

Weekly Report

NTUA

10/1/2020

George Bakas



Status Report

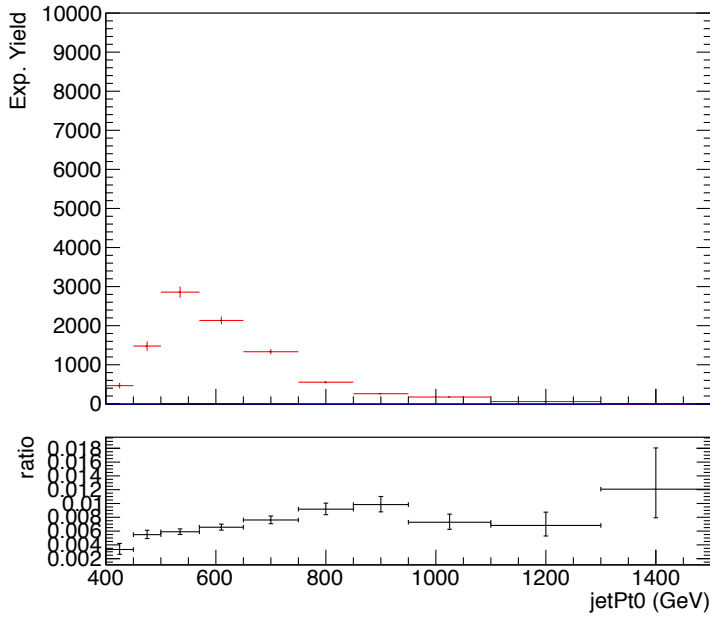
- Analysis:
 - Method we are implementing is not efficient
 - Looser b-tag WP → Less ttbar contamination in CR
 - Need to re-do method to check how the looser b-tag WP responds to our analysis
 - Efficiency/Acceptance ✓
 - QCD Closure tests and ttbar Contamination ✓
 - Response matrices ✓
 - Mass Fit results:
 - **Simultaneous fit is not performing well x**
 - Signal and bkg templates ✓
 - Fit in the 2btag region ✓
 - Btagging efficiency in the subjet p_t , subjet $|\eta|$ phase space ✓
 - Btagging purity ✓
 - In order to compare our results with theoretical parton/particle results → Nominal MC and not High M_{tt} samples
 - Nominal MC production (2016 re-reco)



