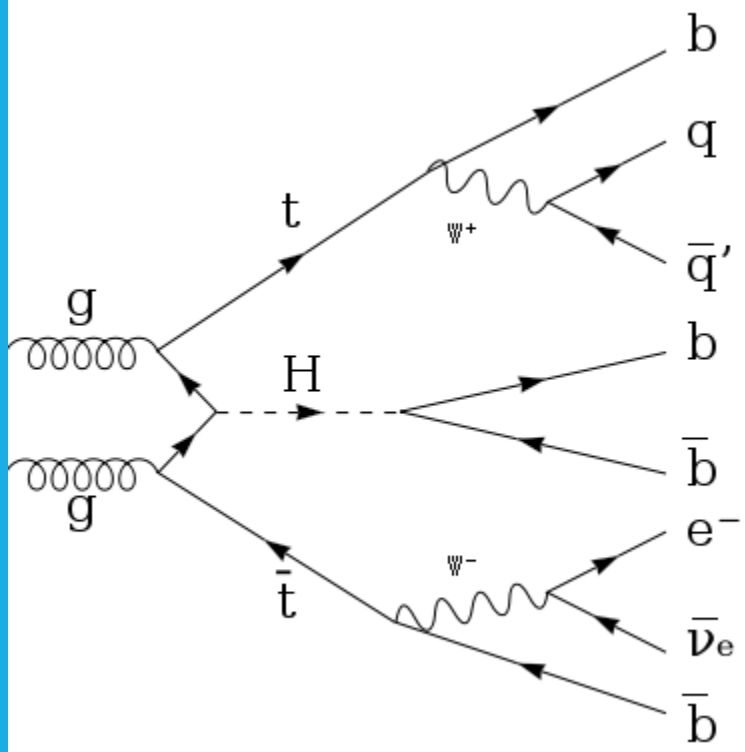
TTBar/ TTBarH Kinematics

AnalysisTop 2.3.20

/TTHNtupleAnalysis



Signal TTBarH _ sample (just used 5 files)

- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.341270.aMcAtNloHerwigppEvtGen_UEEE5_CTEQ6L1_CT10ME_ttH125_inc_semil.merge.DAOD_TOPQ1.e3921_s2608_s2183_r6630_r6264_p2372_tid05809550_00/DAOD_TOPQ1.05809550._000004.pool.root.1
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- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.341270.aMcAtNloHerwigppEvtGen_UEEE5_CTEQ6L1_CT10ME_ttH125_inc_semil.merge.DAOD_TOPQ1.e3921_s2608_s2183_r6630_r6264_p2372_tid05809550_00/DAOD_TOPQ1.05809550._000016.pool.root.1
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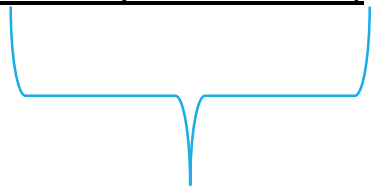
- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.341270.aMcAtNloHerwigppEvtGen_UEEE5_CTEQ6L1_CT10ME_ttH125_inc_semil.merge.DAOD_TOPQ1.e3921_s2608_s2183_r6630_r6264_p2372_tid05809550_00/DAOD_TOPQ1.05809550._000030.pool.root.1

Background TTBar_sample (just used 5 files)

- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.410000.PowhegPythiaEvtGen_P2012_ttbar_hdamp172p5_nonallhad.merge.DAOD_TOPQ1.e3698_s2608_s2183_r6630_r6264_p2353_tid05562695_00/DAOD_TOPQ1.05562692._000028.pool.root.1
- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.410000.PowhegPythiaEvtGen_P2012_ttbar_hdamp172p5_nonallhad.merge.DAOD_TOPQ1.e3698_s2608_s2183_r6630_r6264_p2353_tid05562695_00/DAOD_TOPQ1.05562695._000022.pool.root.1
- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.410000.PowhegPythiaEvtGen_P2012_ttbar_hdamp172p5_nonallhad.merge.DAOD_TOPQ1.e3698_s2608_s2183_r6630_r6264_p2353_tid05562695_00/DAOD_TOPQ1.05562697._000031.pool.root.1
- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.410000.PowhegPythiaEvtGen_P2012_ttbar_hdamp172p5_nonallhad.merge.DAOD_TOPQ1.e3698_s2608_s2183_r6630_r6264_p2353_tid05562695_00/DAOD_TOPQ1.05562701._000001.pool.root.1
- /afs/cern.ch/work/r/rsoualah/samples/mc15_13TeV.410000.PowhegPythiaEvtGen_P2012_ttbar_hdamp172p5_nonallhad.merge.DAOD_TOPQ1.e3698_s2608_s2183_r6630_r6264_p2353_tid05562695_00/DAOD_TOPQ1.05562702._000037.pool.root.1

Event Selection:

Cut flow for Jet >= 4 btagged jet >=2 (for TTBar) & >= 4 (for TTBarH)



To Be Done!

CutFlow : Background TTBar / el + jets

	Cut	events	mc weights	mc*pu weights
1	INITIAL	205000.00	205000.00	205000.00
2	GRL	205000.00	205000.00	205000.00
3	GOODCALO	205000.00	205000.00	205000.00
4	TRIGDEC HLT_e24_lhmedium_iloose_L1EM20VH HLT_e60_lhmedium	50216.00	50216.00	50216.00
5	EL_N 25000 >= 1	43475.00	43475.00	43475.00
6	EL_N 25000 == 1	41935.00	41935.00	41935.00
7	MU_N 25000 == 0	38602.00	38602.00	38602.00
8	TRIGMATCH	38574.00	38574.00	38574.00
9	JETCLEAN LooseBad	38569.00	38569.00	38569.00
10	JET_N 25000 >= 1	38402.00	38402.00	38402.00
11	JET_N 25000 >= 2	36981.00	36981.00	36981.00
12	JET_N 25000 >= 3	31614.00	31614.00	31614.00
13	JET_N 25000 >= 4	21304.00	21304.00	21304.00
14	MET > 30000	17575.00	17575.00	17575.00
15	MWT > 30000	14809.00	14809.00	14809.00
16	MV2C20_N 0.5 >= 2	4098.00	4098.00	4098.00
17	EXAMPLEPLOTS	4098.00	4098.00	4098.00
18	SAVE	4098.00	4098.00	4098.00

