

HEP Weekly Report

NTUA

15/7/2020

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Status Report

- BDT Output scores SR_B
 - SR_B : Baseline selection + tight Mass Cut (120,220) GeV, no TopTagger Selection
 - QCD scaled to data (k-factor)
 - Stack of Delta Phi distributions
 - Maybe an extra effect so that our signal is pure (no QCD) → doesn't seem to help
 - Leading + subleading in different pT regions: [400,600], [600-800], [800,1200], [1200,Inf]
- Top Tagger Scale Factors
 - Tag and Probe: Data and MC don't show inconsistency
 - Data is subtracted QCD and Subdominant bkg (MC) so that the data sample is pure

$$efficiency = \frac{\# (1 \text{ jet pass baseline} + \text{Tight TopTagger Cut AND 1 jet pass SR})}{\# (1 \text{ jet pass baseline} + \text{Tight TopTagger Cut AND 1 jet pass only baseline})}$$

- Implemented Randomization (check random jet) to fill histogram to avoid pT bias
- mTop candidate distributions for Numerator and Denominator of efficiency
 - To scale the ttbar → fit the mTop in each of these regions (ttbar compatible ~ with SR)
- Divide the phase space into pT regions: [400-600]GeV, [600-800]GeV, [800-Inf]GeV

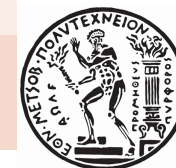


Signal Selection

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

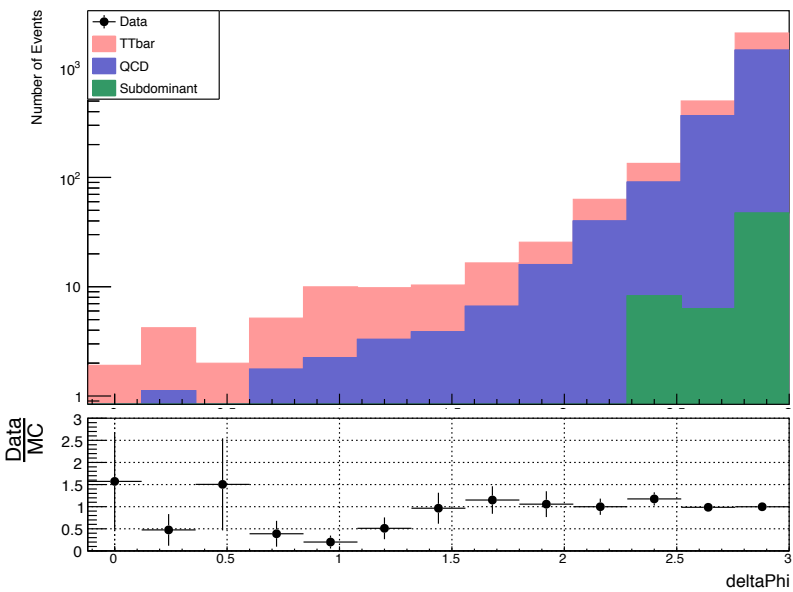
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eta (both leading jets)	< 2.4
mJJ	> 1000 GeV
jetMassSoftDrop (only for fit)	(50,300) GeV
Top Tagger	> 0.2
B tagging (0 btagged jets)	< Medium WP
Control Trigger	



