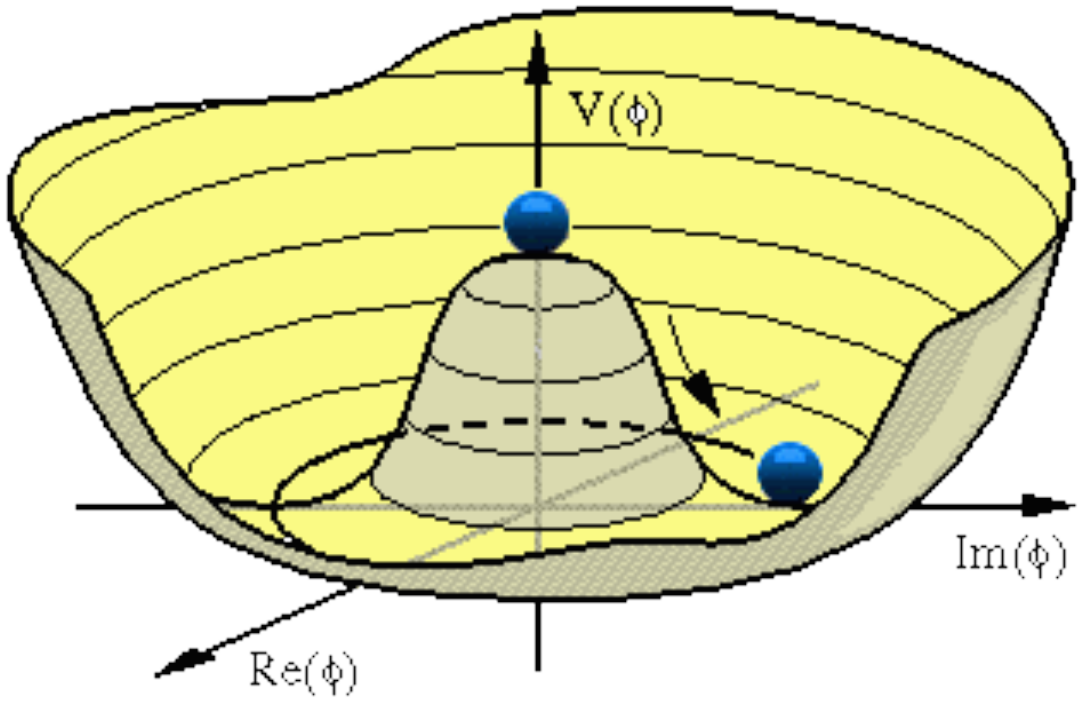
Searches for the Higgs Boson

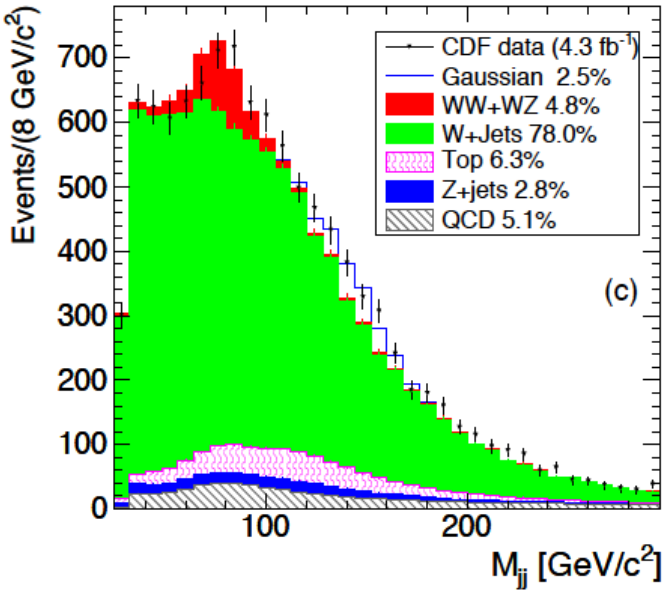


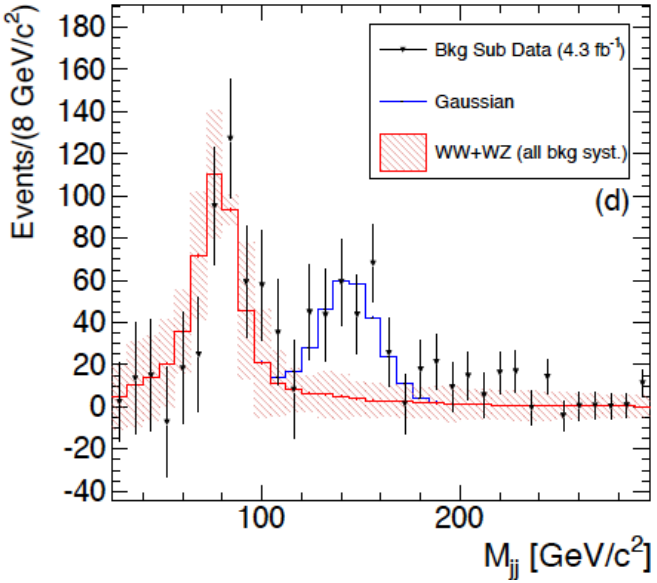
Giovanni Punzi

23th Rencontres de Blois

May 30, 2011

Update on W-jj excess

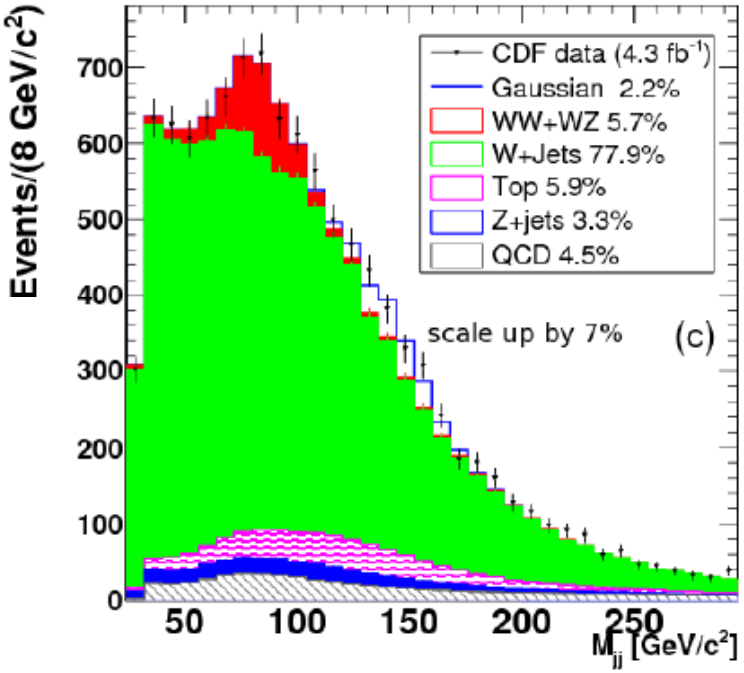


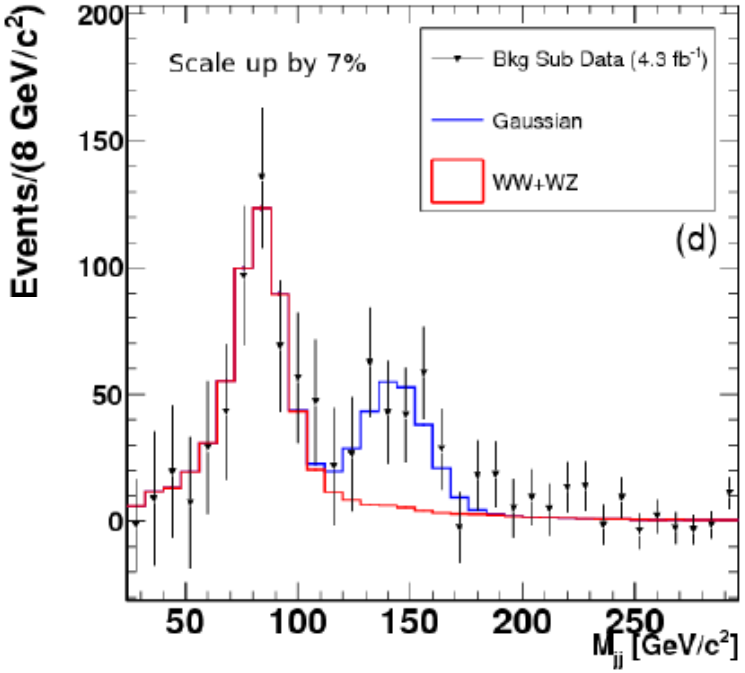


- 3.2σ excess (w/ trial factor) in Mjj spectrum in W+2jets events
  [PRL 106,171801 (2011)]
- Since publication, many papers cited this result and proposed possible interpretations, mostly based on NP
- Interesting SM suggestion: could this be top background ?
  [arXiv:1104.4087, arXiv:1104.3790]
- Would imply a huge error in previous top cross section measurements - however, when one has an unknown peak with the shape of one of his background, one needs to consider the possibility seriously.

What happens if we change the Jet Energy scale?

