

Weekly Report NTUA 22/11/2019

George Bakas



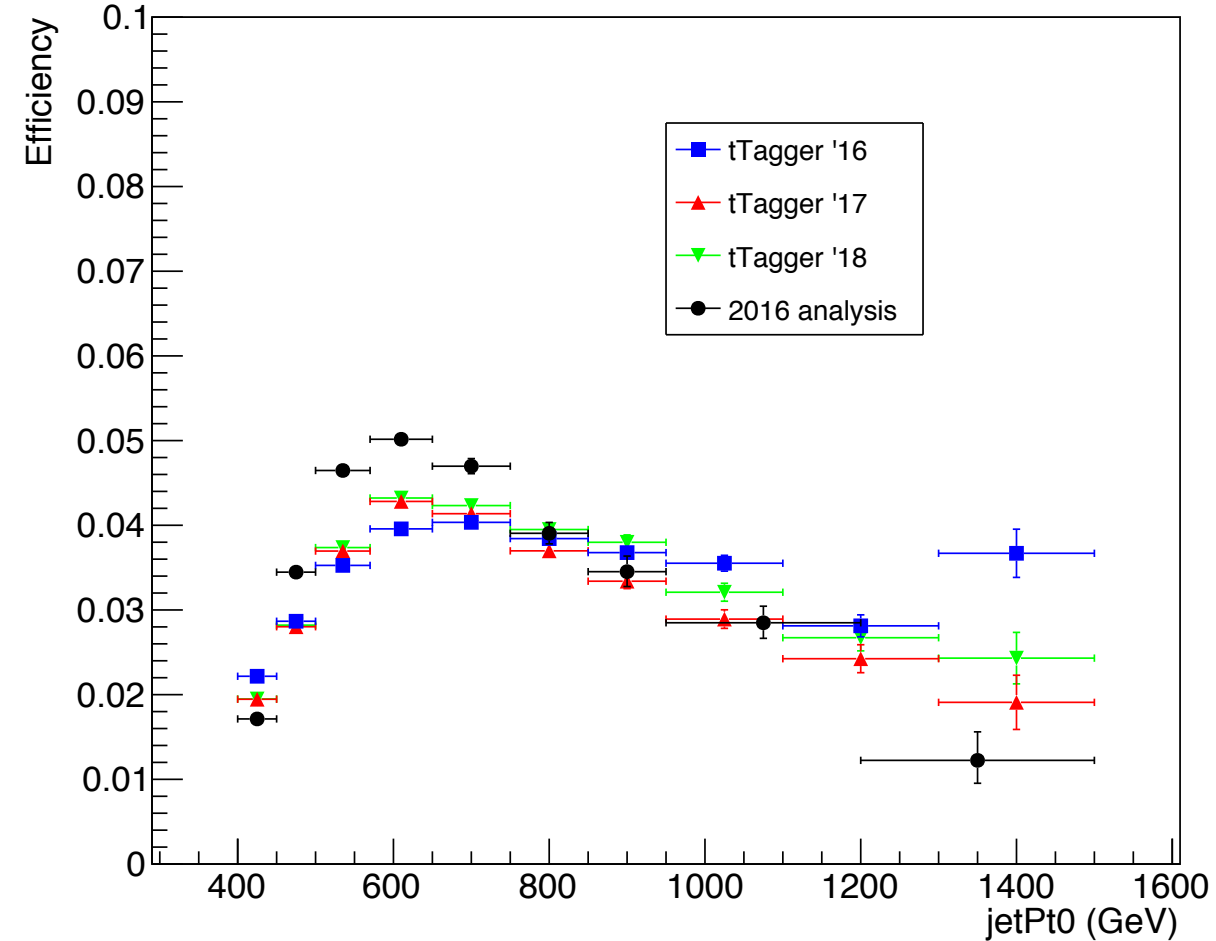
Status Report

- Analysis:
 - Hands on Particle phase space as well
 - Efficiency
 - Acceptance
 - Response matrices
- R_{yield} used as a transfer factor from SR_A to SR defined as: $R_{\text{yield}} = \frac{N_{SR}}{N_{SR_A}}$
 - Check if this quantity is stable in all Regions (0, 1, 2 btag) for every year
- Signal Extraction for several variables