Stack of variables in SRB

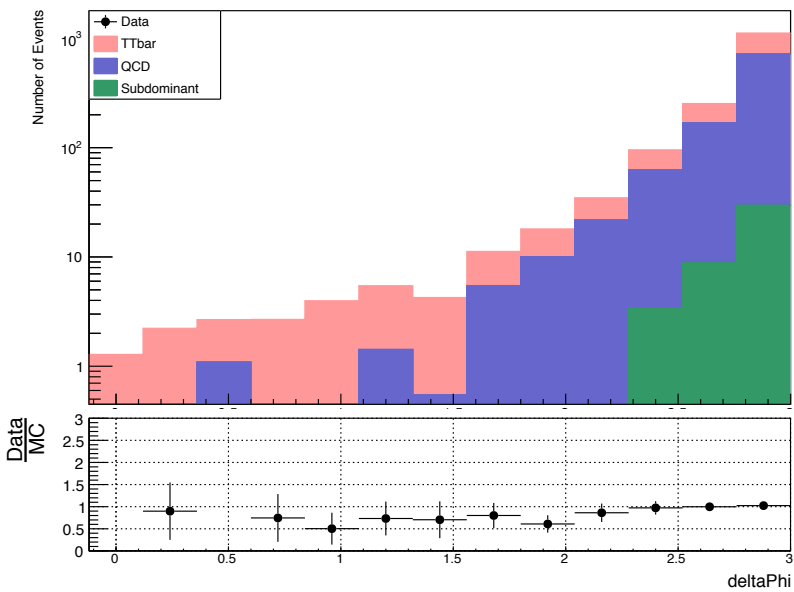
2016

Data vs MC



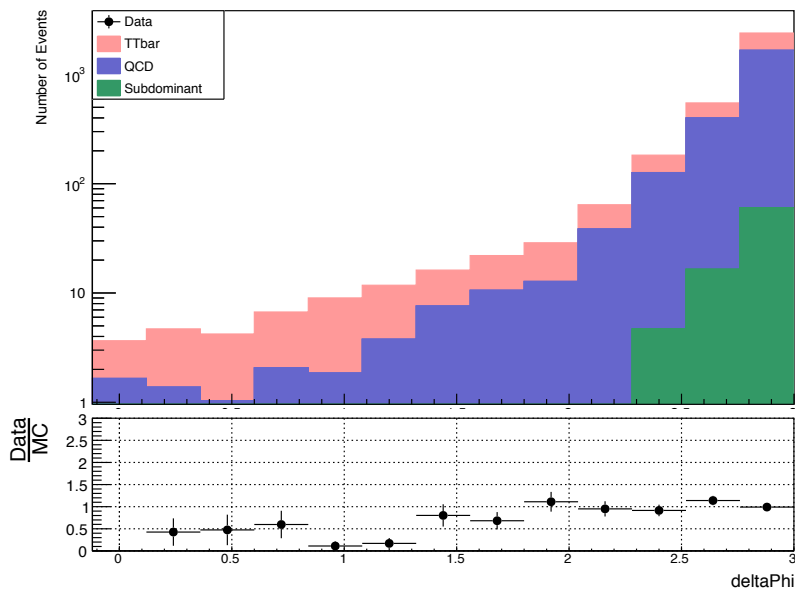
2017

Data vs MC

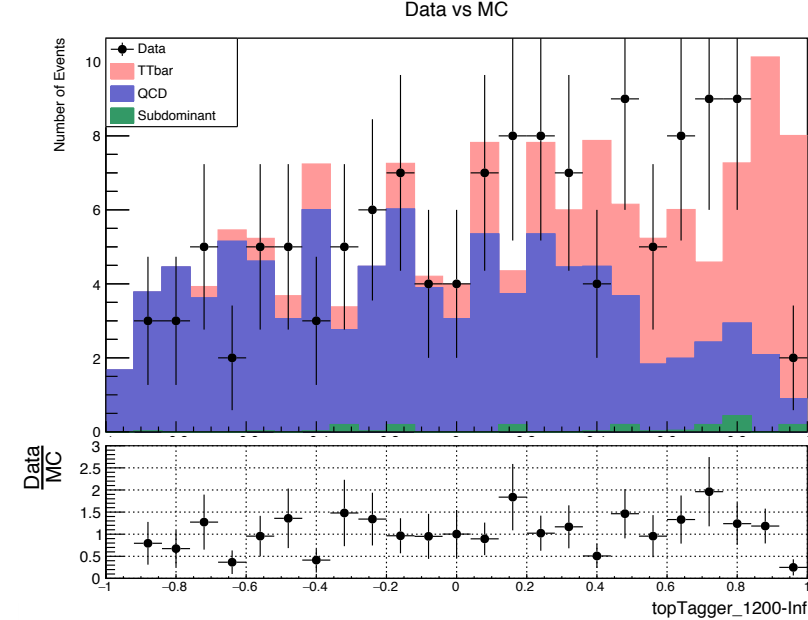
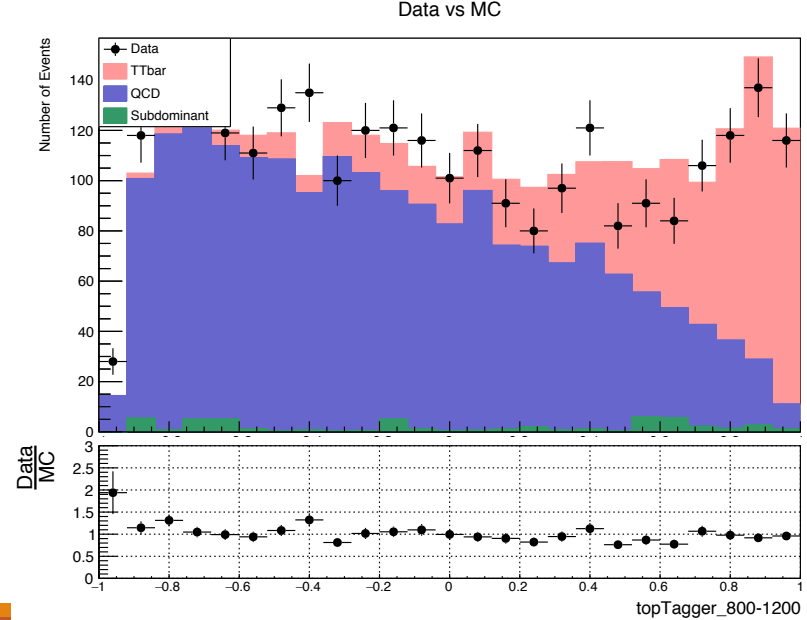
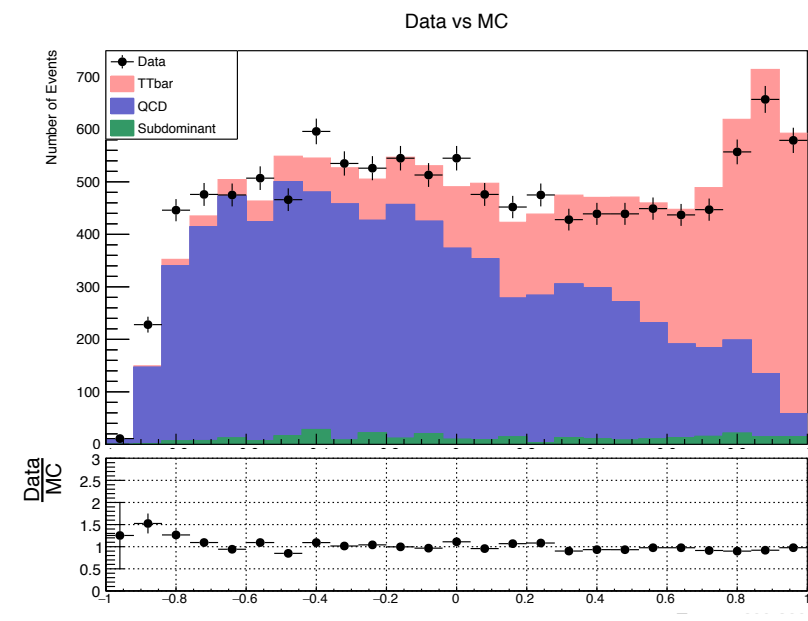
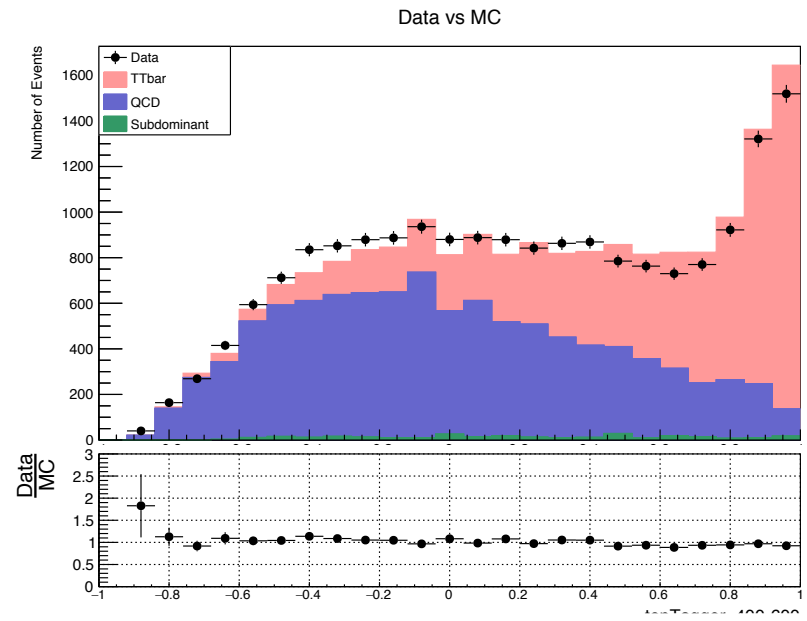


