Progress on last week's action items

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FNAL

Mjj meeting
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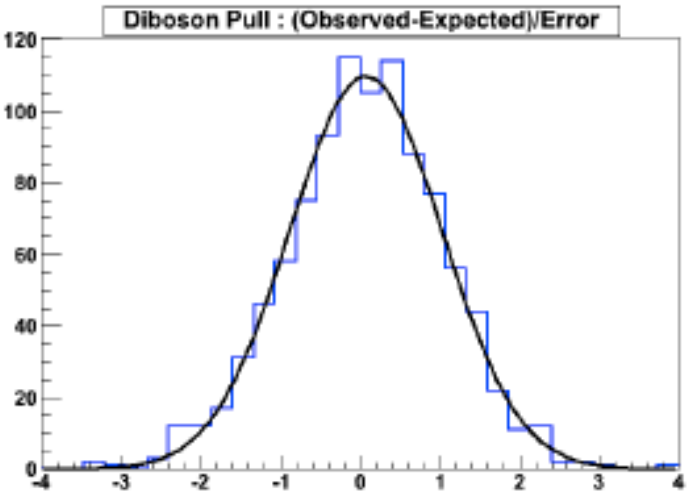
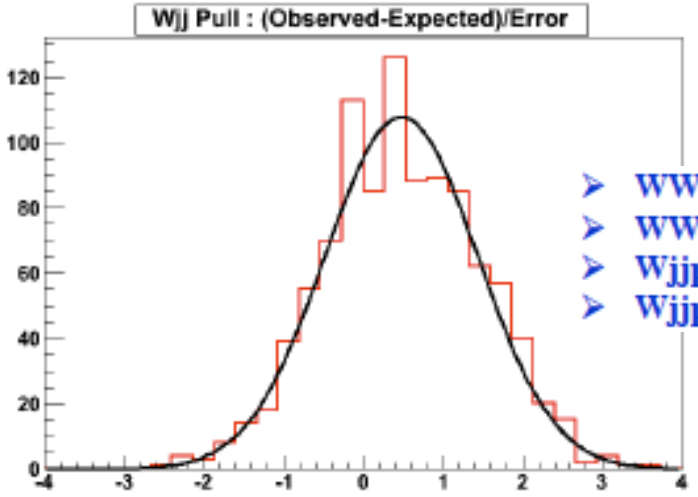
Action item #1

To make sure that the template fit is unbiased and to check the coverage of statistical uncertainty reported by the fit, we need to generate several hundred pseudo experiments (PE) using the shape that best describes the data. Then we fit each of these PE samples using our nominal shape and plot pull distribution for each parameter.

Action taken: Done ! See Ilya's slides 6,7,8.

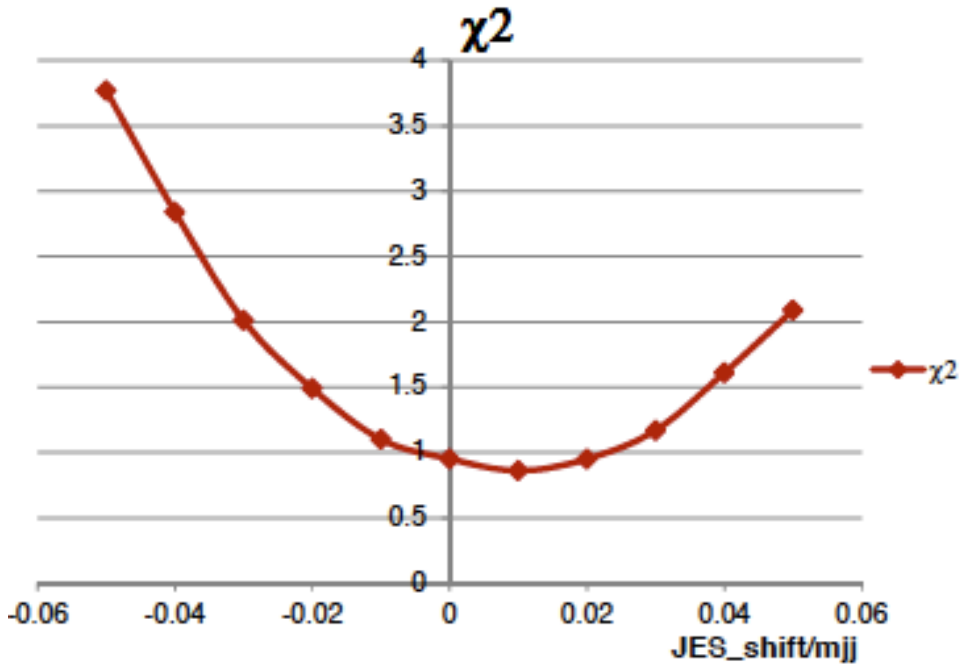




Action item #2

Scan the JES uncertainty in conventional way from -5% to 5% in steps of 1%. Plot the chi^2 of the fit for each change in JES. Verify that the minimum chi^2 is indeed close to zero.

