

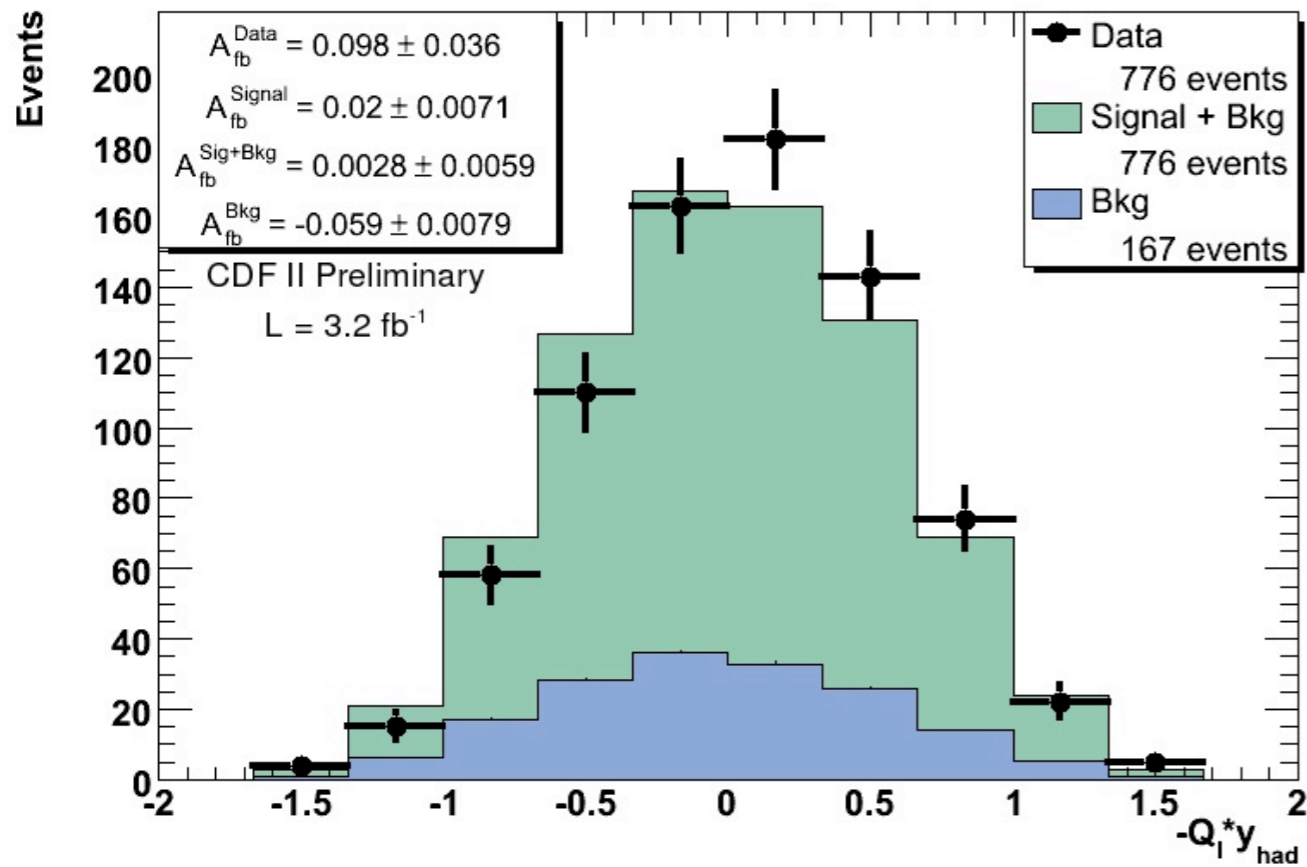
Tevatron Questions

Tom Schwarz
Top@Tevatron 4 LHC

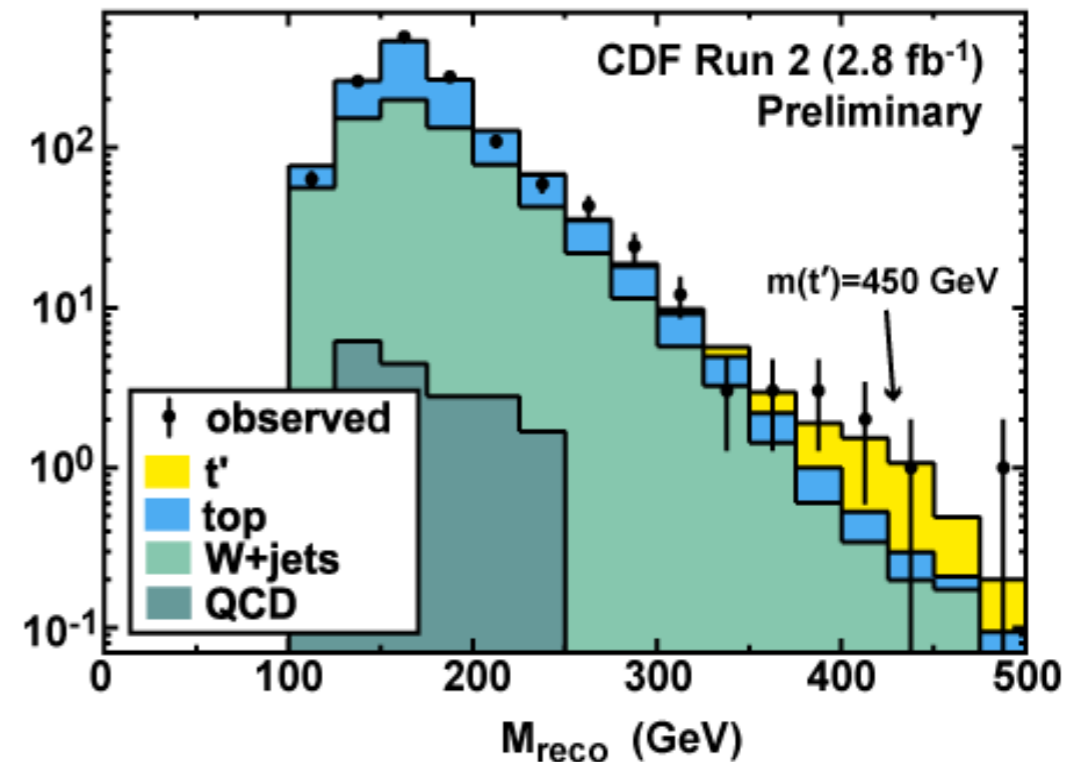
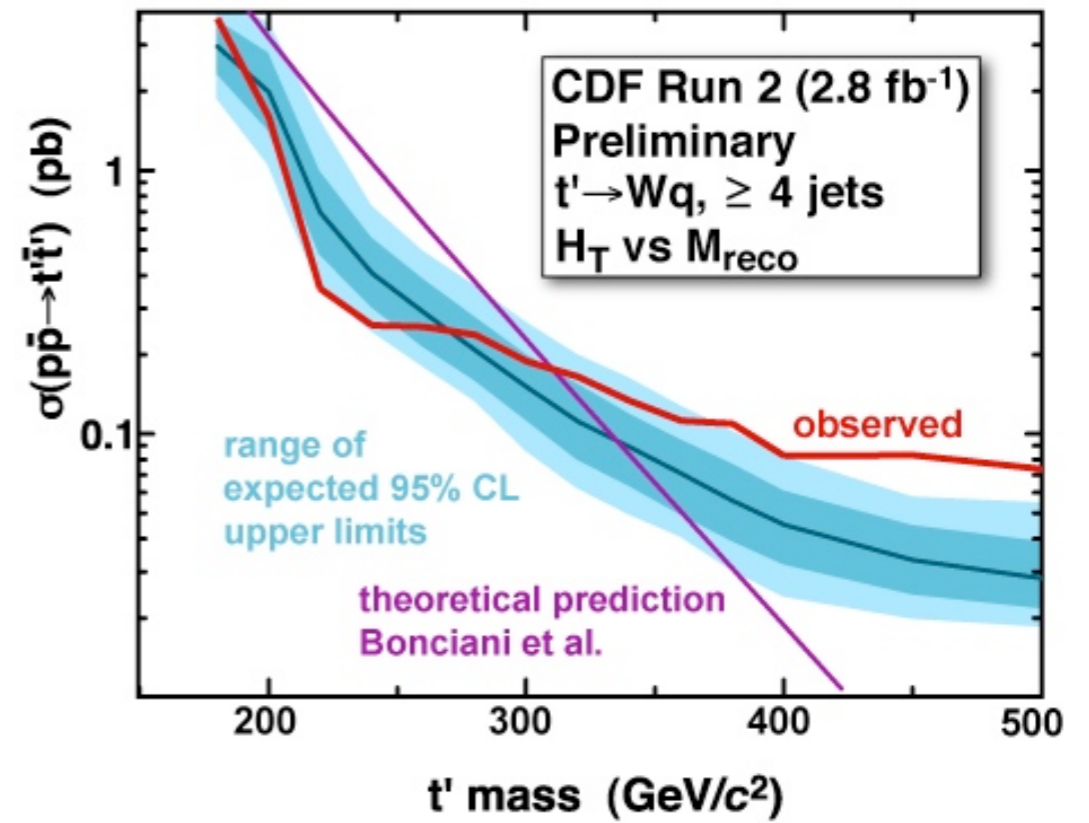


