

Weekly Report NTUA 20/1/2020

George Bakas



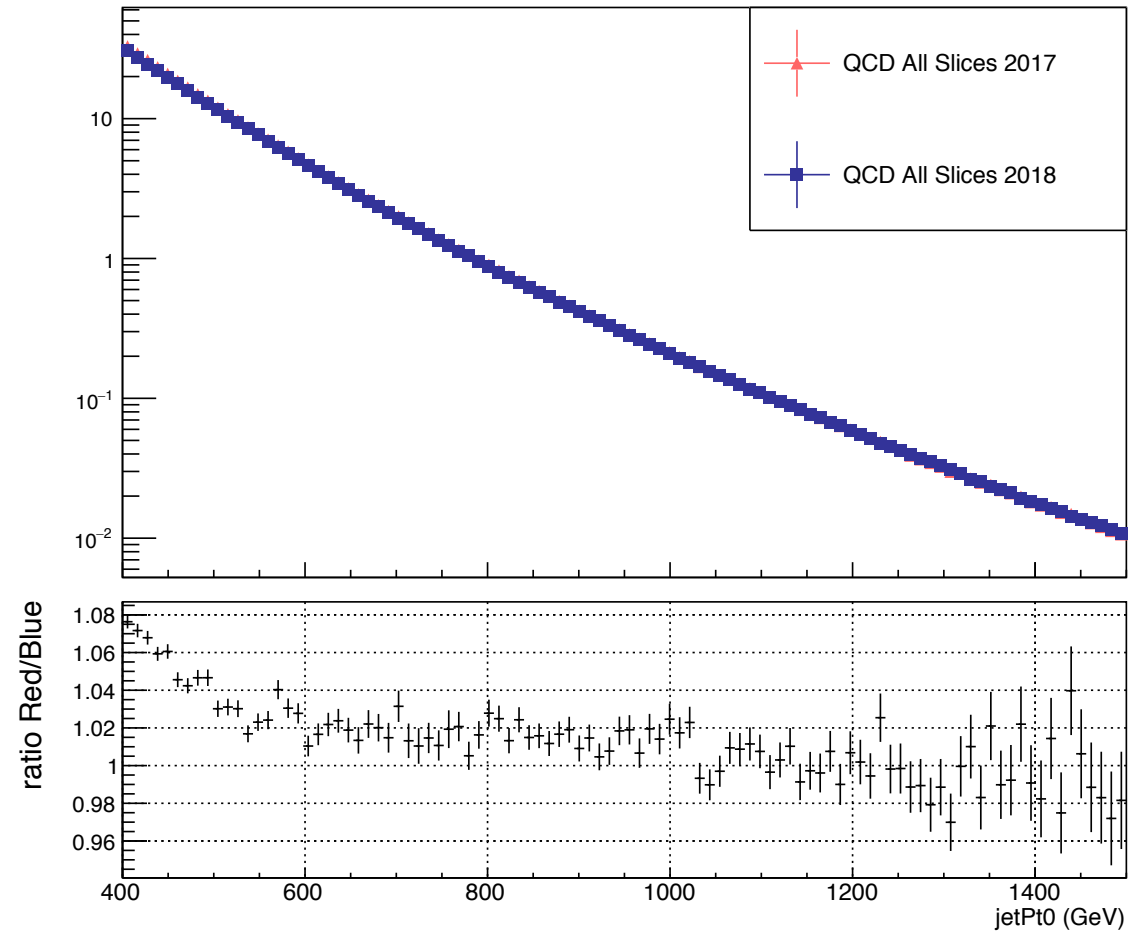
Status Report

- Analysis:
 - Consistency checks with Giannis:
 - QCD Closure and TTContamination
 - Mass Fit
 - Ryield
 - QCD b enriched files
 - Efficiency and Acceptance:
 - Parton and Particle
 - Nominal MC
 - MC '17 and '18 Comparison:
 - QCD
 - Ttbar (High Mtt samples)
 - Leading and Subleading jetPt, jetY, mJJ, ptJJ, yJJ

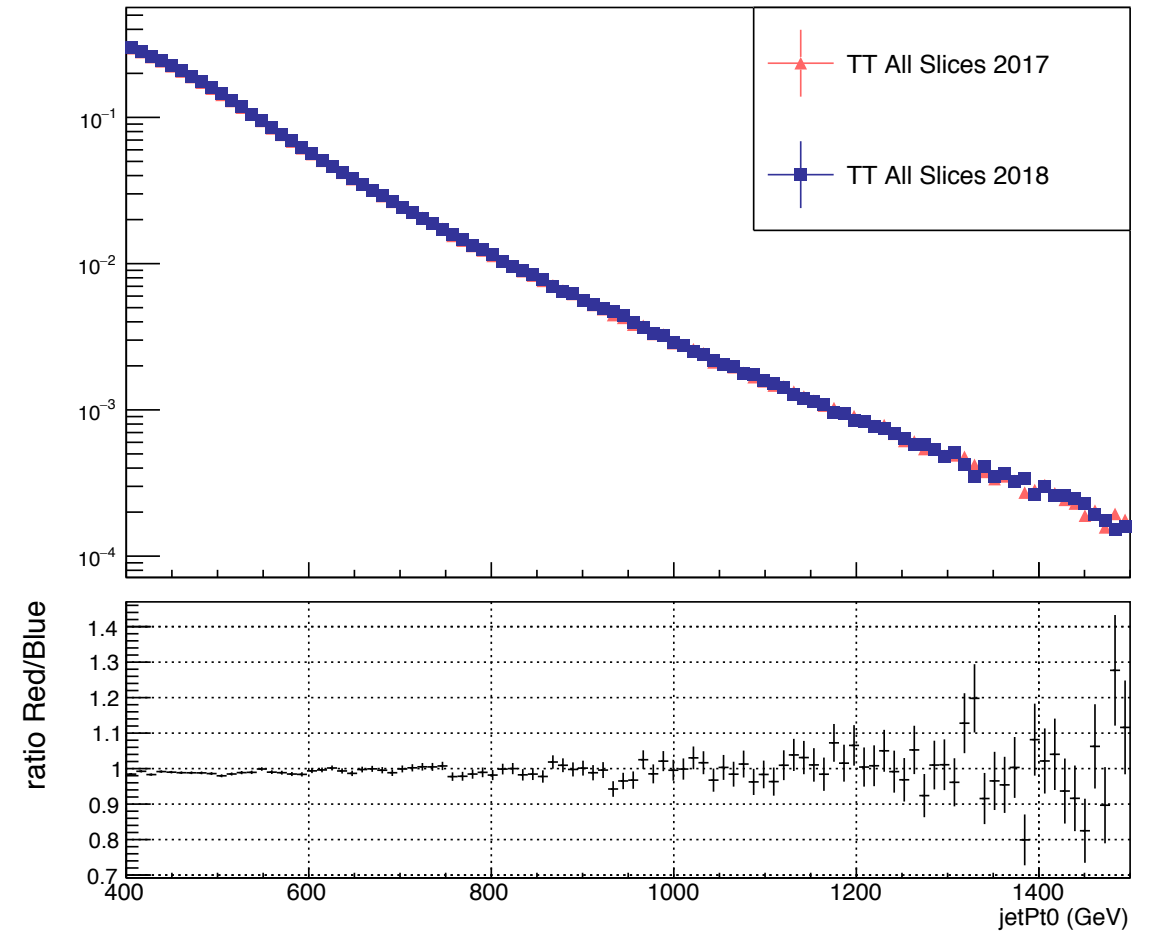


MC Closure tests '17 and '18 Scaled to LUMI

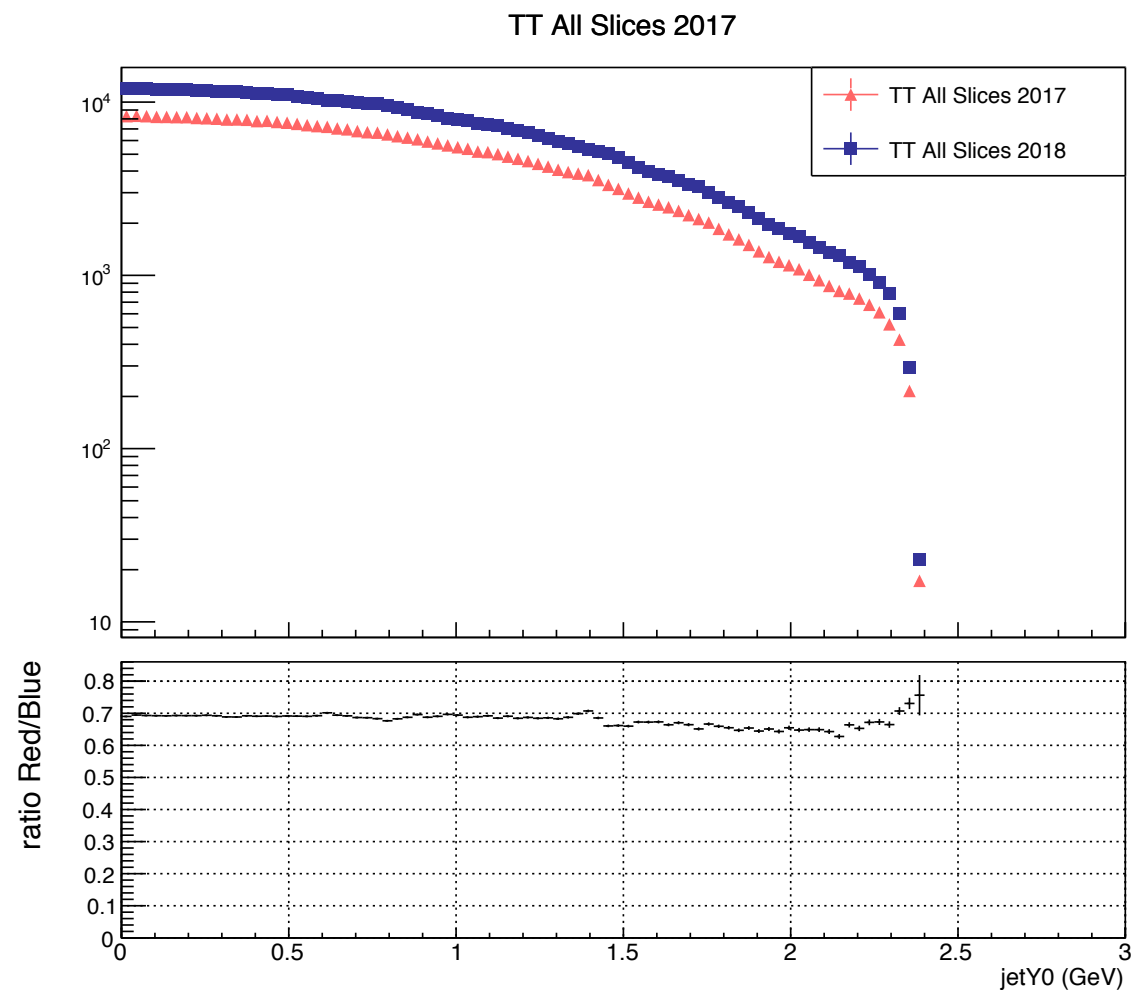
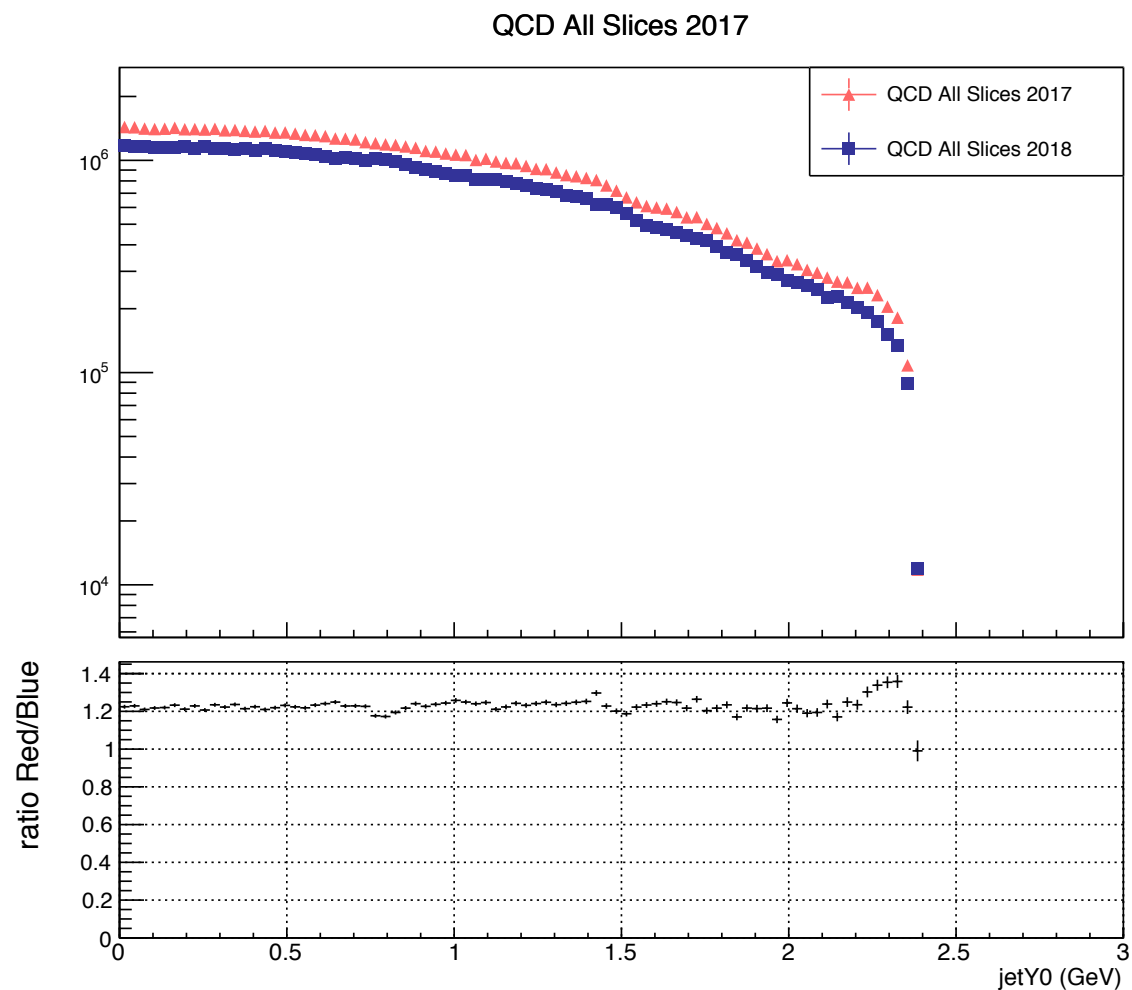
QCD All Slices 2017



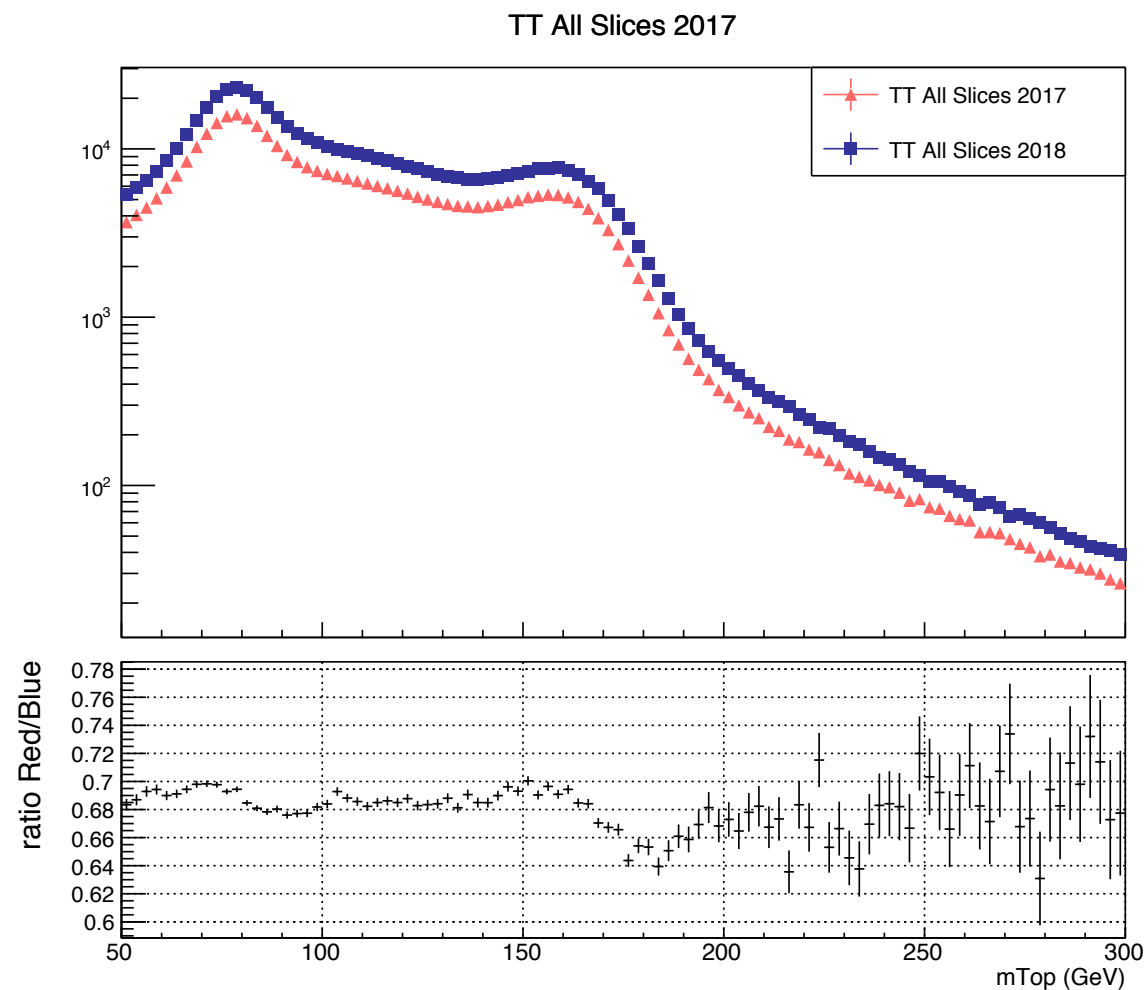
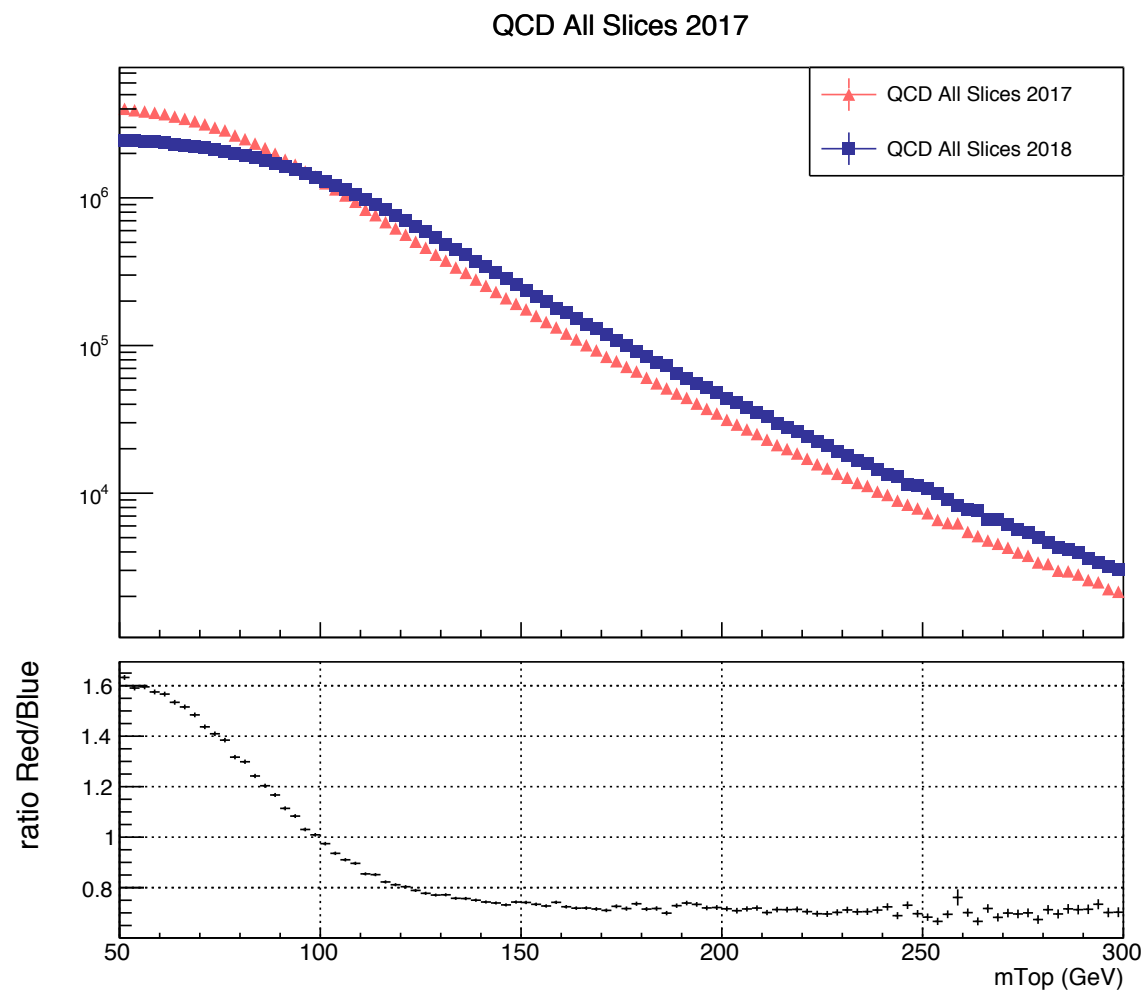
TT All Slices 2017



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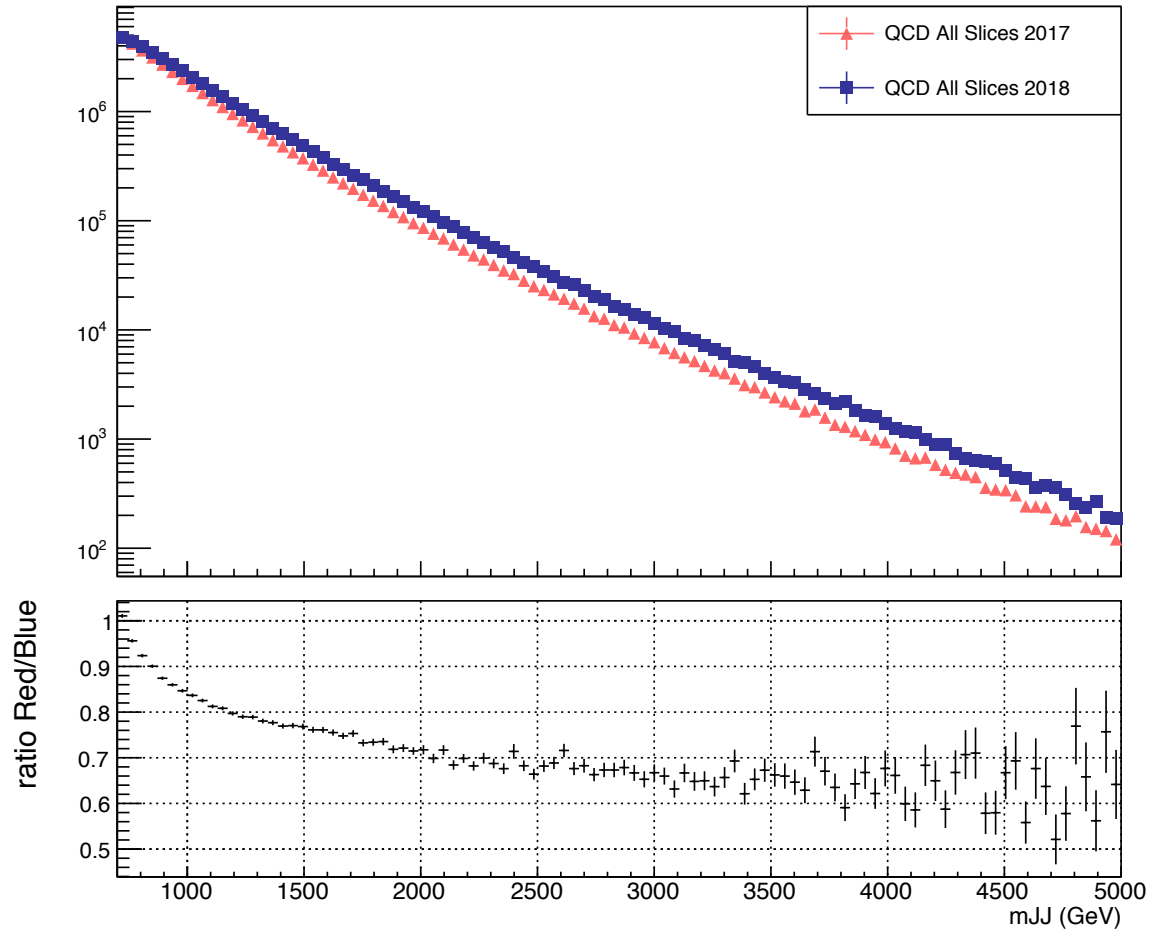


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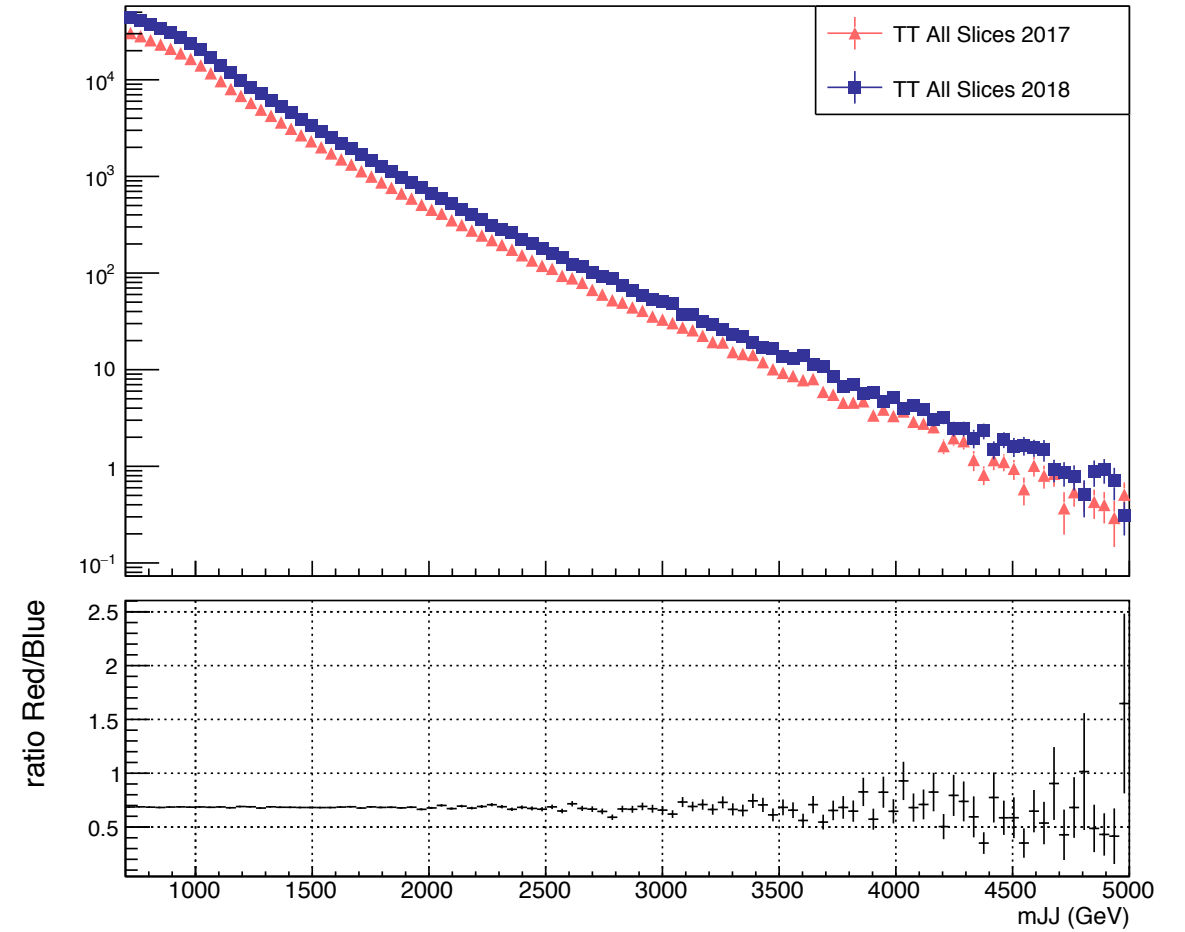