2018

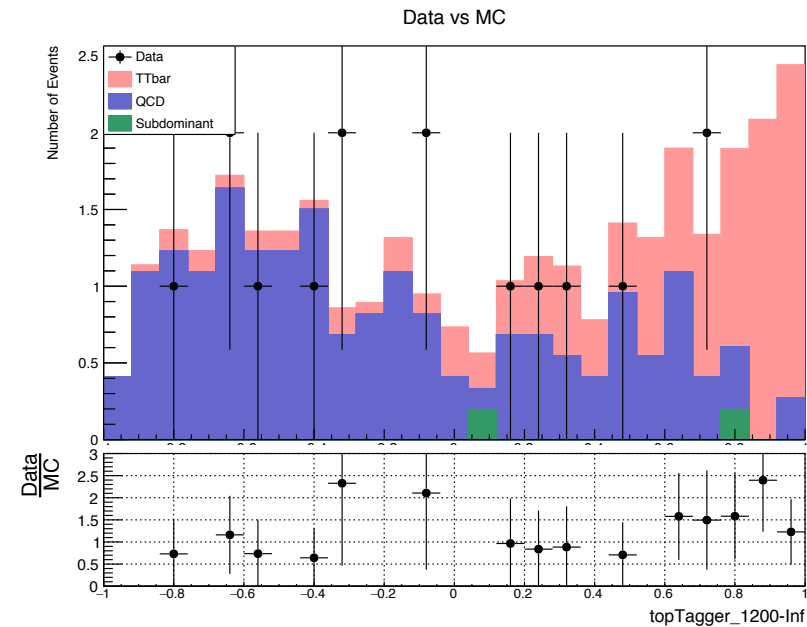
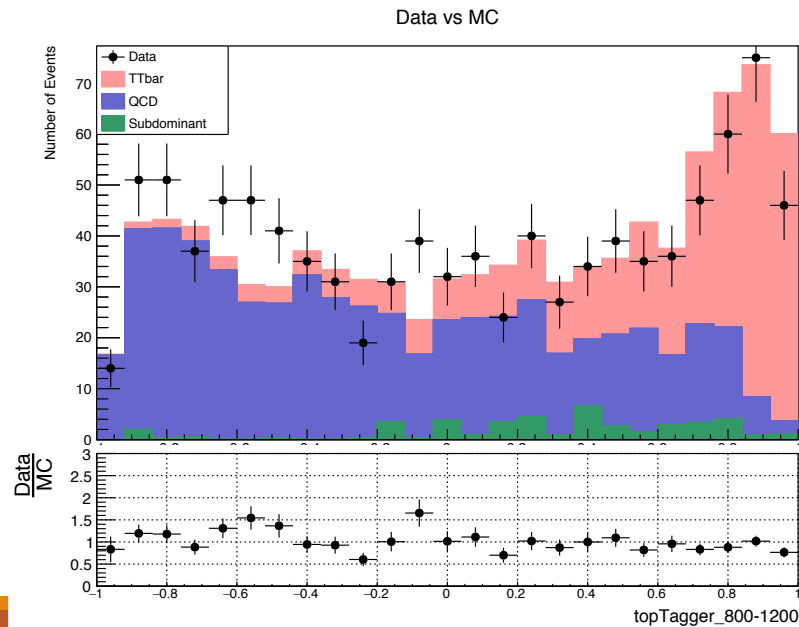
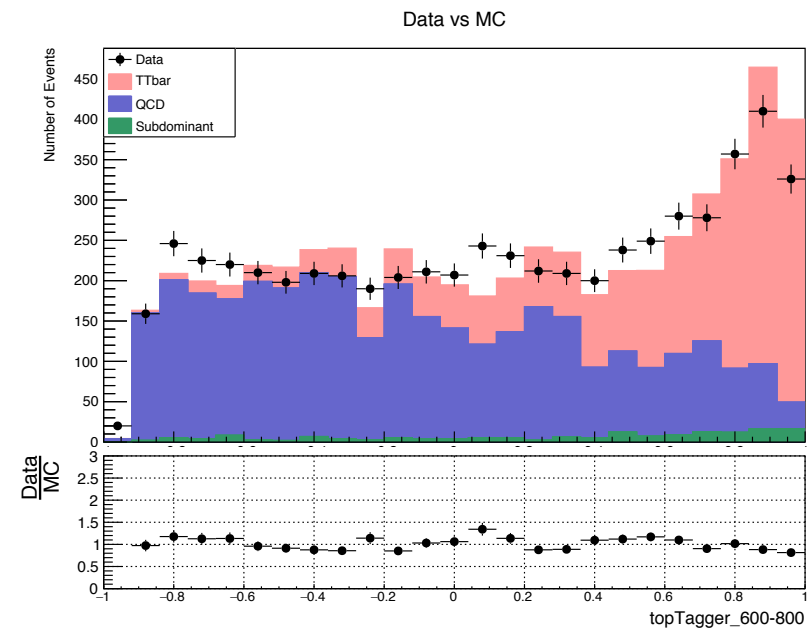
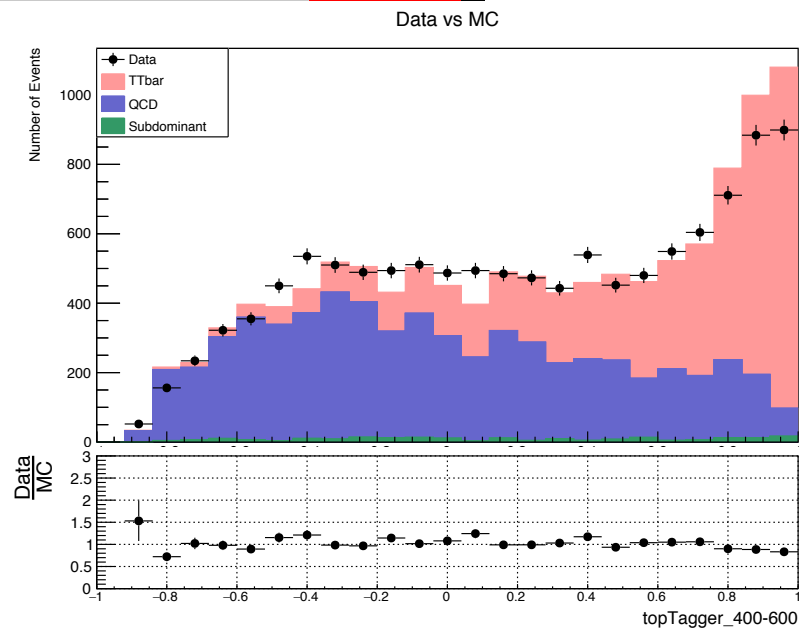
Data vs MC