Action taken: Done ! See Ilya's slides 4.



Additional note on JES

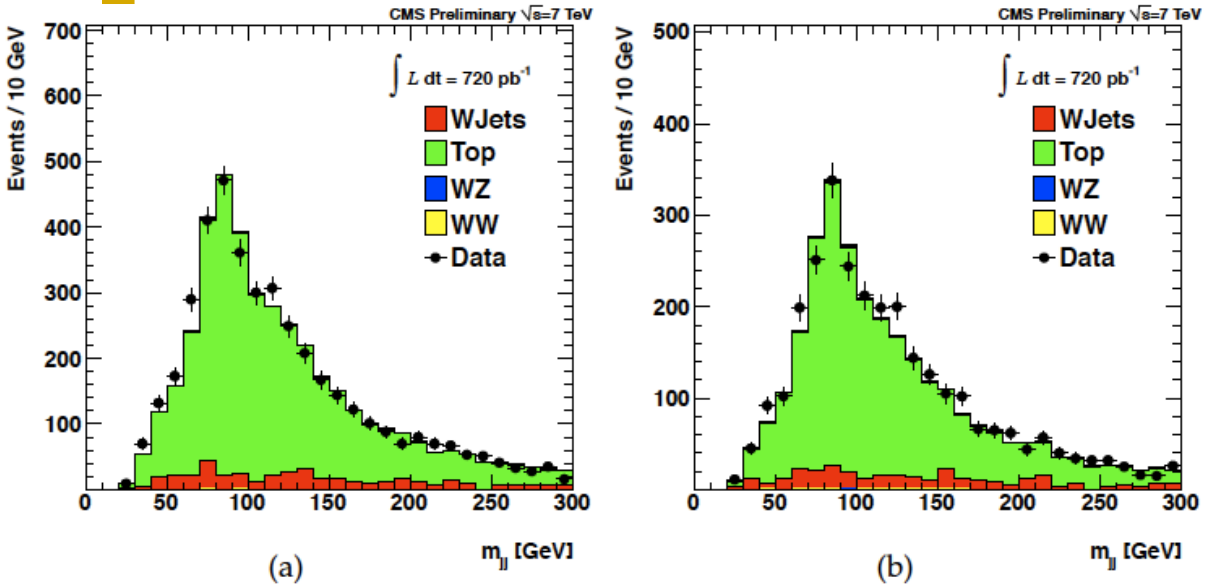
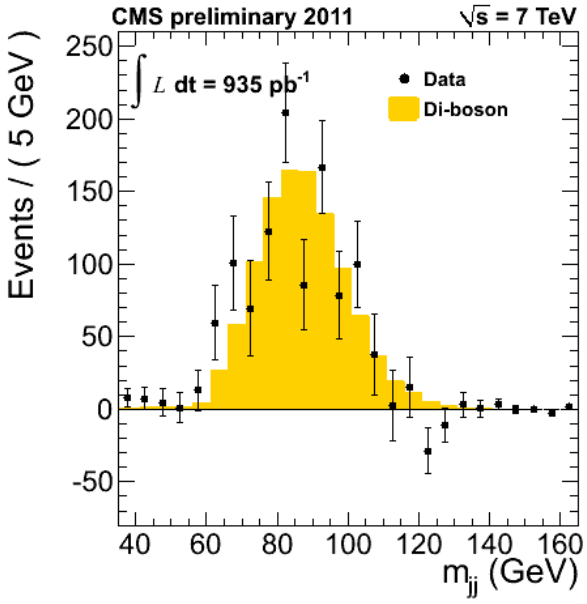


Figure 14: The invariant mass distribution of the two non-*b*-tagged jets in events containing high energy lepton, large $\not{E}_T$, and four jets of which two are *b*-tagged. This sample is dominated by $t\bar{t}$ events. The distribution shown here for both lepton channels (a: muon, b: electron) essentially establishes how well we can reconstruct a hadronically decaying vector boson in CMS detector. The resolution of the reconstructed vector boson is dominated by the jet energy resolution.



