

Validation plots for ttH BSM high mass samples (s+t channel)

Hui-Chi Lin (UMich), Meng-Ju Tsai (UMich), Philipp Gadow
(CERN)

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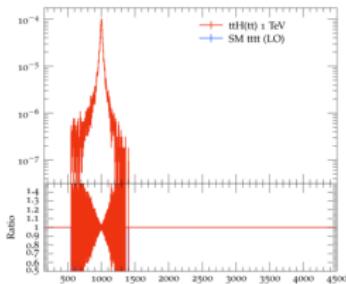
Introduction

- ▶ Study of ttH signal samples on parton and particle/event level.
 - ▶ Samples studied range from 1 TeV to 3 TeV with 100 GeV spacing in mass.
 - ▶ Both s-channel and t-channel simulations were conducted.
 - ▶ Utilized the release AthGeneration,21.6.106 for the generation of samples.
- ▶ Link to the code used for producing results:
[https://github.com/philippgadow/
atlas-run3-multitops-bsm-joboptions/tree/r21](https://github.com/philippgadow/atlas-run3-multitops-bsm-joboptions/tree/r21)

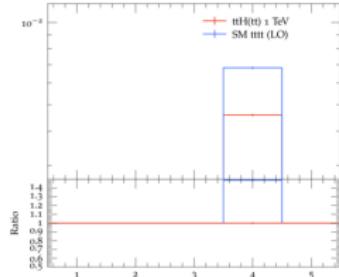
Signal Mass and Width

Signal Mass (GeV)	Signal Width (GeV)	Signal Mass (GeV)	Signal Width (GeV)
1000	30	2100	105
1100	40	2200	110
1200	45	2300	115
1300	50	2400	120
1400	60	2500	125
1500	75	2600	130
1600	80	2700	135
1700	85	2800	140
1800	90	2900	145
1900	95	3000	150
2000	100		

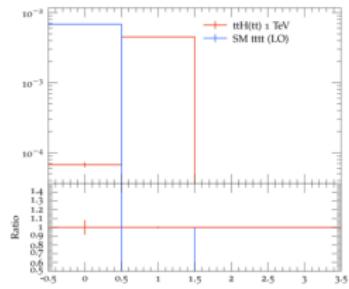
Sample: ttH 1000 GeV - parton level plots



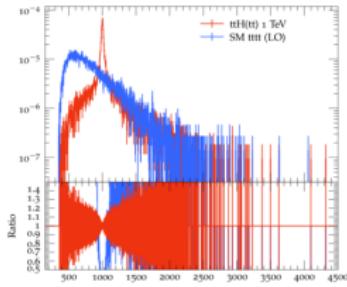
Inclusive mH



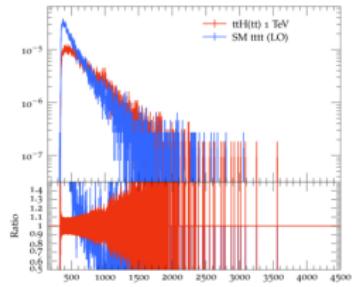
Inclusive $nTop$



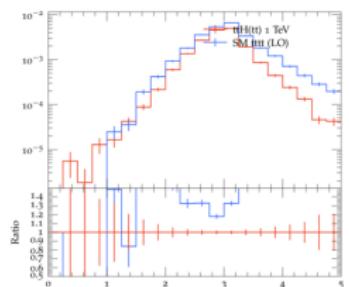
Inclusive nH



Inclusive $InvM$
 $ttbar12$

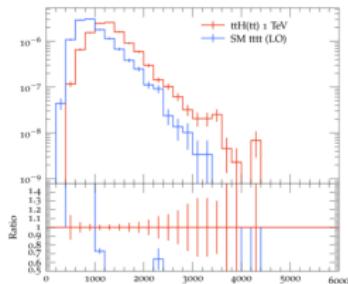


Inclusive $InvM$
 $ttbar34$

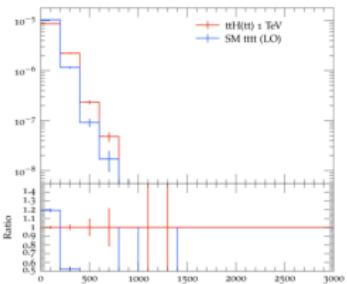


Inclusive dR $ttbar12$

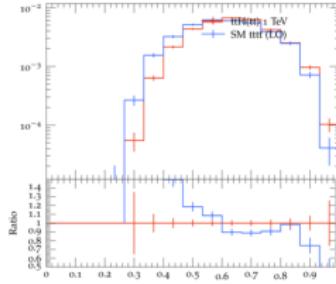
Sample: ttH 1000 GeV - event level plots



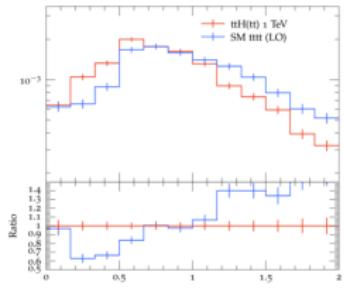
BaselineSR HT 3



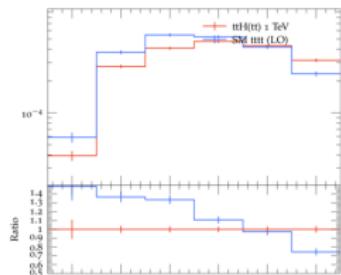
BaselineSR MET



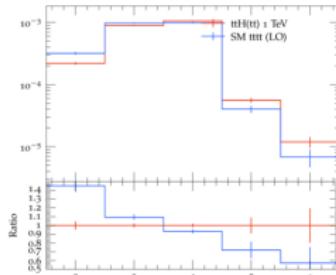
BaselineSR centrality



*BaselineSR deltaR bl
min*

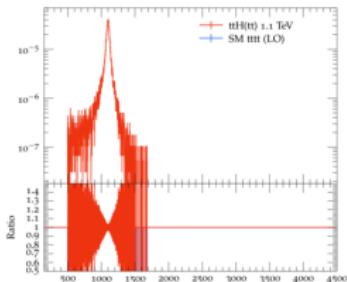


BaselineSR nJets

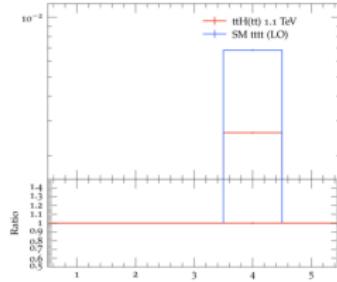


BaselineSR nBjets

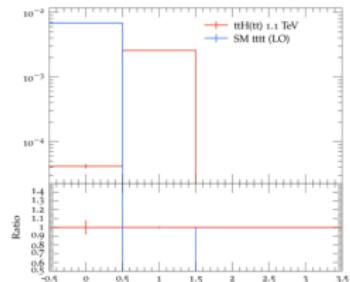
Sample: ttH 1100 GeV - parton level plots



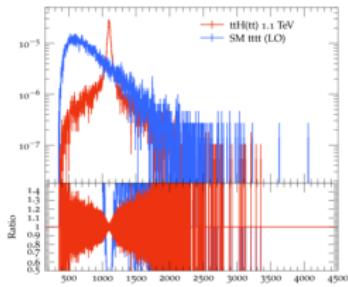
Inclusive mH



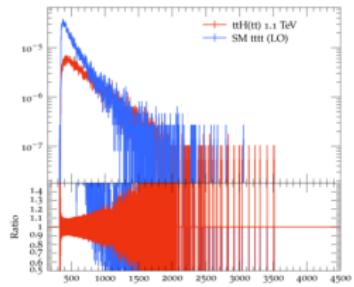
Inclusive $nTop$



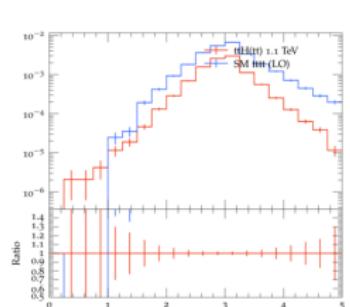
Inclusive nH



Inclusive $InvM$
 $ttbar12$

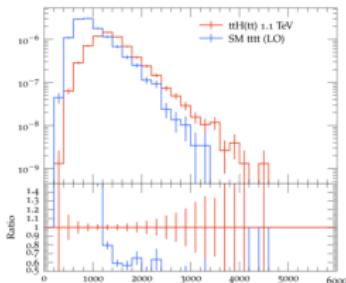


Inclusive $InvM$
 $ttbar34$

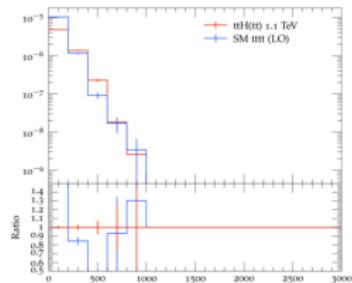


Inclusive dR $ttbar12$

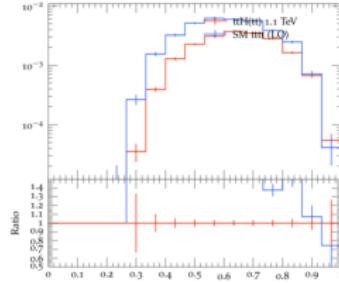
Sample: ttH 1100 GeV - event level plots