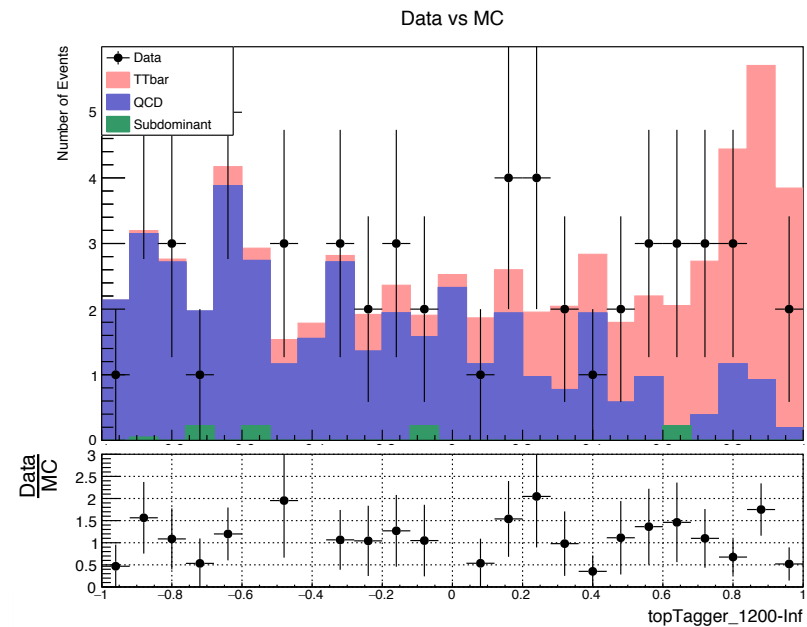
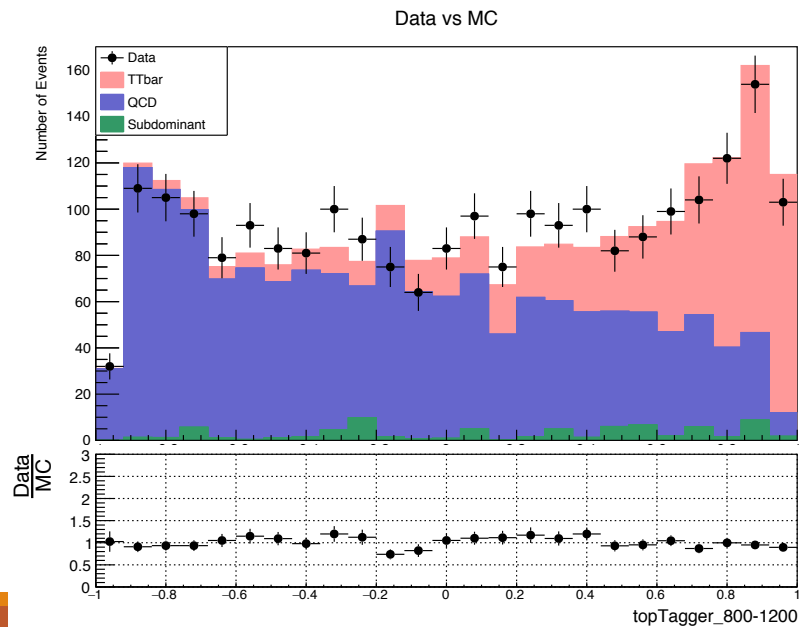
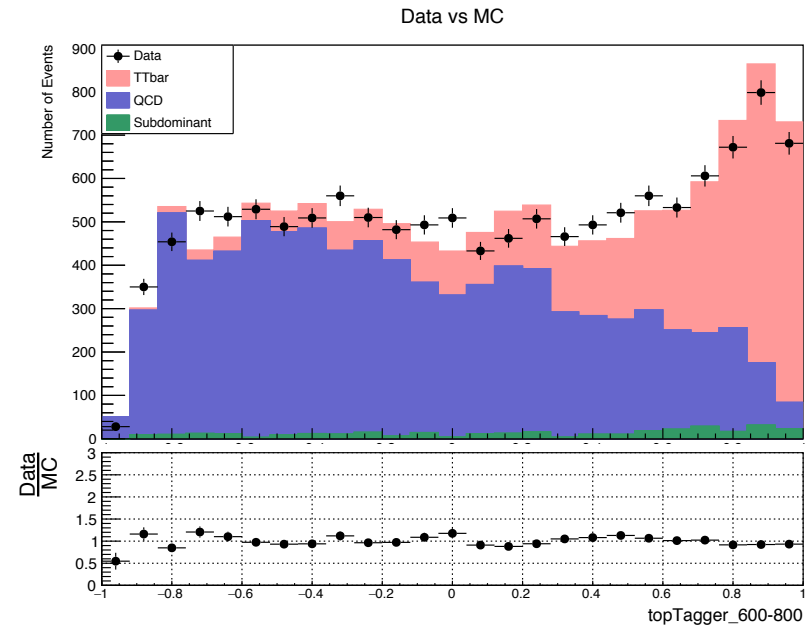
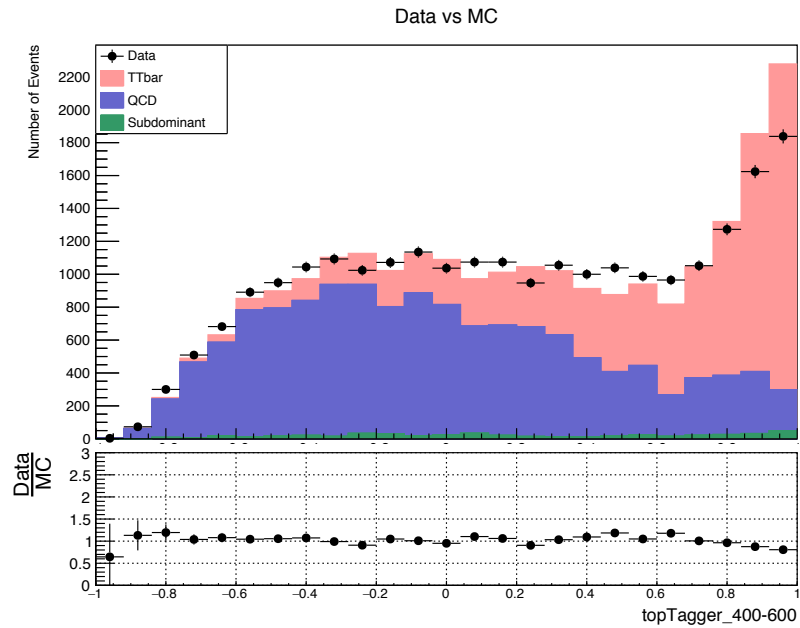
Stack of variables in SRB (2016)



Stack of variables in SRB (2017)



Stack of variables in SRB (2018)



TagAndProbe Efficiency (2016)

Efficiency (George)

eff data: 0.782 ± 0.039

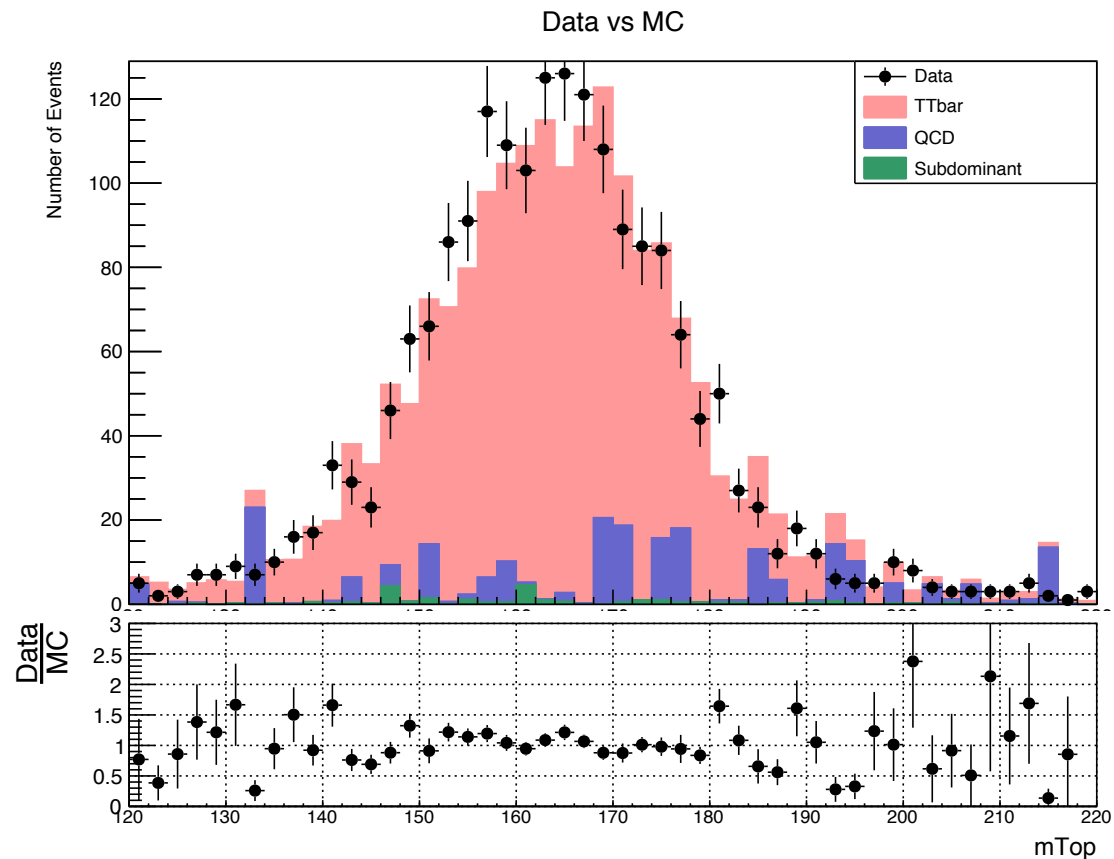
eff ttbar: 0.772 ± 0.014

Efficiency (Giannis)

