Top Discriminator Efficiencies and Signal Over Bkg for several selection Categories

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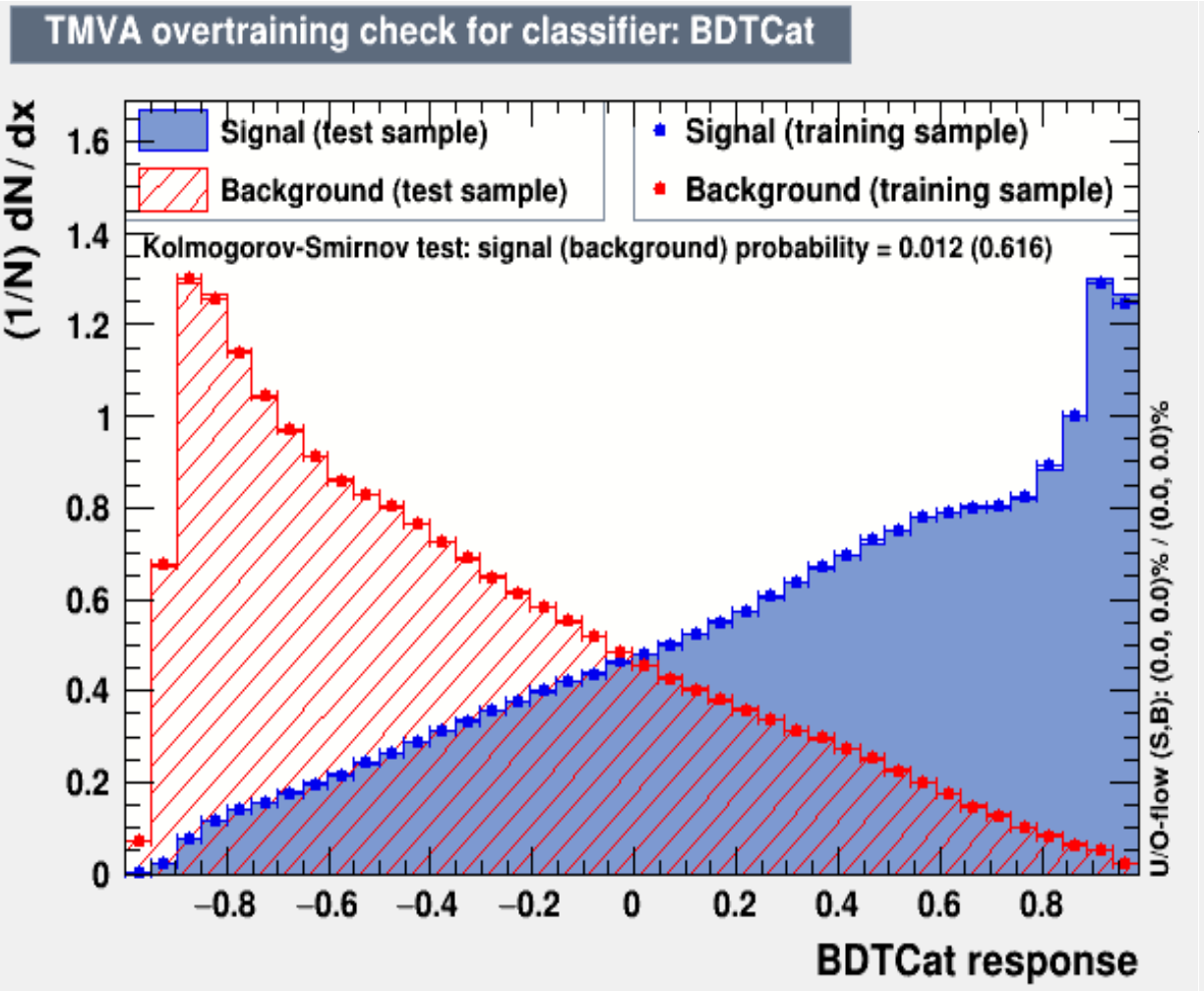
Overview

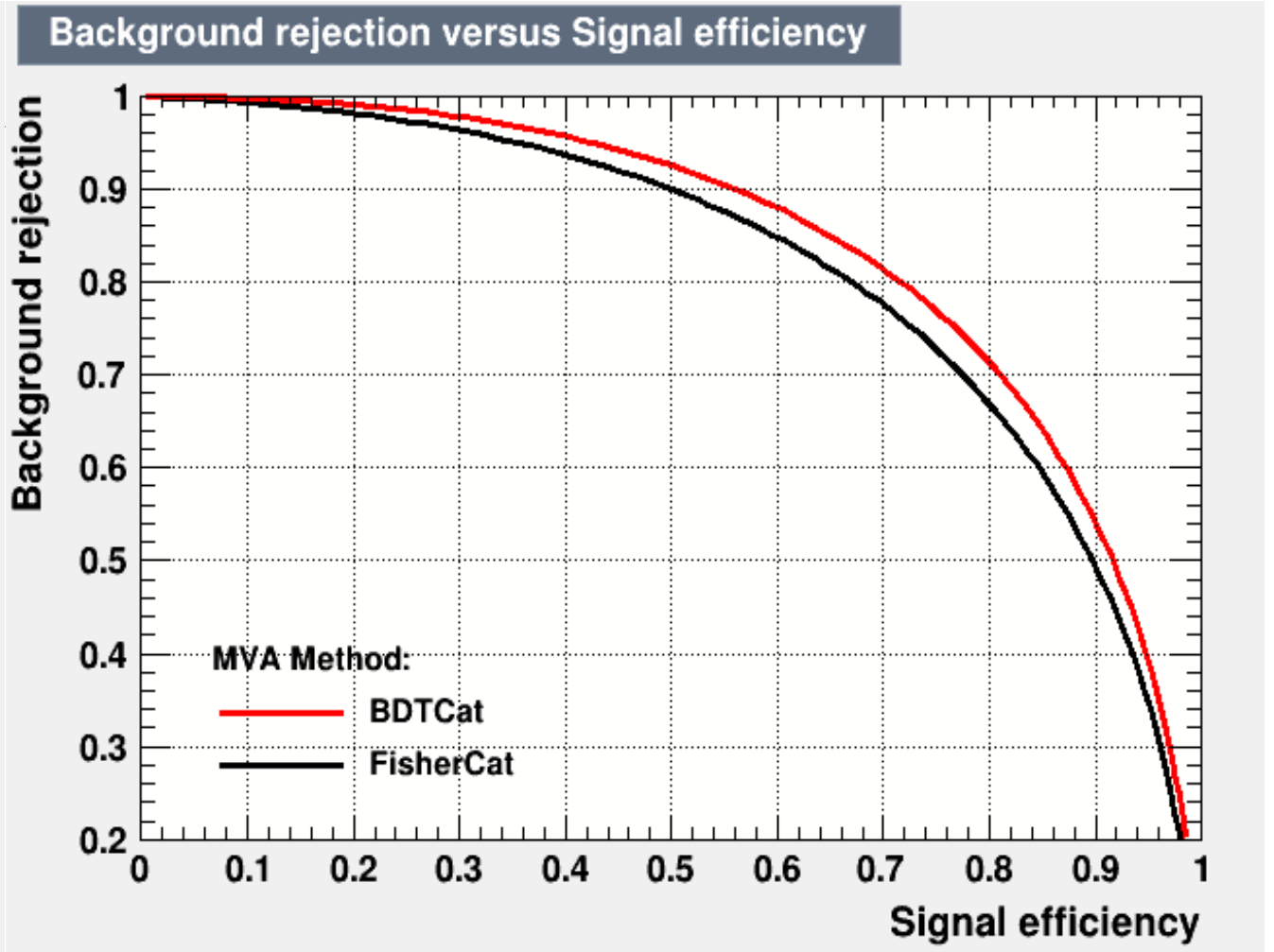
- Efficiencies vs all variables
  - mTTbarParton
  - ptTTbarParton
  - yTTbarParton
  - partonPt
  - partonEta
- Yields for all samples for all variables
- Categories:
  - 1. Both jets are top tagged and b tagged