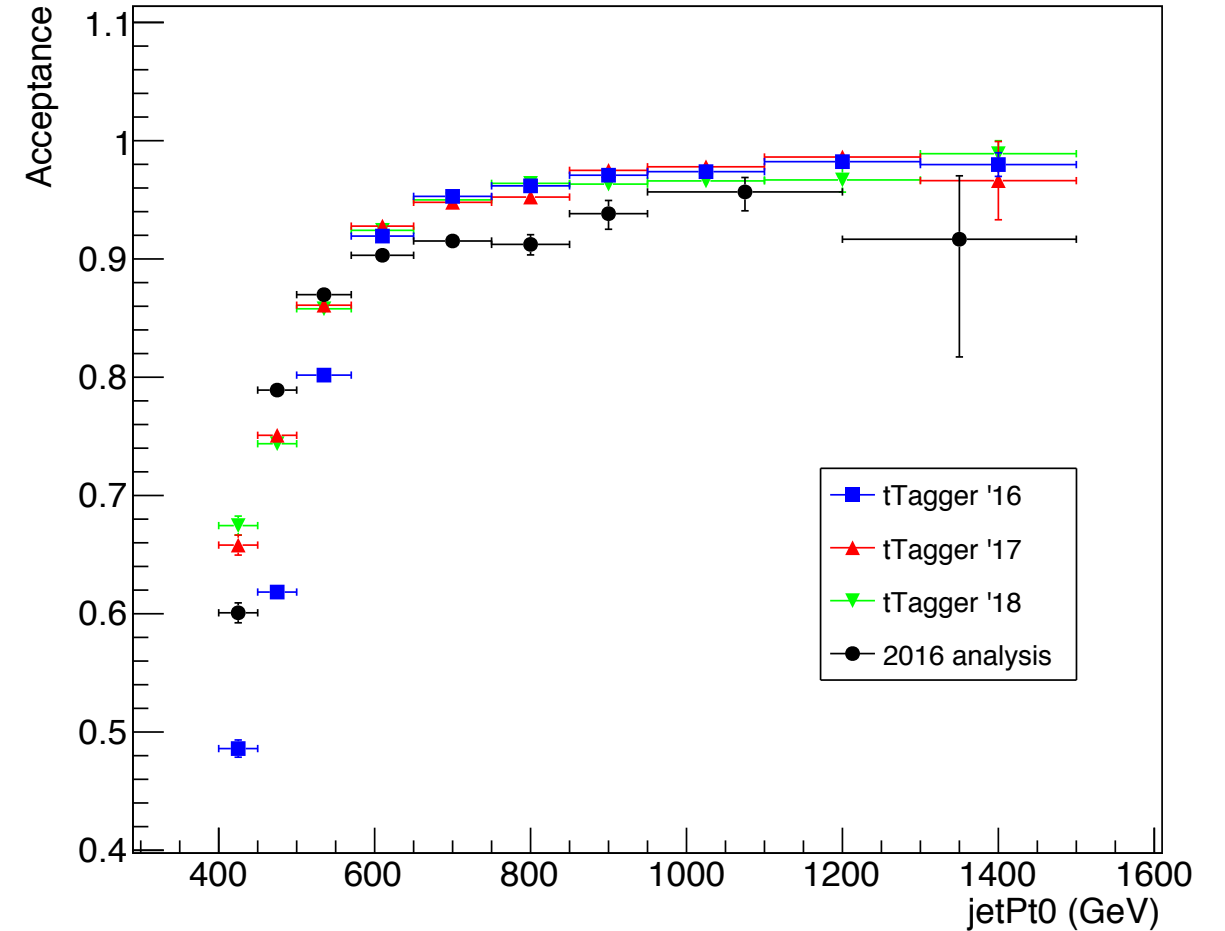


Efficiency and Acceptance for 2016, 2017 and 2018 (parton)

