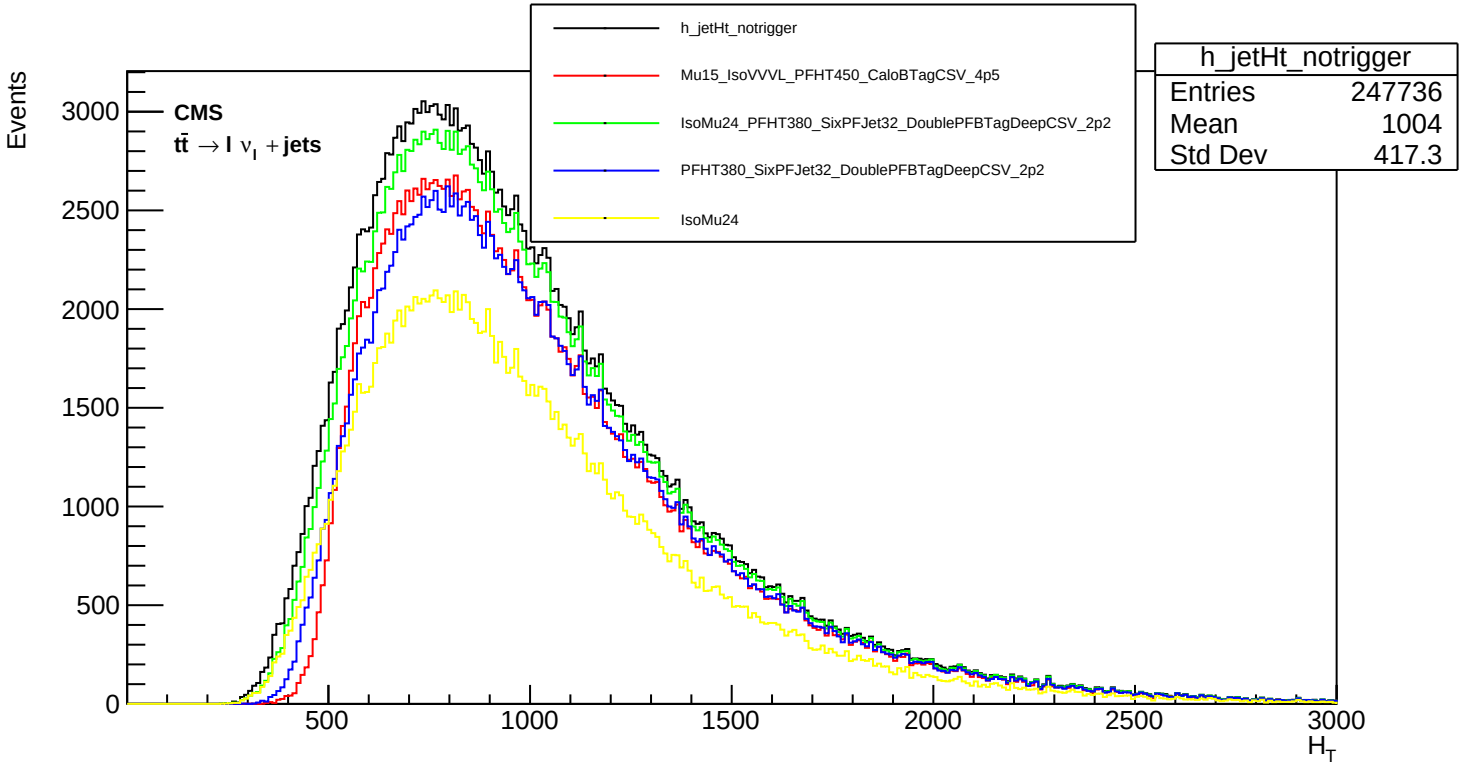
On-line (pre-)selection Requisites for:

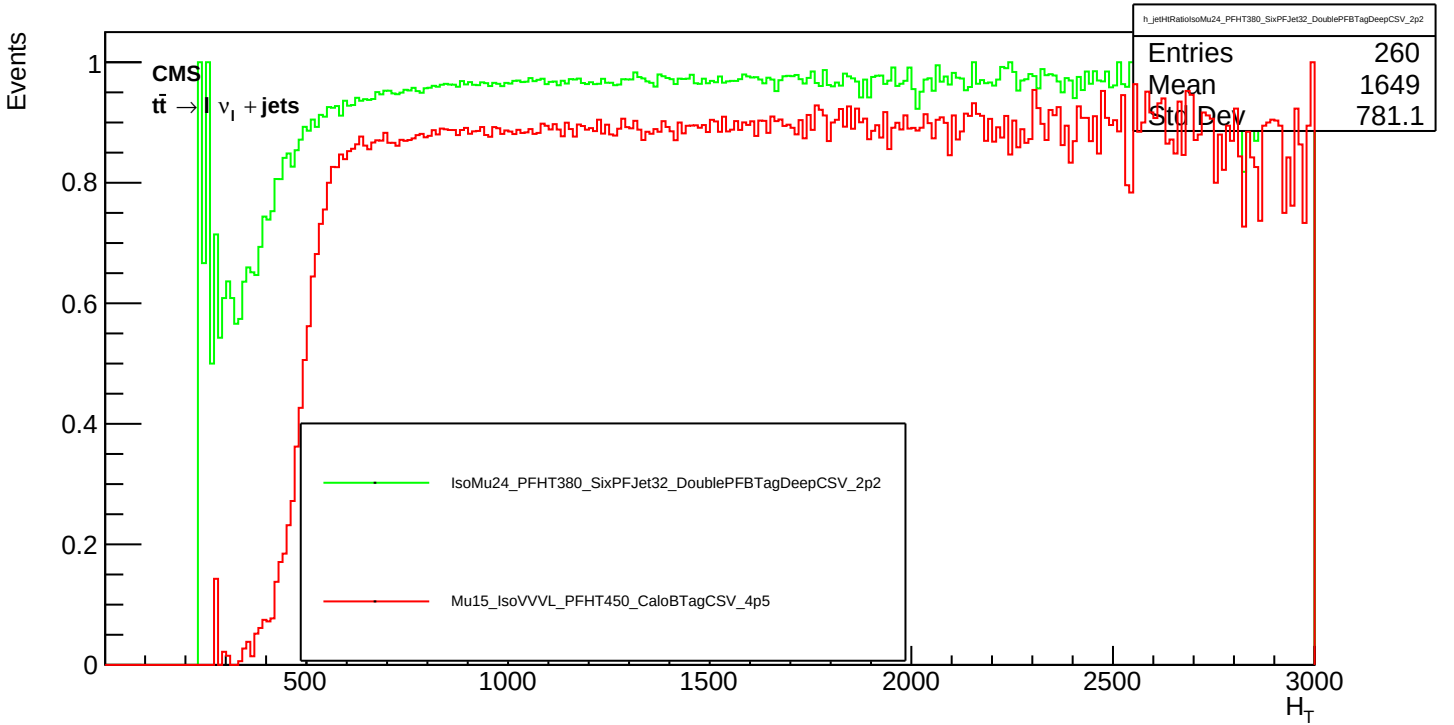
- **Jets:** number > 5 , jetId > 2 and |η| < 2.4
- **Muons:** number >0 and has softId

