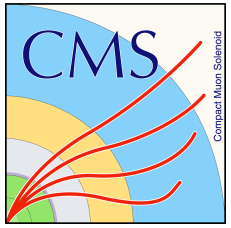
Weekly Report
NTUA
22/11/2019

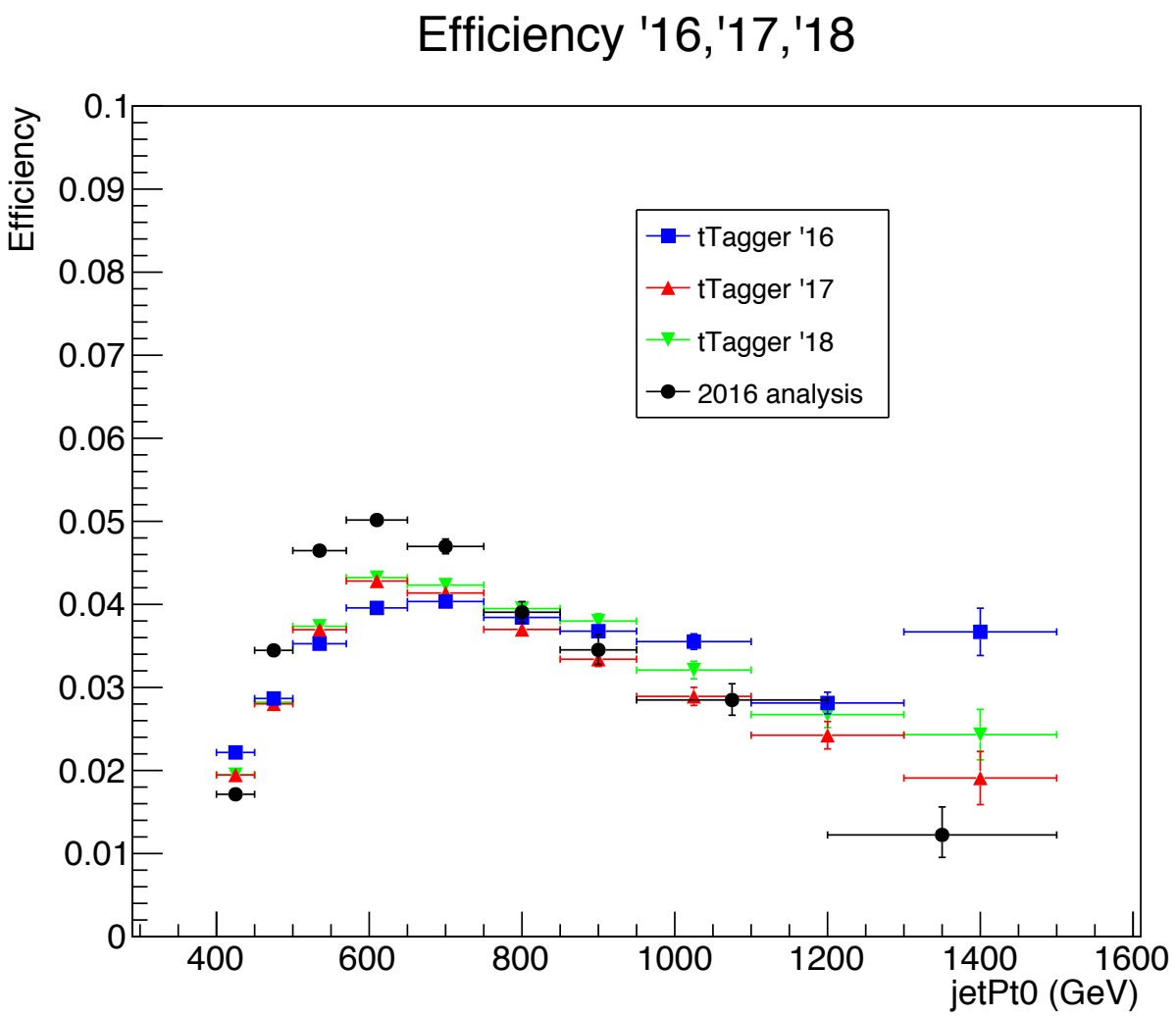
George Bakas

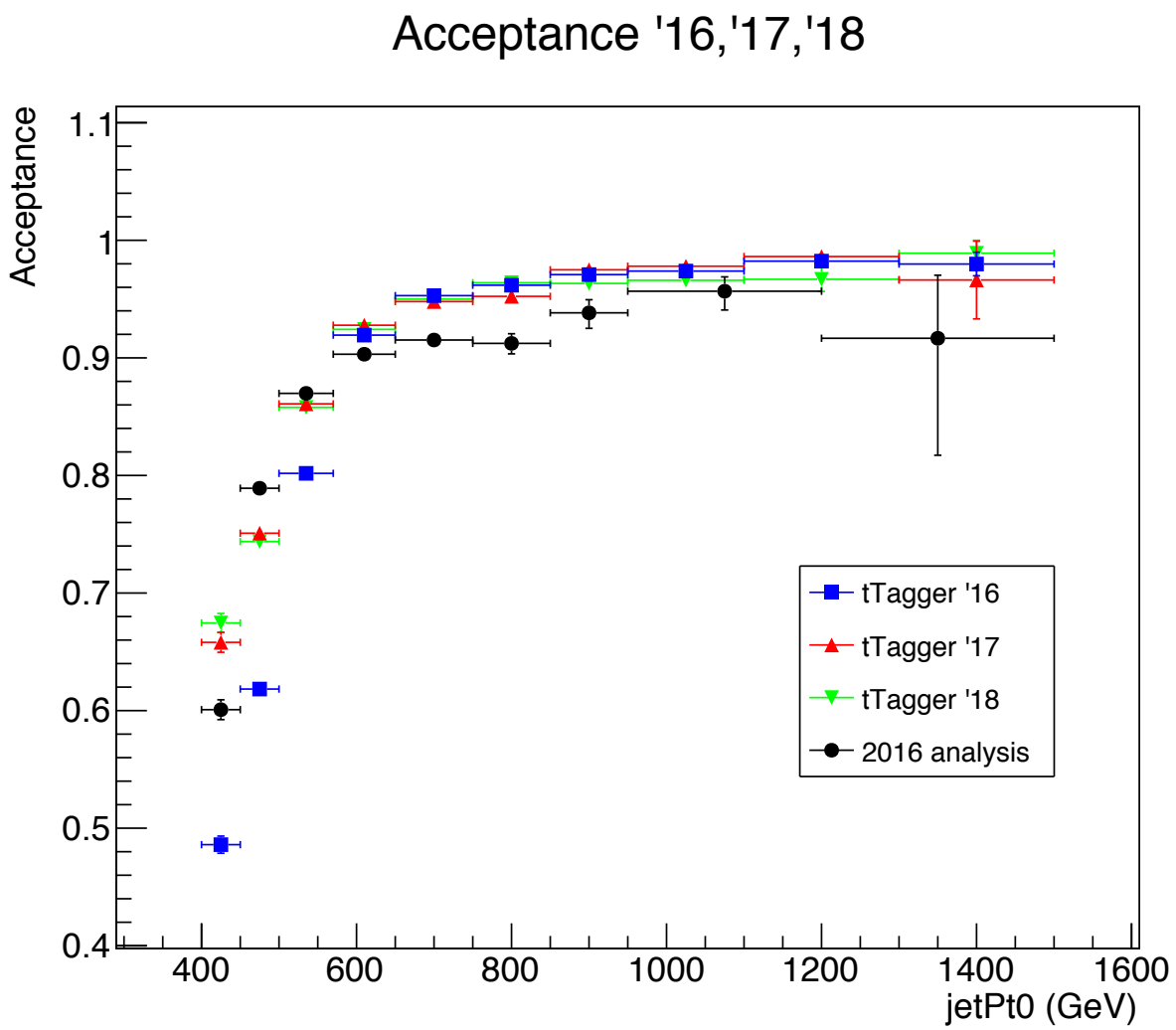


Status Report

