

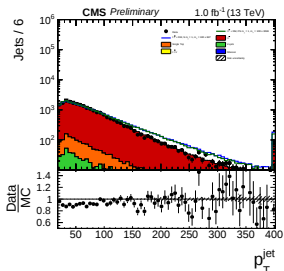


- ✈ BTag SF breaking up in Top/Higgs analysis observed
Has been already covered in a Joint JETMET/BTV meeting
<https://indico.cern.ch/event/903580/contributions/3806678/attachments/2015886/3369388/Jets.pdf>
see also next slides for comparison
- ✈ Andreas Hinzmann has started to introduce some MET fixes
(for Puppi and PF)
https://indico.cern.ch/event/907376/contributions/3817800/attachments/2017480/3372271/PUPPI_in_RECO_and_unclustered_energy_fix.pdf
So I asked him for advice about the proper implementation in 94X.
He pointed me to these pull requests for manual implementation:
<https://github.com/cms-sw/cmssw/pull/29331/files>
<https://github.com/cms-sw/cmssw/pull/29385/files> and clarified
that if PUPPI MET is taken from MiniAOD than PR 29385 is not
necessary, and PR 29331 is leading to changes in unclustered energy
uncertainty, for 10_2_X MiniAOD there is a recipe on slide 10 of the talk
linked above

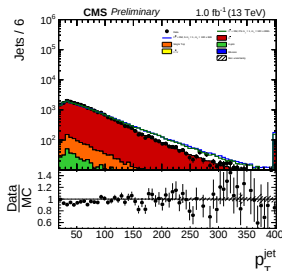
Blinded signal region (combined-channel)



PFjet PileupID tight Pt w/o BTag SF applied



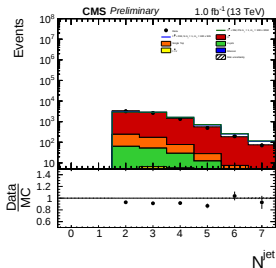
PFjet PileupID tight Pt with BTag SF



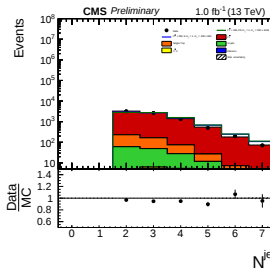
Blinded signal region (combined-channel)



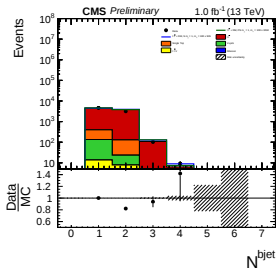
PFjet PileupID tight #jets w/o BTag SF applied



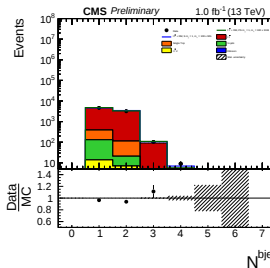
PFjet PileupID tight #jets with BTag SF



PFjet PileupID tight #Bjets w/o BTag SF applied



PFjet PileupID tight #Bjets with BTag SF

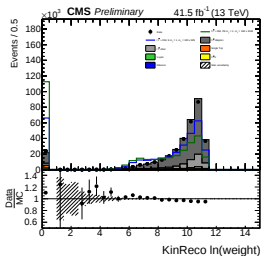


Continuing on limits ...

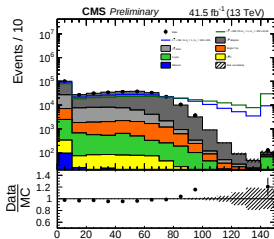
combined-channel after at least 1 b-tagged jet