Result of the fit scaling JES up by 7%



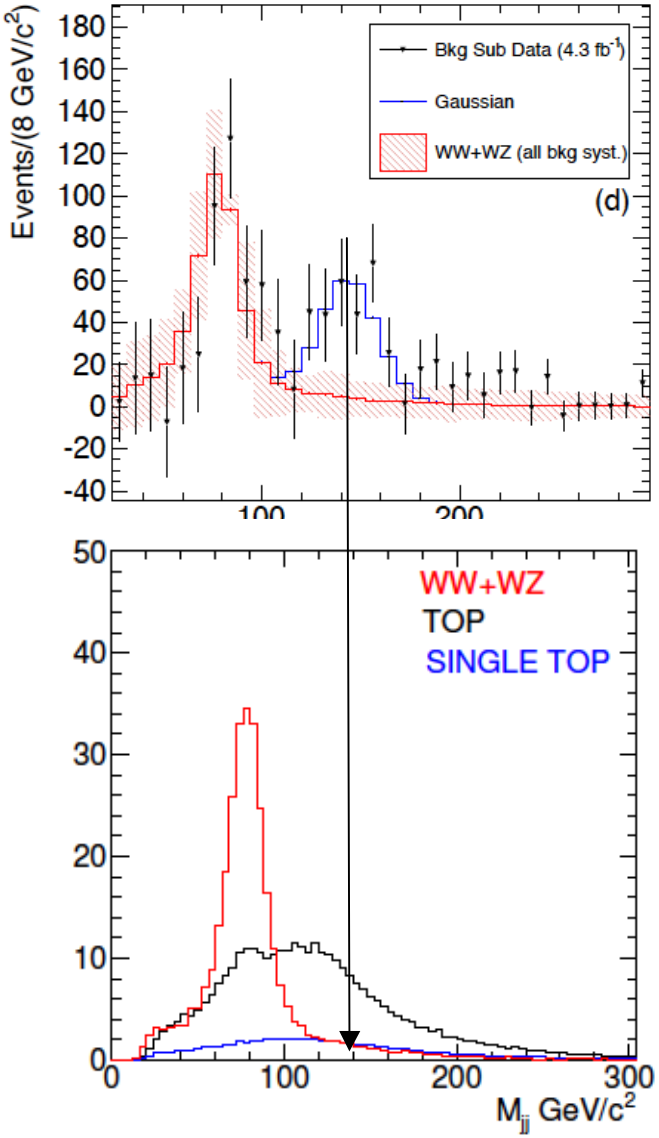


Si

always above 3σ

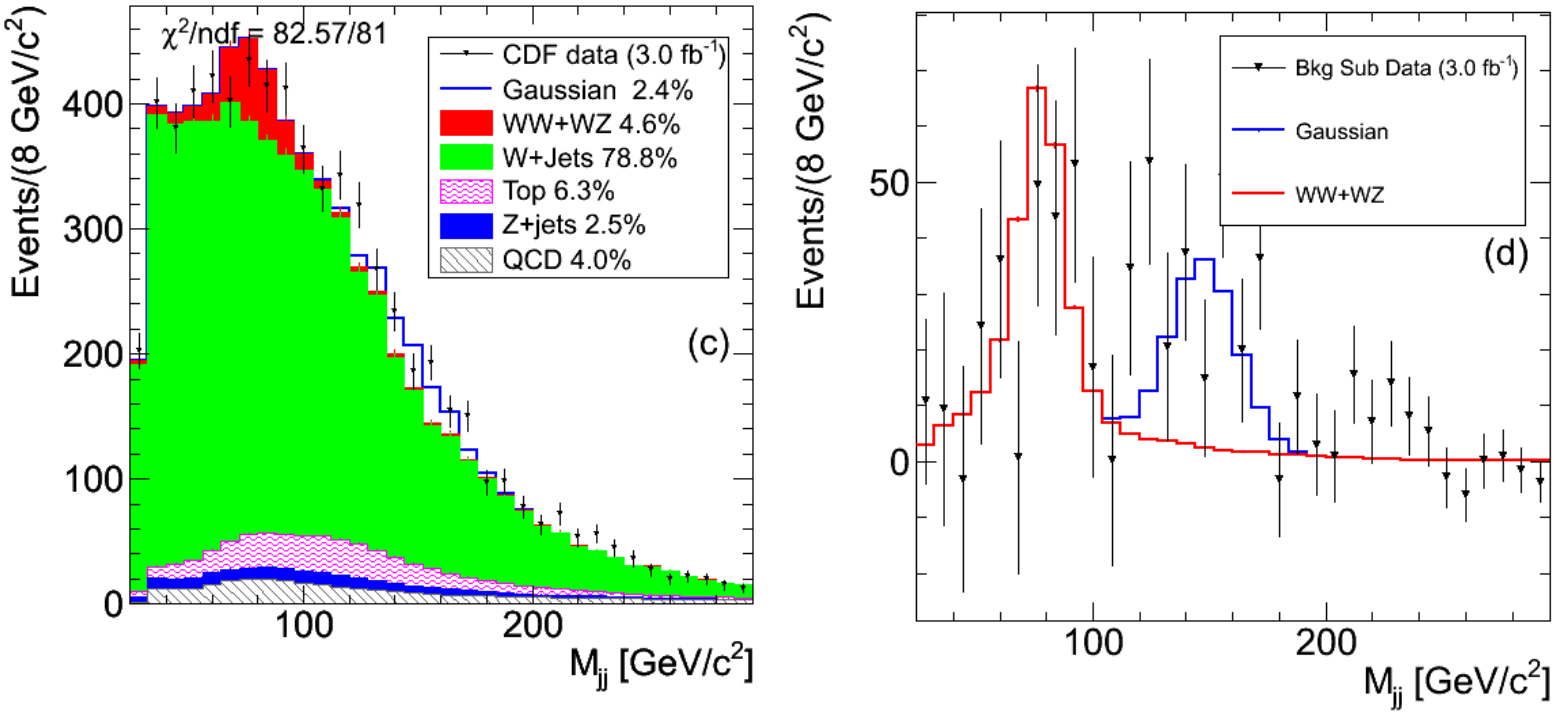
Update on W-jj excess

- But, the answer is NO - this cannot possibly be top background
  - There is no significant tagged component
  - Top-enriched control samples show perfect agreement with simulation
  - When using actual detector simulation, the top background does not peak at the right place