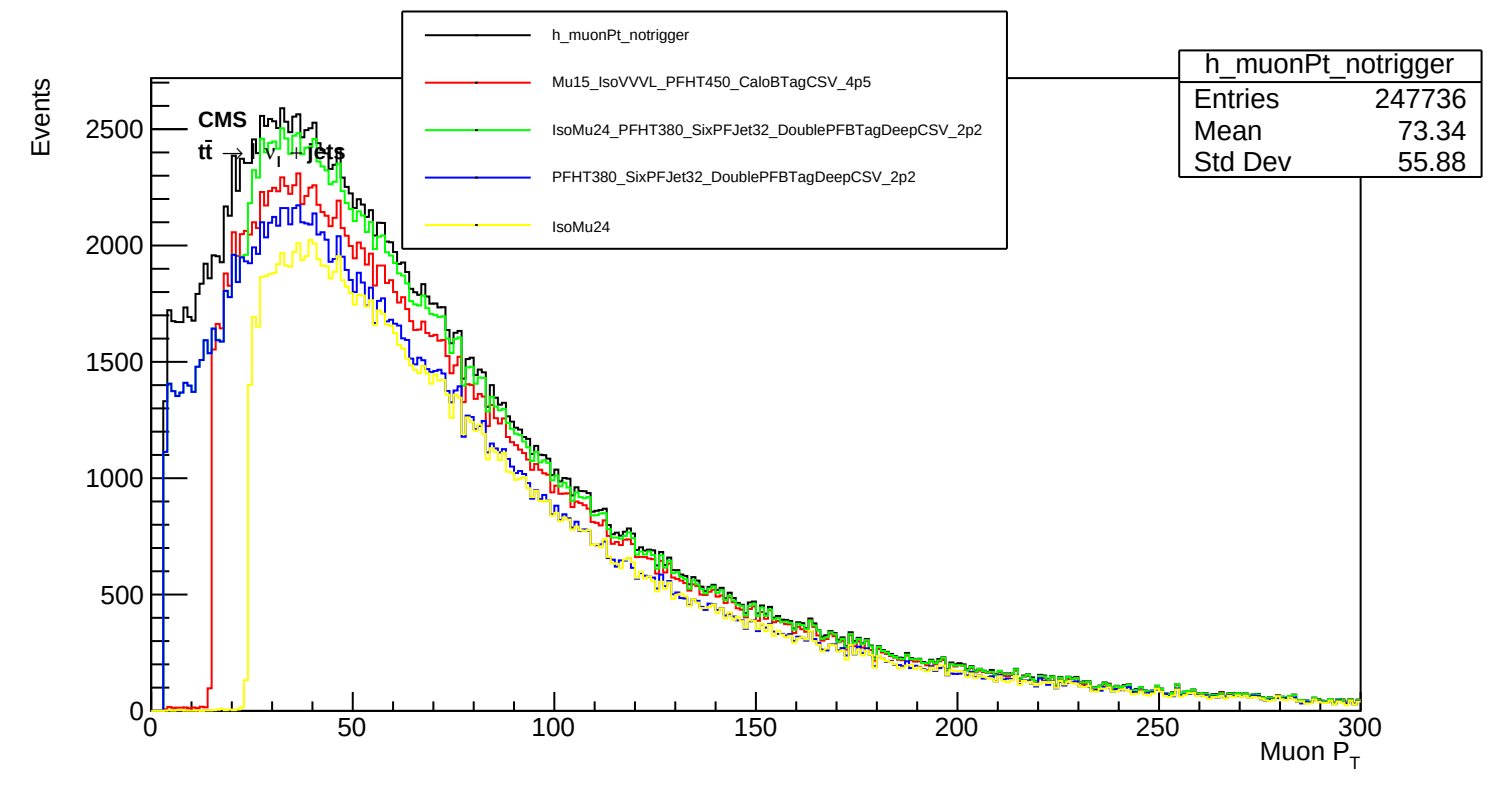
Event Limit: None (see last page)

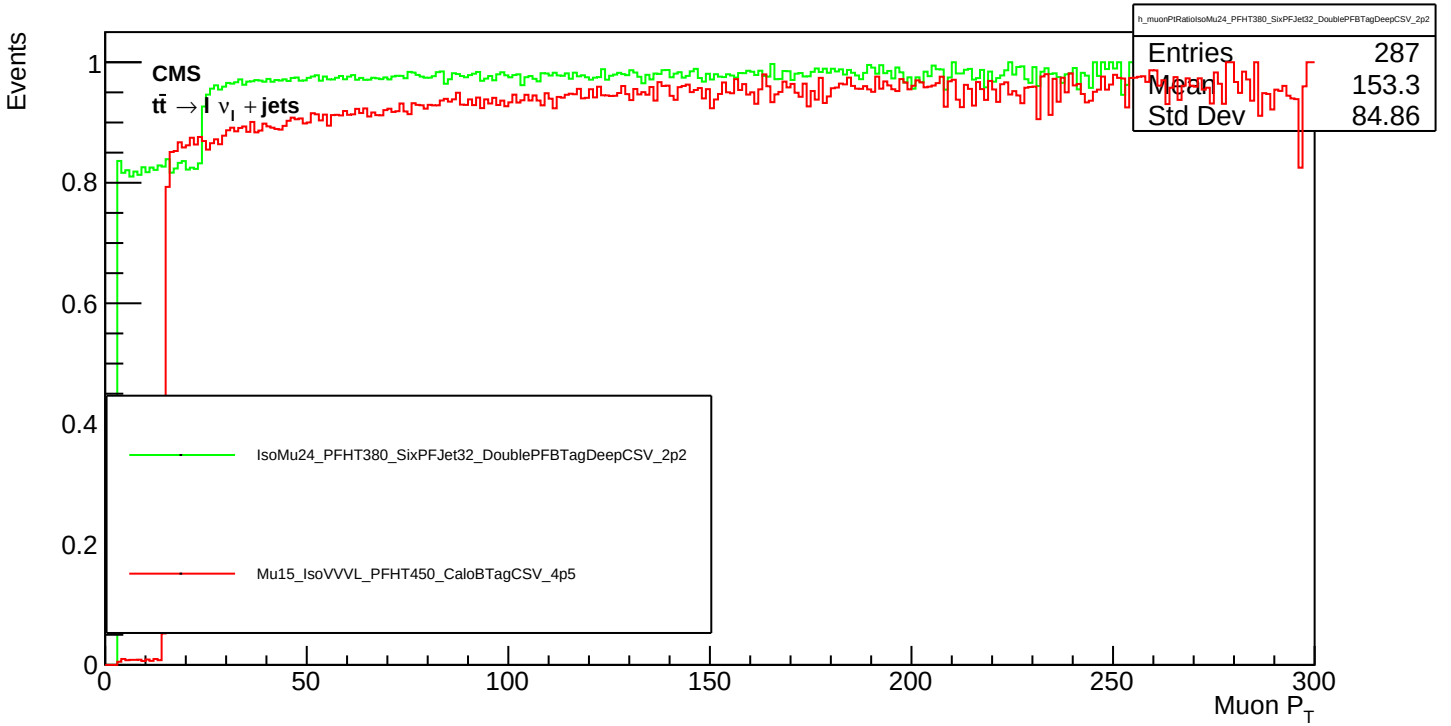
Off-line (post-)selection Requisites for:

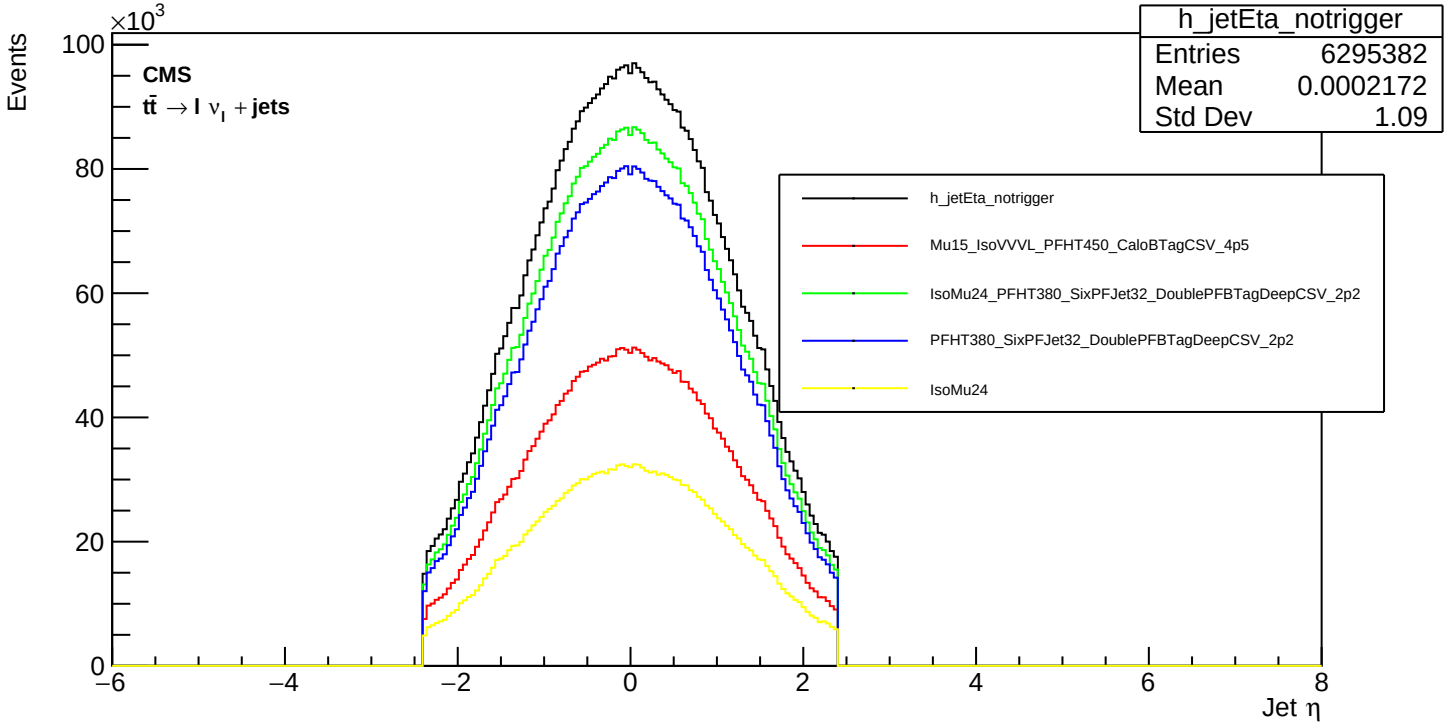
- **Jets:** jetId > 2 , p_T > 30 and |η|<2.4 (for at least 6)
  btagDeepFlavB > 0.7489 (for at least one jet)
- **Muons:** has tightId, |η|<2.4 and miniPFRelIso_all<0.15 (for at least 1)