Efficiency '16,'17,'18

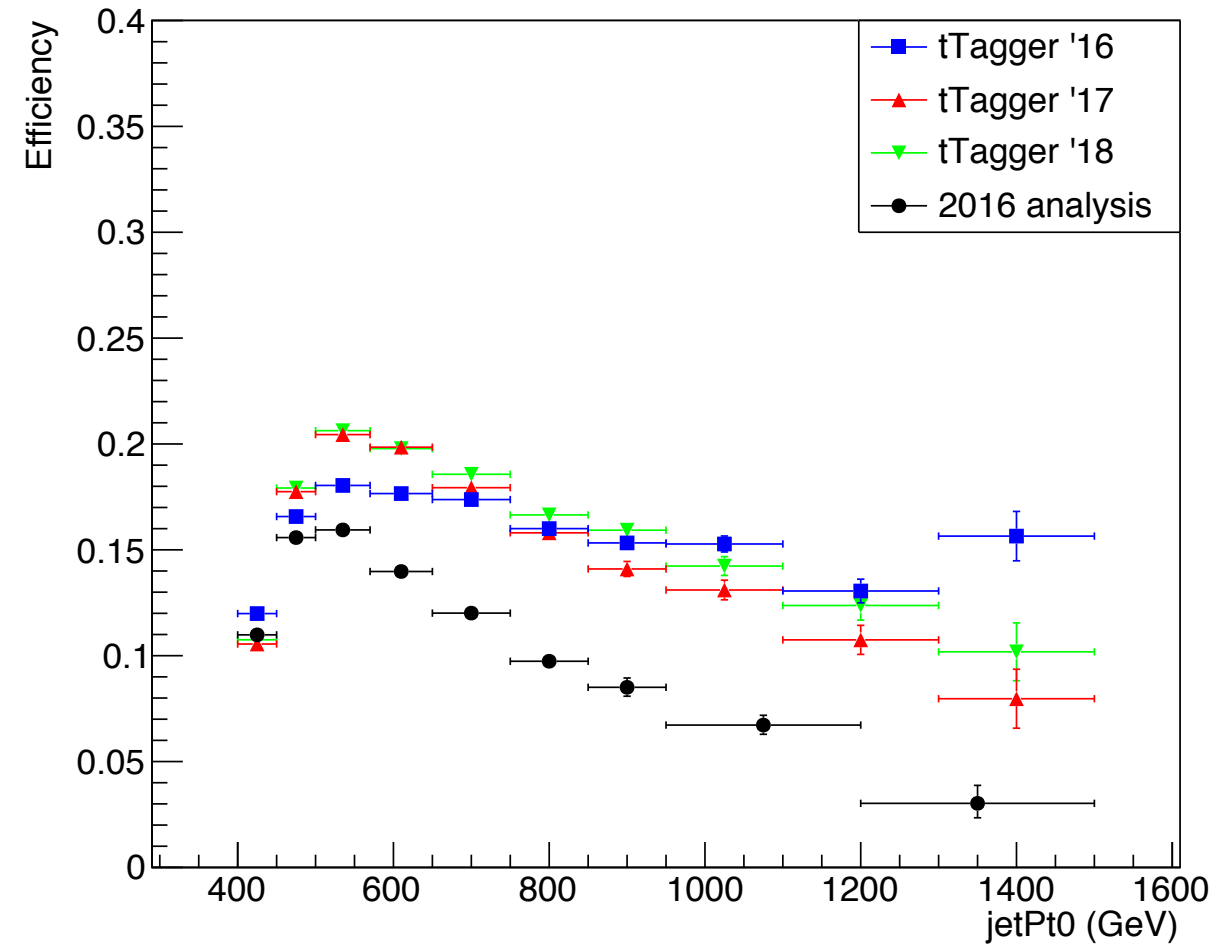


Acceptance '16,'17,'18