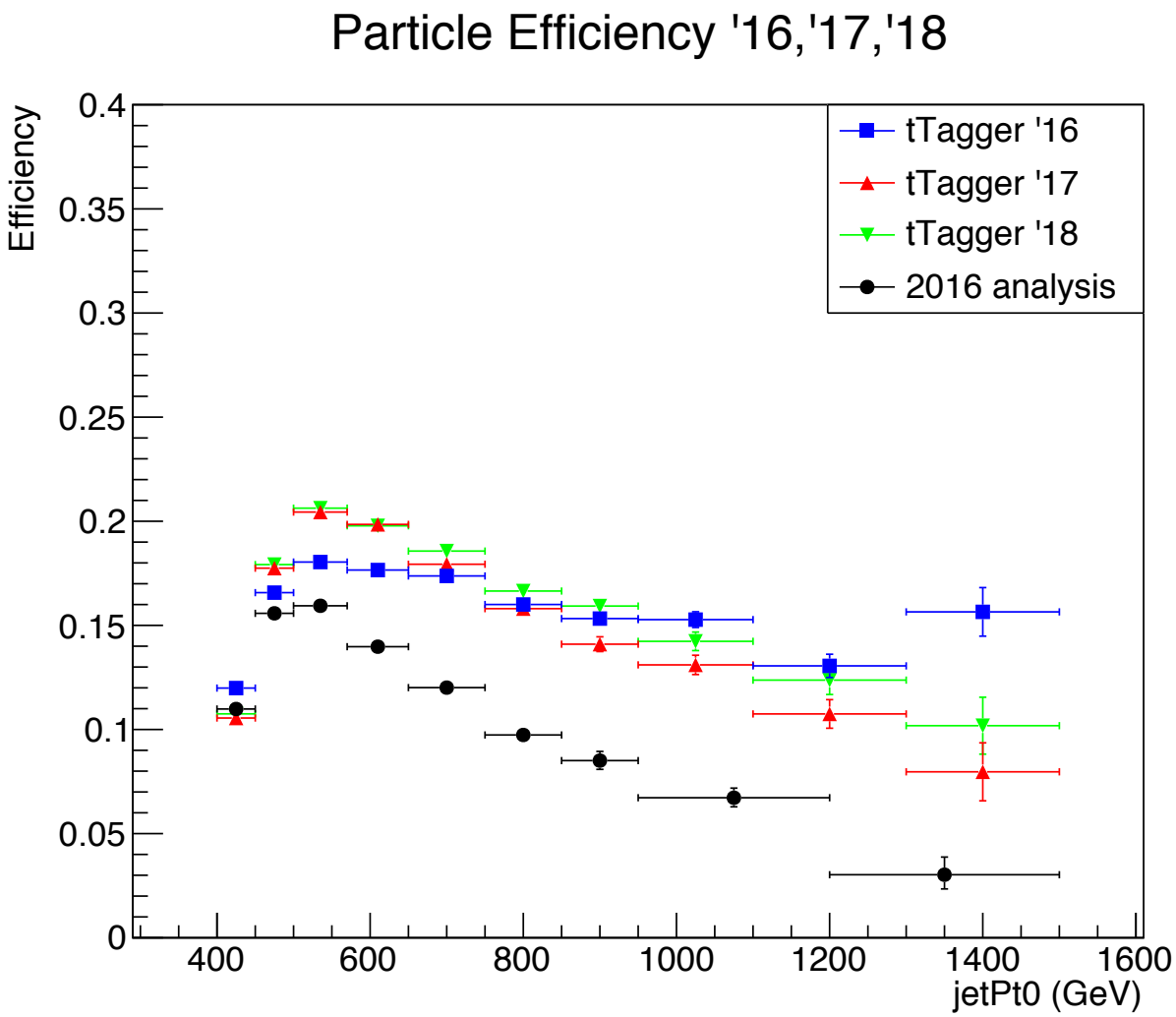
- Analysis:
  - Hands on Particle phase space as well
    - Efficiency
    - Acceptance
  - Response matrices
  - R_{yield} used as a transfer factor from SR_A to SR defined as: $R_{yield} = \frac{N_{SR}}{N_{SR_A}}$
    - Check if this quantity is stable in all Regions (0, 1, 2 btag) for every year
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