Cutflow: Background TTBar / el + jets

	Cut	events	mc weights	mc*pu weights
1	INITIAL	205000.00	205000.00	205000.00
2	GRL	205000.00	205000.00	205000.00
3	GOODCALO	205000.00	205000.00	205000.00
4	TRIGDEC HLT_e24_lhmedium_iloose_L1EM20VH HLT_e60_lhmedium	50216.00	50216.00	50216.00
5	EL_N 25000 >= 1	43475.00	43475.00	43475.00
6	EL_N 25000 == 1	41935.00	41935.00	41935.00
7	MU_N 25000 == 0	38602.00	38602.00	38602.00
8	TRIGMATCH	38574.00	38574.00	38574.00
9	JETCLEAN LooseBad	38569.00	38569.00	38569.00
10	JET_N 25000 >= 1	38402.00	38402.00	38402.00
11	JET_N 25000 >= 2	36981.00	36981.00	36981.00
12	JET_N 25000 >= 3	31614.00	31614.00	31614.00
13	JET_N 25000 >= 4	21304.00	21304.00	21304.00
14	MET > 30000	17575.00	17575.00	17575.00
15	MWT > 30000	14809.00	14809.00	14809.00
16	MV2C20_N 0.5 >= 2	4098.00	4098.00	4098.00
17	EXAMPLEPLOTS	4098.00	4098.00	4098.00
18	SAVE	4098.00	4098.00	4098.00

Cutflow: Background TTBar / mu + jets

	cut	events	mc weights	mc*pu weights
1	INITIAL	205000.00	205000.00	205000.00
2	GRL	205000.00	205000.00	205000.00
3	GOODCALO	205000.00	205000.00	205000.00
4	TRIGDEC HLT_mu20_iloose_L1MU15 HLT_mu50	54981.00	54981.00	54981.00
5	MU_N 25000 >= 1	42762.00	42762.00	42762.00
6	MU_N 25000 == 1	40909.00	40909.00	40909.00
7	EL_N 25000 == 0	37972.00	37972.00	37972.00
8	TRIGMATCH	37759.00	37759.00	37759.00
9	JETCLEAN LooseBad	37749.00	37749.00	37749.00
10	JET_N 25000 >= 1	37584.00	37584.00	37584.00
11	JET_N 25000 >= 2	36114.00	36114.00	36114.00
12	JET_N 25000 >= 3	30756.00	30756.00	30756.00
13	JET_N 25000 >= 4	20731.00	20731.00	20731.00
14	MET+MWT > 60000	18629.00	18629.00	18629.00
15	MV2C20_N 0.5 >= 2	5221.00	5221.00	5221.00
16	EXAMPLEPLOTS	5221.00	5221.00	5221.00
17	SAVE	5221.00	5221.00	5221.00

Cutflow: Signal TTBarH / el + jets

	cut	events	mc weights	mc*pu weights
1	INITIAL	200000.00	106700.00	106700.00
2	GRL	200000.00	106700.00	106700.00
3	GOODCALO	200000.00	106700.00	106700.00
4	TRIGDEC HLT_e24_lhmedium_iloose_L1EM20VH HLT_e60_lhmedium	49514.00	26318.00	26318.00
5	EL_N 25000 >= 1	41257.00	21823.00	21823.00
6	EL_N 25000 == 1	40052.00	21168.00	21168.00
7	MU_N 25000 == 0	37990.00	20094.00	20094.00
8	TRIGMATCH	37959.00	20073.00	20073.00
9	JETCLEAN LooseBad	37956.00	20070.00	20070.00
10	JET_N 25000 >= 1	37953.00	20067.00	20067.00
11	JET_N 25000 >= 2	37912.00	20038.00	20038.00
12	JET_N 25000 >= 3	37530.00	19830.00	19830.00
13	JET_N 25000 >= 4	35851.00	18847.00	18847.00
14	MET > 30000	30778.00	16112.00	16112.00
15	MWT > 30000	25006.00	13150.00	13150.00
16	MV2C20_N 0.5 >= 4	671.00	341.00	341.00
17	EXAMPLEPLOTS	671.00	341.00	341.00
18	SAVE	671.00	341.00	341.00

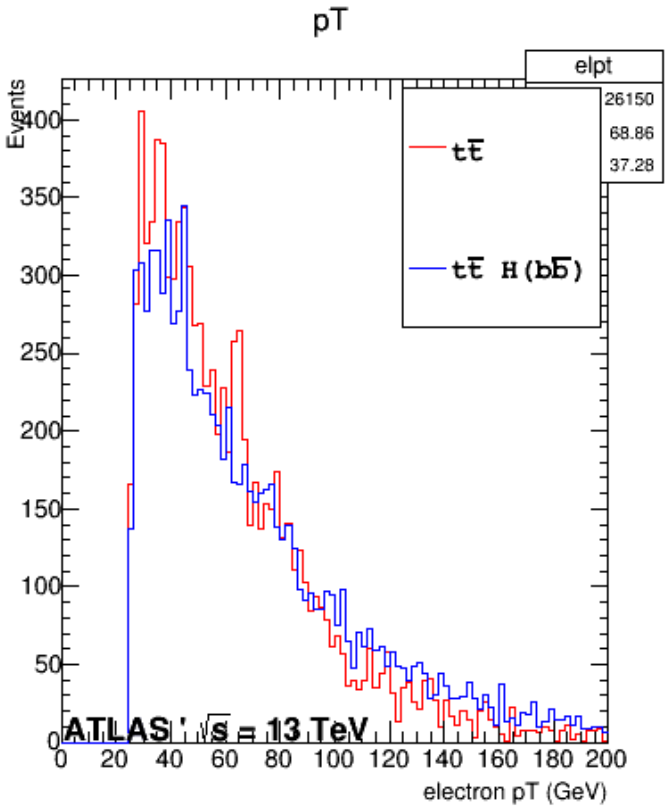
Signal TTBarH / el + jets

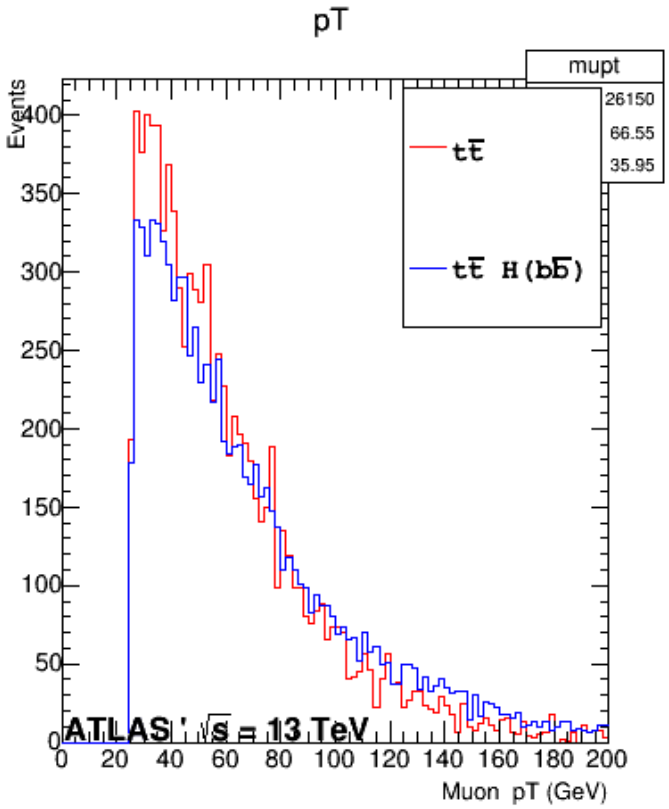
	cut	events	mc weights	mc*pu weights
1	INITIAL	200000.00	106700.00	106700.00
2	GRL	200000.00	106700.00	106700.00
3	GOODCALO	200000.00	106700.00	106700.00
4	TRIGDEC HLT_e24_lhmedium_iloose_L1EM20VH HLT_e60_lhmedium	49514.00	26318.00	26318.00
5	EL_N 25000 >= 1	41257.00	21823.00	21823.00
6	EL_N 25000 == 1	40052.00	21168.00	21168.00
7	MU_N 25000 == 0	37990.00	20094.00	20094.00
8	TRIGMATCH	37959.00	20073.00	20073.00
9	JETCLEAN LooseBad	37956.00	20070.00	20070.00
10	JET_N 25000 >= 1	37953.00	20067.00	20067.00
11	JET_N 25000 >= 2	37912.00	20038.00	20038.00
12	JET_N 25000 >= 3	37530.00	19830.00	19830.00
13	JET_N 25000 >= 4	35851.00	18847.00	18847.00
14	MET > 30000	30778.00	16112.00	16112.00
15	MWT > 30000	25006.00	13150.00	13150.00
16	MV2C20_N 0.5 >= 4	671.00	341.00	341.00
17	EXAMPLEPLOTS	671.00	341.00	341.00
18	SAVE	671.00	341.00	341.00