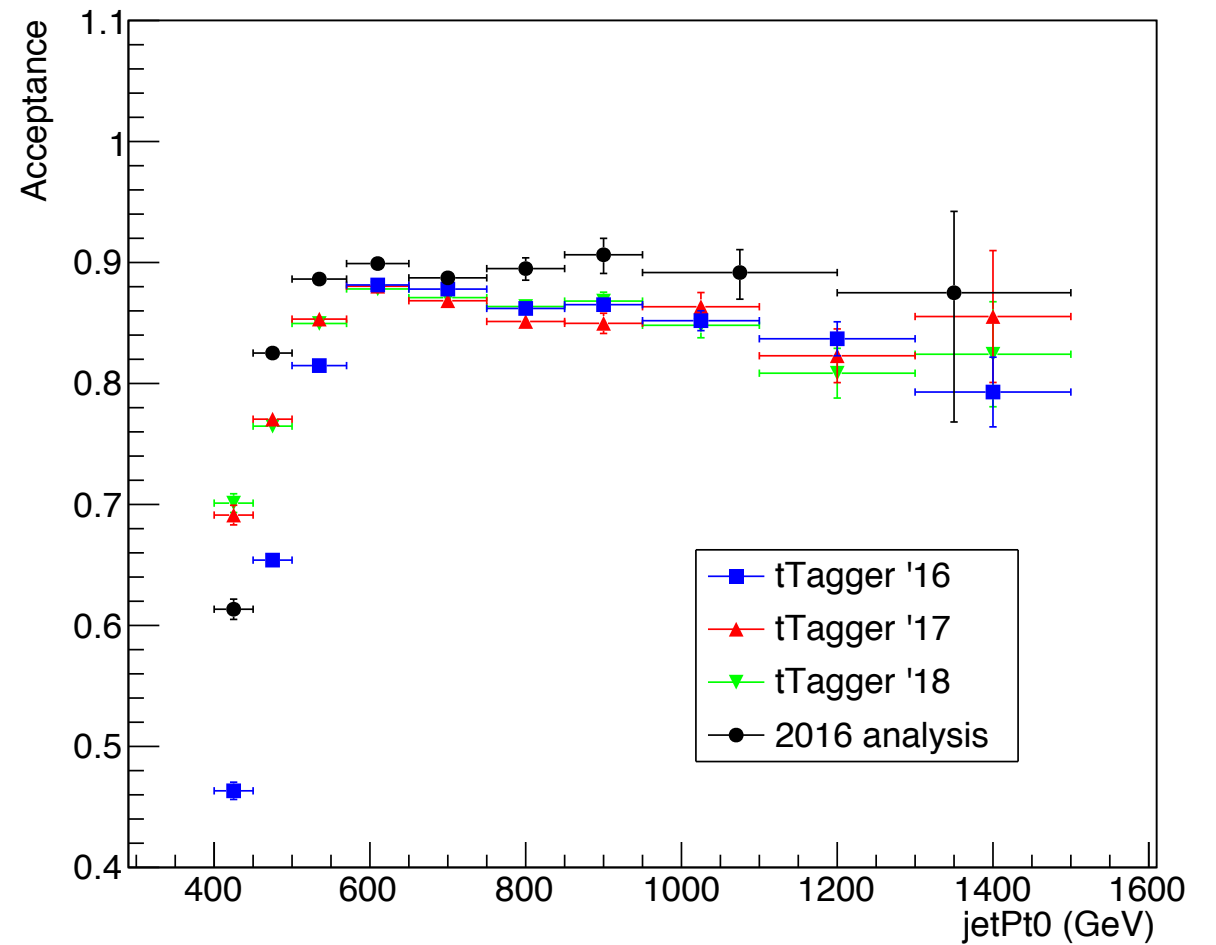


Efficiency and Acceptance for 2016, 2017 and 2018 (particle)

