Week Report
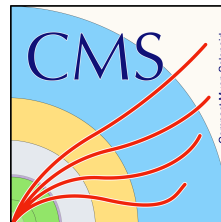# NTUA
27/5/2020

George Bakas

Status Report

- Mass Fit
    - Comparison of the high mtt and nominal mc mass fit results for 2016
        - High mtt files: kQCD_2 (linear modification factor) shows again big fluctuations

    - 2017, 2018 simultaneous fit results show ttbar contamination in 0btag region
        - Change the bkg template fit
        - Impose the fit only in the 2btag region

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

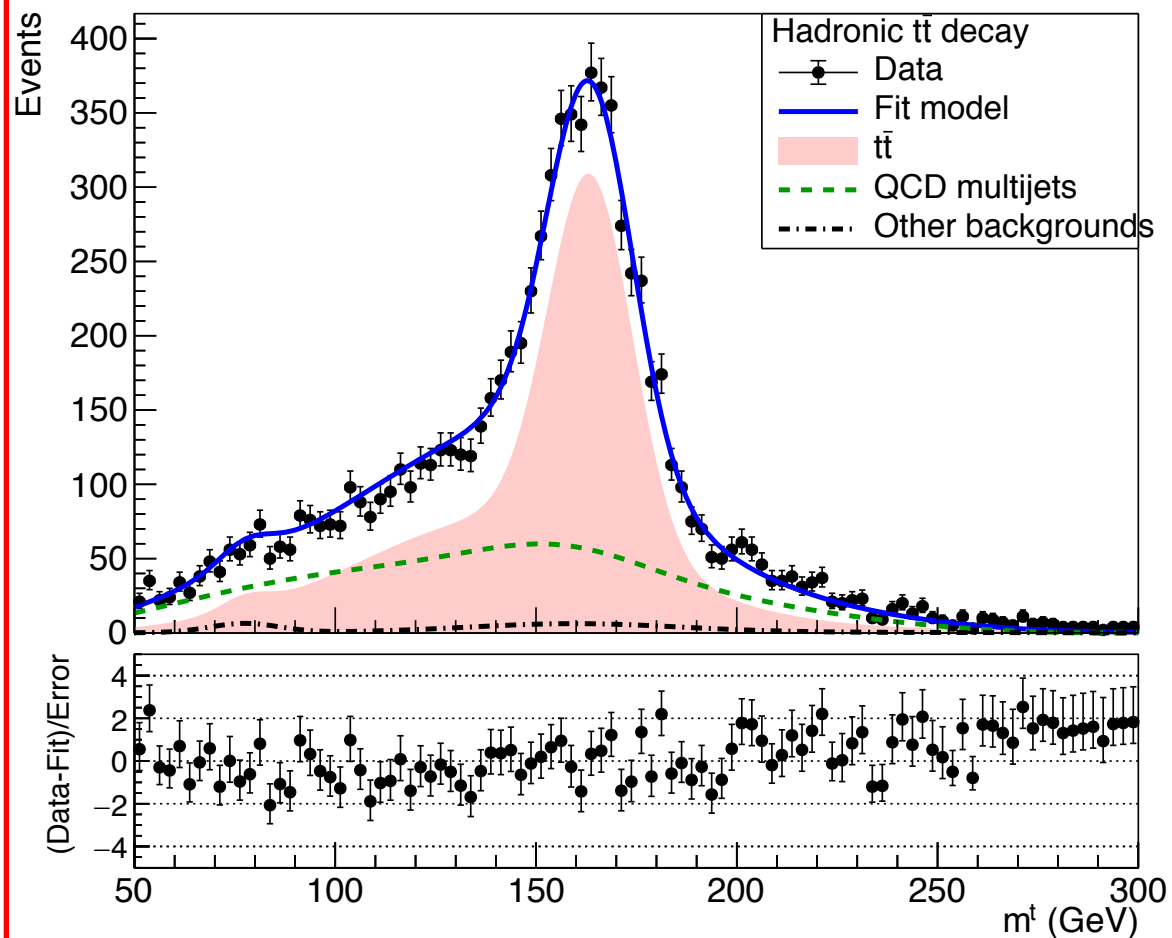| Variables	Selected Cut
pT (both leading jets)	> 400 GeV
Njets	> 1
N leptons	= 0
|eta| (both leading jets)	< 2.4
mJJ	> 1000 GeV
jetMassSoftDrop (only for fit)	(50,300) GeV
Top Tagger	> 0.2
B tagging (0 btagged jets)	< Loose WP
Control Trigger	

Simultaneous Mass Fit 2016
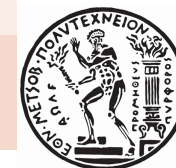
Simultaneous Mass Fit 2016

