Mass fit status
NTUA
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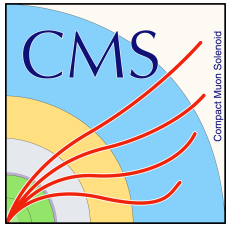
George Bakas



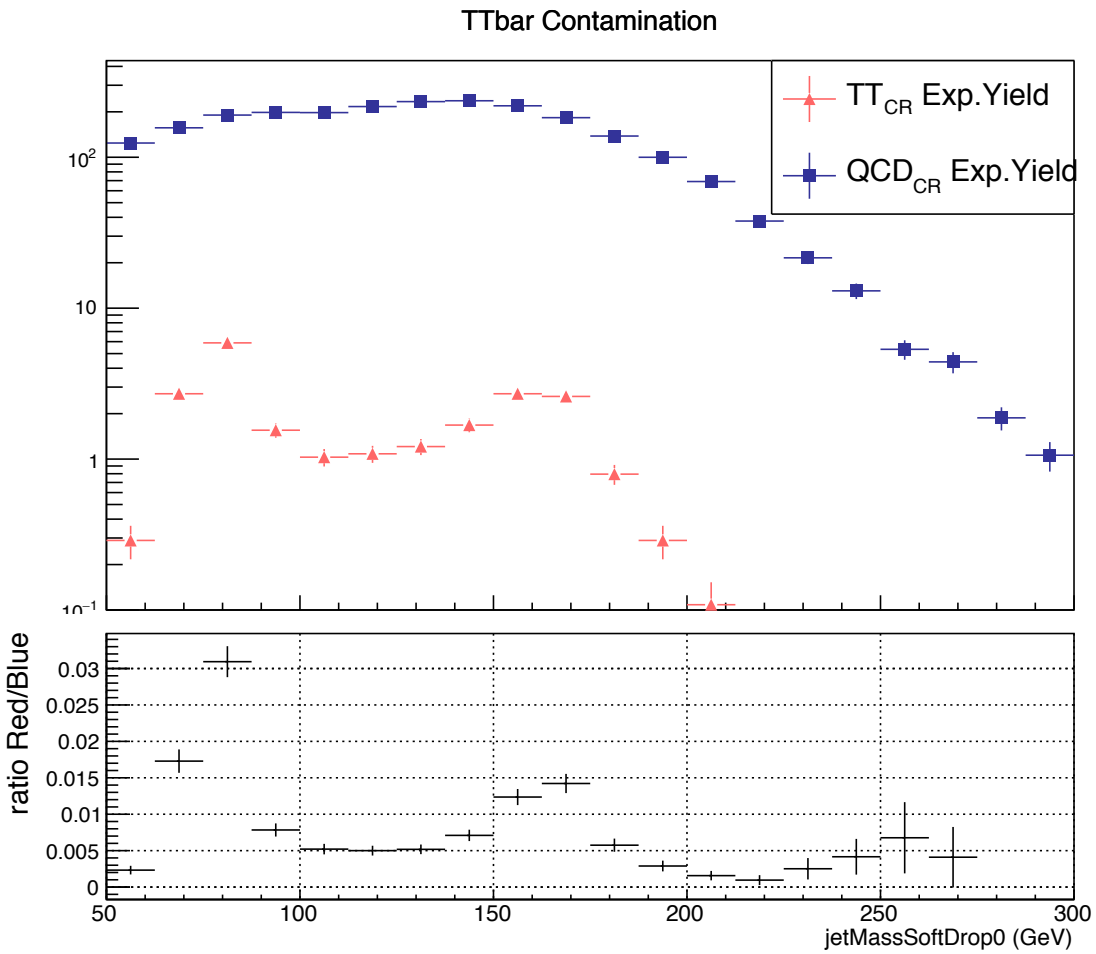
Status Report

- Training with Mass Cut (50,300)GeV @ preselection
  - Larger ttbar contamination vs the previous BDT that has no mass selection criteria