Particle Efficiency '16,'17,'18

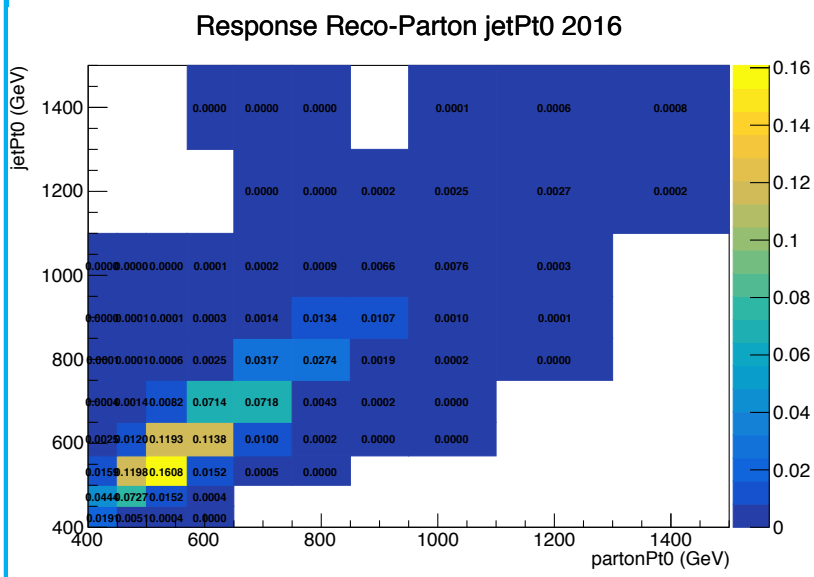


Particle Acceptance '16,'17,'18

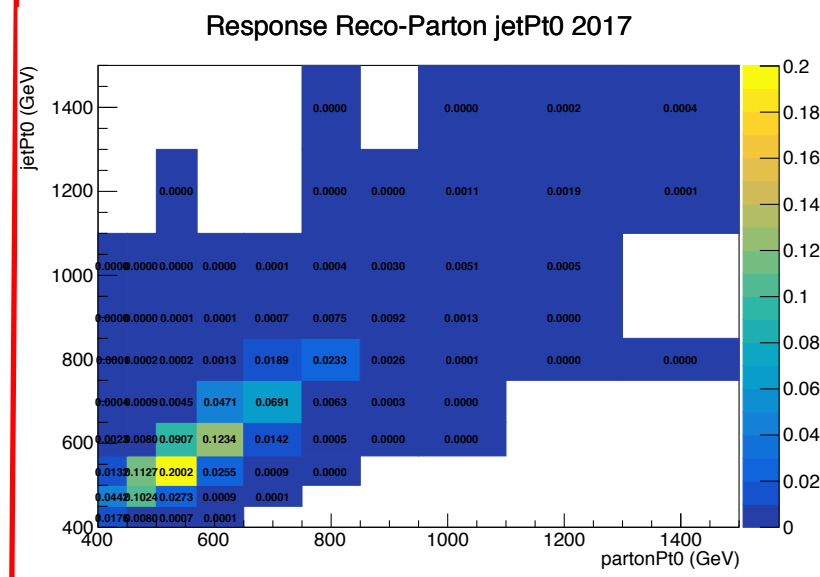


Response Matrices (parton) vs JetPt0

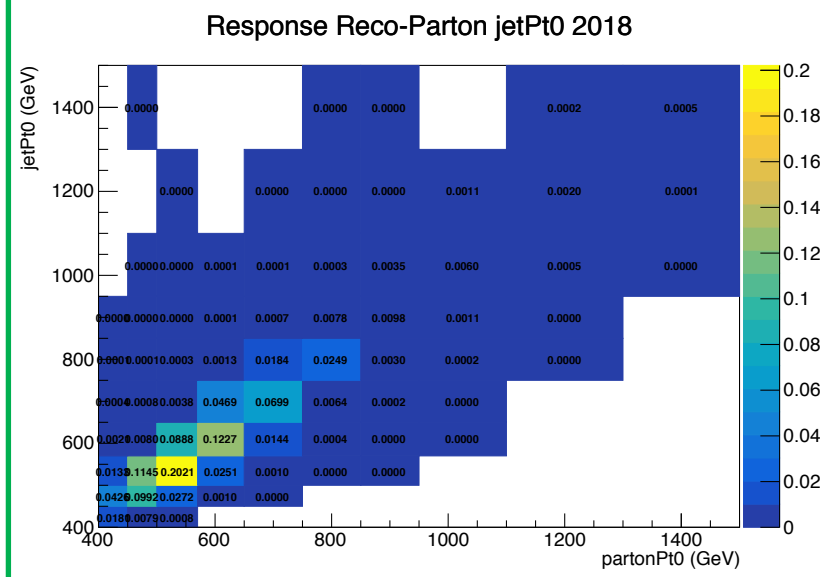
2016



2017



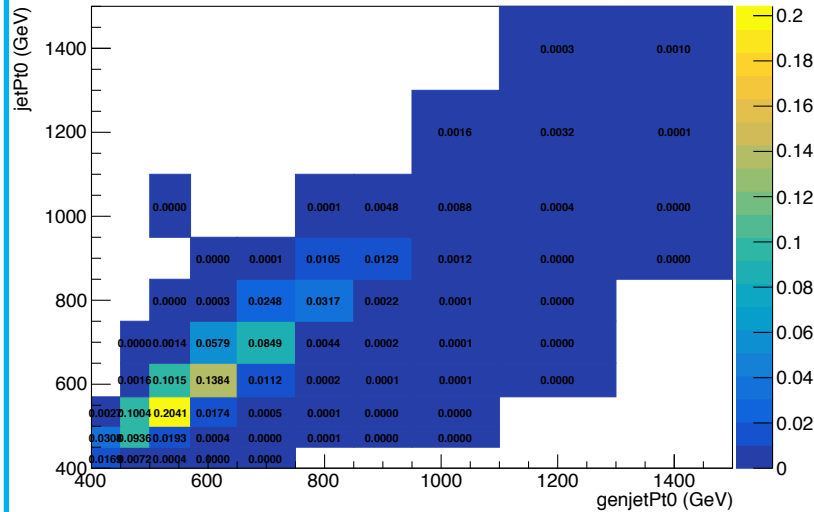
2018



Response Matrices (particle) vs JetPt0

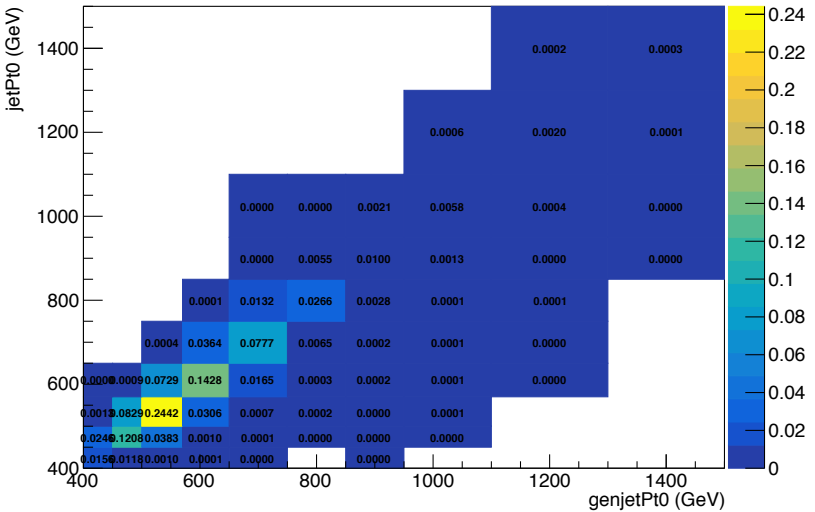
2016

Response Reco-Particle jetPt0 2016



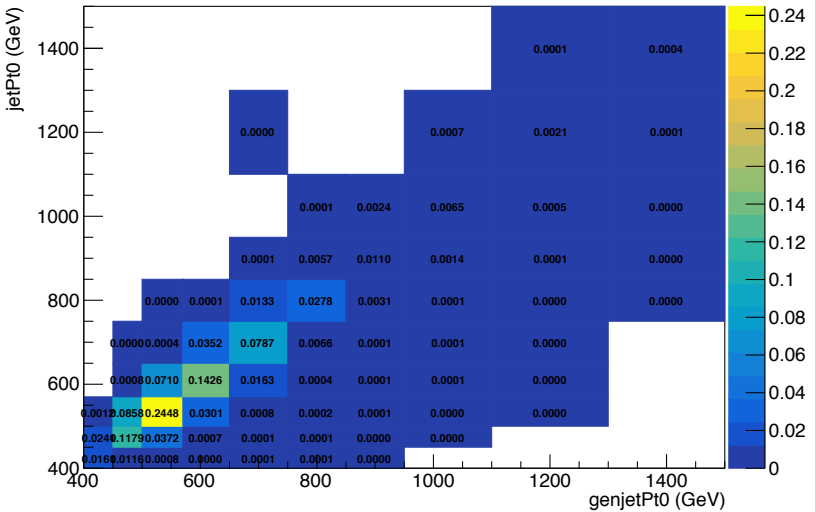
2017

Response Reco-Particle jetPt0 2017



2018

Response Reco-Particle jetPt0 2018



Signal Extraction

$$S(x_{reco}) = D(x_{reco}) - C_{bkg}^{yield} N_{QCD}^{fit} C_{QCD}^{shape}(x_{reco}) Q(x_{reco}) - B(x_{reco})$$

Diagram illustrating the components of the signal extraction equation:

- Fiducial Yield**: Points to $S(x_{reco})$