TT contamination with Loose b-tagging WP

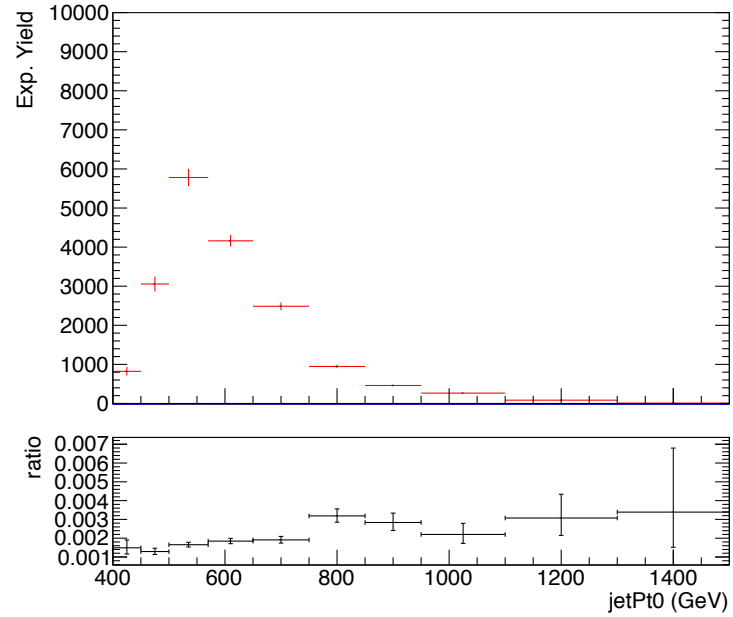
2016

TT Contamination tTagger '16



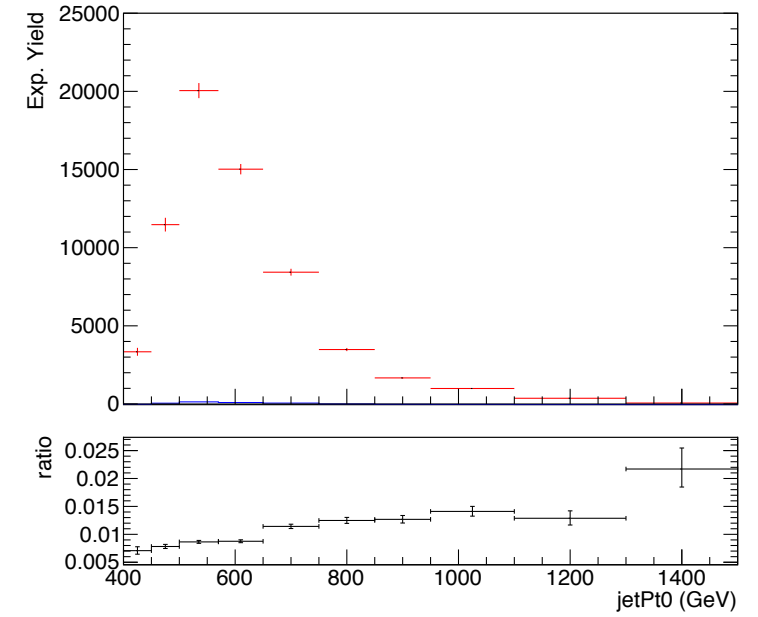
2017

TT Contamination tTagger '17



2018

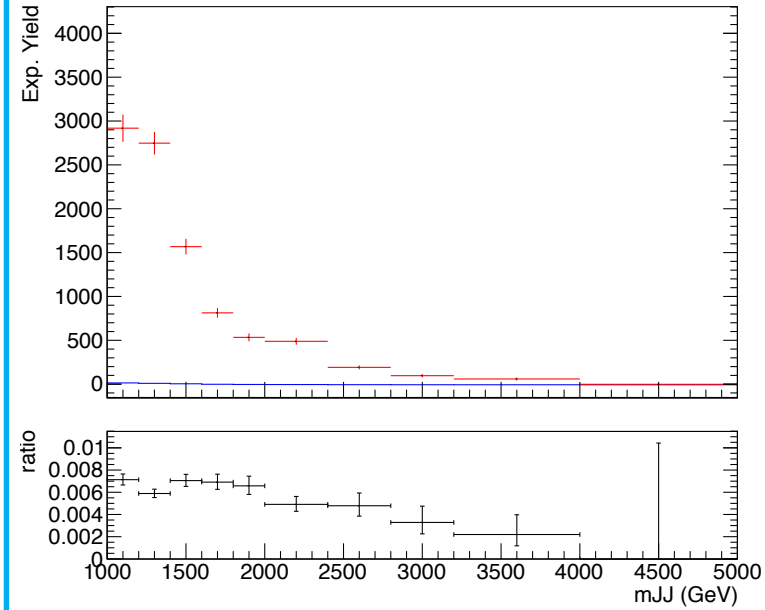
TT Contamination tTagger '18



TT contamination with Loose b-tagging WP

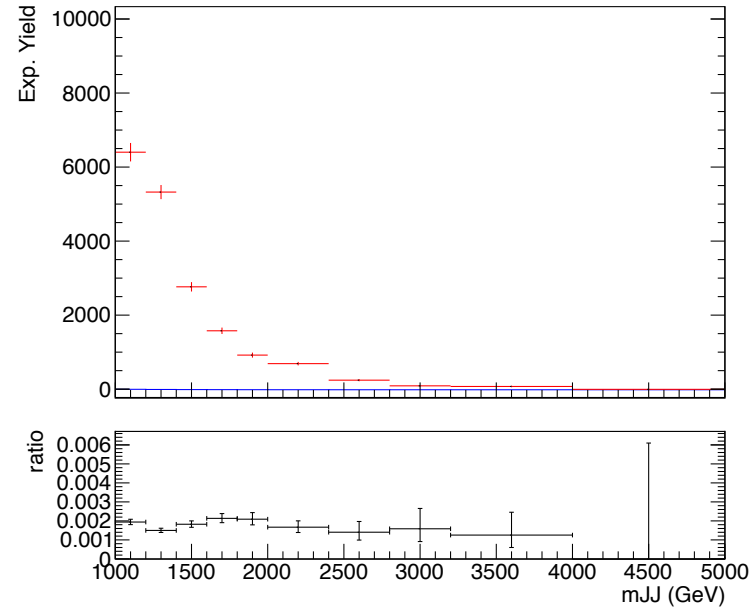
2016

TT Contamination tTagger '16



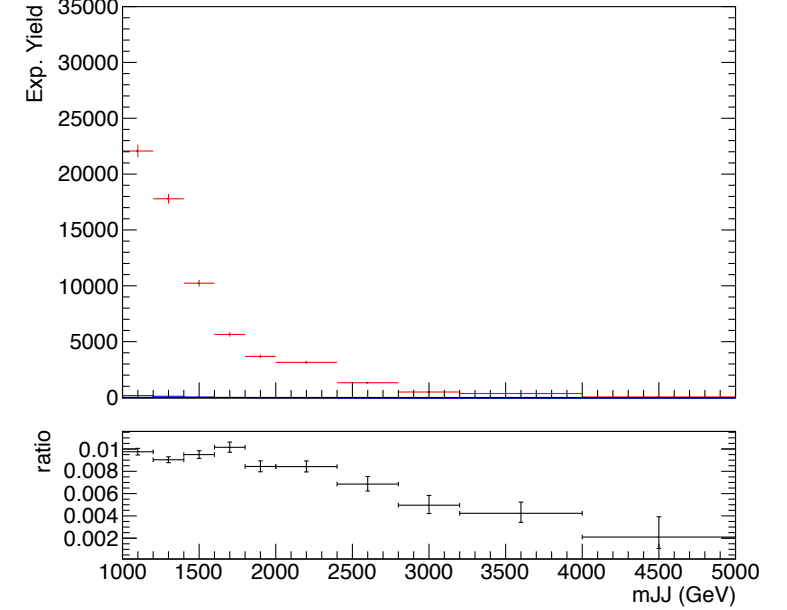
2017

TT Contamination tTagger '17



2018

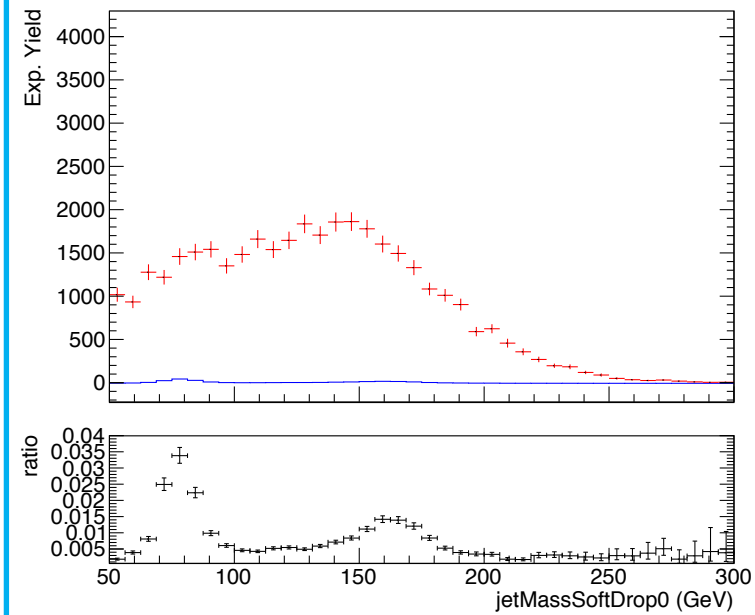