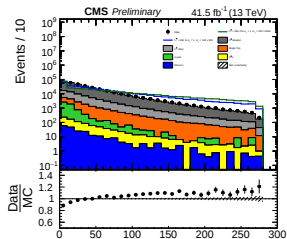
$\ln_kinReco_weight$



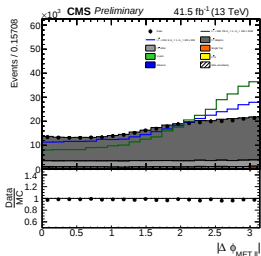
$mt2_ll$



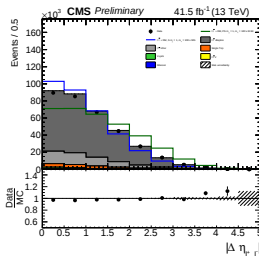
METSig



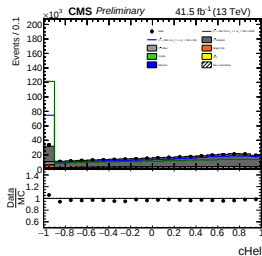
$\delta\Phi_dilep_MET$



$\delta\eta_{ll}^{M_{t\bar{t}}(ll)}$



$cH_{ll}^{MET_sig}$

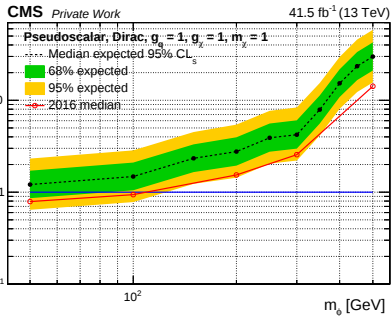


limits full. stat. PS/S mchi 1, with systematics

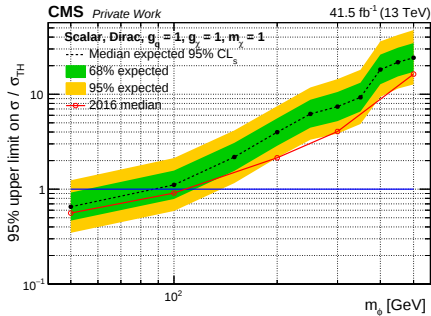


last week's status

PS mchi 1



S mchi 1

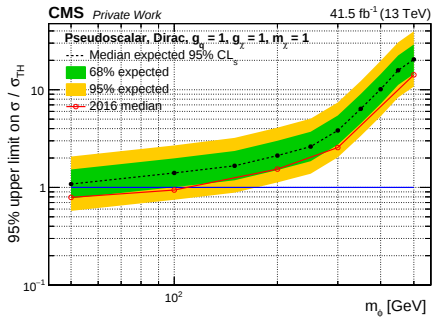


limits full. stat. PS/S mchi 1, with systematics

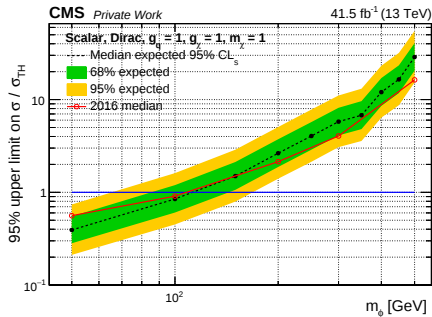


2016 setting status

PS mchi 1



S mchi 1

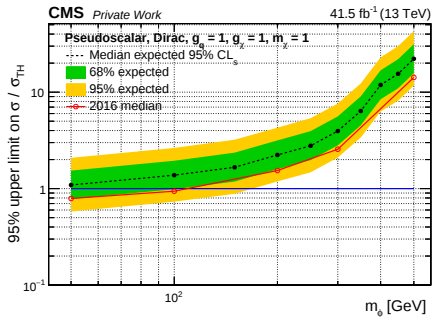


limits full. stat. PS/S mchi 1, Nominal, step 7

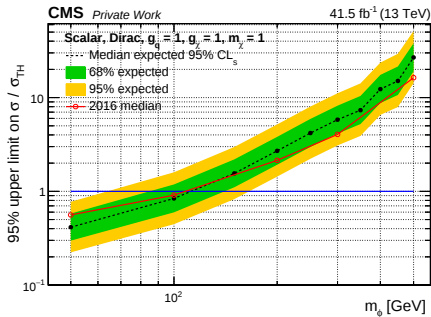


without $\ln_kinReco_weight$

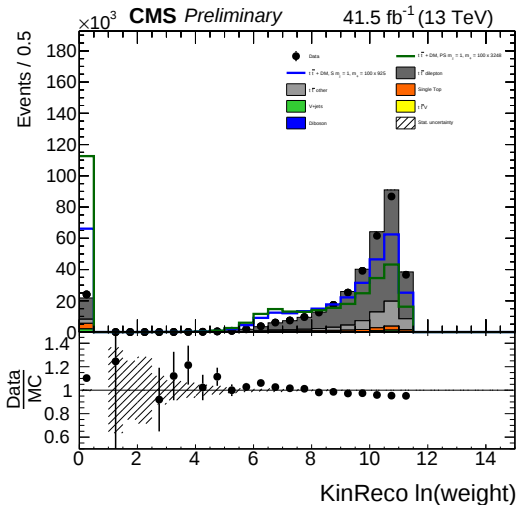
PS mchi 1



S mchi 1



Cut on $\ln_{\text{kinReco_weight}}$ at 5. for BDT training



- more than doubled speed of all BDT training times
- ROC curve performance increases considerably

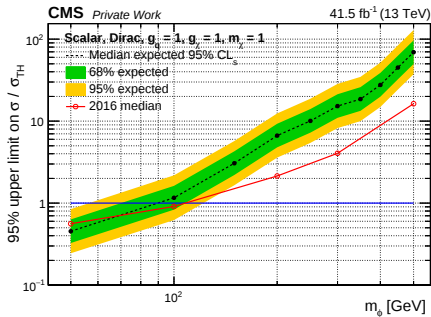
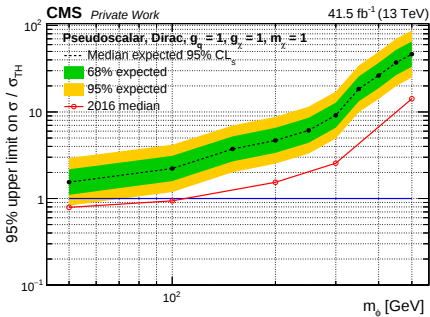
limits full. stat. PS/S mchi 1, Nominal, step 7b