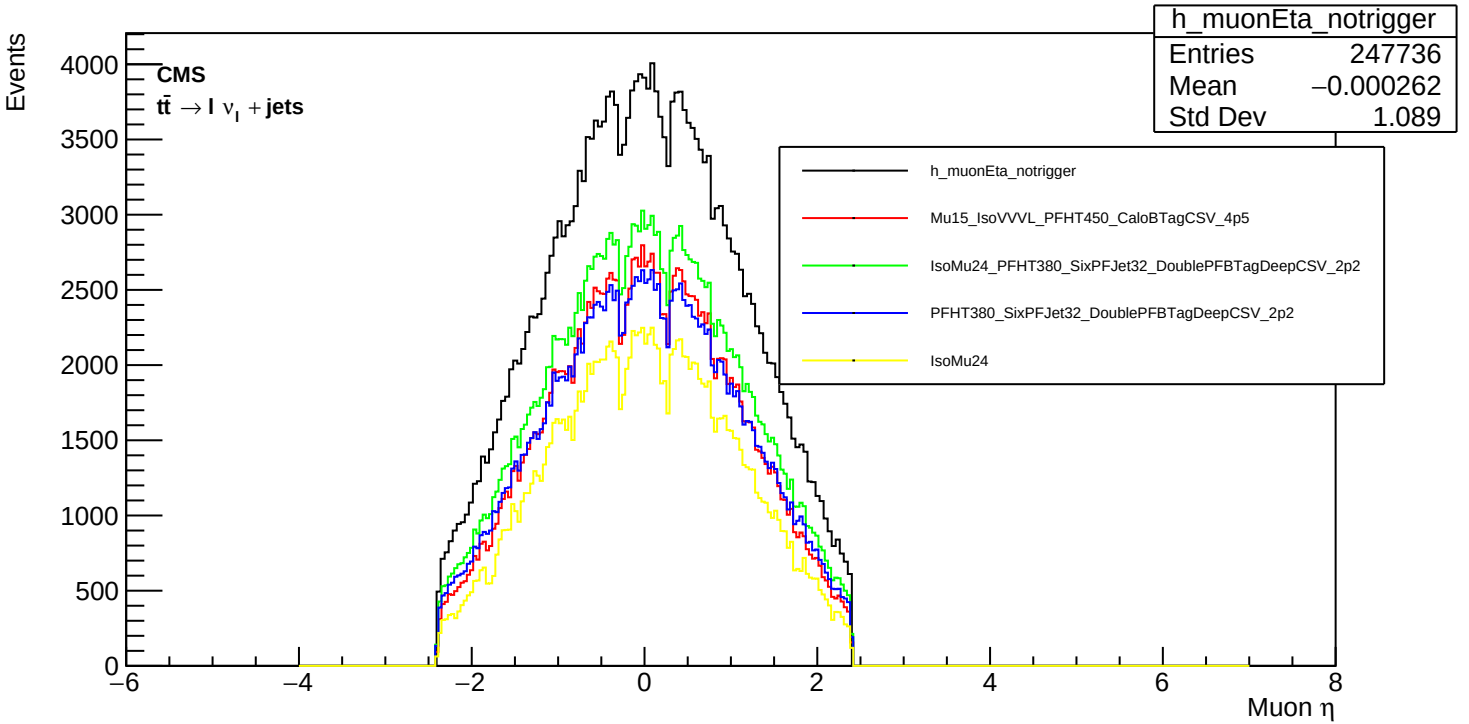

h_jetHt_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24
h_jetHt_notrigger
Entries 247736
Mean 1004
Std Dev 417.3
CMS
tt̄ → l ν_l + jets
Events
H_T
0
500
1000
1500
2000
2500
3000

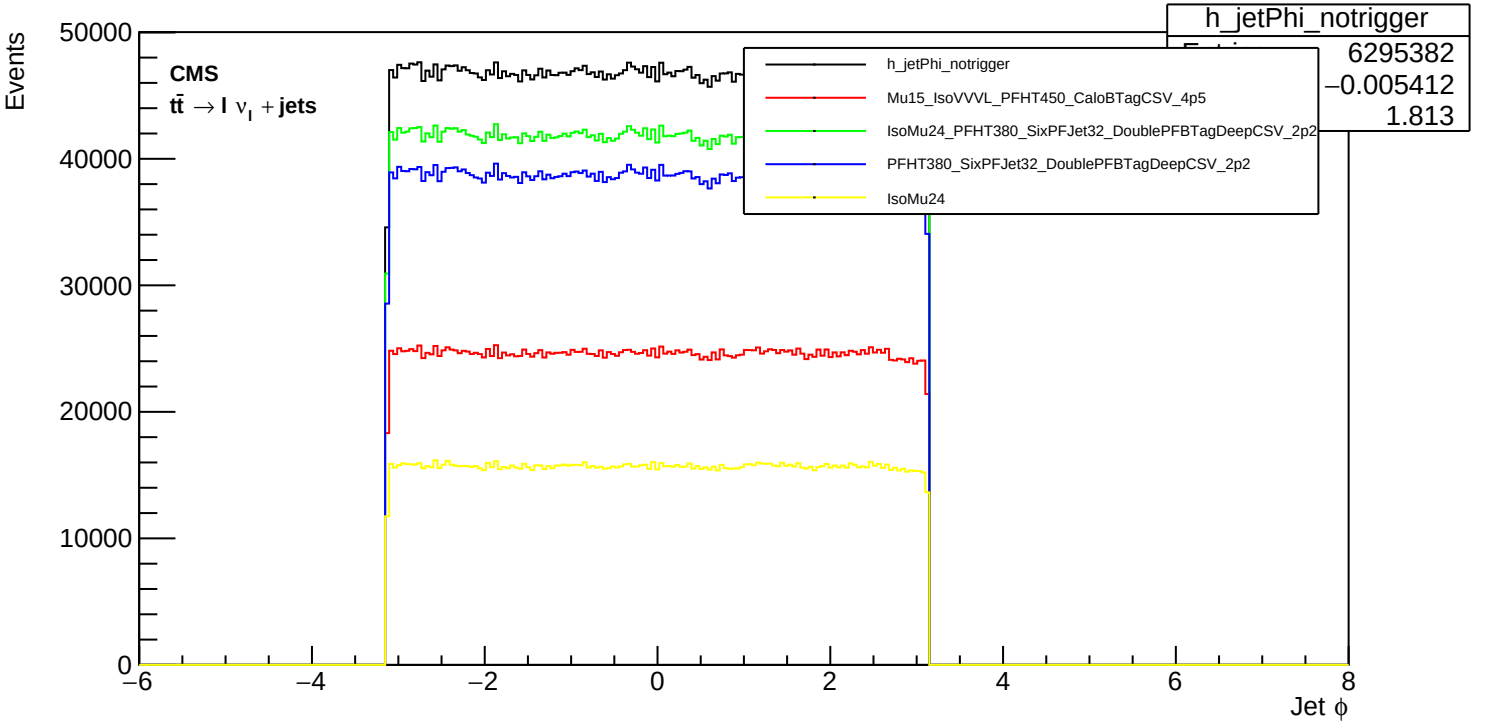

IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
h_jetHtRatioIsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Entries 260
Mean 1649
Std Dev 781.1
CMS
tt̄ → l ν_l + jets
Events
H_T
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5

