Measurements of Top Quark Mass at CDF Run II

Measurements in Lepton+Jets Mode

Use $t\bar{t} \rightarrow l\nu b\bar{b}jj$ events.

Calculate event-by-event reconstructed top mass.

Likelihood fit looks for best top mass and background fraction.

Calibrate the jet energy scale with hadronic $W$ mass.

Best single measurement!
Total uncertainty is smaller than Run I World Average!

New
Reconstructed $W \rightarrow jj$ Mass
Combined Fit
CDF Run II Preliminary

Fit to 138 candidates

Reconstructed $M_{top}$ events.

$M_{top} = 173.5 \pm 2.7$ (stat) $\pm 3.0$ (syst) GeV/$c^2$

Measurement in Dilepton Mode

Use $t\bar{t} \rightarrow l\nu l\nu b\bar{b}$ events.

PDF for top mass calculated event by event through Matrix Element calculation.

$P(x, M_t) = P_{\text{Signal}} \frac{1}{\sigma(M_t)} \frac{d\sigma(M_t)}{dx} + \sum_{i=\text{bkg process}} p_i \frac{1}{\sigma_i} \frac{d\sigma_i}{dx}$

Multiply PDFs over candidate events.

$M_{top} = 165.3 \pm 6.3$ (stat) $\pm 3.6$ (syst) GeV/$c^2$

New World Average with 20 and Run 1

$M_{top} = 172.7 \pm 2.9$ GeV/$c^2$

$M_{higgs} < 219$ GeV/$c^2$ (95% C.L.)

Cross Checks

QDLM
Cross Checks in Lepton+Jets
Cross Check by Different Measurement Methods
Cross Checks in Dilepton
NWA
NWA phi
Ttbar Pz

What is DLM?

CDF Run 2 Preliminary (July 20 2005)

CDF Run 2 Preliminary (318 pb$^{-1}$)

CDF Run B Preliminary

CDF Run II Preliminary (114 pb$^{-1}$)