**Are we exhausting our phase
space at the Tevatron?**

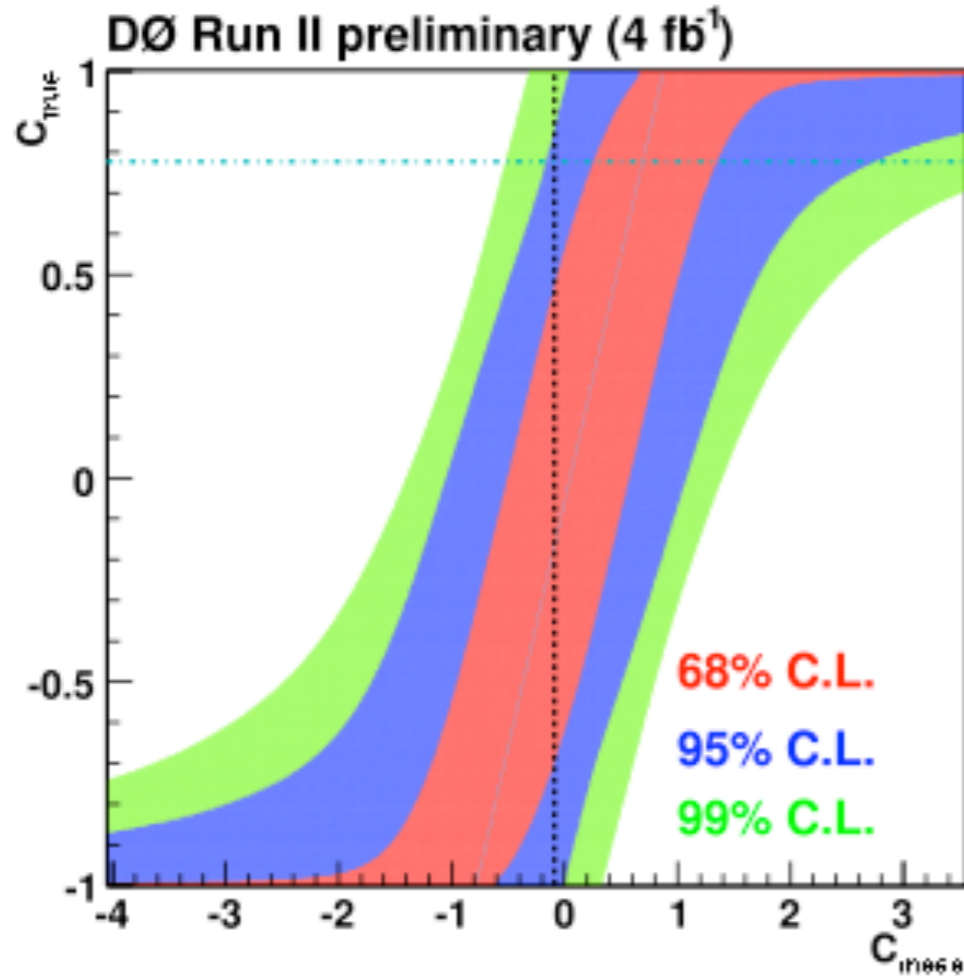
t-tbar A_{fb}



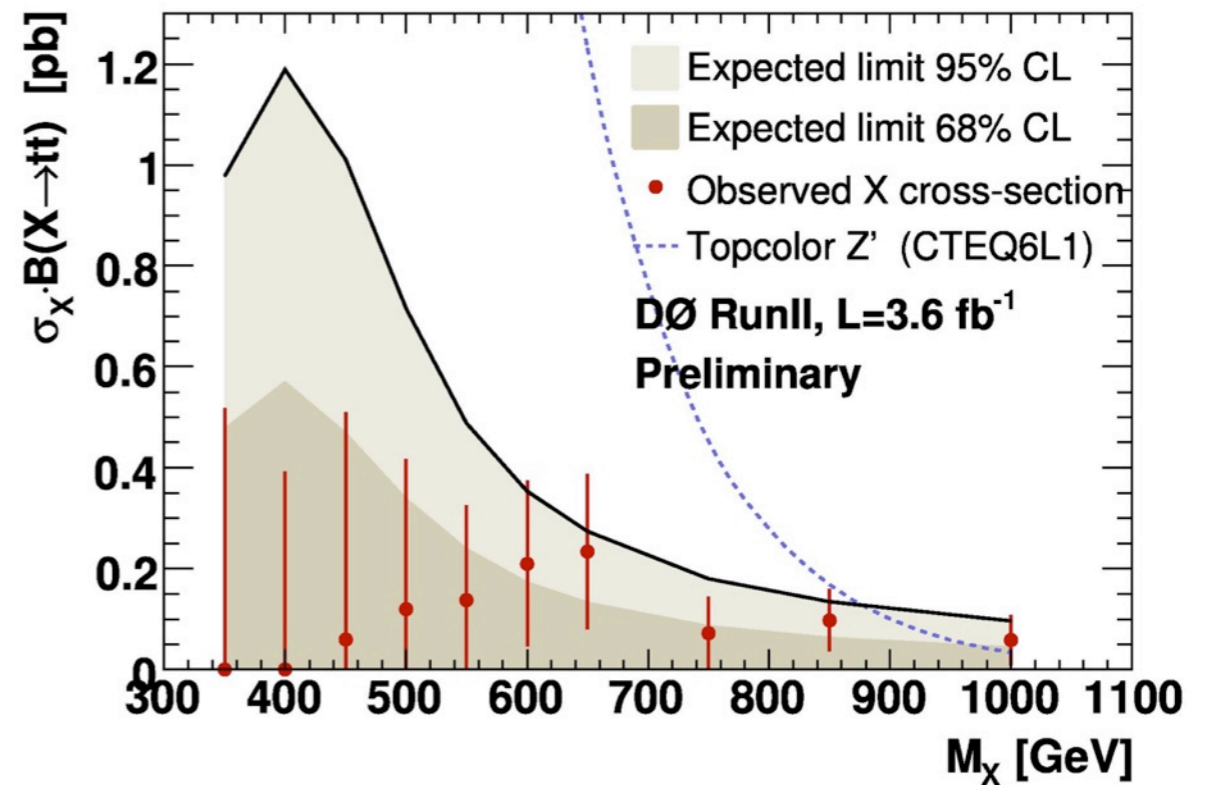
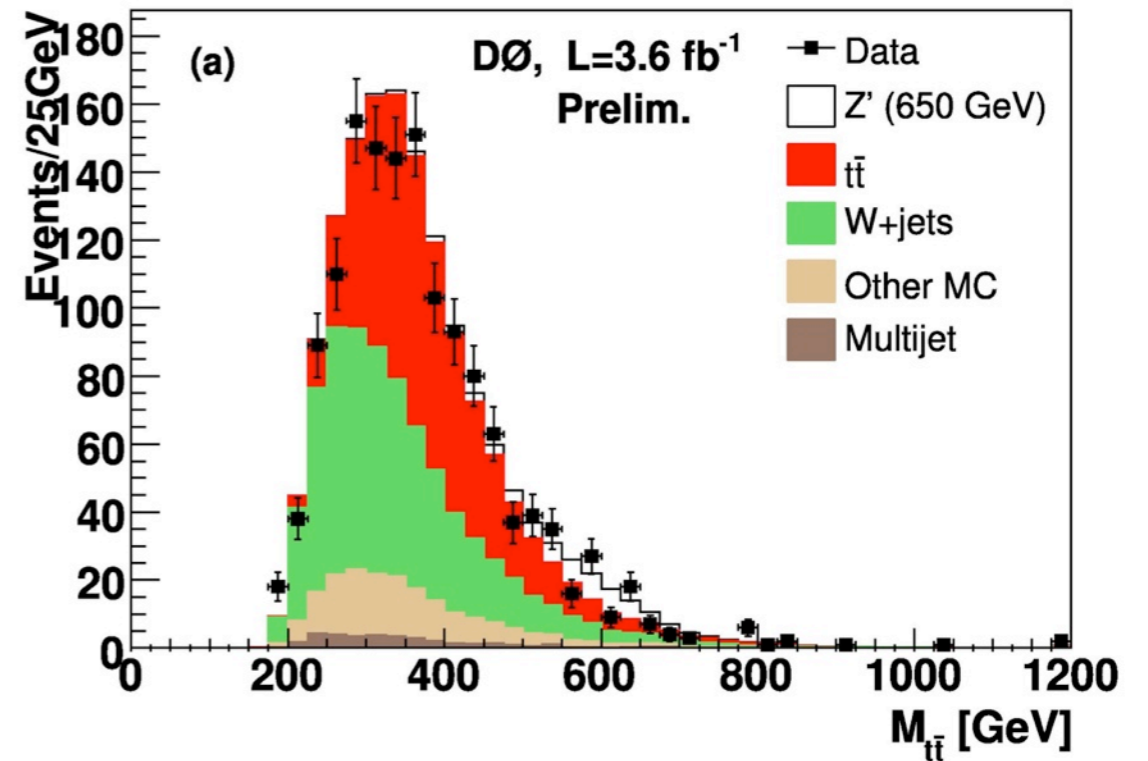
t' Search