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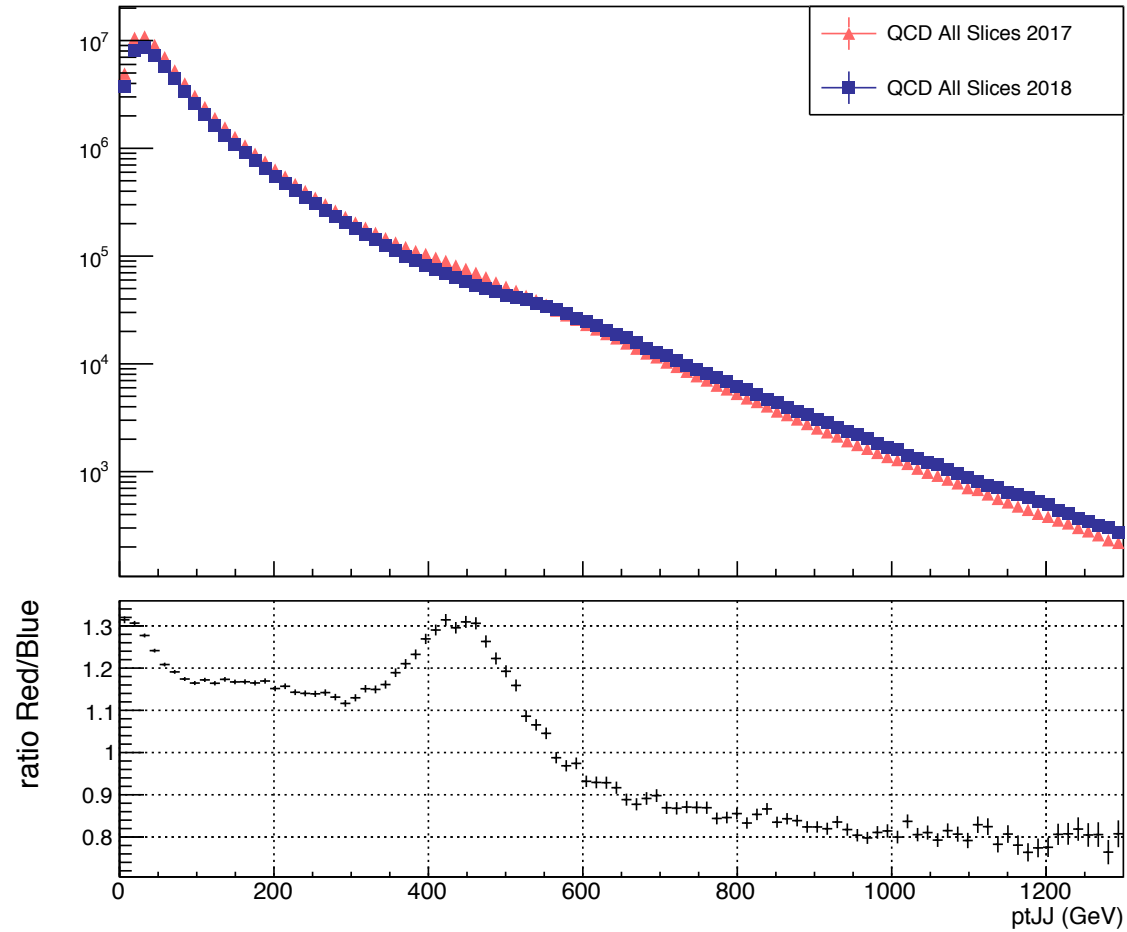


TT All Slices 2017

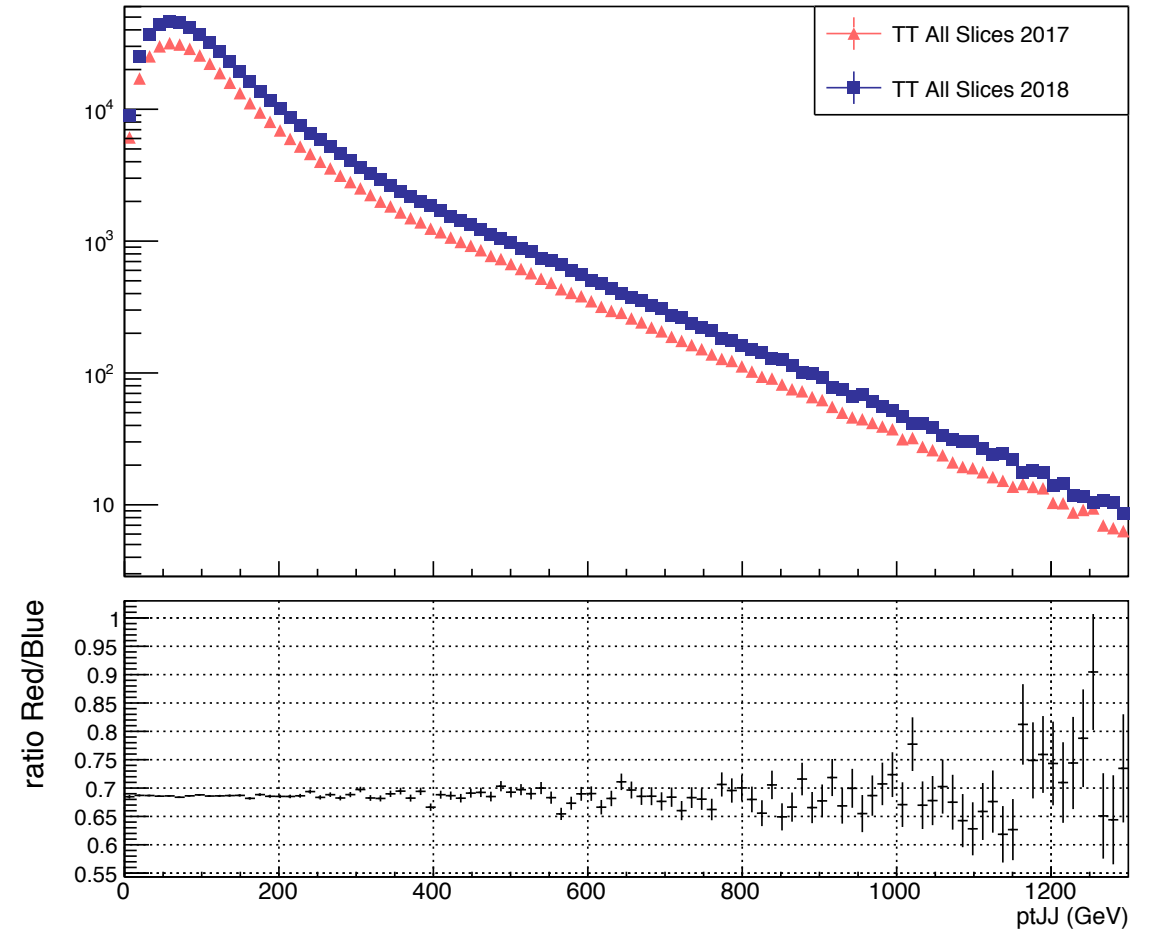


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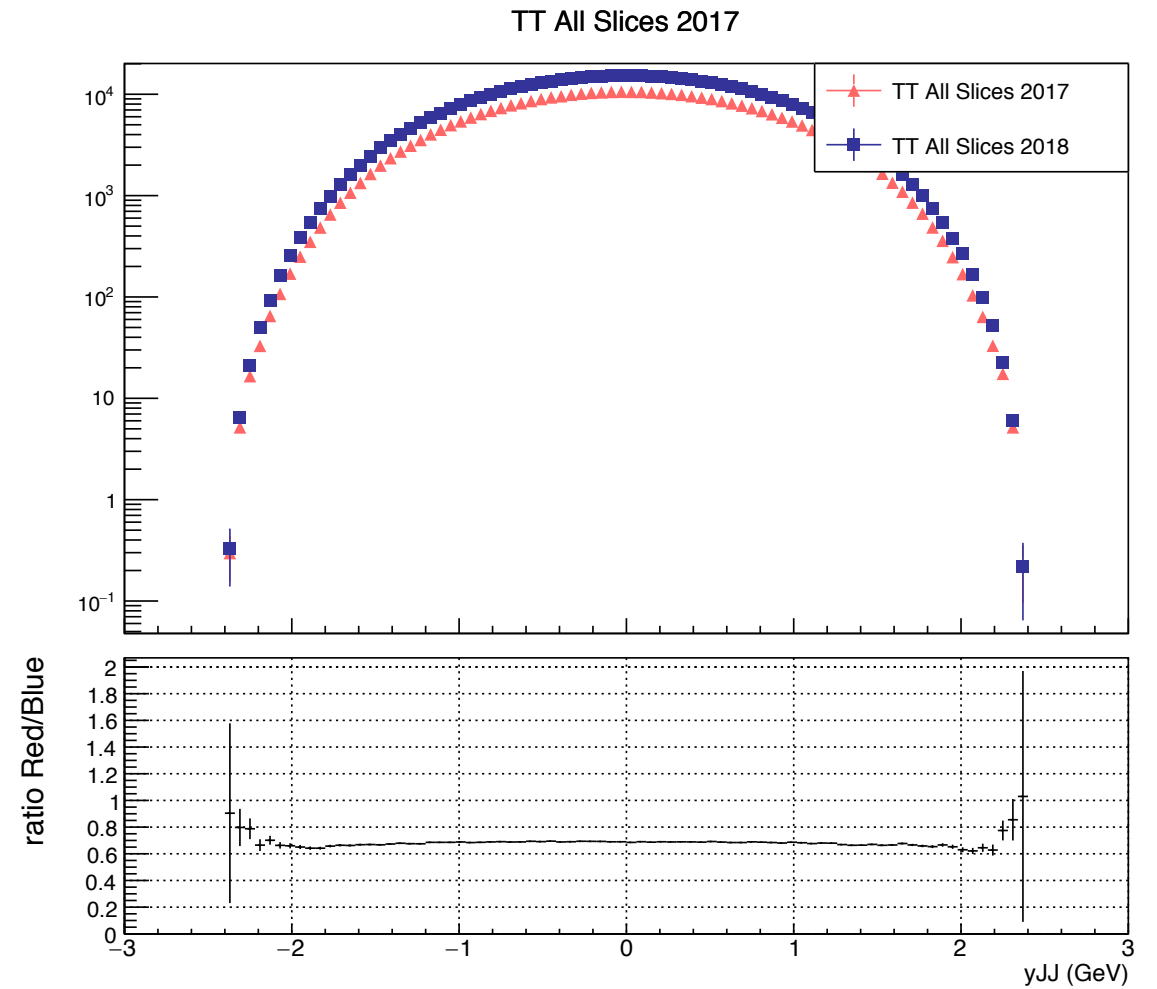
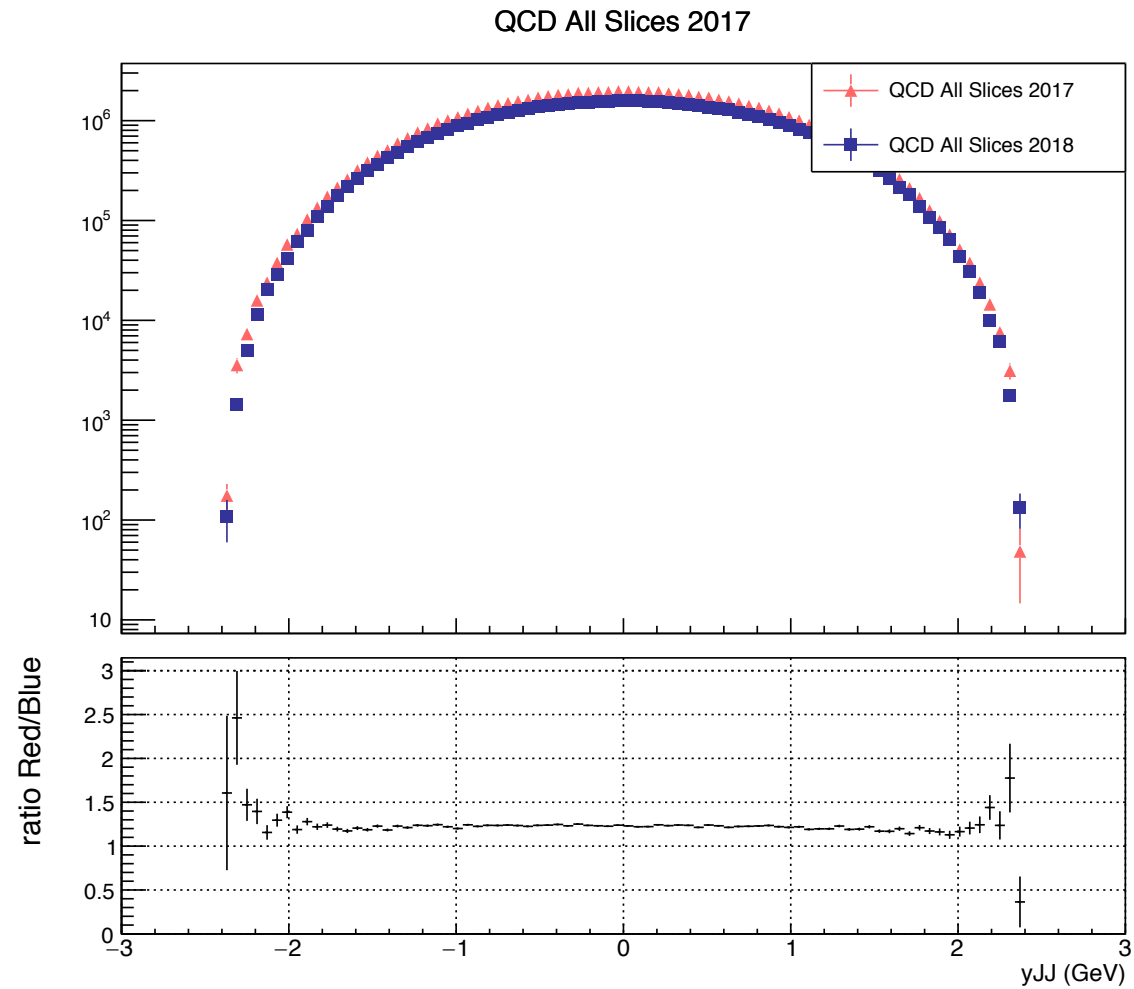
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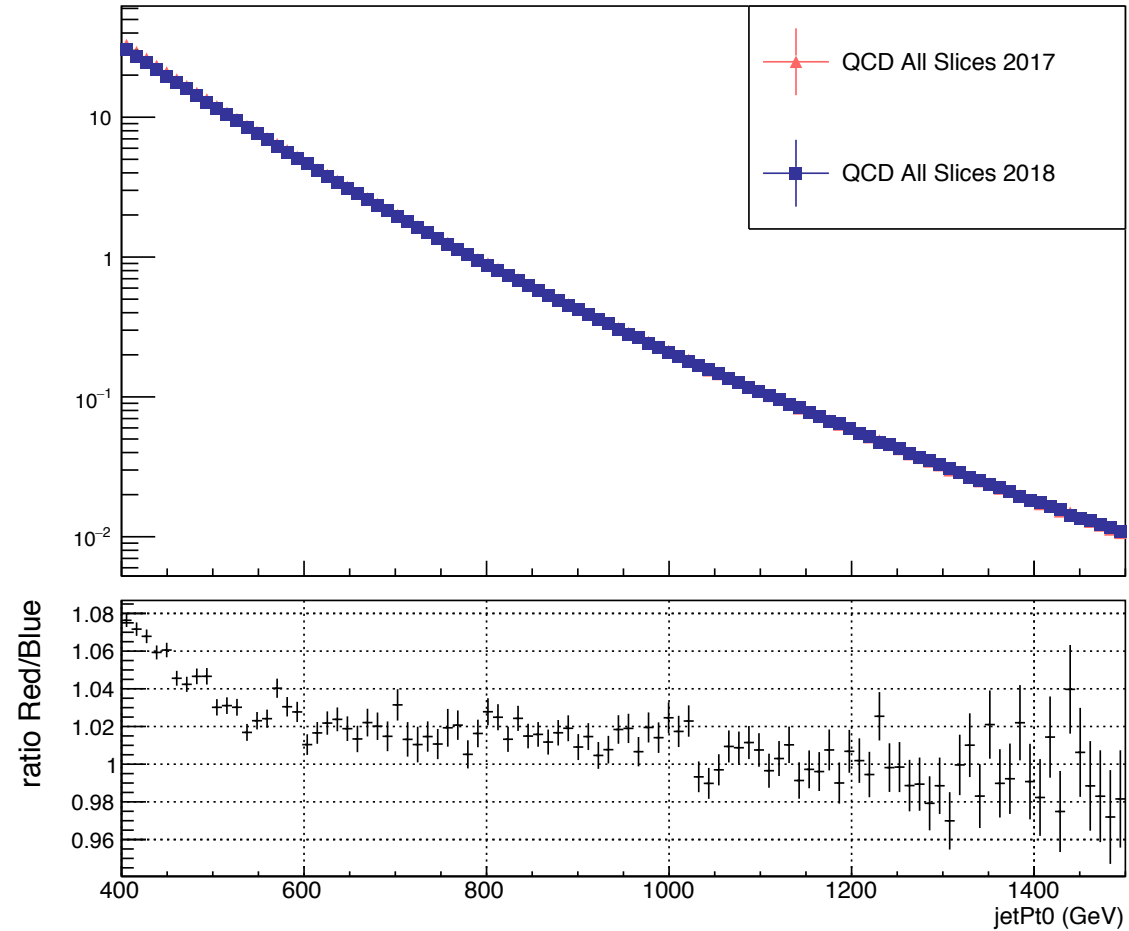


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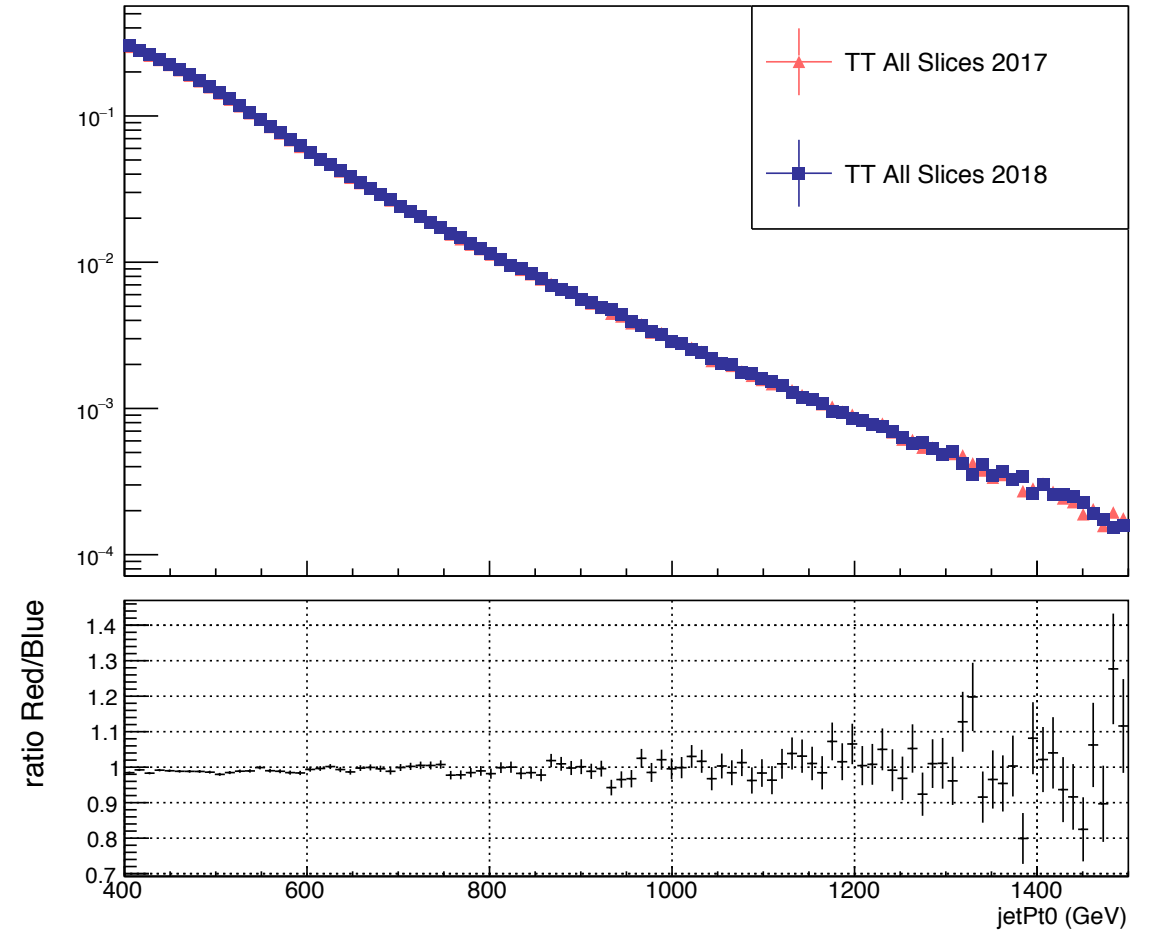


MC Closure tests '17 and '18 (shape)