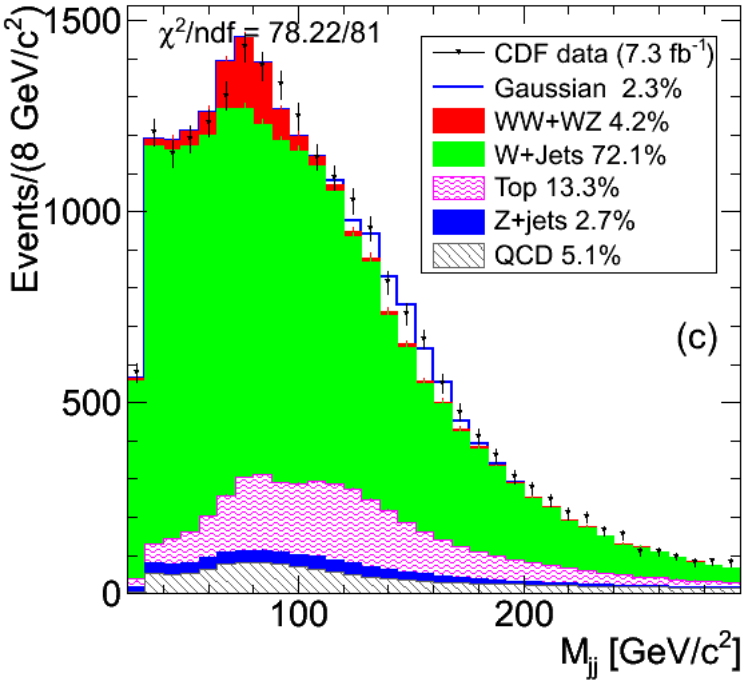
FAQ: Maybe it's just statistics - why aren't you showing the full sample anyway ?

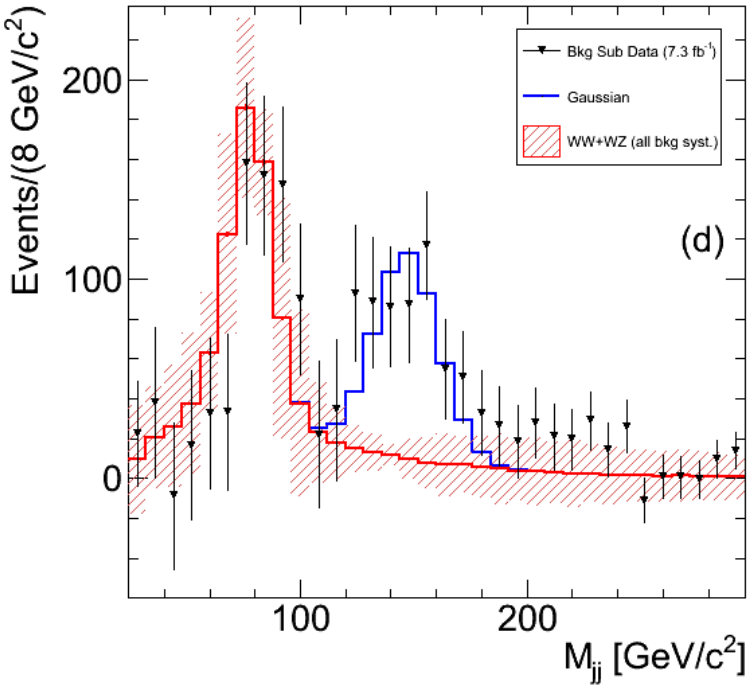
Additional sample of 3fb^{-1} of data



- Looks just the same as the initial 4.3fb-1
- 2.85σ excess including (unneeded) trial factor
- Fitted mass of the excess 147± 5 GeV compatible with first sample

Updated W-jj with 7.3fb^{-1}





- Now closer to 5 sigma
- It was not just a statistical fluctuation
- Serious issue for CDF to understand this.
- Larger sample now allows for more detailed studies - stay tuned for updates.