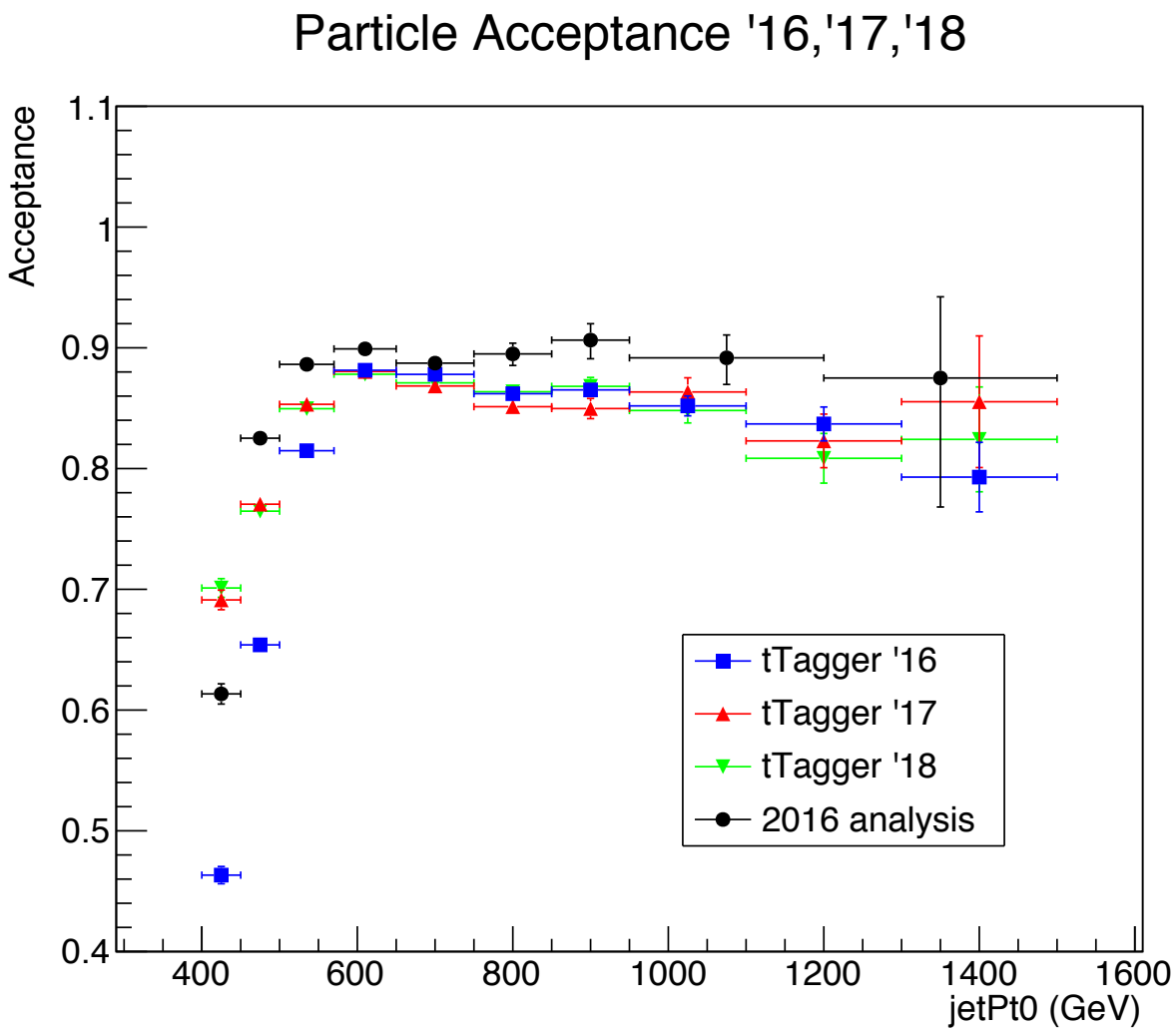
Efficiency and Acceptance for 2016, 2017 and 2018 (parton)





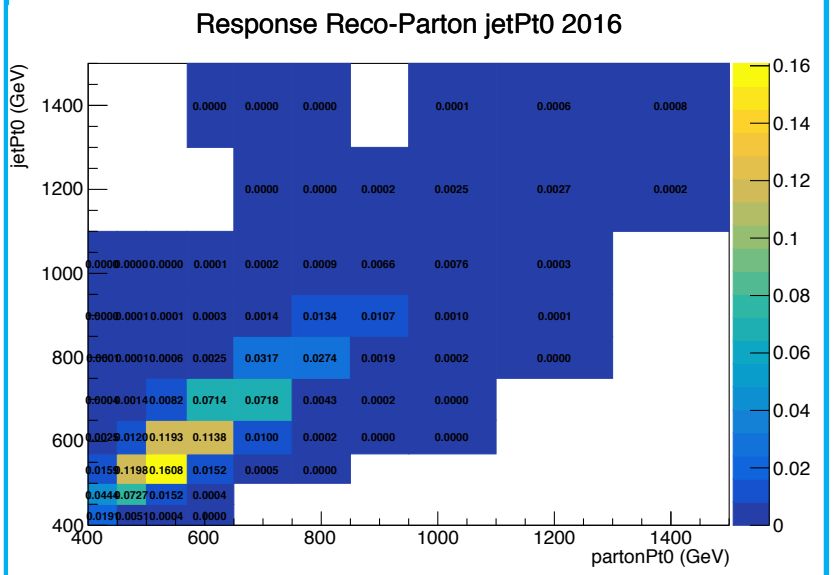
Efficiency and Acceptance for 2016, 2017 and 2018 (particle)