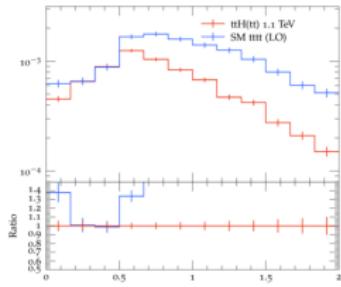
BaselineSR HT 3



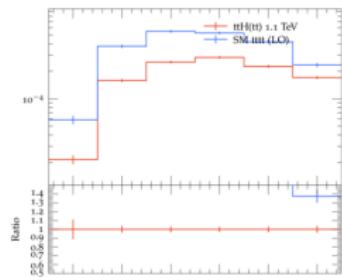
BaselineSR MET



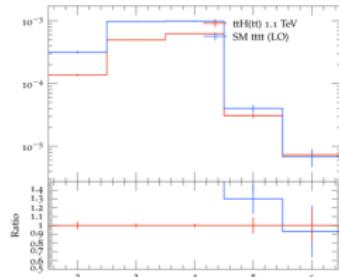
BaselineSR centrality



*BaselineSR deltaR bl
min*

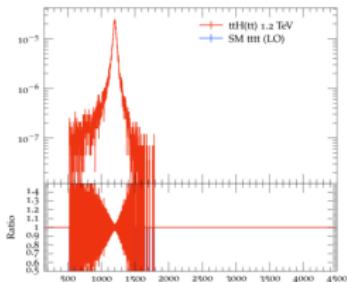


BaselineSR nJets

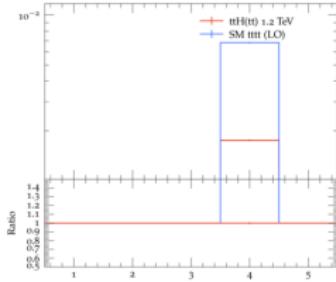


BaselineSR nBjets

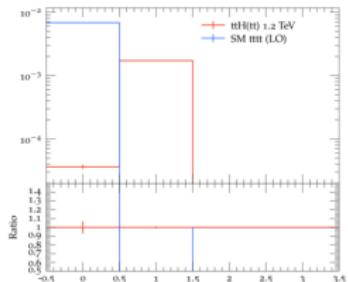
Sample: ttH 1200 GeV - parton level plots



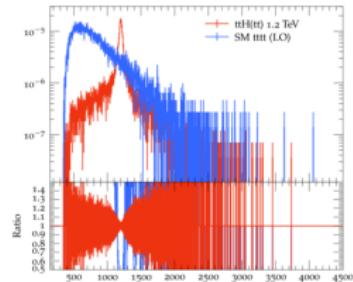
Inclusive m_H



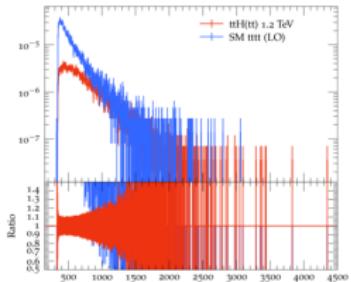
Inclusive n_{Top}



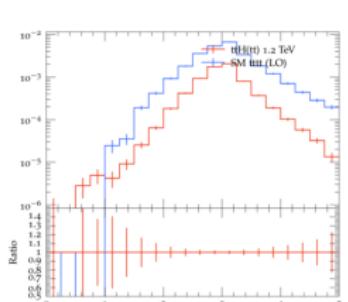
Inclusive n_H



Inclusive $InvM$
 $ttbar12$

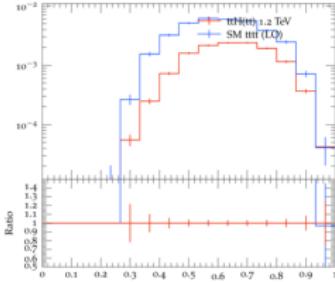
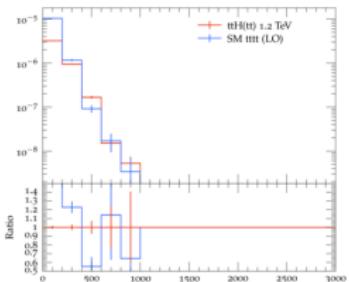
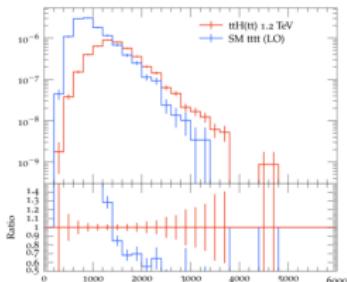


Inclusive $InvM$
 $ttbar34$

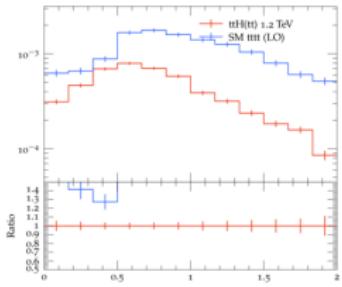


Inclusive dR $ttbar12$

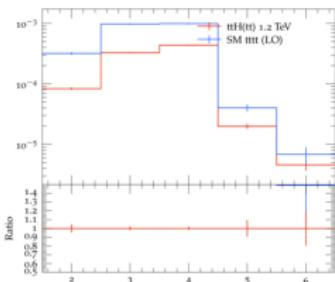
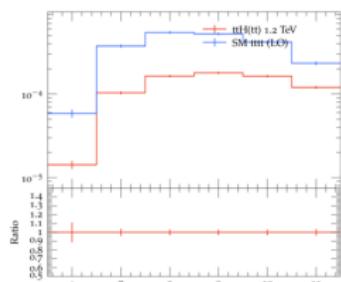
Sample: ttH 1200 GeV - event level plots



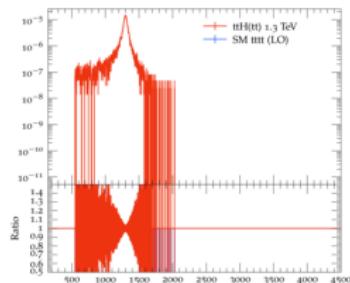
BaselineSR HT 3



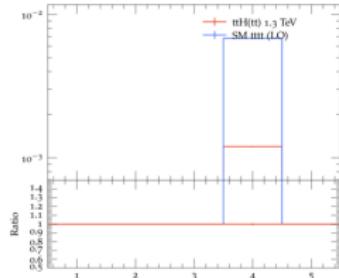
BaselineSR MET



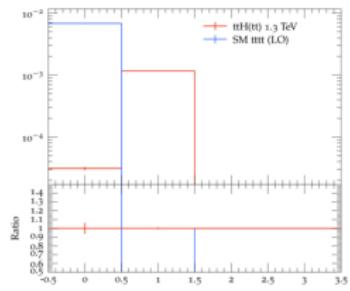
Sample: ttH 1300 GeV - parton level plots



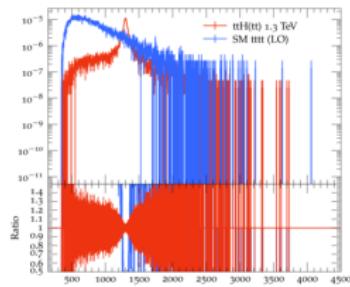
Inclusive mH



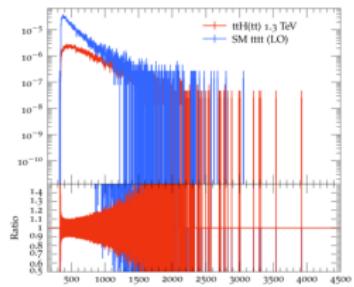
Inclusive $nTop$



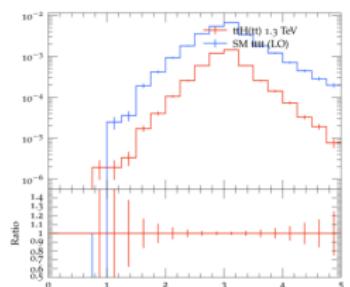
Inclusive nH



Inclusive $InvM$
 $ttbar12$

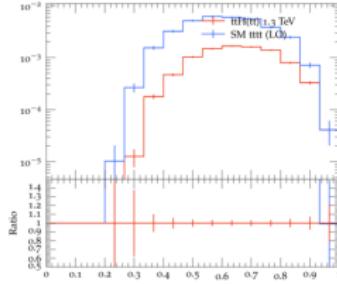
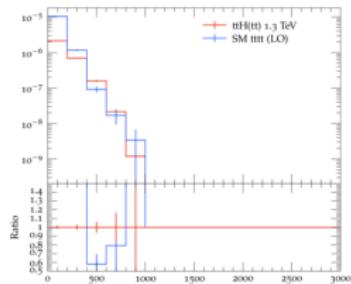
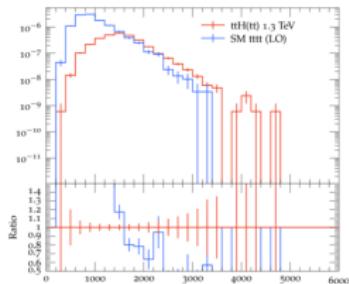


Inclusive $InvM$
 $ttbar34$



Inclusive dR $ttbar12$

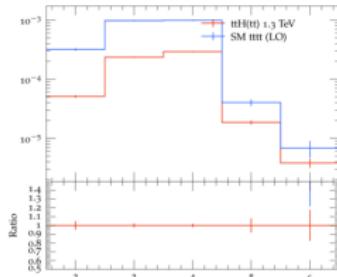
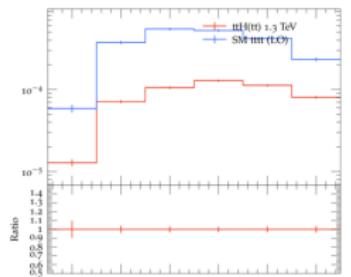
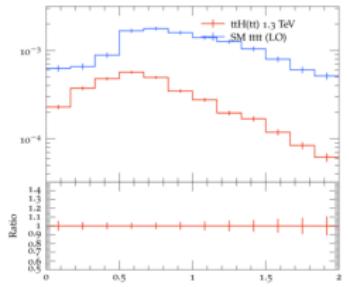
Sample: ttH 1300 GeV - event level plots