TT Contamination tTagger '18



TT contamination with Loose b-tagging WP

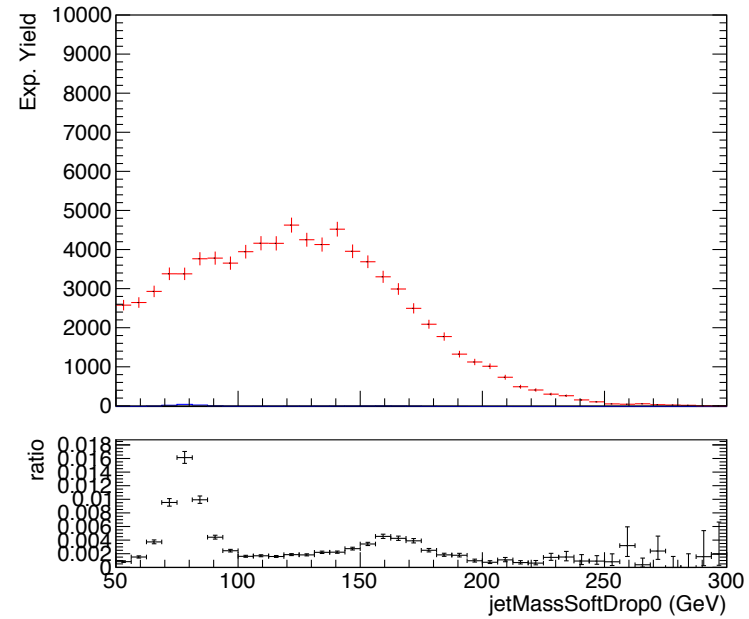
2016

TT Contamination tTagger '16



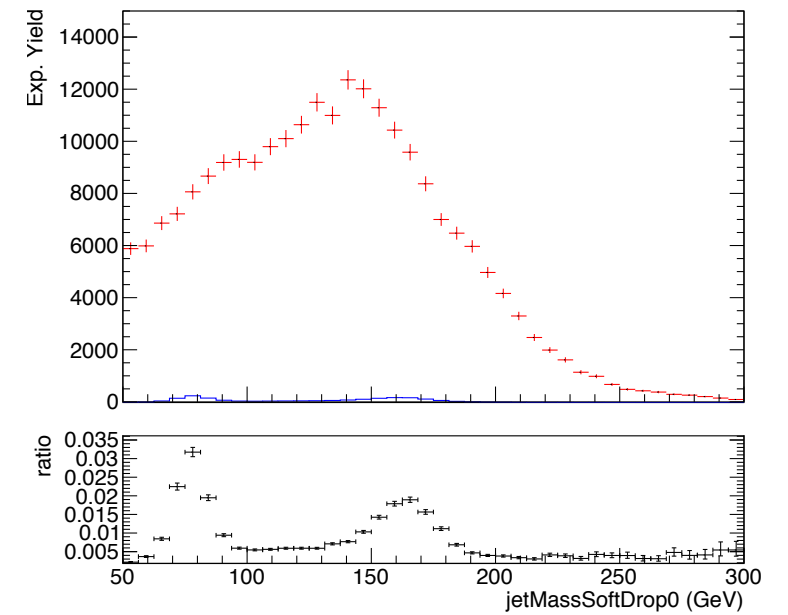
2017

TT Contamination tTagger '17



2018

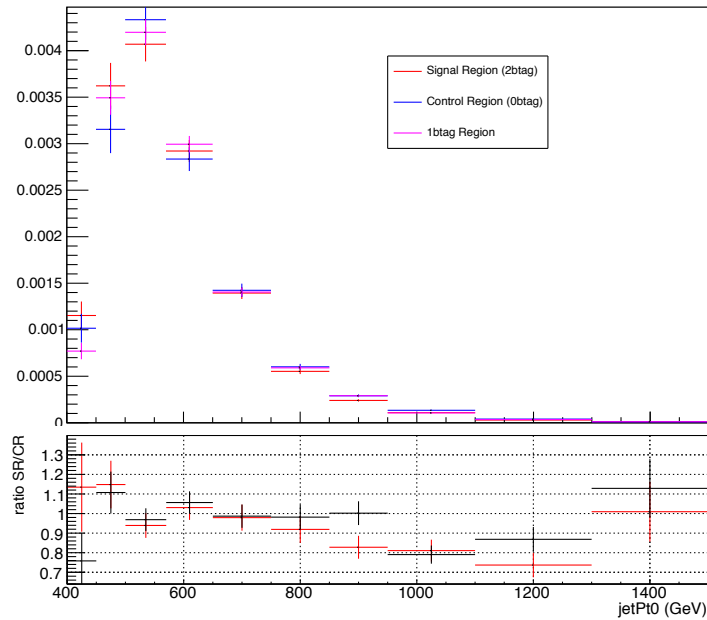
TT Contamination tTagger '18



QCD Closure tests with Loose b-tagging WP

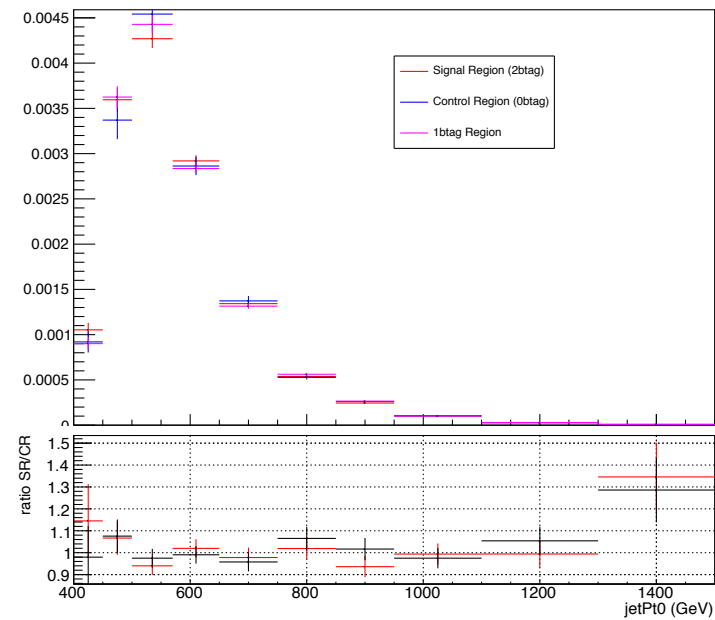
2016

SR tTagger



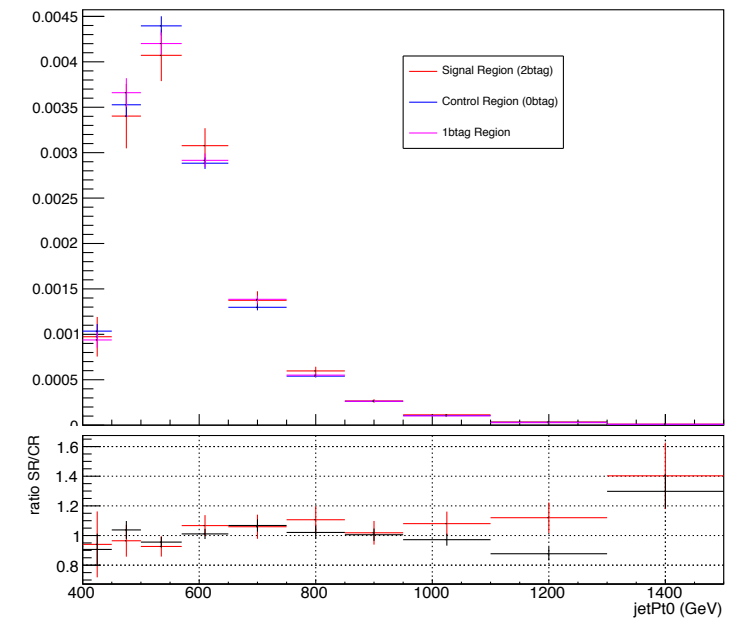
2017

SR tTagger



2018

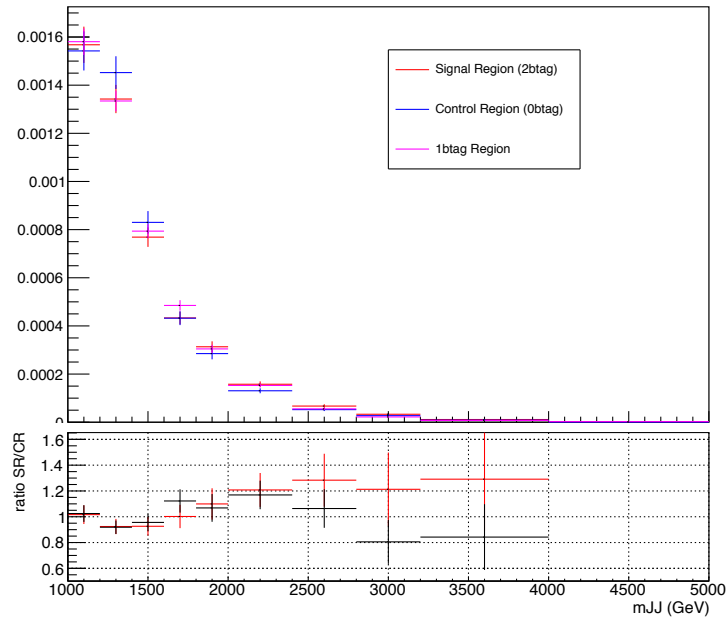