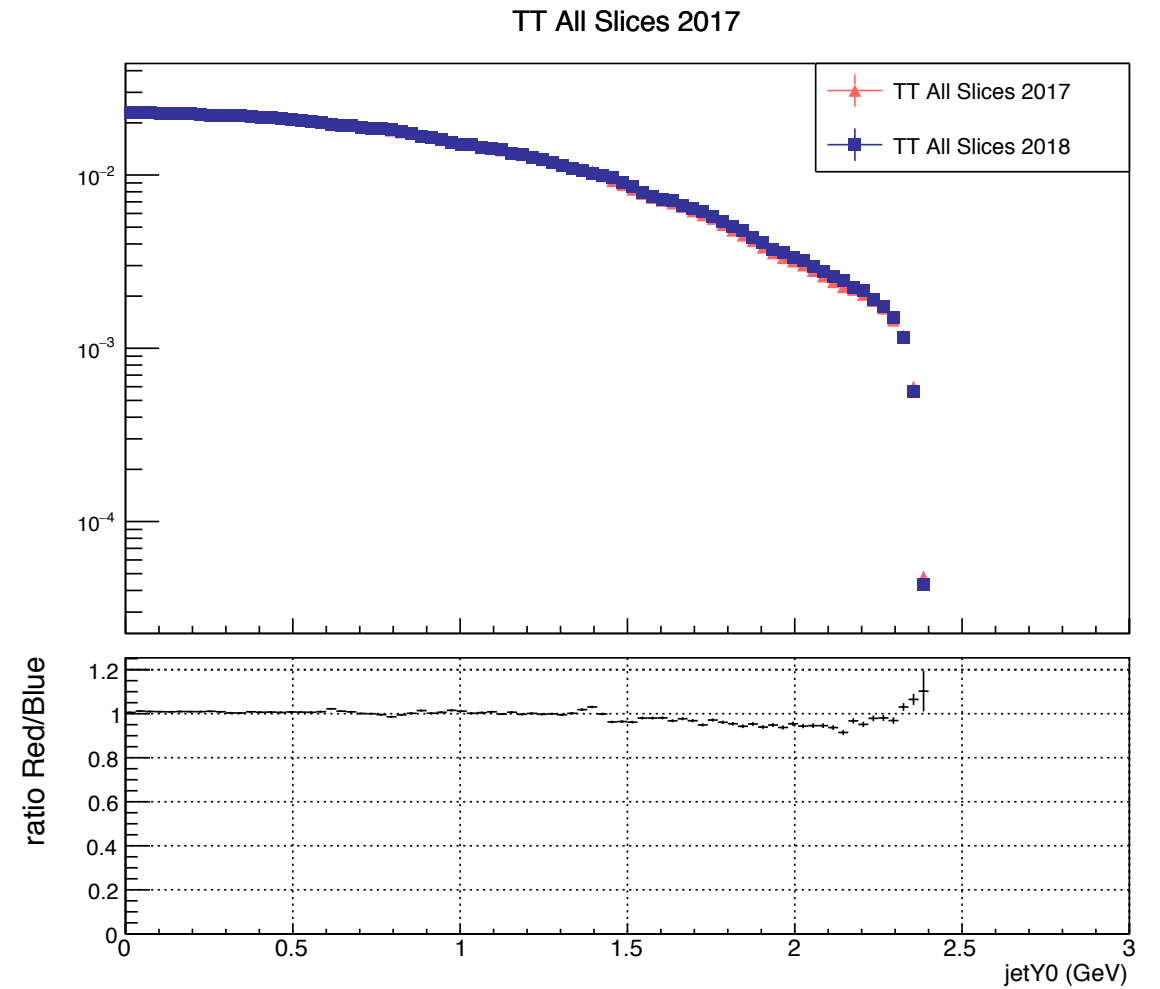
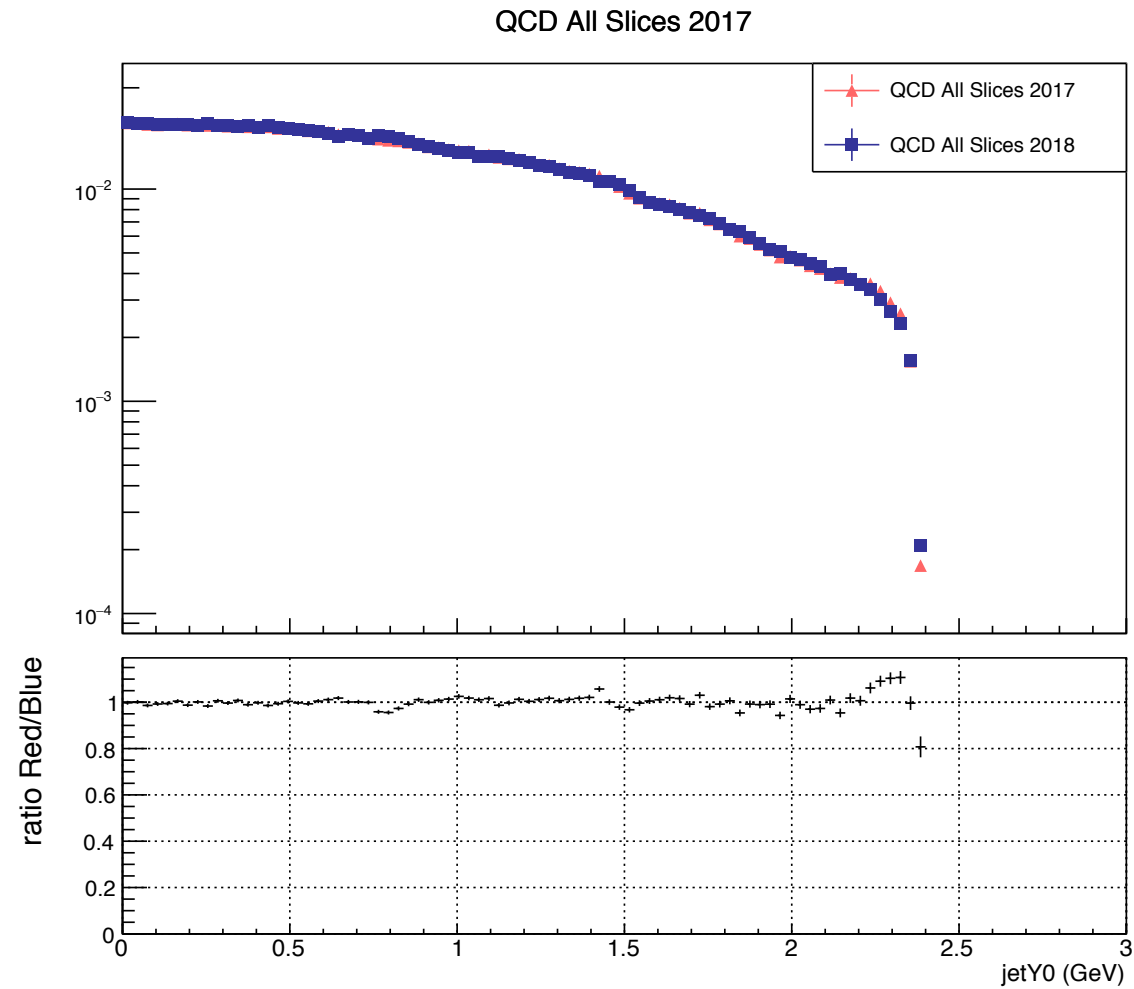
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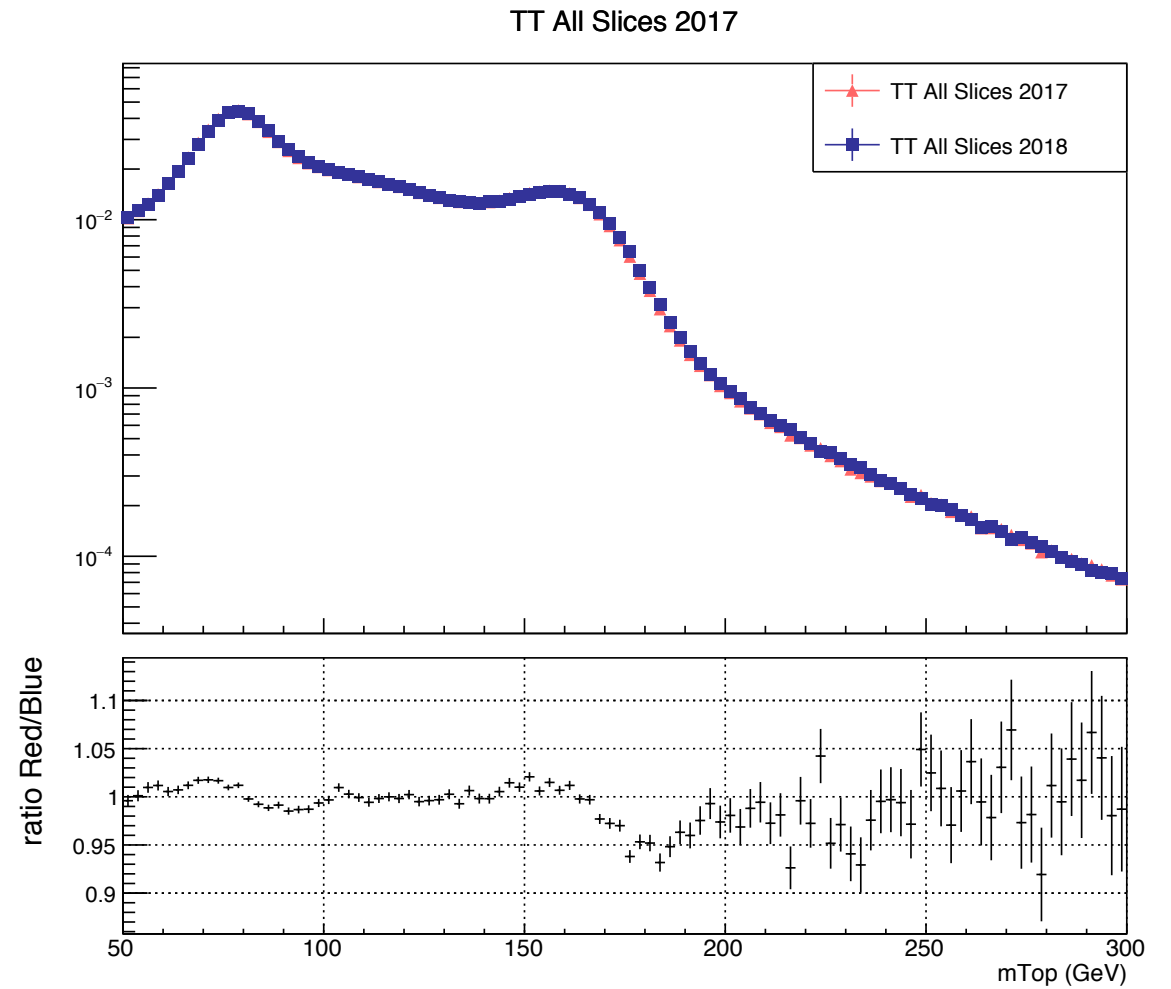
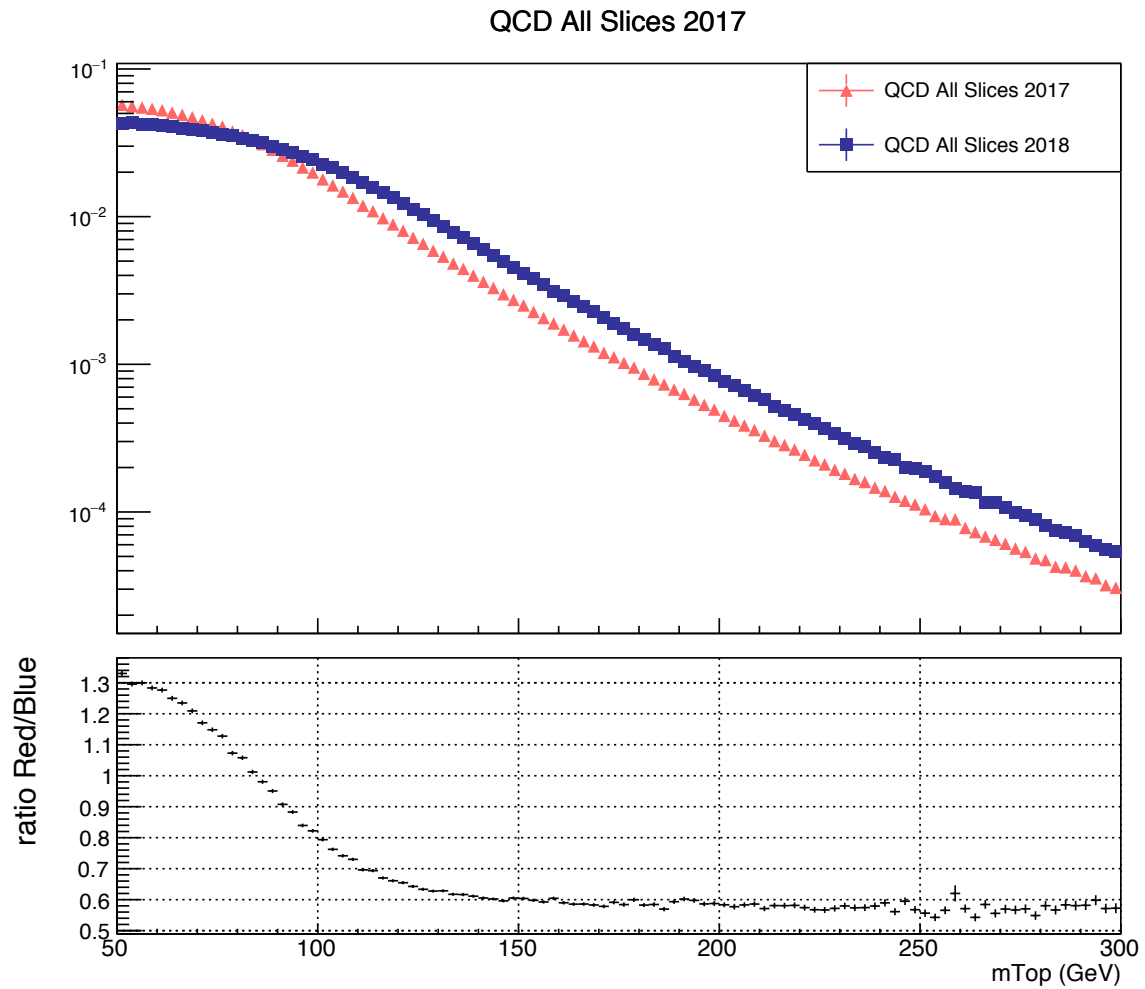
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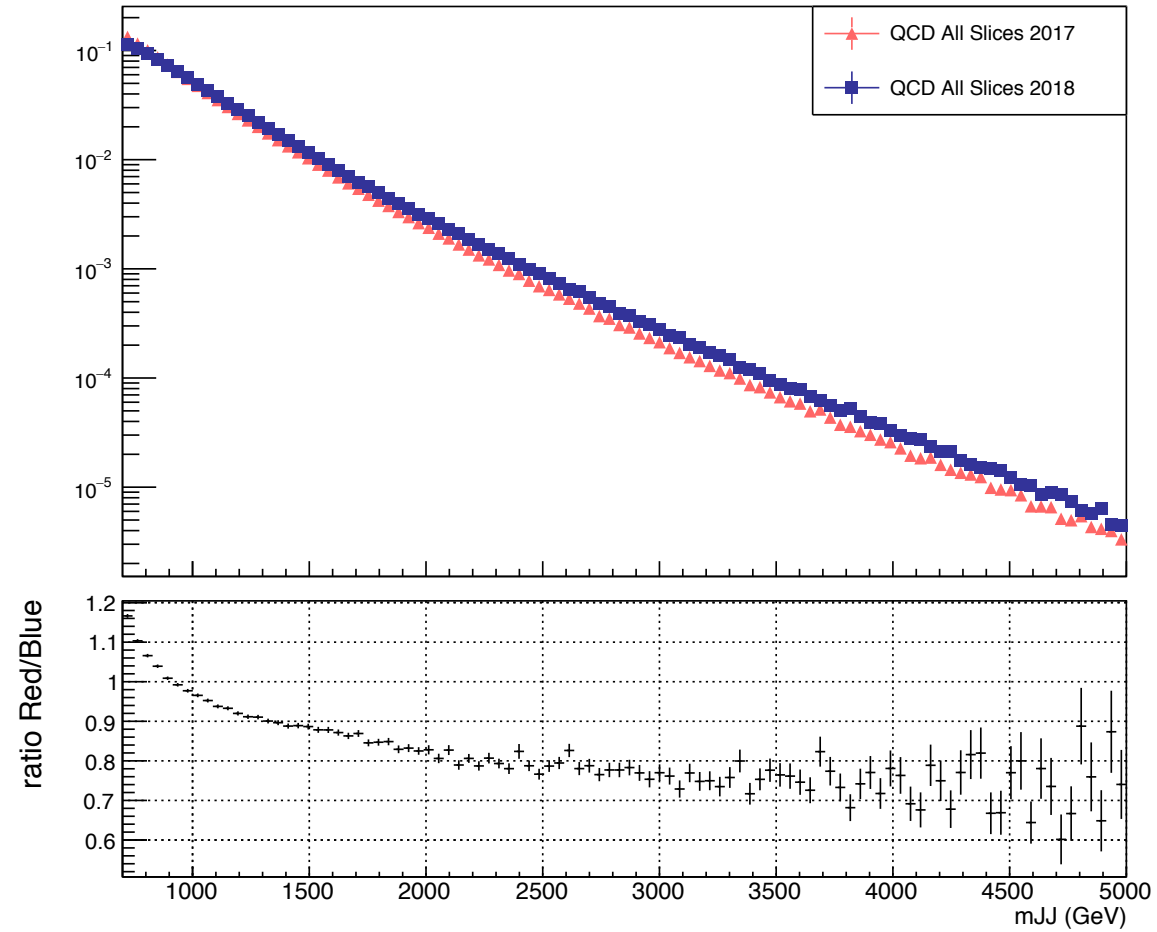


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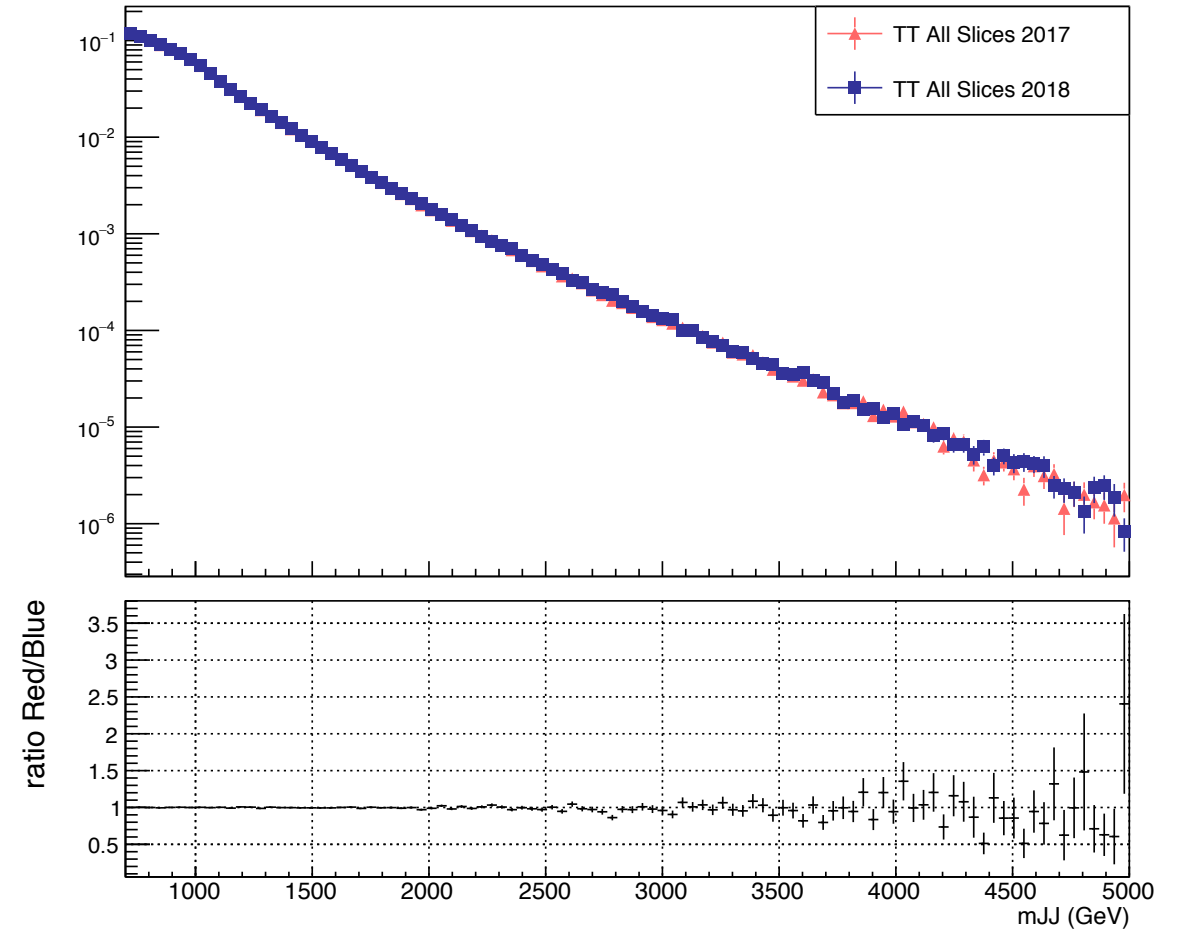


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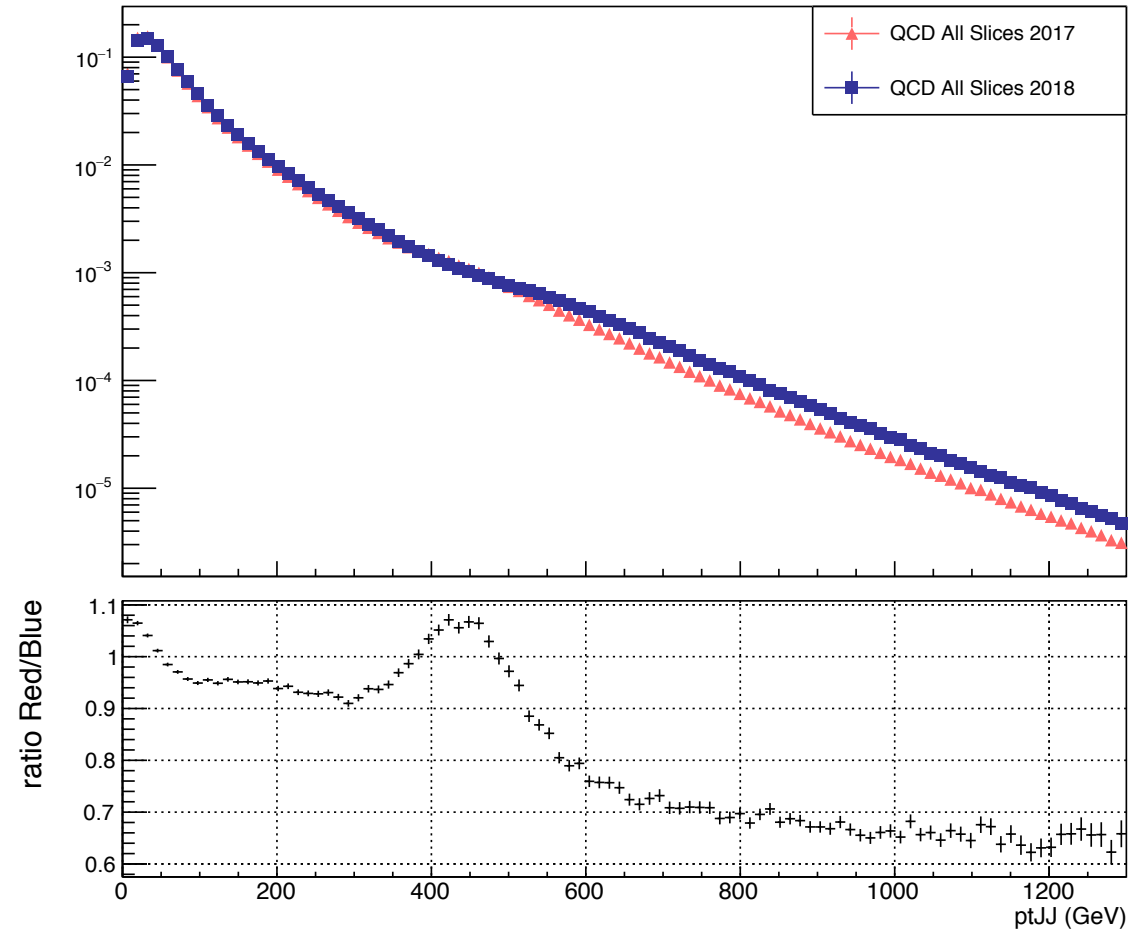


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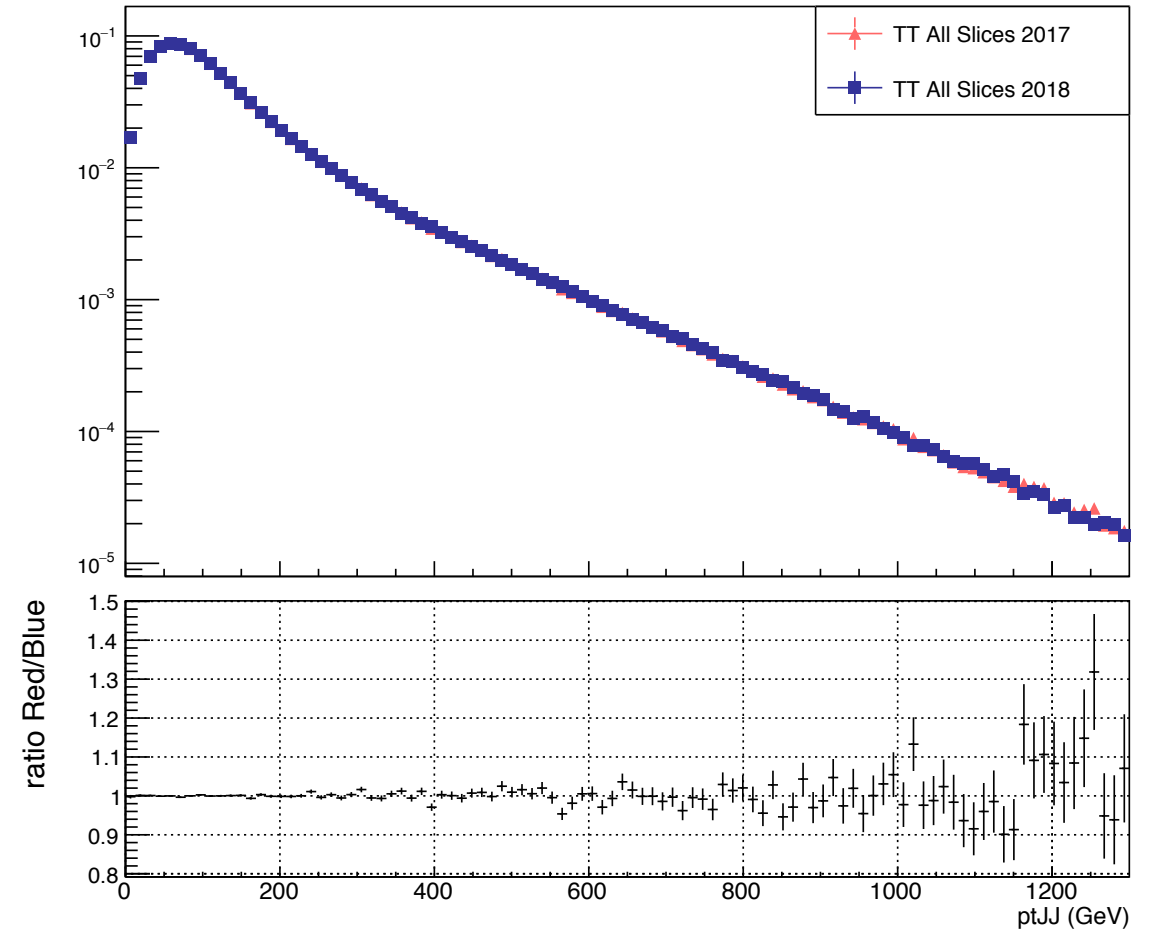


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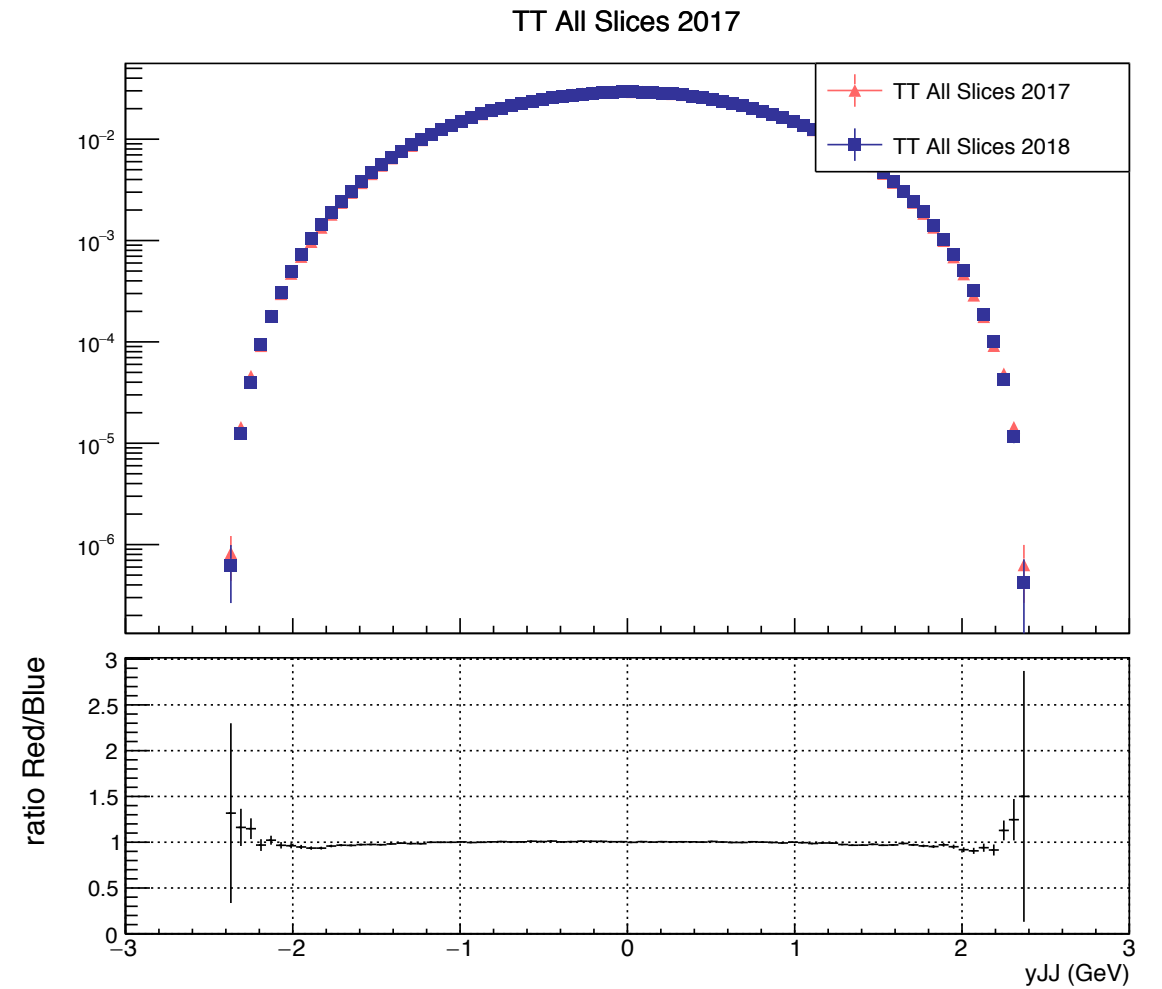
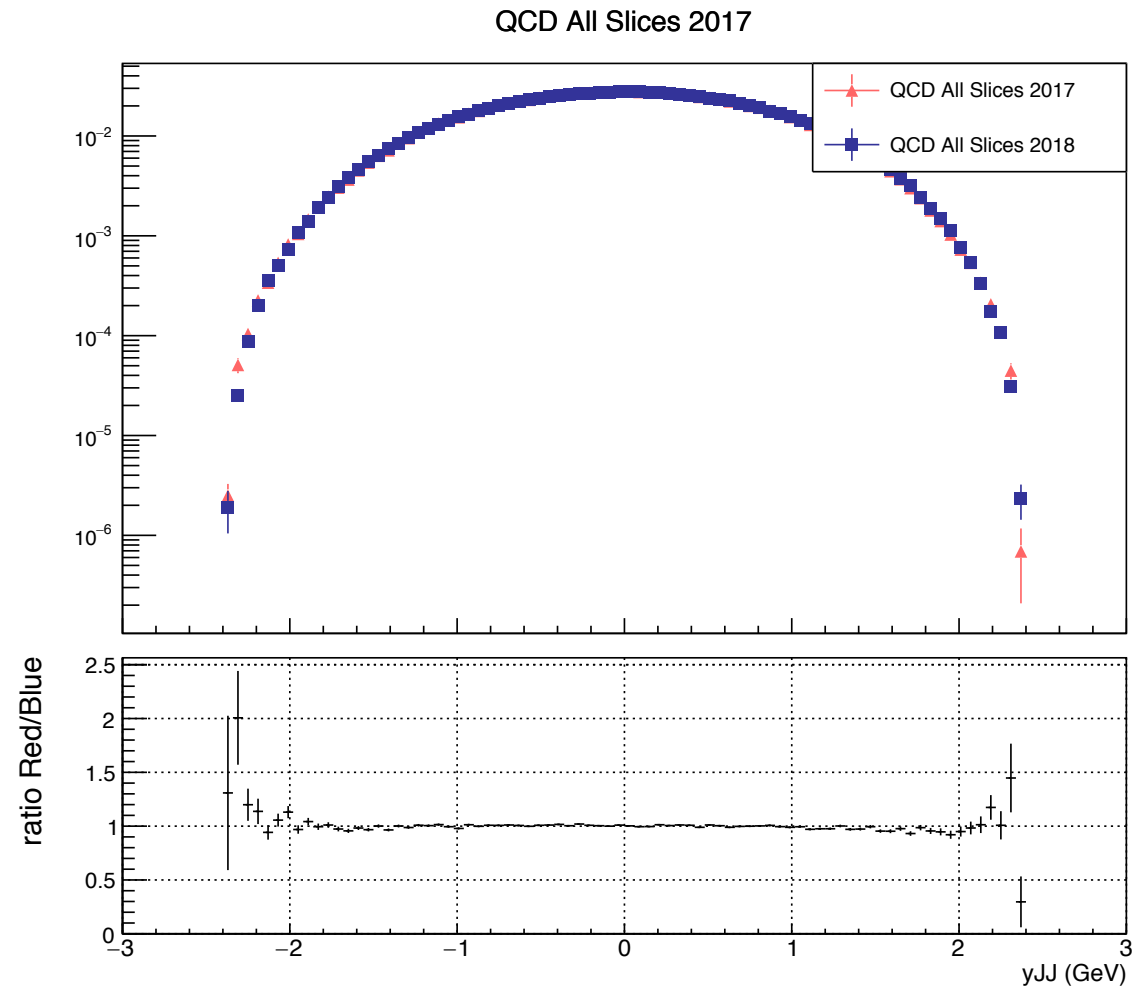
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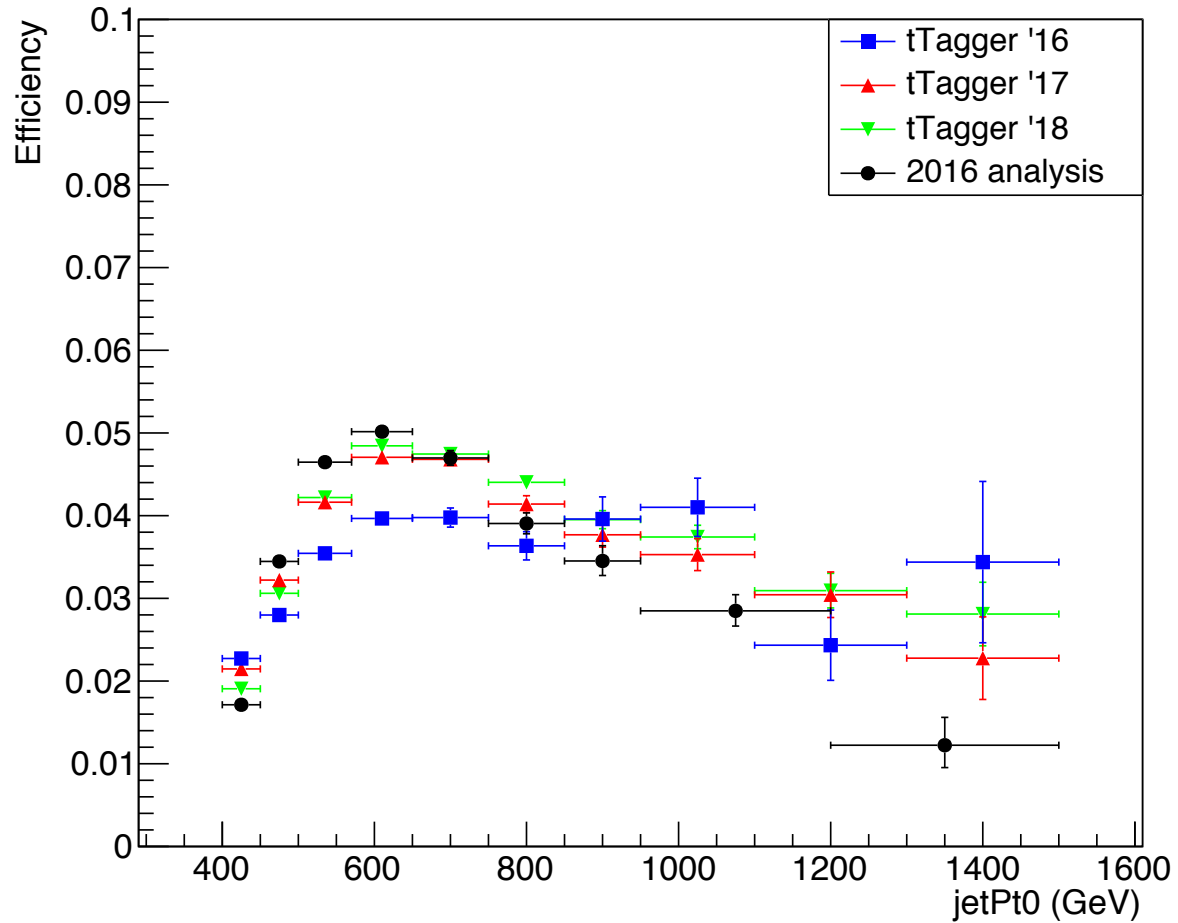