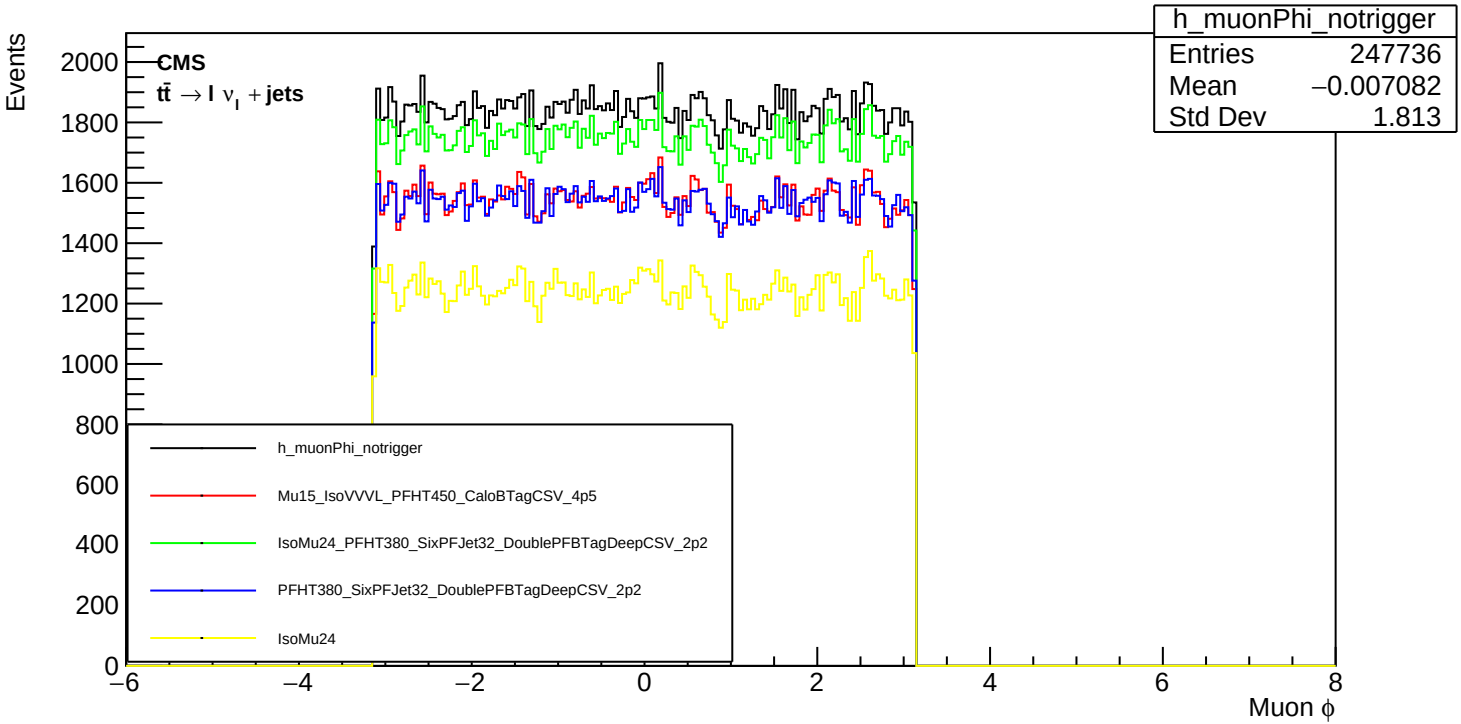

h_muonPt_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24
h_muonPt_notrigger
Entries 247736
Mean 73.34
Std Dev 55.88
CMS
tt̄ → l ν_l + jets
Events
Muon P_T
0
500
1000
1500
2000
2500
0
50
100
150
200
250
300

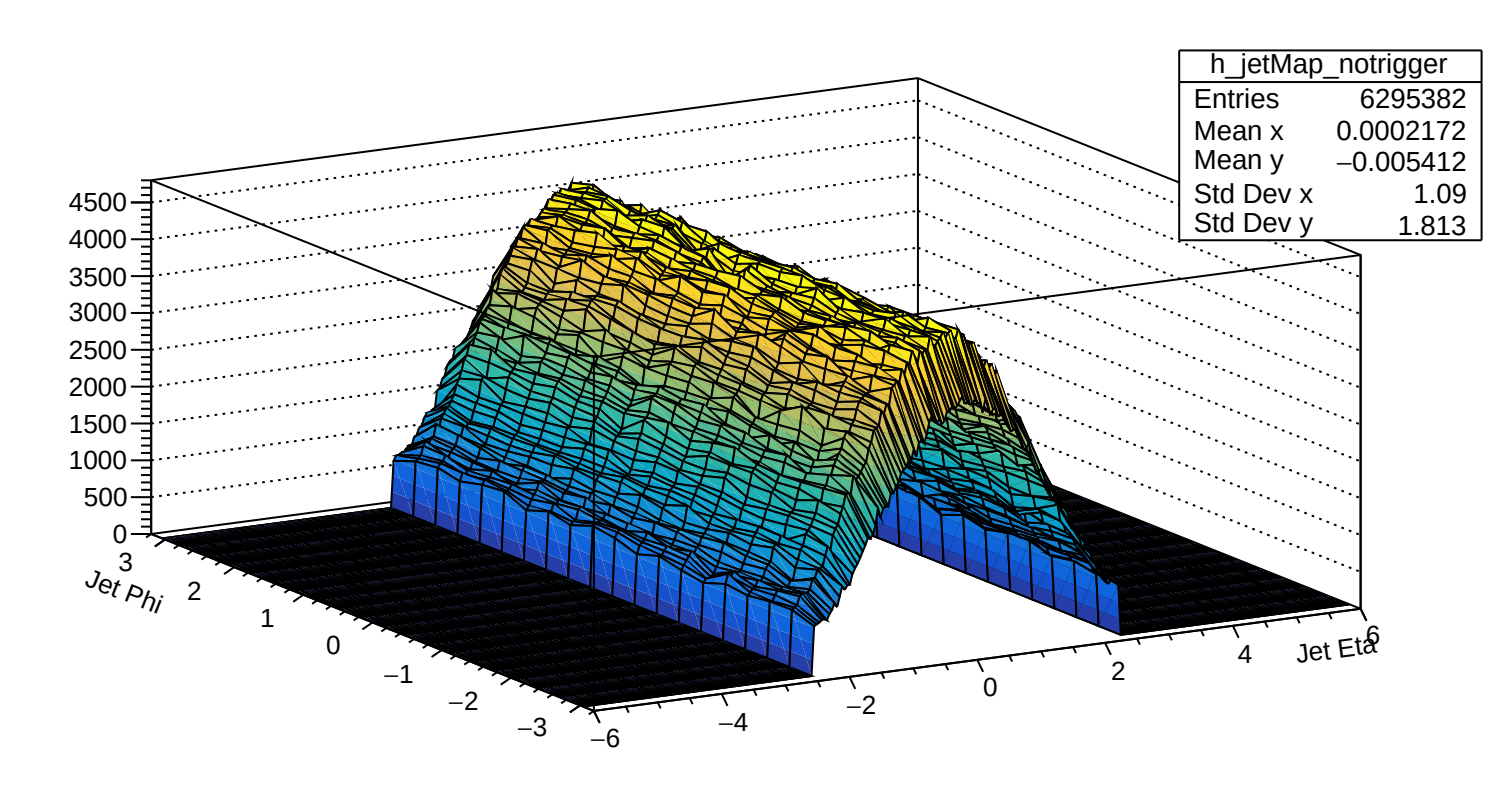

IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
h_muonPtRatioIsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Entries 287
Mean 153.3
Std Dev 84.86
CMS
$t\bar{t} \rightarrow l\ \nu_l + jets$
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
Events
Muon P_T
0
0.2
0.4
0.6
0.8
1
0
50
100
150
200
250
300


h_jetEta_notrigger
Entries 6295382
Mean 0.0002172
Std Dev 1.09
CMS
$t\bar{t} \rightarrow l\ \nu_l + jets$
h_jetEta_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24
Events
×10^3
100
80
60
40
20
0
−6
−4
−2
0
2
4
6
8
Jet η

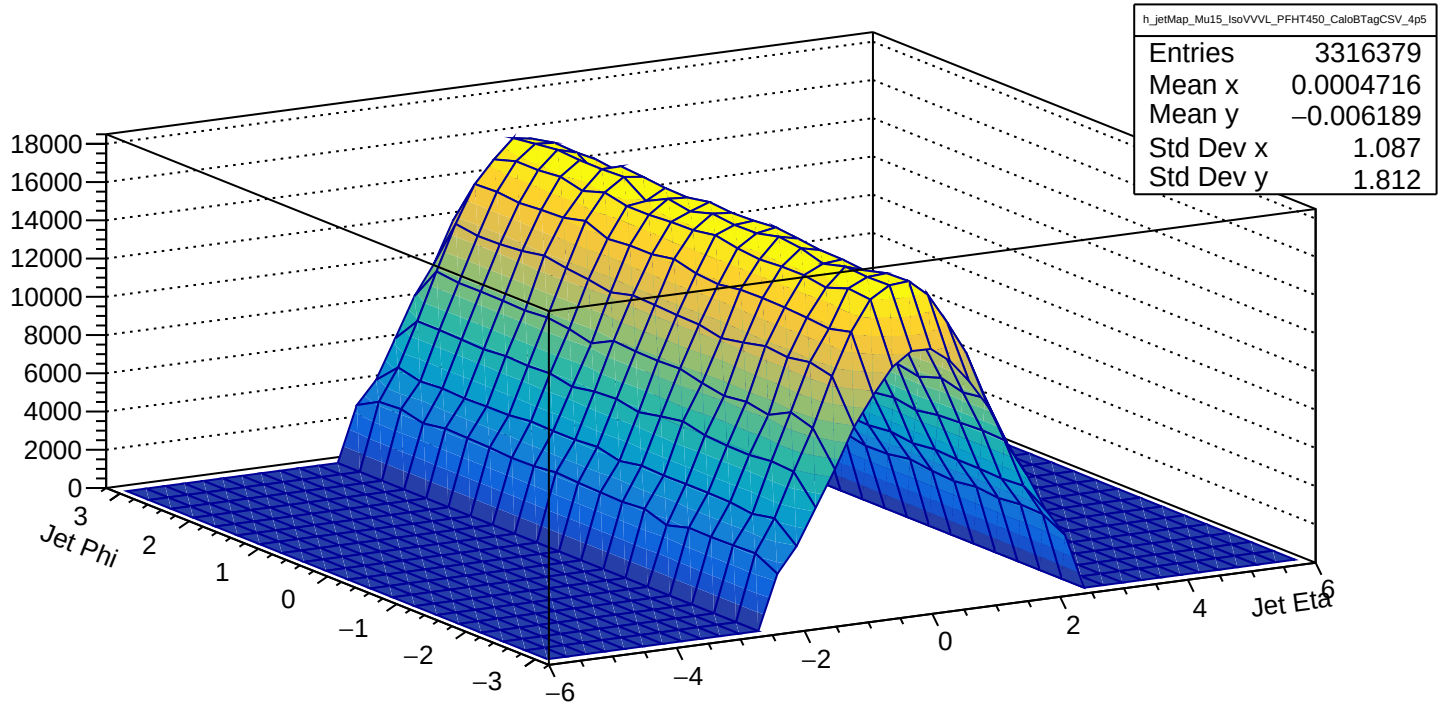

h_muonEta_notrigger
Entries 247736
Mean −0.000262
Std Dev 1.089
CMS
$t\bar{t} \rightarrow l\ \nu_l + jets$
h_muonEta_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24
Events
Muon η
0
500
1000
1500
2000
2500
3000
3500
4000
−6
−4
−2
0
2
4
6
8