- Measured dist from data**: Points to $D(x_{reco})$
- Fitted number of QCD events in SR_A** : Points to N_{QCD}^{fit}
- QCD shape taken from Data (CR)**: Points to $C_{QCD}^{shape}(x_{reco})$
- Transfer factor from SR_A to SR**: Points to C_{bkg}^{yield}
- QCD shape correction factor**: 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 simultaneous fit in 3 regions (0,1,2 btag) because we do not have a pure Control Region.
 - Our data CR is ttbar contaminated

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

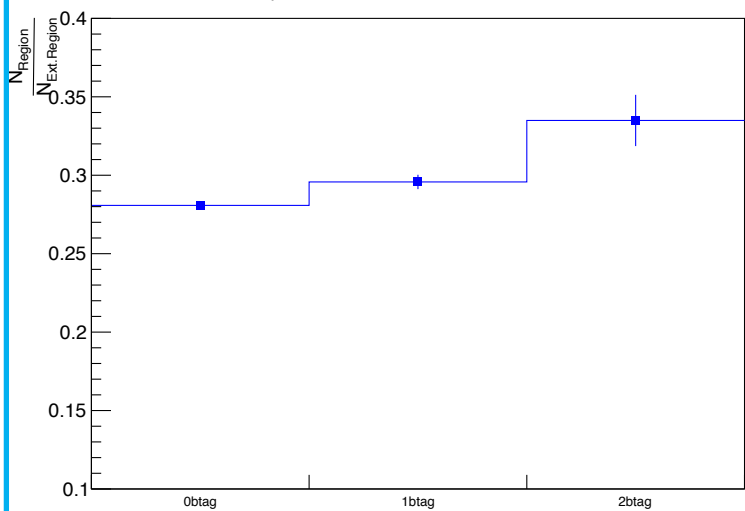
- We assume that $N_{tt}^{(0)} = (1 - e_b)^2 N_{tt}$, $N_{tt}^{(2)} = e_b^2 N_{tt}$ and $N_{tt}^{(1)} = 2(1 - e_b)e_b N_{tt}$ where e_b is the b tagging efficiency and N_{tt} is the total ttbar yield.