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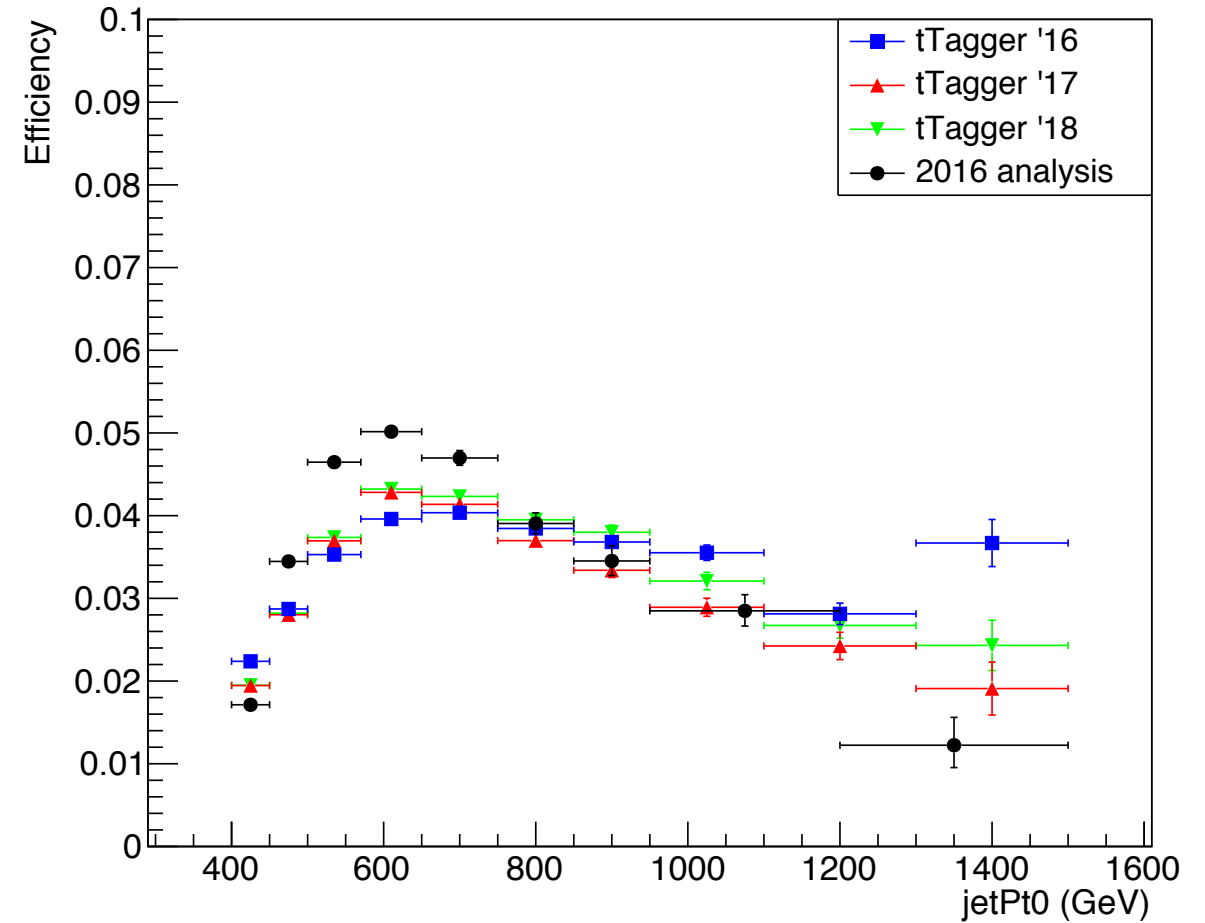


Efficiency from Nominal MC and High Mtt

Parton Efficiency '16,'17,'18 NominalMC

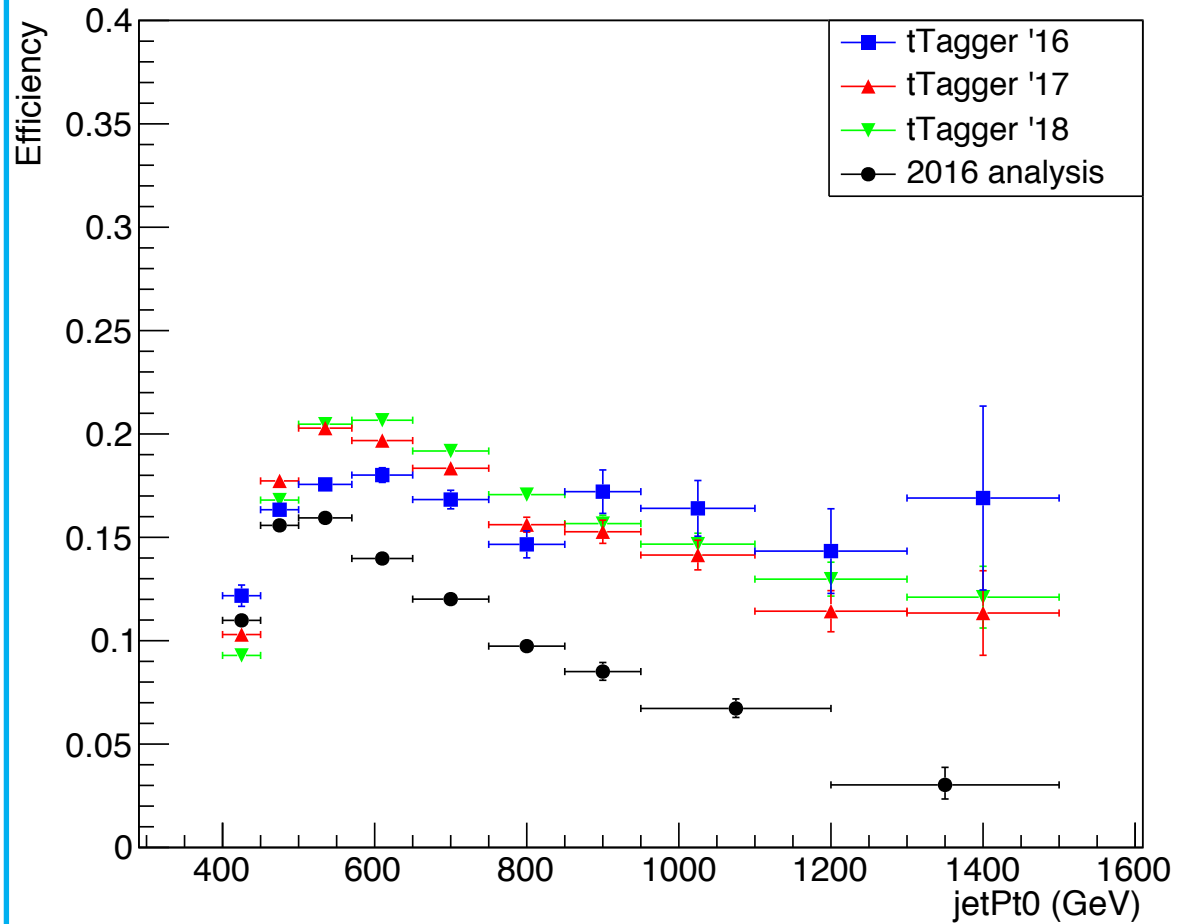


Parton Efficiency '16,'17,'18

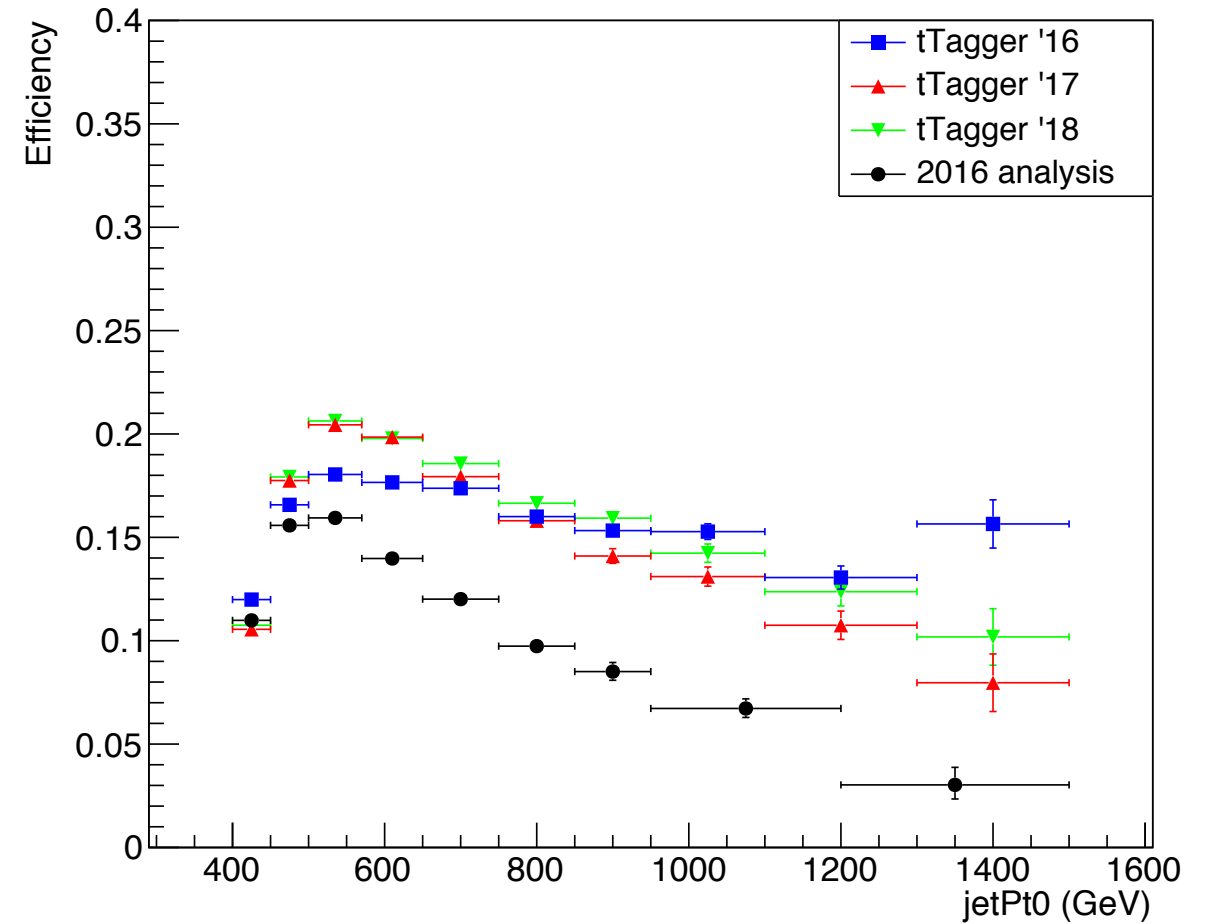


Efficiency from Nominal MC and High Mtt

Particle Efficiency '16,'17,'18 NominalMC

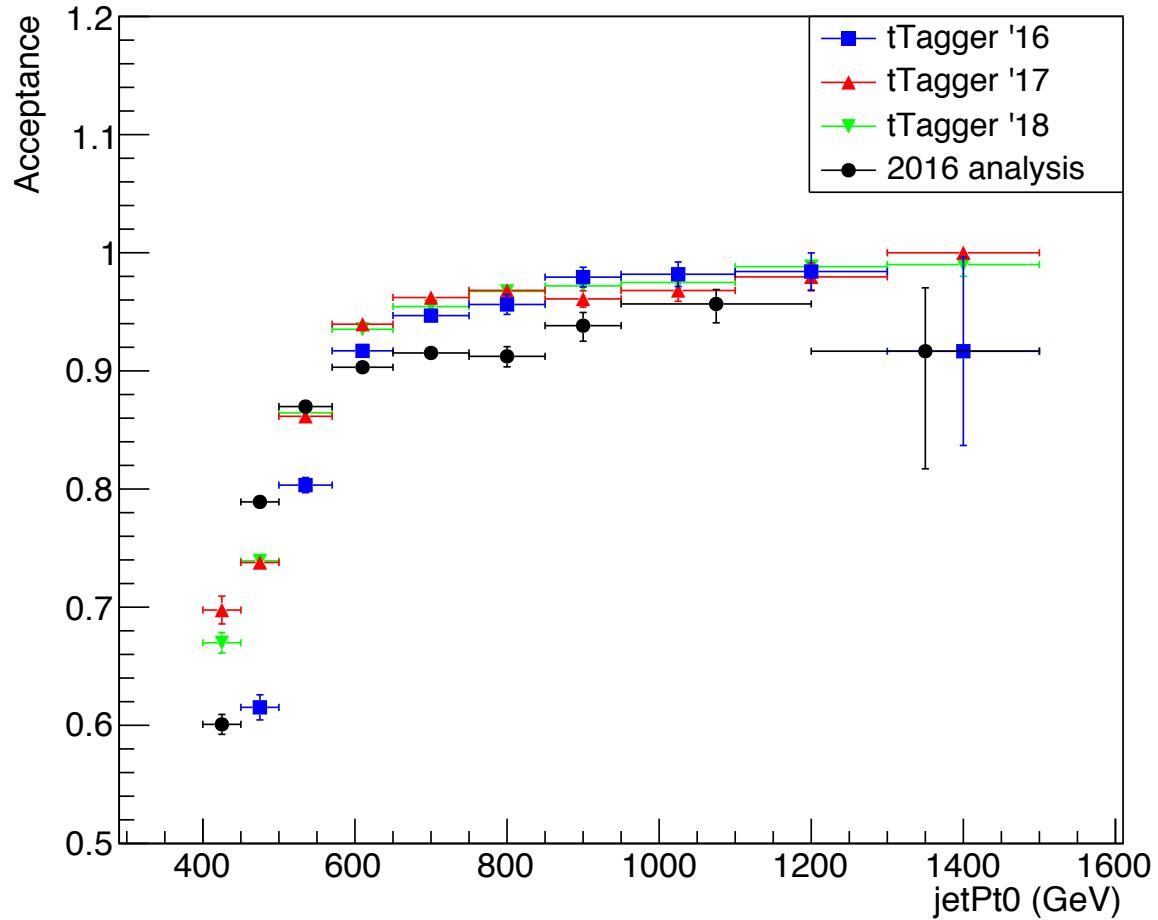


Particle Efficiency '16,'17,'18

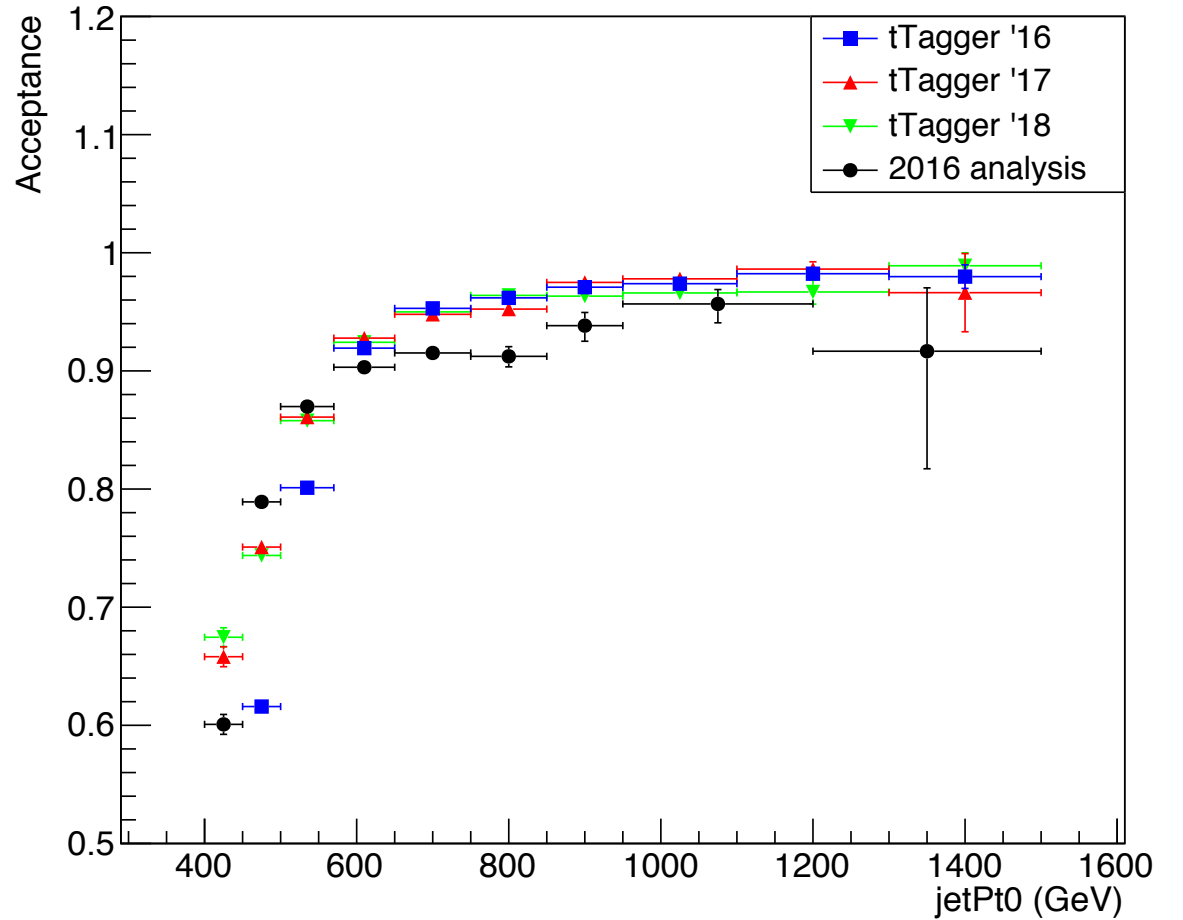


Acceptance from Nominal MC and high Mtt

Parton Acceptance '16,'17,'18 NominalMC

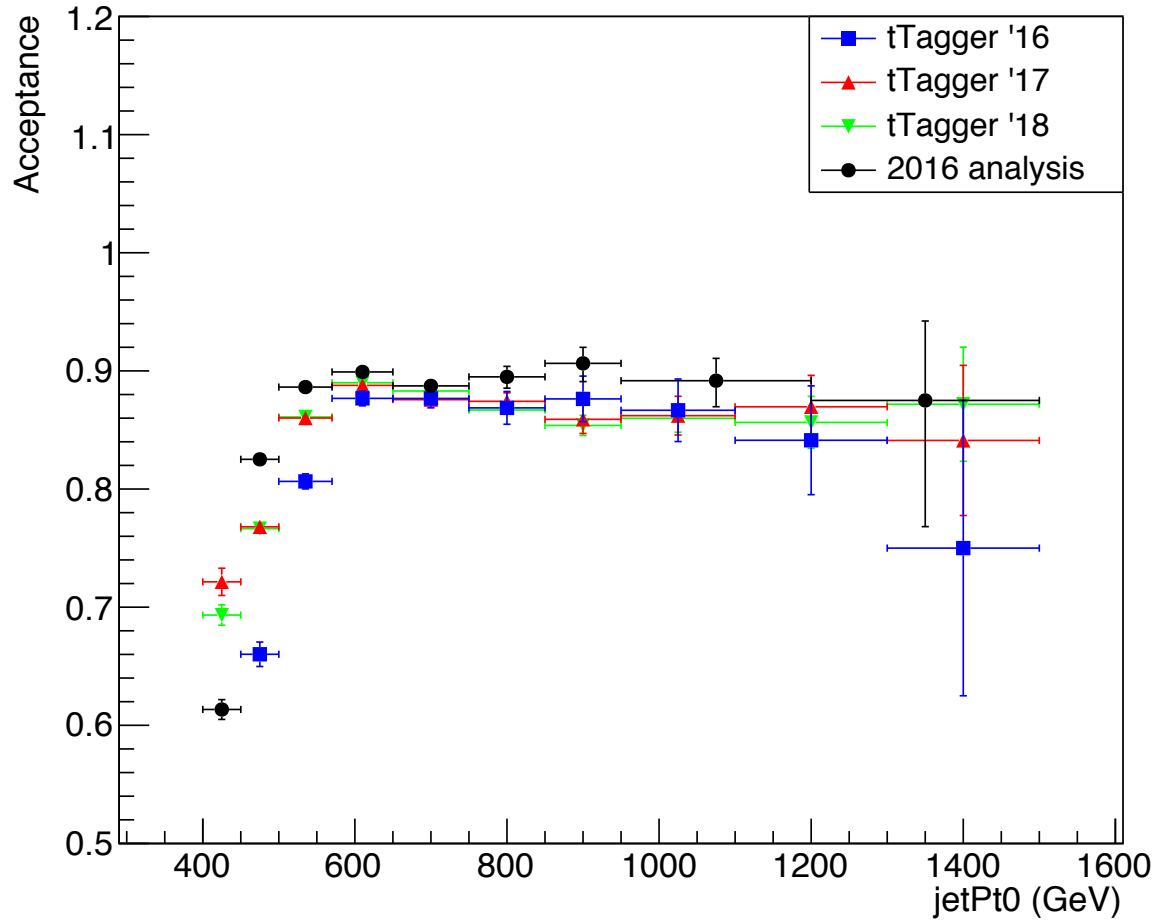


Parton Acceptance '16,'17,'18

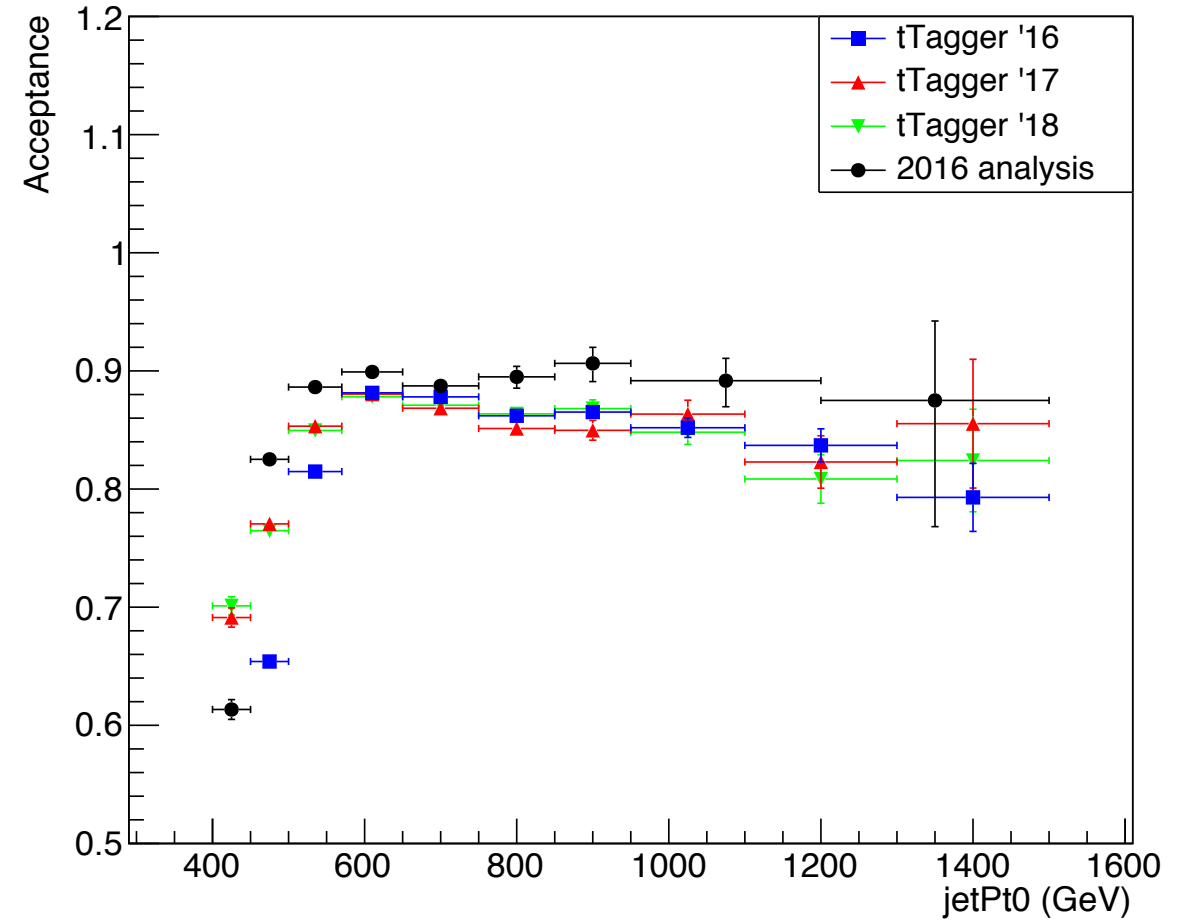


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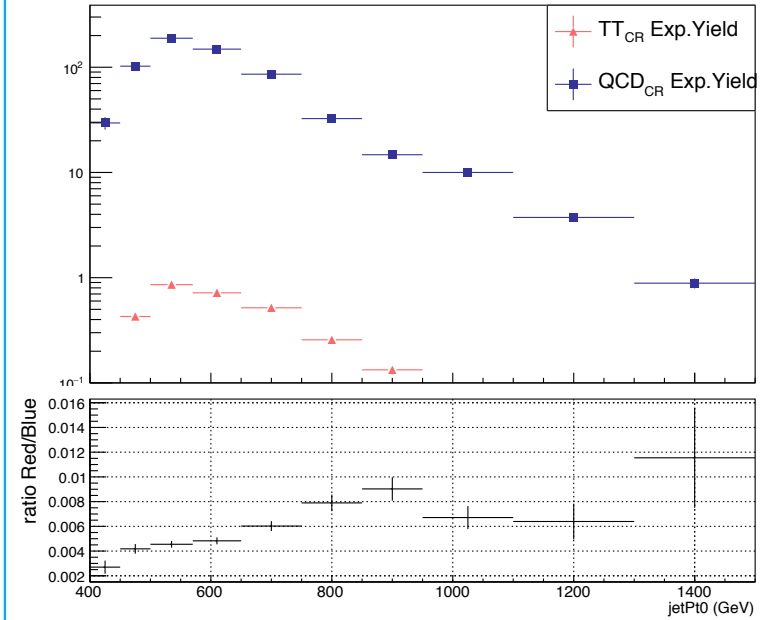
Particle Acceptance '16,'17,'18



