Top mass, ME, lepton+jets, p17

e/mu pt>20, met>20, 4 jets pt>20

triangle cuts to remove QCD

>=1 NN b-tagged jet

- **approximate b,light jet eff.?**

220 events split **roughly** evenly between e/mu – **signal / background?**

$$P_{\rm evt} = f_{\rm top} P_{\rm sig}(x; m_{\rm top}, J) + (1 - f_{\rm top}) P_{\rm bkg}(x, J),$$

apply ME technique

10 variables to integrate over (after constraints)

$$P(x,\alpha) = \frac{1}{\sigma(\alpha)} \int \sum d\sigma(y,\alpha) dq_1 dq_2 f(q_1) f(q_2) W(y,x),$$

f'(q) includes initial system pt from Pythia!

$$P_{\rm sig} = \frac{1}{\sigma^{t\bar{t}}_{\rm obs}} \sum_{i=1}^{24} w_i \int d\rho dm_1^2 dM_1^2 dm_2^2 dM_2^2 d\rho_\ell dq_1^{\rm x} dq_1^{\rm y} dq_2^{\rm x} dq_2^{\rm y}$$
$$\times \sum_{\rm flavors,\nu} |\mathcal{M}_{t\bar{t}}|^2 \frac{f'(q_1) f'(q_2)}{\sqrt{(q_1 \cdot q_2)^2 - m_{q_1}^2 m_{q_2}^2}} \Phi_6 W(y,x),$$

transfer functions for jets (in 4 eta regions and for b/light), e, mu

minimize total likelihood, in situ JES

- W->jj resonance, J
- prior from standard gamma+j JES, G(J)

$$L(x; m_{\rm top}) = \int L(x; m_{\rm top}, J) G(J) dJ$$
$$L(x; J) = \int L(x; m_{\rm top}, J) dm_{\rm top},$$

Calibrate using MC.
Input test mass, see what mass you measure
Input test J, see what J you measure

1000 pseudo-experiments (for tt signal)
Pulls are close to 1

JES fit is nearly 2sigma from the prior!
- **why? is it consistent with systematics?**

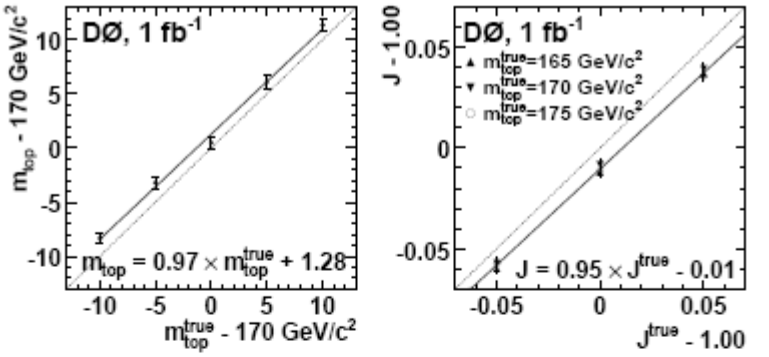

Figure 1: Mean values of m_{top} and J from ensemble tests versus true values parameterized by straight lines. Dashed lines represent identical fitted and true values.

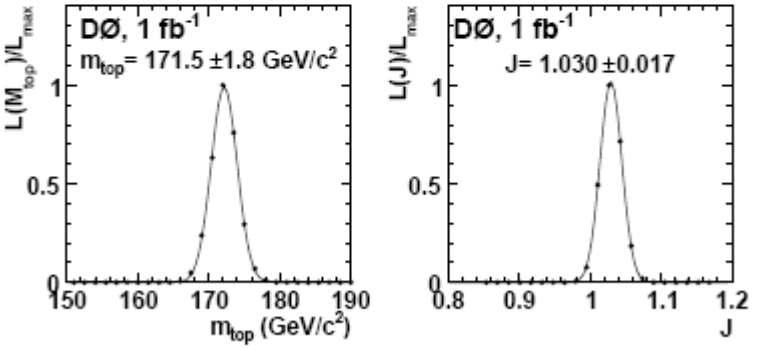

Figure 2: Projections of data likelihoods onto the m_{top} and J axes with best estimates shown.

Just one paragraph on systematics!

I could use more info. This analysis is going to be sys. limited using data we've already collected!

- **How is the uncertainty on the b/light response ratio estimated?**
- **How are uncertainties from jet radiation (signal modeling) estimated? MC@NLO?**
- **Are all the systematics really uncorrelated, thus is it fair to add them in quadrature?**

Source	Uncertainty (GeV/c^2)
Signal modeling	±0.40
Background modeling	±0.04
b-fragmentation	±0.03
PDF uncertainty	±0.14
Heavy flavor component	±0.09
Residual jet energy scale	±0.10
b/light response ratio	±0.83
Jet ID efficiency	±0.26
Jet resolution	±0.03
Trigger	±0.19
Signal fraction	±0.09
QCD contamination	±0.14
MC calibration	±0.26
b-tagging efficiency	±0.15
Signal contamination	±0.13
Muon resolution	±0.23
Luminosity	±0.01
Total	±1.09

Other comments:

- **Would be nice to see the simple M_top, M_W plots too, which give a sense for the S/B, statistics, and resolutions involved.**

$$m_{\mathrm{top}} = 171.5 \pm 1.8(\mathrm{stat.+J}) \pm 1.1(\mathrm{syst.})\ \mathrm{GeV}$$