R_{yield} Calculation

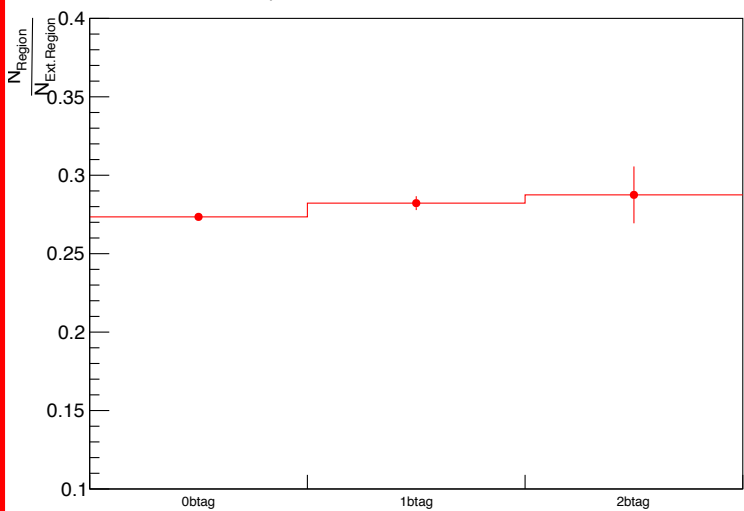
2016

R_{yield} transfer factor 2016



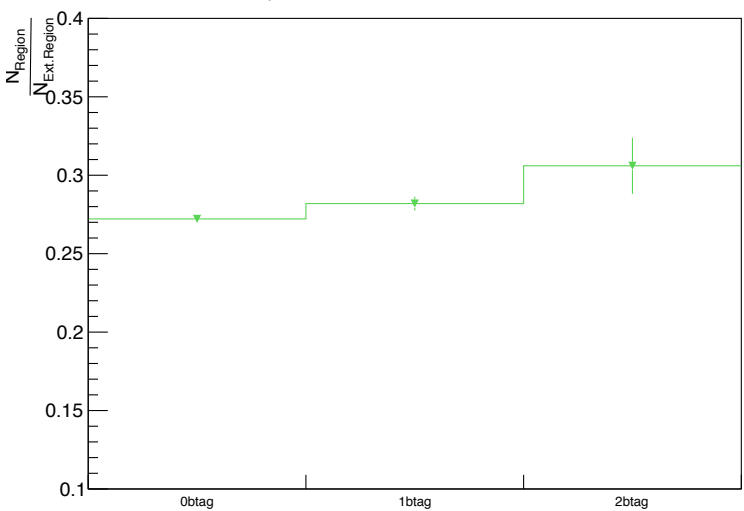
2017

R_{yield} transfer factor 2017



2018

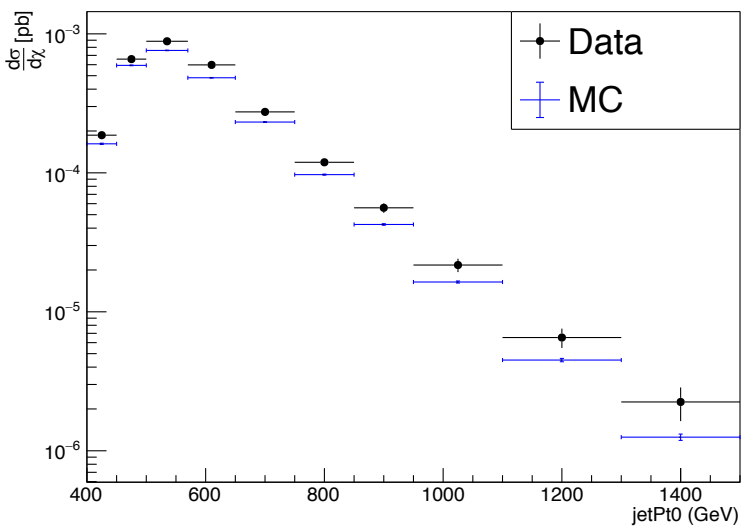
R_{yield} transfer factor 2018



Fiducial differential xsec

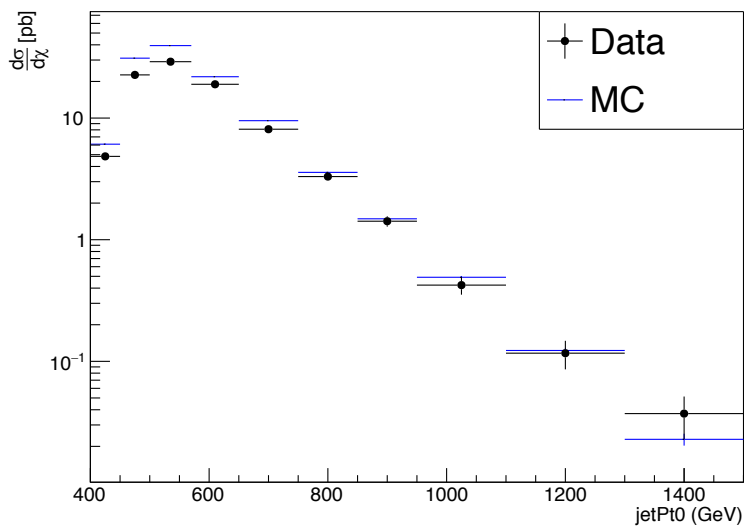
2016