TT contamination with mixed btagging wp's

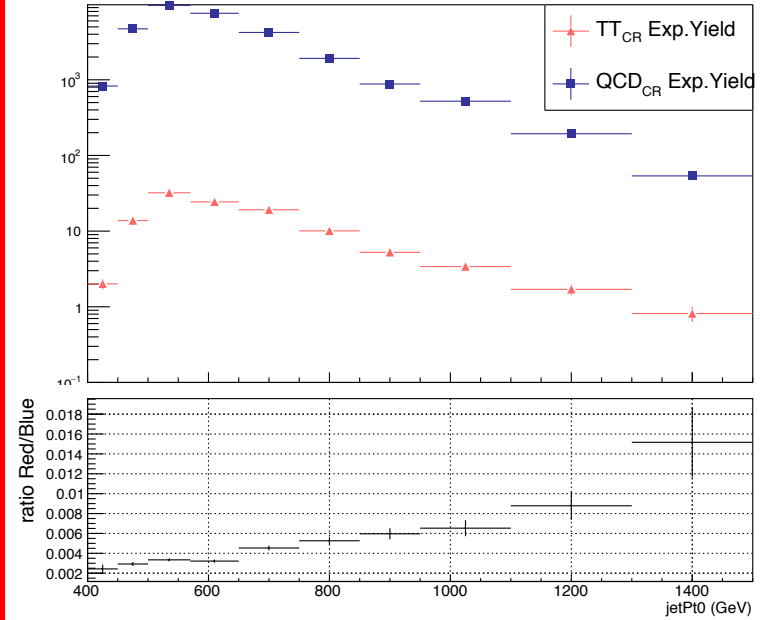
2016

TTbar Contamination



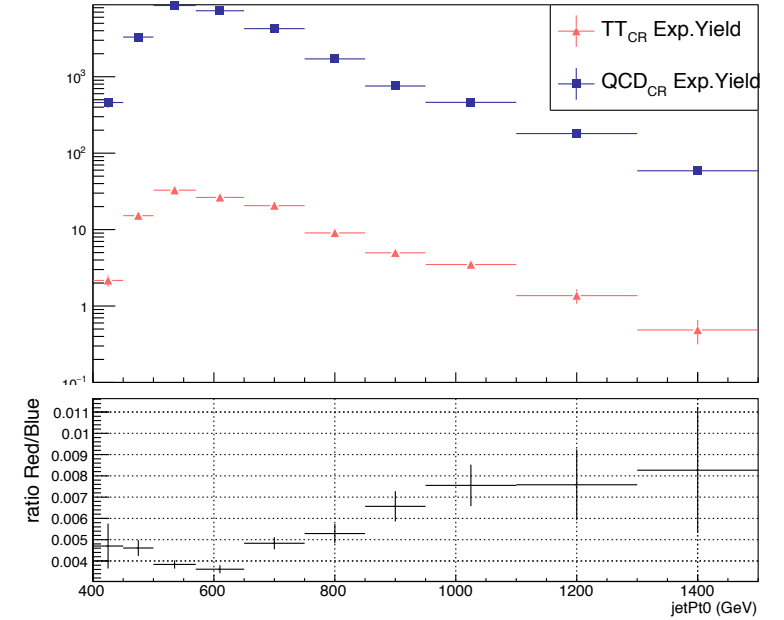
2017

TTbar Contamination



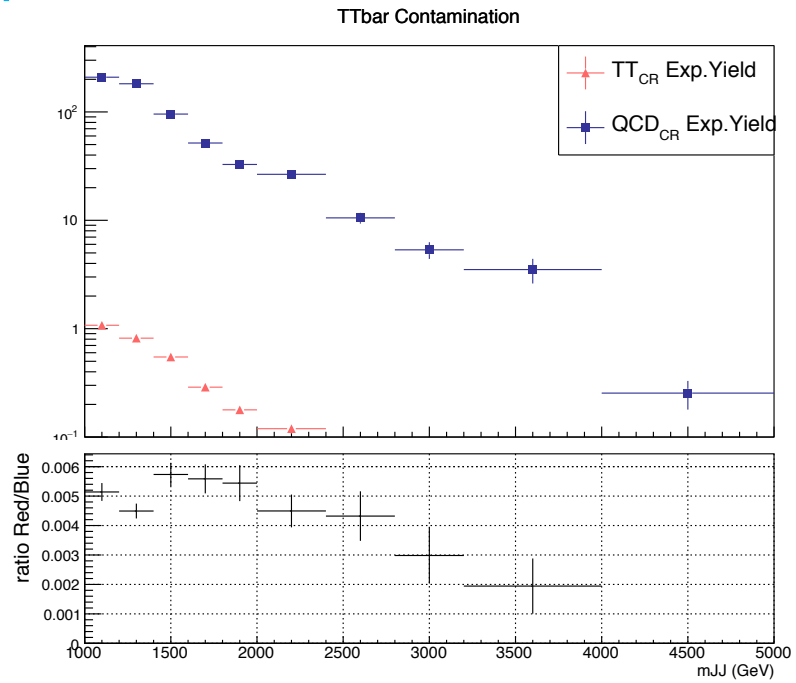
2018

TTbar Contamination

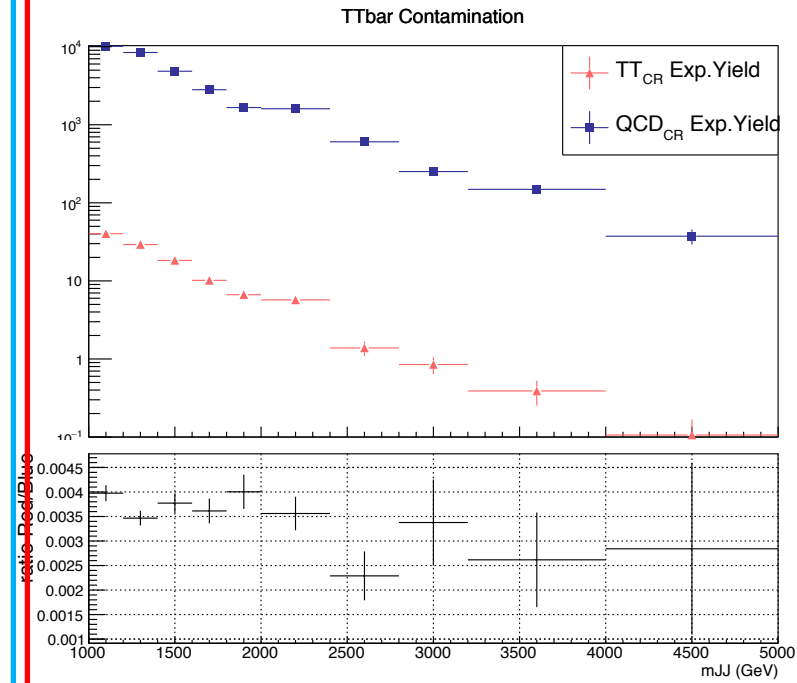


TT contamination with mixed btagging wp's

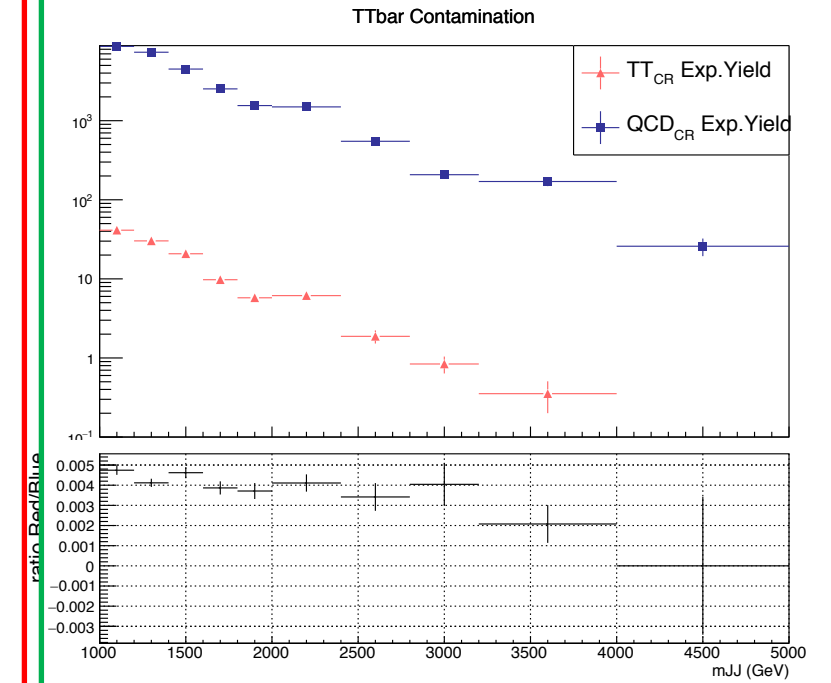
2016



2017

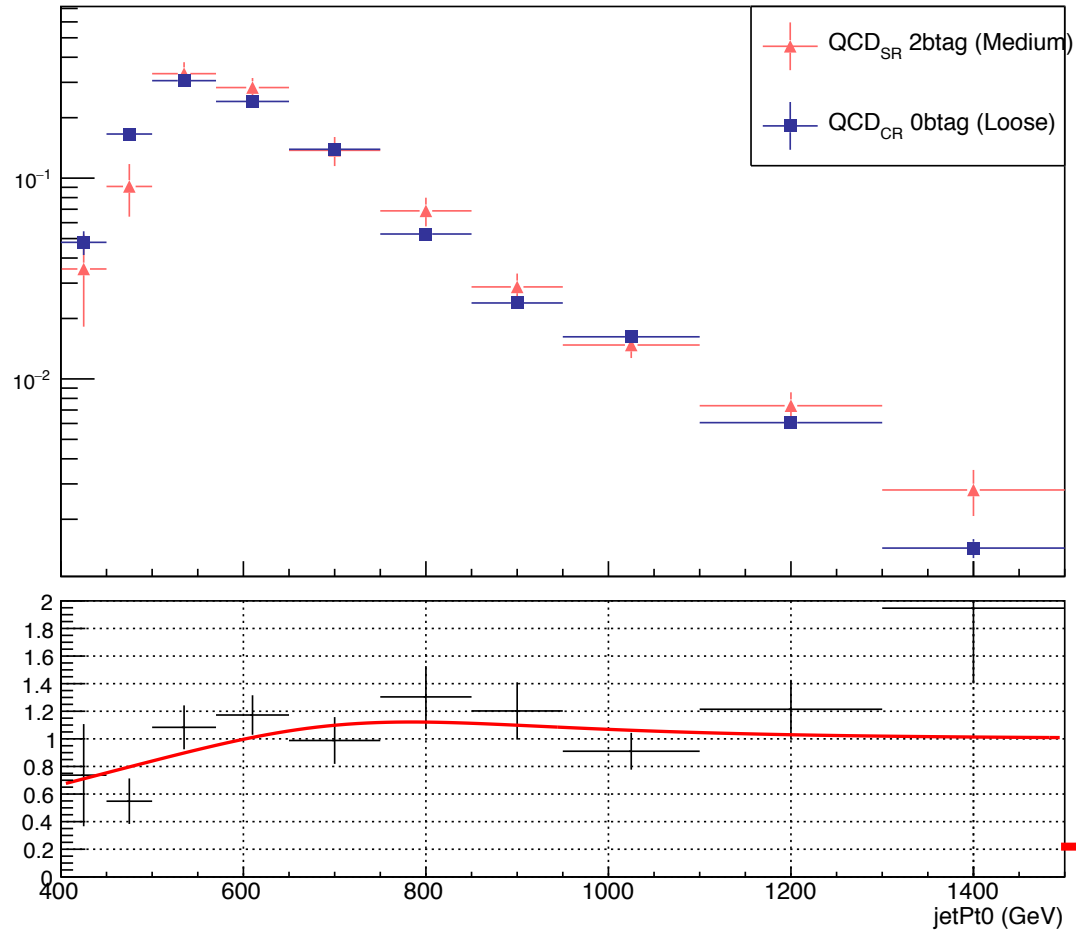


2018

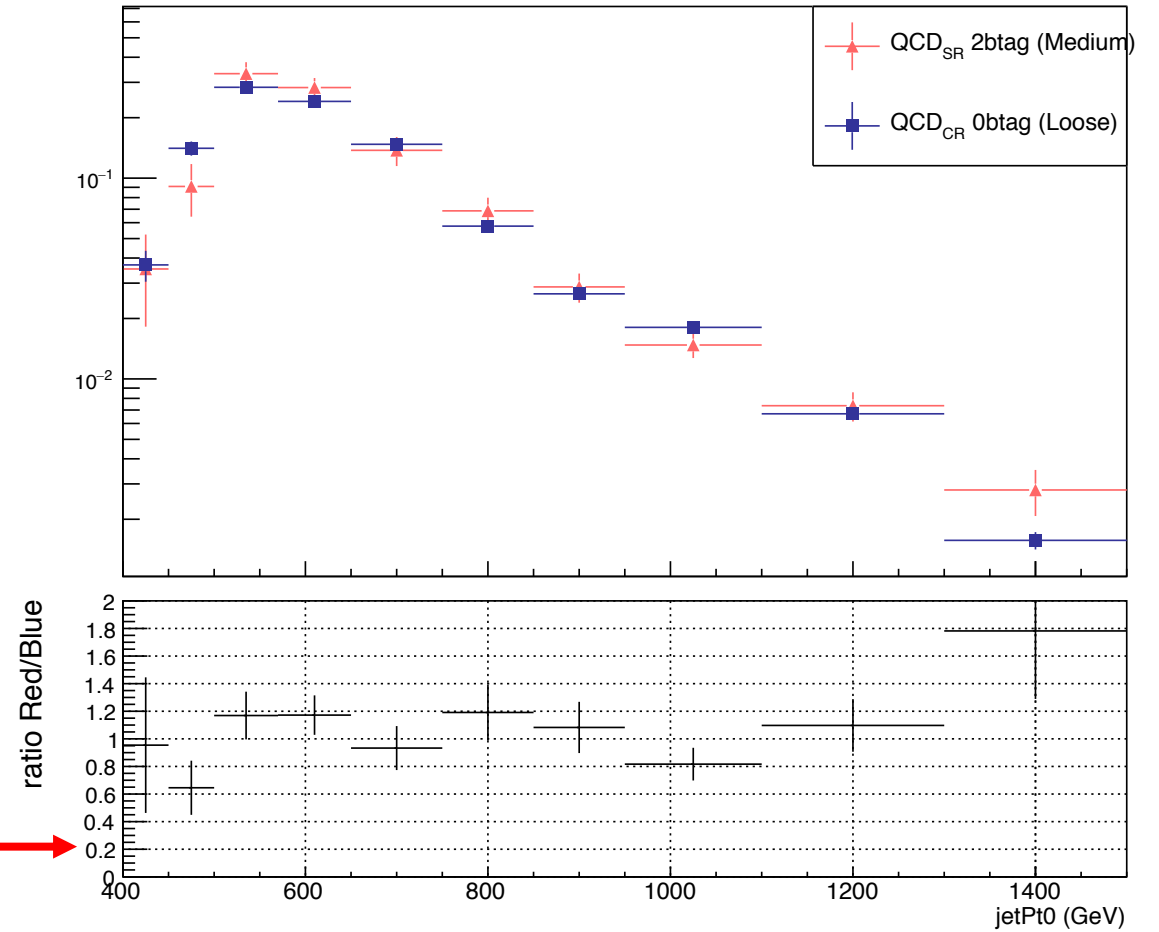


QCD Closure tests with mixed b-tagging WP's 2016

QCD Closure



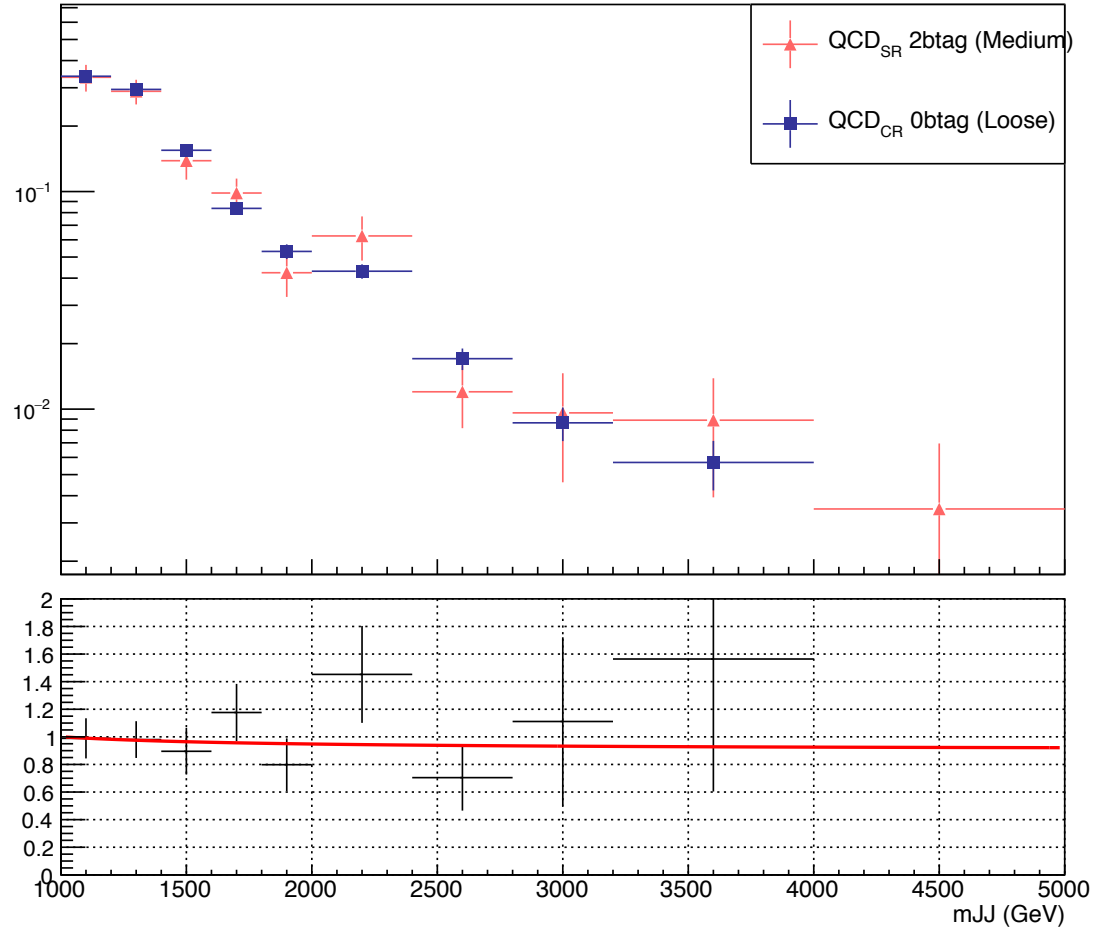
QCD Closure



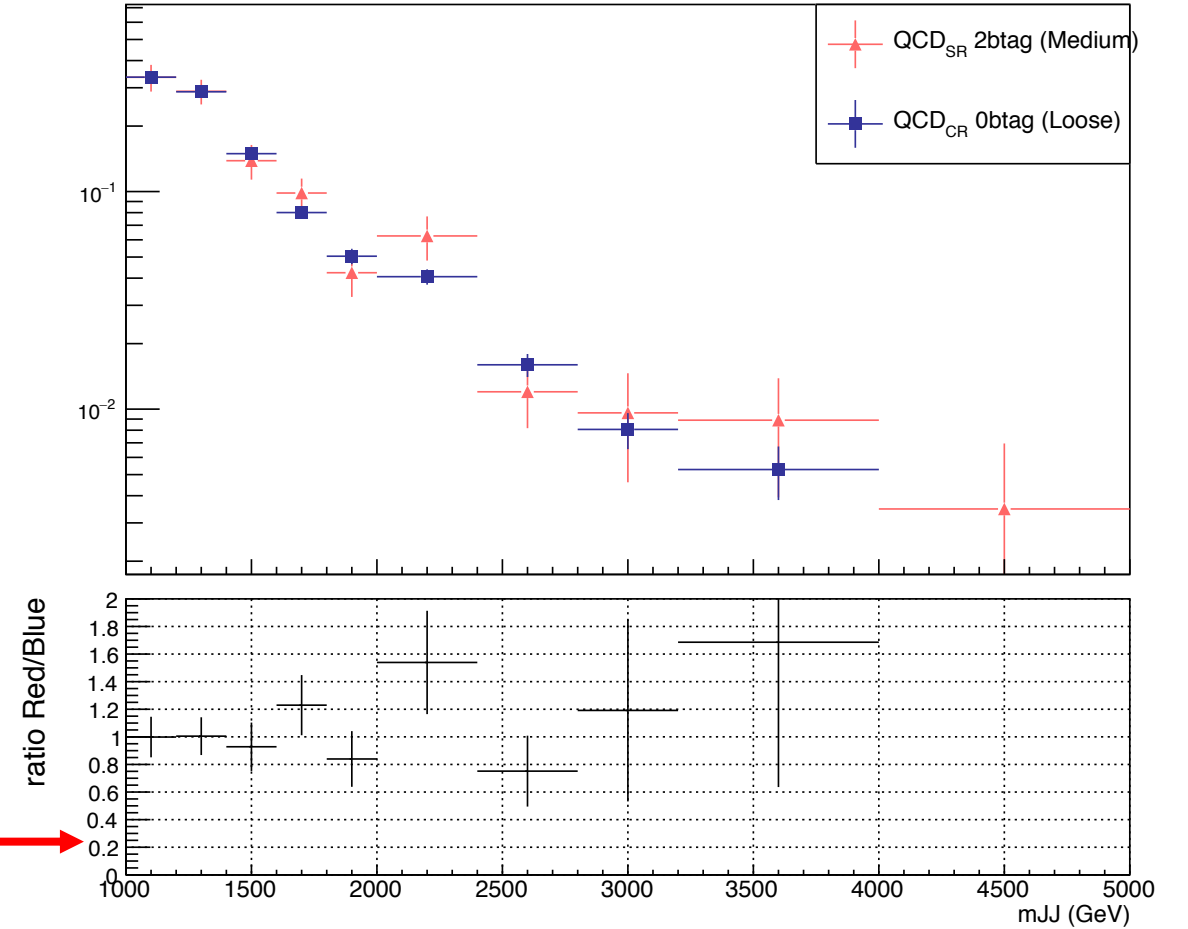
QCD Closure tests with mixed b-tagging WP's