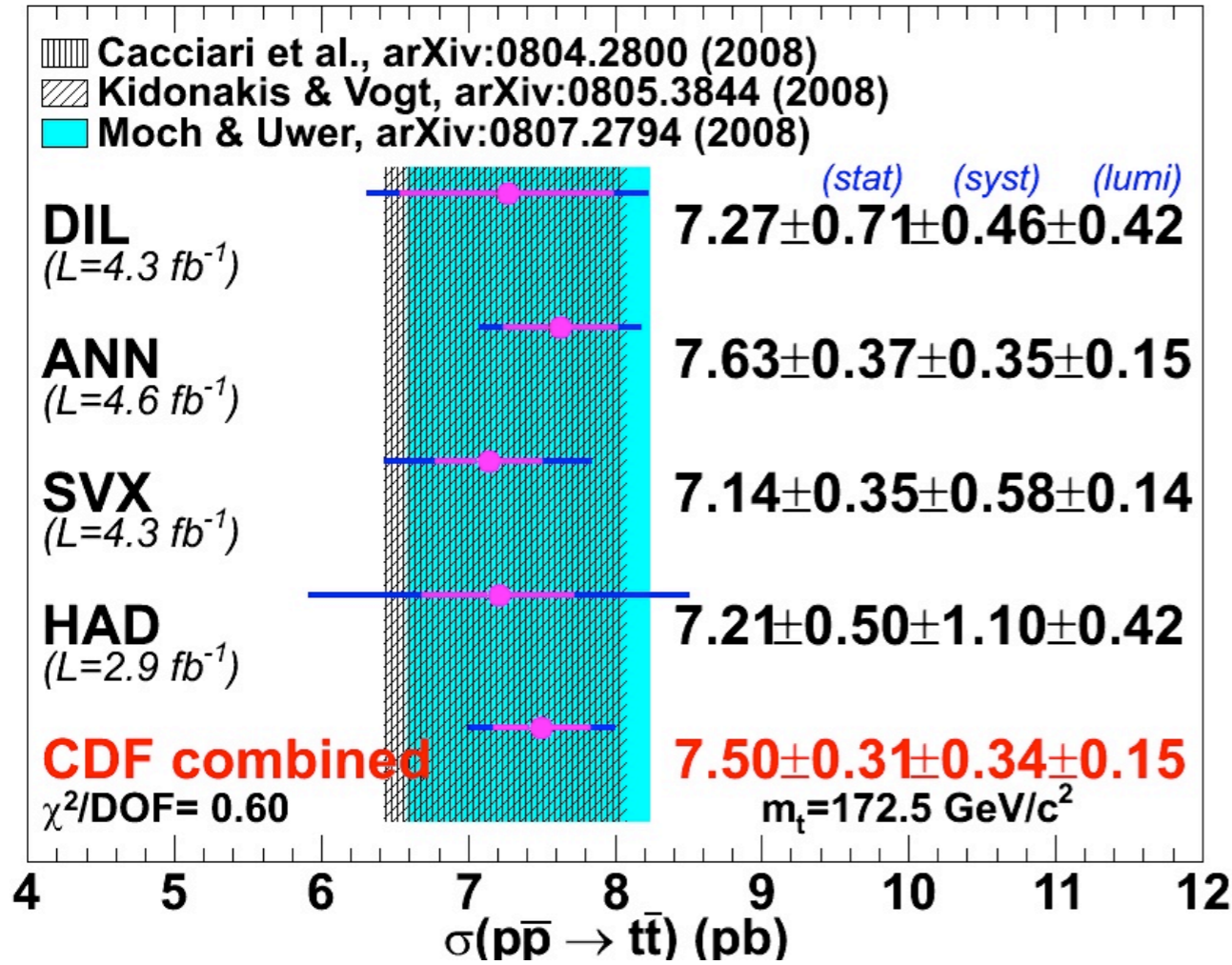
Spin Correlations



Resonance Search

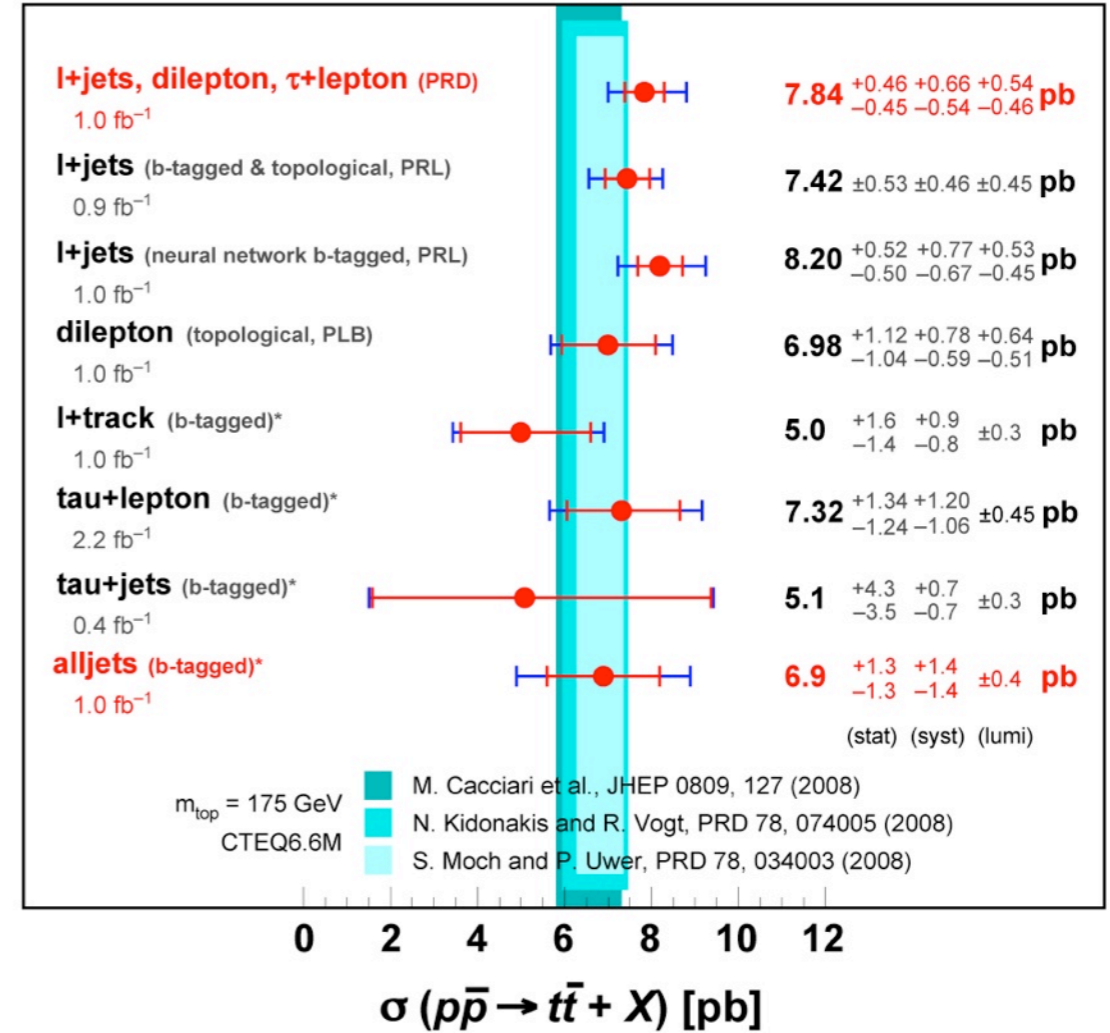


The cold water...X-Section

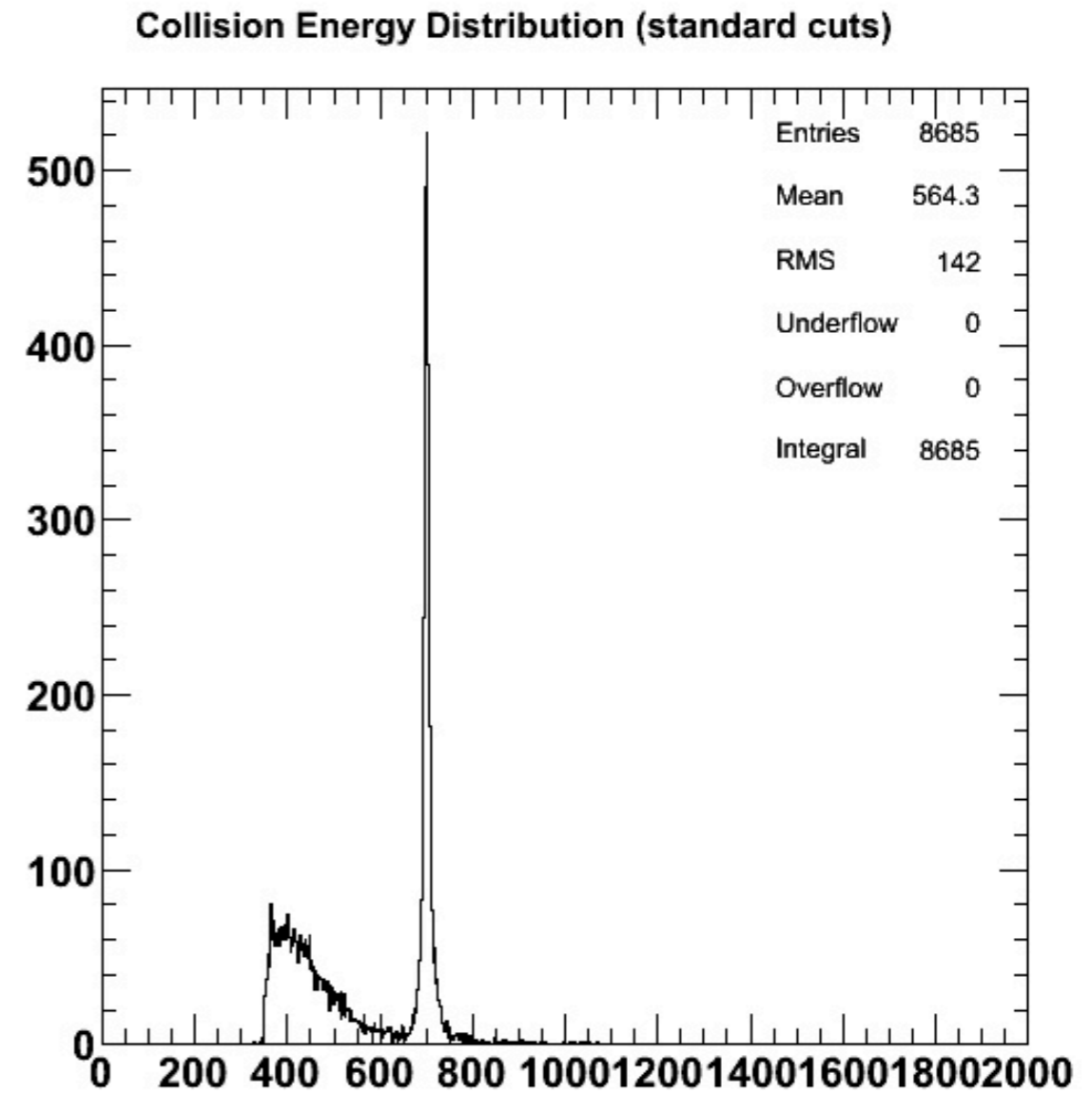
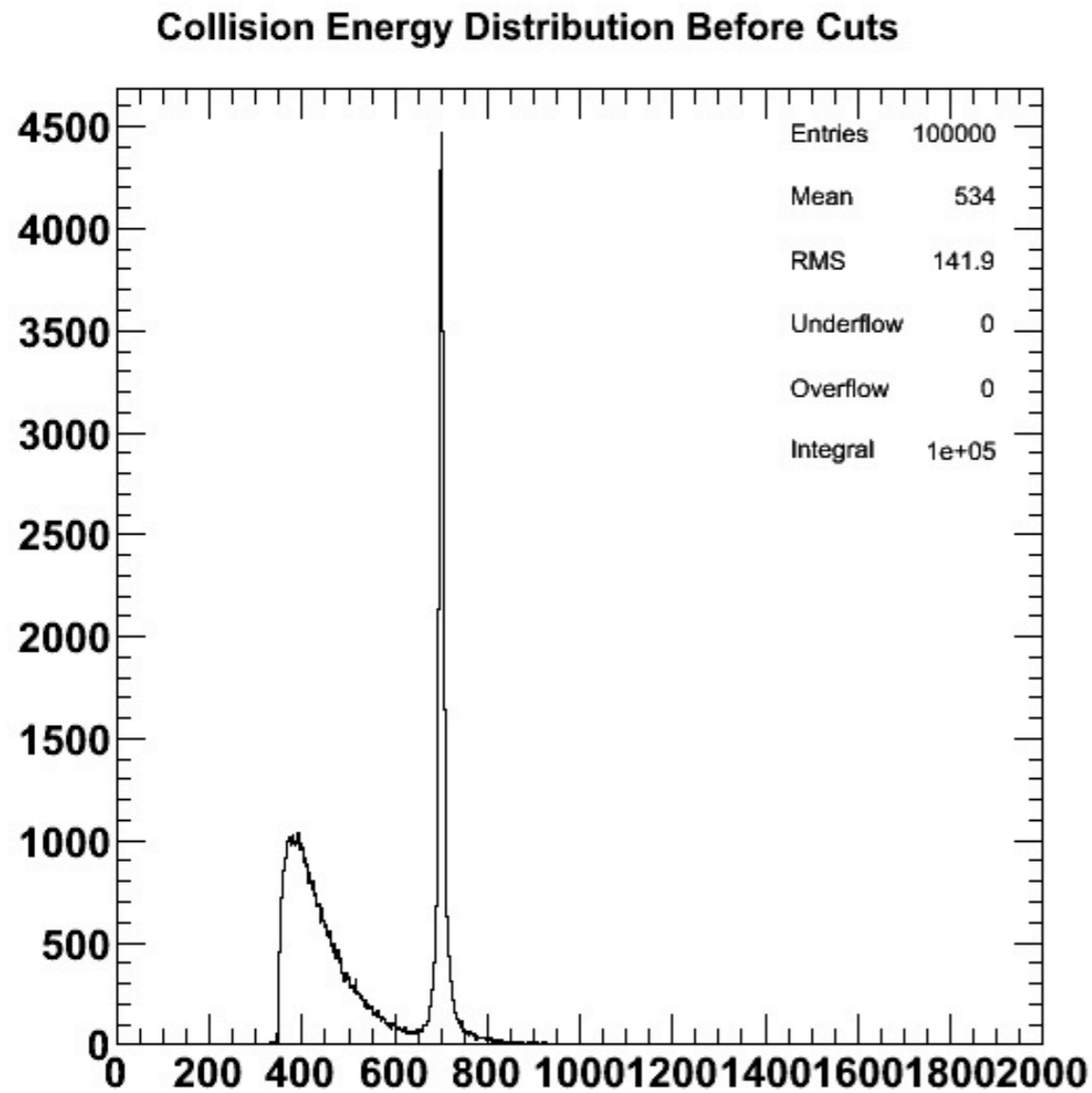


DØ Run II * = preliminary

August 2009



Selection not optimal for high energy resonances?



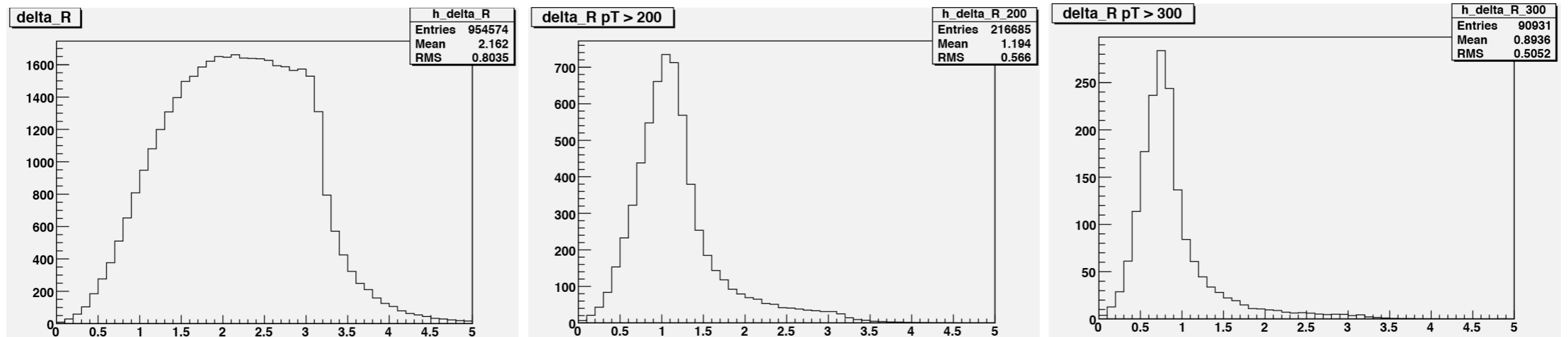
