

Measurements of Top Quark Mass at CDF Run II

Measurement in Lepton+Jets Mode

Best single measurement!

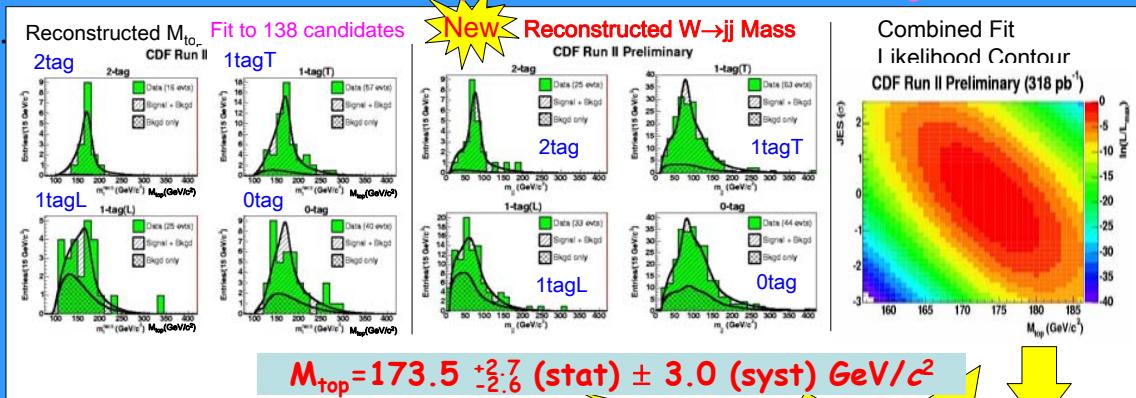
Total uncertainty is smaller than Run I World Average!

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



Measurement in Dilepton Mode

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

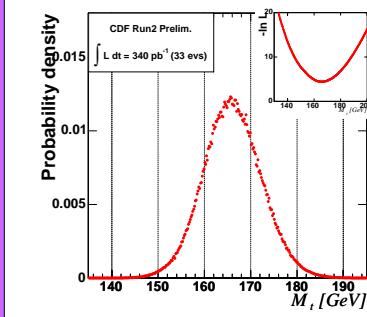
PDF for top mass calculated event by event through Matrix Element calculation.

$$P(\mathbf{x}, M_t) = p_{signal} \times \frac{1}{\sigma(M_t)} \cdot \frac{d\sigma(M_t)}{d\mathbf{x}} + \sum_{i=bkg \text{ process}} p_i \times \frac{1}{\sigma_i} \cdot \frac{d\sigma_i}{d\mathbf{x}}$$

Multiply PDFs over candidate events.

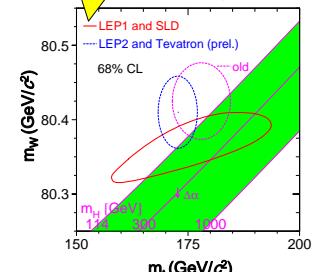
$M_{top} = 165.3 \pm 6.3 \text{ (stat)} \pm 3.6 \text{ (syst) GeV/c}^2$

Joint PDF of 33 Candidate Events

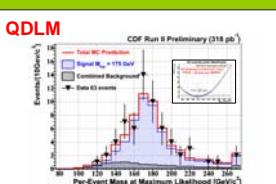


New World Average with D0 and Run I

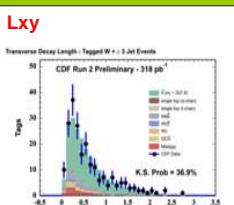
$M_{top} = 172.7 \pm 2.9 \text{ GeV/c}^2$



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



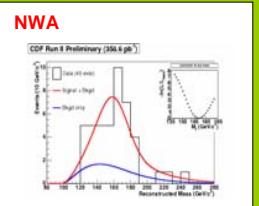
Cross Checks in Lepton+Jets



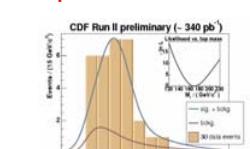
Cross Check by Different Measurement Methods

	Run 1 World Average (Run 1)	Run 1 D0 Lepton-Jets (Run 1 only)	Run 1 CDF Lepton-Jets (Run 1 only)	New TeV Average (prel.) (Run 1 + Run 2)	Lepton-Jets: $M_{top}^2 - W^2$ (Run 1 + Run 2)	Lepton-Jets: L_{xy} (Run 1 + Run 2)	Lepton-Jets: Matrix Element (Run 1 + Run 2)	Dilepton: $M_{top}^2 - W^2$ (Run 1 + Run 2)	Dilepton: L_{xy} (Run 1 + Run 2)	Dilepton: Matrix element (Run 1 + Run 2)	Dilepton: Weighting (Run 1 + Run 2)	Dilepton: ϕ of V (Run 1 + Run 2)	Dilepton: $P_{t(\ell)}$ (Run 1 + Run 2)
Top mass (GeV/c ²)	178.0 ± 2.7 ± 3.3	180.1 ± 3.6 ± 3.9	176.1 ± 5.1 ± 5.3	172.7 ± 1.7 ± 2.4	173.5 ± 2.7 ± 3.0	173.2 ± 2.6 ± 3.2	172.0 ± 2.6 ± 3.3	165.3 ± 6.3 ± 3.6	207.8 ± 27.8 ± 6.5	172.0 ± 2.6 ± 3.3	170.6 ± 7.1 ± 4.4	169.8 ± 9.2 ± 3.8	170.2 ± 7.3 ± 3.8

Cross Checks in Dilepton



NWA phi



Ttbar Pz