SR tTagger



QCD Closure tests with Loose b-tagging WP

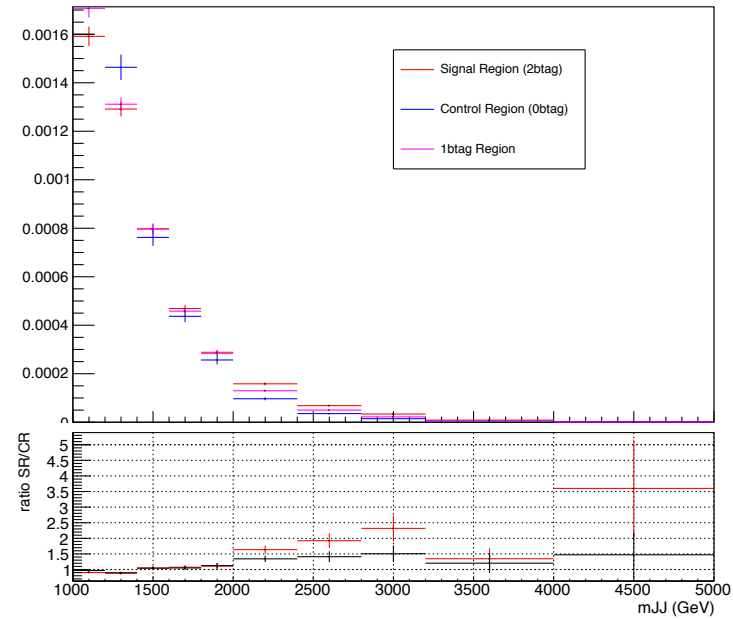
2016

SR tTagger



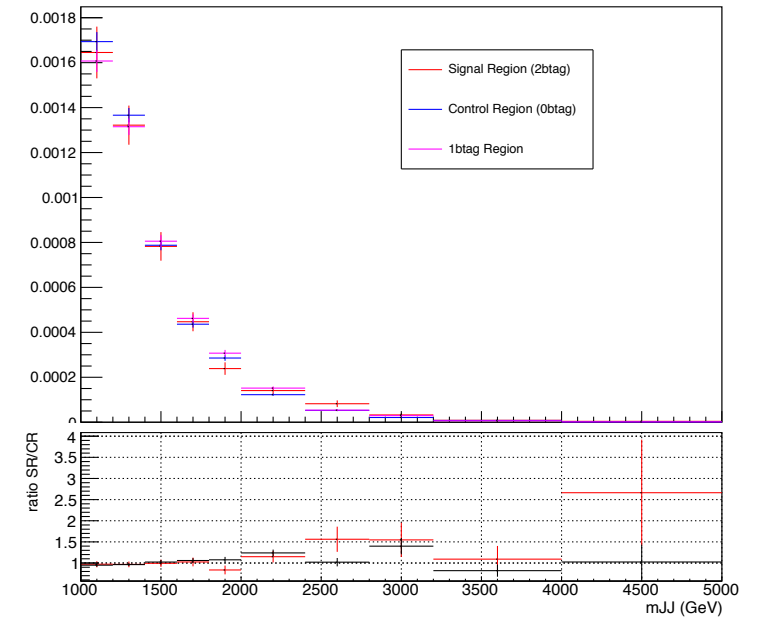
2017

SR tTagger



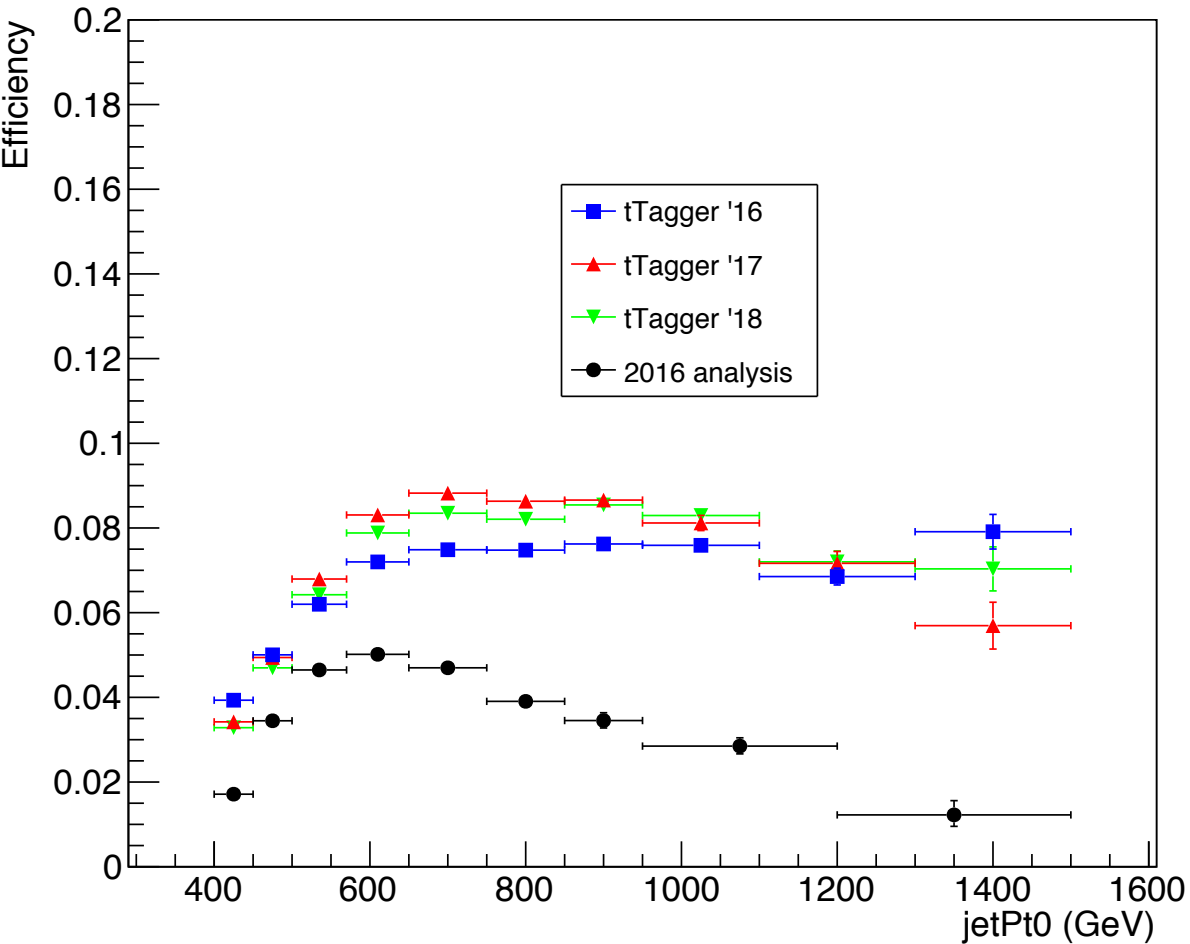
2018

SR tTagger

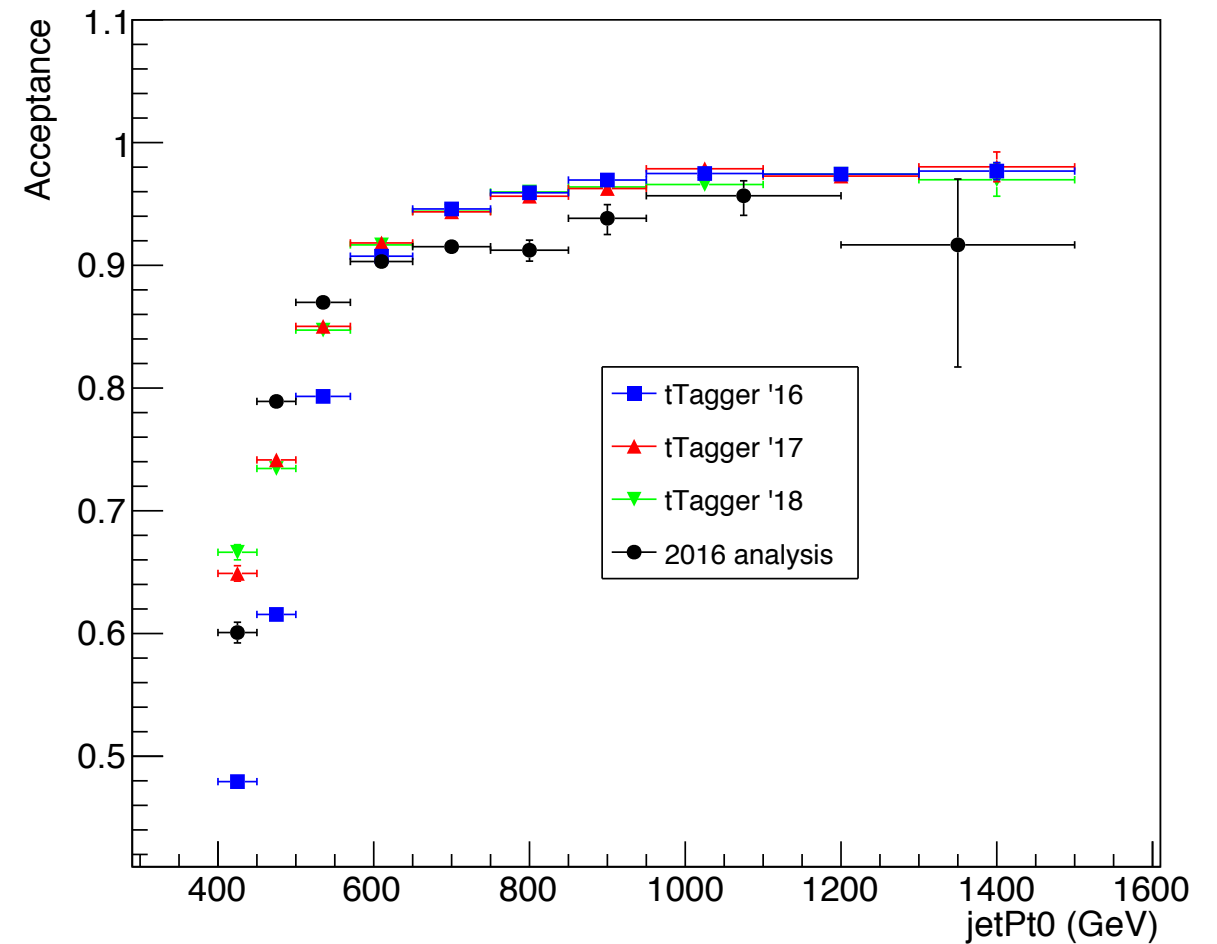


Efficiency And Acceptance for all years

Efficiency '16,'17,'18



Acceptance '16,'17,'18



Signal Extraction

$$S(x_{reco}) = D(x_{reco}) - N_{QCD, reduced}^{(2)} C_{QCD}^{shape}(x_{reco}) Q(x_{reco}) - B(x_{reco})$$