High Mtt   Nominal
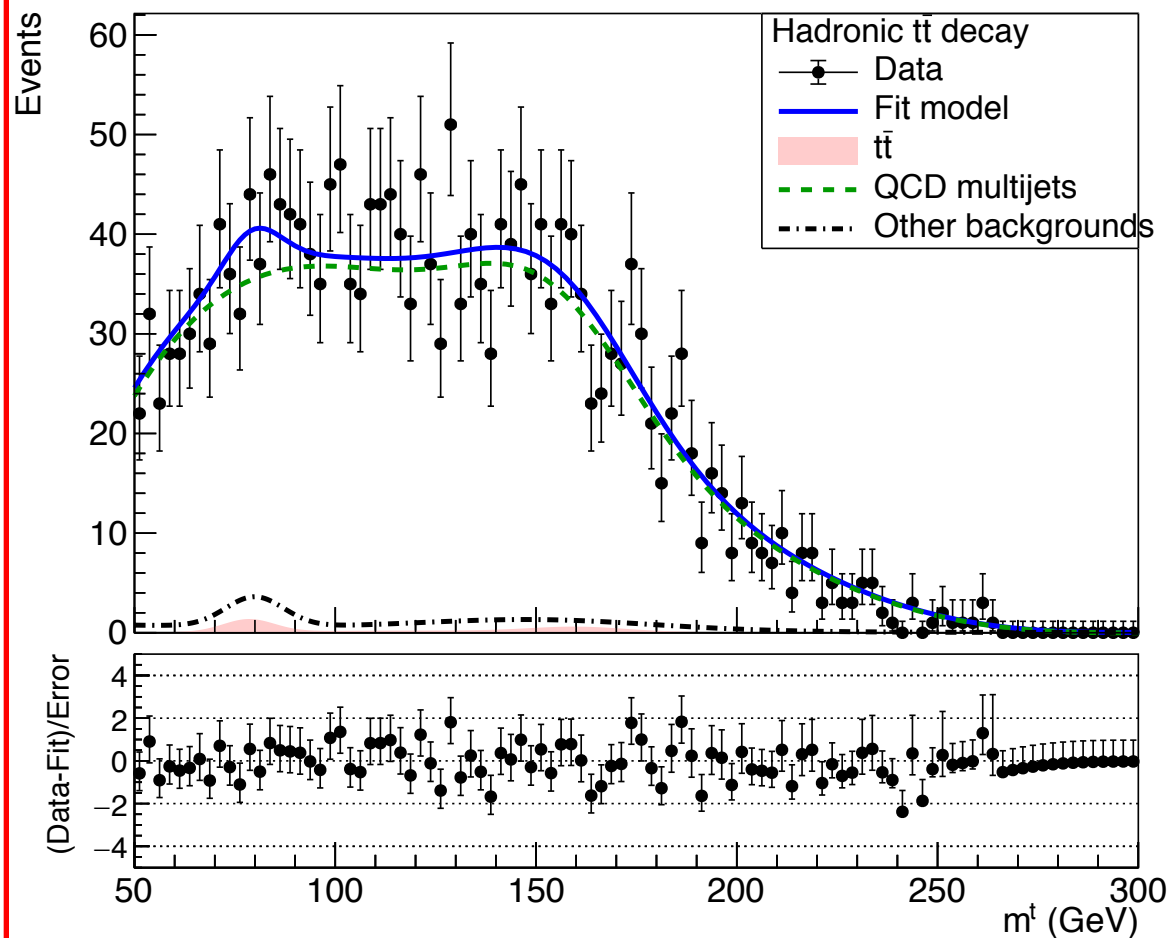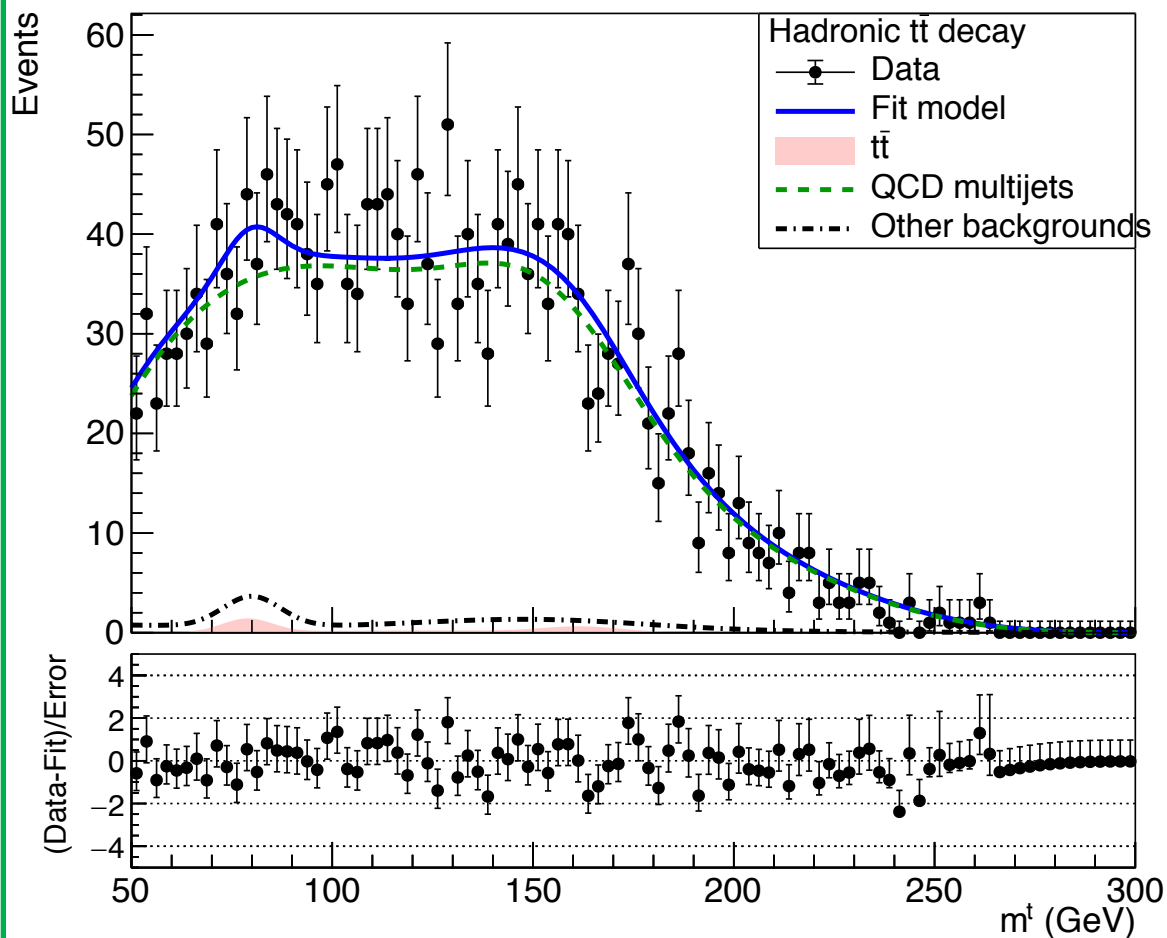
Simultaneous Mass Fit Result