2016

QCD Closure

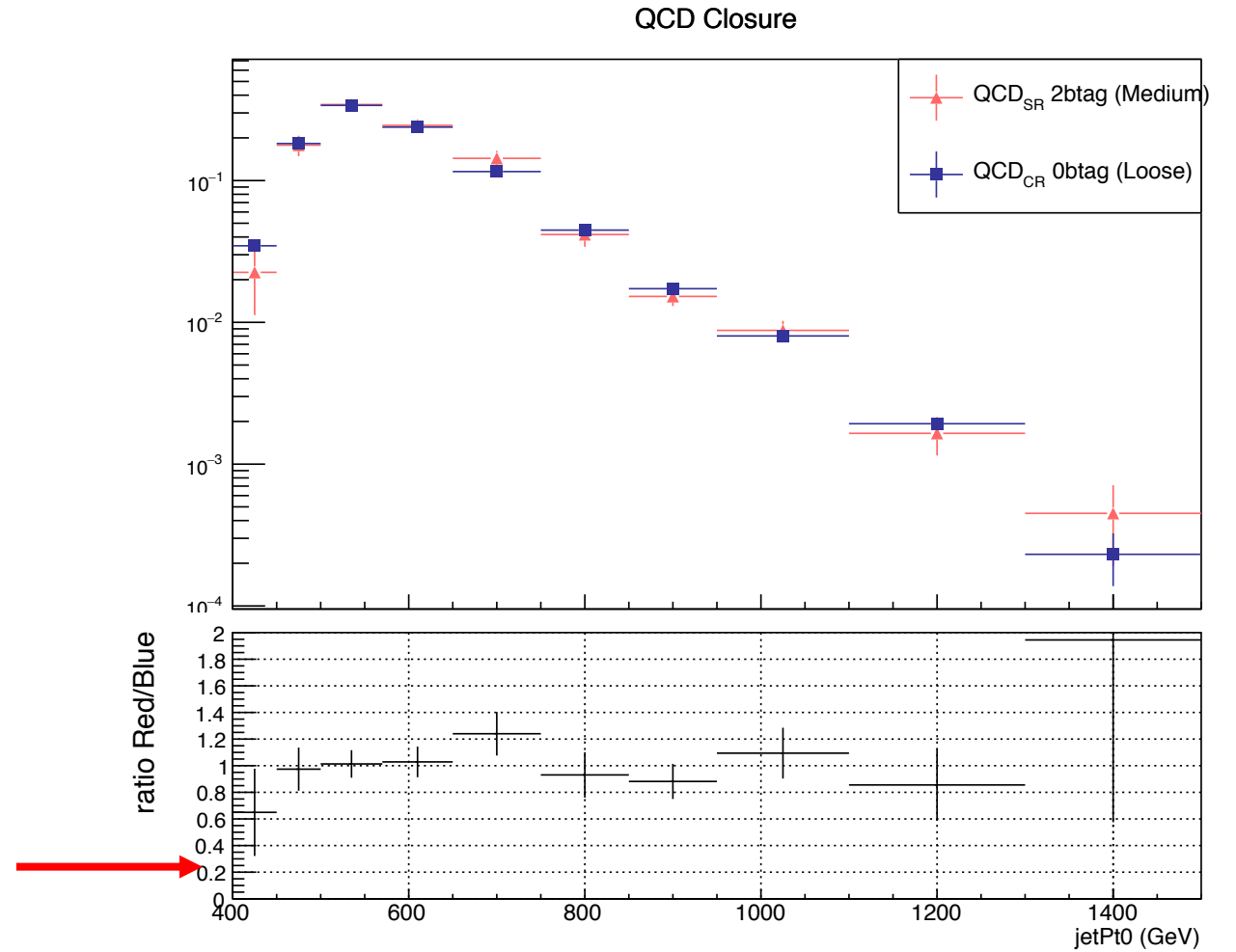
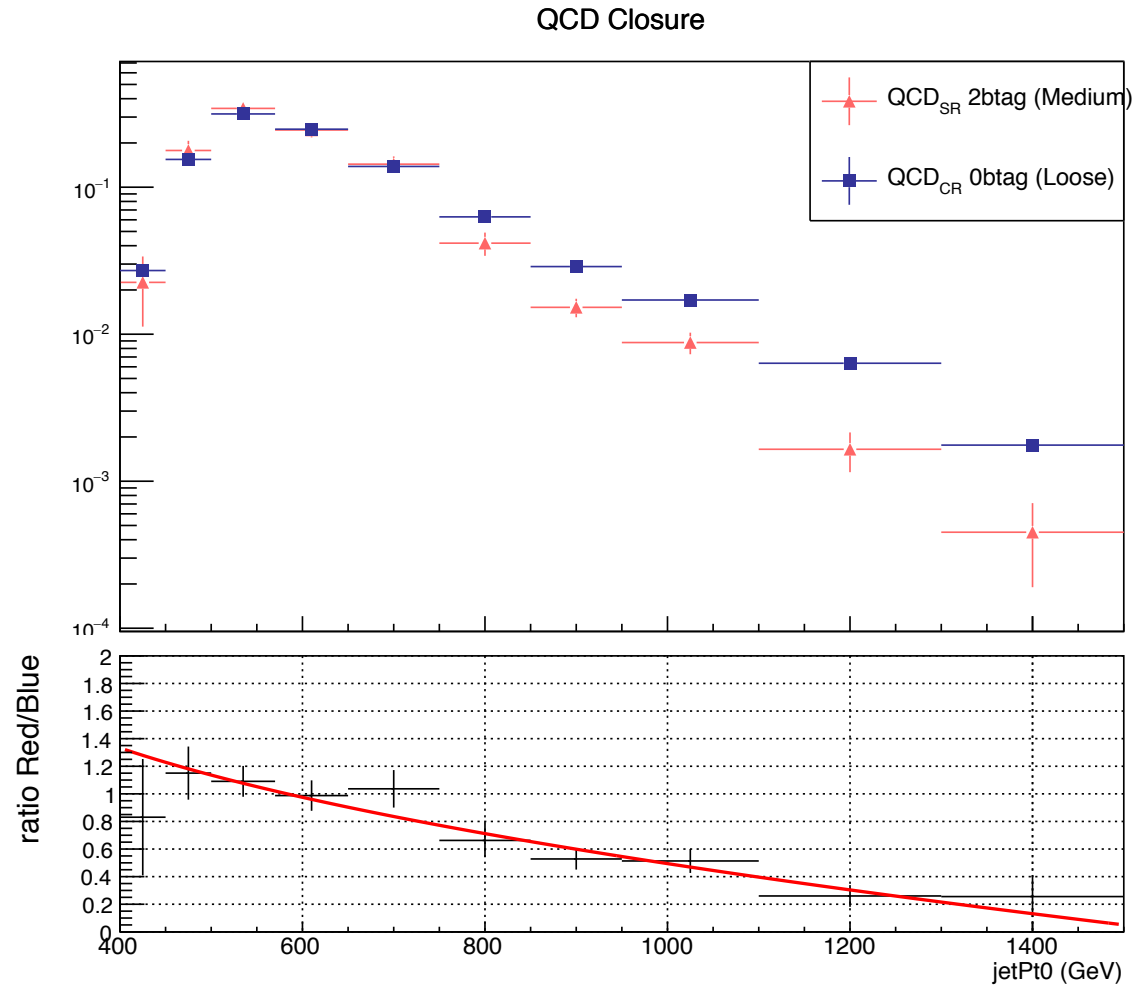


QCD Closure

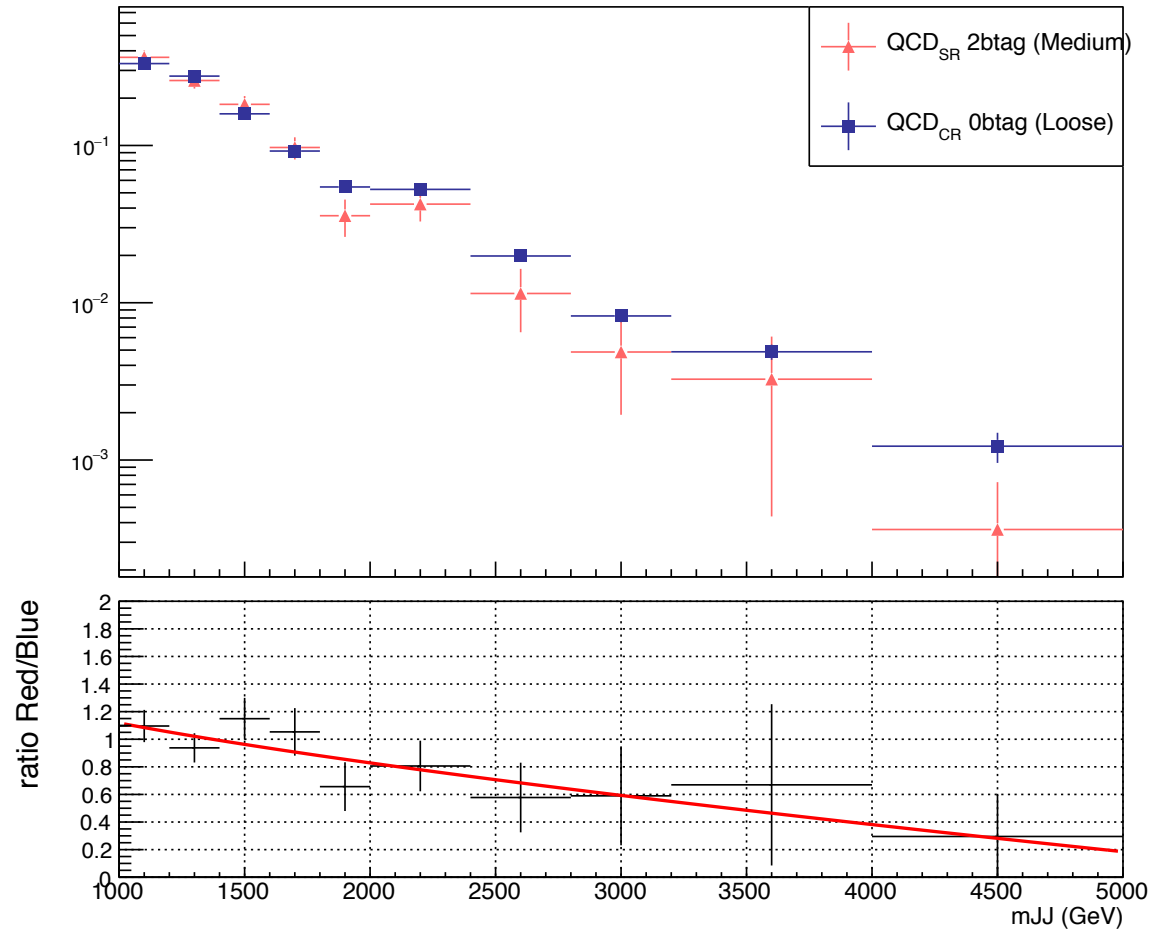


QCD Closure tests with mixed b-tagging WP's

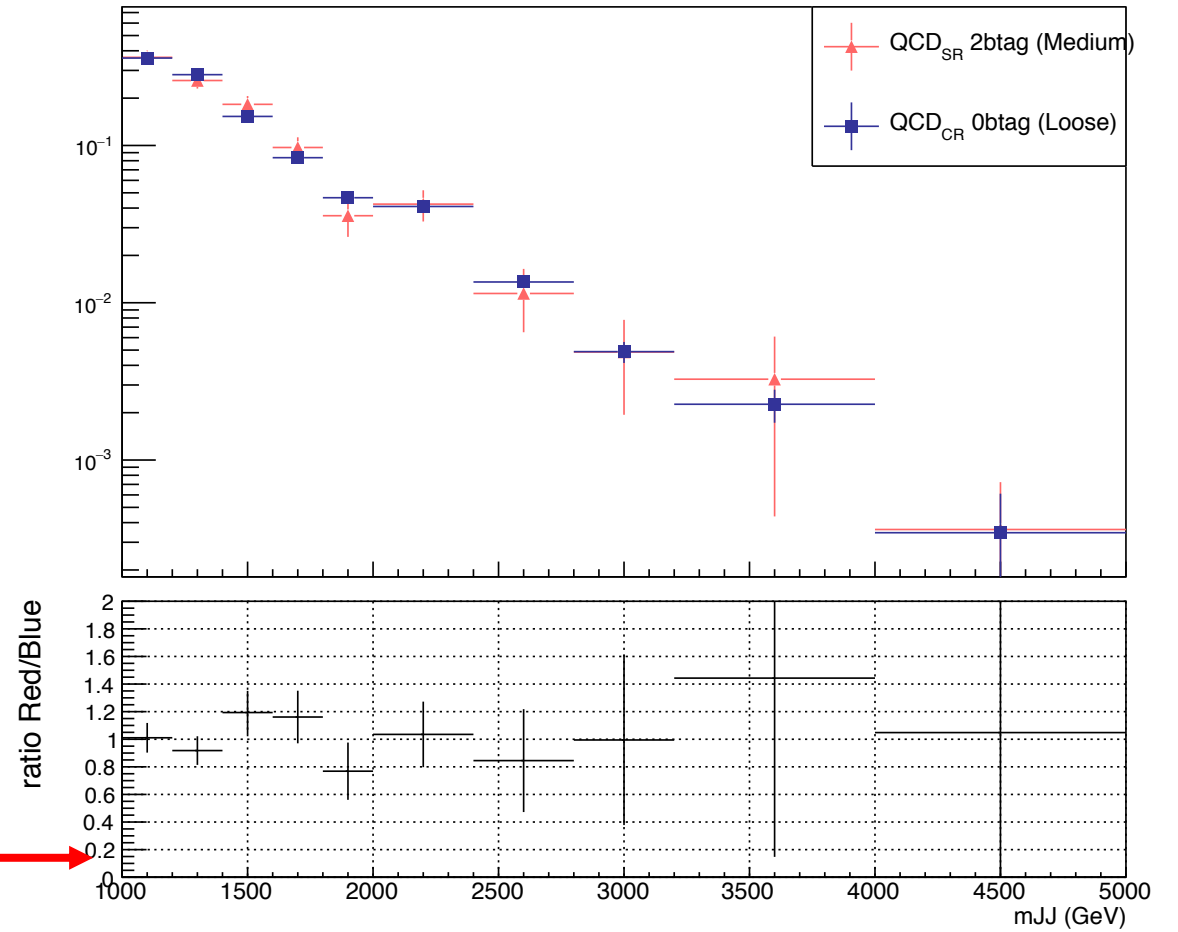
2017



QCD Closure

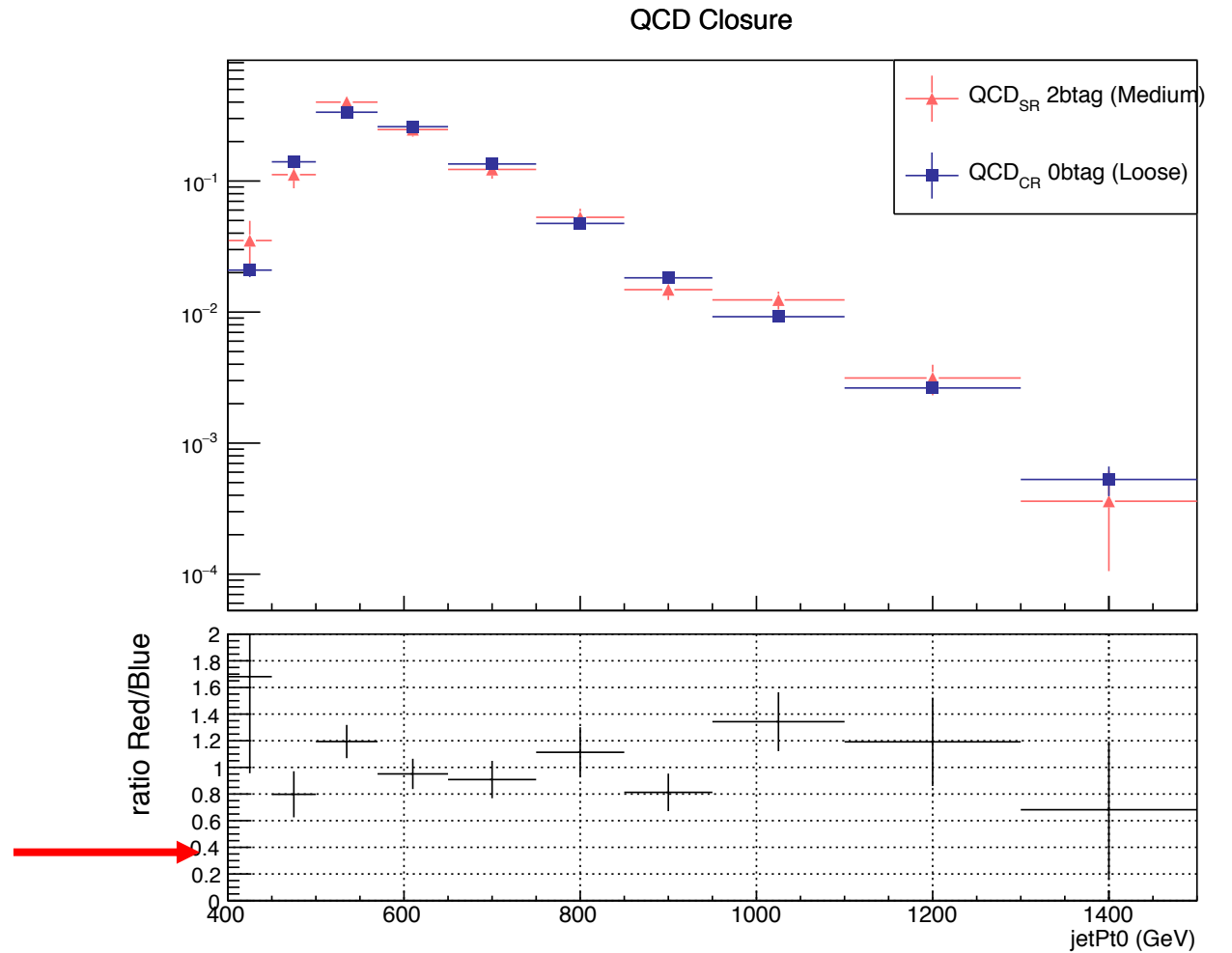
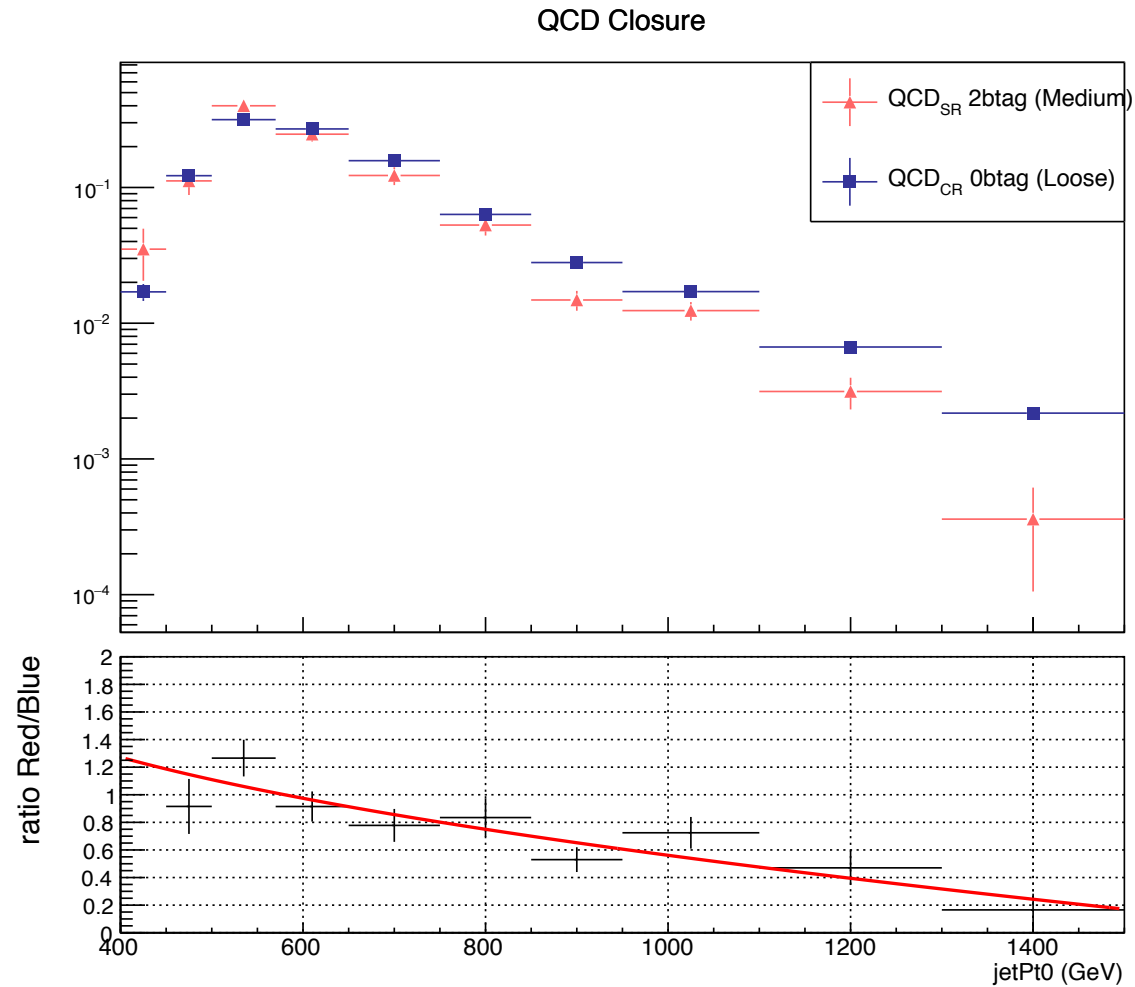


QCD Closure

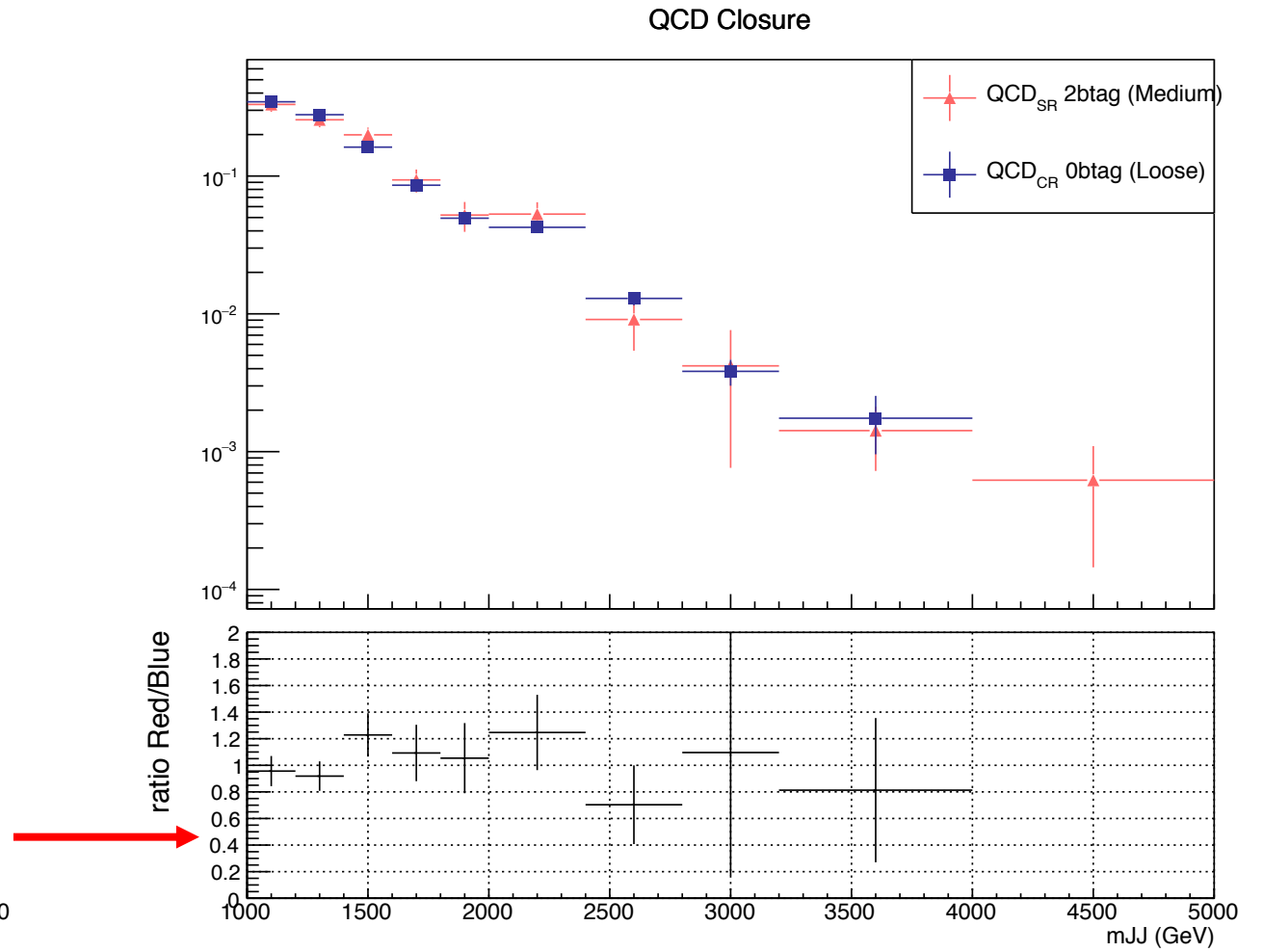
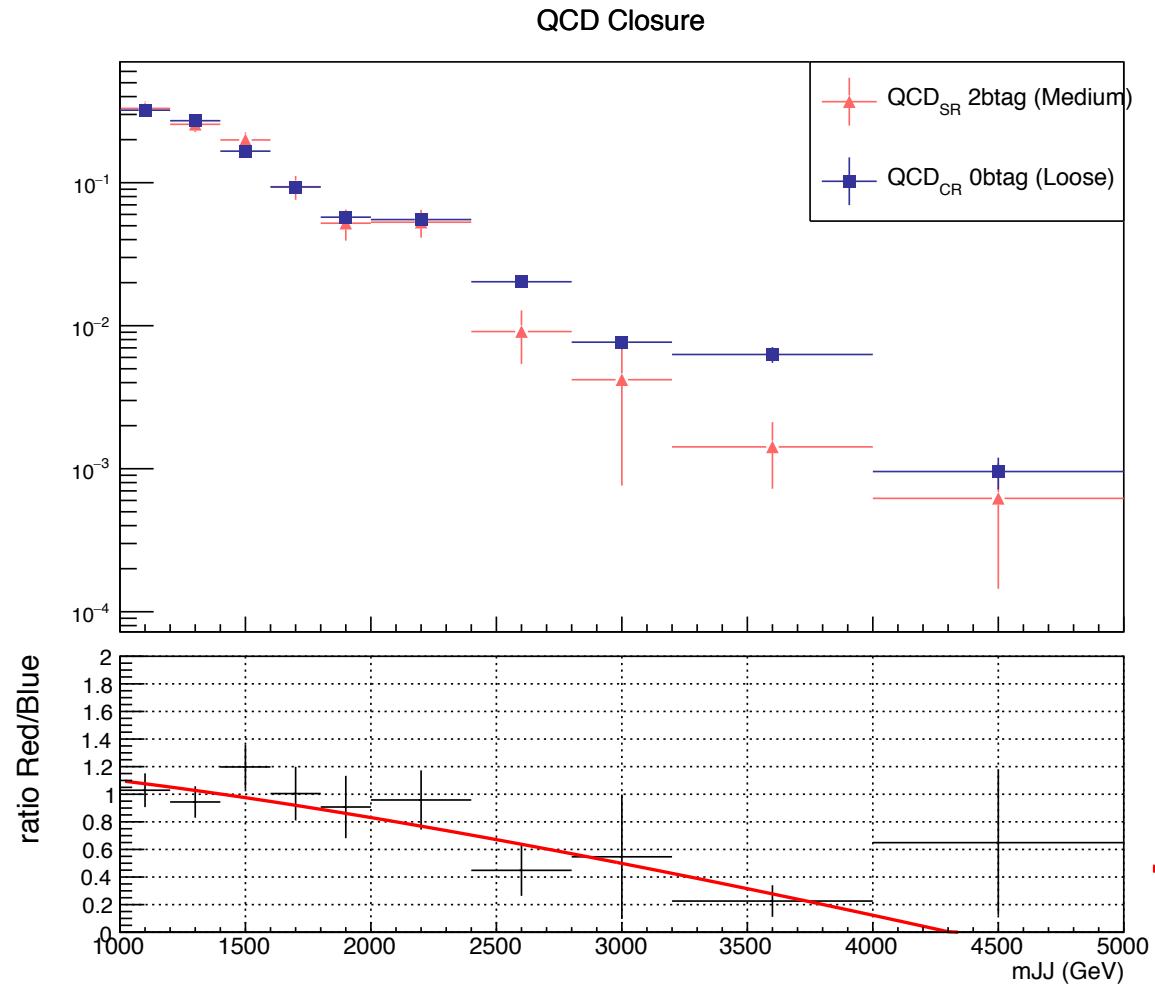


QCD Closure tests with mixed b-tagging WP's

2018



QCD Closure tests with mixed b-tagging WP's 2018



Signal Extraction

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

Diagram illustrating the signal extraction formula with callouts:

- Fiducial Yield**: Points to R_{yield}
- Measured dist from data**: Points to $D(x_{reco})$
- Taken from data**: Points to $C_{R_{yield}}^{cor}$
- Mass Fit in 2btag region**: Points to $N_{QCD, reduced}^{(2)}$
- QCD shape correction factor**: Points to $C_{QCD}^{shape}(x_{reco})$
- QCD shape taken from Data (CR)**: Points to $Q(x_{reco})$
- Subdominant bkg shape and contribution (MC)**: Points to $B(x_{reco})$

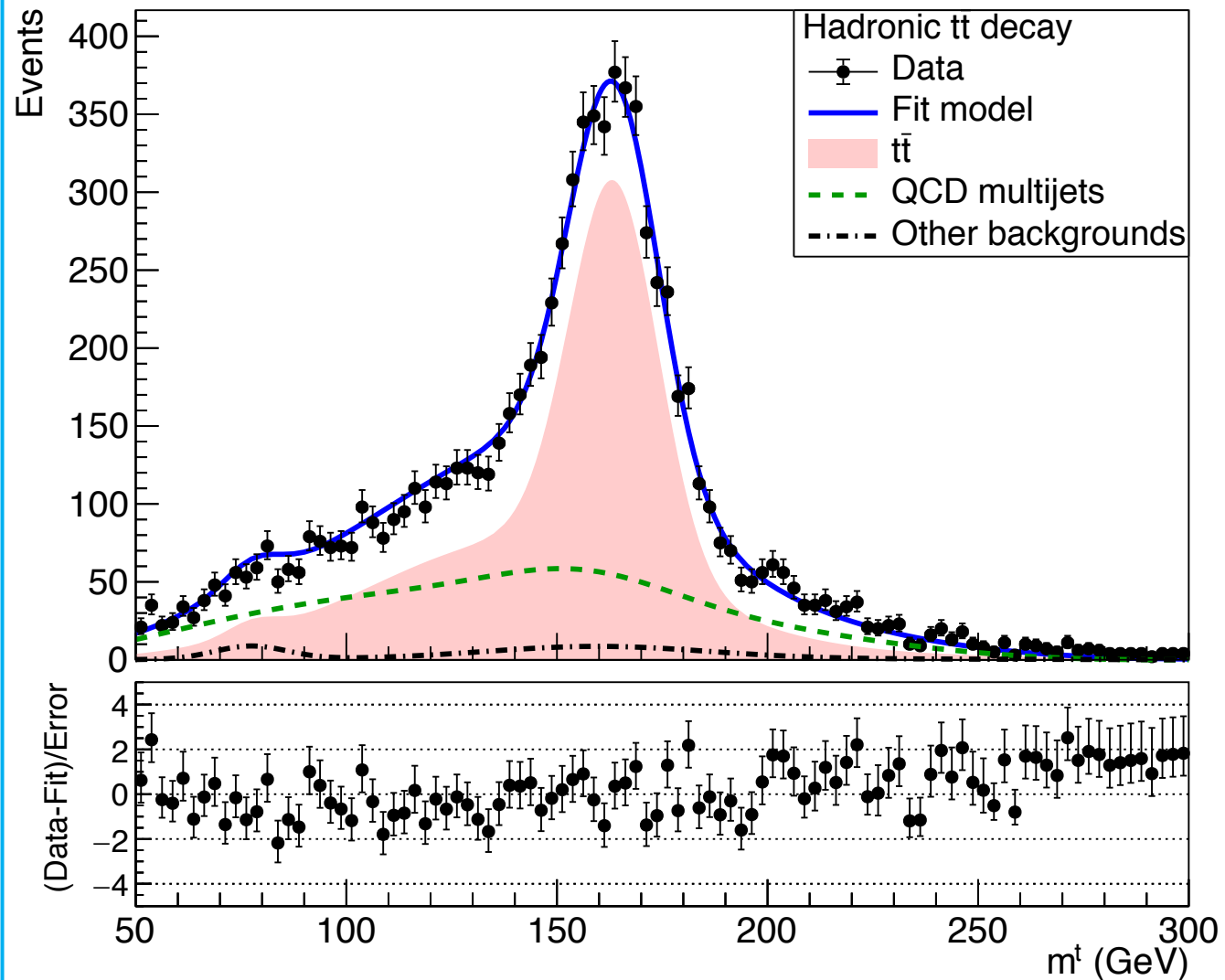
- Where x_{reco} is the respected variable of interest (ttbar mass, pt, rapidity, leading and subleading jetPt and |jetY|)
- We deploy a fit in the 2btag region: Now we have a **pure Control Region**.