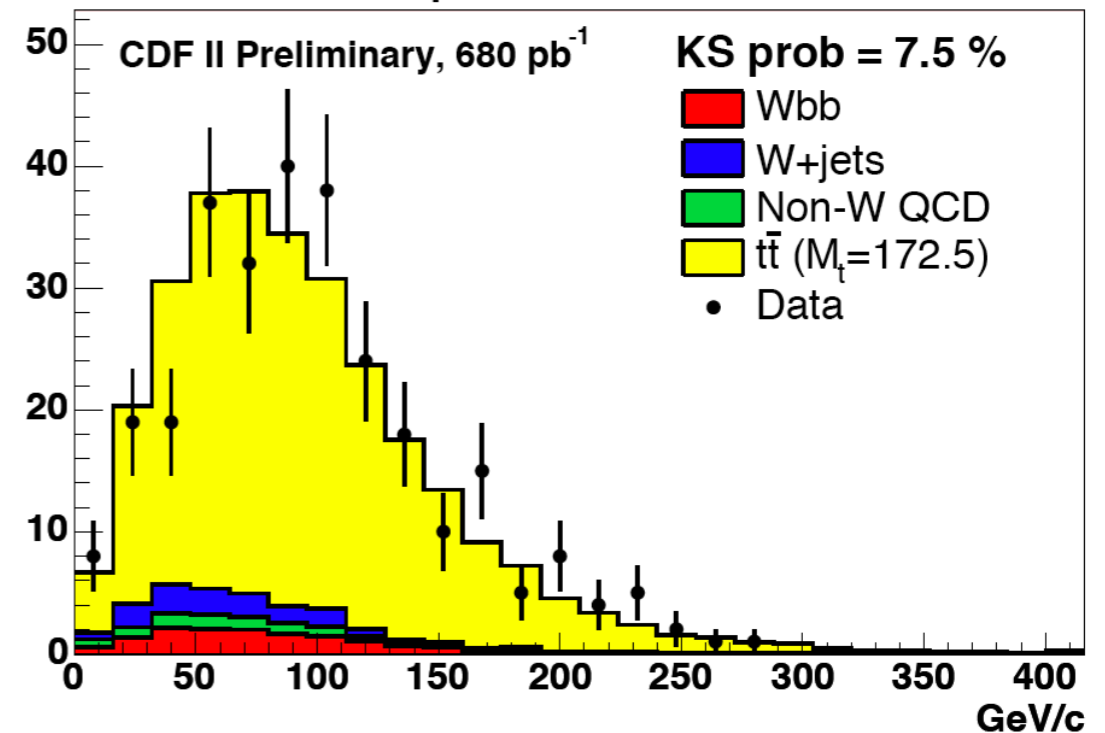
Color Octet $M_x = 700$ GeV

Boosted Top at the Tevatron

- Can we do this?
- Could be cutting off our tails
 - Delta R cuts on jets
 - Isolation on lepton
- If t' and A_{fb} are hinting at something, this might be a good direction

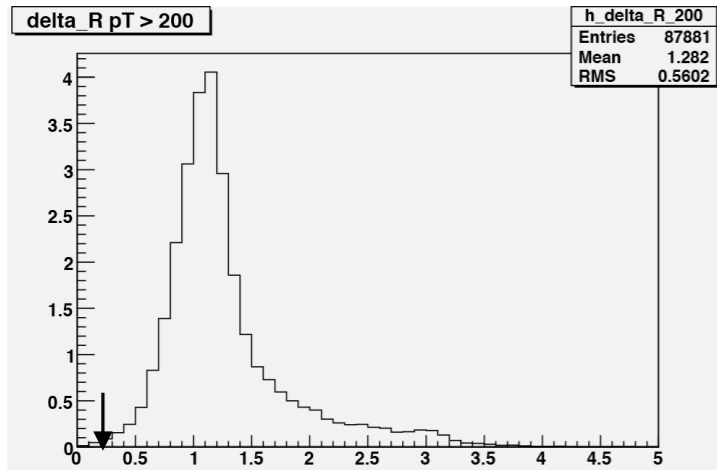
But what else?