Data vs MC (2016) for jetPt0



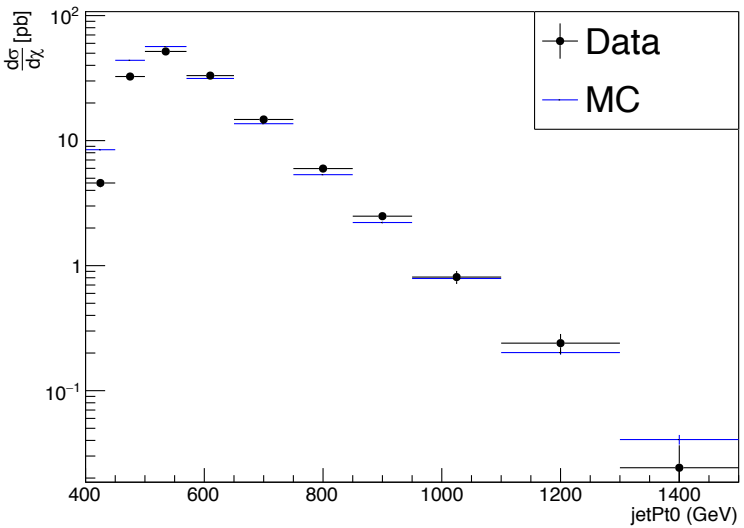
2017

Data vs MC 2017 for jetPt0



2018

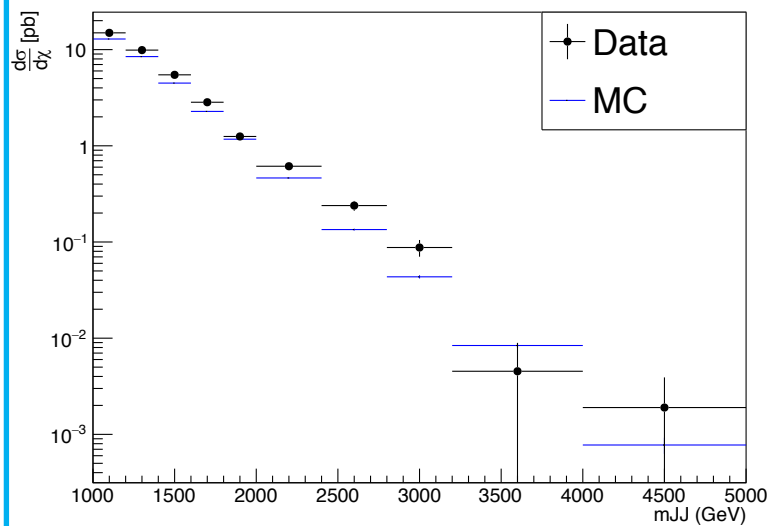
Data vs MC 2018 for jetPt0



Fiducial differential xsec

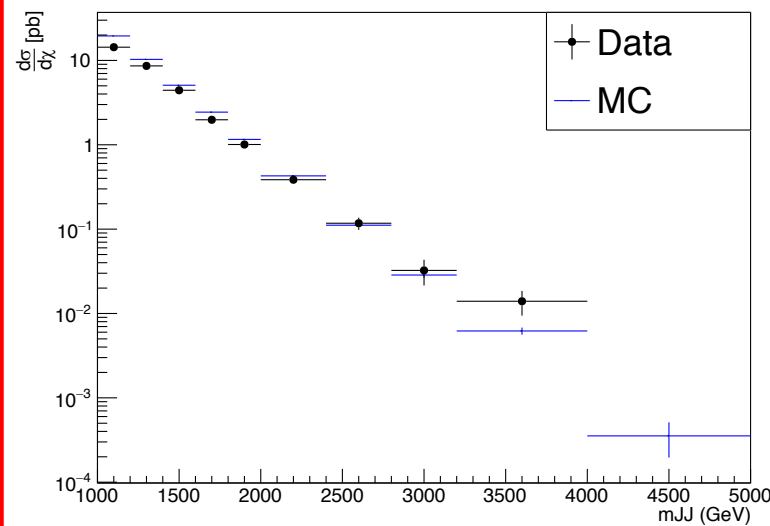
2016

Data vs MC 2016 for mJJ



2017

Data vs MC 2017 for mJJ



2018

Data vs MC 2018 for mJJ