Floating Parameter	FinalValue +/- Error
btagEff_0	9.4889e-01 +/- 6.10e-02
btagEff_2	7.9722e-01 +/- 8.67e-02
kMassResol	9.6641e-01 +/- 2.78e-02
kMassScale	1.0002e+00 +/- 2.02e-03
kQCD_2b	9.9999e-01 +/- 1.68e+00
nFitBkg_0b	7.8425e+01 +/- 1.19e+01
nFitBkg_2b	2.3732e+02 +/- 4.21e+01
nFitQCD_0b	2.0003e+03 +/- 6.84e+01
nFitQCD_2b	2.7897e+03 +/- 1.43e+02
nFitSig	8.6259e+03 +/- 1.83e+03

N0_observed = 22.5358, N2_observed = 5482.32
Ntt expected: 7797.25
Ntt observed: 5504.86
Signal strength r: 0.706
Singal strength r in 2btag: 0.705101

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 expected: 7872.02
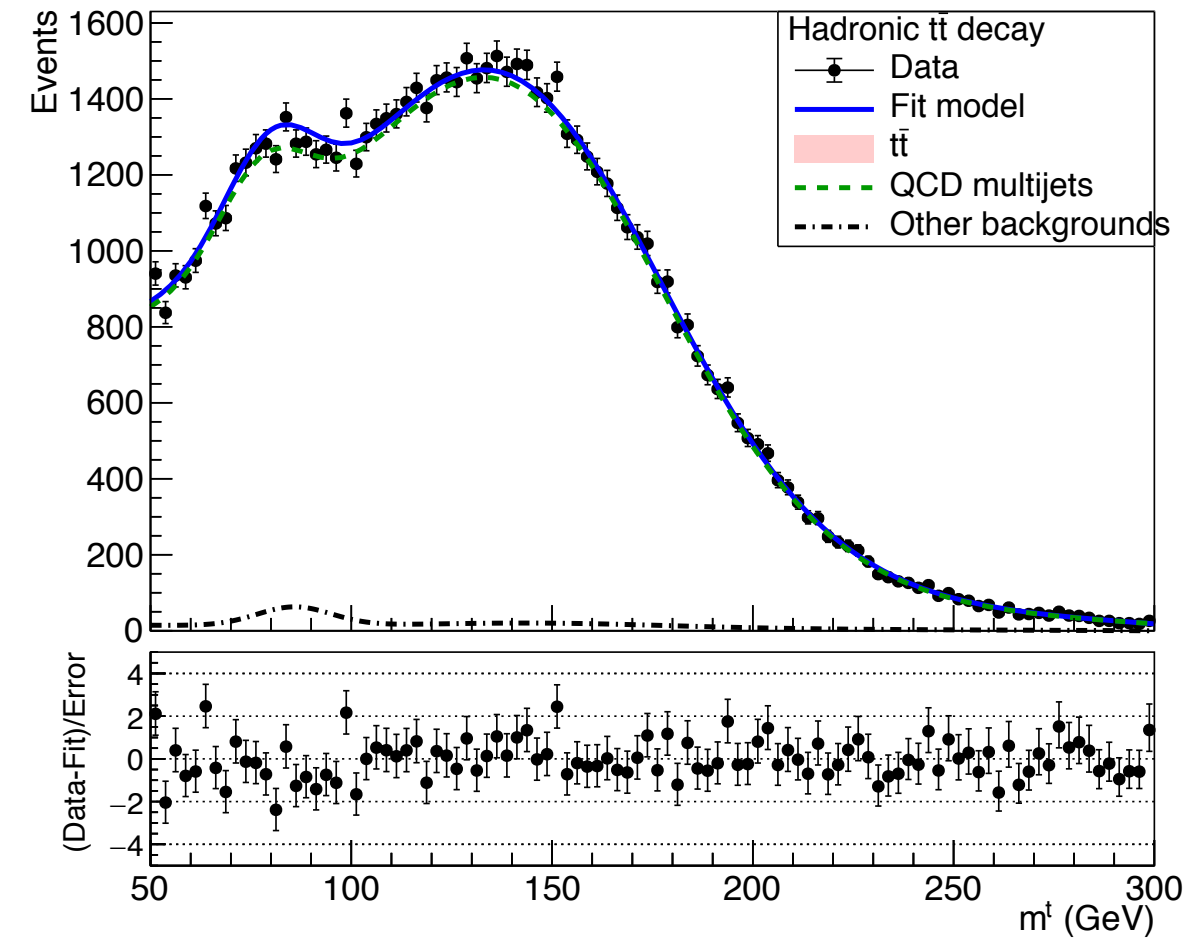Ntt observed: 5474.4
Signal strength r: 0.695426
Singal strength r in 2btag: 0.69463
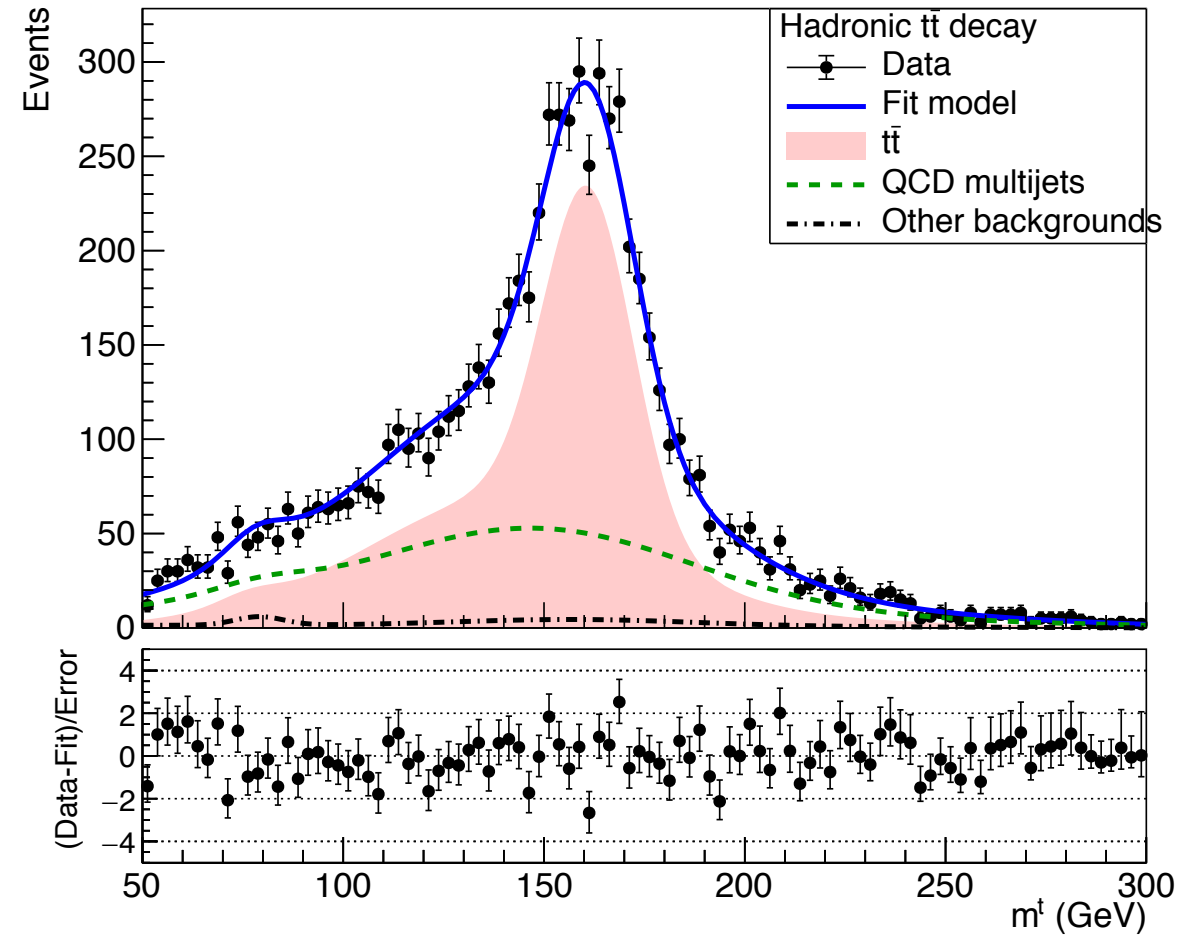
Simultaneous Mass Fit 2017