Reco t/tbar p_T , 1-tag(T) + 2-tag events



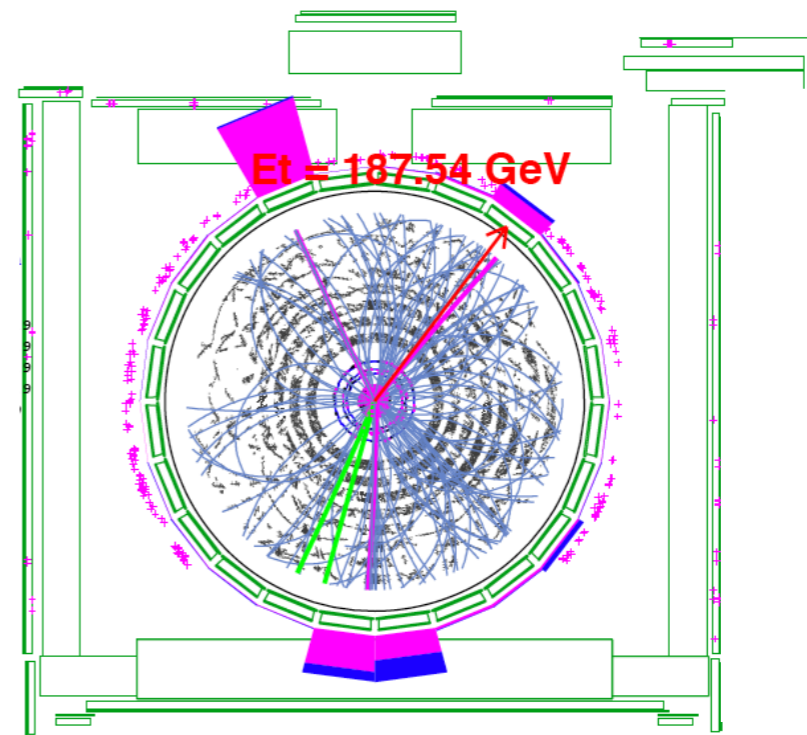
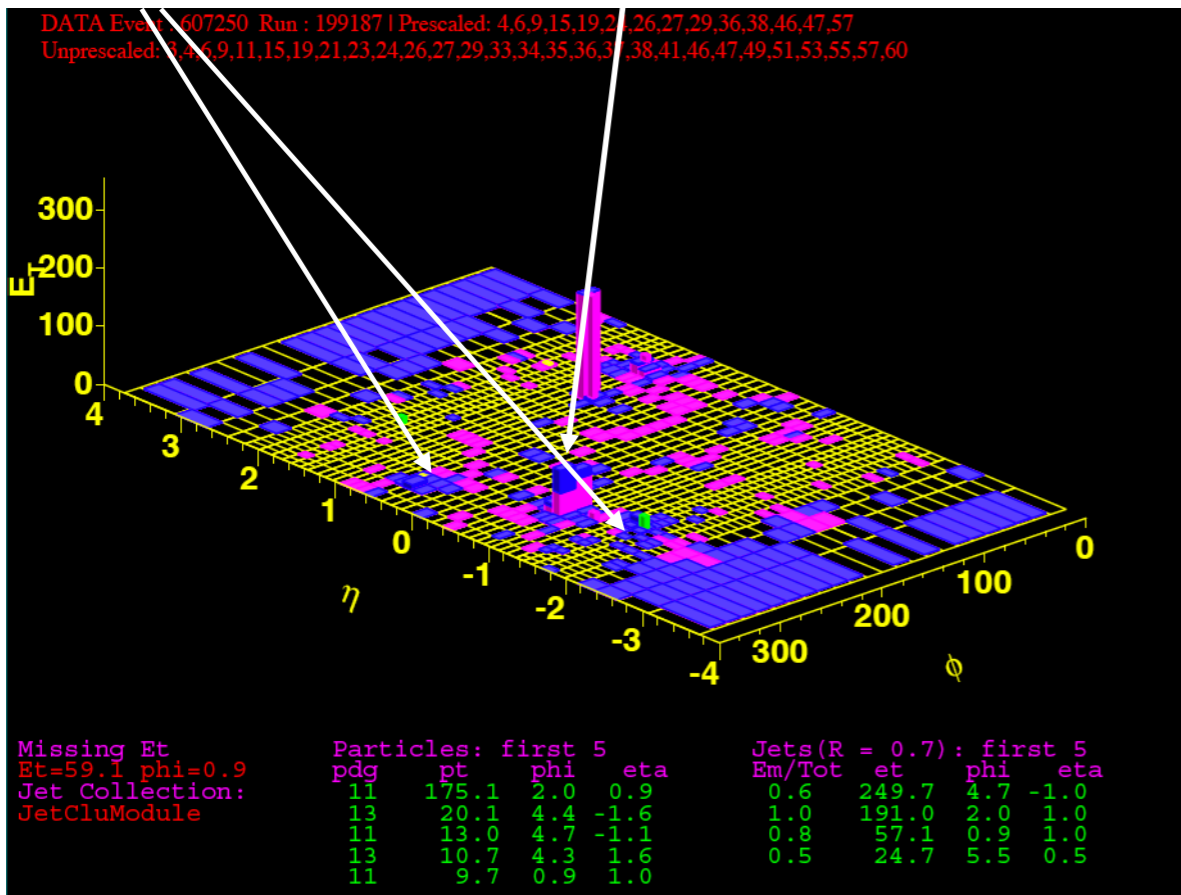
- Joey Huston (MSU)

$p_T = 270 \text{ GeV}/c$



$W(\Delta R = 2.28)$

b

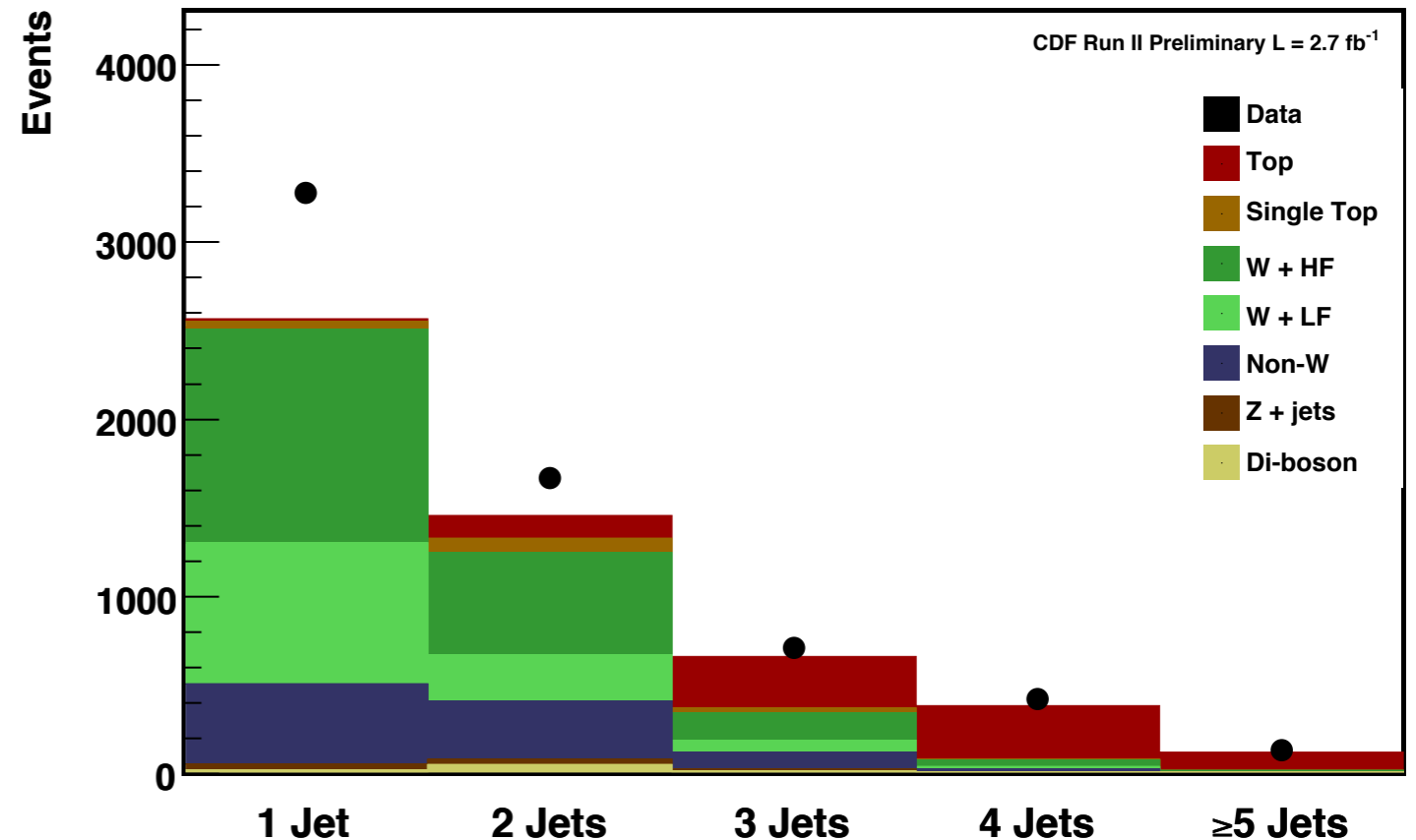
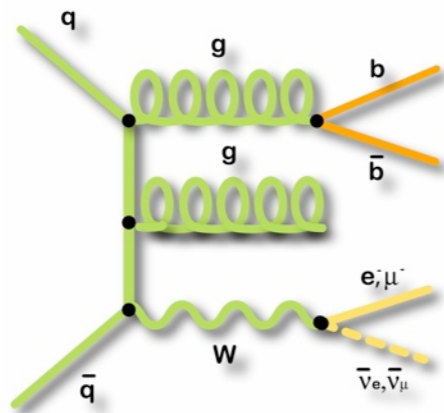