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



Fit Result 2016 using CR Loose WP and SR Medium WP

A RooPlot of "mTop"

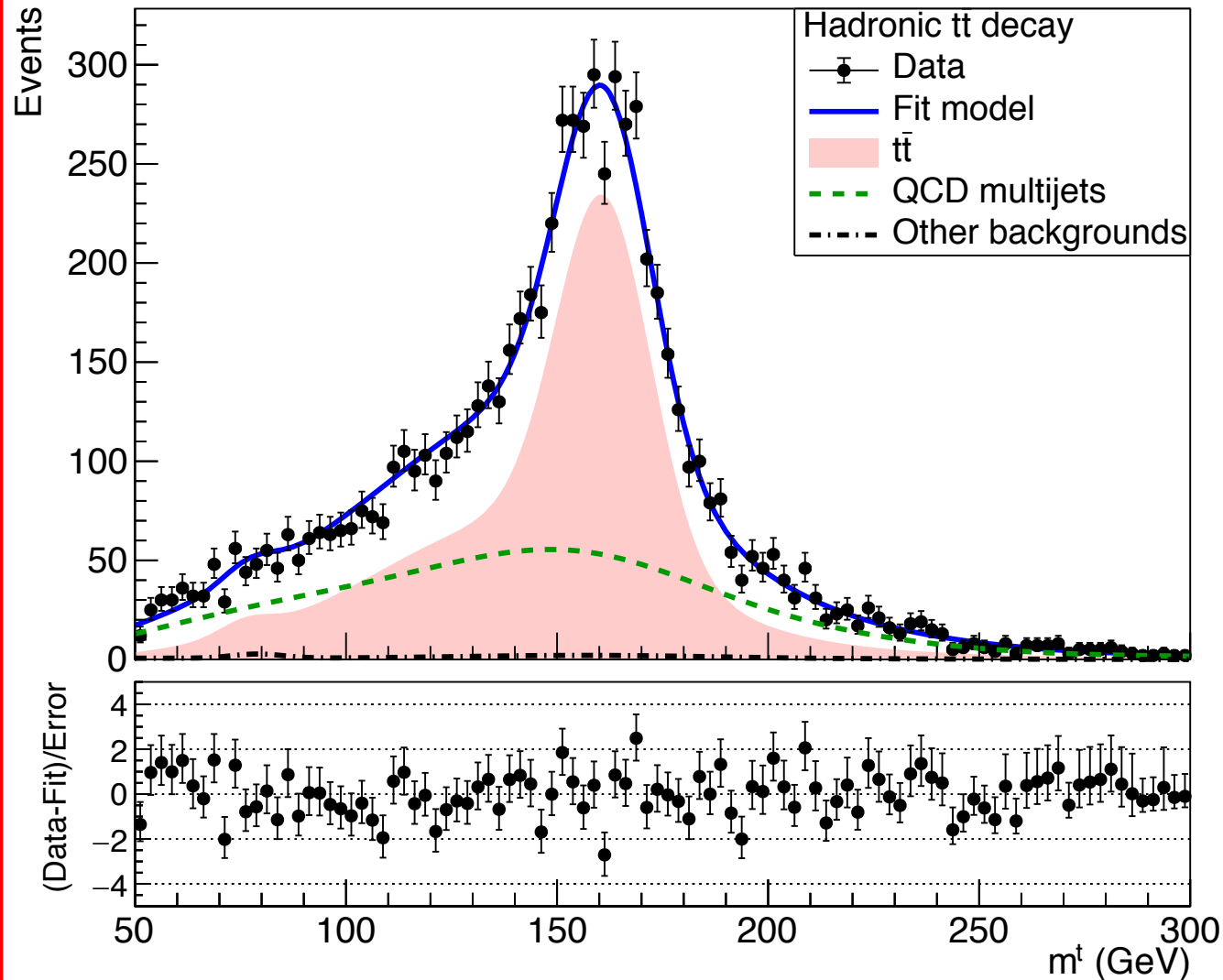


Floating Parameter	FinalValue	+/-	Error
kMassResol	9.6549e-01	+/-	2.83e-02
kMassScale	9.9995e-01	+/-	2.03e-03
kQCD_2b	9.9998e-01	+/-	1.70e+00
nFitBkg_2b	3.2758e+02	+/-	1.61e+02
nFitQCD_2b	2.7195e+03	+/-	1.90e+02
nFitSig2b	5.4591e+03	+/-	1.58e+02



Fit Result 2017 using CR Loose WP and SR Medium WP

A RooPlot of "mTop"

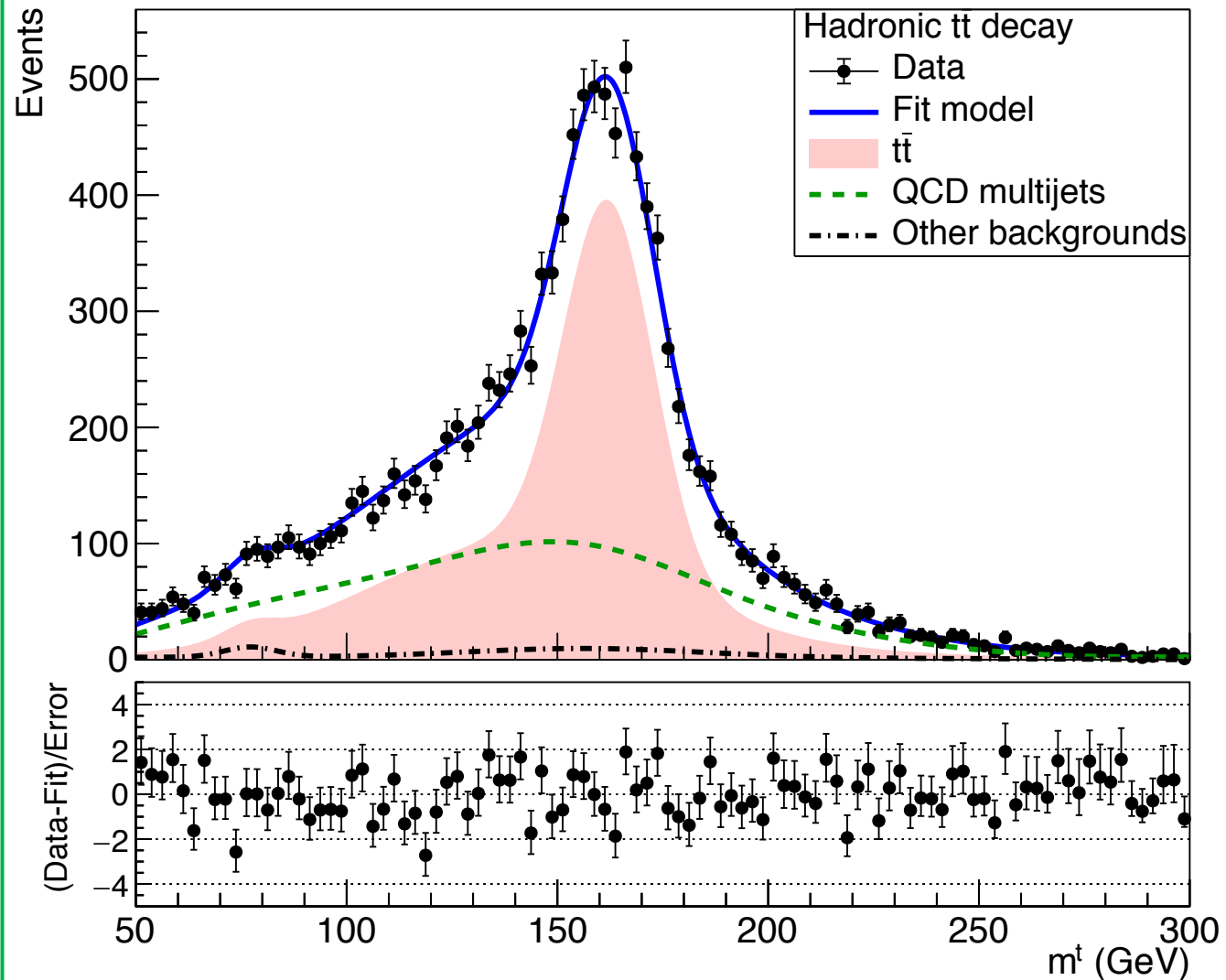


Floating Parameter	FinalValue	+/-	Error
kMassResol	1.0527e+00	+/-	3.91e-02
kMassScale	9.8583e-01	+/-	2.66e-03
kQCD_2b	7.5794e-02	+/-	6.59e-02
nFitBkg_2b	9.8203e+01	+/-	2.02e+02
nFitQCD_2b	2.6515e+03	+/-	2.52e+02
nFitSig2b	4.4959e+03	+/-	1.56e+02



Fit Result 2018 using CR Loose WP and SR Medium WP

A RooPlot of "mTop"

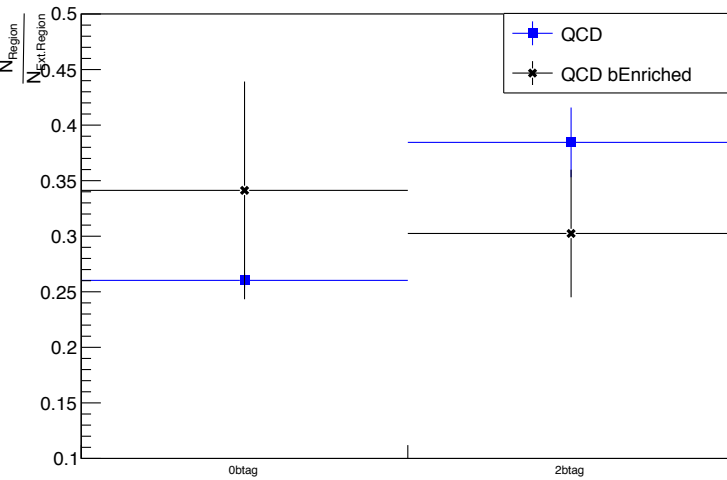


Floating Parameter	FinalValue	+/-	Error
kMassResol	9.9209e-01	+/-	2.96e-02
kMassScale	9.9014e-01	+/-	1.94e-03
kQCD_2b	2.3257e-01	+/-	1.24e-02
nFitBkg_2b	4.2872e+02	+/-	2.62e+02
nFitQCD_2b	4.7447e+03	+/-	3.27e+02
nFitSig2b	7.1502e+03	+/-	1.98e+02

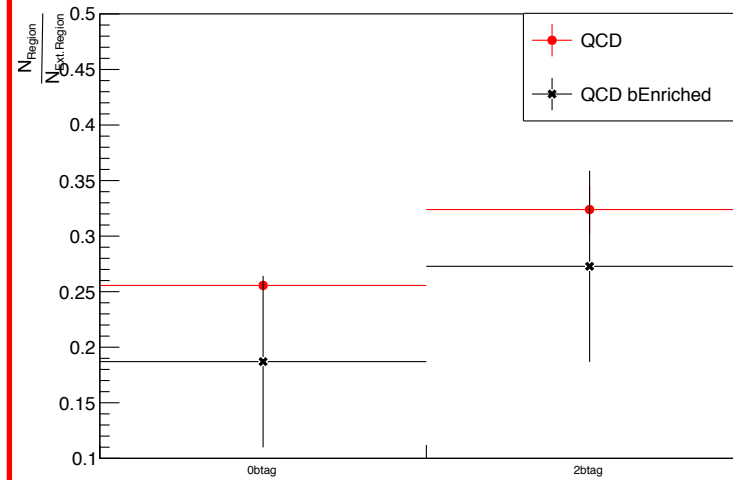


Transfer Factors (Closure tests) in mixed Loose WP CR and Medium WP SR

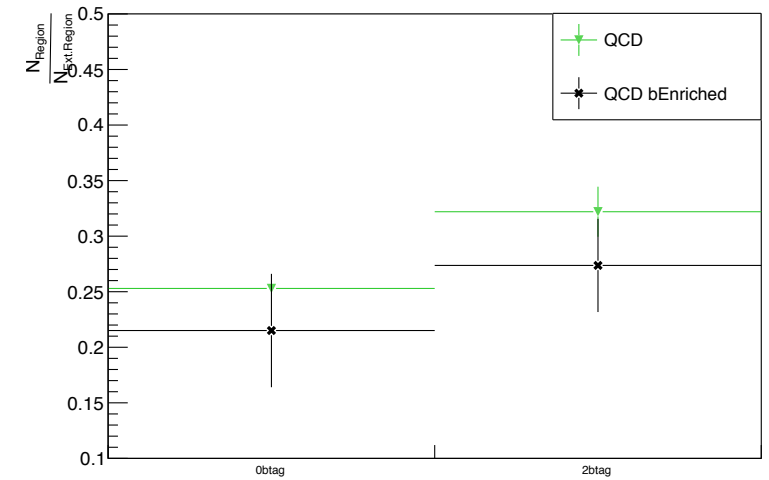
R_{yield} transfer factor 2016 (Closure Test)



R_{yield} transfer factor 2017 (Closure Test)



R_{yield} transfer factor 2018 (Closure Test)