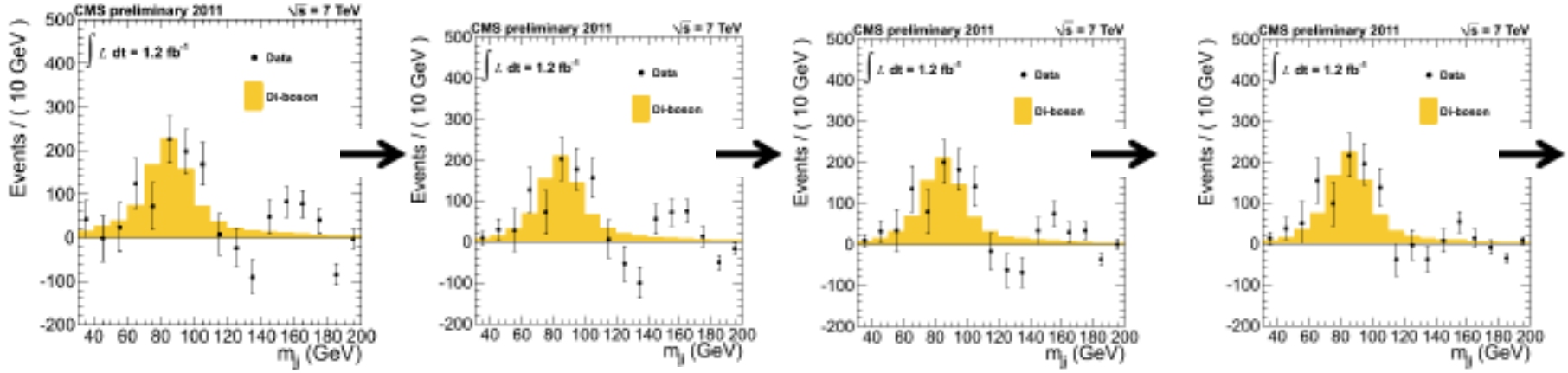
From Mjj Indico page dated July 12

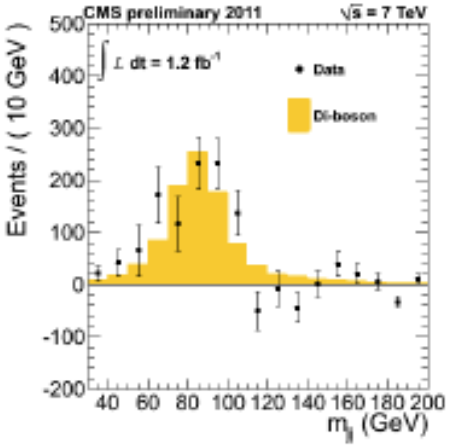
All indications suggest that JES in data and MC agree very well.
Jet resolution is not much worse in data.

Action item #3

Check if diboson shape in background-subtracted (data - background) improves adiabatically as one goes from loose (i.e., CDF-like) cuts to cuts optimized specifically for diboson.

Action taken: Done ! See Ilya's slides 9,10, 11.

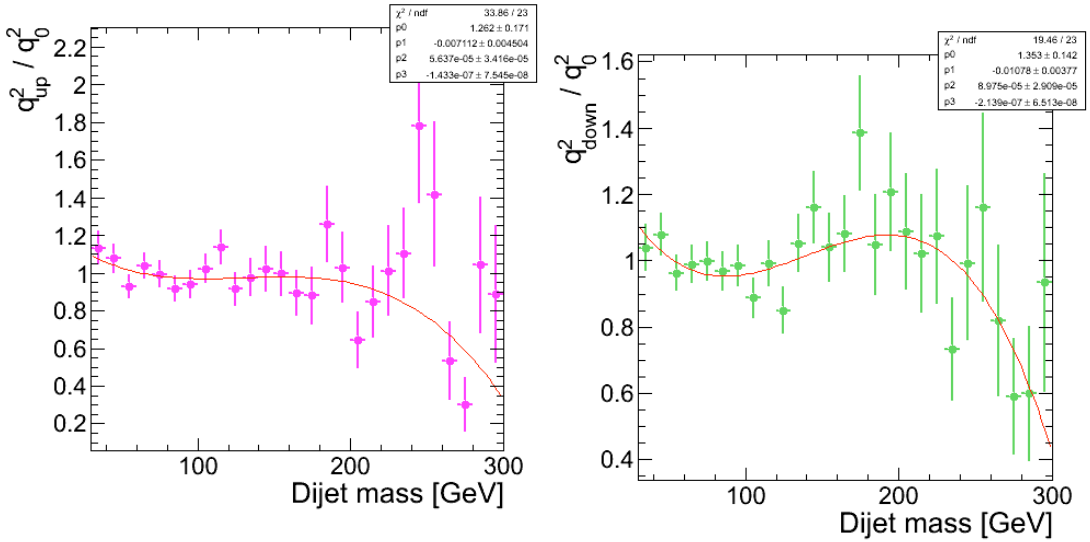




In the very first plot since we are completely swamped by background, it is hard to say if we do not model the W+jets right or it is statistical fluctuation in the number of W+jets. As the S/B improves, so does our ability to observe qq processes (diboson or otherwise)

Action item #4

Investigate if the effect of renormalization & factorization scale variation makes sense.