- Joey Huston (MSU)

**Do we understand
backgrounds or are they just
contained?**

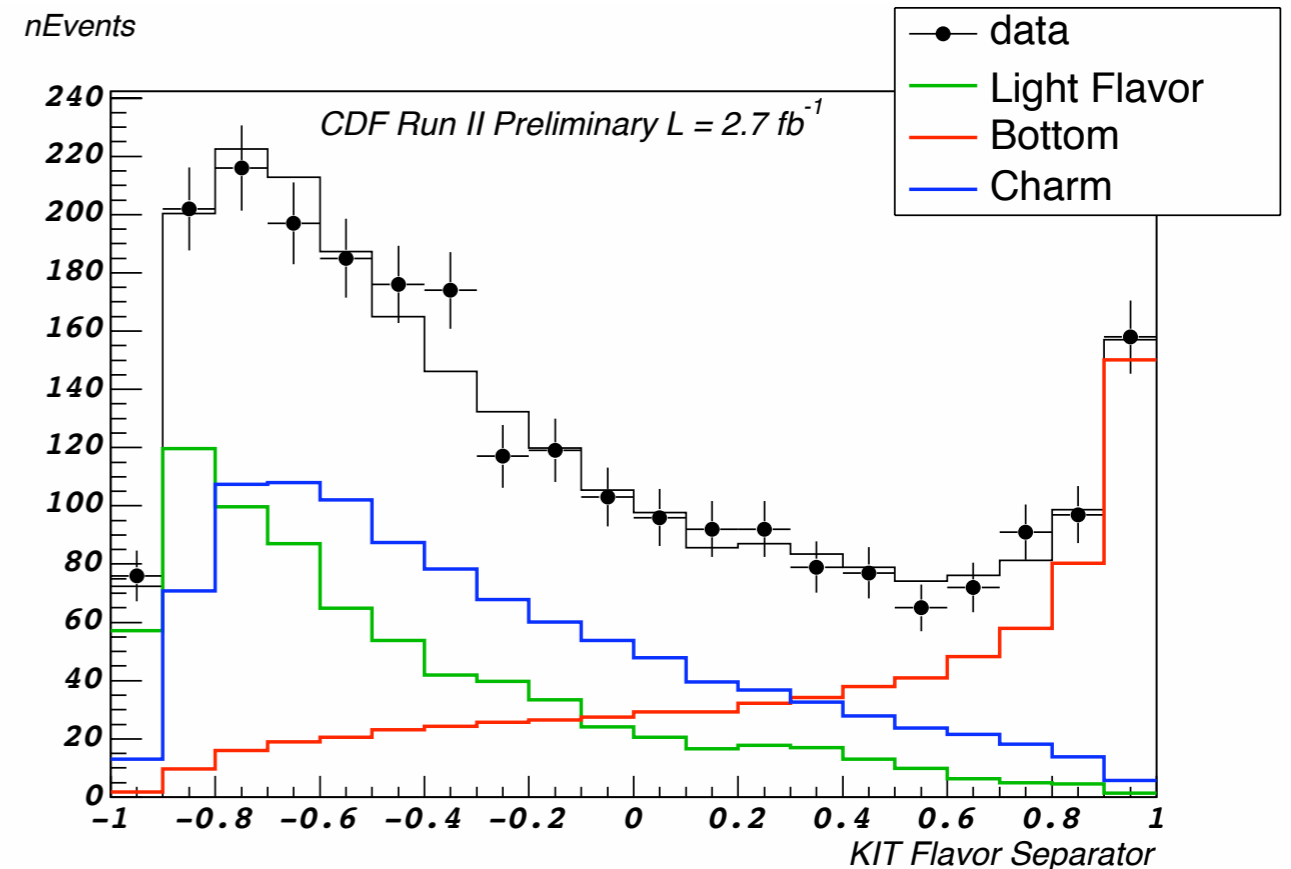
Tagging Prediction

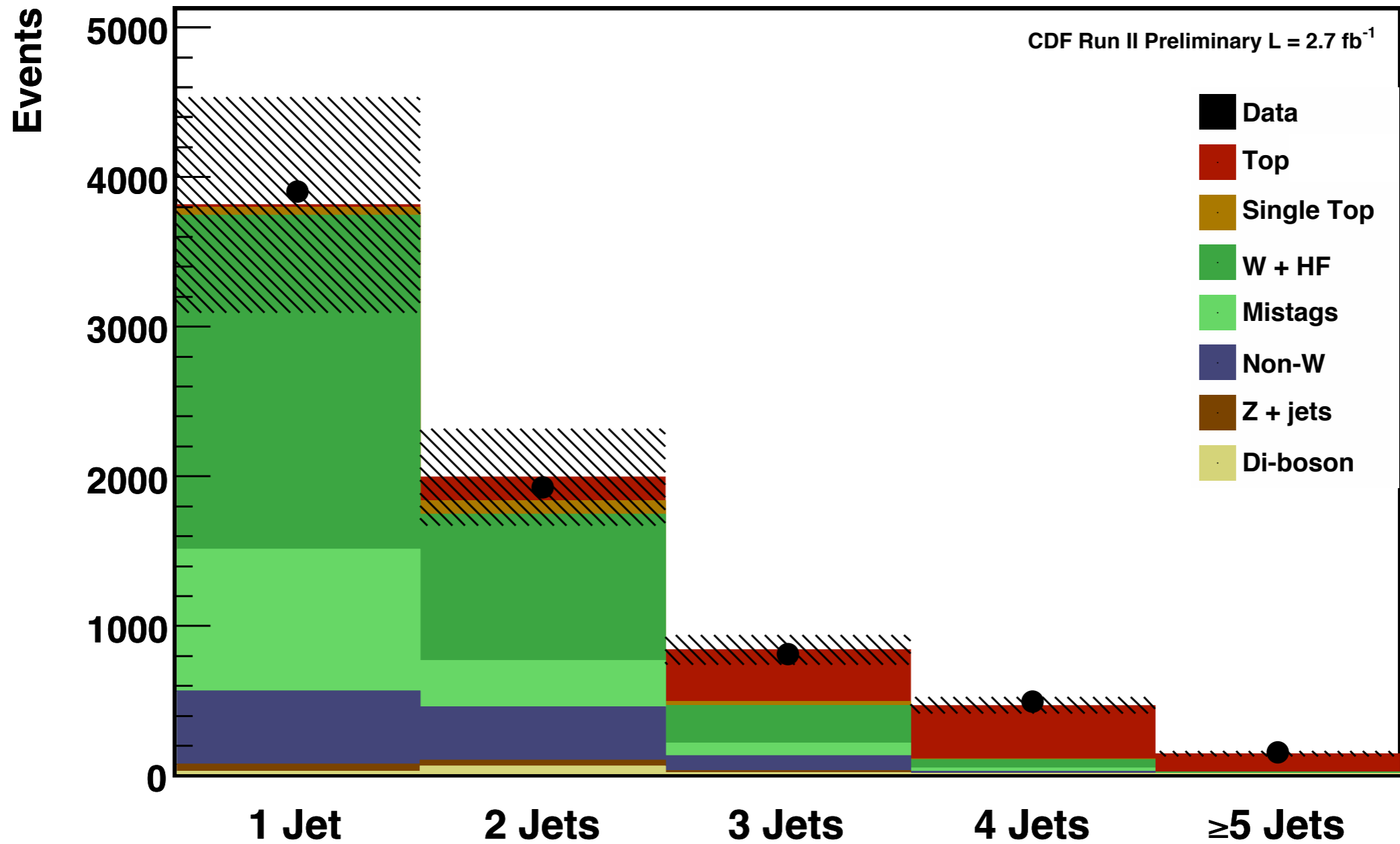
- Background dominated regions look awful!
- So what's wrong?
- Turns out that LO Monte Carlo under predicts the amount of W +jet events with heavy flavor



Correcting W + HF

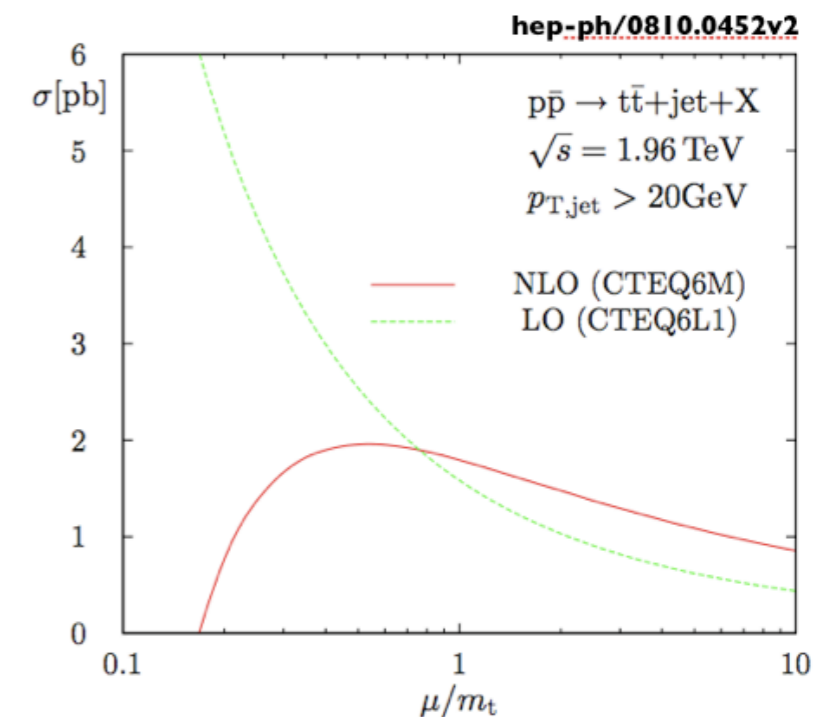
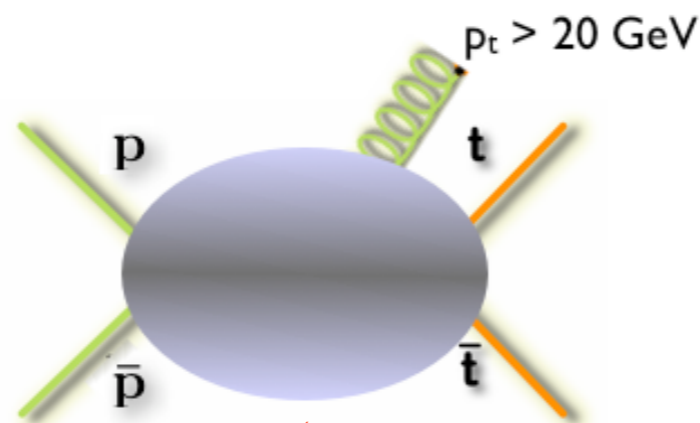
- Effectively we measure the Heavy Flavor content in W+I jet events
- Use a Neural Network trained on tracking/tag variables to distinguish bottom, charm and light flavor
- Simultaneously fit for bottom, charm, and light flavor fractions
- Compare to Monte Carlo to derive a correction factor and apply this to the W + jets prediction in the signal region
- Cross check technique across jet multiplicity