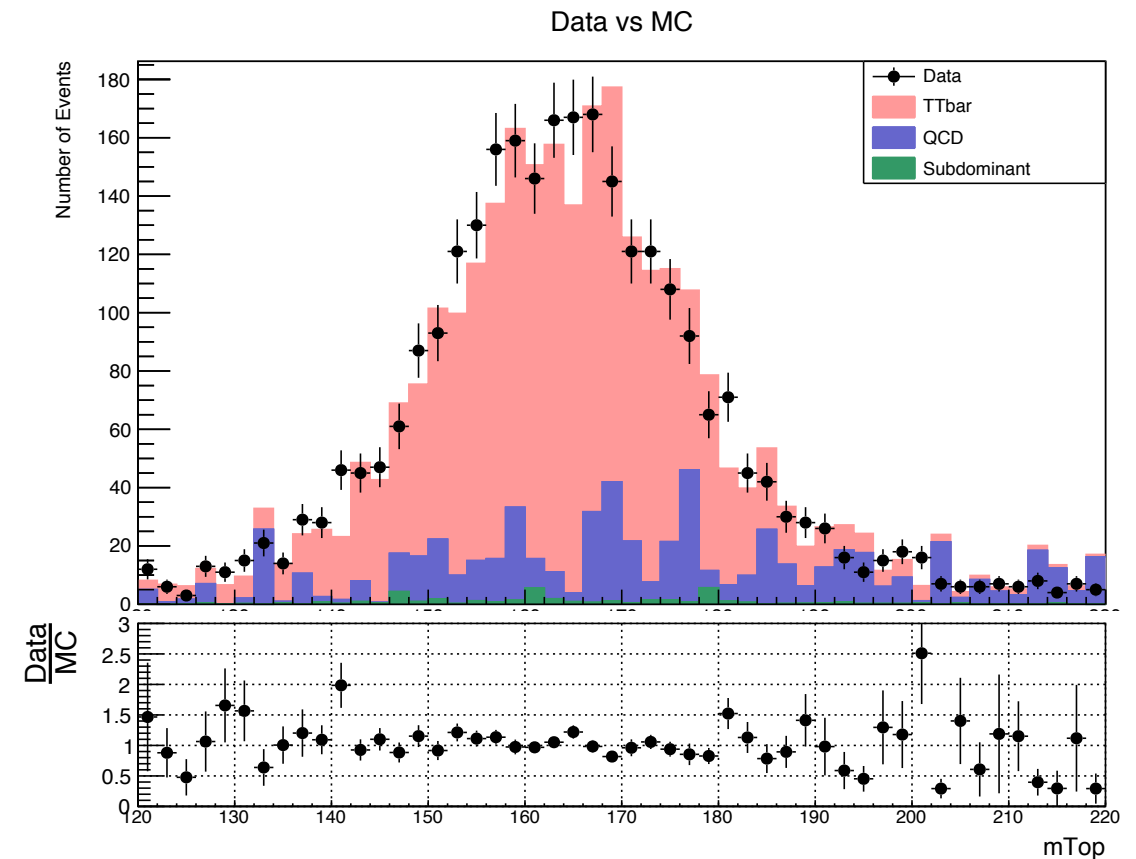
eff data: 0.788 ± 0.04

eff ttbar: 0.769 ± 0.014

Tight TopTagger + SR TopTagger



Tight TopTagger + Probe



TagAndProbe Efficiency (2017)

Efficiency (George)

eff data: 0.864 ± 0.043

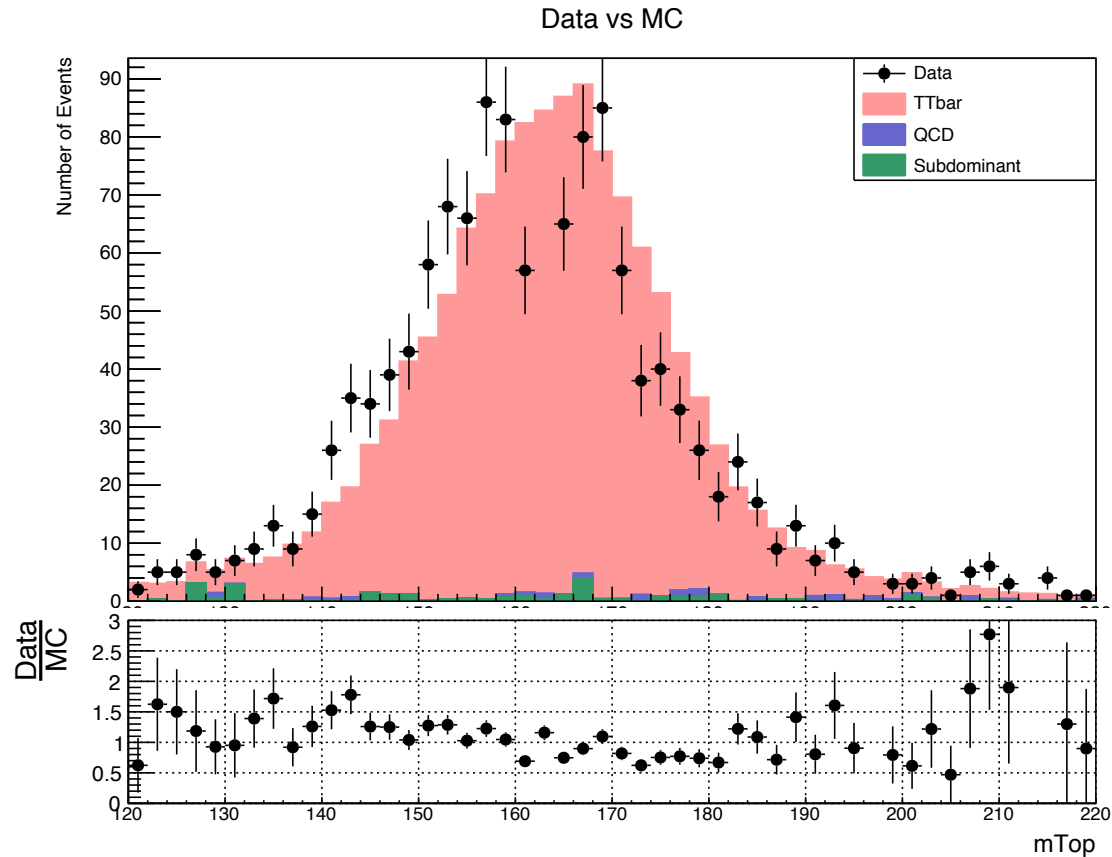
eff ttbar: 0.875 ± 0.007

Efficiency (Giannis)

