance parameters in LH
- For uncertainty in template due to NLO effect need some NLO MC
- Factorization/ normalization scale: use Q^2 up/down variation
- Propagate uncertainty in the top pair and single top production cross section and NJet survival rate for the former

[4.] Plugin the theoretical uncertainty in acceptance, and uncertainty in lepton efficiency computation.

A careful estimation of all systematics will take some time. Meanwhile we will start with the simpler ones and will work through the rest.