Diagram illustrating the components of the signal extraction equation:

- Fiducial Yield**: Points to the left side of the equation, $S(x_{reco})$.
- Measured dist from data**: Points to the first term on the right, $D(x_{reco})$.
- Mass Fit in 2btag region**: Points to the coefficient $N_{QCD, reduced}^{(2)}$.
- QCD shape correction factor**: Points to the term $C_{QCD}^{shape}(x_{reco})$.
- QCD shape taken from Data (CR)**: Points to the term $Q(x_{reco})$.
- Subdominant bkg shape and contribution (MC)**: Points to the term $B(x_{reco})$.

- Where x_{reco} is the respected variable of interest (ttbar mass, pt, rapidity, leading and subleading jetPt and |jetY|)
- We deploy a fit in the 2btag region: Now we have a **pure Control Region**.

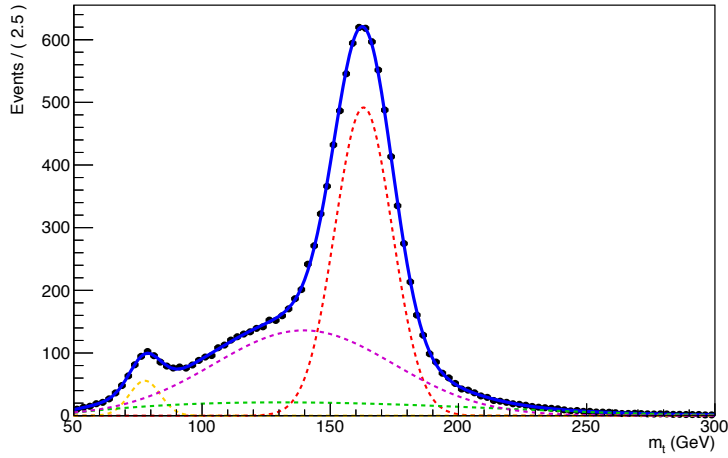
$$D(m^t)^{(2)} = N_{tt}^{(2)} T^{(2)}(m^t, k_{MassScale}, k_{MassResolution}) + N_{bkg}^{(2)} B(m^t)(1 + k_1 x) + N_{sub}^{(2)} O^{(2)}(m^t)$$



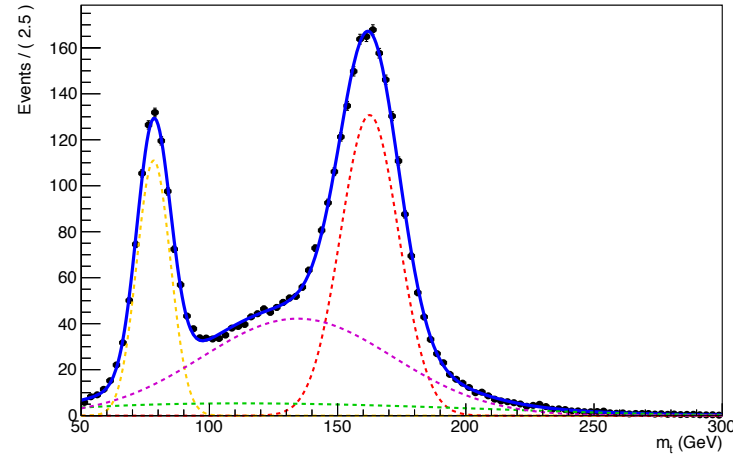
Template Fit Results for 2016

Ttbar templates

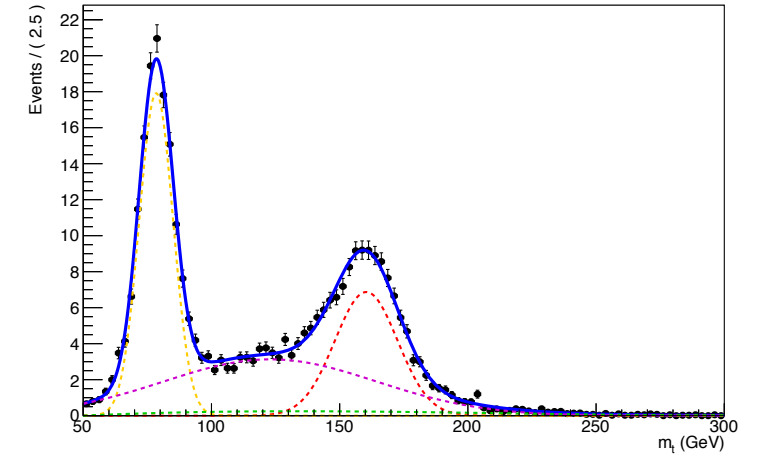
A RooPlot of "mTop"



