

The CDF Excess in Wjj Events

T. Aaltonen *et al.*, 507 authors [CDF Collaboration],
*Invariant Mass Distribution of Jet Pairs Produced in
Association with a W Boson in $p\bar{p}$ Collisions
at $\sqrt{s} = 1.96$ TeV,*

arXiv:1104.0699 [04 Apr. 2011] \Rightarrow Phys. Rev. Lett.

We report a study of the invariant mass distribution of jet pairs produced in association with a W boson using data collected with the CDF detector which correspond to an integrated luminosity of 4.3 fb^{-1} . The observed distribution has an excess in the 120-160 GeV/c^2 mass range which is not described by current theoretical predictions within the statistical and systematic uncertainties. In this letter we report studies of the properties of this excess.



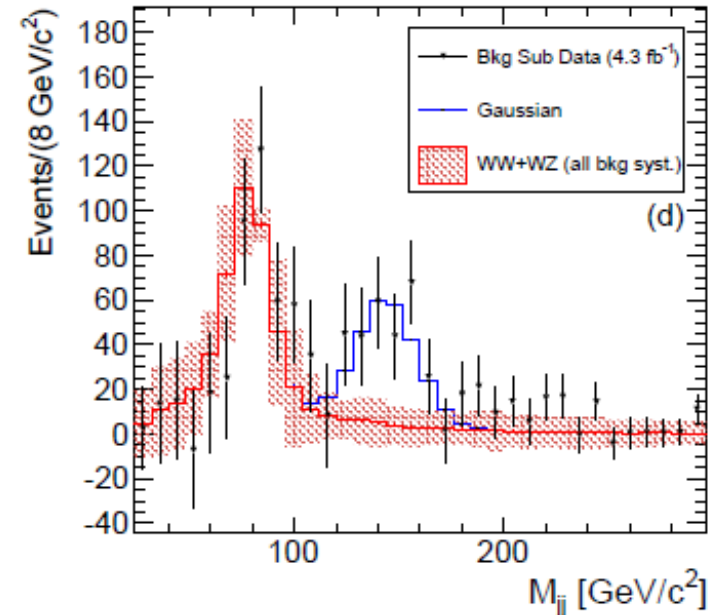
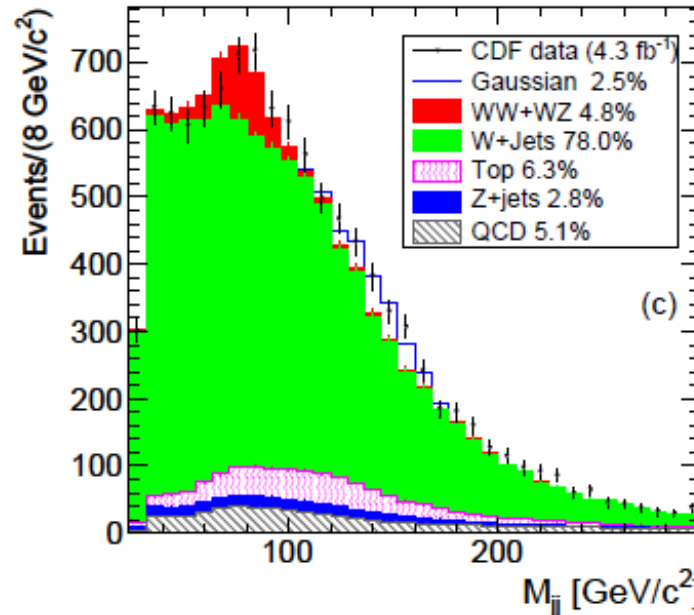
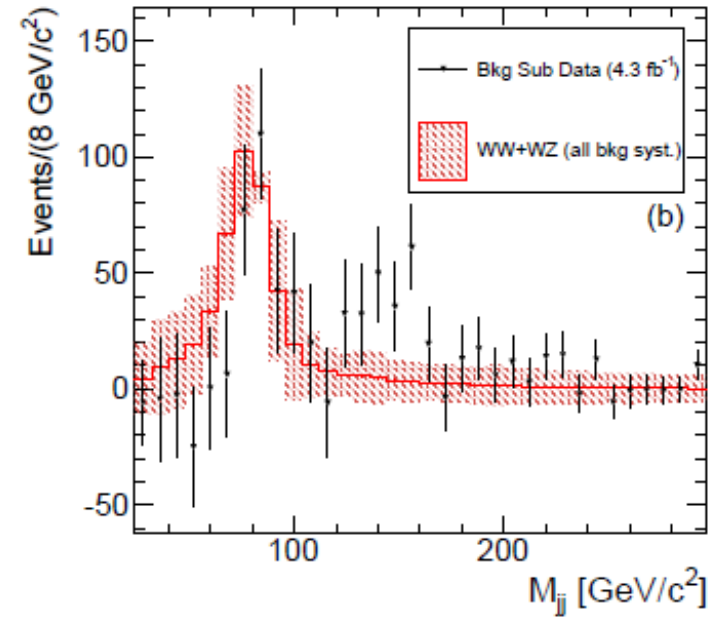
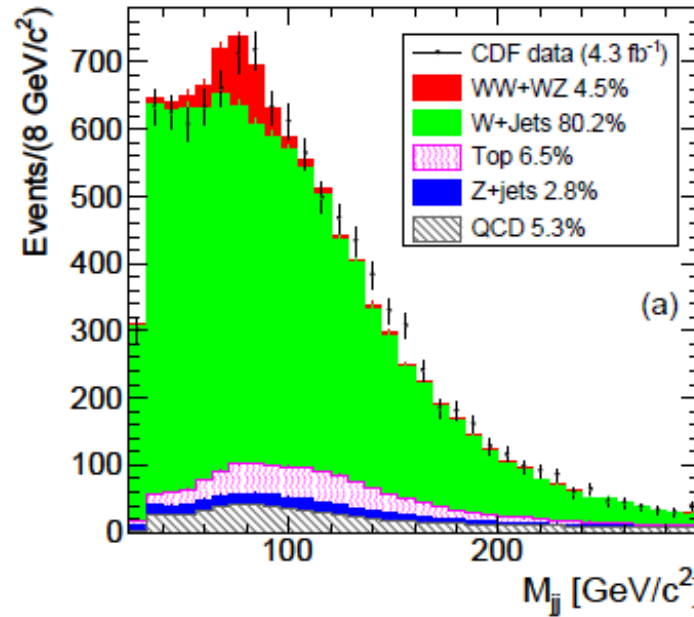
The measured spectrum (4.3 fb^{-1})