Cuts:

- Reco:
  - nJets > 1,
  - |jetEta| < 2.4 (both jets)
  - jetPt > 400 GeV (both jets)
  - 120 GeV < jetMassSoftDrop < 220 GeV (both jets)
- Parton:
  - |etaParton| < 2.4 (both partons)
  - ptTopParton > 400 GeV (both partons)
  - mTTbarParton > 1000

Training

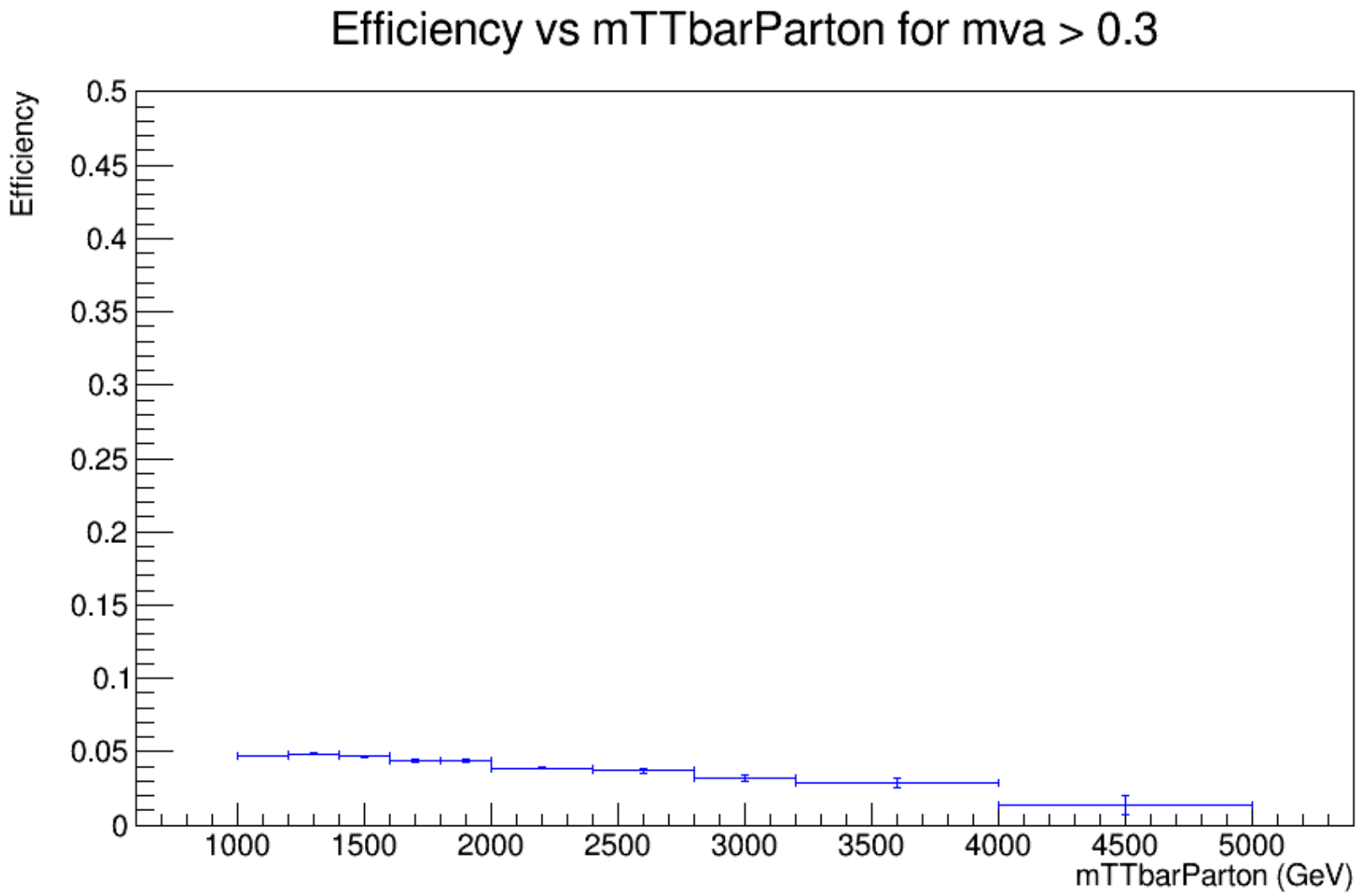

TMVA overtraining check for classifier: BDTCat
Signal (test sample)
Background (test sample)
Signal (training sample)
Background (training sample)
Kolmogorov-Smirnov test: signal (background) probability = 0.012 (0.616)
(1/N) dN / dx
BDTCat response
U/O-flow (S,B): (0.0, 0.0)% / (0.0, 0.0)%


Background rejection versus Signal efficiency
Background rejection
Signal efficiency
MVA Method:
BDTCat
FisherCat