BaselineSR HT 3

BaselineSR MET

BaselineSR centrality

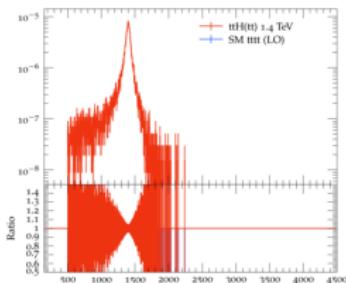


BaselineSR deltaR bl min

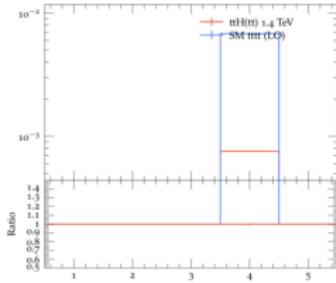
BaselineSR nJets

BaselineSR nBjets

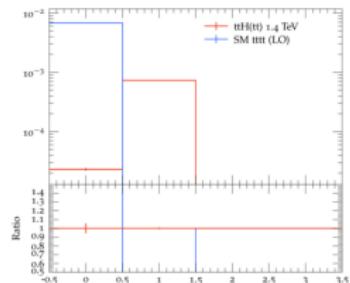
Sample: ttH 1400 GeV - parton level plots



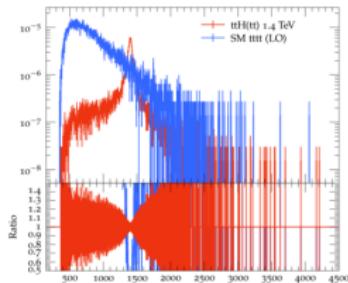
Inclusive mH



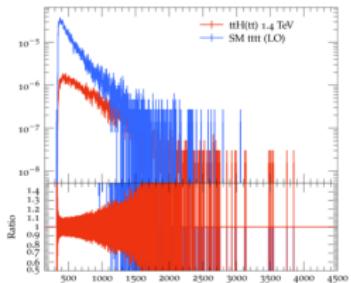
Inclusive $nTop$



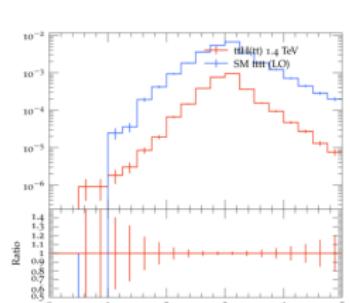
Inclusive nH



Inclusive $InvM$
 $ttbar12$

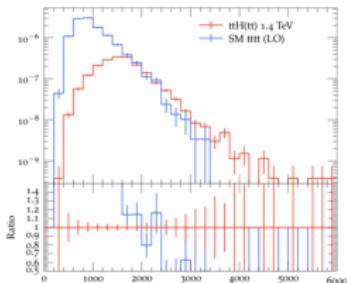


Inclusive $InvM$
 $ttbar34$

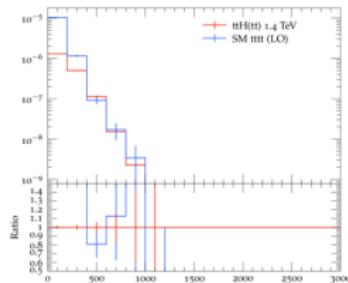


Inclusive dR $ttbar12$

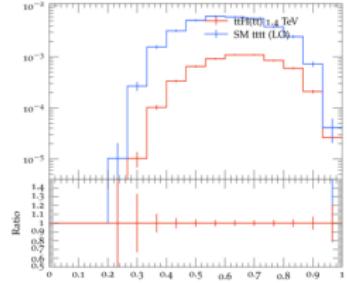
Sample: ttH 1400 GeV - event level plots



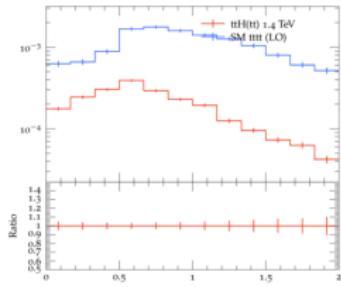
BaselineSR HT 3



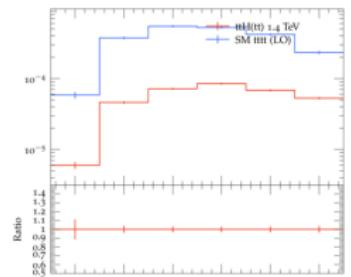
BaselineSR MET



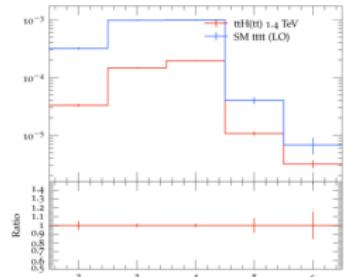
BaselineSR centrality



*BaselineSR deltaR bl
min*

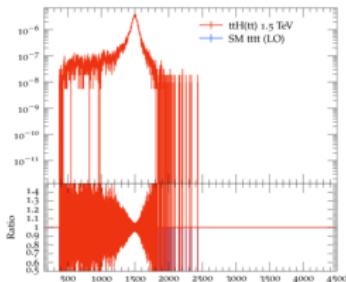


BaselineSR nJets

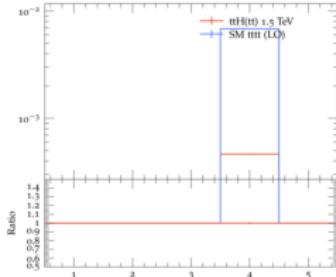


BaselineSR nBjets

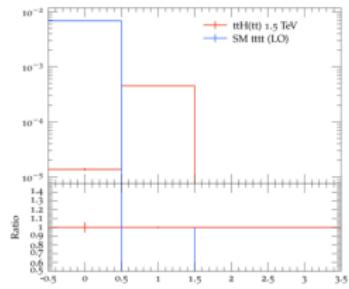
Sample: ttH 1500 GeV - parton level plots



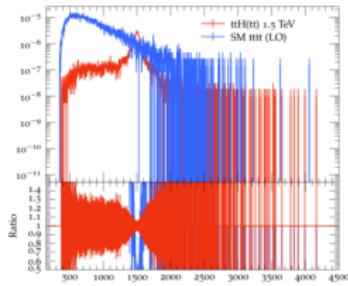
Inclusive m_H



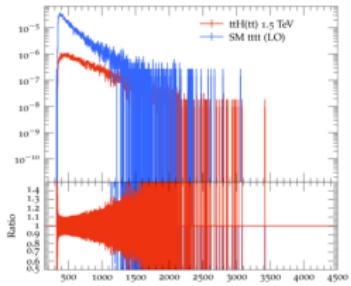
Inclusive n_{Top}



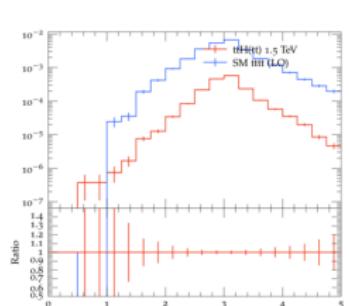
Inclusive n_H



Inclusive $\text{InvM}_{tt\bar{b}12}$

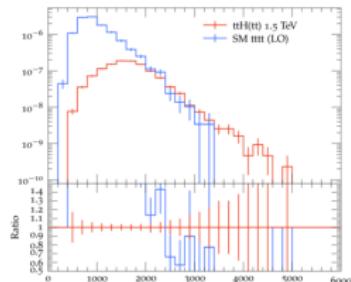


Inclusive $\text{InvM}_{tt\bar{b}34}$

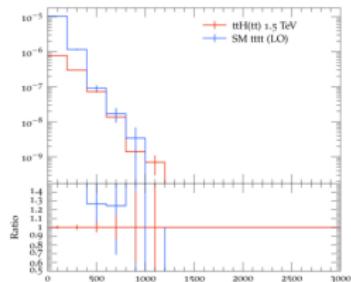


Inclusive $dR_{tt\bar{b}12}$

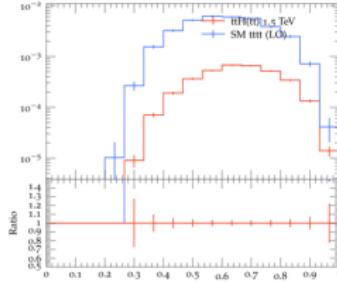
Sample: ttH 1500 GeV - event level plots



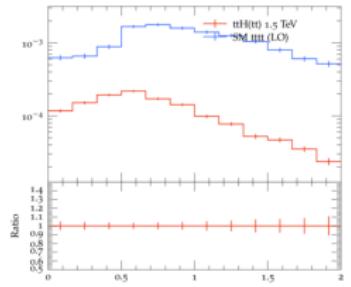
BaselineSR HT 3



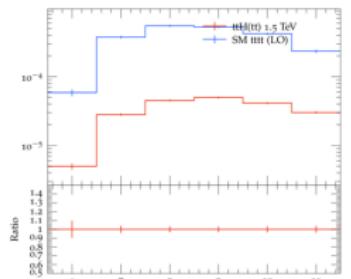
BaselineSR MET



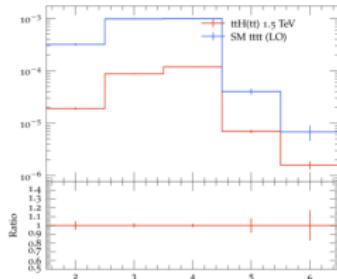
BaselineSR centrality



*BaselineSR deltaR bl
min*

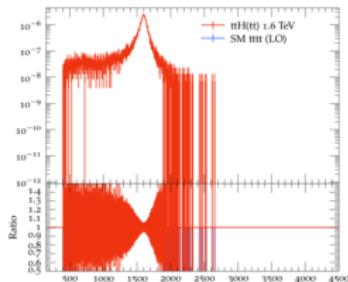


BaselineSR nJets

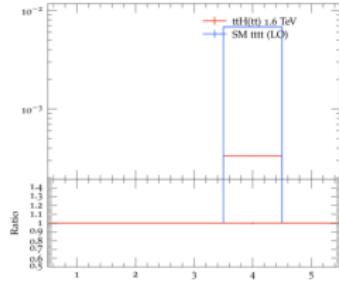


BaselineSR nBjets

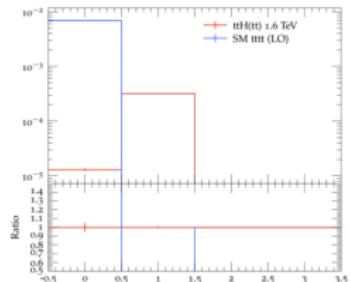
Sample: ttH 1600 GeV - parton level plots