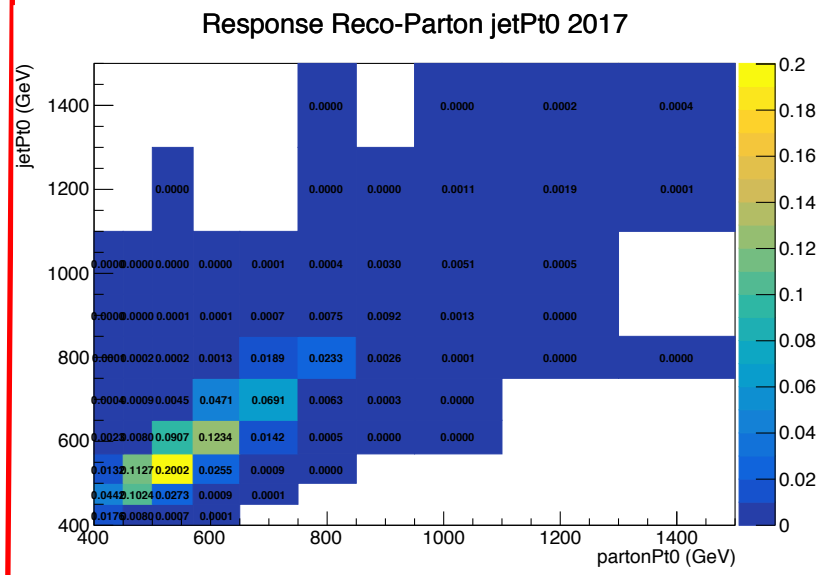


Response Matrices (parton) vs JetPt0

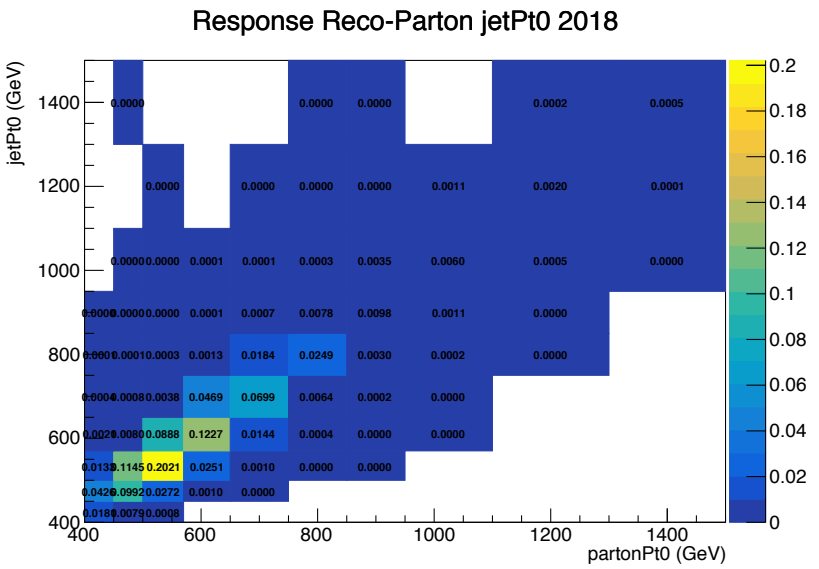
2016



2017

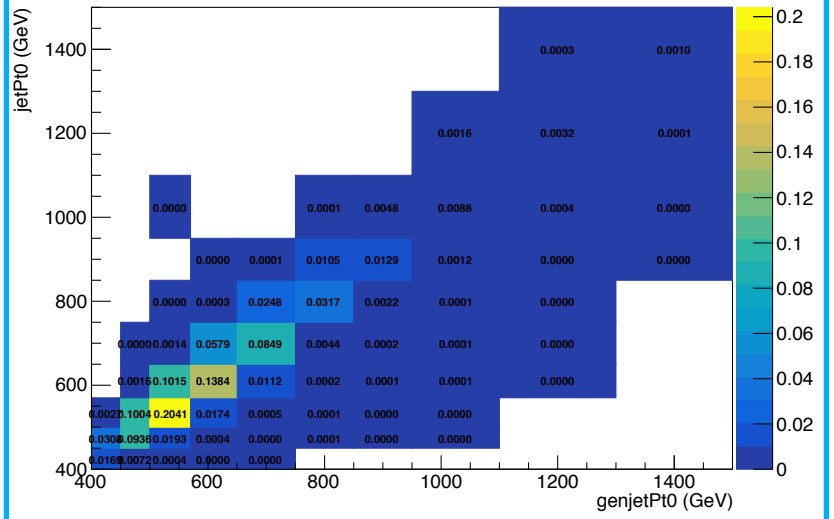


2018

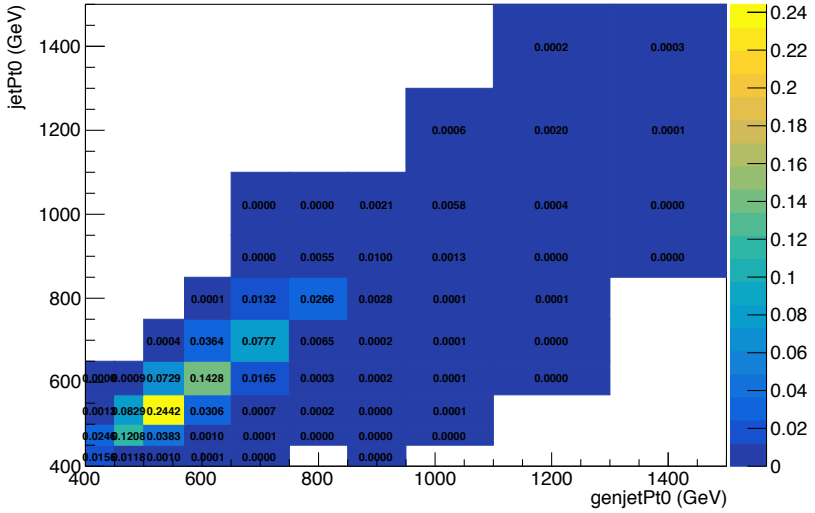


Response Matrices (particle) vs JetPt0

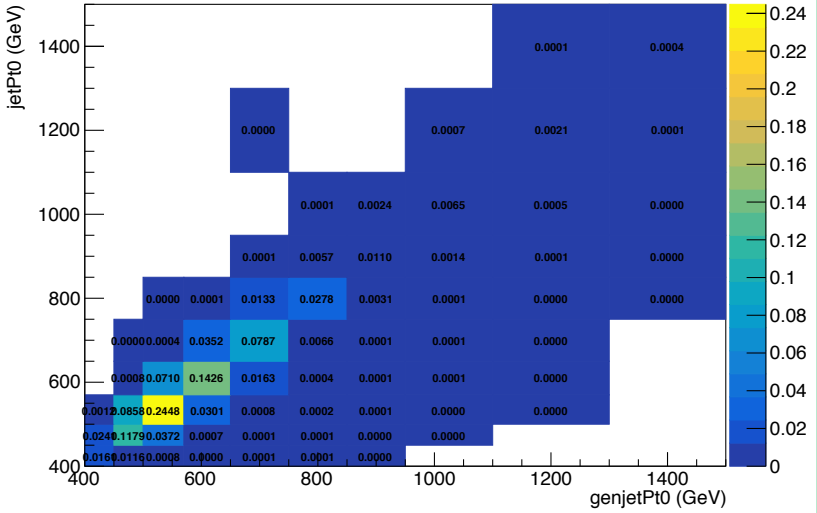
2016



2017



2018



Signal Extraction

Measured dist from data

Fitted number of QCD events in SR_A

QCD shape taken from Data (CR)

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

Fiducial Yield

Transfer factor from SR_A to SR

QCD shape correction factor

Subdominant bkg shape and contribution (MC)