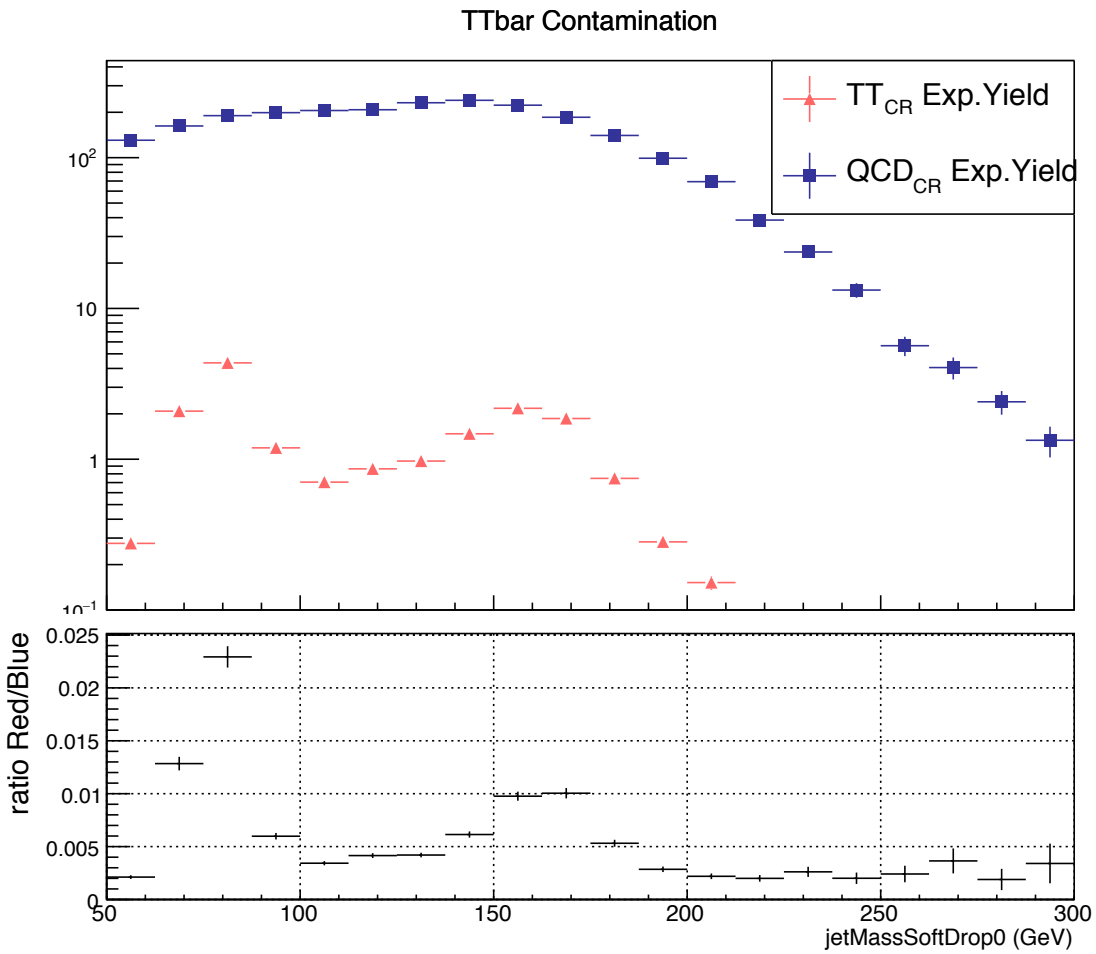
- Mass Fit
  - Cannot understand why the k_{slope} is so big when we implement the fit
    - Can it be due to statistics??
  - Simultaneous fit seems to have better results (qcd params are frozen)