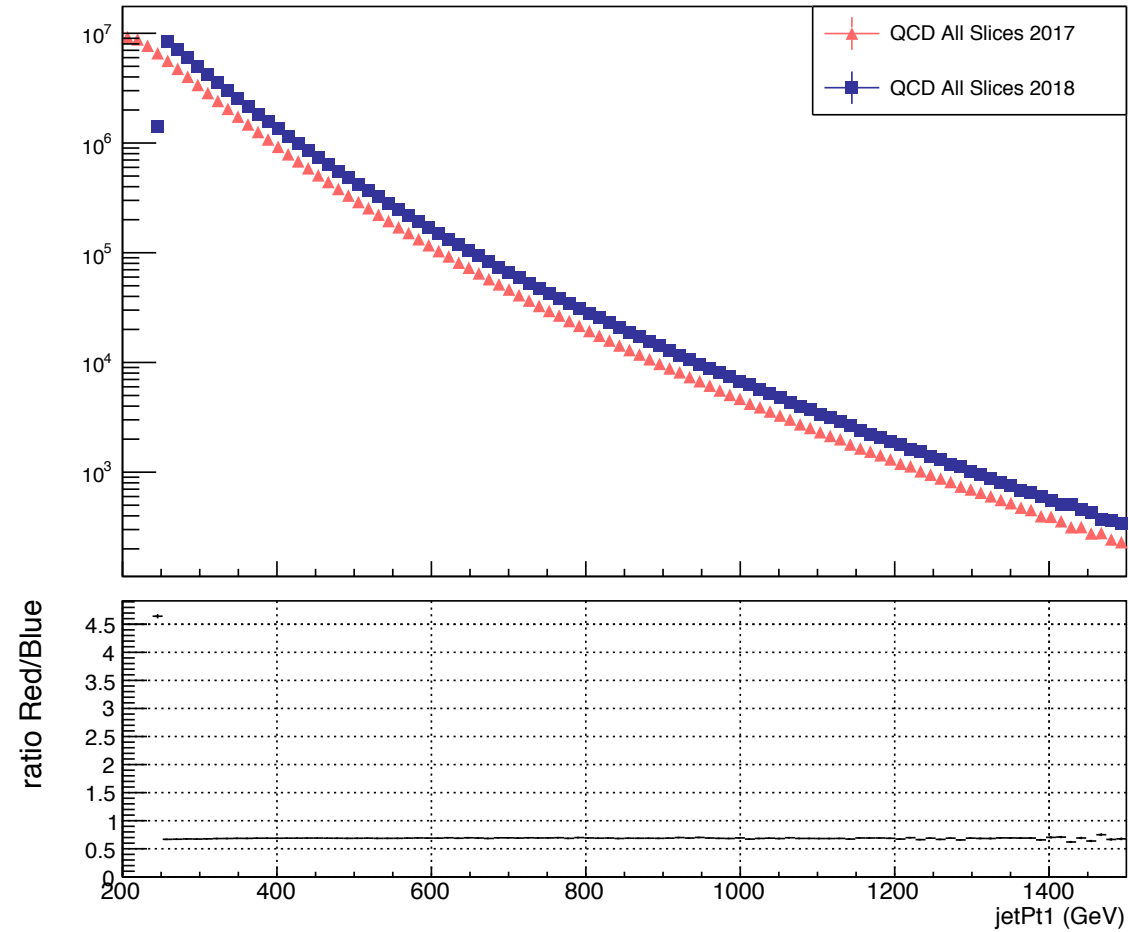


BACKUP

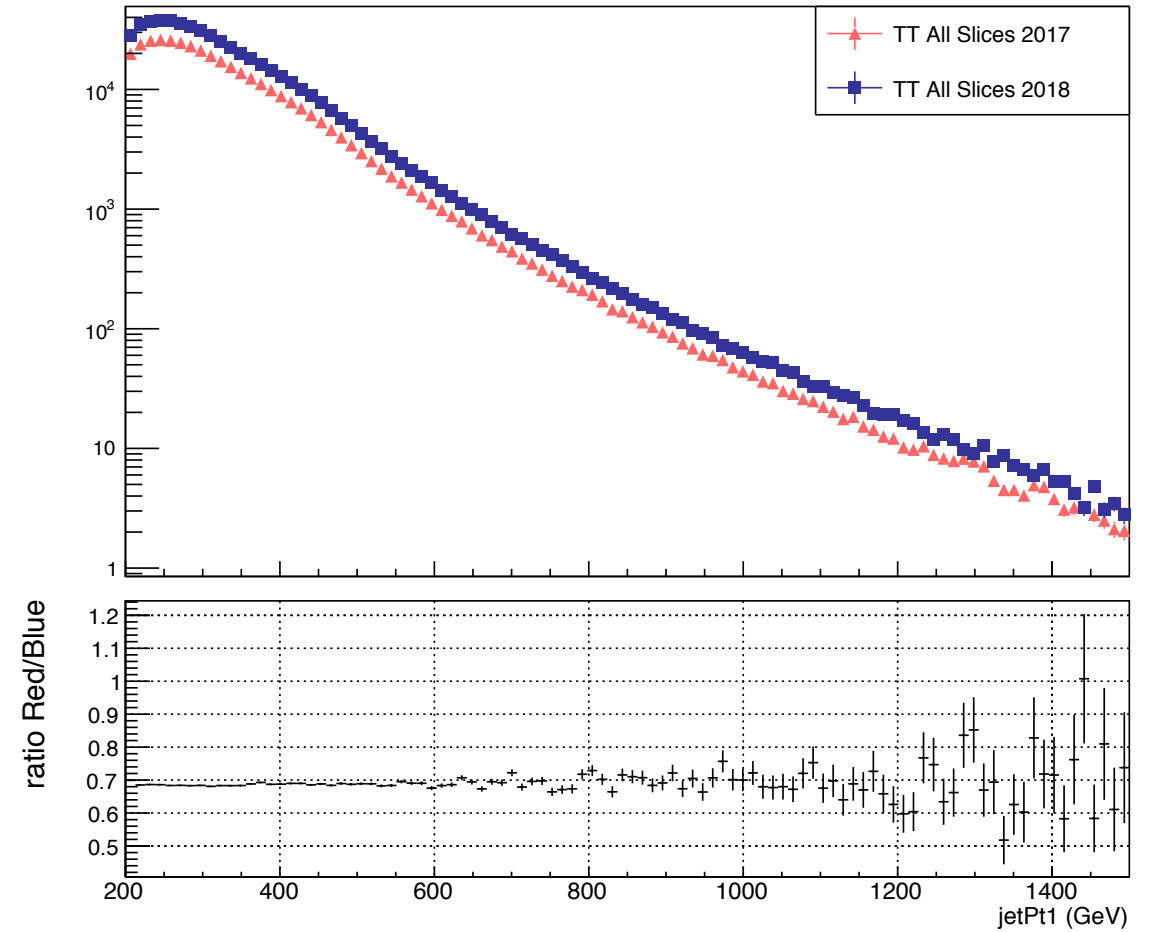


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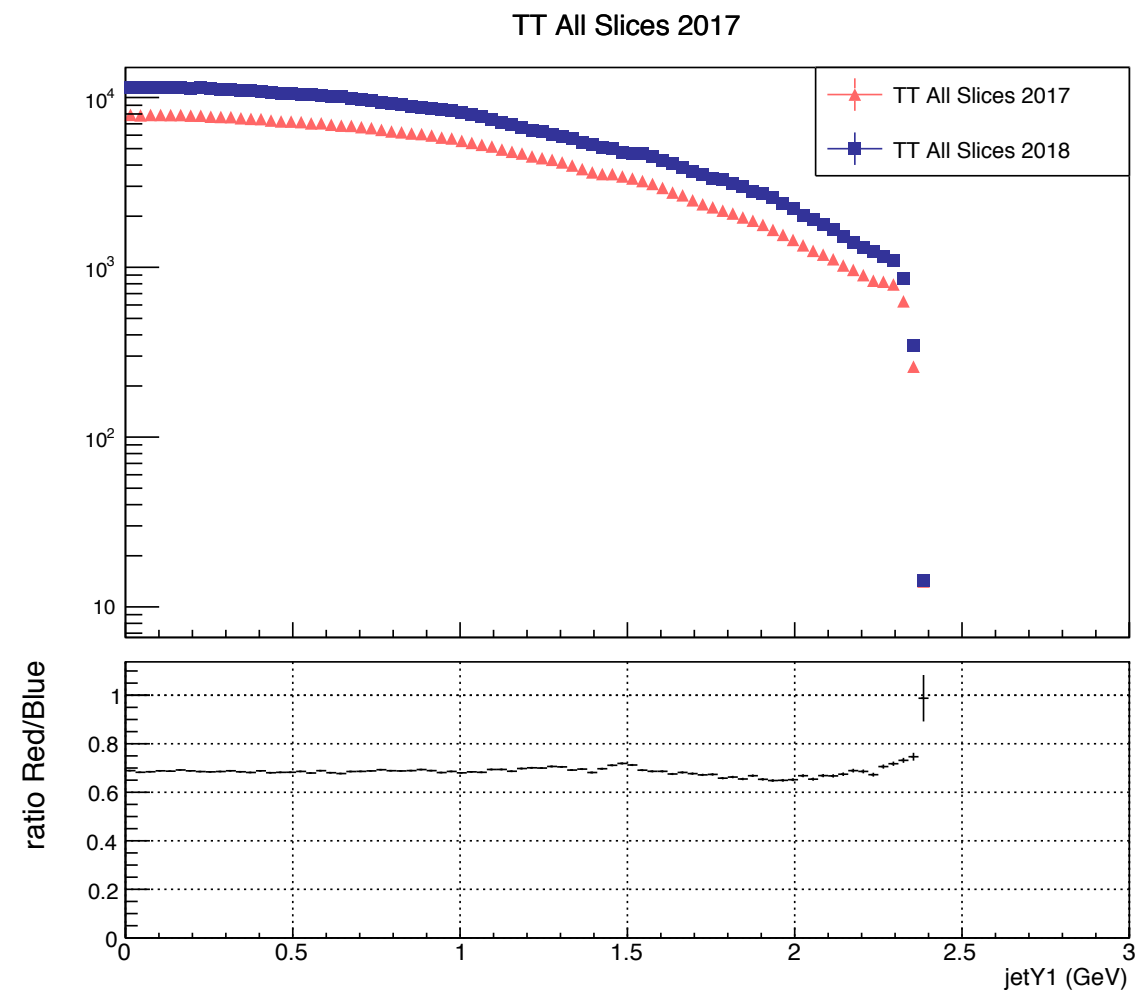
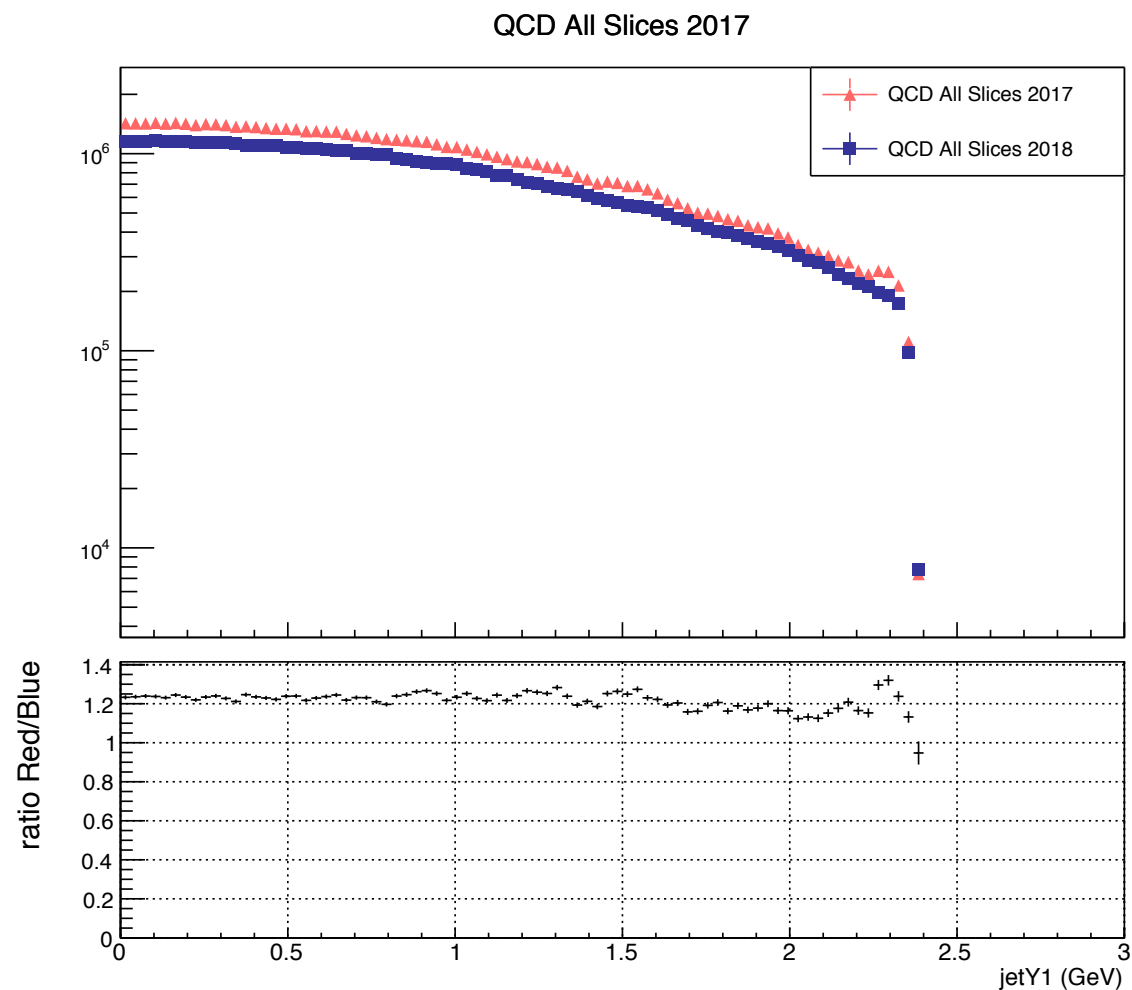
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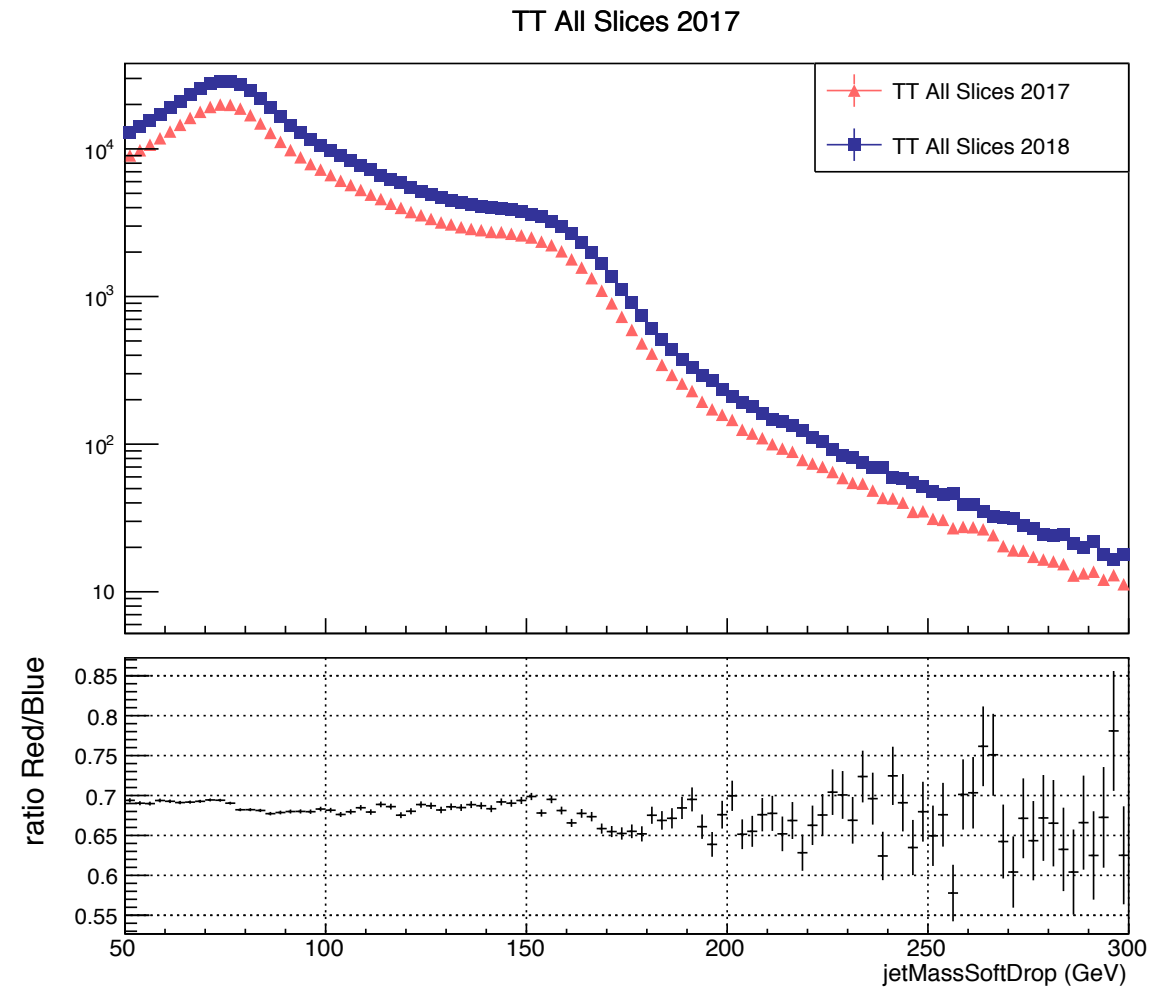
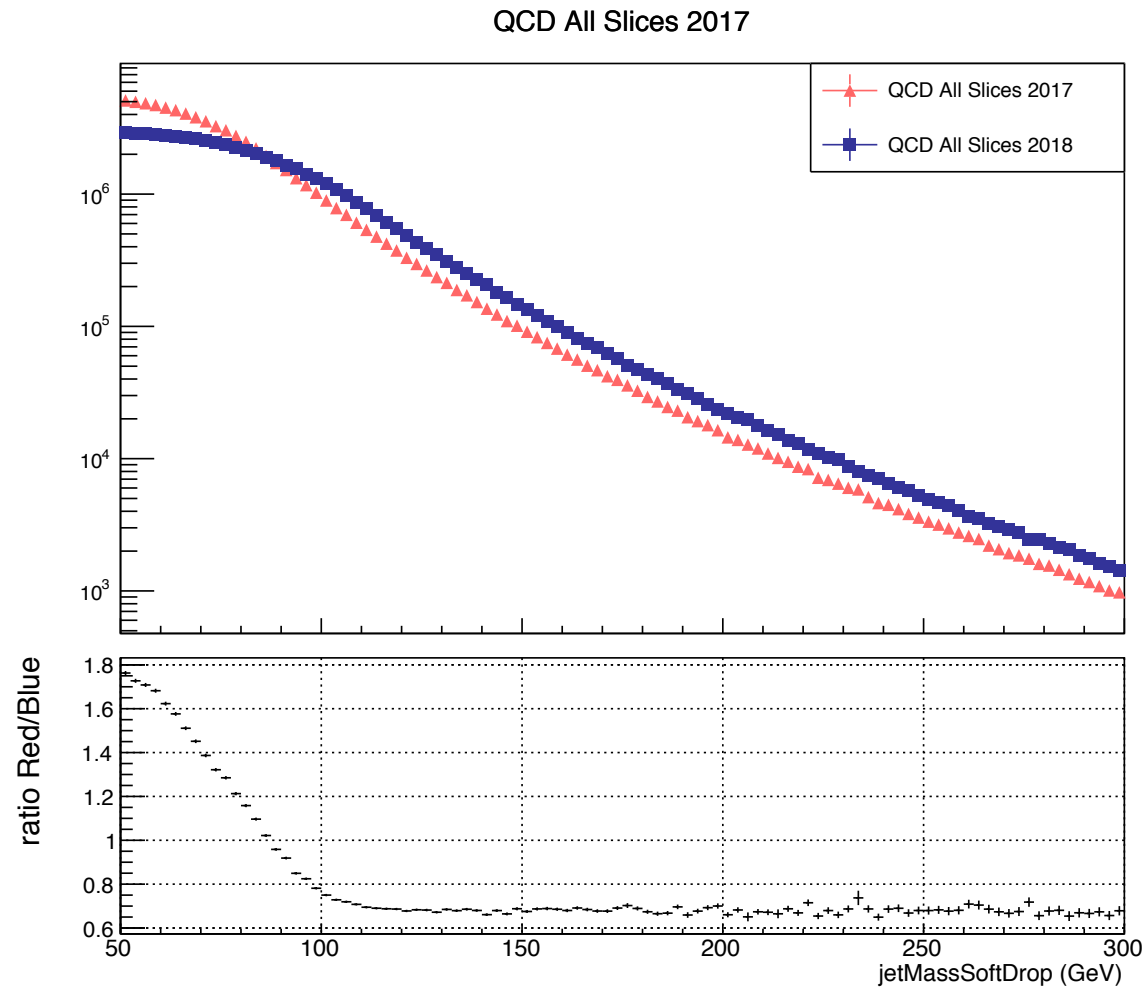
TT All Slices 2017



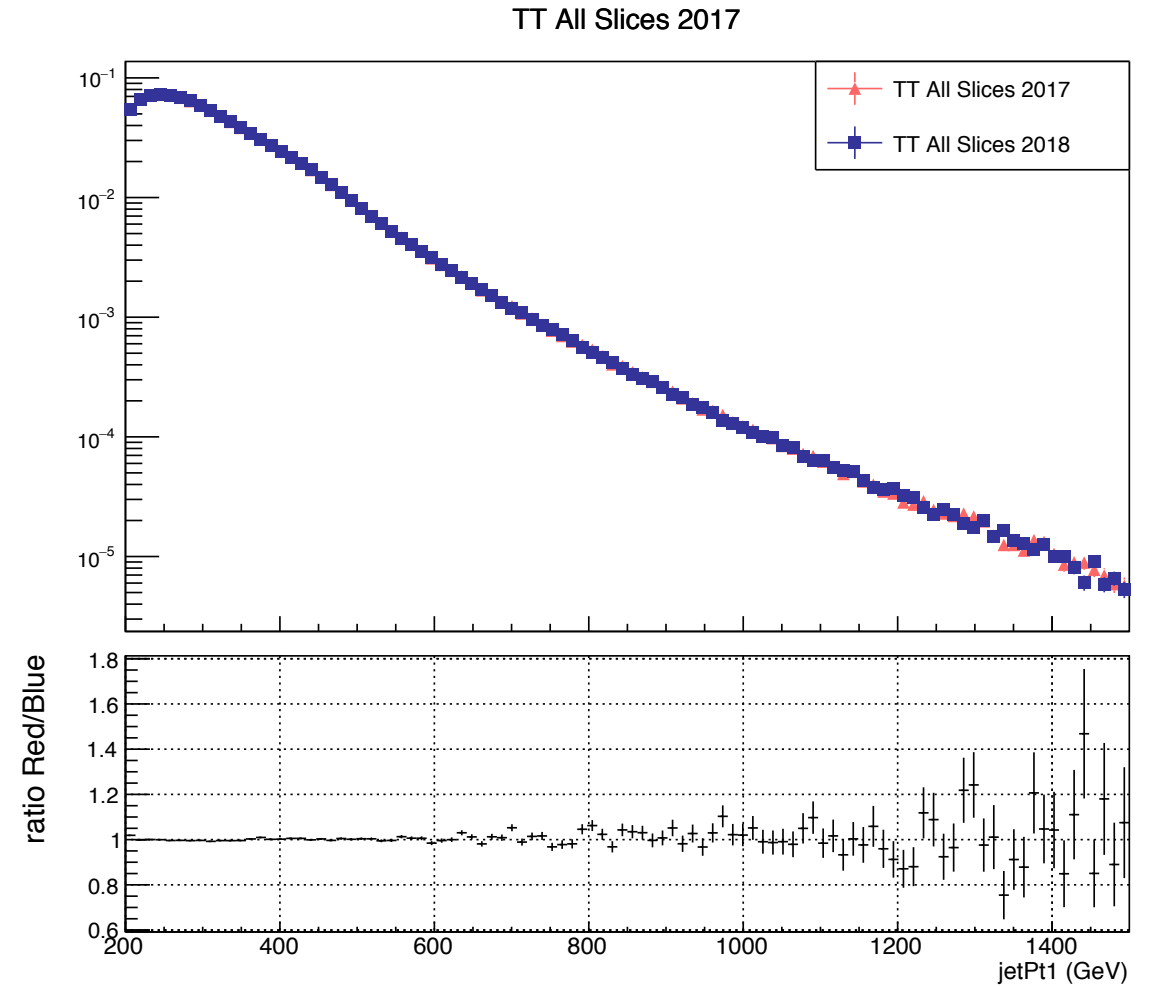
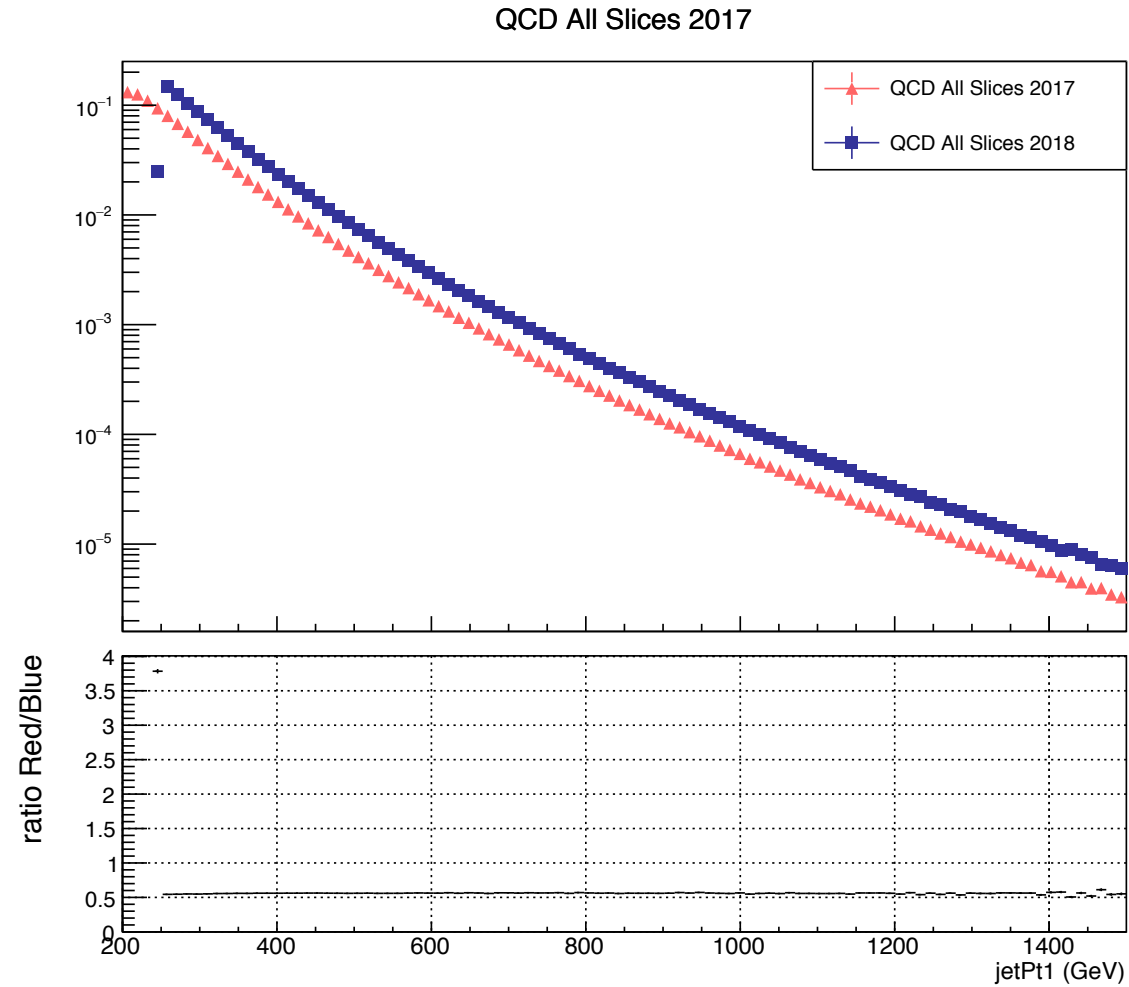
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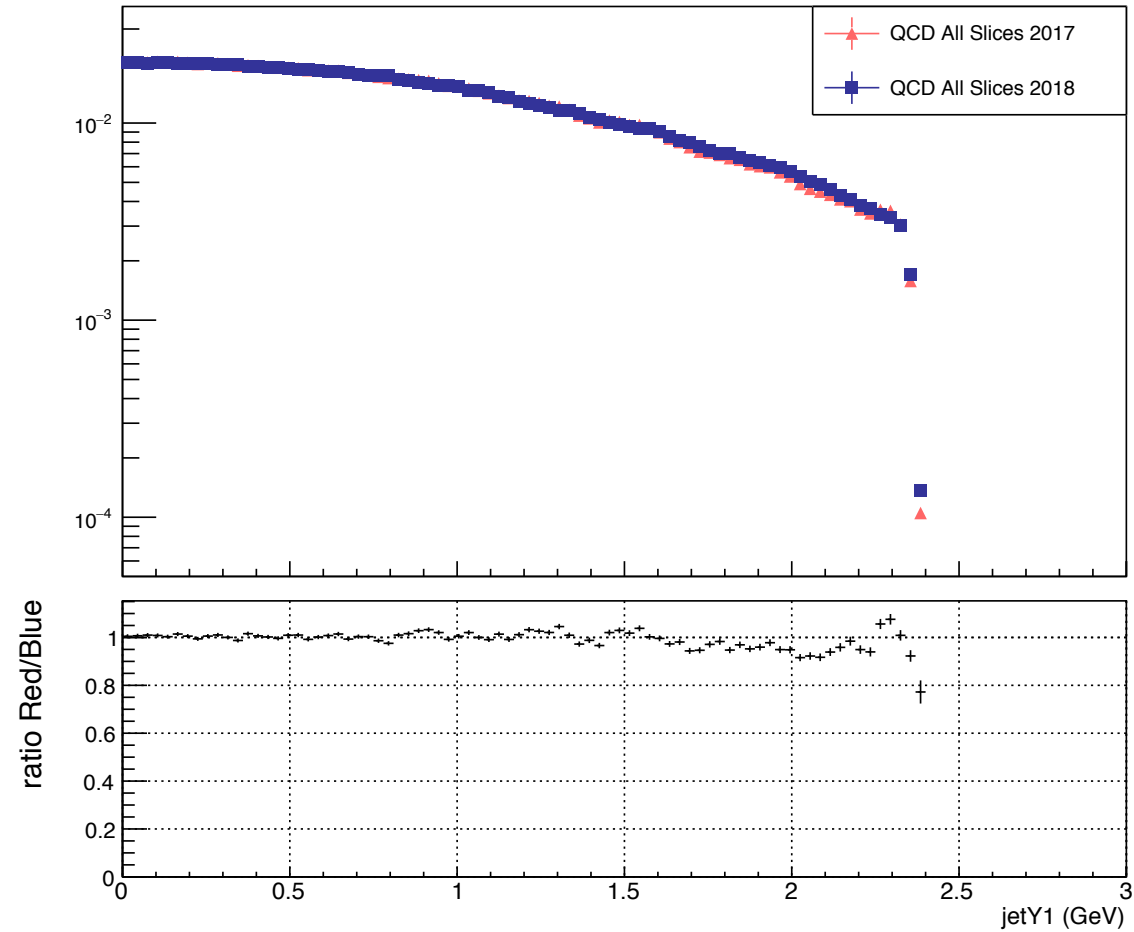


MC Closure tests '17 and '18 (shape)

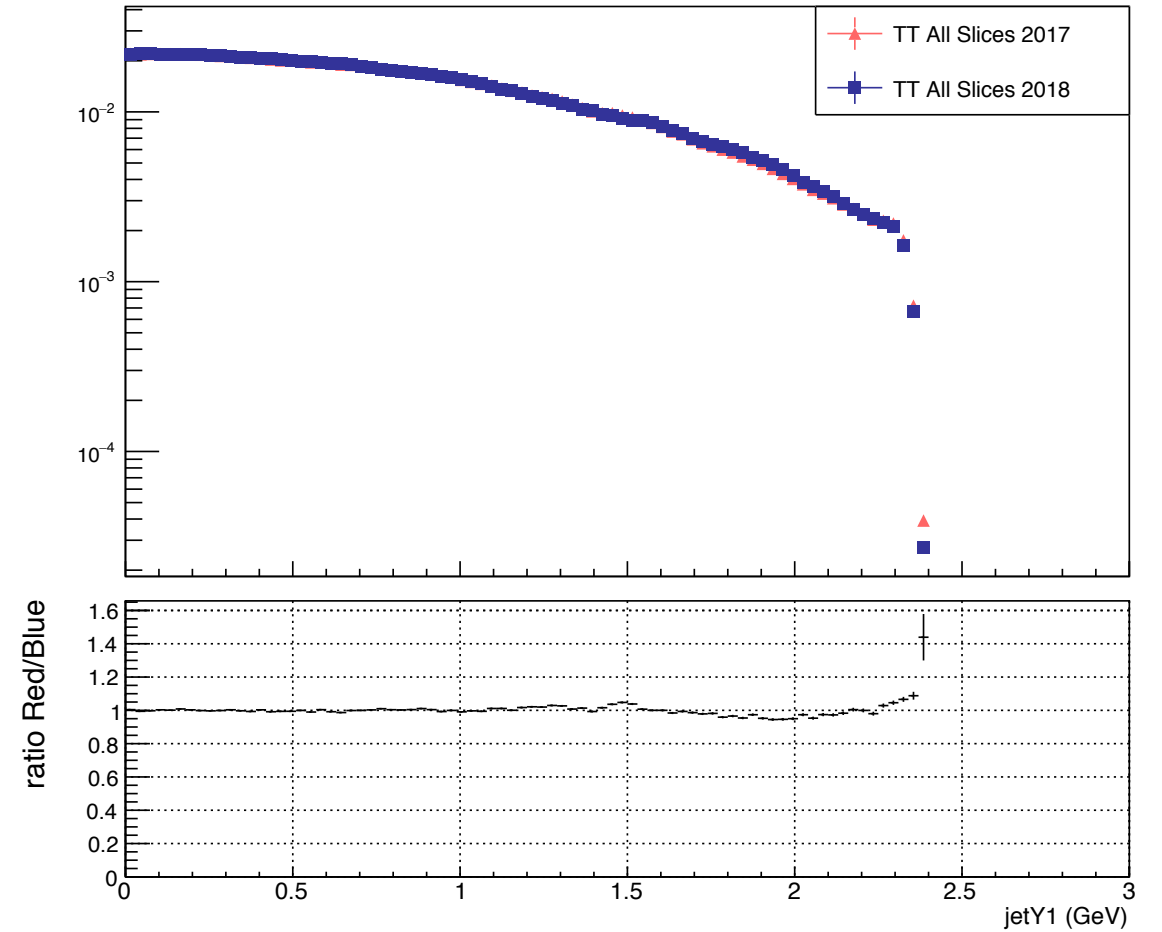


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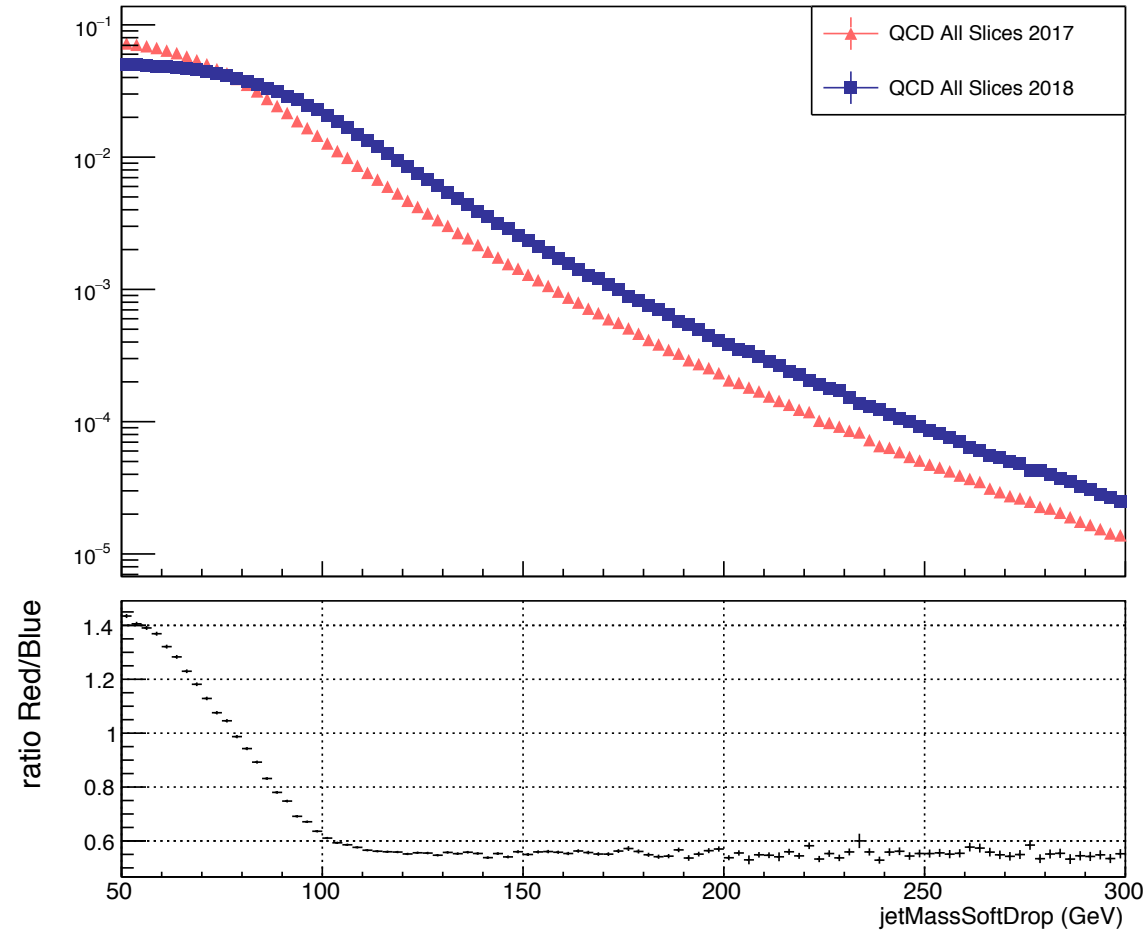


TT All Slices 2017



MC Closure tests '17 and '18 (shape)

QCD All Slices 2017



TT All Slices 2017