Signal TTBarH / Mu + jets

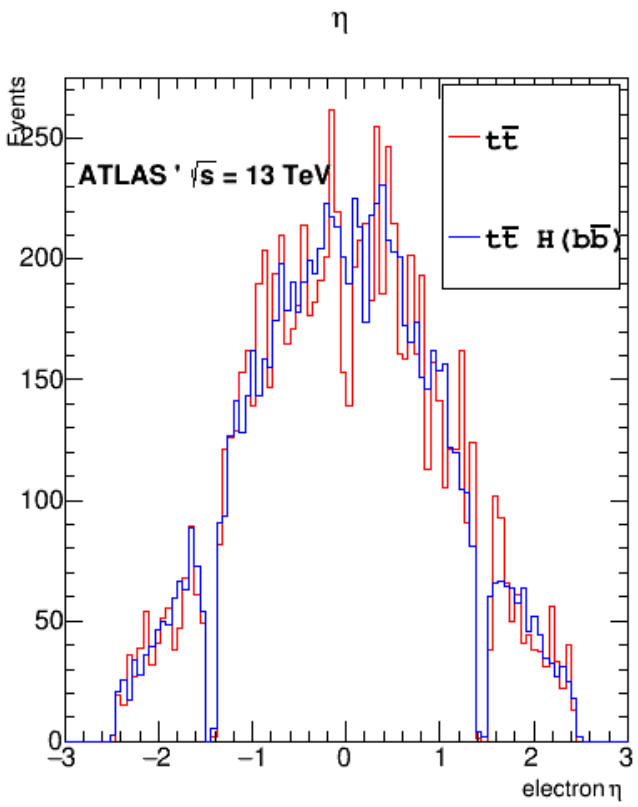
	cut	events	mc weights	mc*pu weights
1	INITIAL	200000.00	106700.00	106700.00
2	GRL	200000.00	106700.00	106700.00
3	GOODCALO	200000.00	106700.00	106700.00
4TRIGDEC	HLT_mu20_iloose_L1MU15 HLT_mu50	54780.00	29230.00	29230.00
5	MU_N 25000 >= 1	37575.00	20049.00	20049.00
6	MU_N 25000 == 1	36285.00	19377.00	19377.00
7	EL_N 25000 == 0	34440.00	18366.00	18366.00
8	TRIGMATCH	34120.00	18202.00	18202.00
9	JETCLEAN LooseBad	34111.00	18197.00	18197.00
10	JET_N 25000 >= 1	34107.00	18197.00	18197.00
11	JET_N 25000 >= 2	34061.00	18173.00	18173.00
12	JET_N 25000 >= 3	33744.00	17962.00	17962.00
13	JET_N 25000 >= 4	32237.00	17121.00	17121.00
14	MET+MWT > 60000	29369.00	15603.00	15603.00
15	MV2C20_N 0.5 >= 2	14257.00	7627.00	7627.00
16	EXAMPLEPLOTS	14257.00	7627.00	7627.00
17	SAVE	14257.00	7627.00	7627.00