0 btag

2 btag

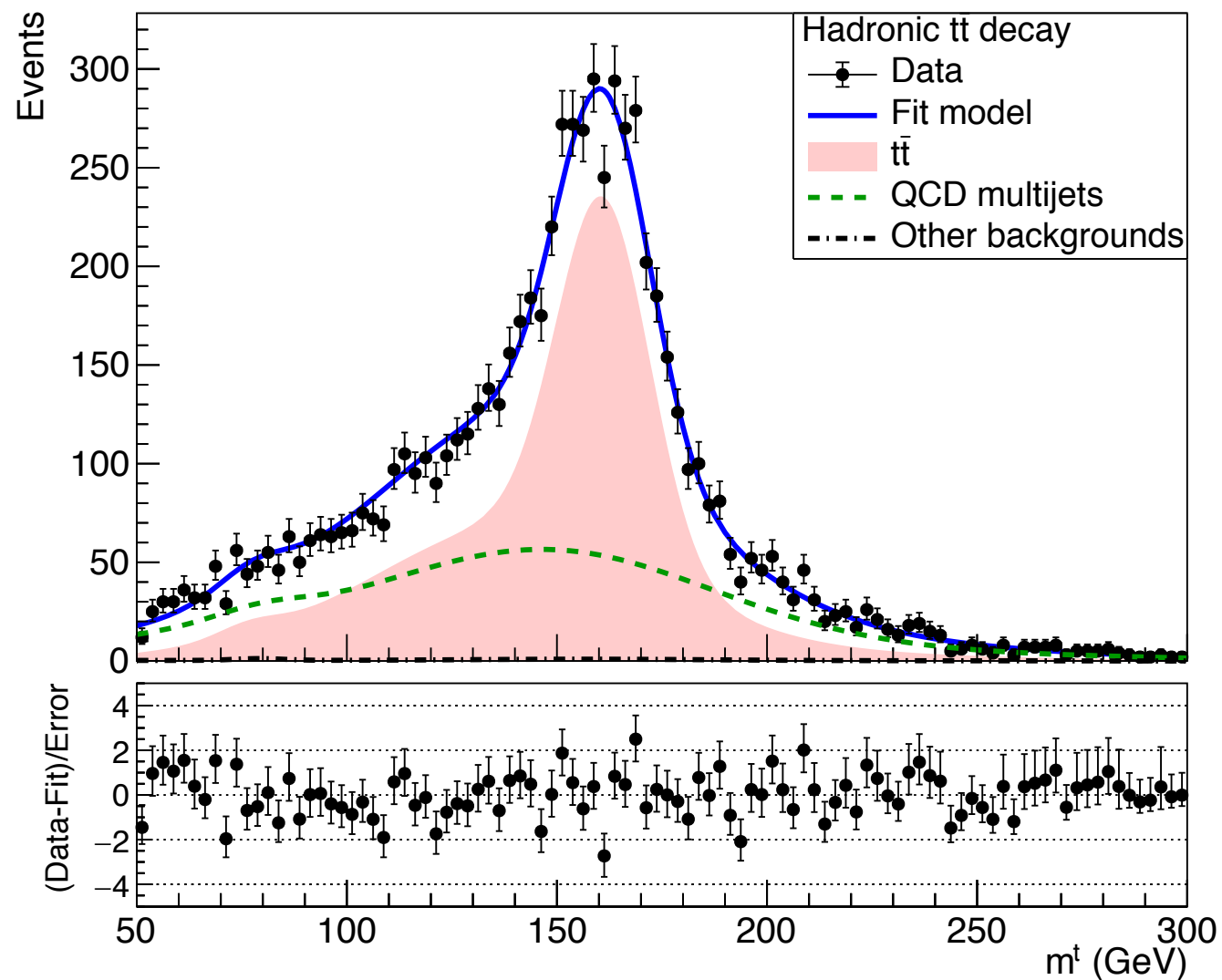# Mass Fit 2017

2 btag

A RooPlot of "mTop"