Efficiency vs mTTbarParton

Top tagger cut : 0.3
B-tagging: Medium working point

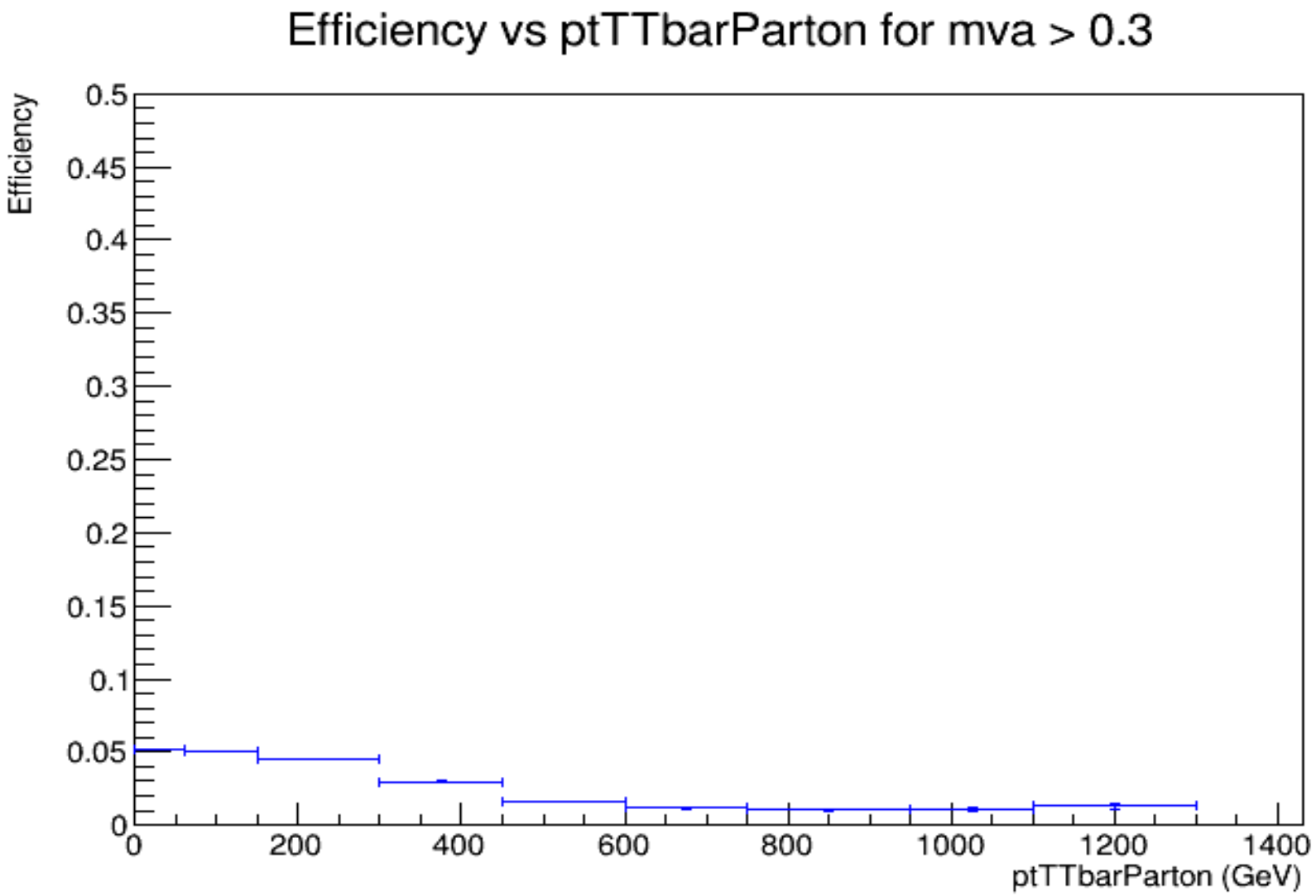
Mtt Samples



Efficiency vs ptTTbarParton

Top tagger cut : 0.3
B-tagging: Medium working point

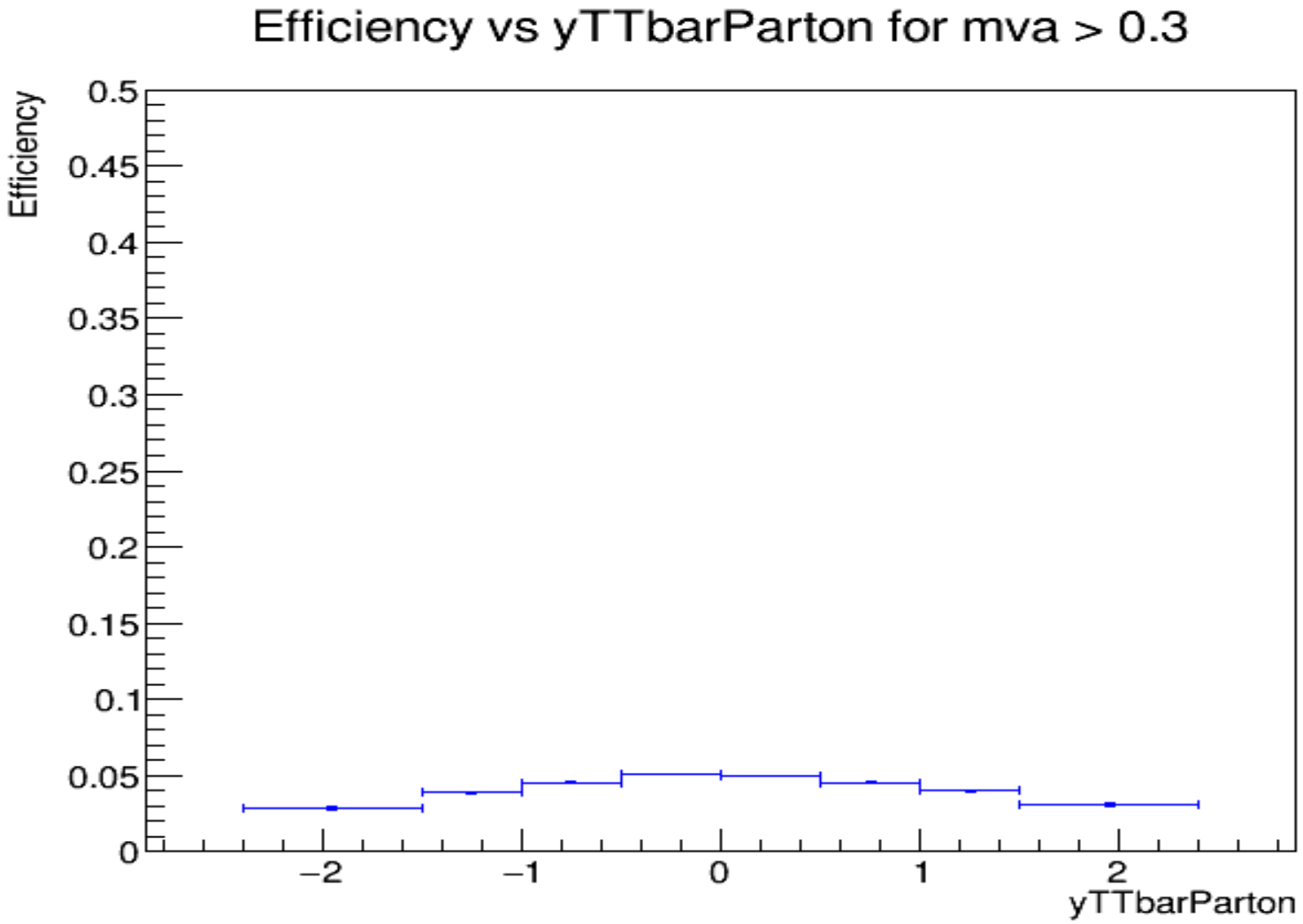