Fitting

SM background
only

$$\chi^2/\text{ndf} = 77.1/84$$

SM Wjj: Alpgen +
Pythia



SM background +
Gaussian peak

$$\chi^2/\text{ndf} = 56.7/81$$



The CDF bump fitted (4.3 fb^{-1})

Validity of analysis:
WW peak at 80 GeV

Excess events:

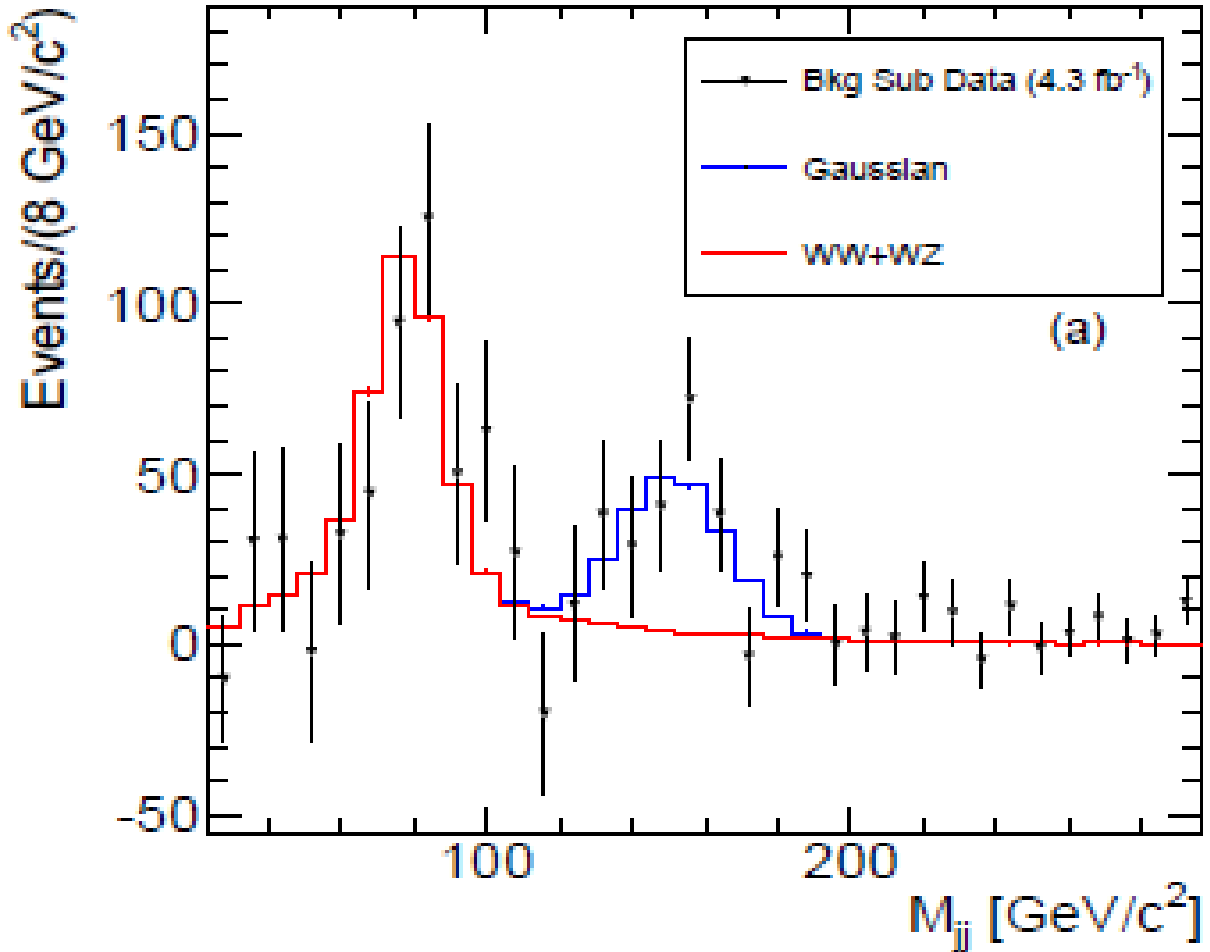
$$e^\pm: 156 \pm 42$$

$$\mu^\pm: 97 \pm 38$$

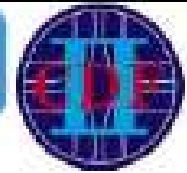
SM background +
Gaussian peak:

$$M_{jj} = 144 \pm 5 \text{ GeV}/c^2$$

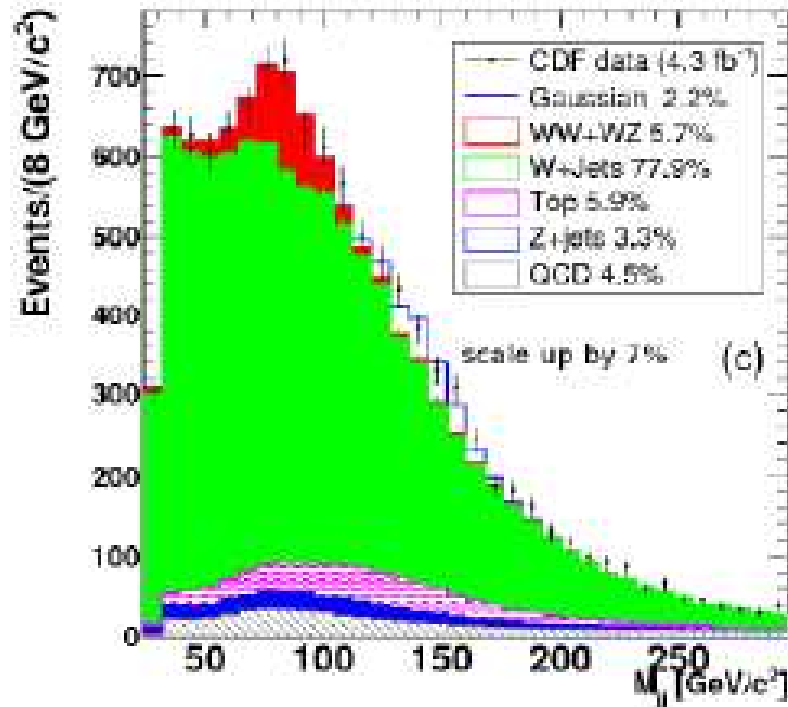
$$\chi^2/\text{ndf} = 10.9/20$$



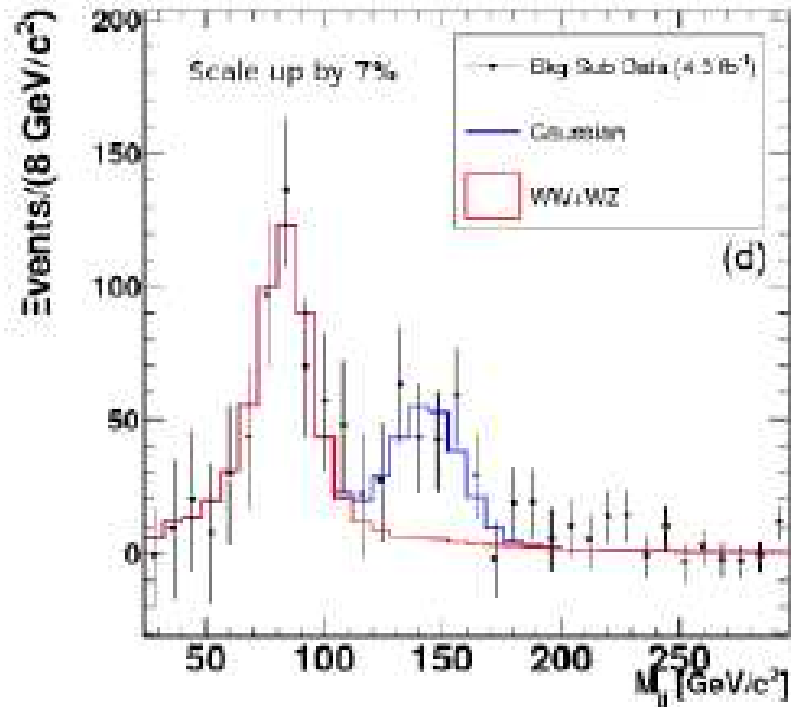
What happens if we change the Jet Energy scale?