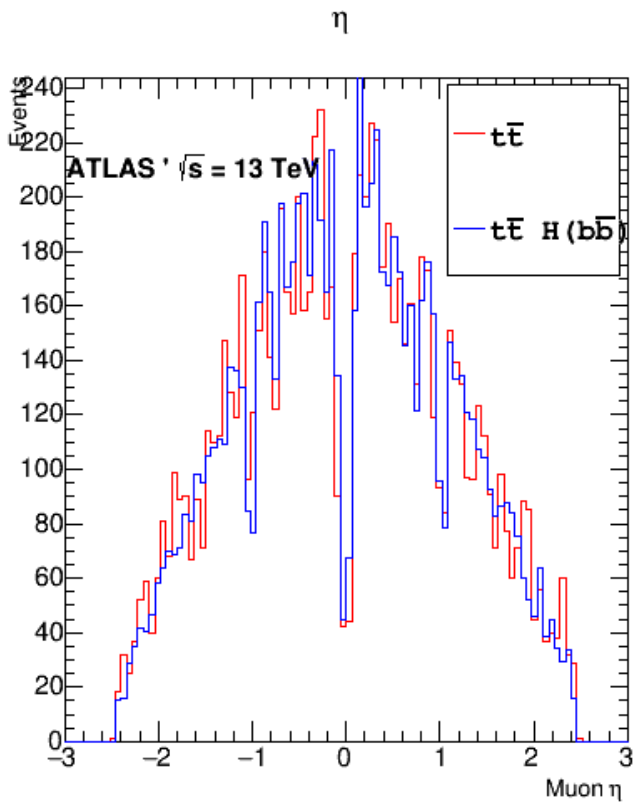
Some Kinematic Distributions: Lepton pt



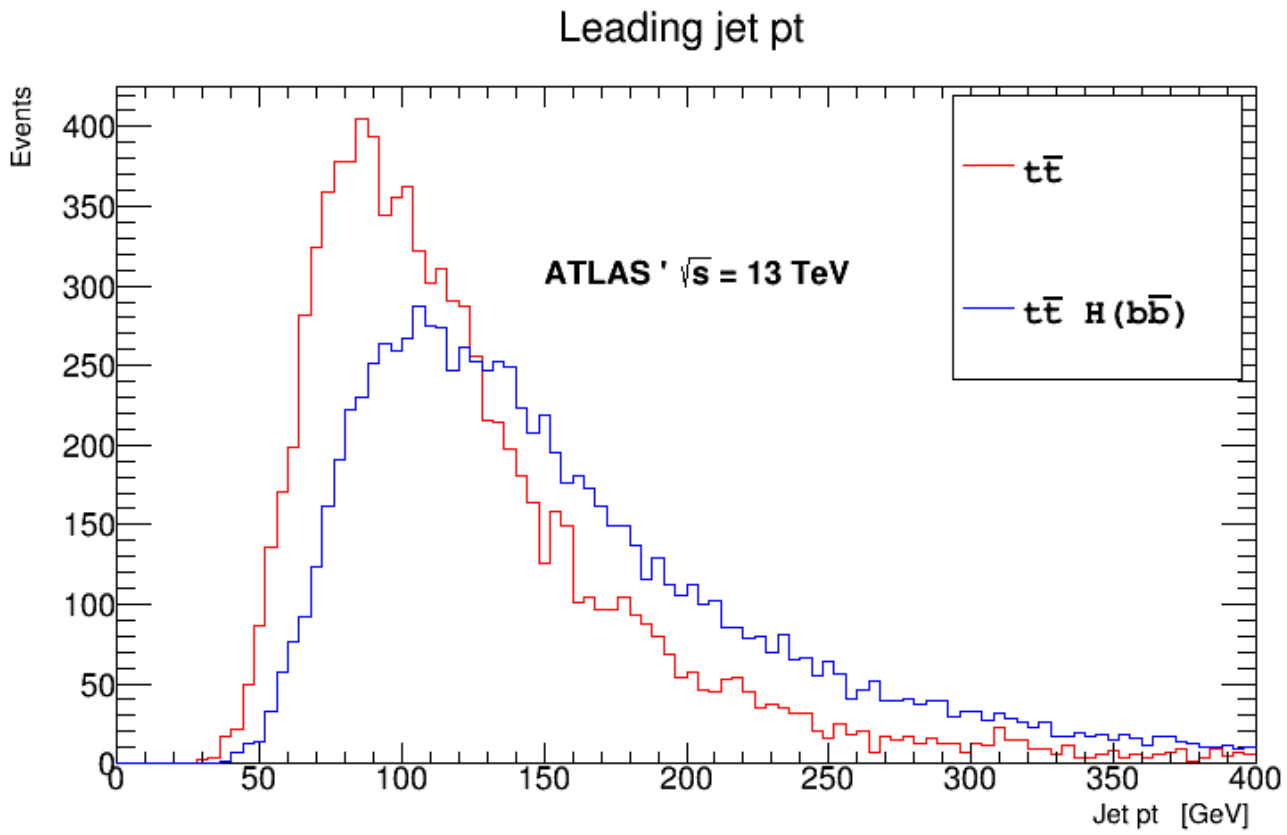


Lepton eta

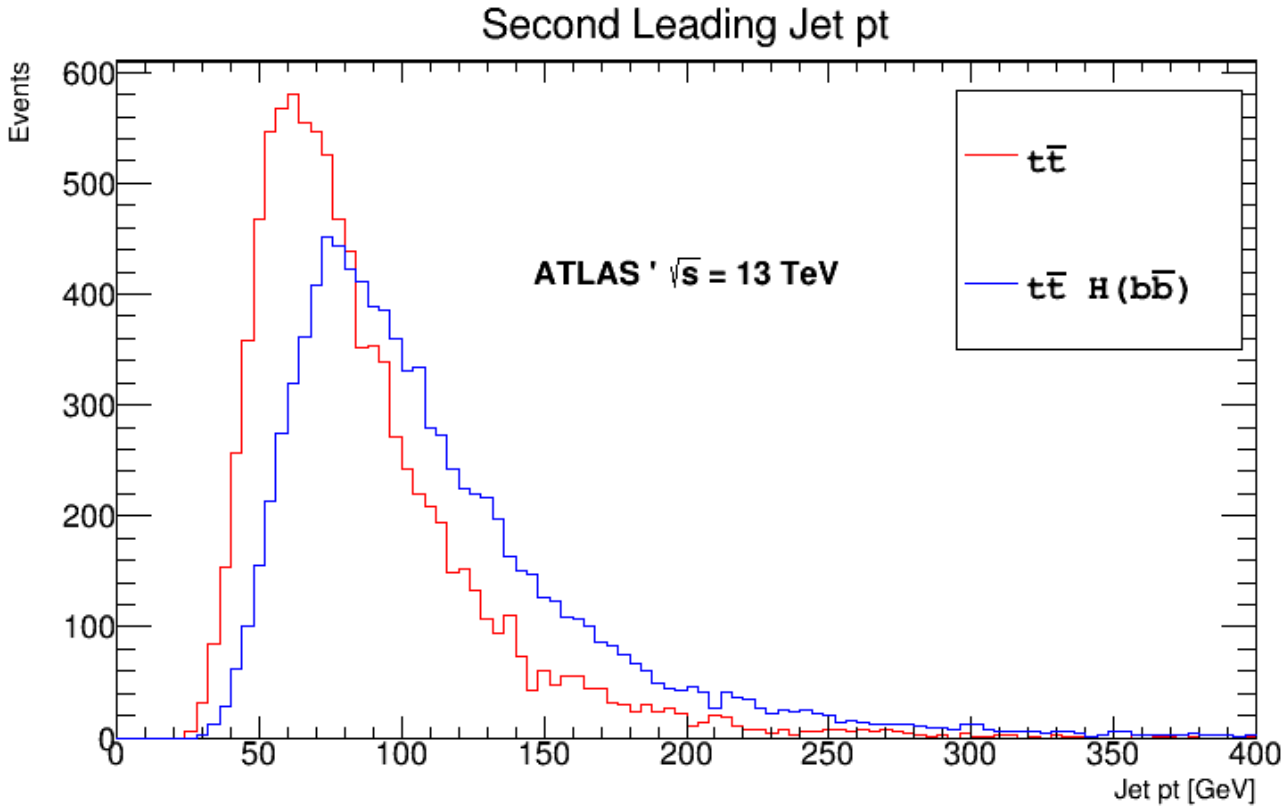

η
Events
ATLAS ' √s = 13 TeV
tt̄
tt̄ H(bb̄)
electron η