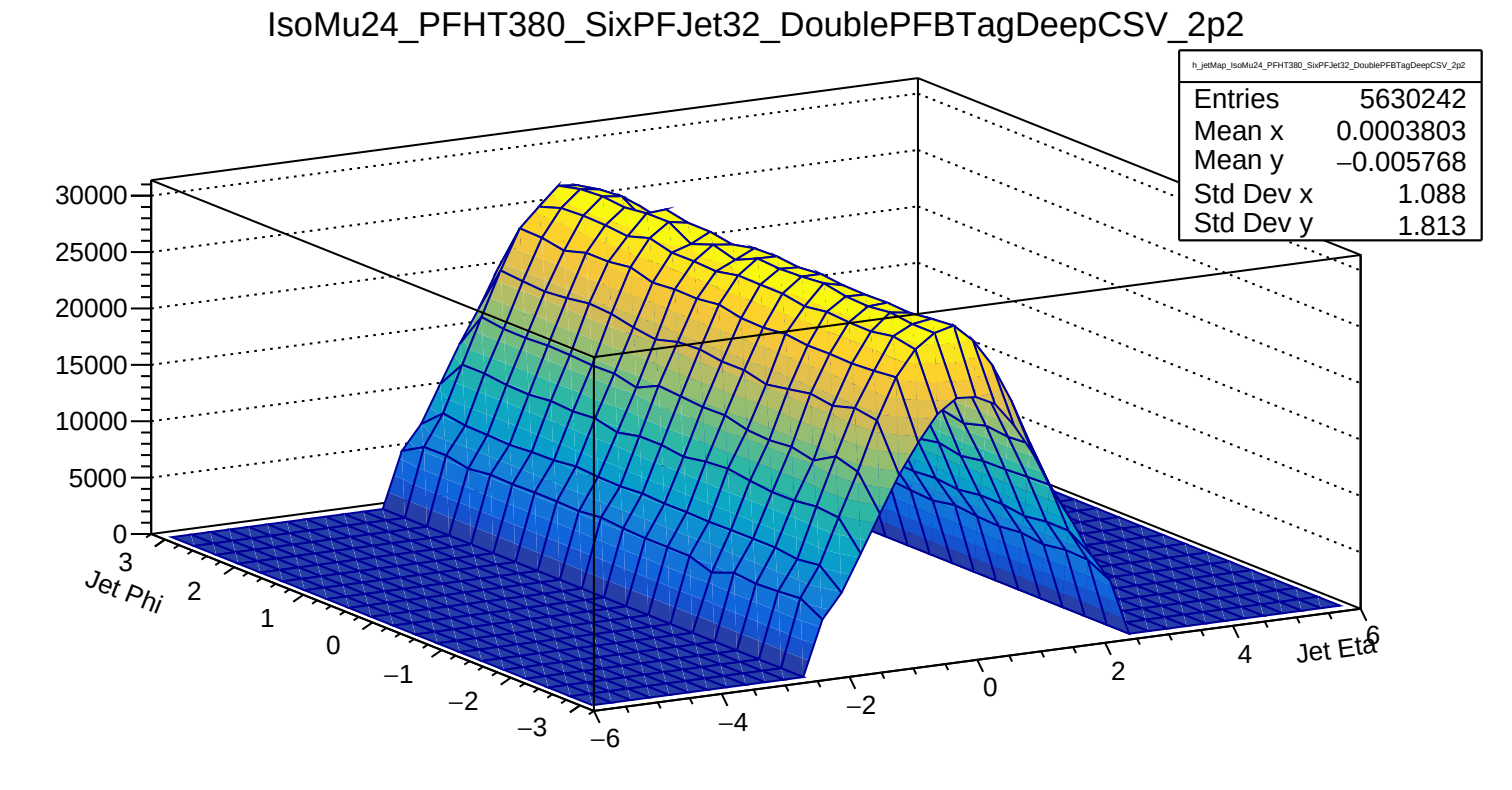

h_jetPhi_notrigger
6295382
−0.005412
1.813
CMS
$t\bar{t} \rightarrow l\ \nu_l + jets$
h_jetPhi_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24
Events
50000
40000
30000
20000
10000
0
−6
−4
−2
0
2
4
6
8
Jet ϕ


CMS
$t\bar{t} \rightarrow l\ \nu_l + jets$
h_muonPhi_notrigger
Entries 247736
Mean −0.007082
Std Dev 1.813
Events
Muon ϕ
h_muonPhi_notrigger
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
IsoMu24

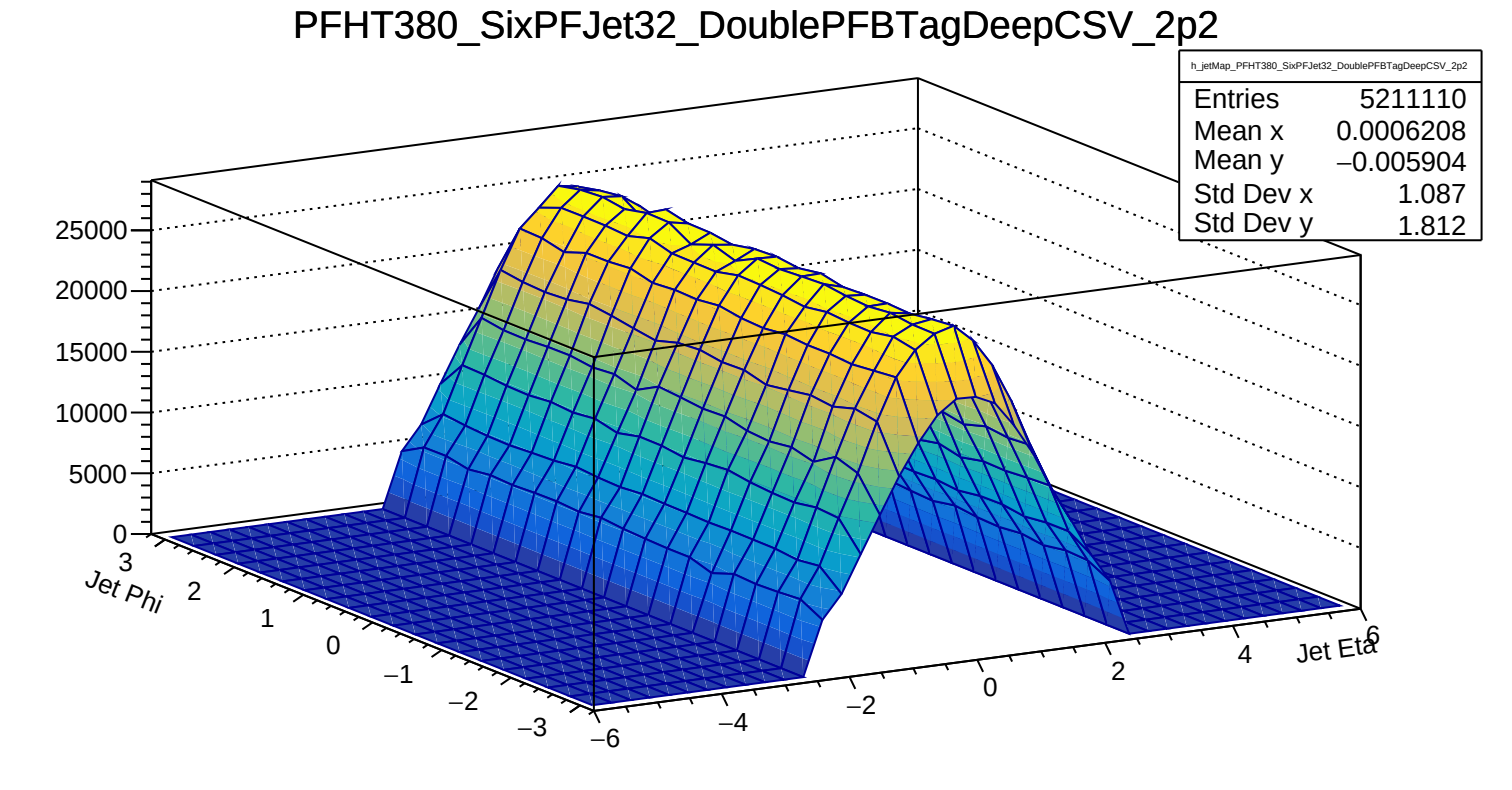

h_jetMap_notrigger
Entries 6295382
Mean x 0.0002172
Mean y −0.005412
Std Dev x 1.09
Std Dev y 1.813
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Jet Phi
3
2
1
0
−1
−2
−3
−6
−4
−2
0
2
4
6
Jet Eta