Result of the fit scaling JES up by 7%



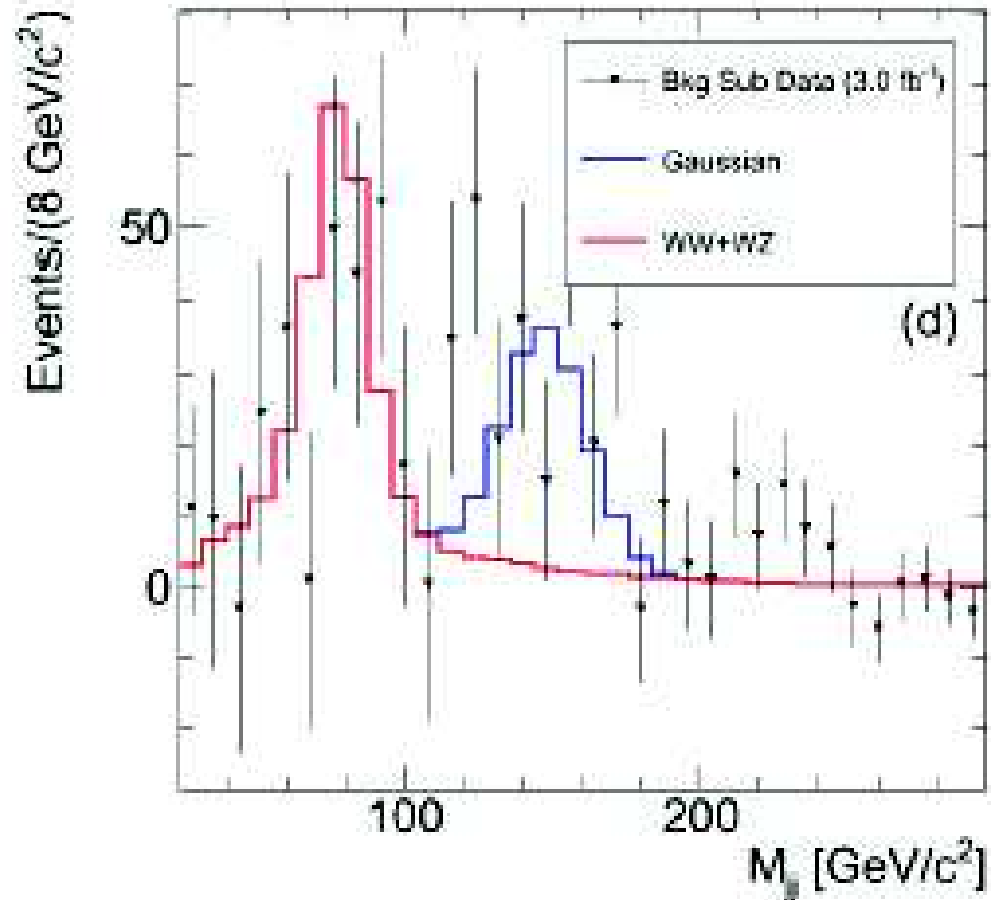
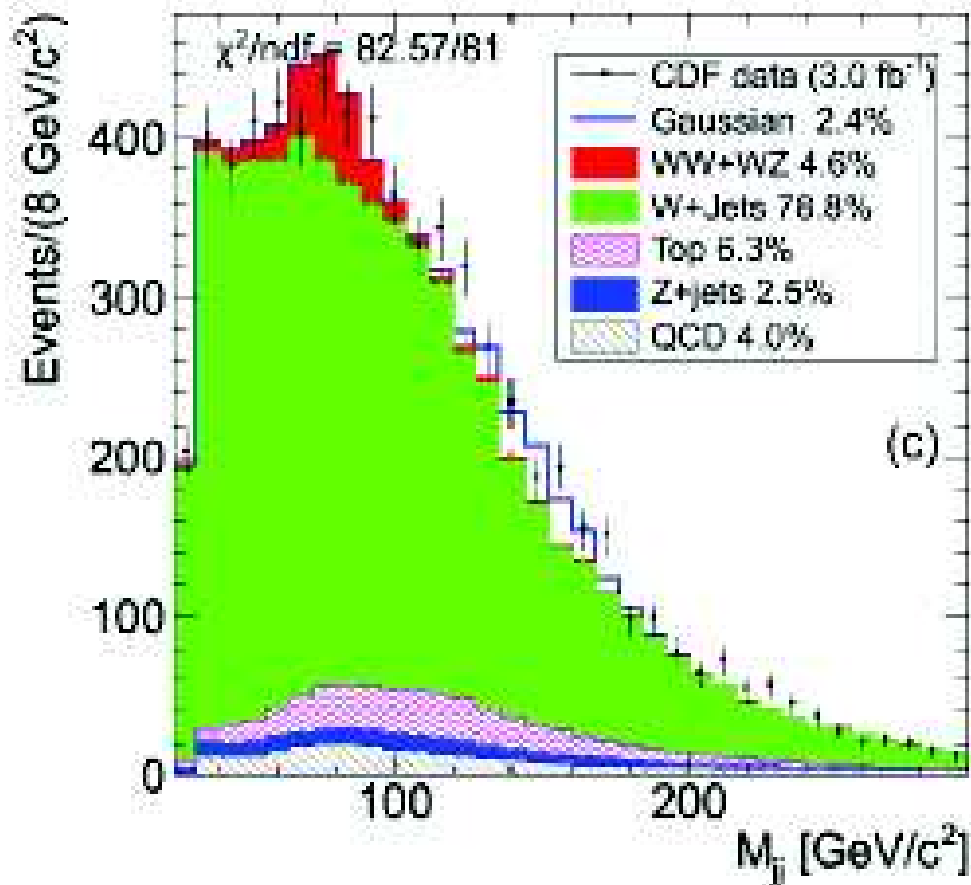
always above 3σ