with TCut away $\ln_kinReco_weight < 5$

PS mchi 1

S mchi 1

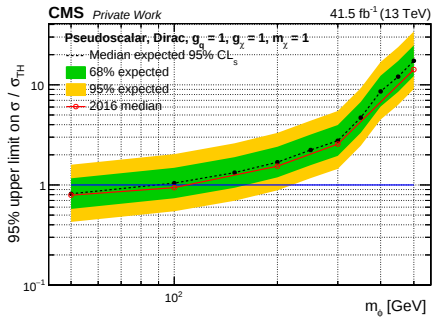


limits full. stat. PS/S mchi 1, Nominal, step 7

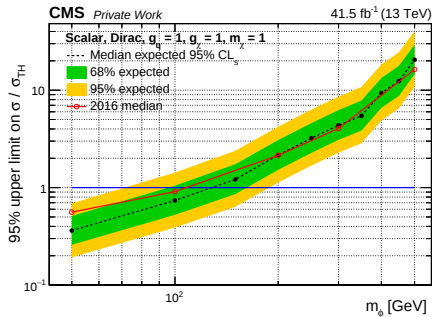


with TCut away $\ln_kinReco_weight > 5$

PS mchi 1

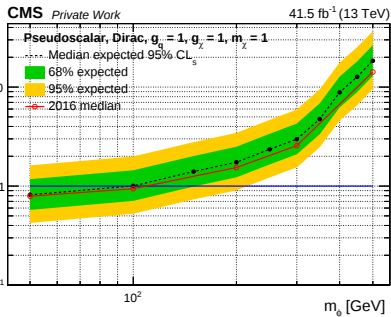


S mchi 1

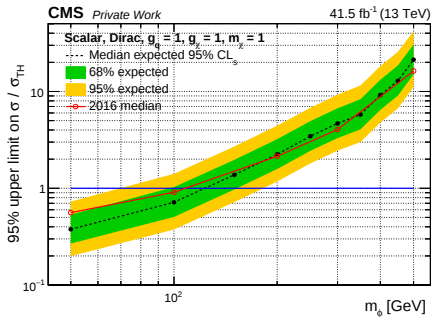


Electron/Muon Tight, with TCut away $\ln_{\text{kinReco_weight}} > 5$

PS mchi 1



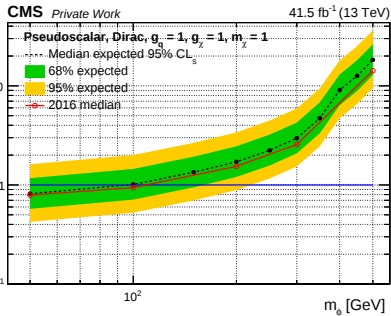
S mchi 1



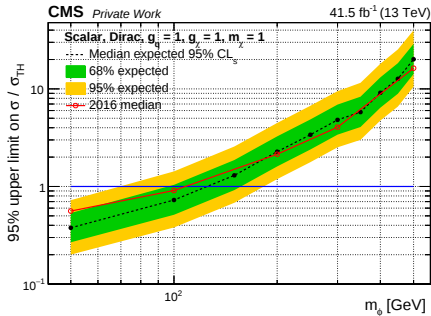


Electron/Muon Tight, with TCut away $\ln_{\text{kinReco_weight}} > 5$

PS mchi 1



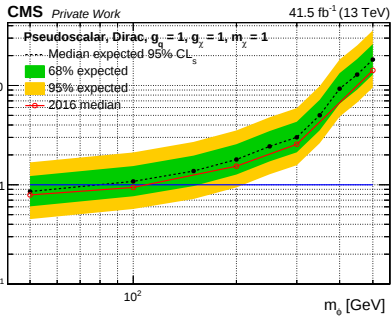
S mchi 1



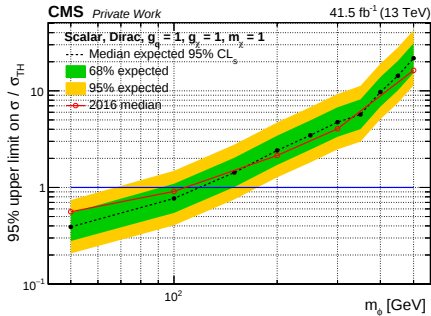


Ele/Muon Tight, DeepCSV L, with TCut away $\ln_{\text{kinReco_weight}} > 5$

PS mchi 1

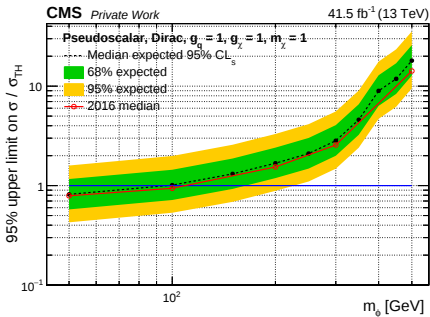


S mchi 1

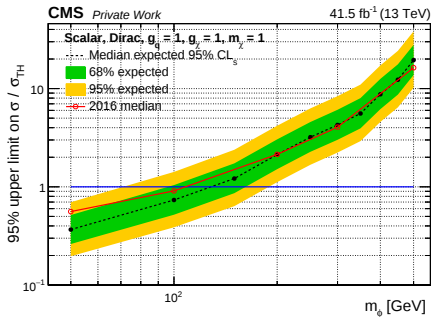