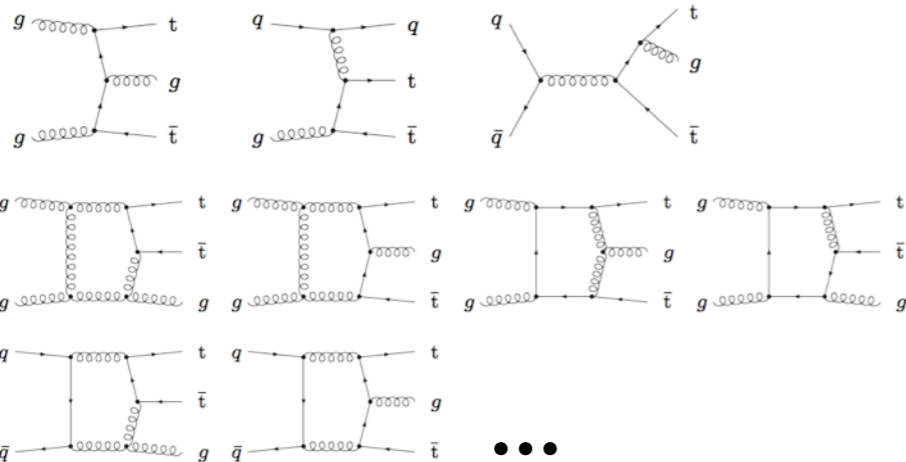


Measurement of the $t\bar{t} + j$ Cross Section

- Idea is to quantify the production of top anti-top pairs in association with a hard jet



(16 diagrams)



$$\sigma_{t\bar{t}+j} = 1.6 \pm 0.2_{\text{stat}} \pm 0.5_{\text{sys}} \text{ pb}$$

$$\sigma_{t\bar{t}+j} = 1.79^{+0.16}_{-0.31}$$

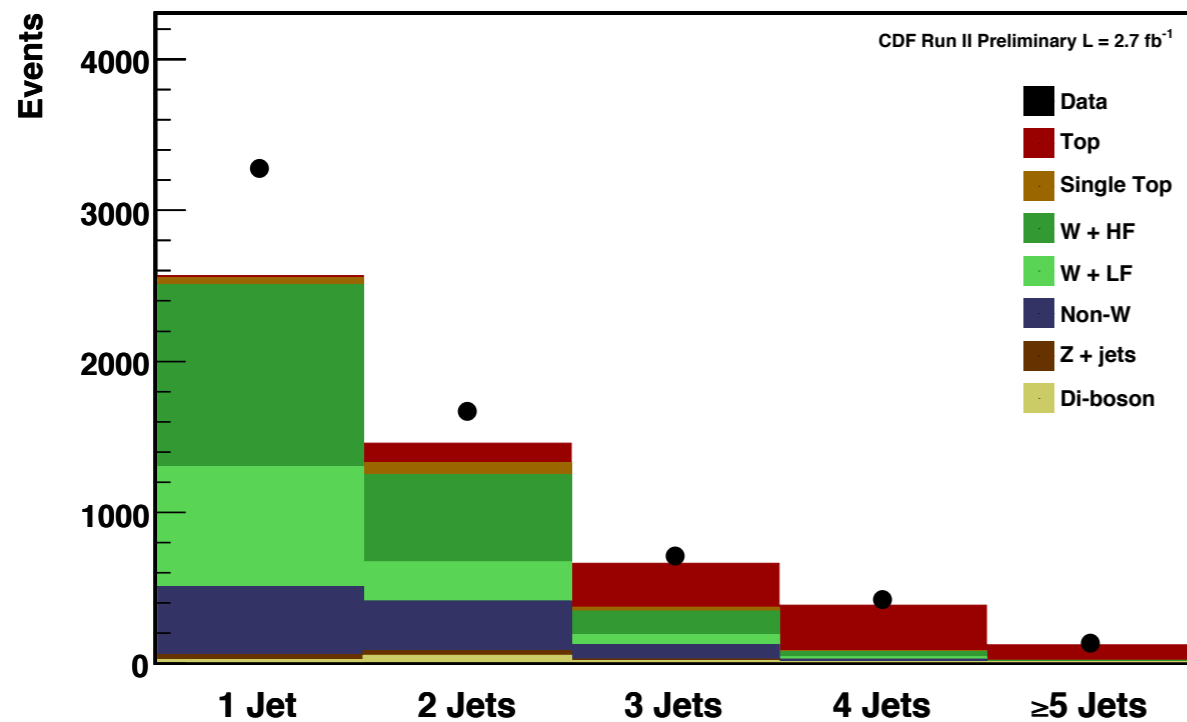
Dittmaier, Uwer, and Weinzierl hep-ph/0810.0452v2

Why should we care?

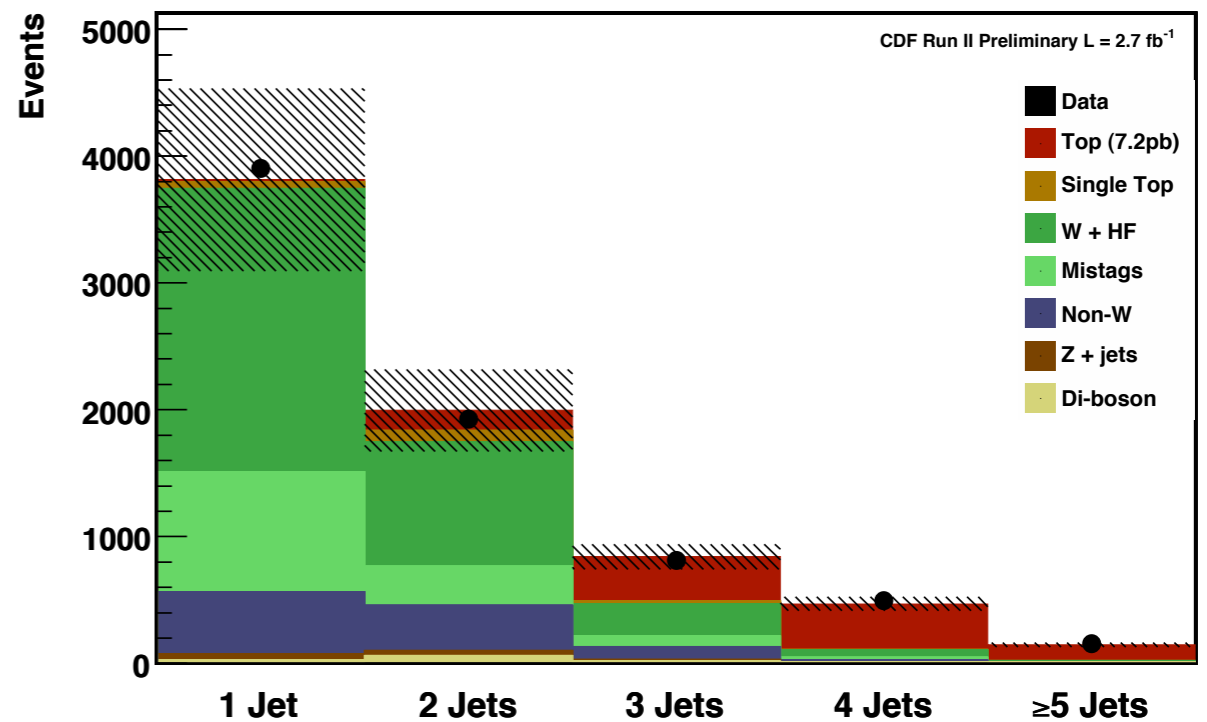
- Today's signal is tomorrow's background $H + 2 \text{ jets } t\bar{t}H$
- $t\bar{t}+j$ is to the LHC what $W + \text{heavy flavor}$ is to the Tevatron