Fit Results Comparison 2017

Simultaneous Fit

```
   Floating Parameter      FinalValue +/-   Error
  --------------------    ---------------------------
            btagEff_0     9.9482e-01 +/-   3.98e-01
            btagEff_2     6.5148e-01 +/-   7.98e-02
            kMassResol    1.0587e+00 +/-   3.83e-02
            kMassScale    9.8653e-01 +/-   2.62e-03
              kQCD_2b     1.1693e-01 +/-   1.04e-01
           nFitBkg_0b     1.5007e+03 +/-   2.12e+02
           nFitBkg_2b     2.1332e+02 +/-   4.73e+01
           nFitQCD_0b     7.4729e+04 +/-   2.79e+02
           nFitQCD_2b     2.5200e+03 +/-   1.43e+02
               nFitSig    1.0640e+04 +/-   2.48e+03
```

```
N0_observed = 0.285417, N2_observed = 4515.96
Ntt expected: 9381.7
Ntt observed: 4516.24
Signal strength r: 0.481389
Singal strength r in 2btag: 0.522745
```

Simple Mass fit in 2 btag region

```
   Floating Parameter      FinalValue +/-   Error
  --------------------    ---------------------------
            kMassResol    1.0487e+00 +/-   3.86e-02
            kMassScale    9.8684e-01 +/-   2.66e-03
              kQCD_2b     8.6291e-02 +/-   8.31e-02
           nFitBkg_2b     4.2648e+01 +/-   2.89e+02
           nFitQCD_2b     2.6999e+03 +/-   2.71e+02
            nFitSig2b     4.5021e+03 +/-   1.54e+02
```
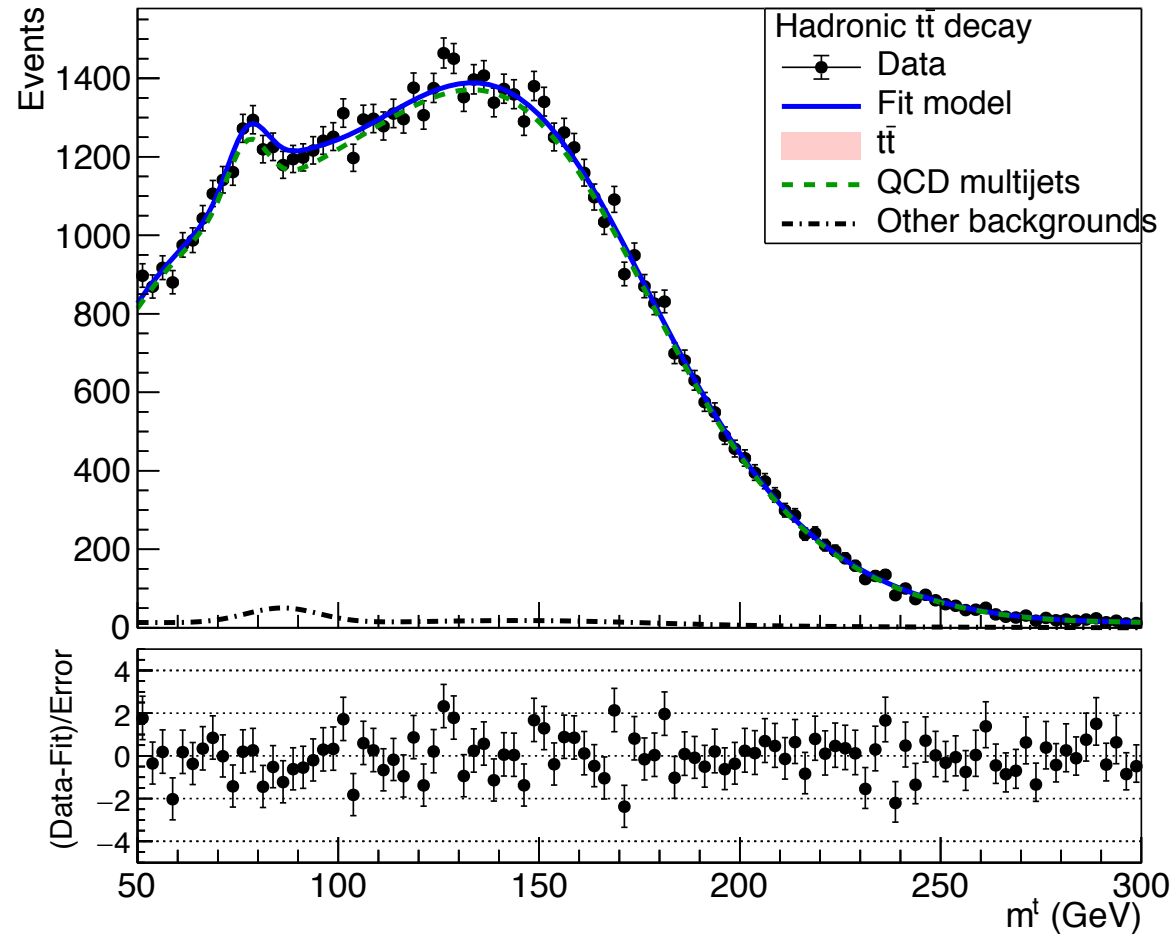
```
Signal strength: r = 0.521139
```
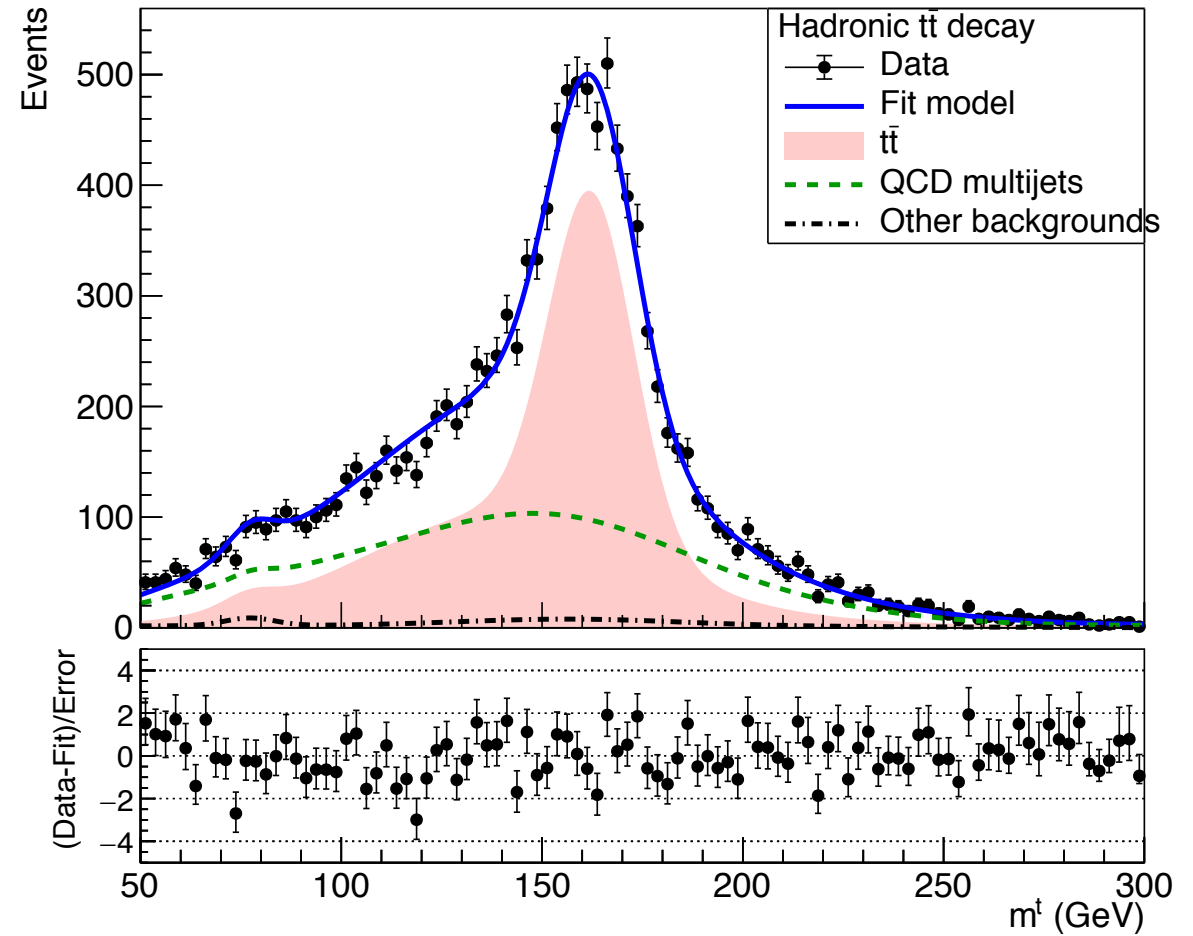
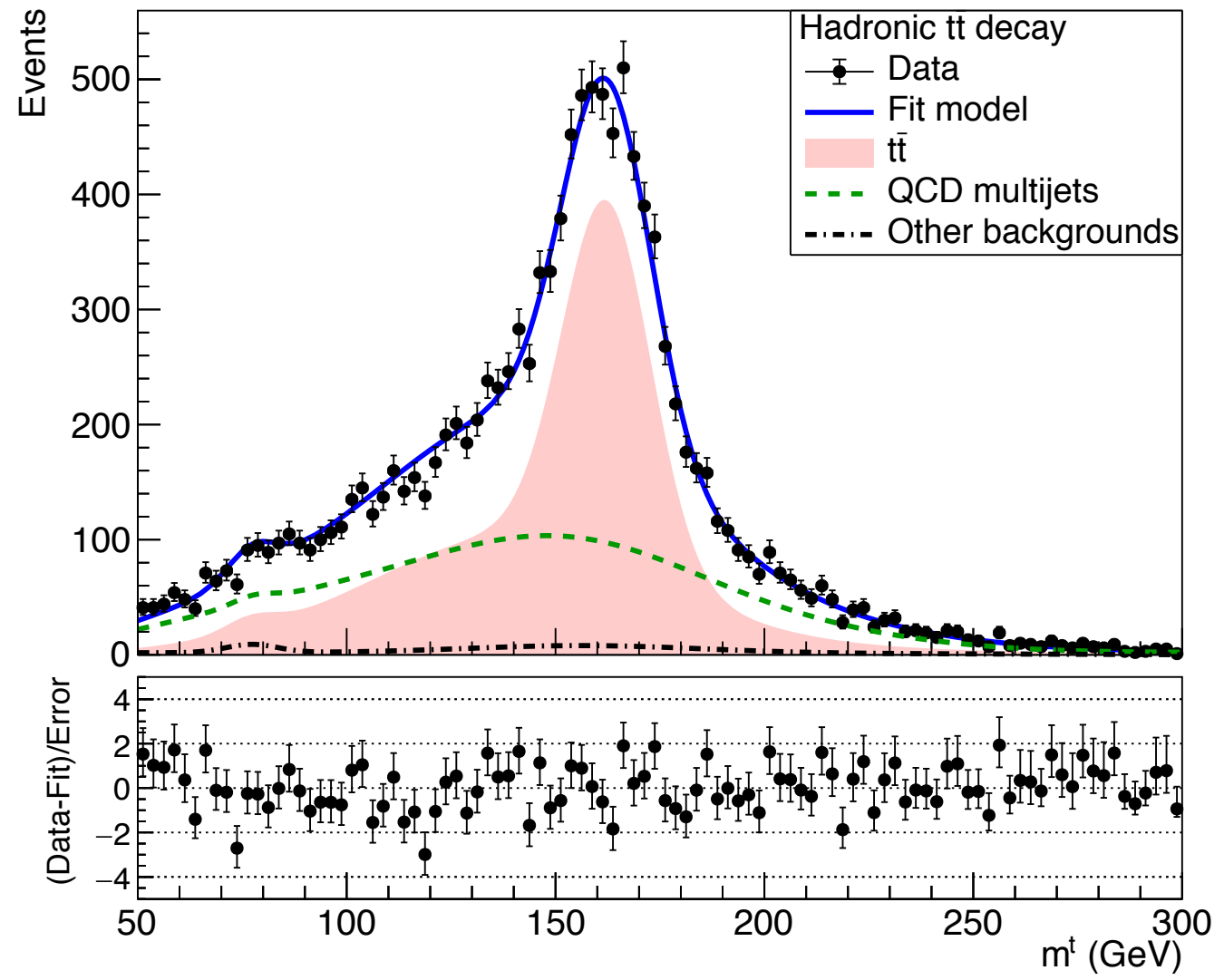# Simultaneous Mass Fit 2018