Ele Mvalso90, Muon Medium, with TCut away $\ln_{\text{kinReco_weight}} > 5$

PS mchi 1

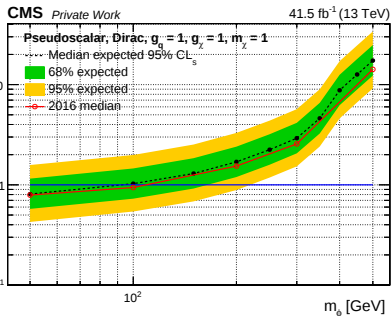


S mchi 1

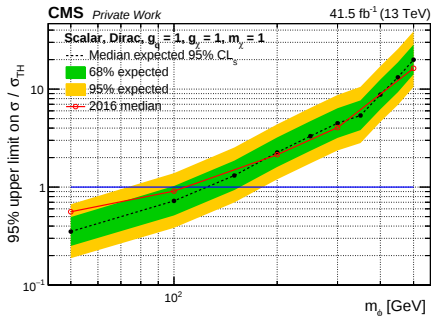


Ele Mvalso90, Muon M, DeepCSV L, cut away $\ln_{\text{kinReco_weight}} > 5$

PS mchi 1



S mchi 1

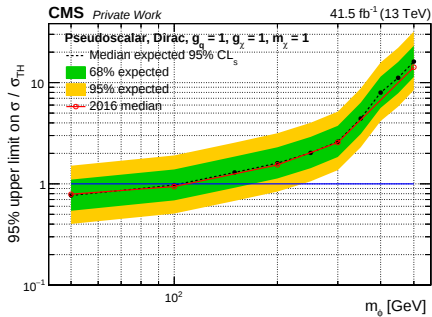


limits full. stat. PS/S mchi 1, Nominal, step 7b

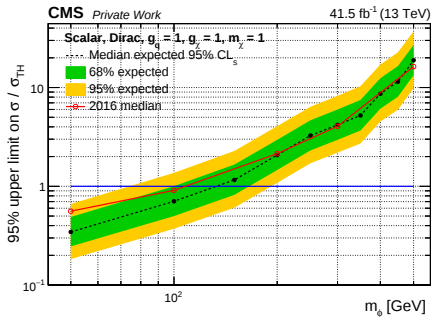


with TCut on $\ln_kinReco_weight$ +step7b

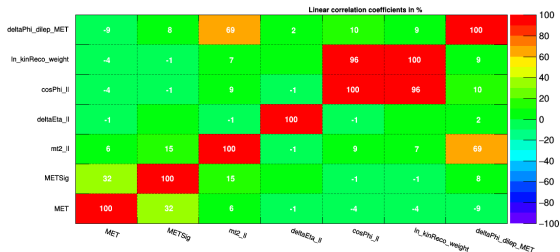
PS mchi 1



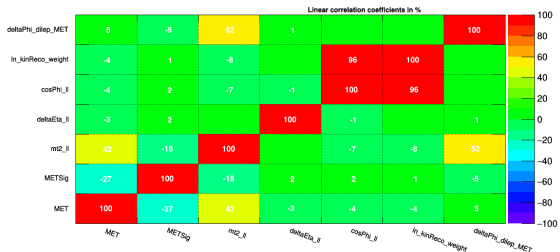
S mchi 1



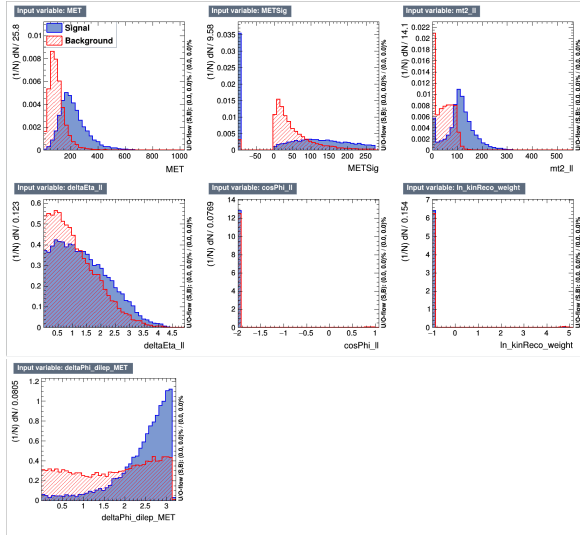
correlation Background



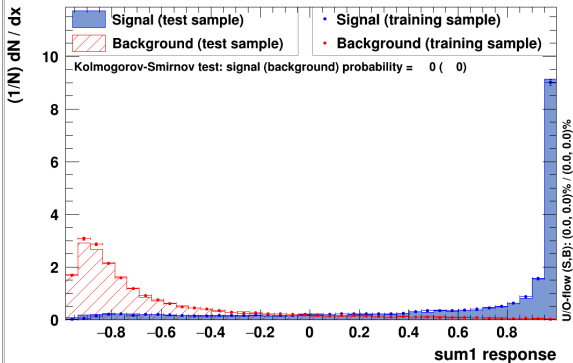
correlation signal

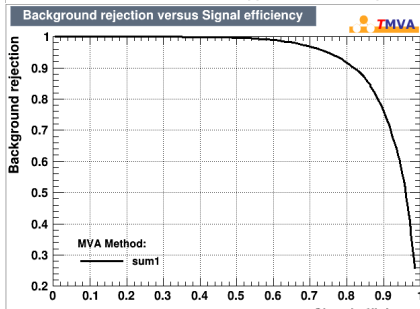
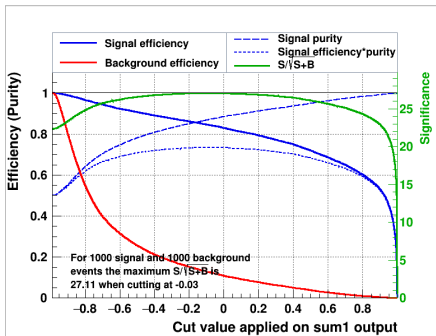


input variables



TMVA overtraining check for classifier: sum1





Backup

Event yields, combined, step 7b, Tight Muon, Tight Electron, triggerOff, DeepCSV M:

Data	269419	±	519.056 (0.19%)
Diboson	190.81	±	8.49 (4.45%)
$t\bar{t}V$	563.37	±	6.41 (1.14%)
V+jets	4133.07	±	235.87 (5.71%)
Single Top	12145.57	±	50.41 (0.42%)
$t\bar{t}$ other	40271.55	±	128.34 (0.32%)
$t\bar{t}$ dilepton	224275.64	±	307.22 (0.14%)
$t\bar{t}$ + DM, S $m_\chi = 1, m_\phi = 100$	307.17	±	1.11 (0.36%)
$t\bar{t}$ + DM, PS $m_\chi = 1, m_\phi = 100$	87.35	±	0.34 (0.39%)
Total background:	281580.02	±	411.27 (0.15%)

$$\text{ttDM PS, } \frac{\text{Signal}}{\sqrt{\text{Background}}} = 0.165$$

$$\text{ttDM S, } \frac{\text{Signal}}{\sqrt{\text{Background}}} = 0.579$$

Event yields, combined, step 7b, Muon Medium, Electron mvalso90, triggerOff, DeepCSV M:

Data	333382	±	577.392 (0.17%)
Diboson	225.00	±	9.20 (4.09%)
$t\bar{t}V$	700.44	±	7.22 (1.03%)
V+jets	5550.34	±	310.67 (5.60%)
Single Top	14770.03	±	56.35 (0.38%)
$t\bar{t}$ other	52275.97	±	146.26 (0.28%)
$t\bar{t}$ dilepton	275159.23	±	342.04 (0.12%)
$t\bar{t}$ + DM, S $m_\chi = 1, m_\phi = 100$	376.78	±	1.24 (0.33%)
$t\bar{t}$ + DM, PS $m_\chi = 1, m_\phi = 100$	107.21	±	0.38 (0.36%)
Total background:	348681.02	±	488.07 (0.14%)

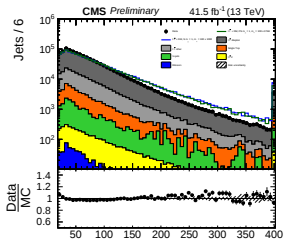
$$\text{ttDM PS, } \frac{\text{Signal}}{\sqrt{\text{Background}}} = 0.182$$

$$\text{ttDM S, } \frac{\text{Signal}}{\sqrt{\text{Background}}} = 0.638$$

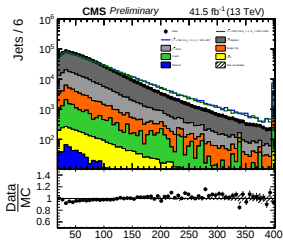
combined-channel after at least 1 b-tagged jet



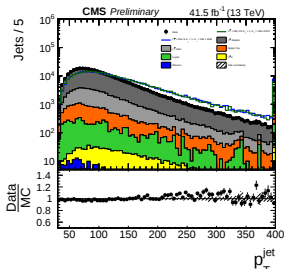
jet pt PuppiJets, Puppi Met



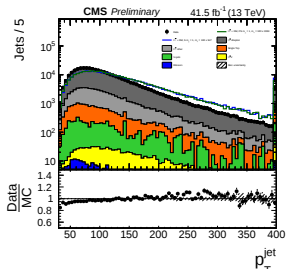
jet pt, PF jets, PuppiMet,



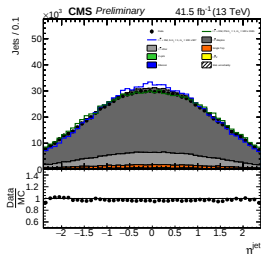
1st jet pt PuppiJets, Puppi Met



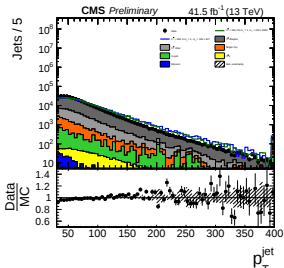
1st jet pt, PF jets, PuppiMet,



jet eta, PF jets, PuppMet,



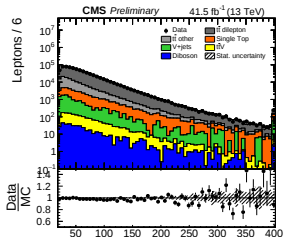
2nd jet pt, PF jets, PuppMet,



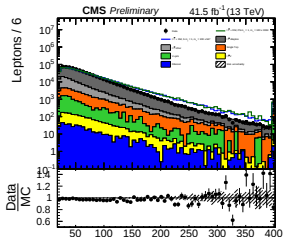
combined-channel after at least 1 b-tagged jet