The W+HF problem

before corrections



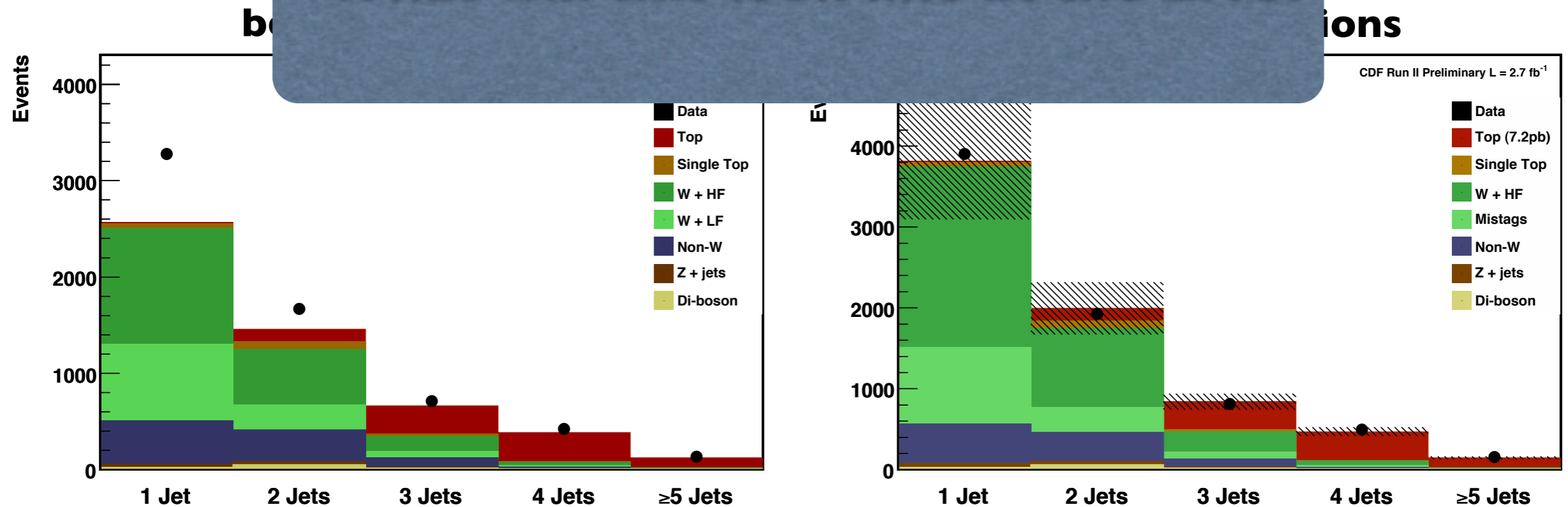
after corrections

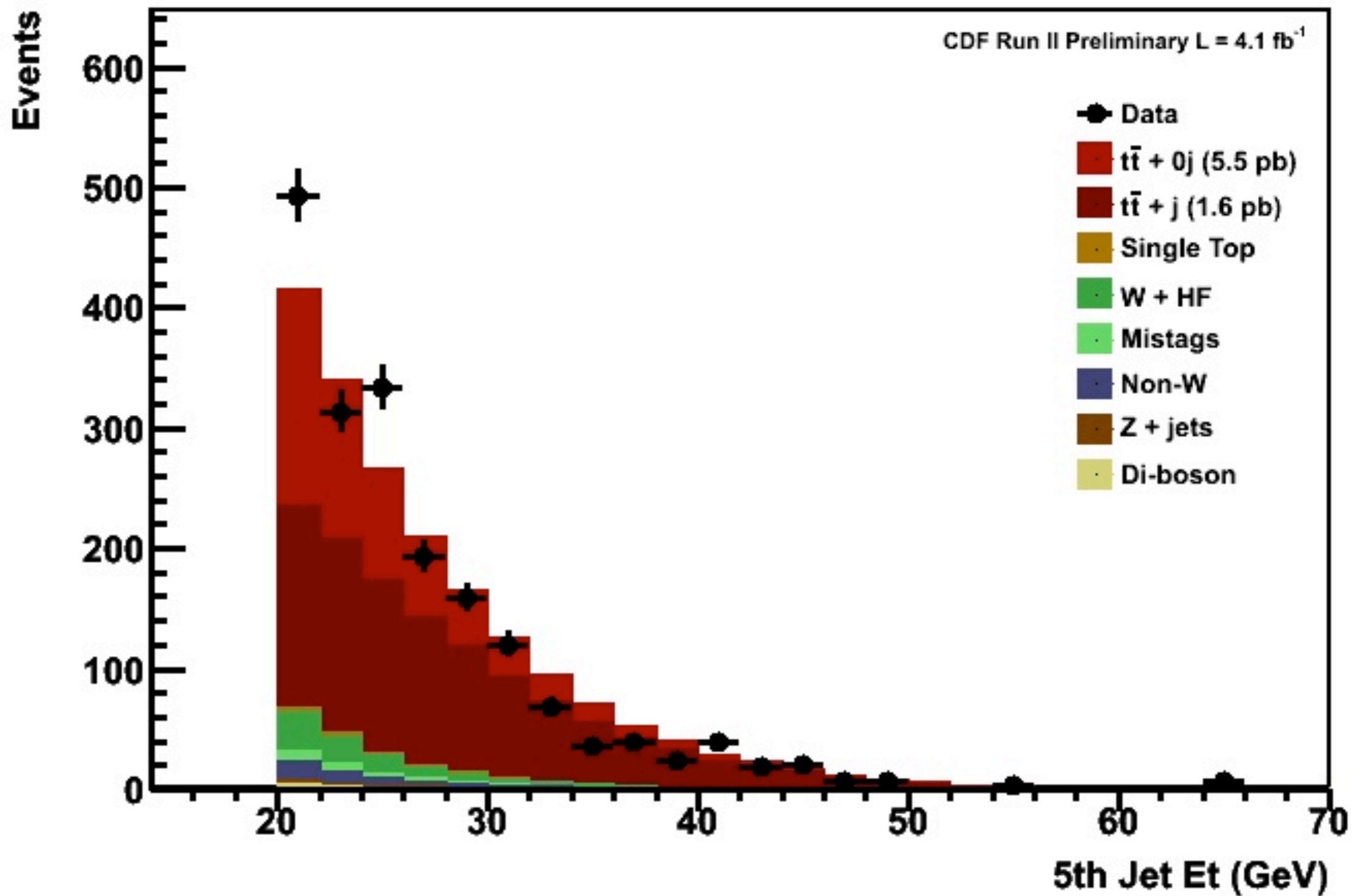


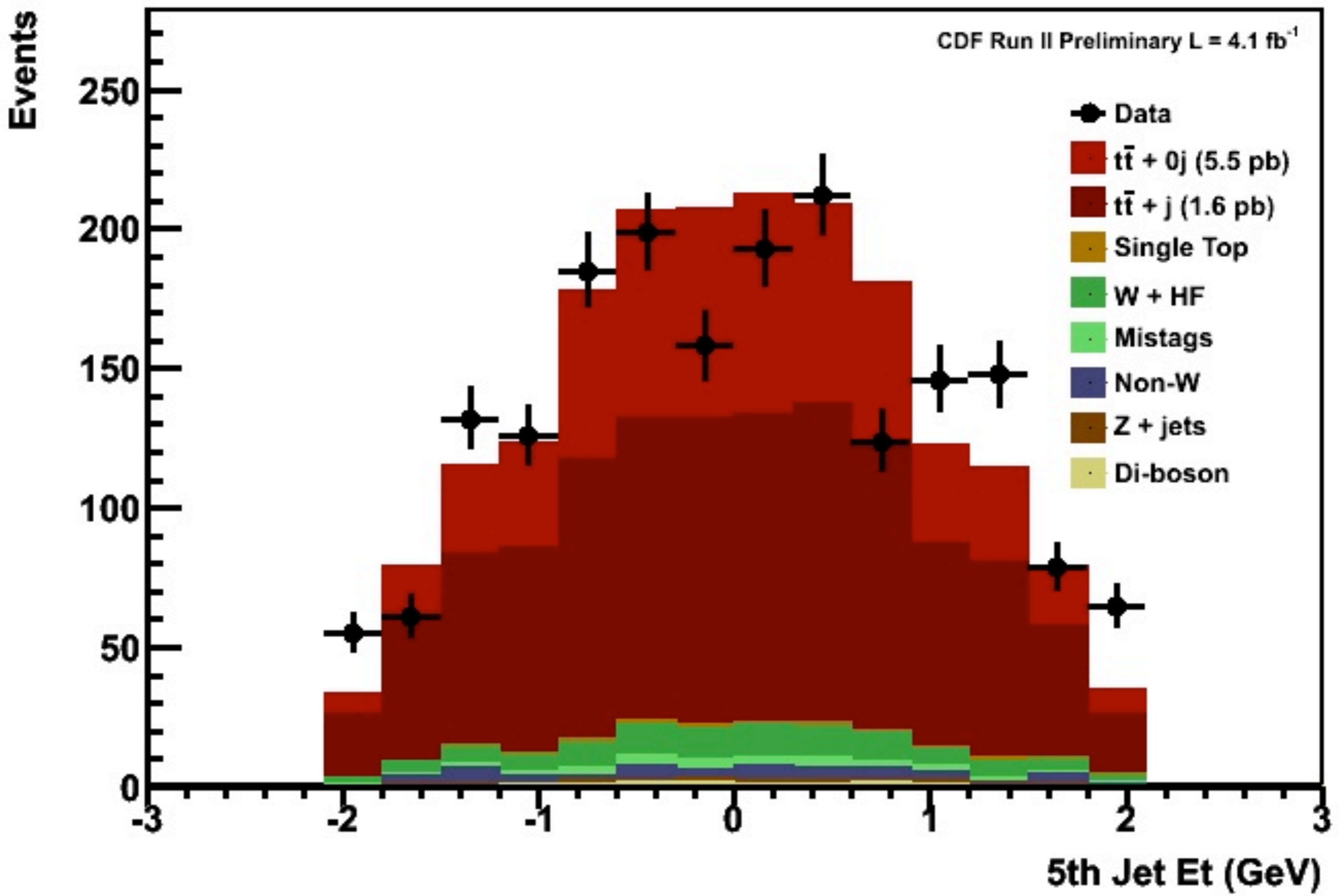
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What will this look like at the LHC?







Resonance Search

CDF Run II preliminary, $L=2.8\text{fb}^{-1}$