Mtt Samples



Efficiency vs yTTbarParton

Top tagger cut : 0.3
B-tagging: Medium working point

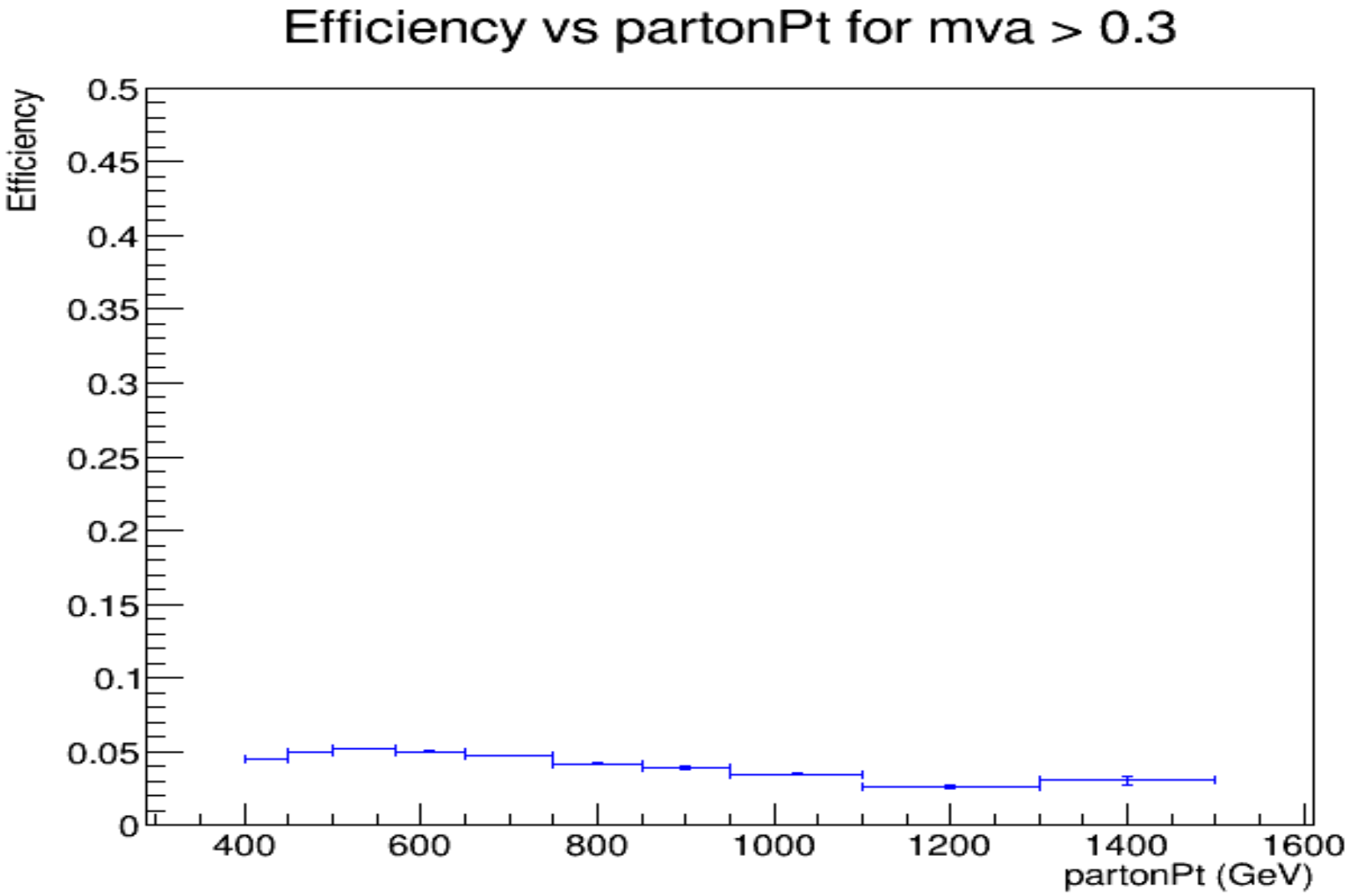
Mtt Samples



Efficiency vs partonPt

Top tagger cut : 0.3
B-tagging: Medium working point

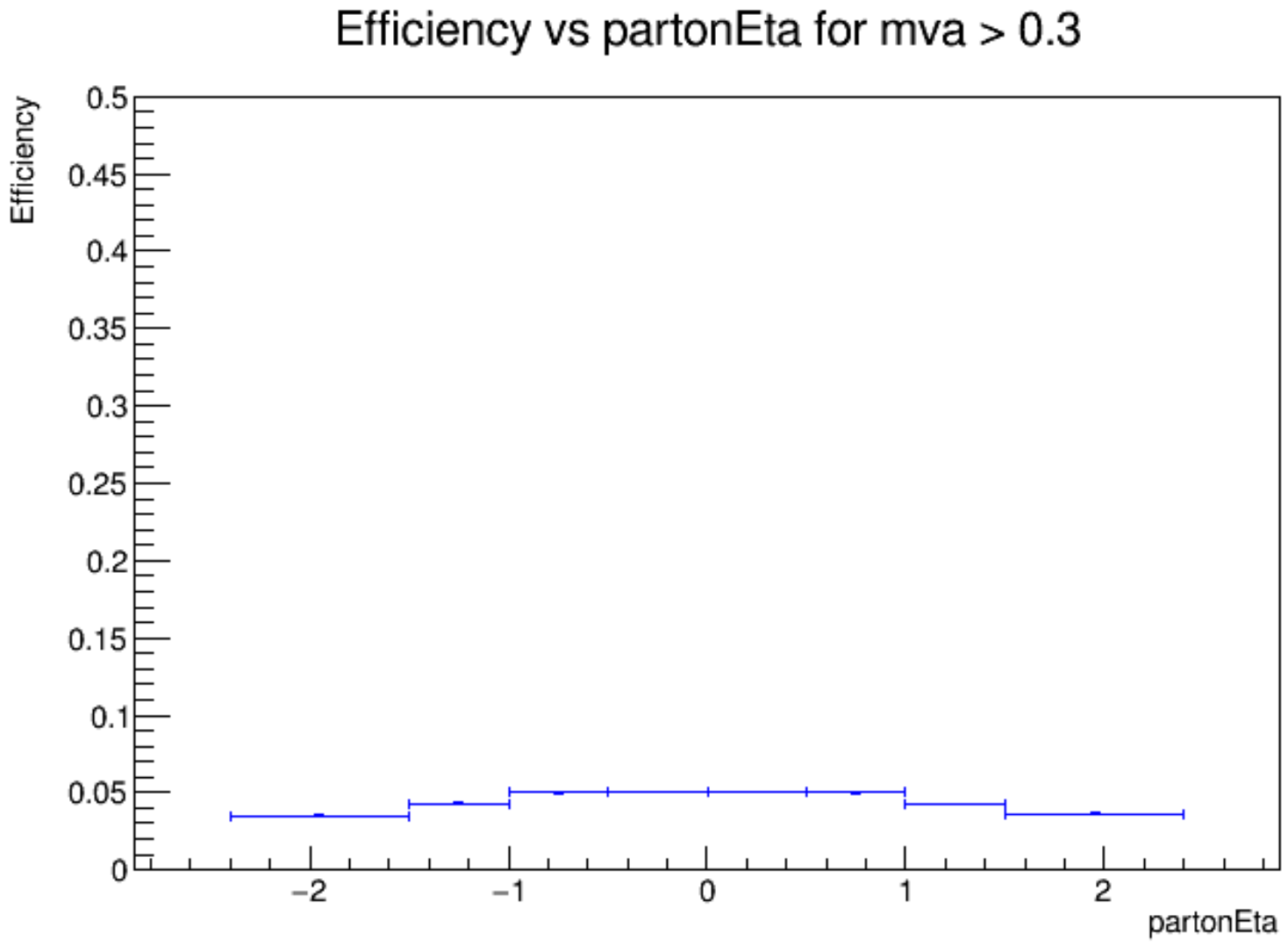