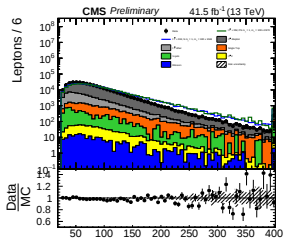
lepton pt PuppiJets, Puppi Met



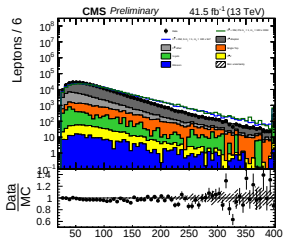
lepton pt, PF jets, PuppiMet,



1st lepton pt PuppiJets, p_T^l PuppiMet,



1st lepton pt, p_T^l PF jets, PuppiMet,



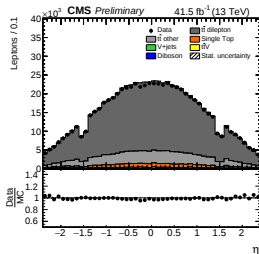
p_T^l

p_T^l

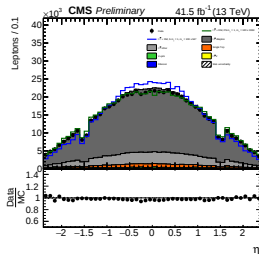
combined-channel after at least 1 b-tagged jet



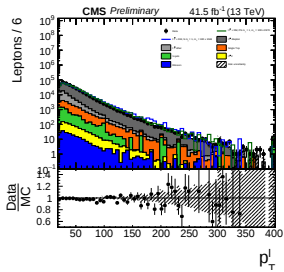
lepton eta PuppiJets, Puppi Met



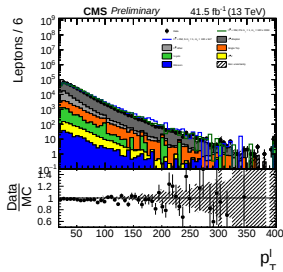
lepton eta, PF jets, PuppiMet,



2nd lepton pt PuppiJets, Puppi Met
PuppiMet,



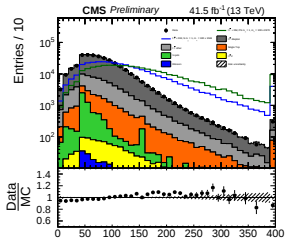
2nd lepton pt, PF jets,



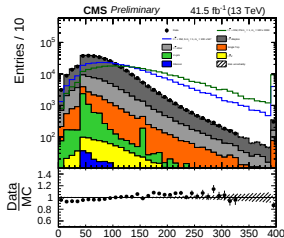
combined-channel after at least 1 b-tagged jet



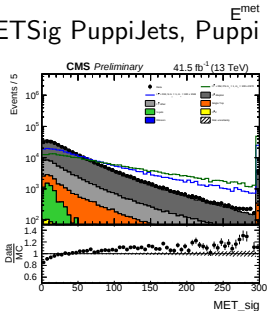
MET PuppiJets, Puppi Met



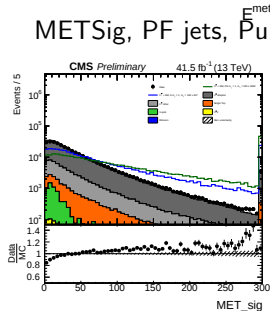
MET, PF jets, PuppiMet,



METSig PuppiJets, Puppi Met



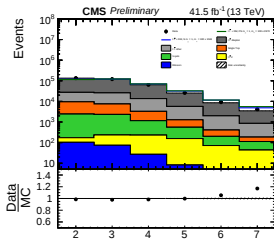
METSig, PF jets, PuppiMet,



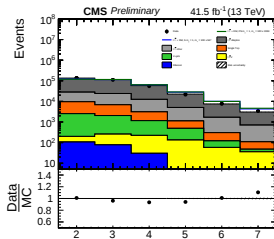
combined-channel after at least 1 b-tagged jet



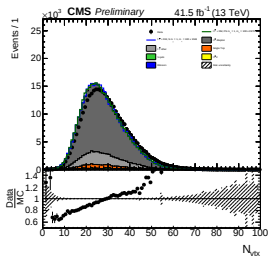
jet mult PuppiJets, Puppi Met



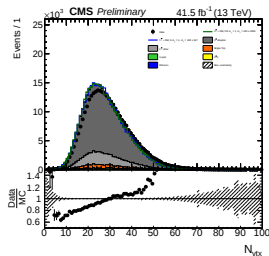
jet mult, PF jets, PuppiMet,



vertMulti PuppiJets, Puppi Met $N_{\text{jet}}^{\text{jet}}$



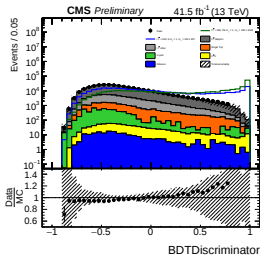
vertMulti, PF jets, PuppiMet, $N_{\text{jet}}^{\text{jet}}$



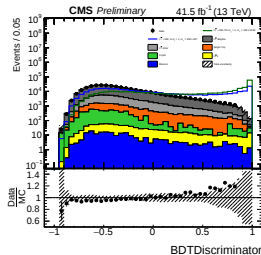
BDT Discriminants combined before TCut, step7