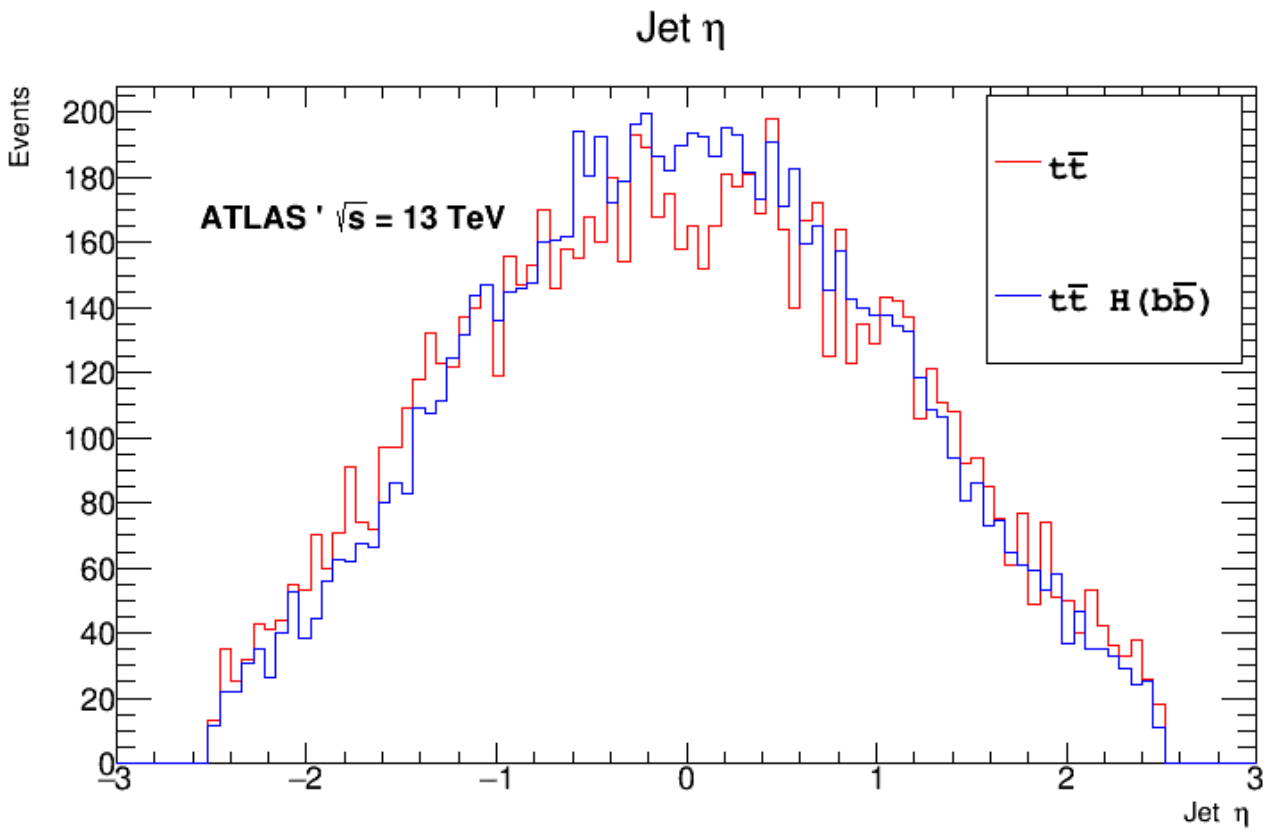

η
Events
ATLAS ' √s = 13 TeV
tt̄
tt̄ H(bb̄)
Muon η

Leading Jet pt

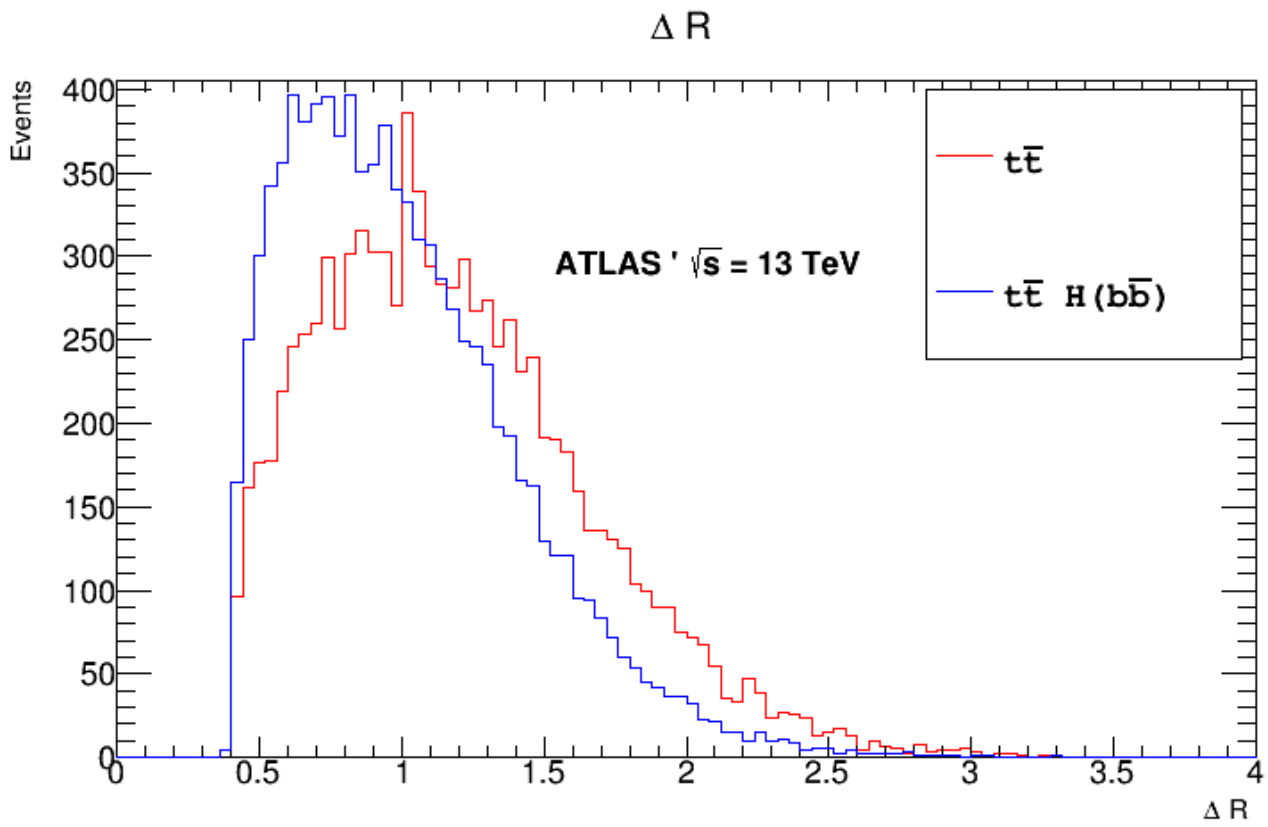


Second leading Jet pt

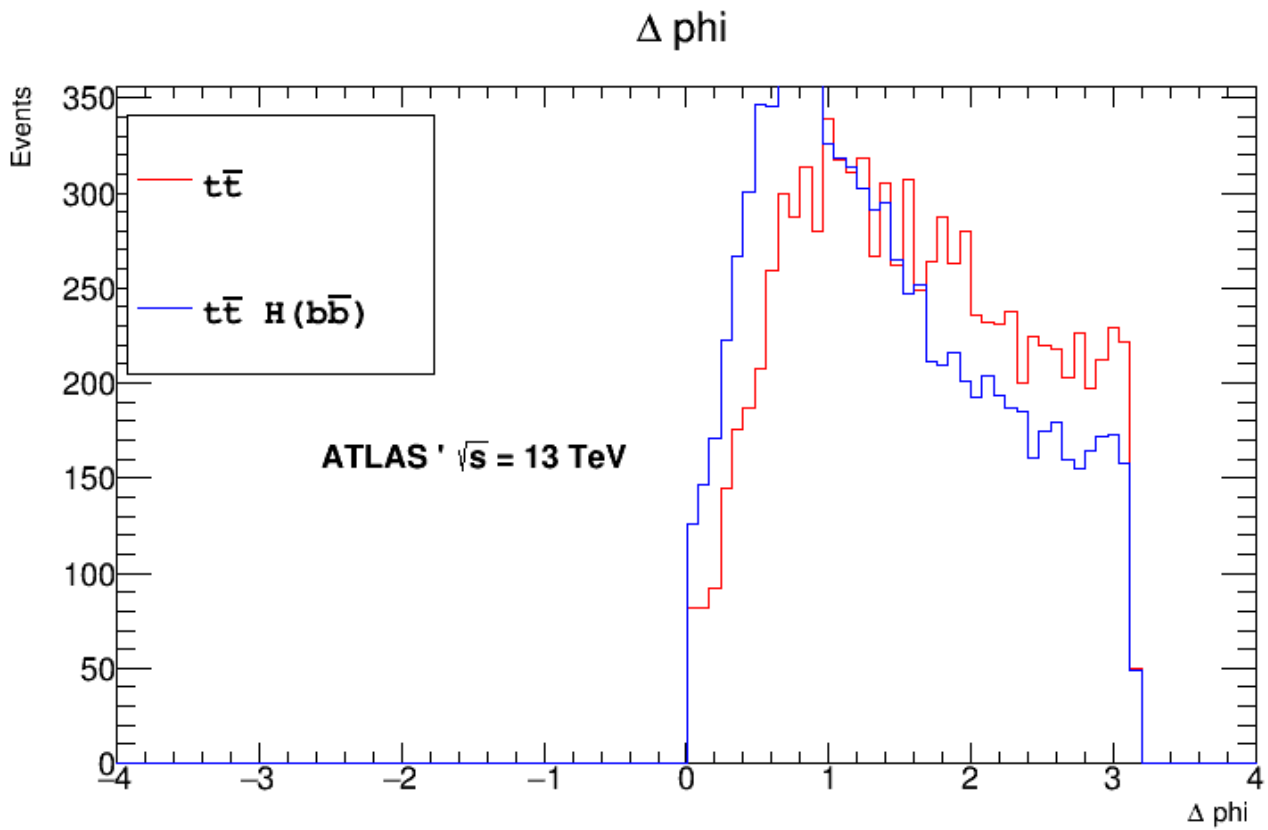



Jet η
Events
ATLAS ' √s = 13 TeV
tt̄