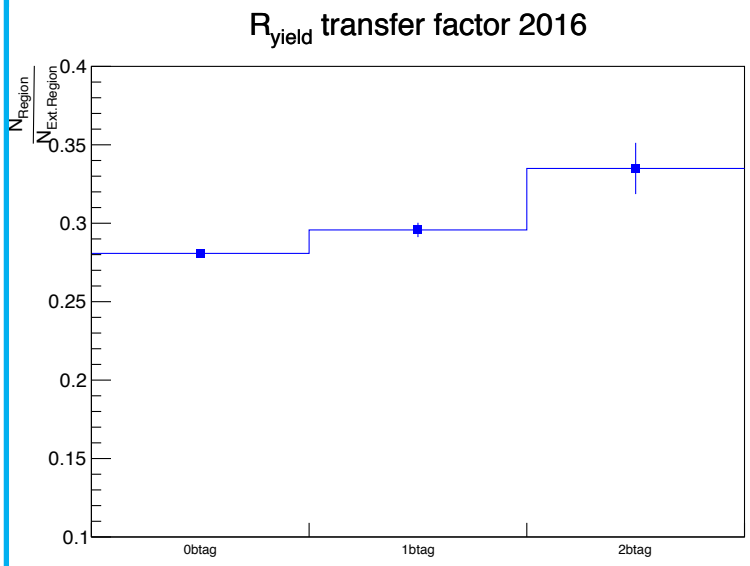
- Where x_{reco} is the respected variable of interest (ttbar mass,pt, rapidity, leading and subleading jetPt and |jetY|)
- We deploy a simultaneous fit in 3 regions (0,1,2 btag) because we do not have a pure Control Region.
  - Our data CR is ttbar contaminated

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

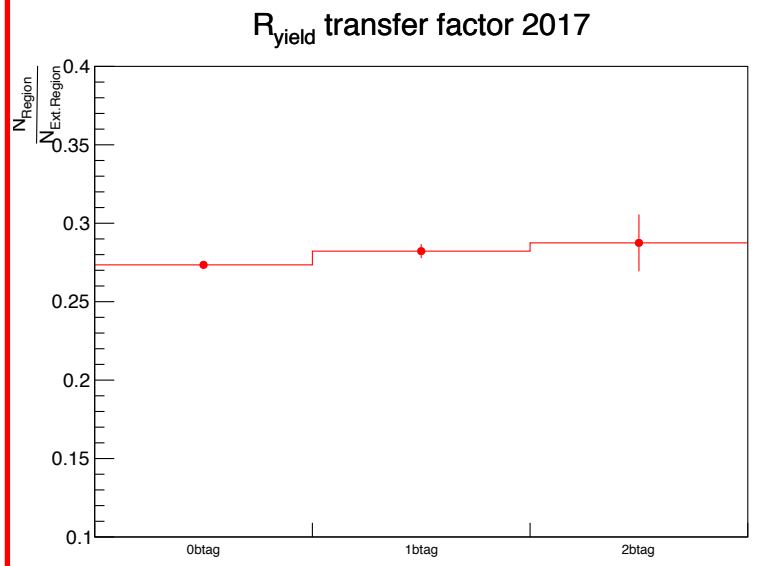
- We assume that $N_{tt}^{(0)} = (1 - e_b)^2 N_{tt}$, $N_{tt}^{(2)} = e_b^2 N_{tt}$ and $N_{tt}^{(1)} = 2(1 - e_b) e_b N_{tt}$ where e_b is the b tagging efficiency and N_{tt} is the total ttbar yield.