New training with mass cut: 50 < m_{top} <300 GeV

With mass cut



Without mass cut



Signal Selection

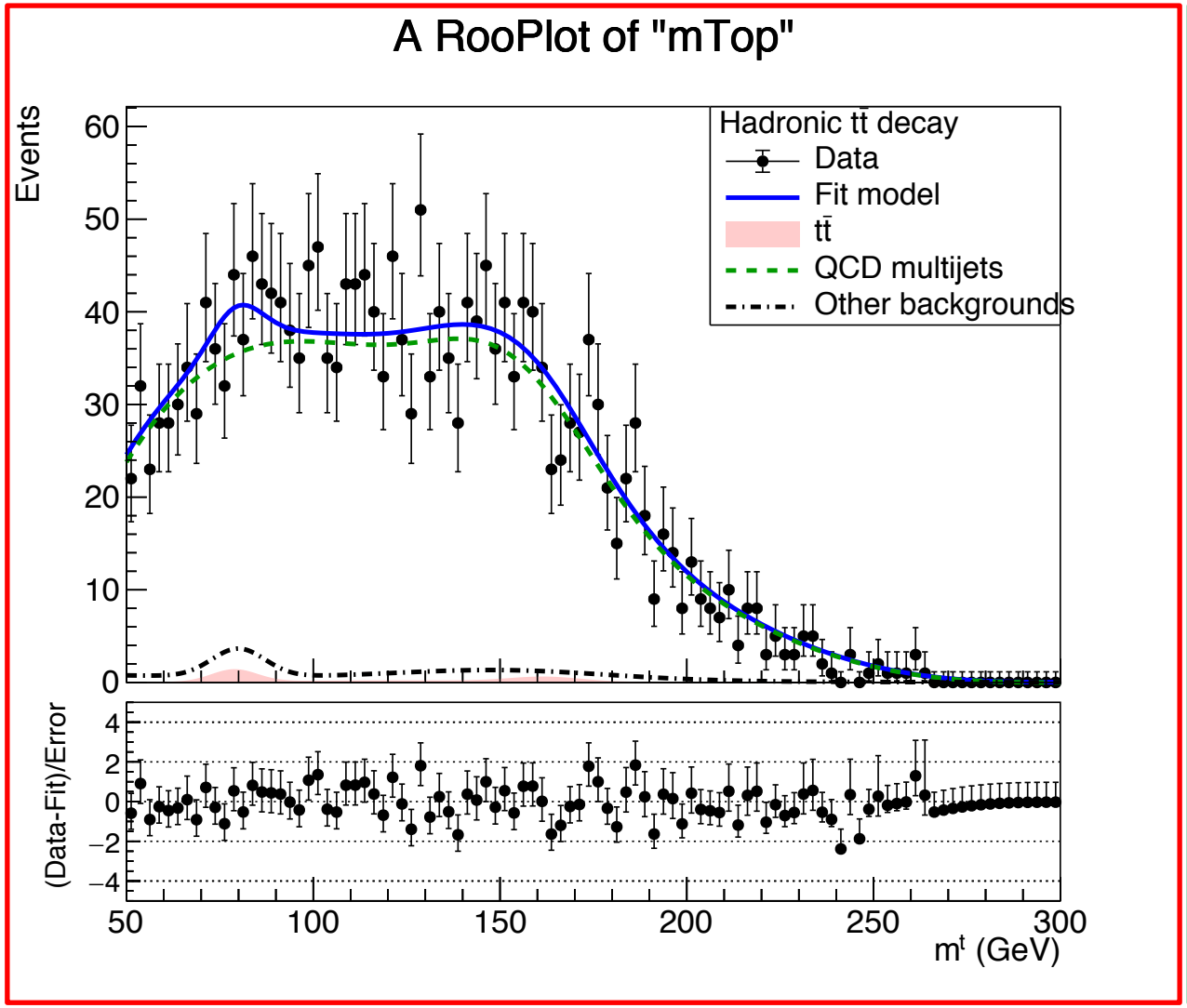
Variables	Selected Cut
pT (both leading jets)	> 400 GeV
Njets	> 1
N leptons	= 0
|eta| (both leading jets)	< 2.4
mJJ	> 1000 GeV
jetMassSoftDrop (only for fit)	(50,300) GeV
Top Tagger	> 0.2
B tagging (2 btagged jets)	> Medium WP
Signal Trigger	