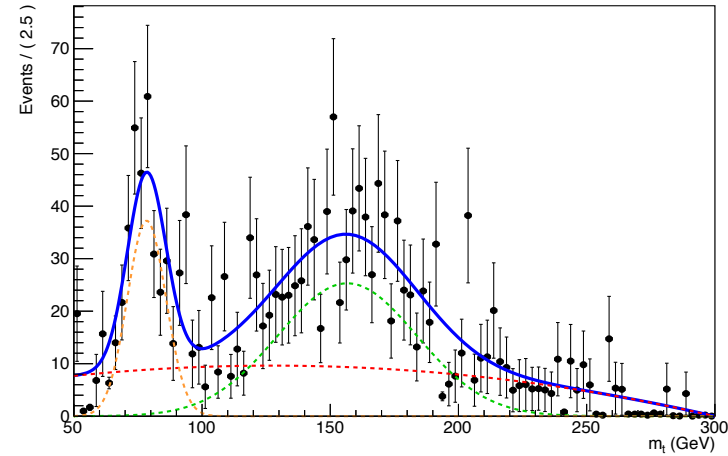
A RooPlot of "mTop"



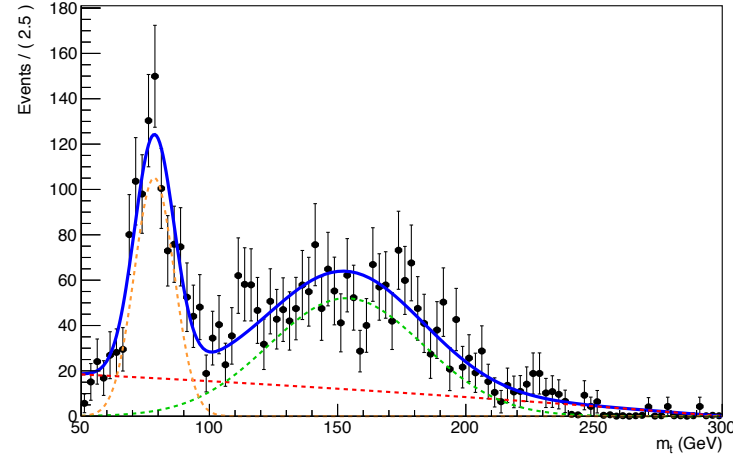
A RooPlot of "mTop"



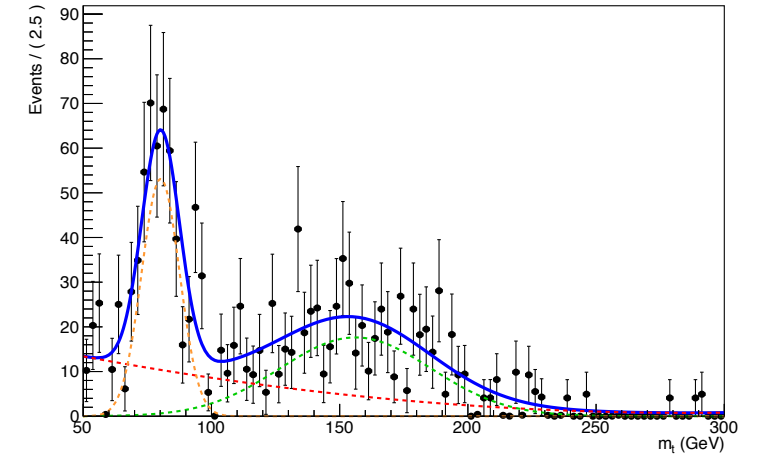
A RooPlot of "mTop"



A RooPlot of "mTop"



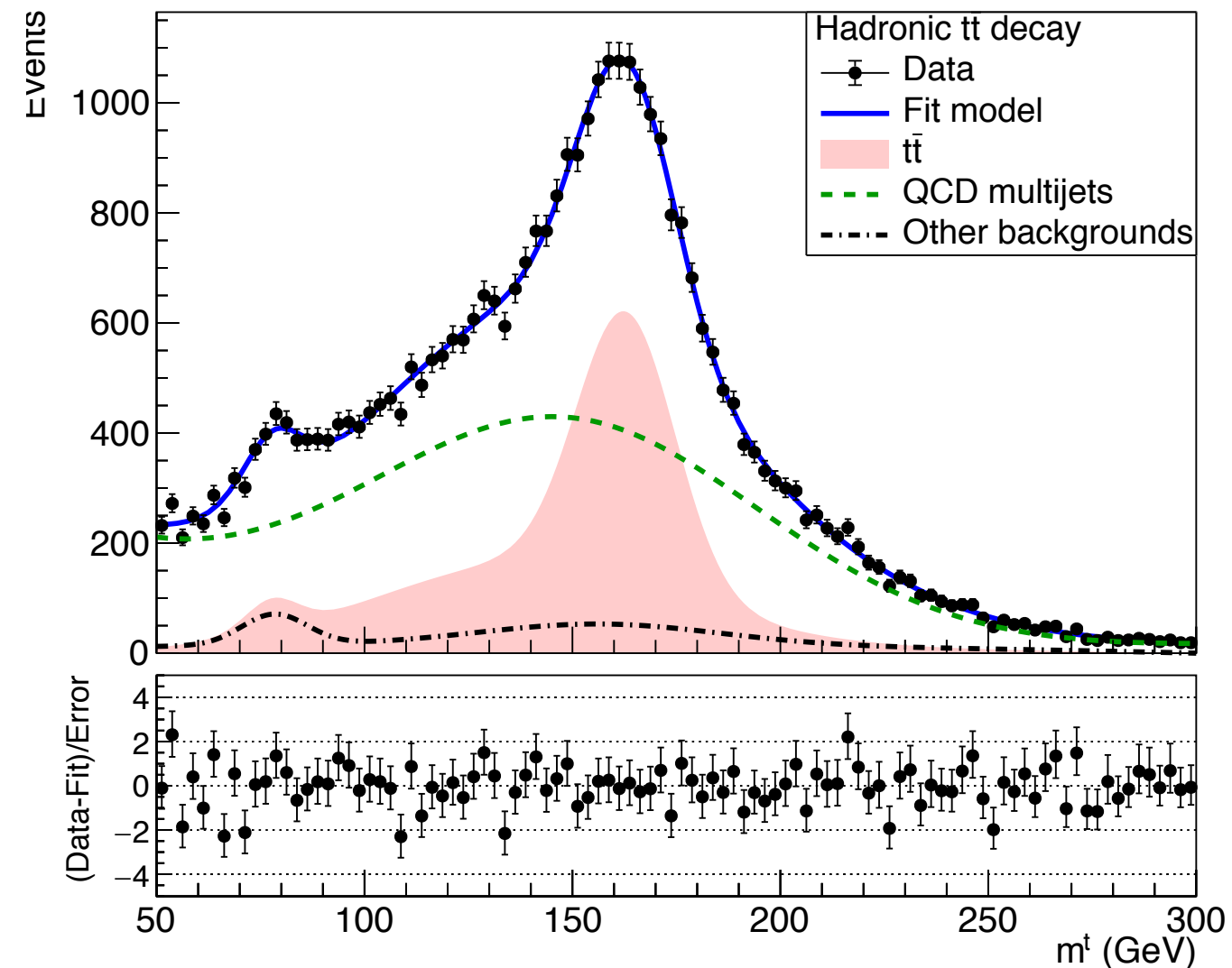
A RooPlot of "mTop"