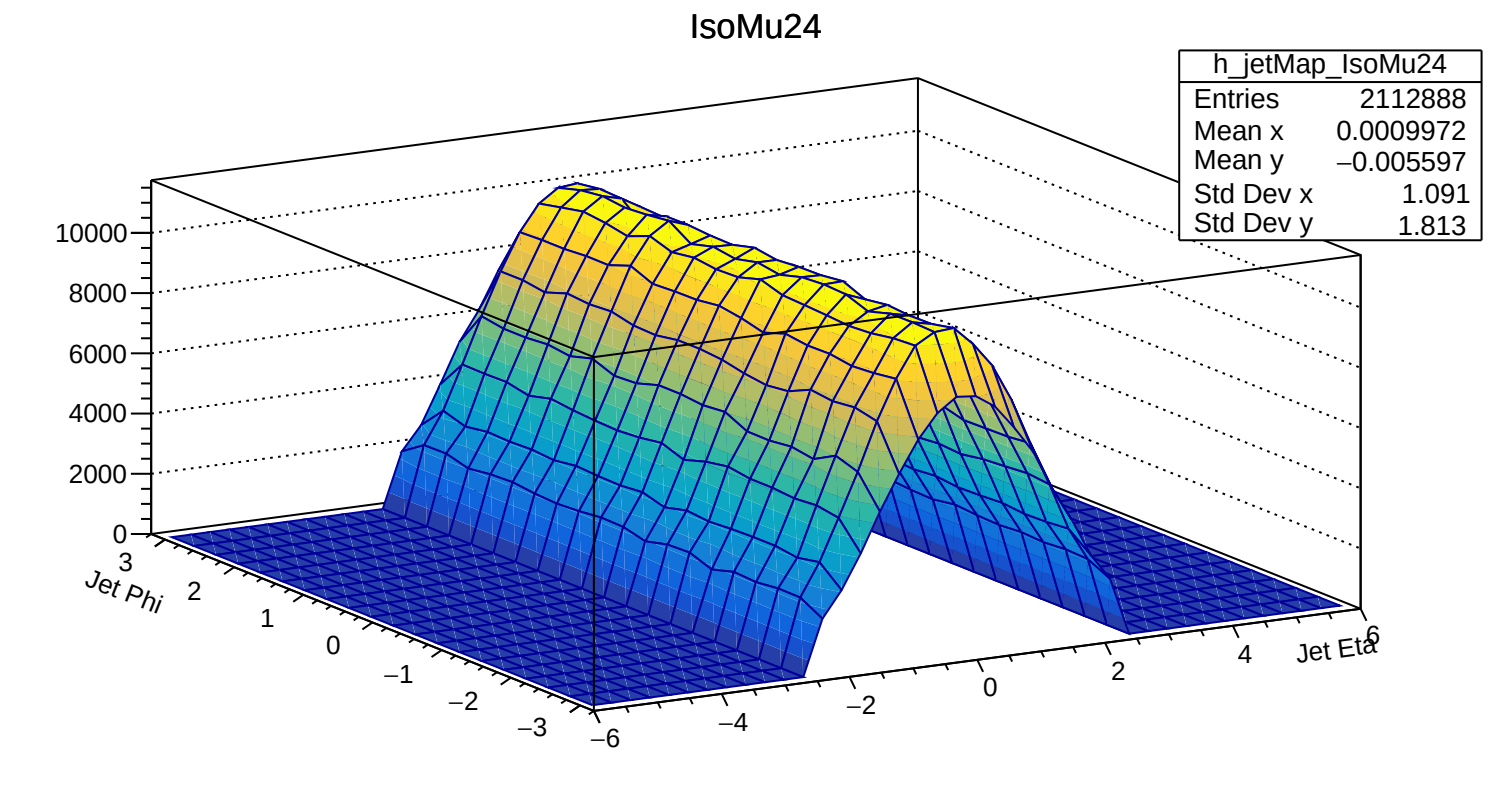
Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5