Mtt Samples



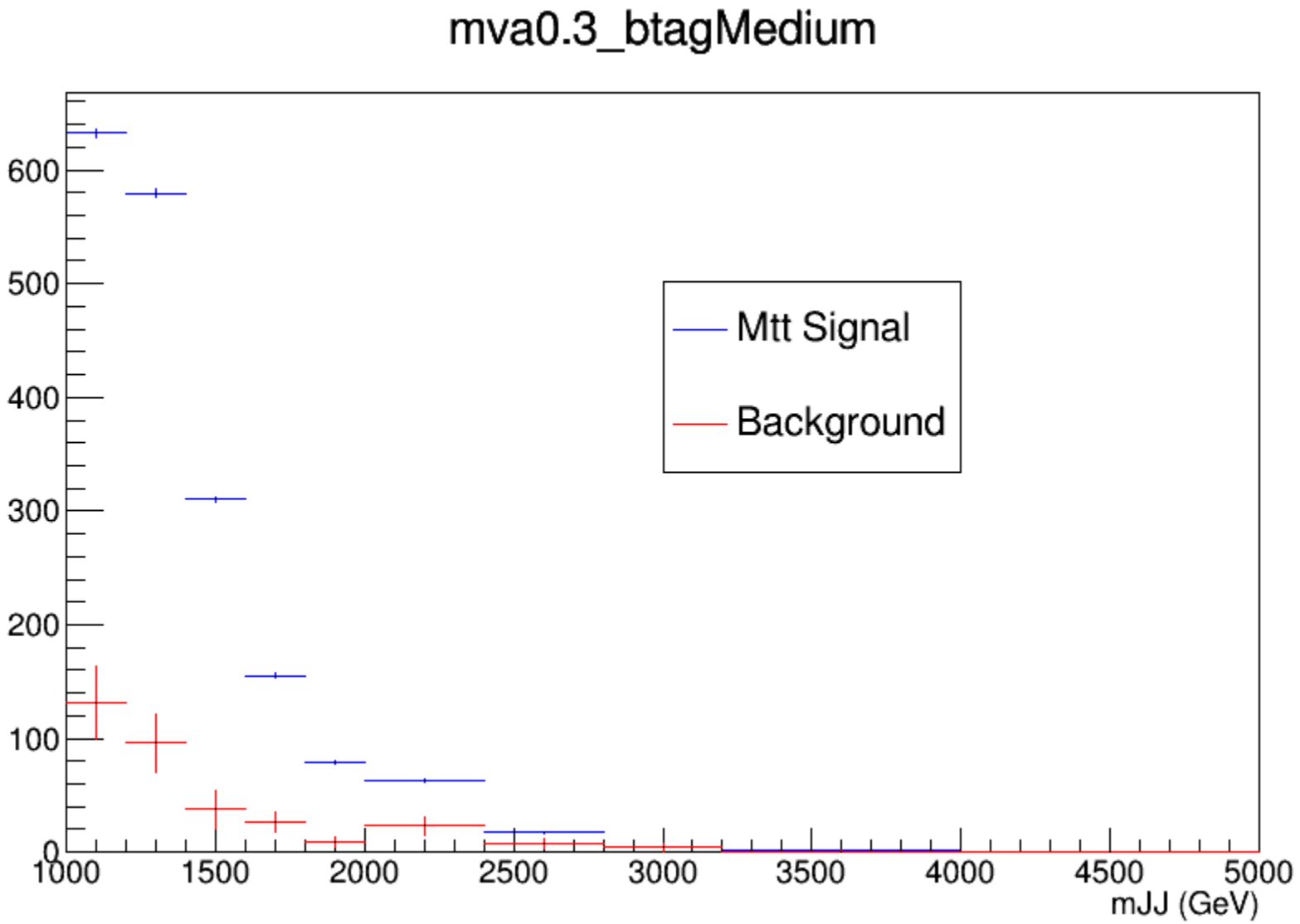
Efficiency vs jetPt

Top tagger cut : 0.3
B-tagging: Medium working point

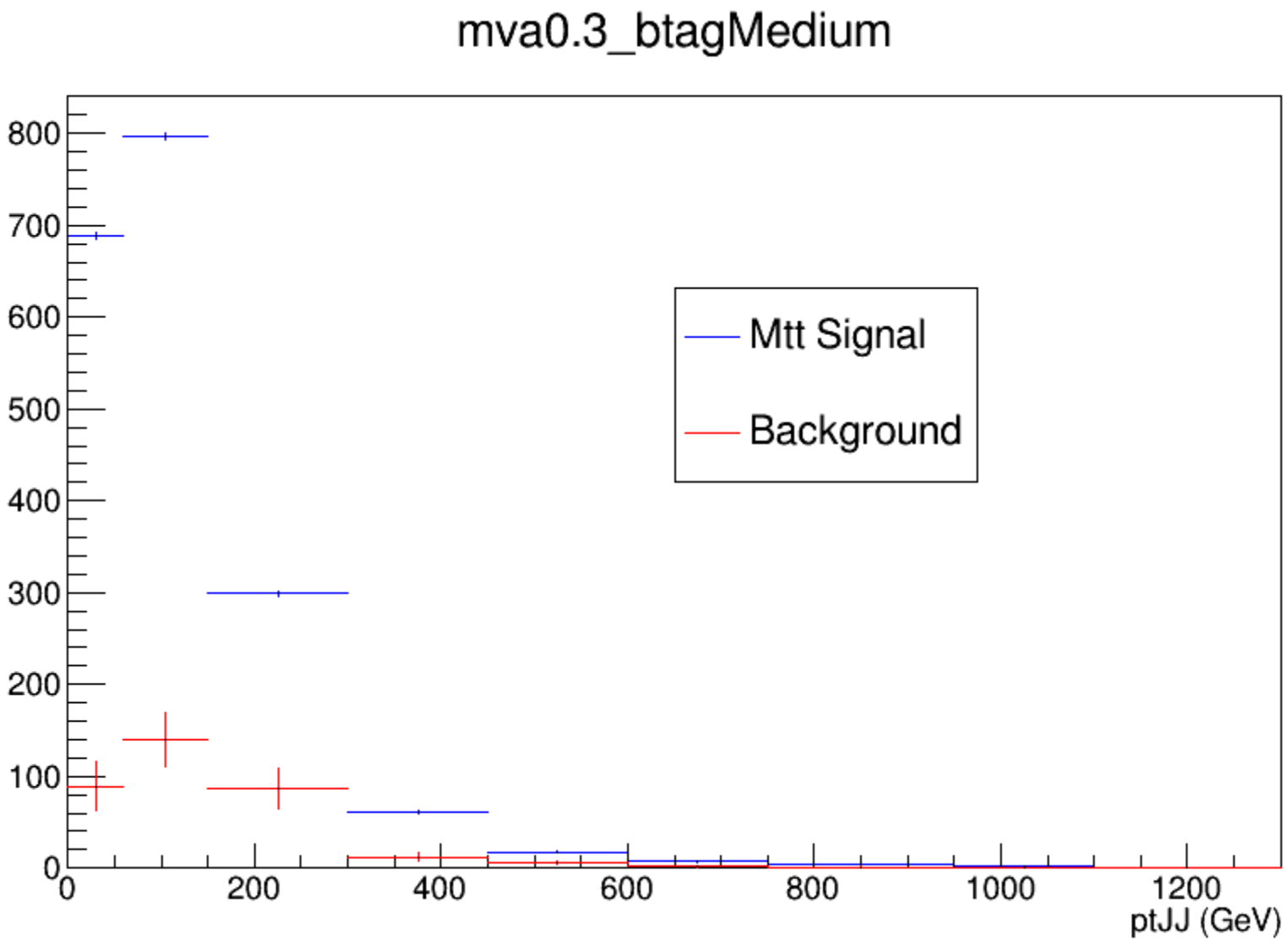
Mtt Samples



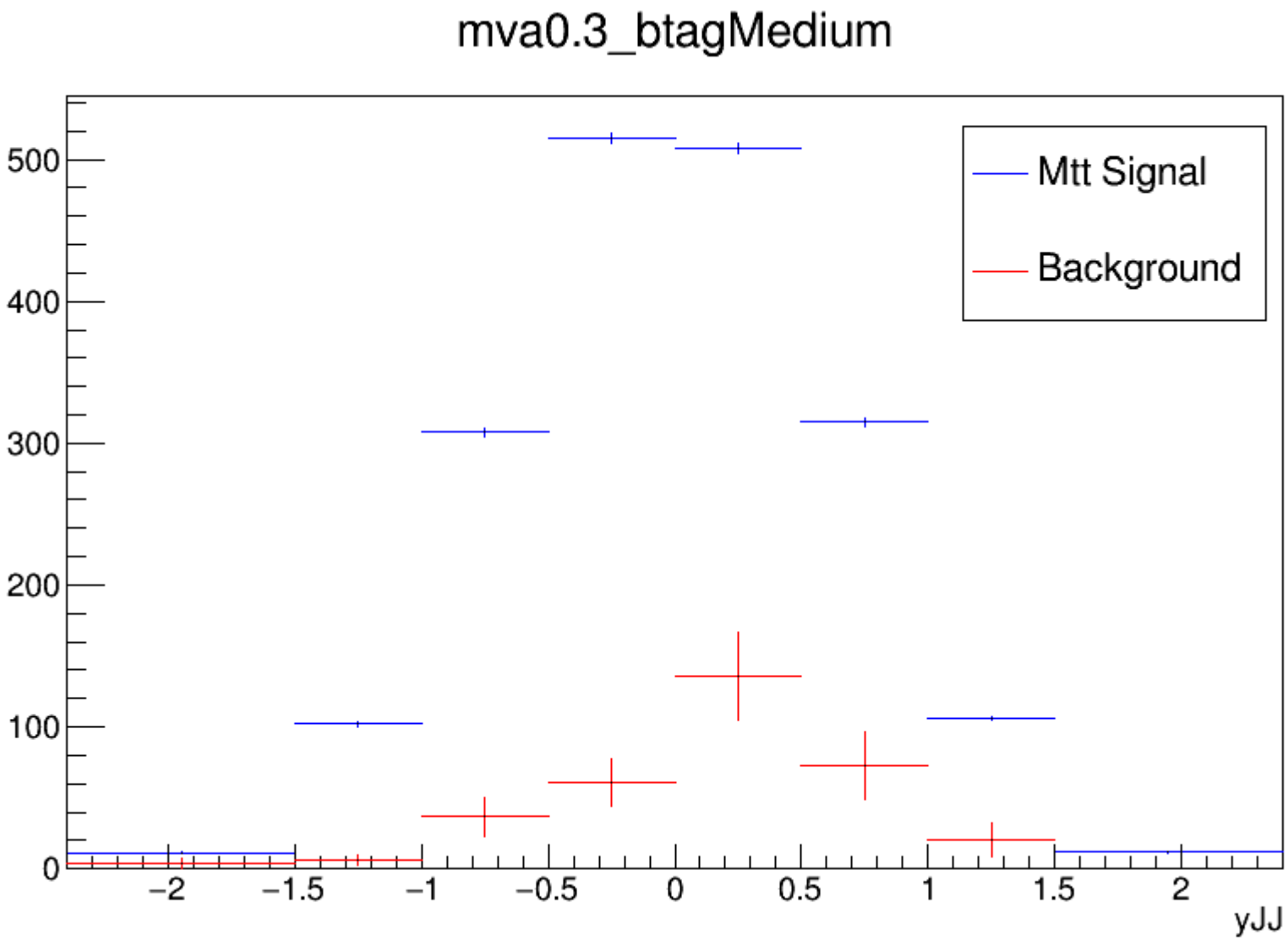
Expected Yields vs mJJ