Subdominant bkg templates



A RooPlot of "mTop"



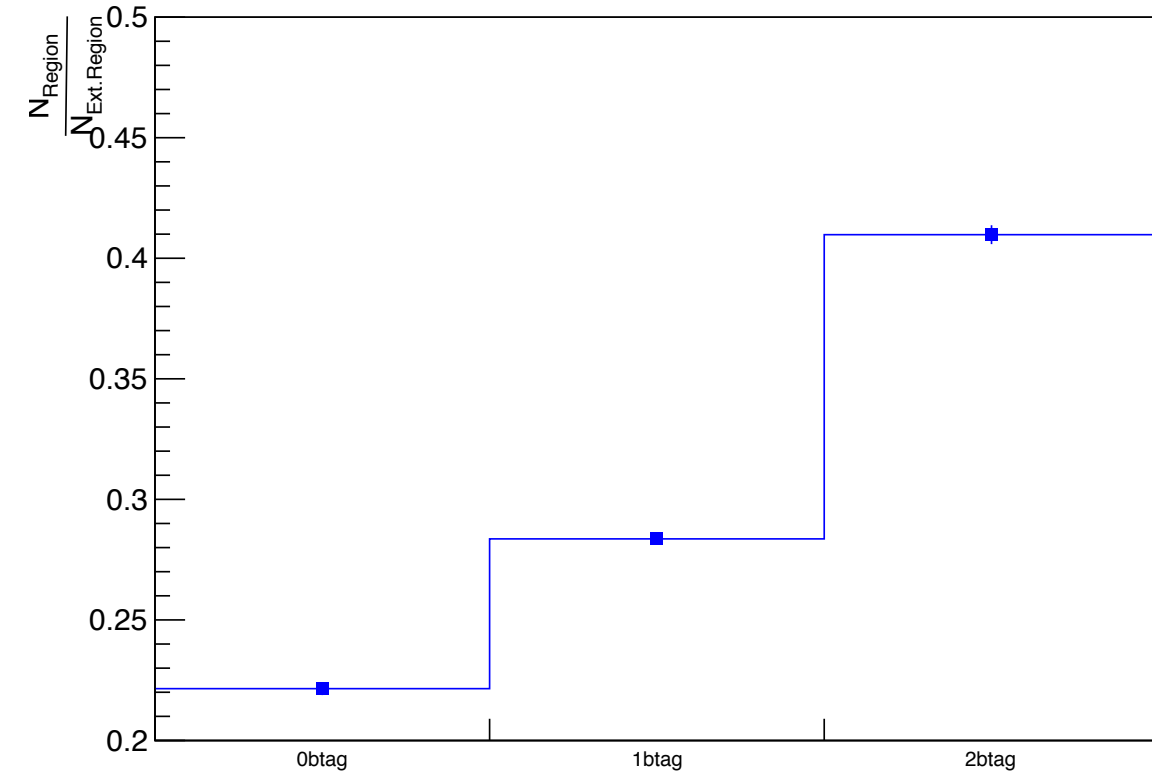
Floating Parameter	FinalValue	+/-	Error
kMassResol	1.0522e+00	+/-	3.99e-02
kMassScale	9.9932e-01	+/-	2.13e-03
kQCD_2b	-2.2221e-03	+/-	8.40e-04
nFitBkg_2b	2.6836e+03	+/-	5.94e+02
nFitQCD_2b	2.2612e+04	+/-	6.91e+02
nFitSig2b	1.2392e+04	+/-	7.16e+02
qcd_b0	1.2781e+00	+/-	1.59e+00
qcd_b1	3.1374e-02	+/-	1.60e-01
qcd_b2	5.8115e-01	+/-	7.09e-01
qcd_b3	4.9877e-05	+/-	1.32e+00
qcd_b4	3.2530e-01	+/-	4.61e-01
qcd_f1	1.8593e-01	+/-	1.13e-01
qcd_mean	1.5516e+02	+/-	4.94e+00
qcd_sigma	4.7968e+01	+/-	2.82e+00



Transfer Factors (both Data and Closure tests)

Data

R_{yield} transfer factor 2016_Loose



MC Closure Test

R_{yield} transfer factor 2016_Loose (Closure Test)