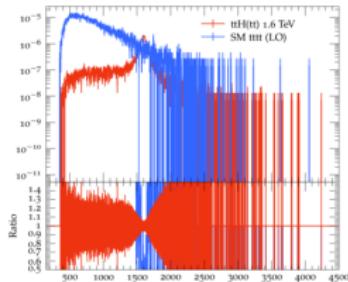
Inclusive mH



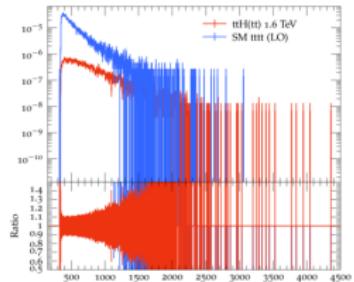
Inclusive $nTop$



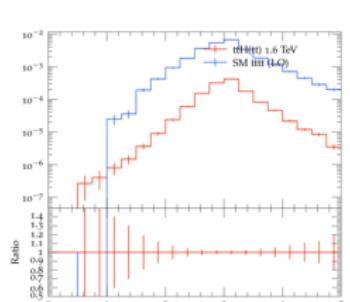
Inclusive nH



Inclusive $InvM$
 $ttbar12$

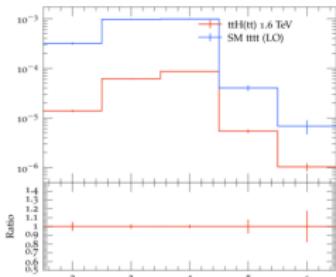
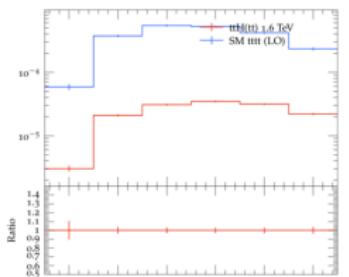
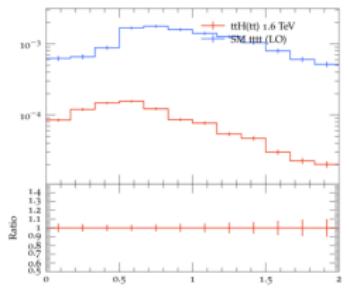
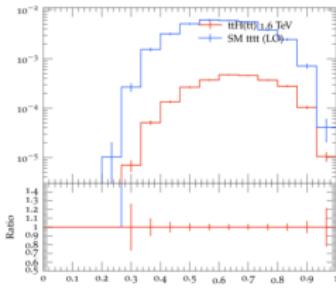
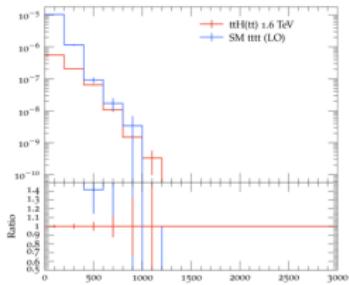
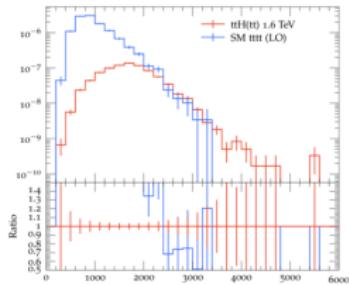


Inclusive $InvM$
 $ttbar34$

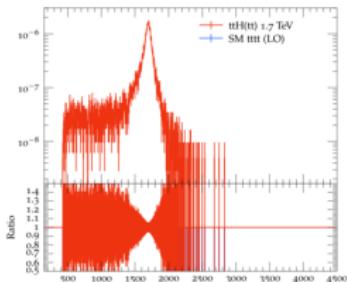


Inclusive dR $ttbar12$

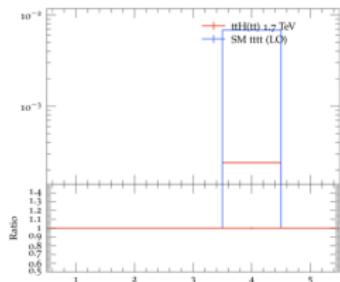
Sample: ttH 1600 GeV - event level plots



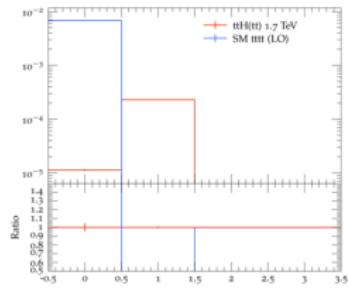
Sample: ttH 1700 GeV - parton level plots



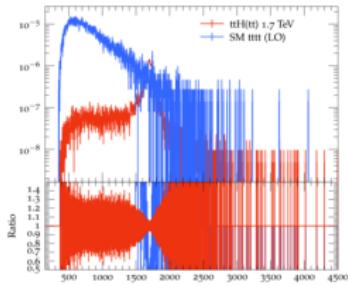
Inclusive mH



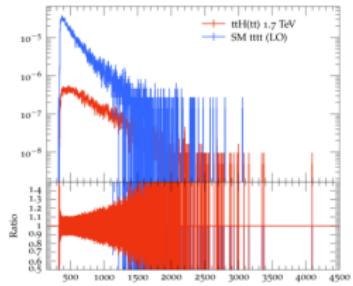
Inclusive $nTop$



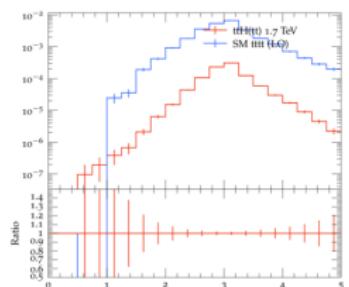
Inclusive nH



Inclusive $InvM_{ttbar12}$

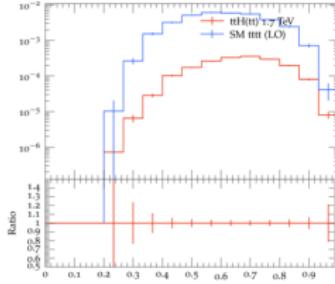
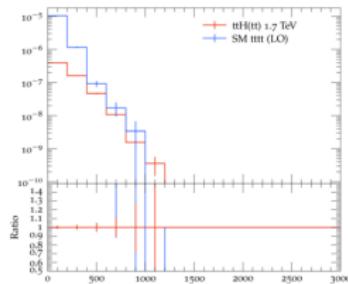
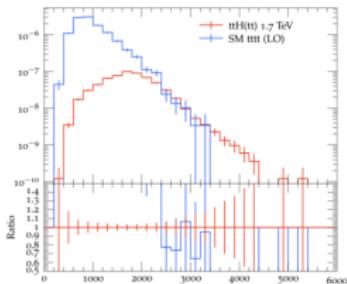


Inclusive $InvM_{ttbar34}$



Inclusive $dR_{ttbar12}$

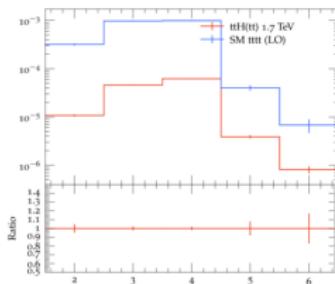
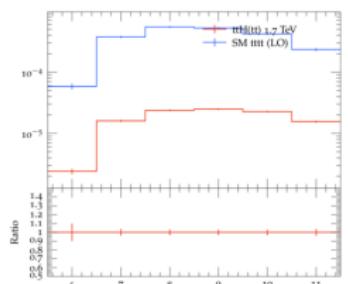
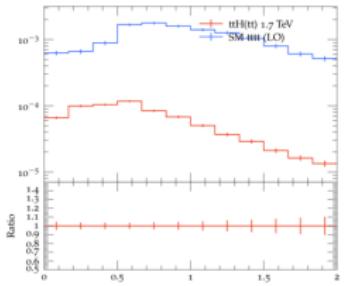
Sample: ttH 1700 GeV - event level plots



BaselineSR HT 3

BaselineSR MET

BaselineSR centrality

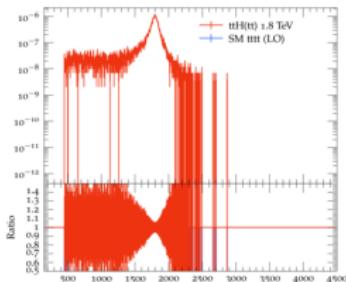


BaselineSR deltaR bl
min

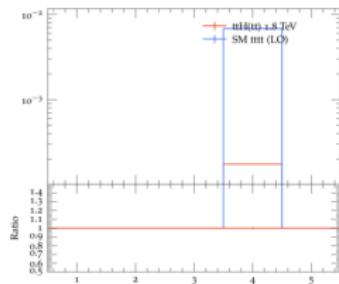
BaselineSR nJets

BaselineSR nBjets

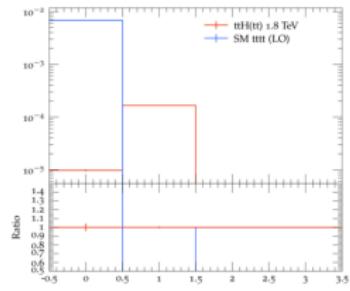
Sample: ttH 1800 GeV - parton level plots