Control Region Selection

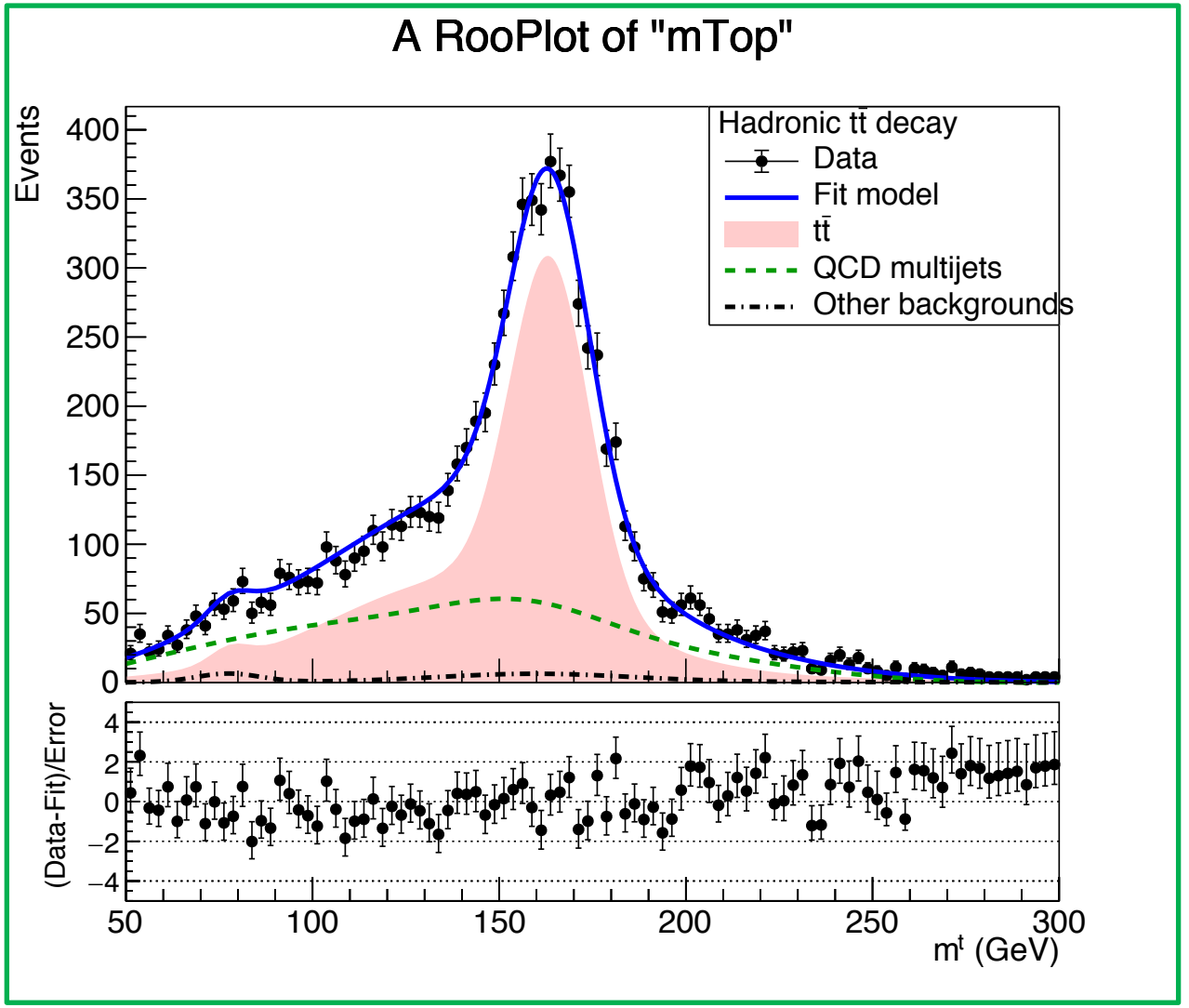
Variables	Selected Cut
pT (both leading jets)	> 400 GeV
Njets	> 1
N leptons	= 0
|eta| (both leading jets)	< 2.4
mJJ	> 1000 GeV
jetMassSoftDrop (only for fit)	(50,300) GeV
Top Tagger	> 0.2
B tagging (0 btagged jets)	< Loose WP
Control Trigger	

Simultaneous Mass Fit

0-btag



2-btag



Simultaneous Mass Fit Result

Floating Parameter	FinalValue +/- Error
btagEff_0	9.5471e-01 +/- 5.62e-02
btagEff_2	7.2228e-01 +/- 7.93e-02
kMassResol	9.5237e-01 +/- 2.74e-02
kMassScale	1.0003e+00 +/- 2.02e-03
kQCD_2b	9.4207e-01 +/- 1.73e+00
nFitBkg_0b	7.8461e+01 +/- 1.22e+01
nFitBkg_2b	2.3596e+02 +/- 2.28e+01
nFitQCD_0b	2.0016e+03 +/- 6.98e+01
nFitQCD_2b	2.8212e+03 +/- 1.43e+02
nFitSig	1.0452e+04 +/- 2.10e+03

N0_observed = 21.4402, N2_observed = 5452.96
Ntt observed (all regions): 5474.4
Ntt expected (all regions): 7872.02

Signal strength r: 0.695426 (both 2 and 0 btag regions)
Singal strength r in 2btag: 0.69463 (only for 2btag region)
Singal strength r in 0btag: 0.981499 (only from 0btag region)

To be noted:

- In general we define btag efficiency such as that:

$$N_{sig}^{(0)} = \left(1 - e_{btag}\right)^2 N_{sig} \quad \text{and} \quad N_{sig}^{(2)} = e_{btag}^2 N_{sig}$$

- Now we are using two different b-tagging WP's → have different btagEfficiency for every WP
- $e_{btag}^{(0)}$ and $e_{btag}^{(2)}$
- $N_{sig}^{(0)} = \left(1 - e_{btag}^{(0)}\right)^2 N_{sig}$ and $N_{sig}^{(2)} = (e_{btag}^{(2)})^2 N_{sig}$