Mass Fit 2018

2 btag

A RooPlot of "mTop"

Fit Results Comparison 2018

Simultaneous Fit

```
    Floating Parameter      FinalValue +/-   Error
    -------------------      ------------------------
            btagEff_0        9.9999e-01 +/-   4.17e-01
            btagEff_2        6.8809e-01 +/-   6.93e-02
            kMassResol       9.8763e-01 +/-   2.85e-02
            kMassScale       9.9163e-01 +/-   1.93e-03
              kQCD_2b        8.0939e-01 +/-   1.70e+00
            nFitBkg_0b       1.2657e+03 +/-   2.10e+02
            nFitBkg_2b       3.4281e+02 +/-   6.81e+01
            nFitQCD_0b       7.0489e+04 +/-   2.78e+02
            nFitQCD_2b       4.8265e+03 +/-   1.87e+02
               nFitSig       1.5111e+04 +/-   2.93e+03
```

```
N0_observed = 1.04483e-06, N2_observed = 7154.63
Ntt expected: 13174.4
Ntt observed: 7154.63
Signal strength r: 0.54307
Singal strength r in 2btag: 0.578823
```

Simple Mass fit in 2 btag region

```
    Floating Parameter      FinalValue +/-   Error
    -------------------      ------------------------
            kMassResol       9.8512e-01 +/-   2.93e-02
            kMassScale       9.9160e-01 +/-   1.93e-03
              kQCD_2b        1.0816e+00 +/-   1.65e-02
            nFitBkg_2b       3.4941e+02 +/-   2.74e+02
            nFitQCD_2b       4.8304e+03 +/-   3.41e+02
             nFitSig2b       7.1442e+03 +/-   1.97e+02
```

```
Signal strength: r = 0.577978
```