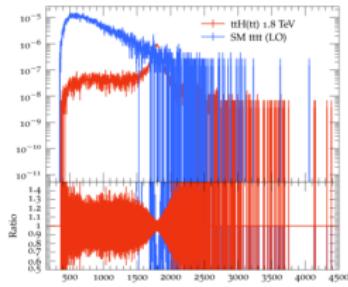
Inclusive mH



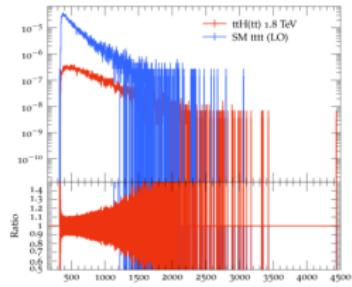
Inclusive $nTop$



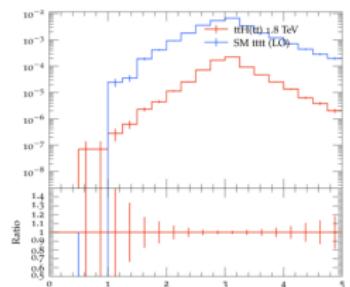
Inclusive nH



Inclusive $InvM$
 $ttbar12$

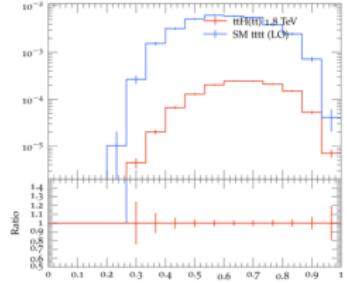
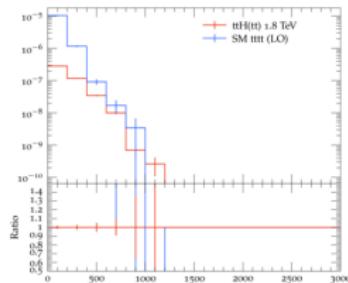
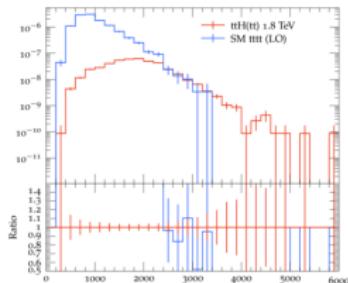


Inclusive $InvM$
 $ttbar34$



Inclusive dR $ttbar12$

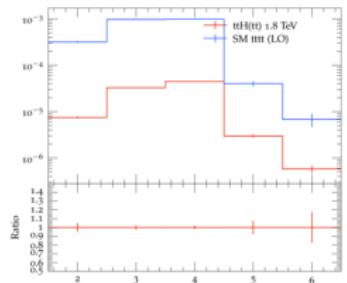
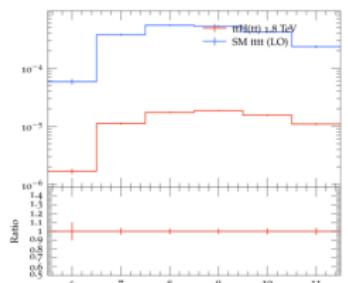
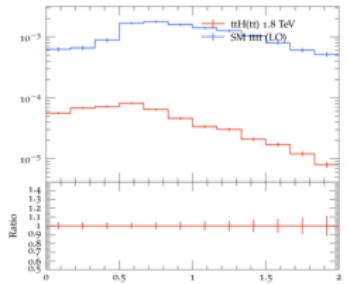
Sample: ttH 1800 GeV - event level plots



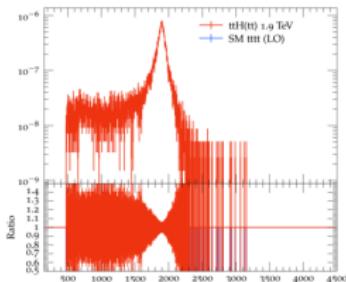
BaselineSR HT 3

BaselineSR MET

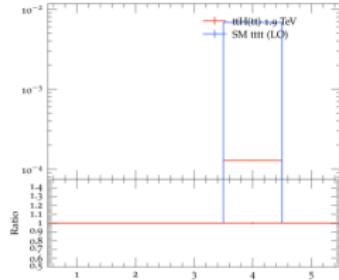
BaselineSR centrality



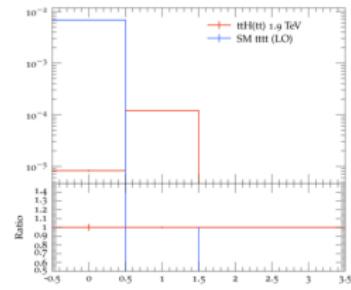
Sample: ttH 1900 GeV - parton level plots



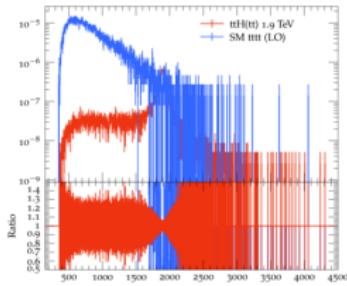
Inclusive mH



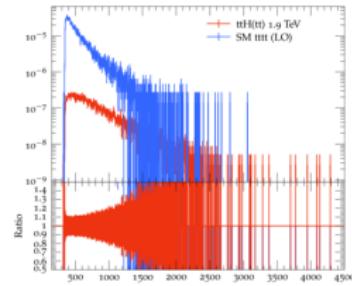
Inclusive $nTop$



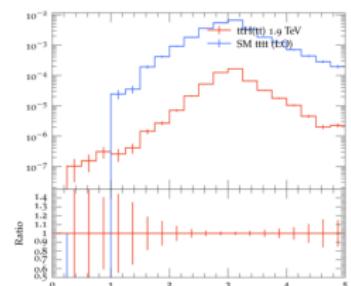
Inclusive nH



Inclusive $InvM$
 $ttbar12$

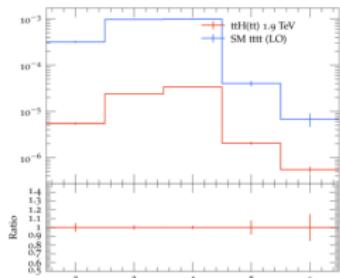
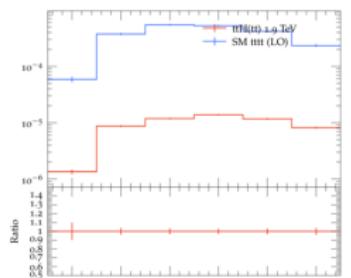
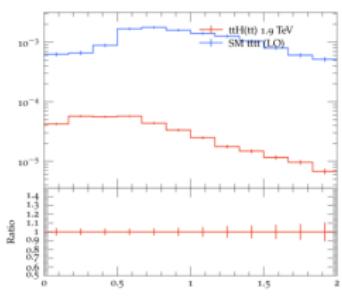
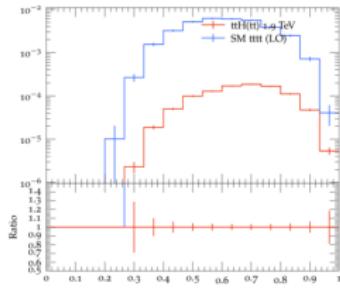
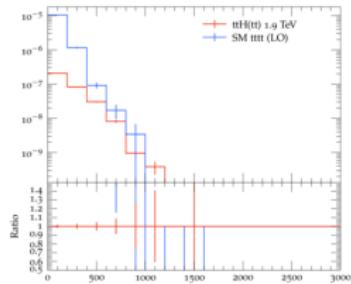
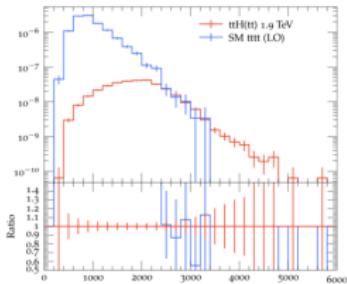


Inclusive $InvM$
 $ttbar34$

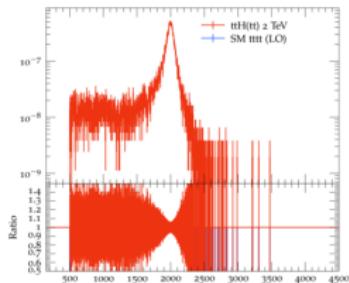


Inclusive dR $ttbar12$

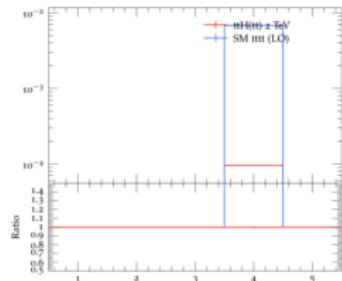
Sample: ttH 1900 GeV - event level plots



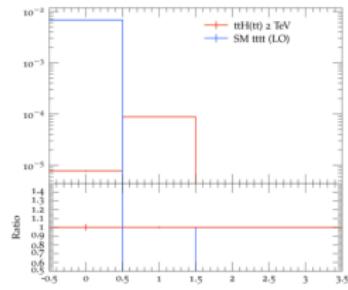
Sample: ttH 2000 GeV - parton level plots