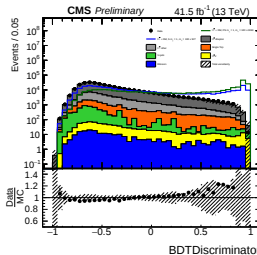
PS, 1, 50 :: AUC: 0.765



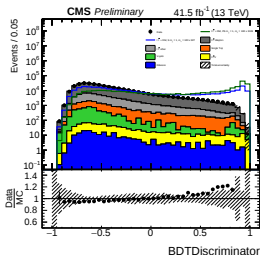
PS, 1, 100 :: AUC: 0.793



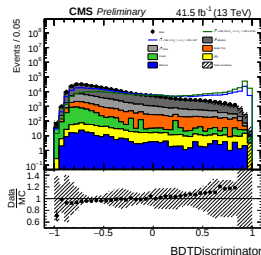
PS, 1, 200 :: AUC: 0.821



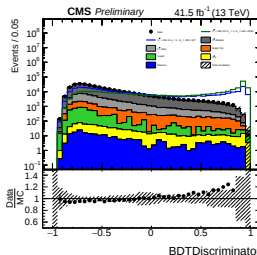
PS, 1, 300 :: AUC: 0.834



PS, 1, 400 :: AUC: 0.850



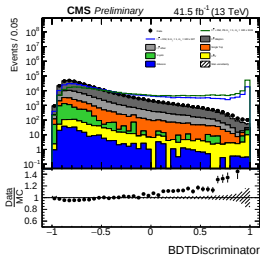
PS, 1, 500 :: AUC: 0.857



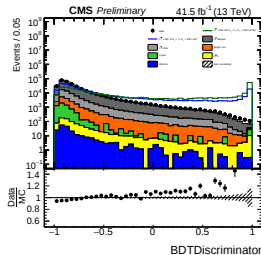
BDT Discriminants combined after TCut away in kinReco



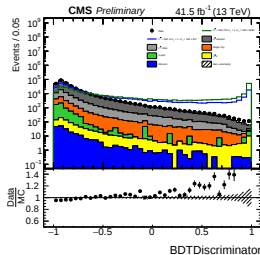
PS, 1, 50 :: AUC: 0.908



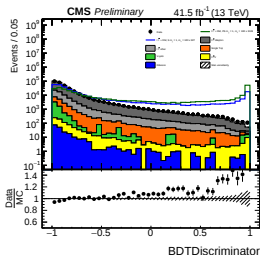
PS, 1, 100 :: AUC: 0.928



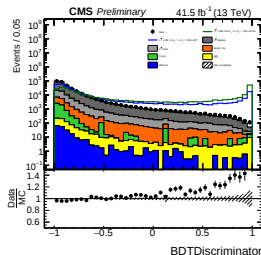
PS, 1, 200 :: AUC: 0.941



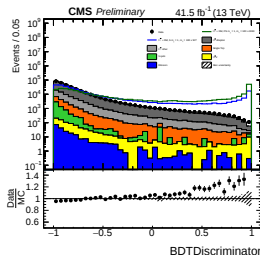
PS, 1, 300 :: AUC: 0.949



PS, 1, 400 :: AUC: 0.956



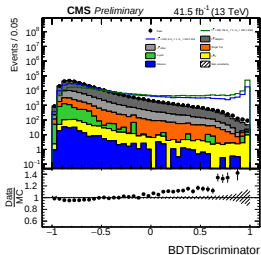
PS, 1, 500 :: AUC: 0.957



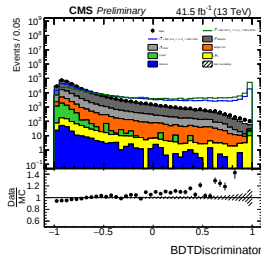
BDT Discriminants combined after TCut, step7b



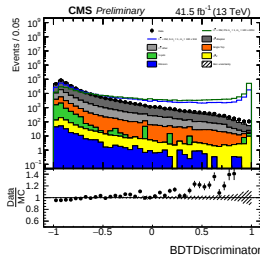
PS, 1, 50 :: AUC: 0.908



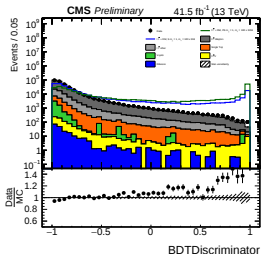
PS, 1, 100 :: AUC: 0.928



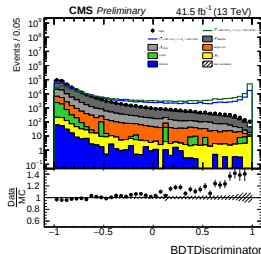
PS, 1, 200 :: AUC: 0.941



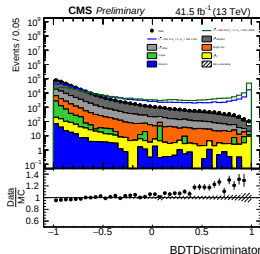
PS, 1, 300 :: AUC: 0.949



PS, 1, 400 :: AUC: 0.956



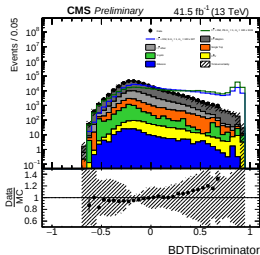
PS, 1, 500 :: AUC: 0.957



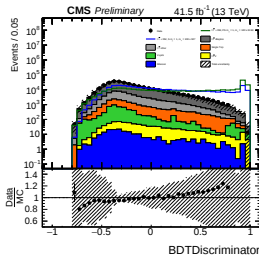
BDT Discriminants combined before TCut, step7