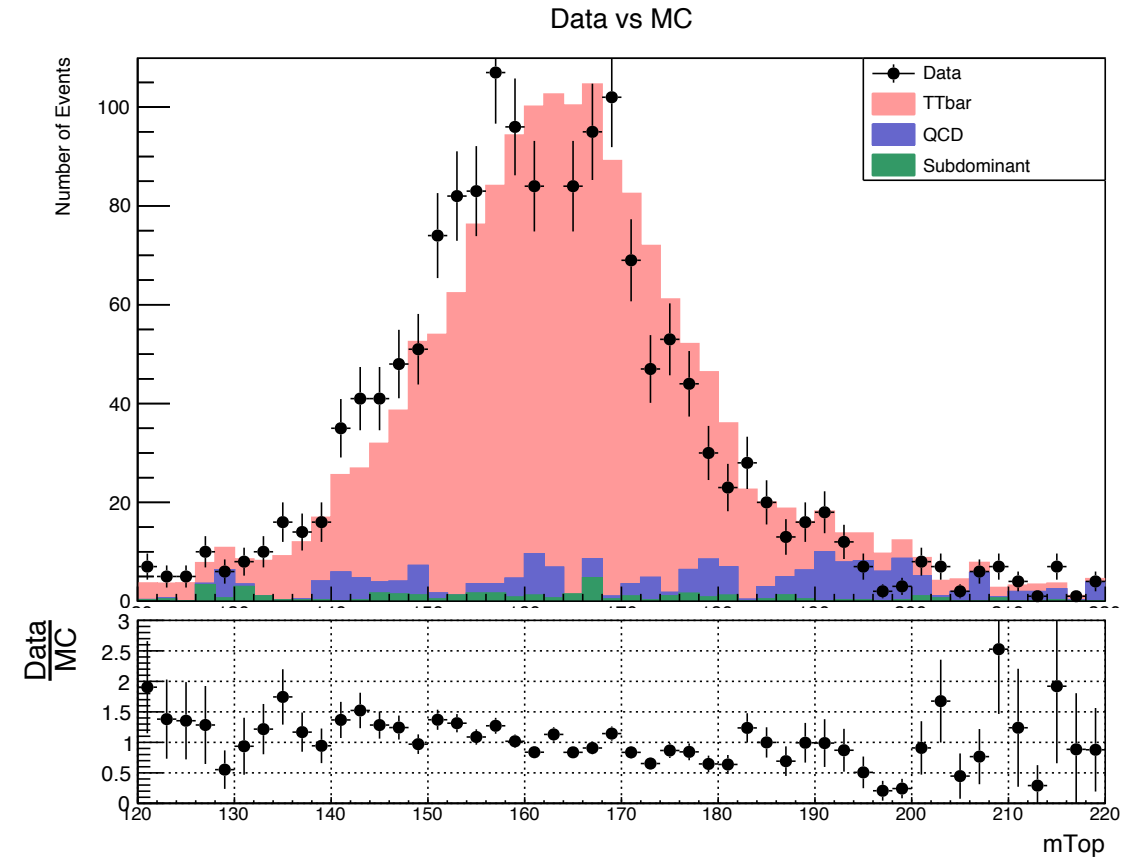
eff data: 0.873 ± 0.056

eff ttbar 0.862 ± 0.007

Tight TopTagger + SR TopTagger



Tight TopTagger + Probe

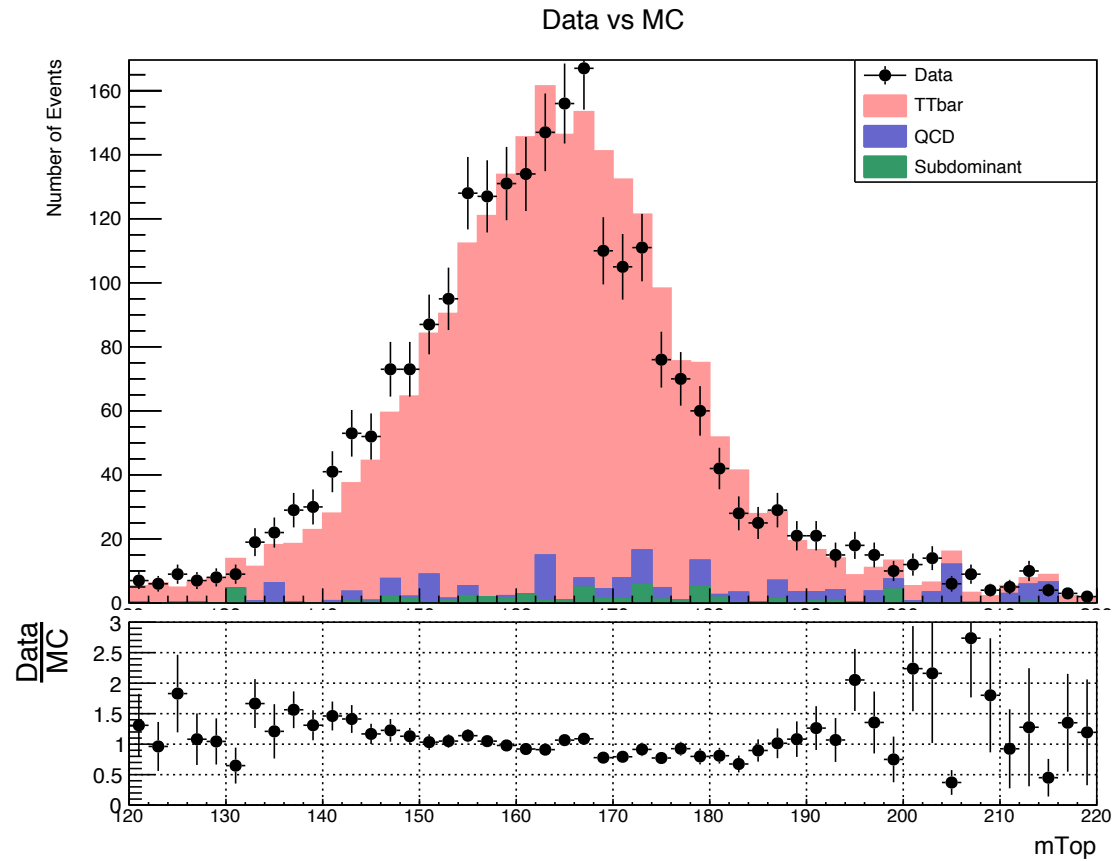


TagAndProbe Efficiency (2018)