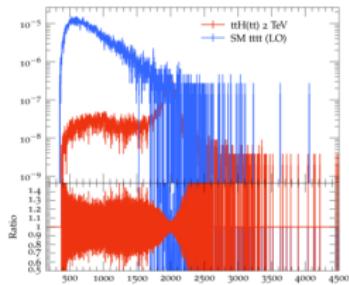
Inclusive mH



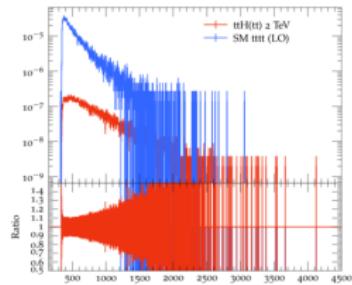
Inclusive $nTop$



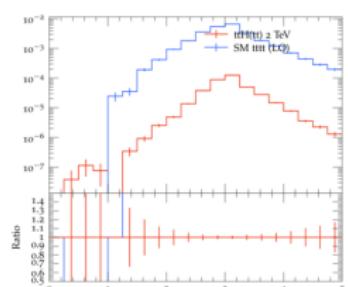
Inclusive nH



Inclusive $InvM_{ttbar12}$

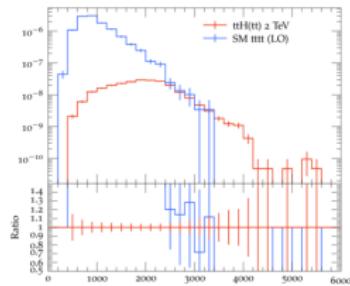


Inclusive $InvM_{ttbar34}$

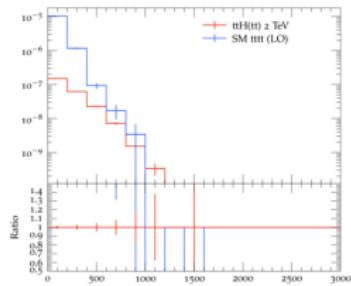


Inclusive $dR_{ttbar12}$

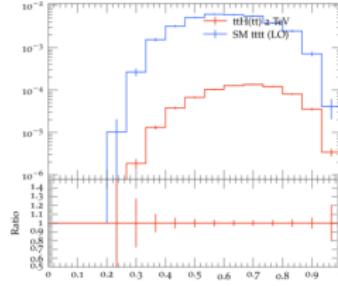
Sample: ttH 2000 GeV - event level plots



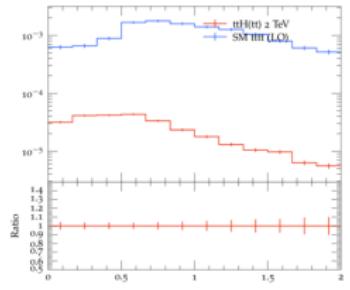
BaselineSR HT 3



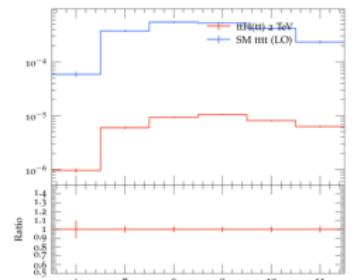
BaselineSR MET



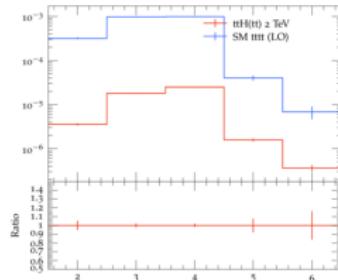
BaselineSR centrality



*BaselineSR deltaR bl
min*

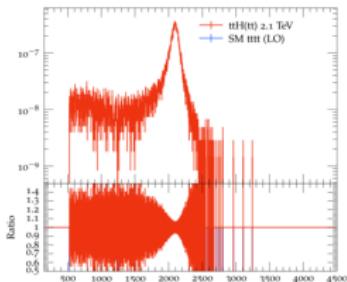


BaselineSR nJets

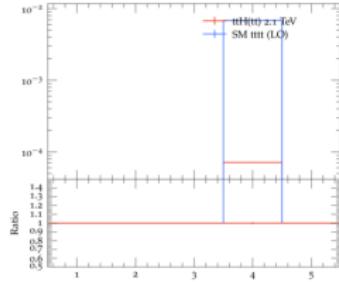


BaselineSR nBjets

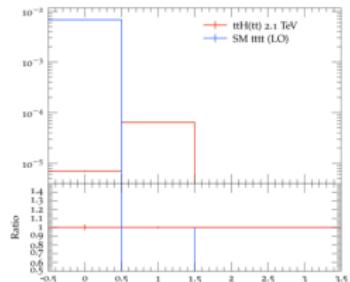
Sample: ttH 2100 GeV - parton level plots



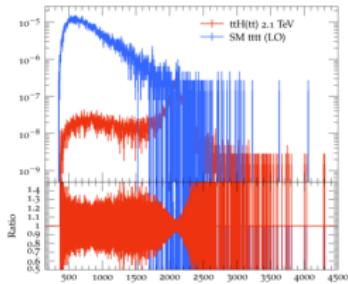
Inclusive mH



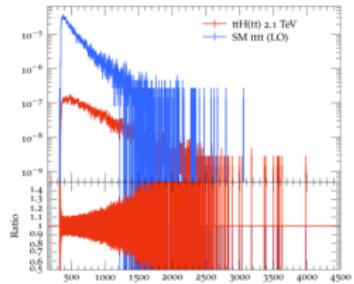
Inclusive $nTop$



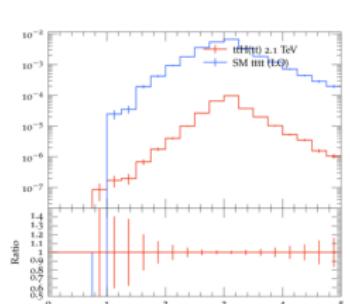
Inclusive nH



Inclusive $\text{InvM}_{tt\bar{t}12}$

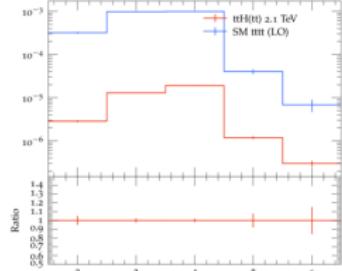
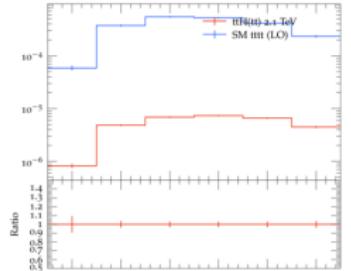
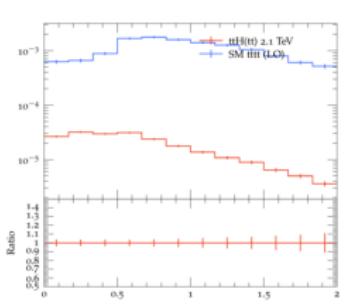
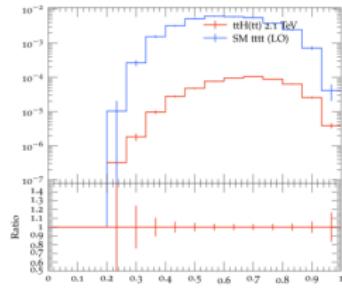
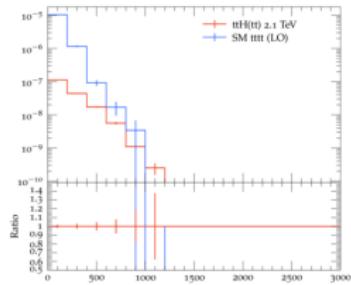
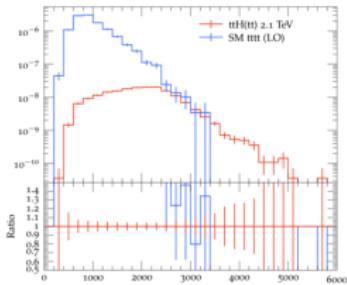


Inclusive $\text{InvM}_{tt\bar{t}34}$

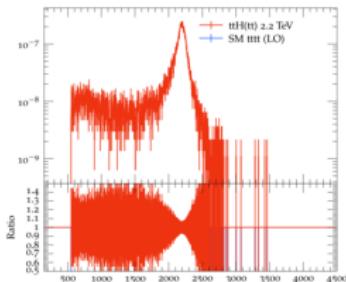


Inclusive $dR_{tt\bar{t}12}$

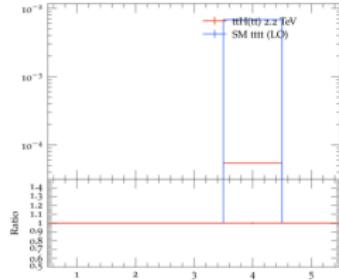
Sample: ttH 2100 GeV - event level plots



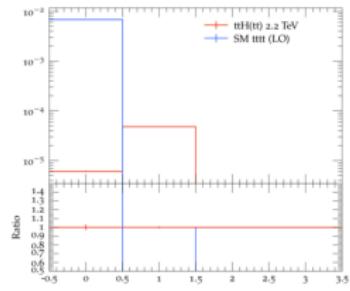
Sample: ttH 2200 GeV - parton level plots