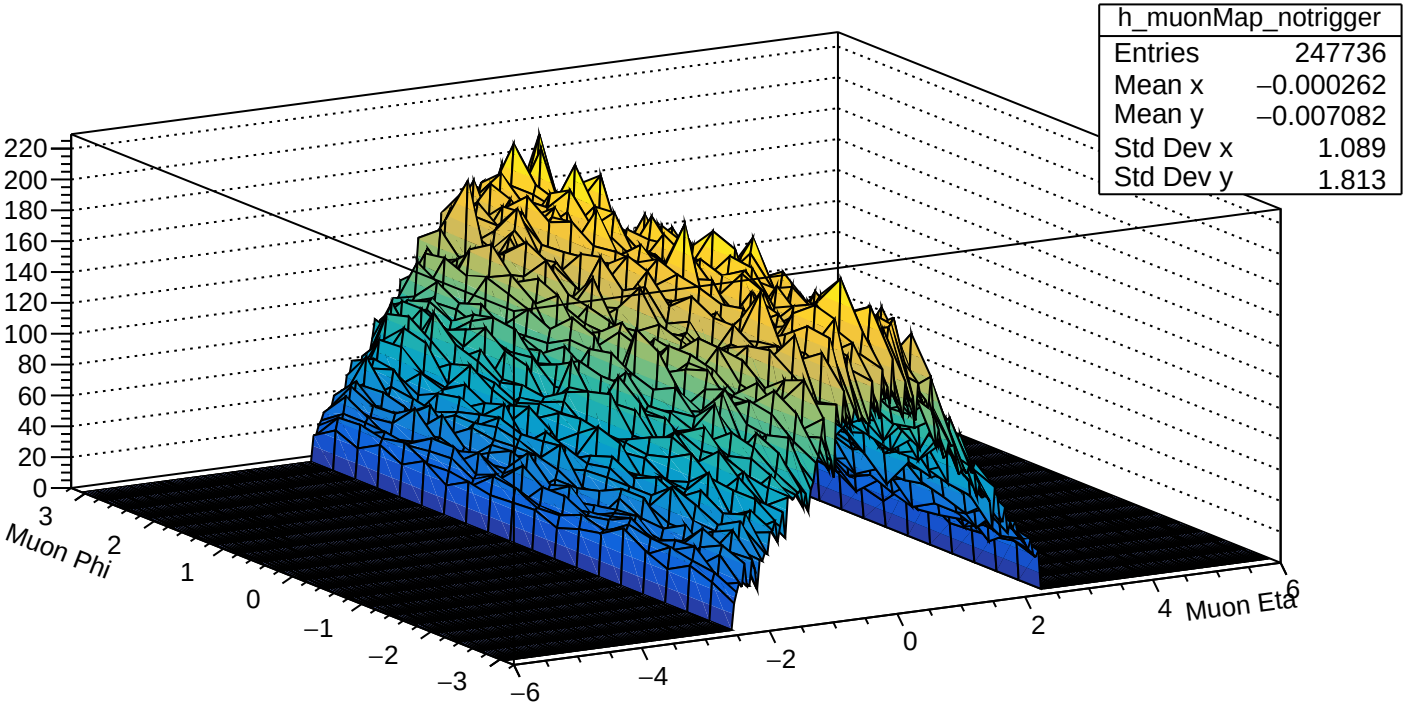


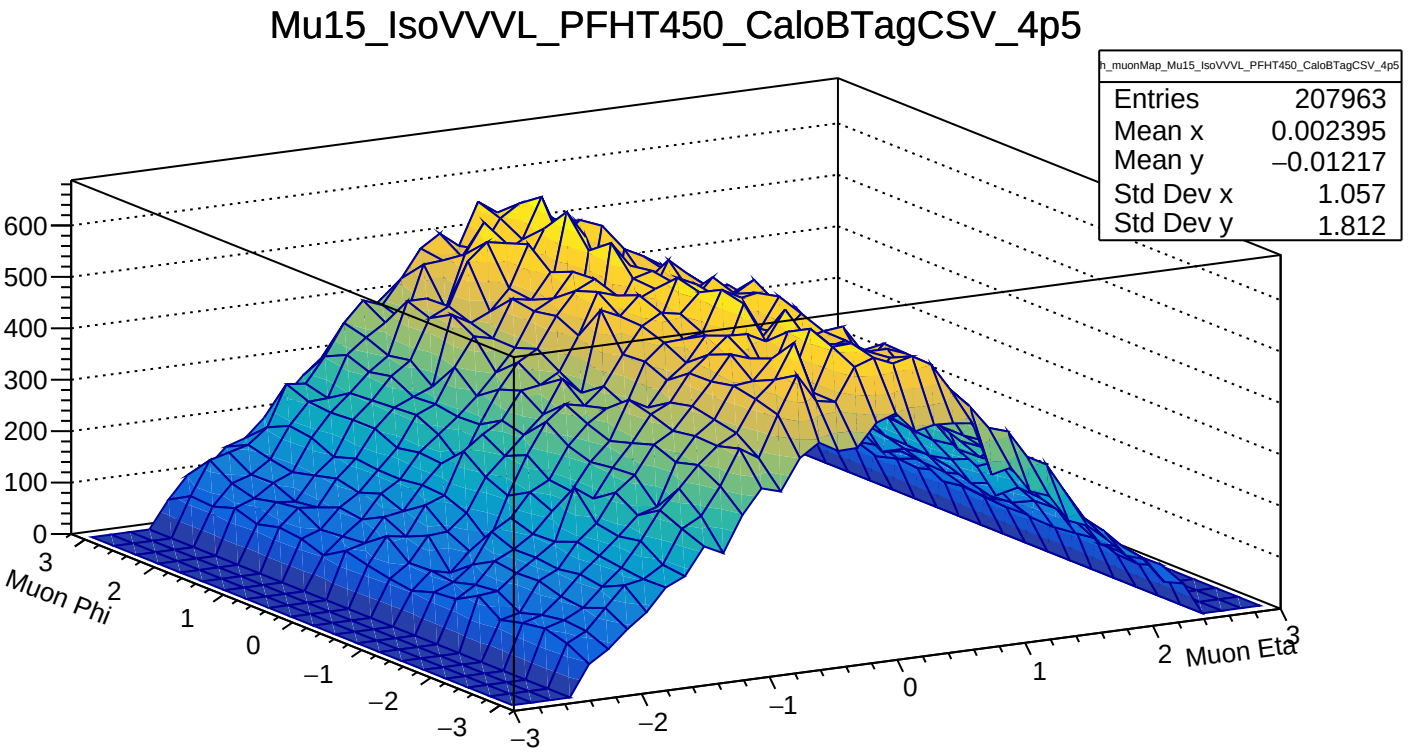

IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
h_jetMap_IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Entries 5630242
Mean x 0.0003803
Mean y −0.005768
Std Dev x 1.088
Std Dev y 1.813
30000
25000
20000
15000
10000
5000
0
Jet Phi
3
2
1
0
−1
−2
−3
Jet Eta
−6
−4
−2
0
2
4
6

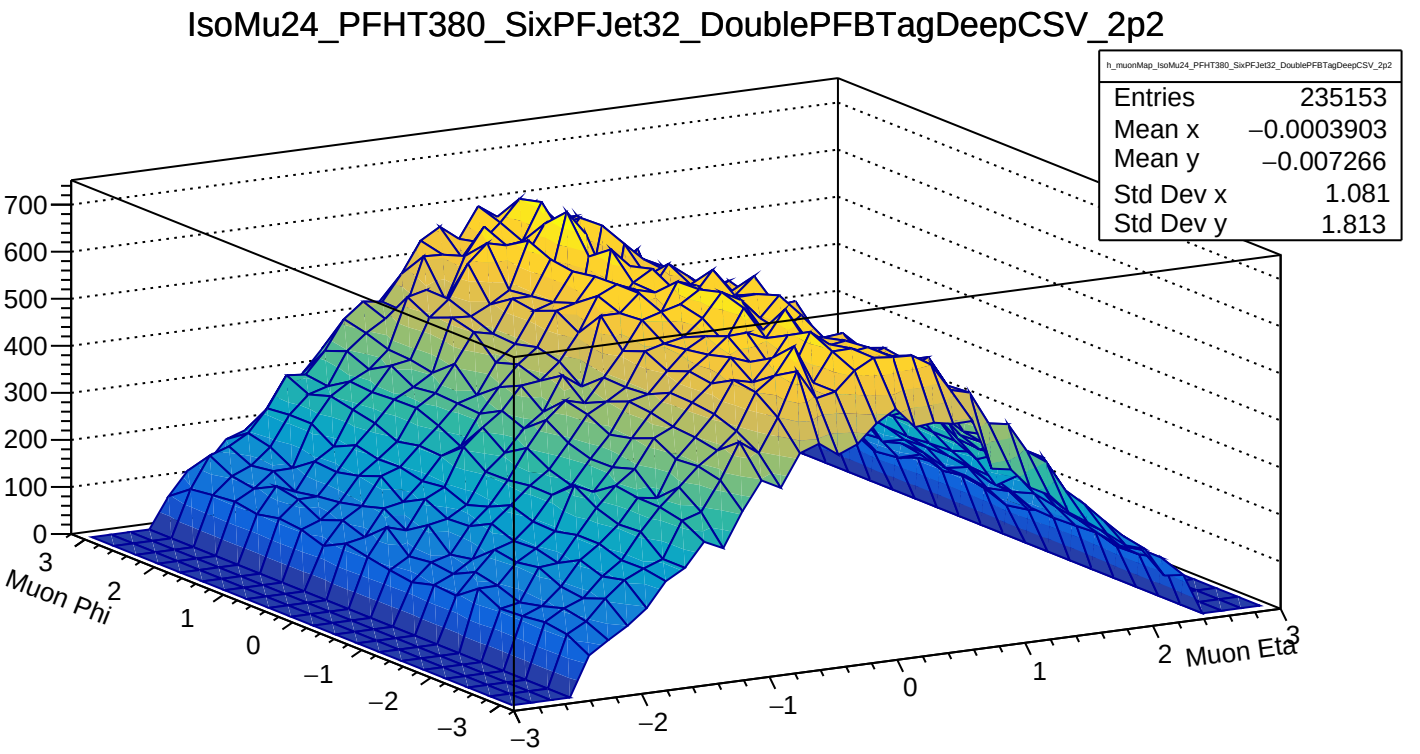
PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2