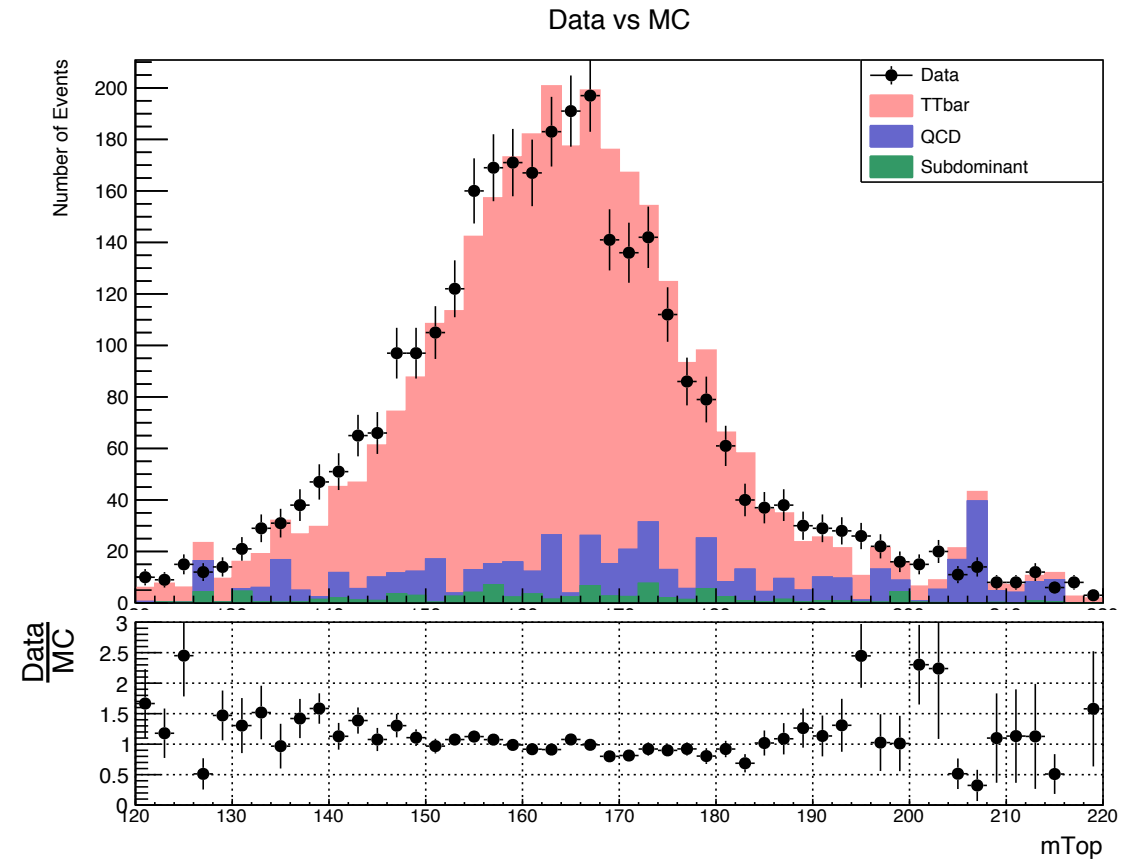
Efficiency (George):
eff data: 0.822 ± 0.034
eff ttbar: 0.839 ± 0.005

Efficiency (Giannis):
eff data: 0.792 ± 0.034
eff ttbar: 0.827 ± 0.005

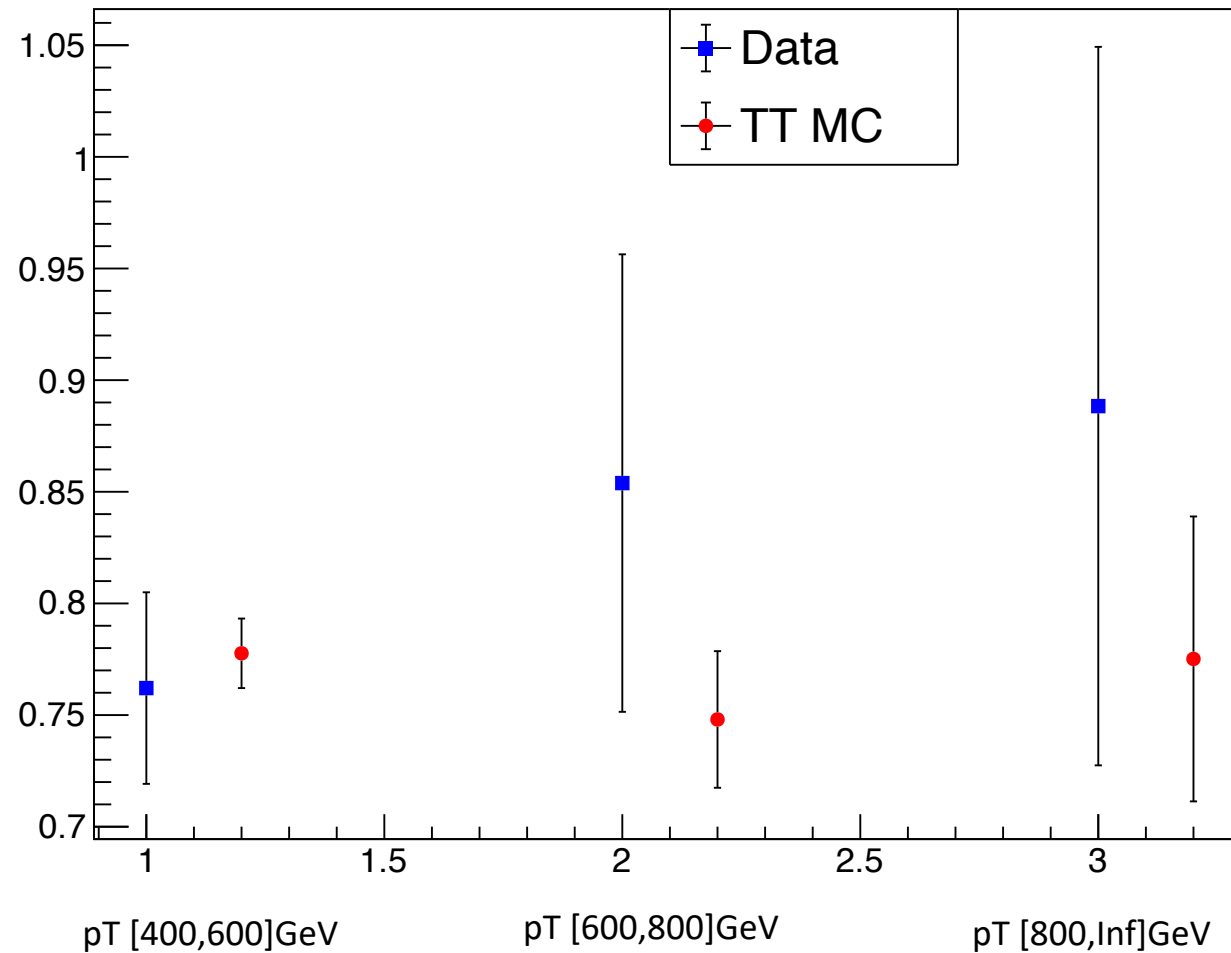
Tight TopTagger + SR TopTagger



Tight TopTagger + Probe



TagAndProbe Efficiency per Pt region (2016)