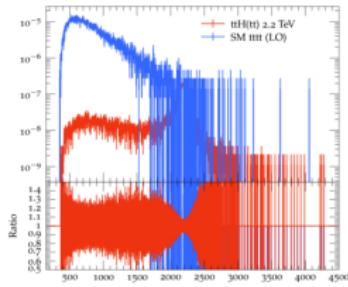
Inclusive mH



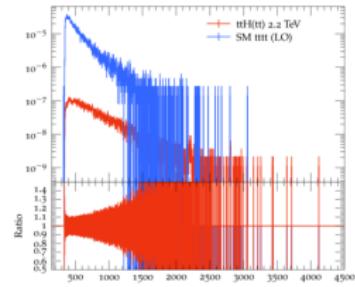
Inclusive $nTop$



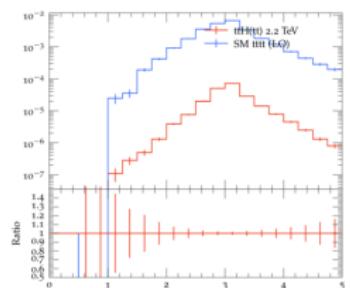
Inclusive nH



Inclusive $\text{InvM}_{tt\bar{b}ar12}$

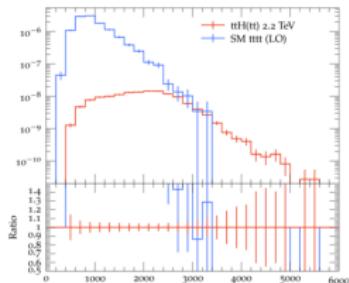


Inclusive $\text{InvM}_{tt\bar{b}ar34}$

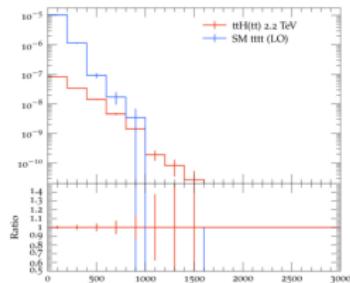


Inclusive $dR_{tt\bar{b}ar12}$

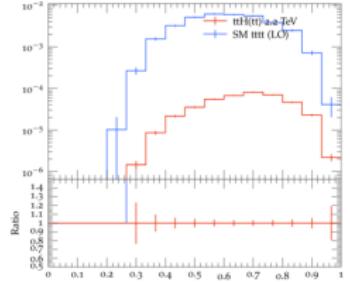
Sample: ttH 2200 GeV - event level plots



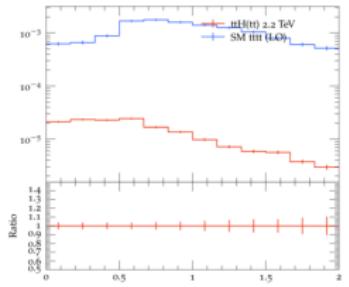
BaselineSR HT 3



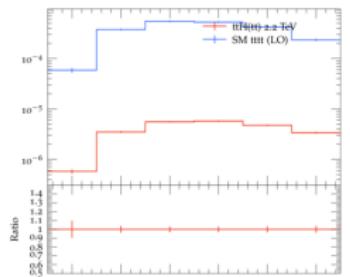
BaselineSR MET



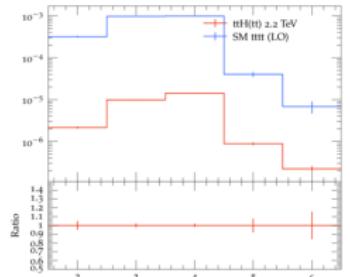
BaselineSR centrality



*BaselineSR deltaR bl
min*

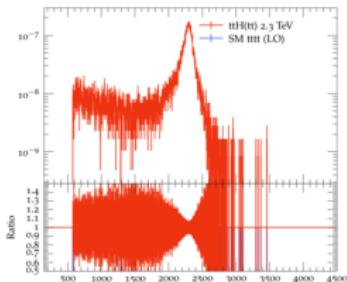


BaselineSR nJets

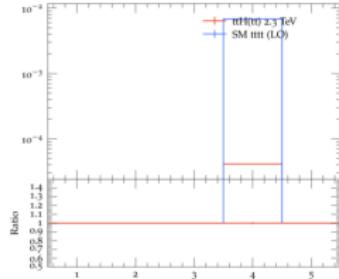


BaselineSR nBjets

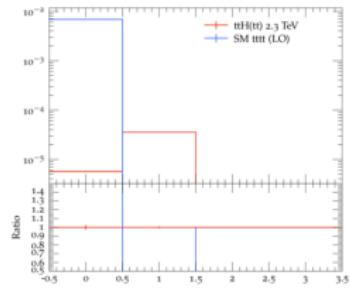
Sample: ttH 2300 GeV - parton level plots



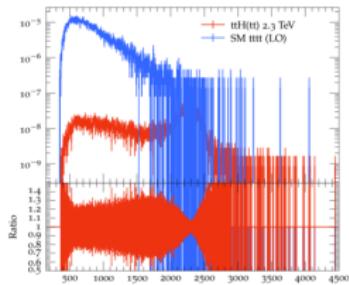
Inclusive mH



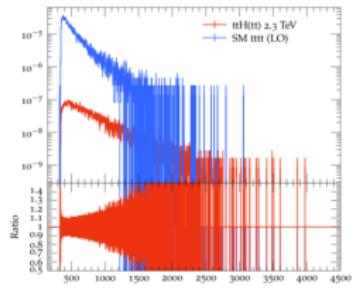
Inclusive $nTop$



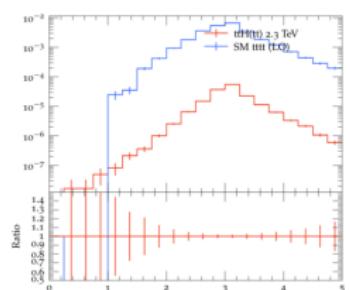
Inclusive nH



Inclusive $InvM_{ttbar12}$

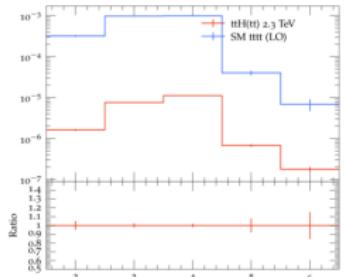
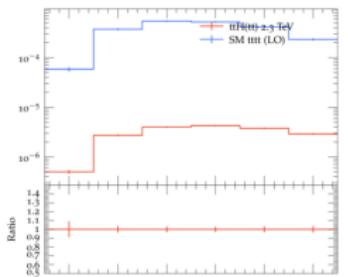
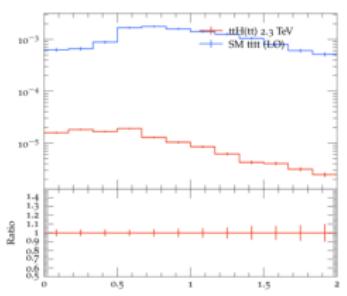
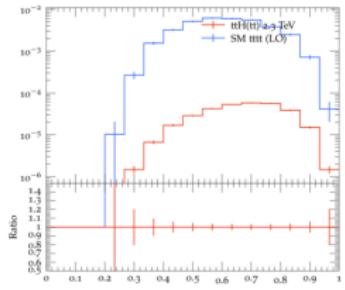
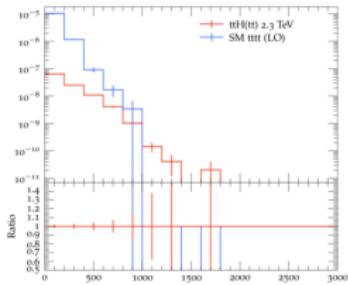
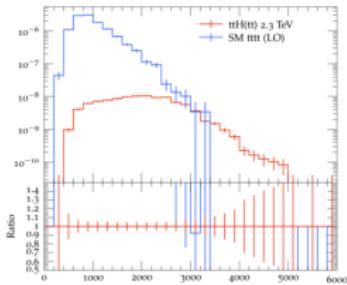


Inclusive $InvM_{ttbar34}$

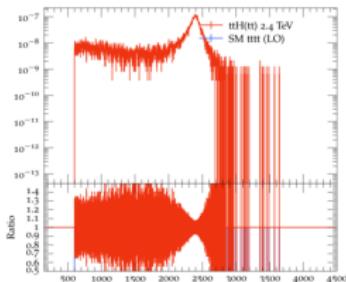


Inclusive $dR_{ttbar12}$

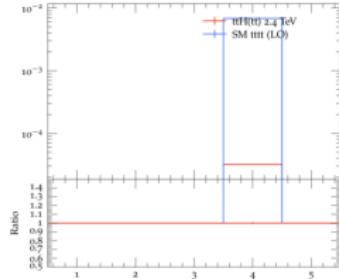
Sample: ttH 2300 GeV - event level plots



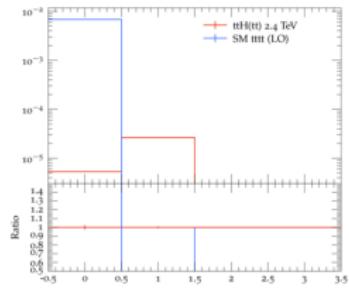
Sample: ttH 2400 GeV - parton level plots



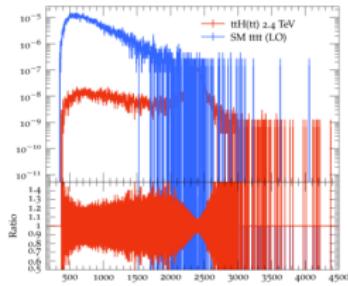
Inclusive mH



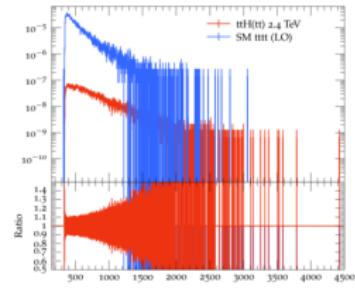
Inclusive $nTop$



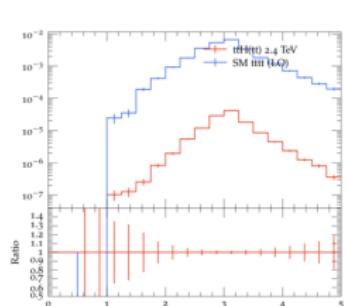
Inclusive nH



Inclusive $\text{InvM}_{tt\bar{b}12}$

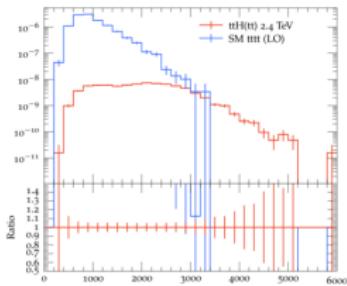


Inclusive $\text{InvM}_{tt\bar{b}34}$

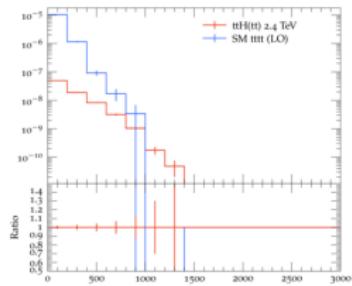


Inclusive $dR_{tt\bar{b}12}$

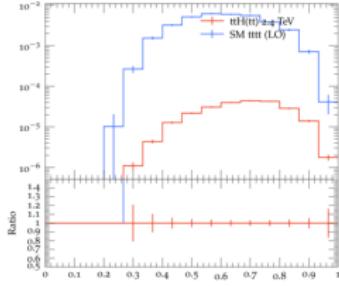
Sample: ttH 2400 GeV - event level plots