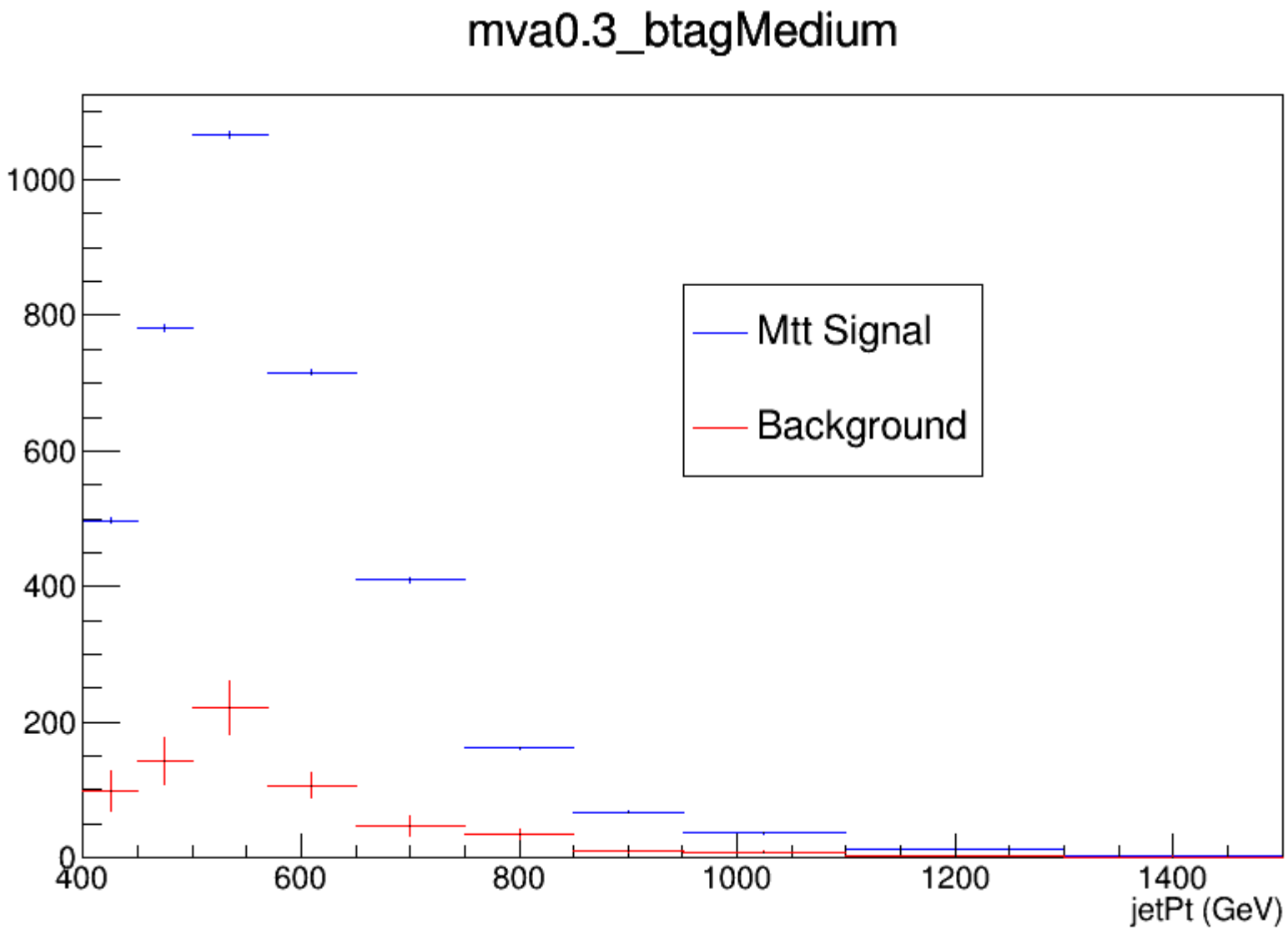
Expected Yields vs ptJJ



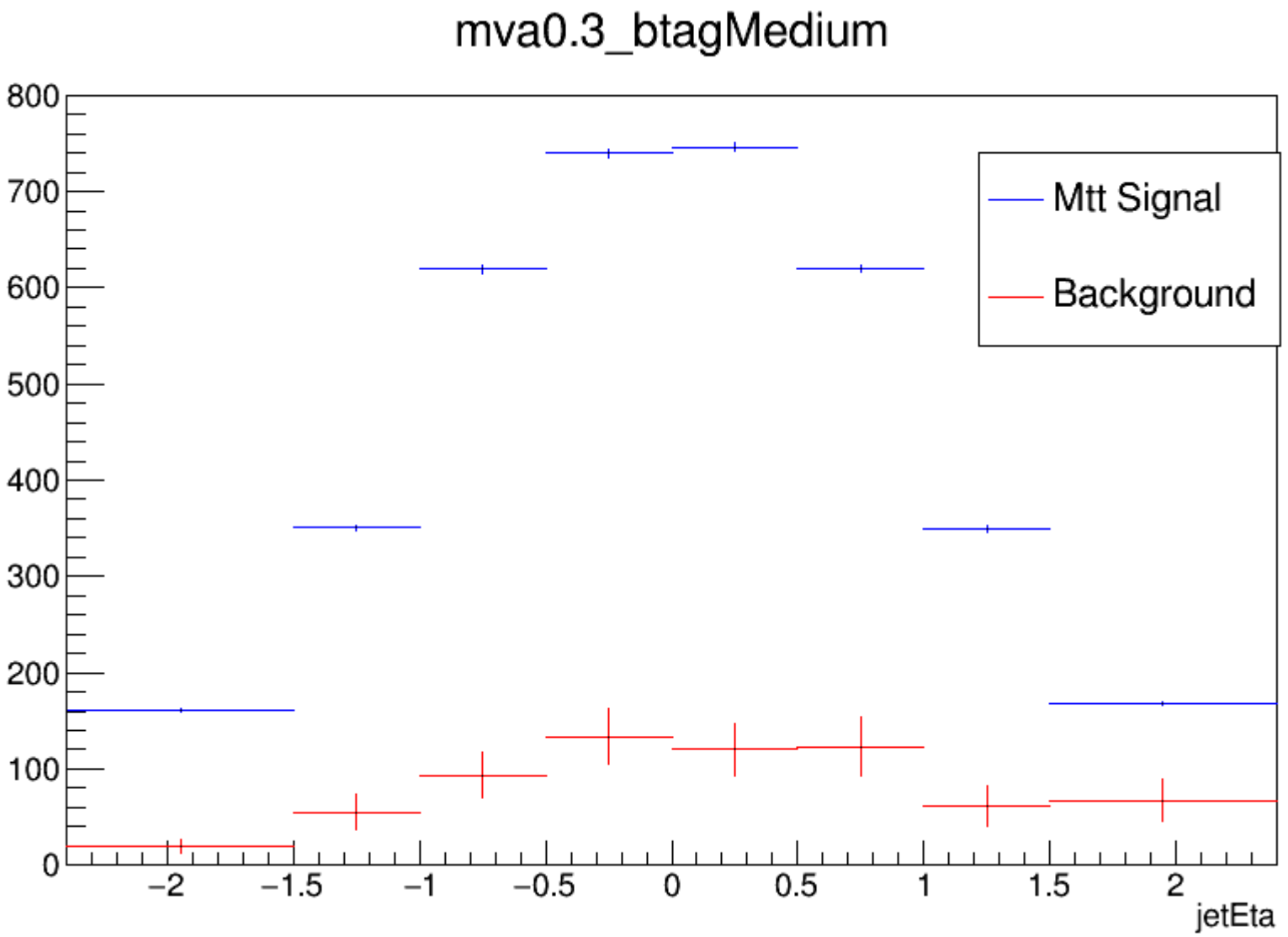
Expected Yields vs yJJ



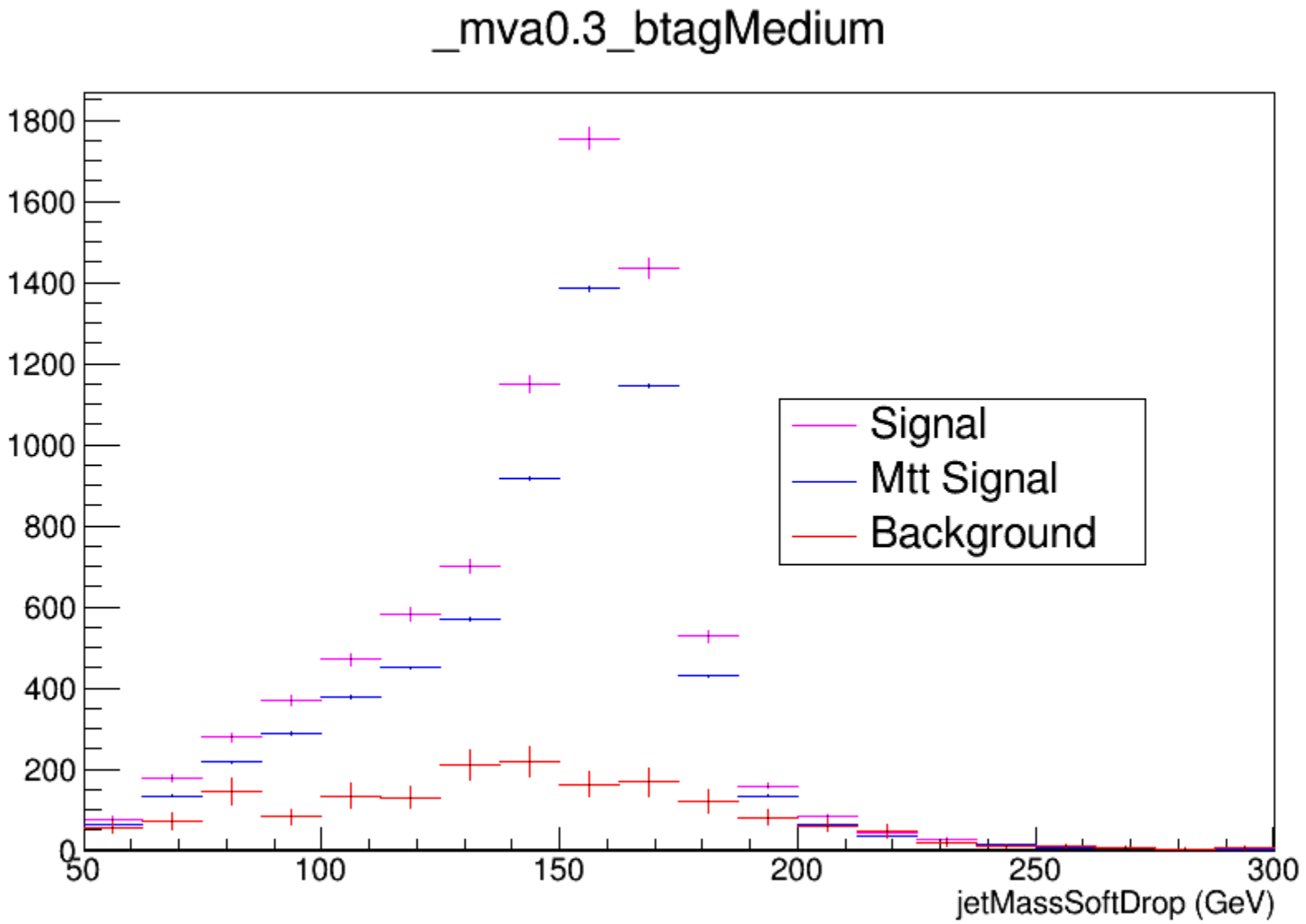
Expected Yields vs jetPt



Expected Yields vs jetEta



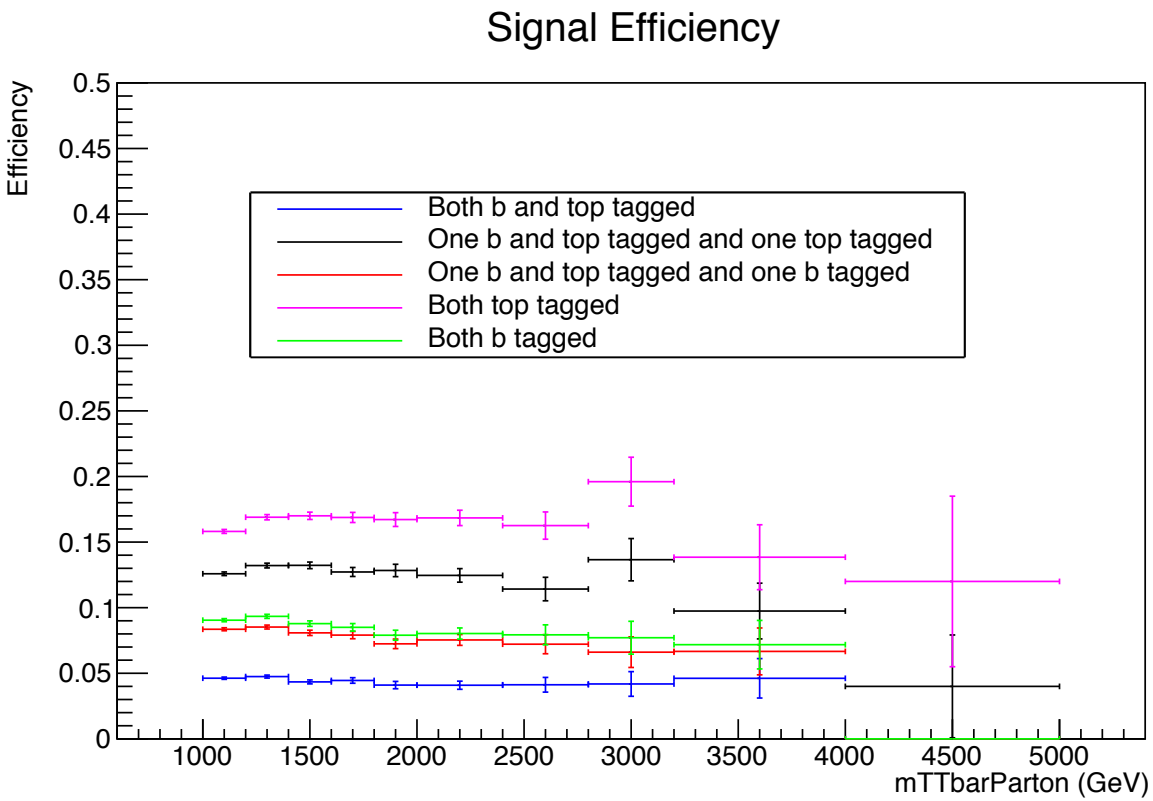
Expected Yields vs JetMassSoftDrop (double fill)



Comments and Questions

- In the last presentation, we saw that both Mtt sample efficiencies and Nominal MC efficiencies have very similar shapes. But specifically for the efficiency in the medium WP at low mva cuts (vs mTTbarParton) we can see that in the Mtt sample it is dropping while in the Nominal MC the efficiency seems to stabilize.

nominal TT_TuneCUETP8M2T4_13TeV-powherg-pythia8



Mtt Samples

Top tagger cut : 0.3
B-tagging: Medium working point