tt̄ H(bb̄)
Jet η
0
20
40
60
80
100
120
140
160
180
200
−3
−2
−1
0
1
2
3

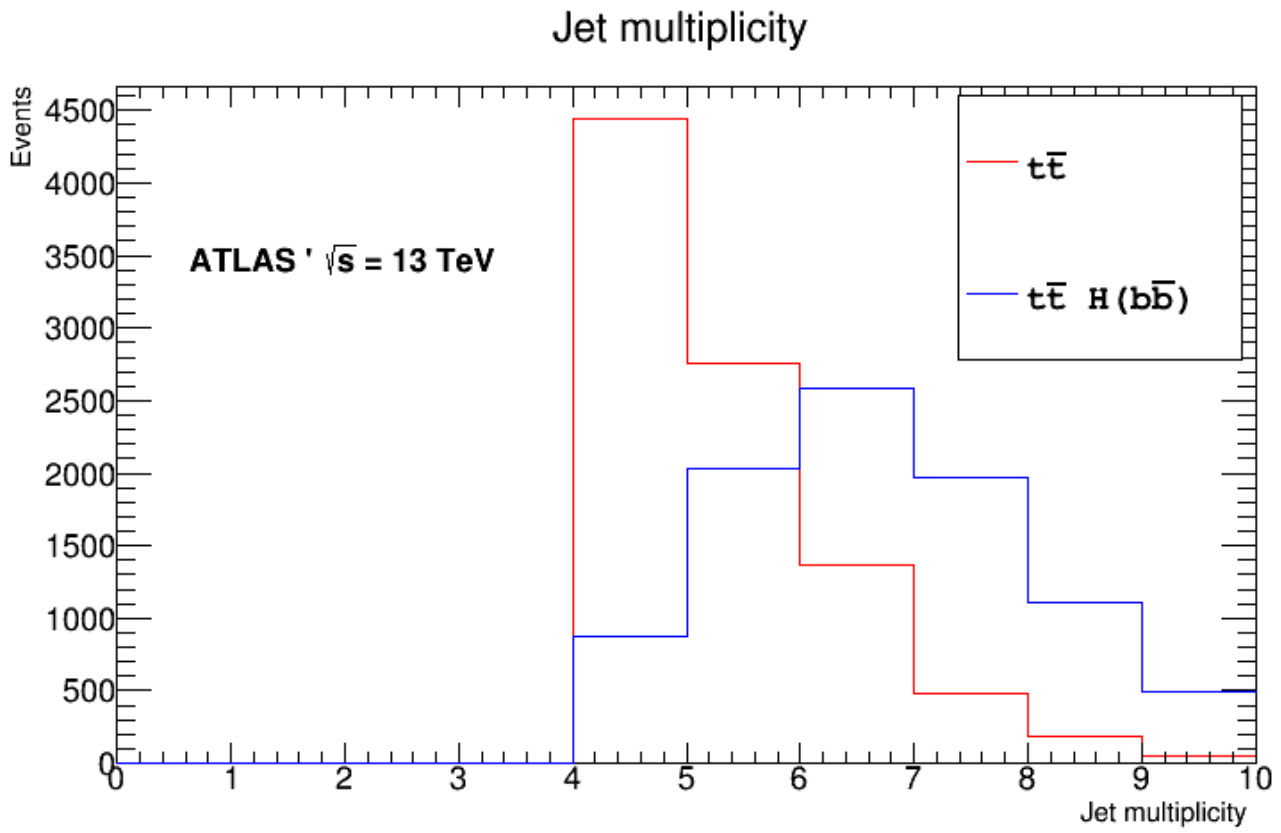
Delta R


Δ R
Events
400
350
300
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
3.5
4
Δ R
ATLAS ' √s = 13 TeV
tt̄
tt̄ H(bb̄)