R_{yield} Calculation

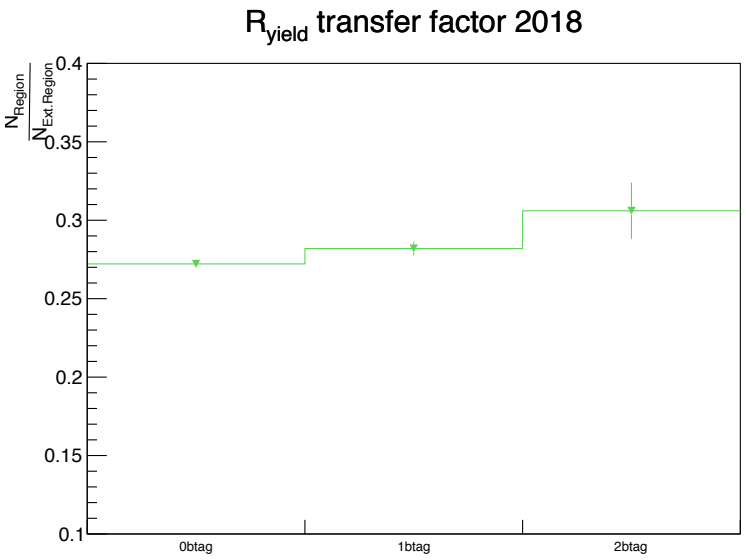
2016



2017

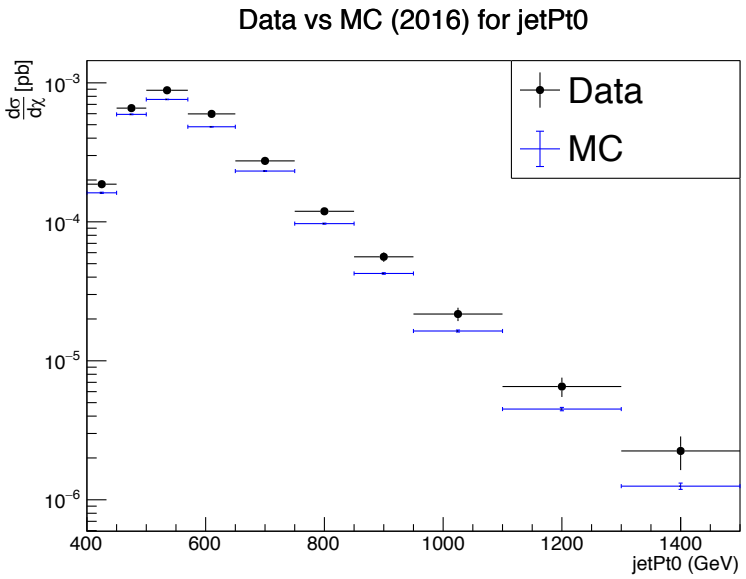


2018

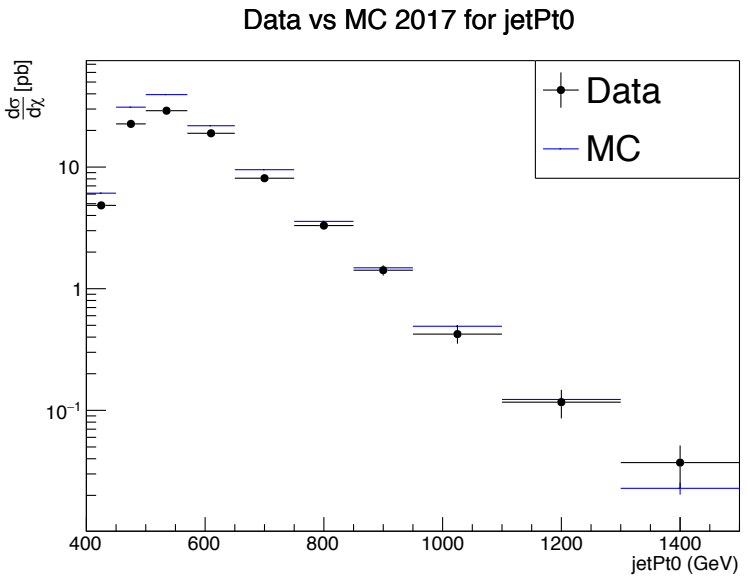


Fiducial differential xsec