Action taken: Work in progress. Have some more information at hand.

At the first order the μ scale controls the normalization ratio of N+1 jets / N jets and that is where people study this variation. Any effect on mJJ should be secondary. It is hard to tell in a hand-waving way how μ-up and μ-down variation would effect mJJ. One really has to get this from simulation. I have generated 50k MCFM of default μ, μ-up, and μ-down samples. I do not see any change in mJJ although there are small changes in jet pT. We will investigate more on this in the next few days.

Action item #5

Check if the diboson yield returned by fit makes sense from what we know of diboson NLO cross section, their SM branching ratios, and selection efficiency ?

Action taken: Yes.

WW + WZ cross section at NLO = 61 pb
BR(W->lnu) = 2 * 1/9
BR(W/Z -> jj) = 2/3
Luminosity = 1.2 fb^-1
Efficiency x Acceptance = 0.1

Therefore, expected yield ~ 1000
There is 10% uncertainty in cross section and 6% in luminosity.

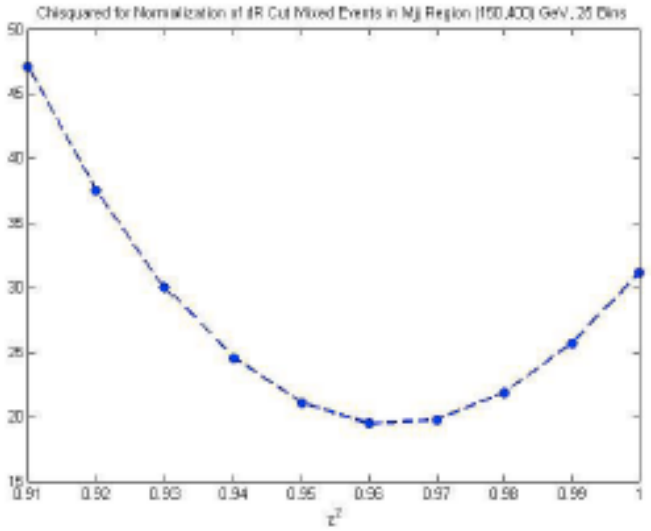
Our fit result with nominal cuts gives very close value with an uncertainty of about 20%.

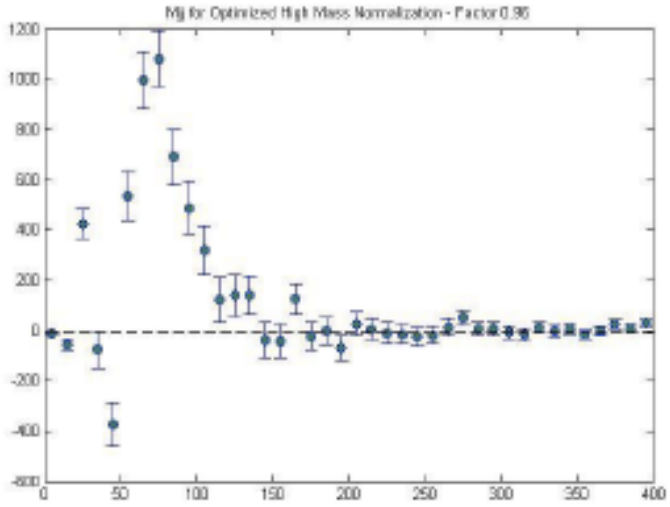
Action item #6

Data driven W+jets shape (i.e., using “mixed events”) from Dan.

Action taken: Dan has completed his studies. Please see

https://indico.cern.ch/materialDisplay.py?contribId=33&materialId=slides&confId=147015





Action item #7–11

Maria to check what happens when she drops PU reweighing. There were some minor differences in distributions from FNAL tree versus Wisc.

Maria to upgrade to official PU reweighing recipe.

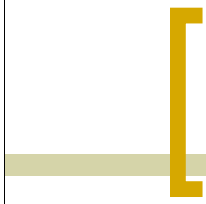
Kalanand to rerun trees with residual JES correction

Action taken: Running now. Should be done by this weekend.

Maria & Pratima to investigate the small bump in dijet pT spectrum near 50 GeV. Also, same for some difference in their pT distributions.

Maria to fit Kalanand's Mjj distributions to see how her fit performs

Hopefully we will hear from Maria regarding these today.




CMS

BACKUP SLIDES