Efficiency per Pt region

eff data pT[400-600]: 0.762 ± 0.043

eff ttbar pT[400-600]: 0.778 ± 0.016

eff data pT[600-800]: 0.854 ± 0.103

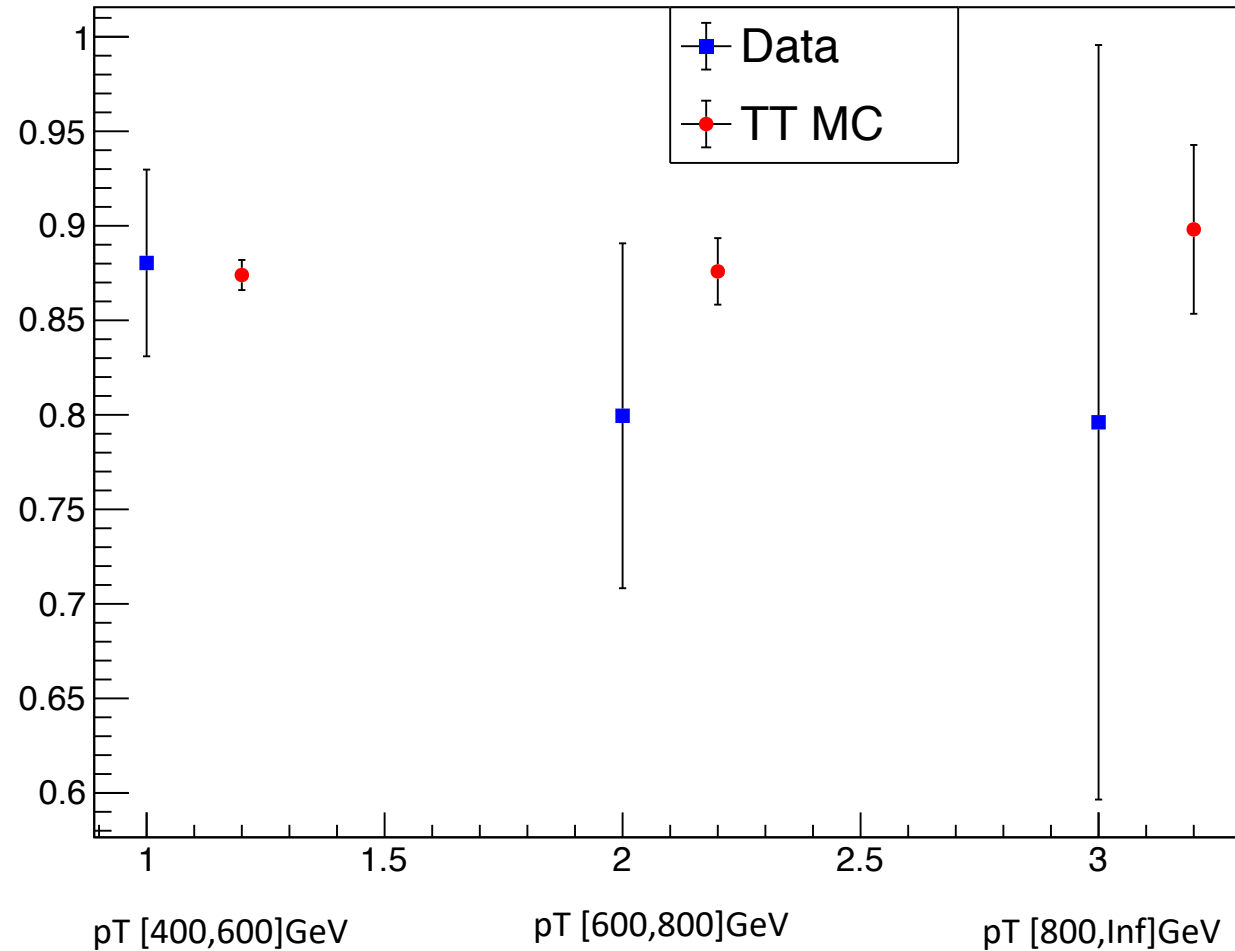
eff ttbar pT[600-800]: 0.748 ± 0.031

eff data pT[800-Inf]: 0.888 ± 0.161

eff ttbar pT[800-Inf]: 0.775 ± 0.064



TagAndProbe Efficiency per Pt region(2017)



Efficiency per Pt region

eff data pT[400-600]: 0.880 ± 0.049

eff ttbar pT[400-600]: 0.874 ± 0.008

eff data pT[600-800]: 0.799 ± 0.091

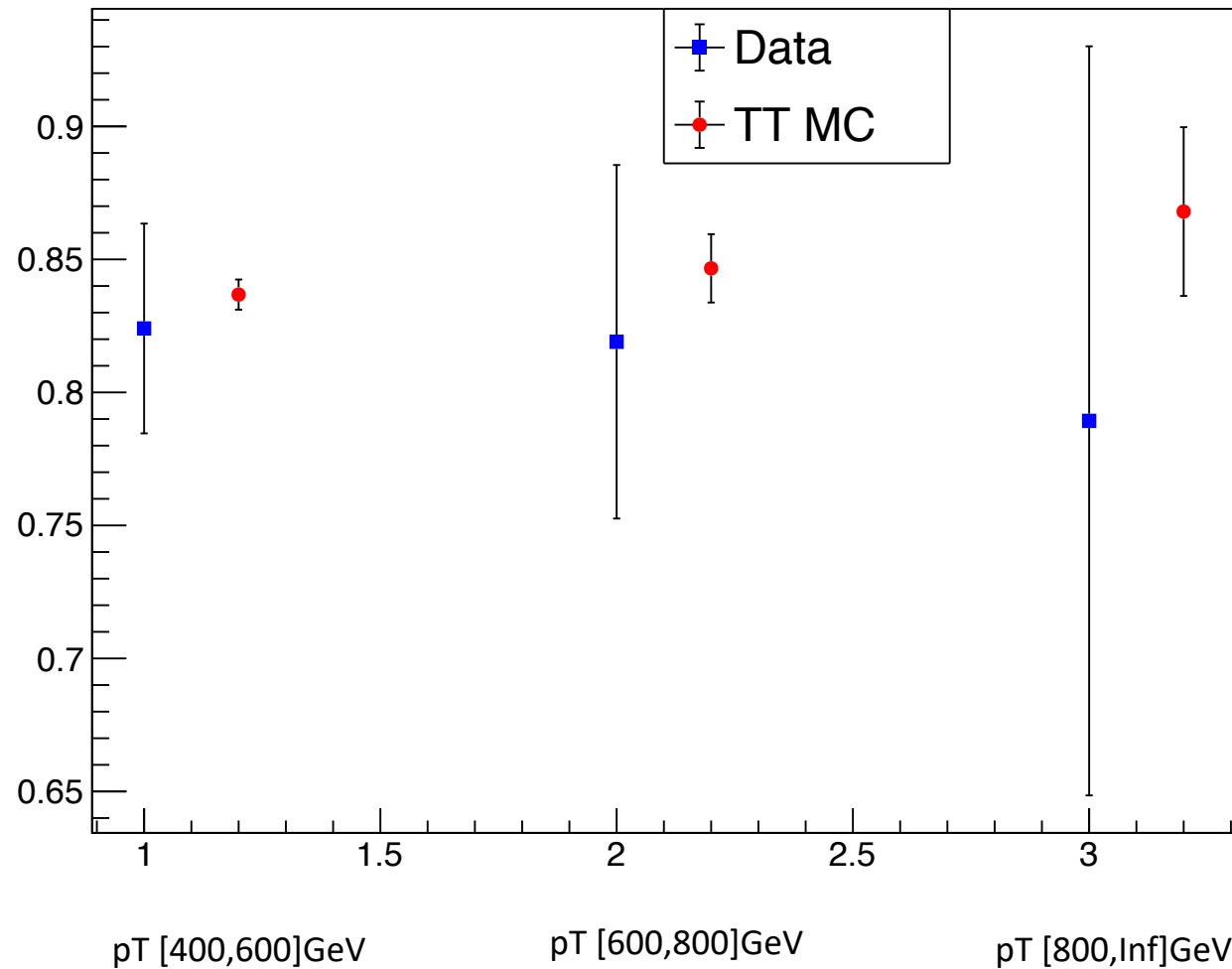
eff ttbar pT[600-800]: 0.876 ± 0.018

eff data pT[800-Inf]: 0.796 ± 0.2

eff ttbar pT[800-Inf]: 0.898 ± 0.045



TagAndProbe Efficiency per Pt region(2018)



Efficiency per Pt region

eff data pT[400-600]: 0.824 ± 0.039

eff ttbar pT[400-600]: 0.837 ± 0.006

eff data pT[600-800]: 0.819 ± 0.066

eff ttbar pT[600-800]: 0.847 ± 0.013

eff data pT[800-Inf]: 0.789 ± 0.141

eff ttbar pT[800-Inf]: 0.868 ± 0.032