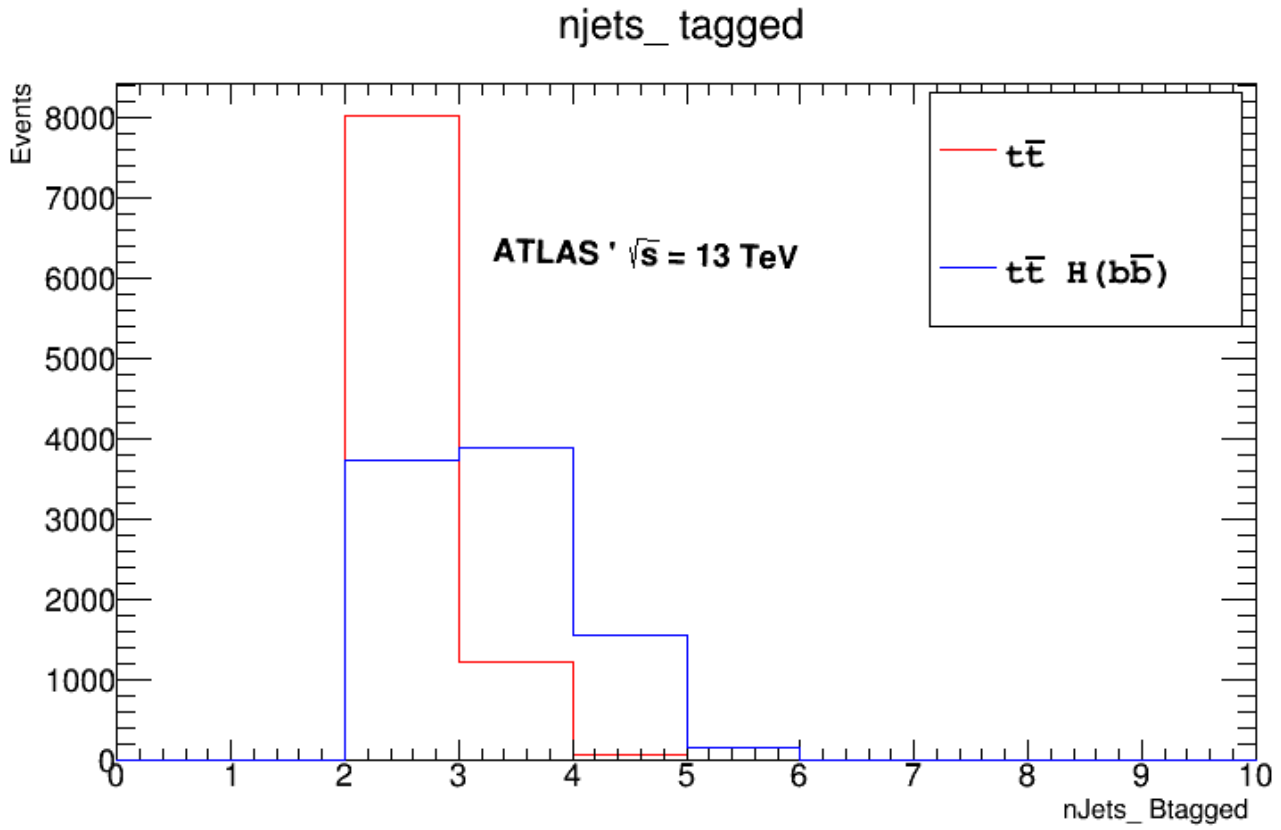
Delta Phi


Δ phi
Events
350
300
250
200
150
100
50
0
−4
−3
−2
−1
0
1
2
3
4
Δ phi
tt̄
tt̄ H(bb̄)
ATLAS ' √s = 13 TeV