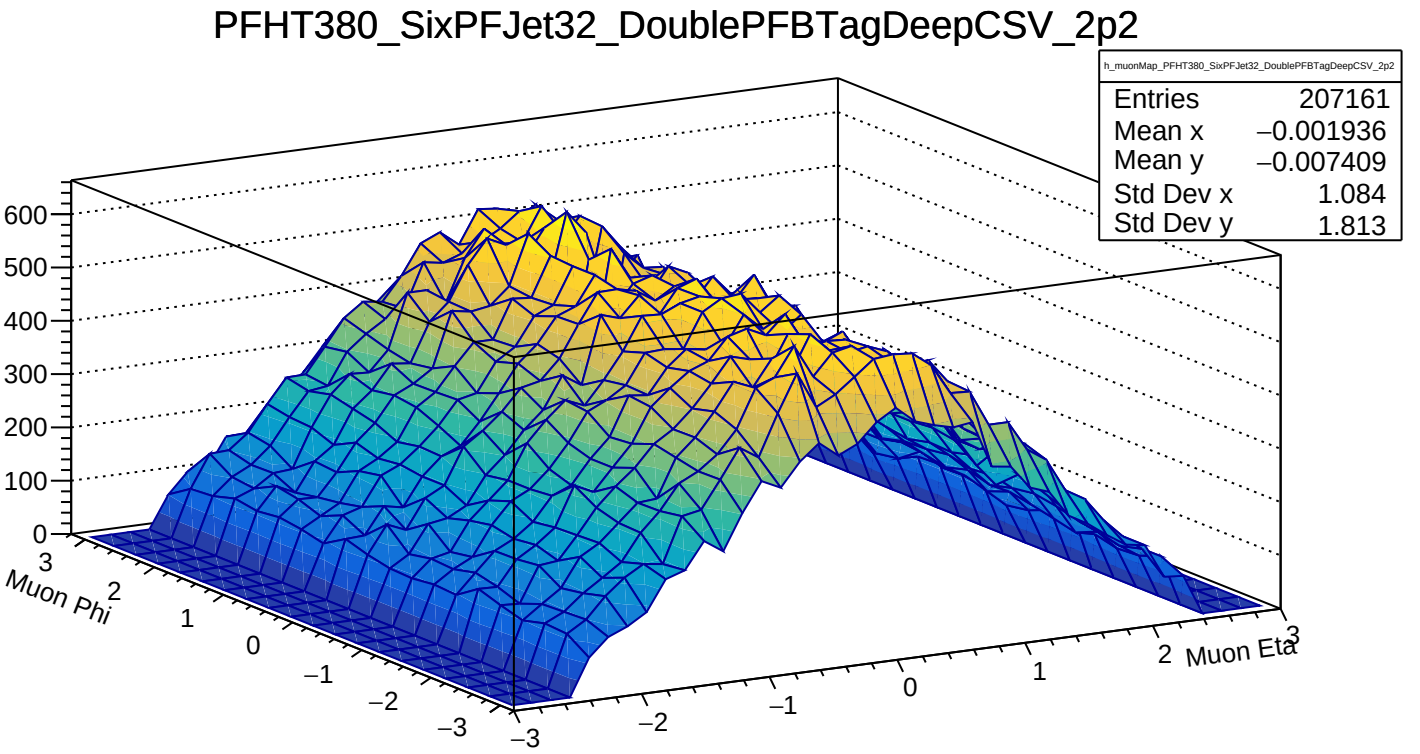


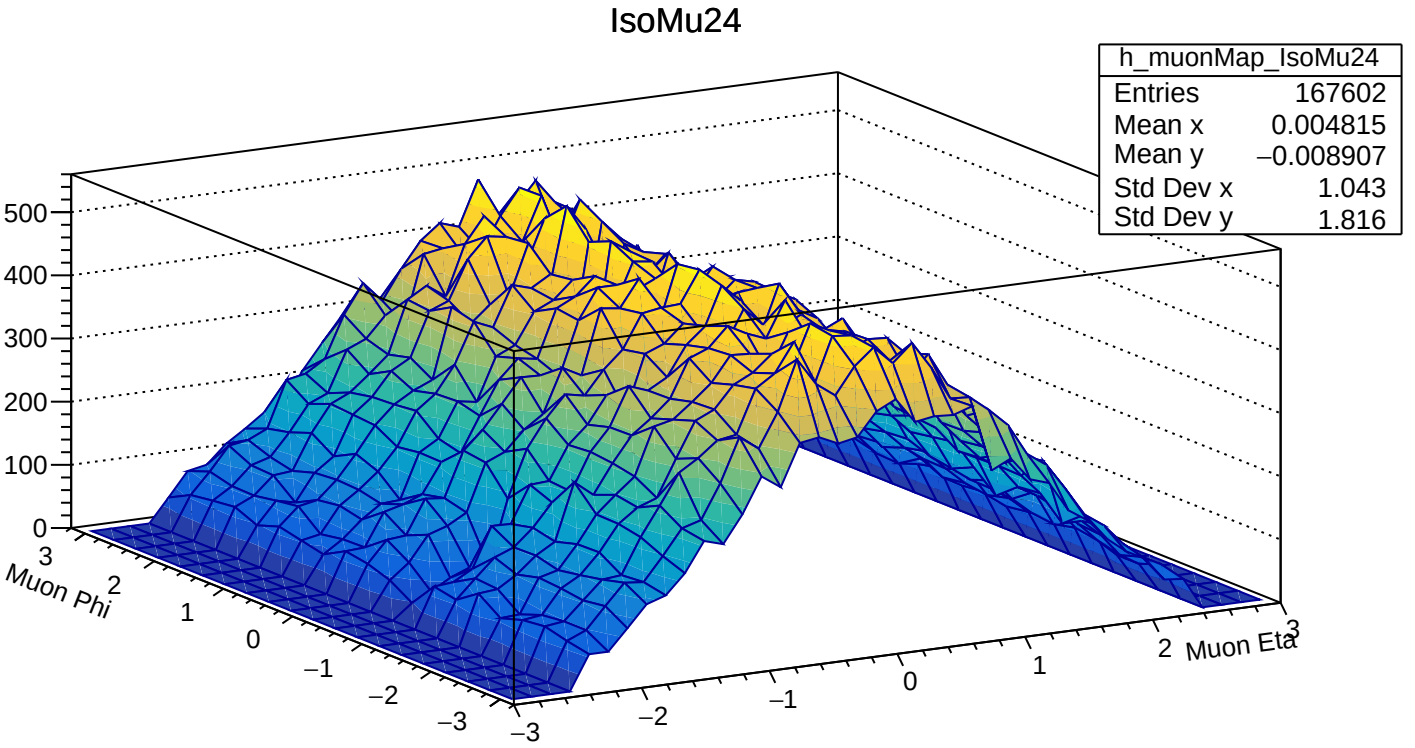

IsoMu24
h_jetMap_IsoMu24
Entries 2112888
Mean x 0.0009972
Mean y −0.005597
Std Dev x 1.091
Std Dev y 1.813
10000
8000
6000
4000
2000
0
Jet Phi
3
2
1
0
−1
−2
−3
Jet Eta
−6
−4
−2
0
2
4
6

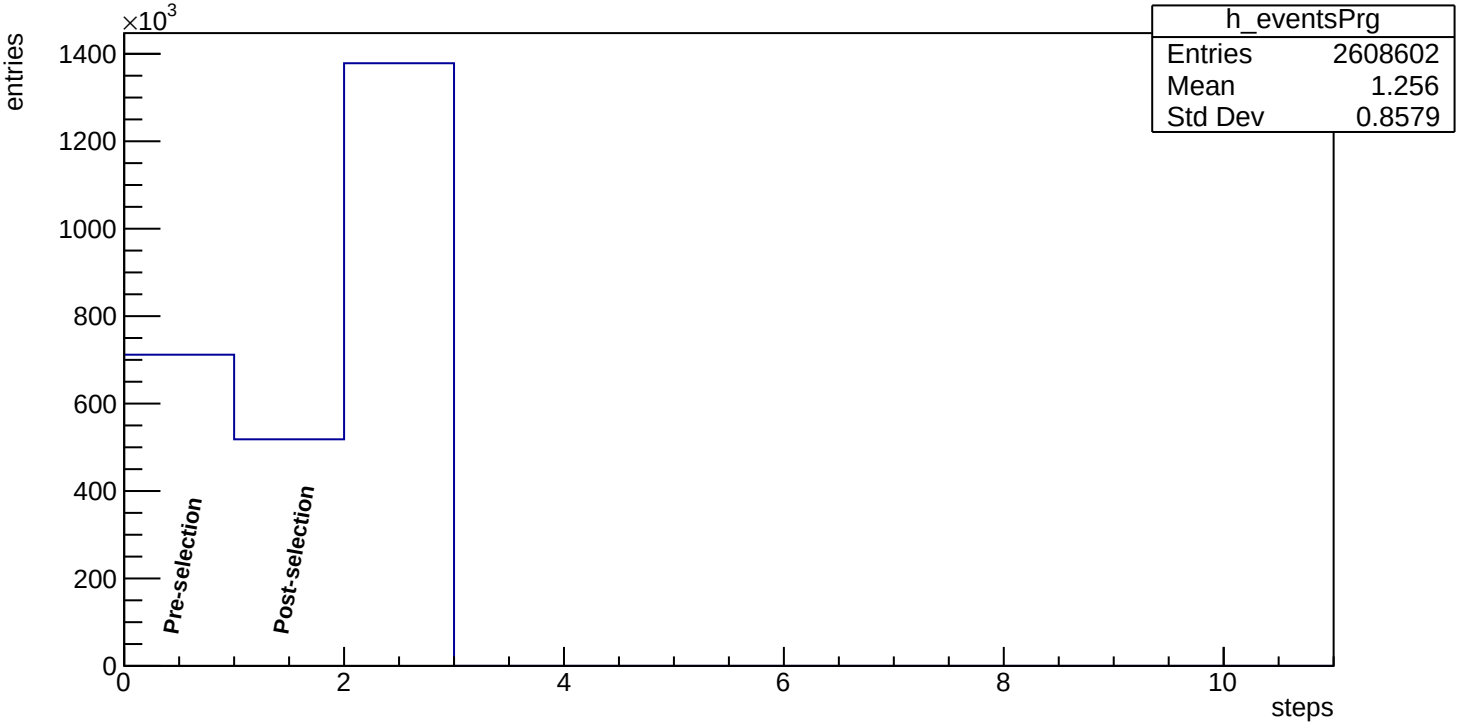

h_muonMap_notrigger
Entries 247736
Mean x −0.000262
Mean y −0.007082
Std Dev x 1.089
Std Dev y 1.813
220
200
180
160
140
120
100
80
60
40
20
0
3
2
1
0
−1
−2
−3
Muon Phi
−6
−4
−2
0
2
4
6
Muon Eta


Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
h_muonMap_Mu15_IsoVVVL_PFHT450_CaloBTagCSV_4p5
Entries 207963
Mean x 0.002395
Mean y −0.01217
Std Dev x 1.057
Std Dev y 1.812
600
500
400
300
200
100
0
Muon Phi
3
2
1
0
−1
−2
−3
Muon Eta
−3
−2
−1
0
1
2
3


IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
h_muonMap_IsoMu24_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Entries 235153
Mean x −0.0003903
Mean y −0.007266
Std Dev x 1.081
Std Dev y 1.813
700
600
500
400
300
200
100
0
Muon Phi
3
2
1
0
−1
−2
−3
Muon Eta
−3
−2
−1
0
1
2
3


PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
h_muonMap_PFHT380_SixPFJet32_DoublePFBTagDeepCSV_2p2
Entries 207161
Mean x −0.001936
Mean y −0.007409
Std Dev x 1.084
Std Dev y 1.813
600
500
400
300
200
100
0
Muon Phi
3
2
1
0
−1
−2
−3
Muon Eta
−3
−2
−1
0
1
2
3


IsoMu24
h_muonMap_IsoMu24
Entries 167602
Mean x 0.004815
Mean y −0.008907
Std Dev x 1.043
Std Dev y 1.816
500
400
300
200
100
0
Muon Phi
3
2
1
0
−1
−2
−3
Muon Eta
−3
−2
−1
0
1
2
3


h_eventsPrg
Entries 2608602
Mean 1.256
Std Dev 0.8579
entries
×10^3
1400
1200
1000
800
600
400
200
0
0
2
4
6
8
10
steps
Pre-selection
Post-selection