Si



Additional sample of 3fb⁻¹ of data

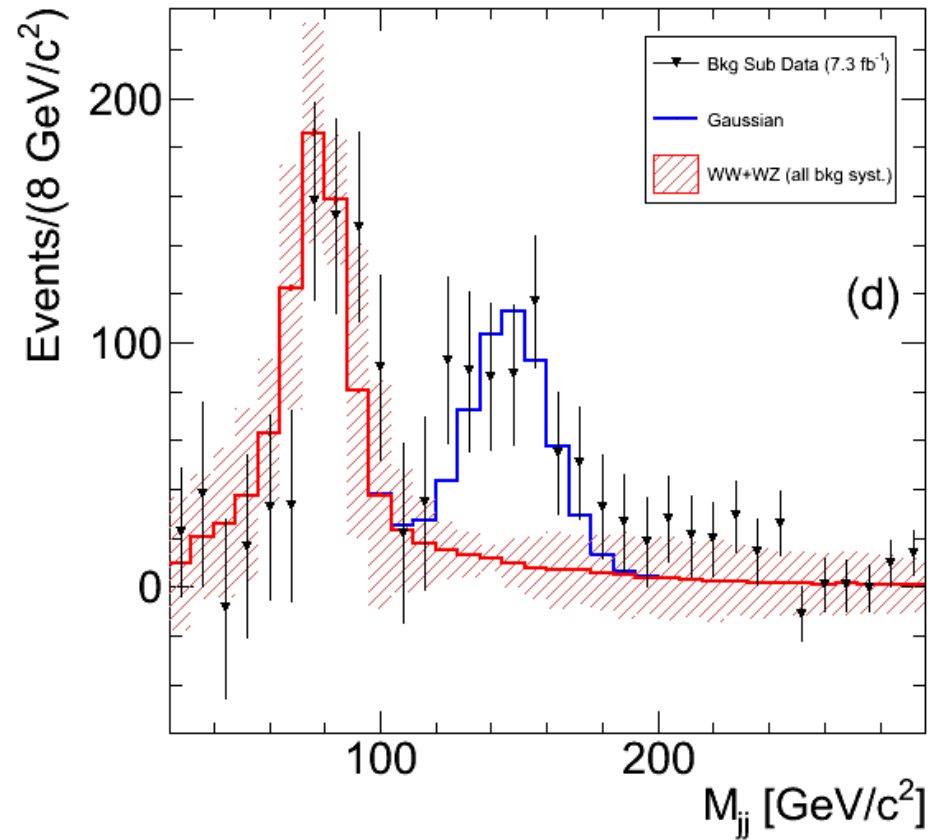
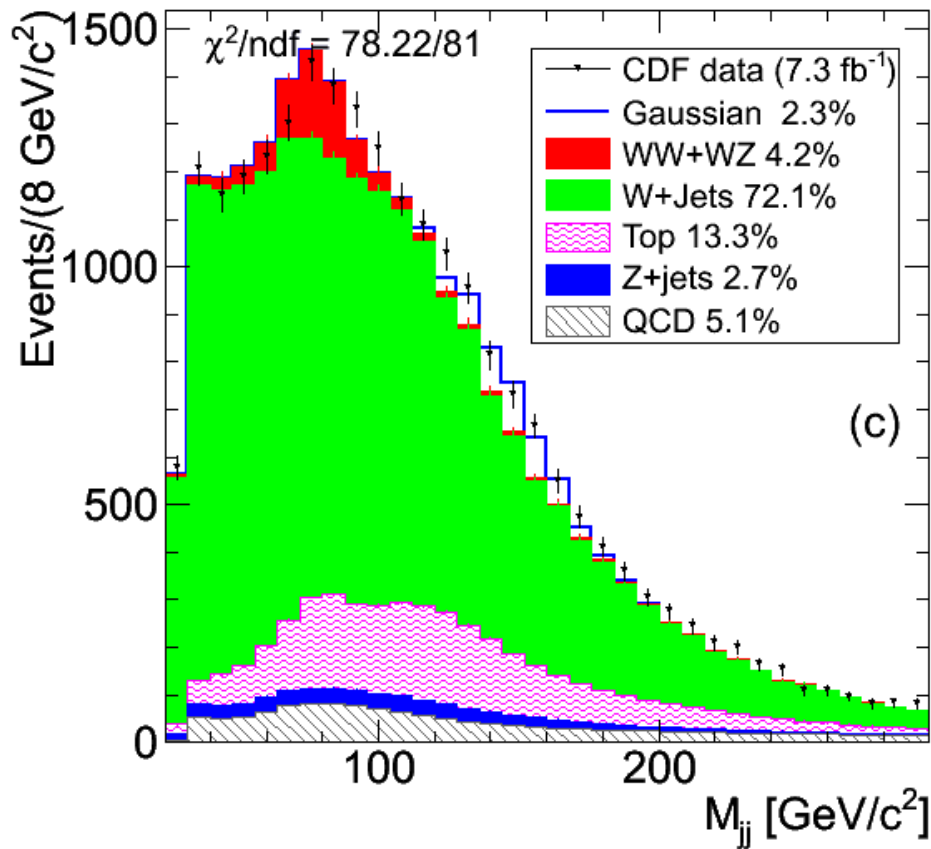


Confirmation: 2.85 σ excess at 147 ± 5 GeV

Giovanni Punzi, 23th Rencontres de Blois, May 30, 2011



The CDF bump: 4.8σ at 7.3 fb^{-1} !



Giovanni Punzi, 23th Rencontres de Blois, May 30, 2011



SUMMARY

LHC will decide about the validity of this effect, but we are
~ 1 year away in luminosity.

For now we should wait for D0-s announcement.