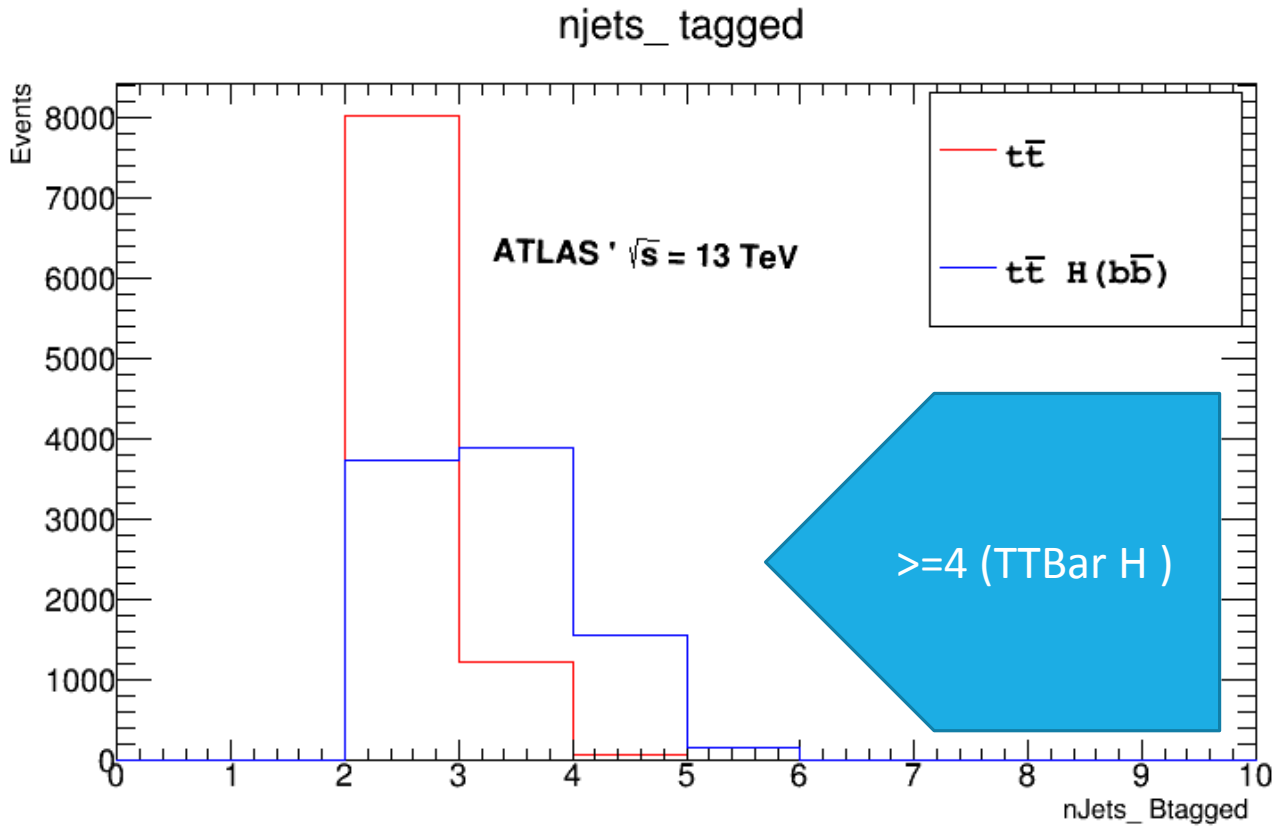
Jet Multiplicity



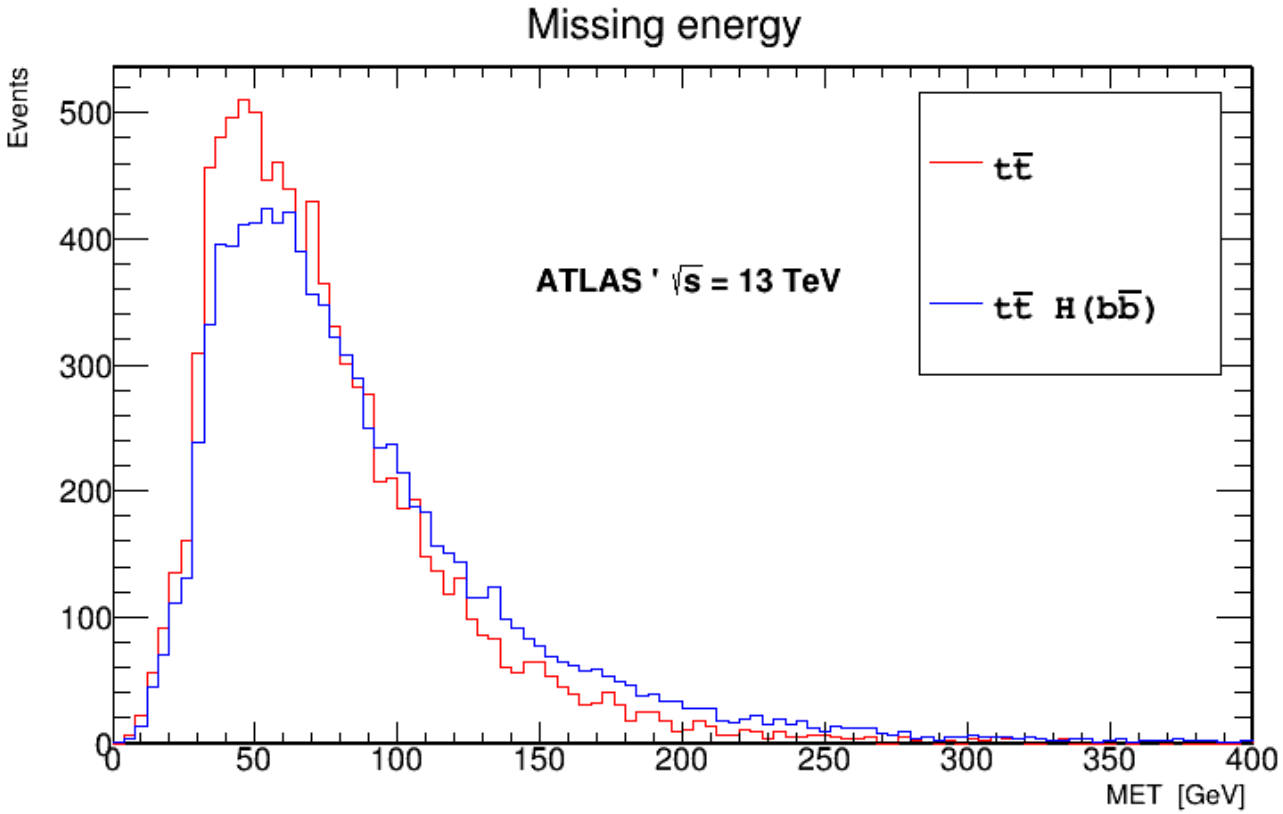
N Jets - Tagged



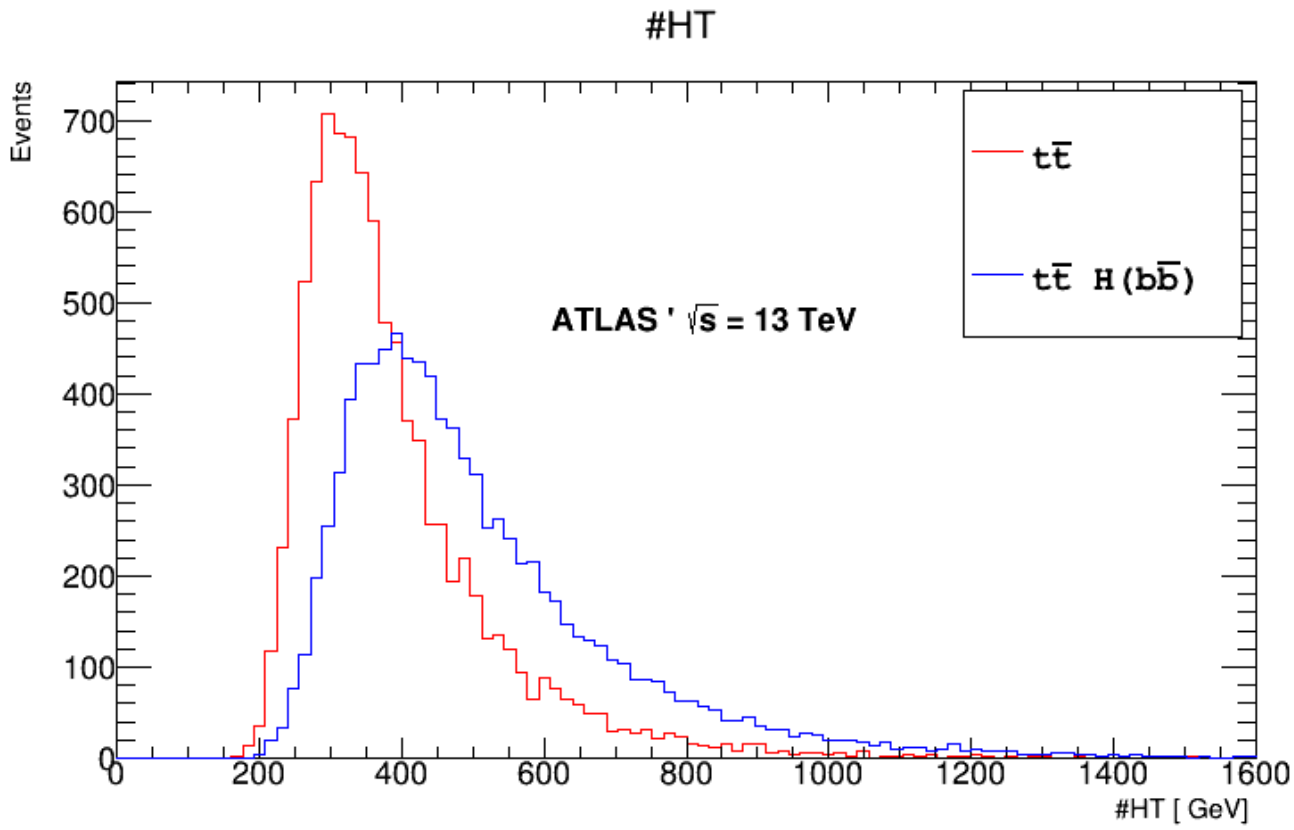
N Jets - Tagged



Missing Energy



$HT = \sum p_t^{jets}$



Further work

1 - Next time we will look to other Regions and use another new functionalities of the code: TTHNtupleAnalysis which provides a flat Ntuples:

2- I'll use new package which is supposed to handle the statistical part of the analysis:
 TtHFitter:
https://twiki.cern.ch/twiki/bin/view/AtlasProtected/TtHFitter

Next week, hopefully we will have nice plots with some data and MC comparisons with 13 TeV results !

Data Cutflow:

https://docs.google.com/spreadsheets/d/1QkK_NUXLj4NKLXHNEPslDERasluntvdfhmm2_A8Crg4/edit#gid=0