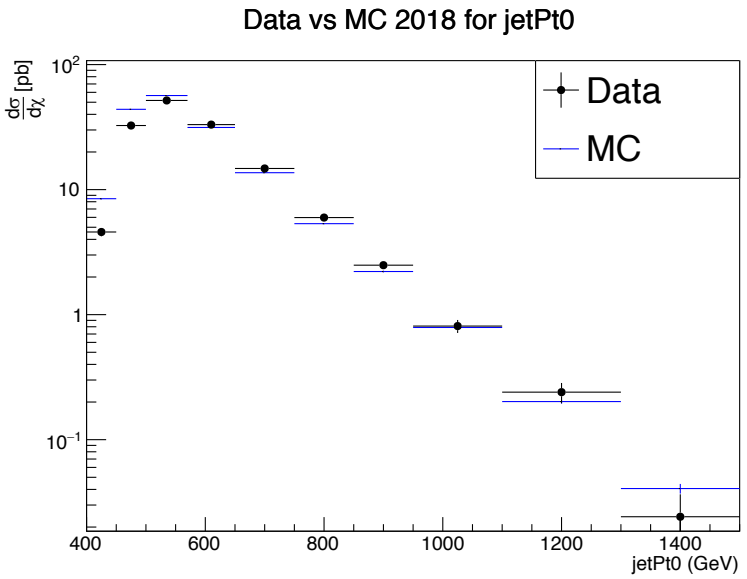
2016



2017

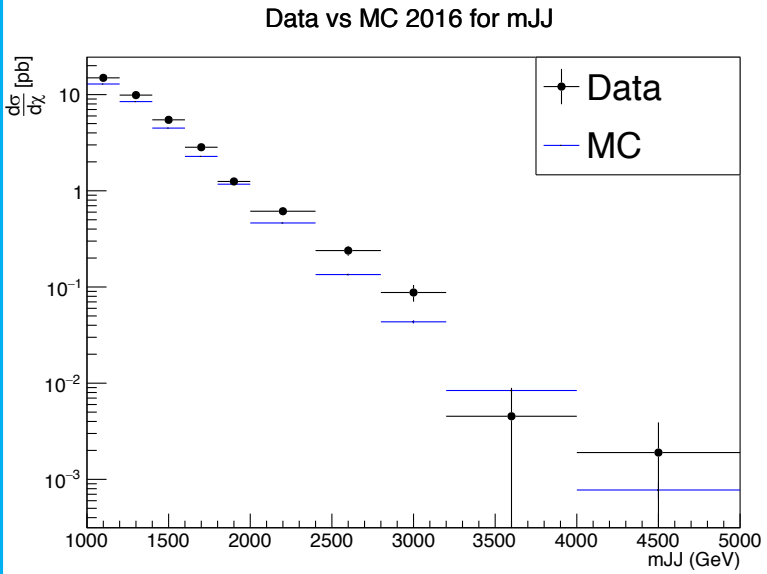


2018

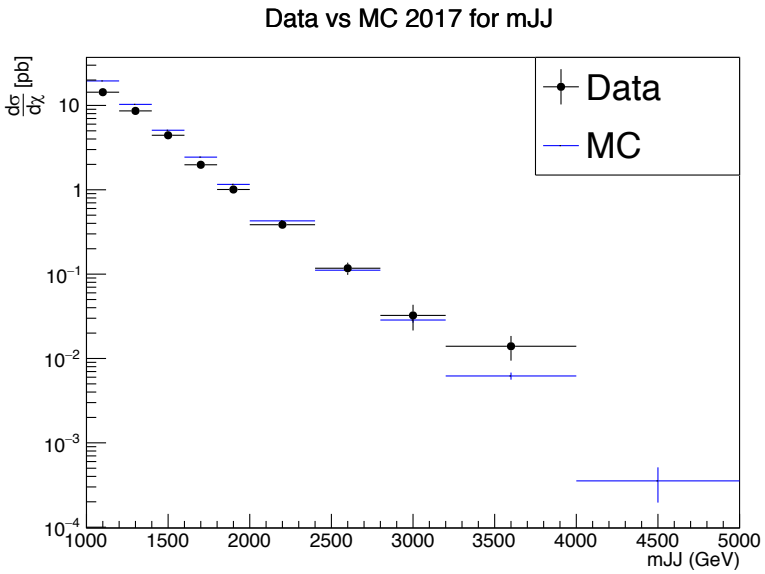


Fiducial differential xsec

2016



2017



2018