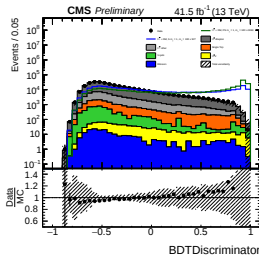
S, 1, 50 :: AUC: 0.641



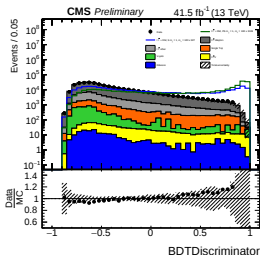
S, 1, 100 :: AUC: 0.708



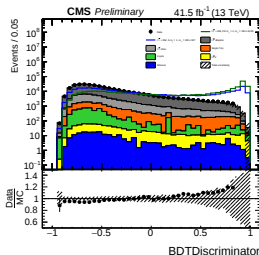
S, 1, 200 :: AUC: 0.788



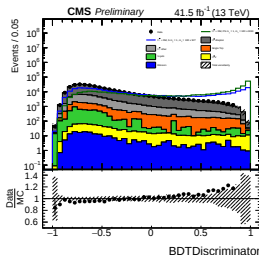
S, 1, 300 :: AUC: 0.827



S, 1, 400 :: AUC: 0.842



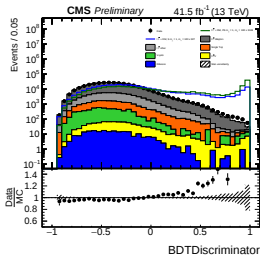
S, 1, 500 :: AUC: 0.856



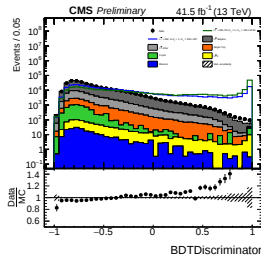
BDT Discriminants combined after TCut, step7



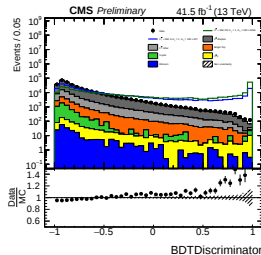
S, 1, 50 :: AUC: 0.784



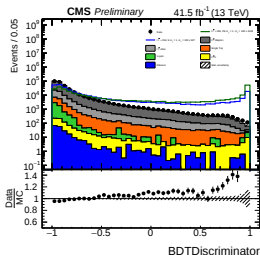
S, 1, 100 :: AUC: 0.862



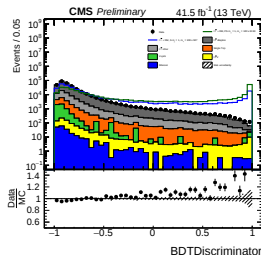
S, 1, 200 :: AUC: 0.923



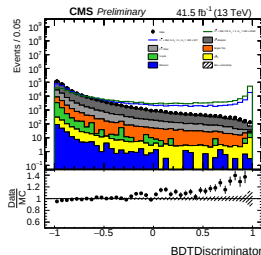
S, 1, 300 :: AUC: 0.949



S, 1, 400 :: AUC: 0.953



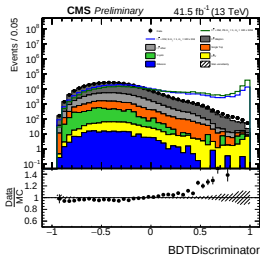
S, 1, 500 :: AUC: 0.962



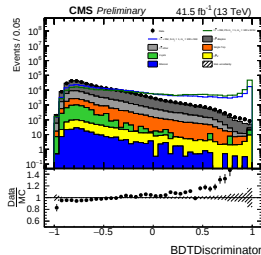
BDT Discriminants combined after TCut, step7b



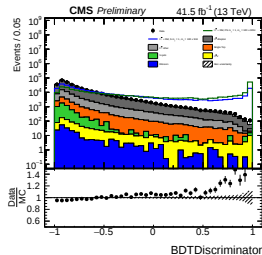
S, 1, 50 :: AUC: 0.784



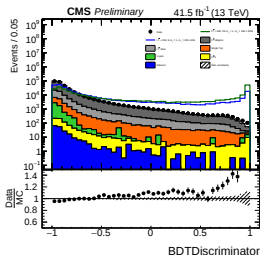
S, 1, 100 :: AUC: 0.862



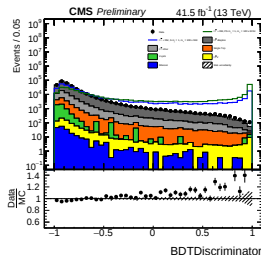
S, 1, 200 :: AUC: 0.923



S, 1, 300 :: AUC: 0.949



S, 1, 400 :: AUC: 0.953



S, 1, 500 :: AUC: 0.962