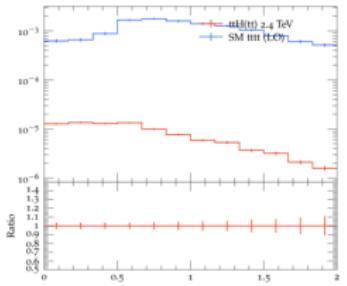
BaselineSR HT 3



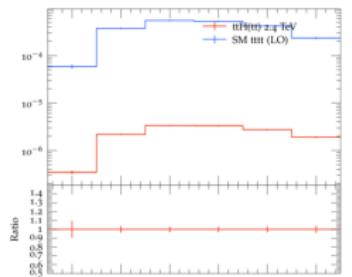
BaselineSR MET



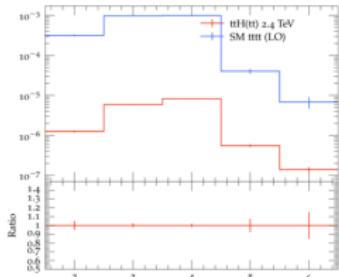
BaselineSR centrality



*BaselineSR deltaR bl
min*

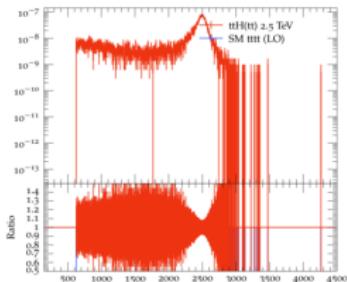


BaselineSR nJets

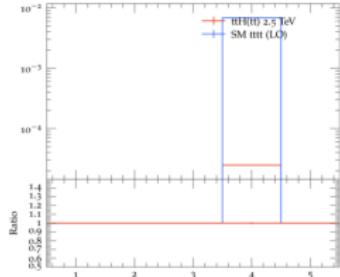


BaselineSR nBjets

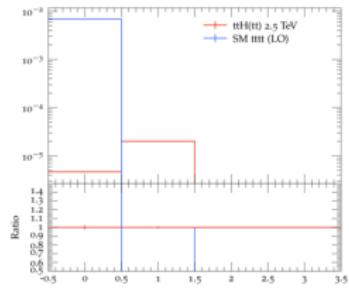
Sample: ttH 2500 GeV - parton level plots



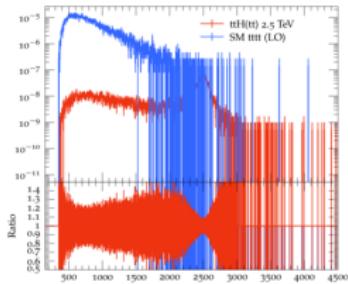
Inclusive mH



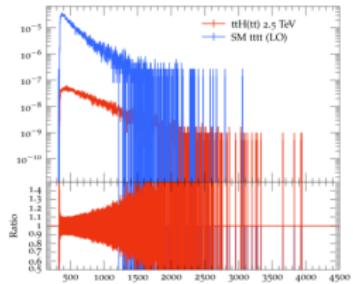
Inclusive $nTop$



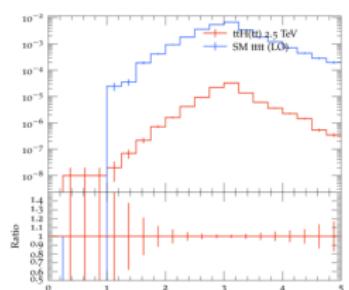
Inclusive nH



Inclusive $InvM$
 $ttbar12$

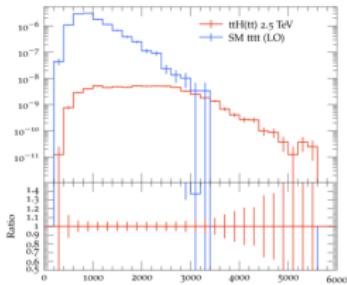


Inclusive $InvM$
 $ttbar34$

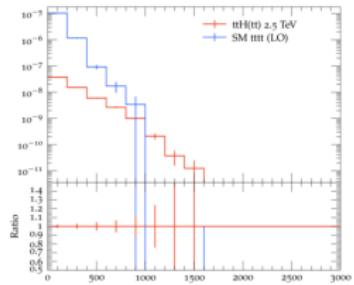


Inclusive dR $ttbar12$

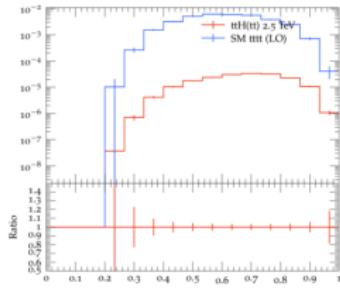
Sample: ttH 2500 GeV - event level plots



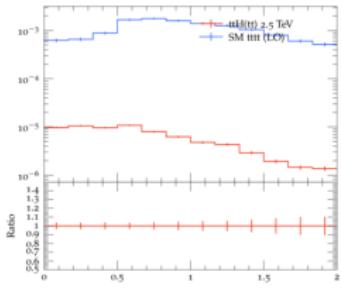
BaselineSR HT 3



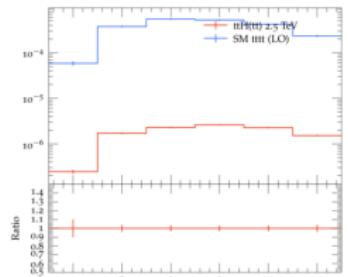
BaselineSR MET



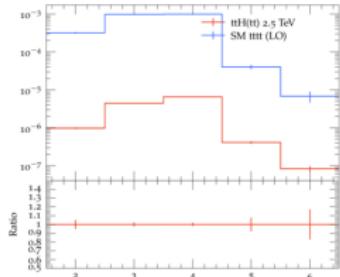
BaselineSR centrality



*BaselineSR deltaR bl
min*

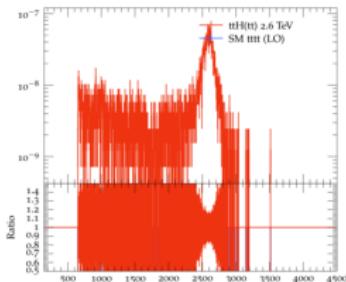


BaselineSR nJets

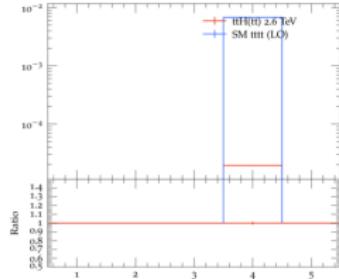


BaselineSR nBjets

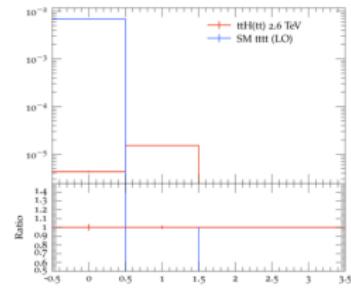
Sample: ttH 2600 GeV - parton level plots



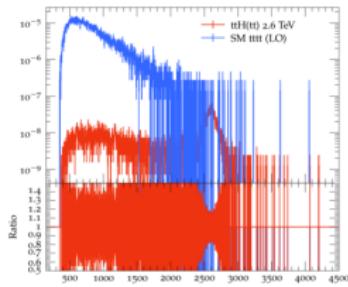
Inclusive mH



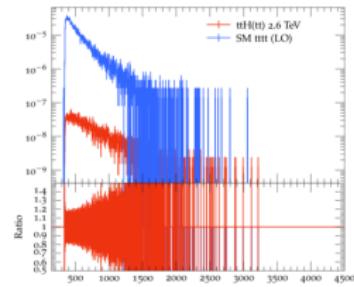
Inclusive $nTop$



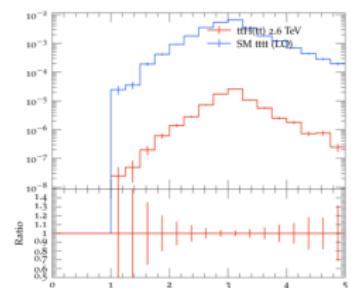
Inclusive nH



Inclusive $InvM$
 $ttbar12$

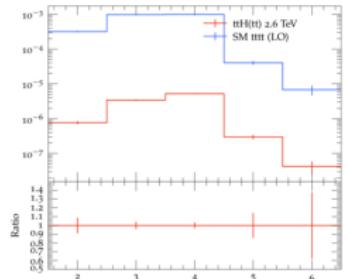
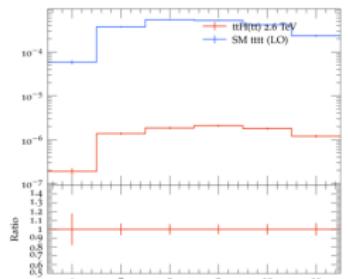
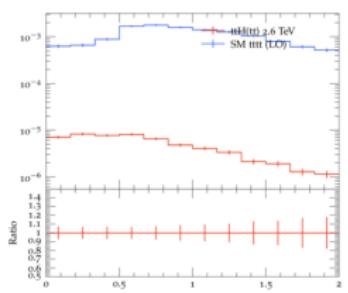
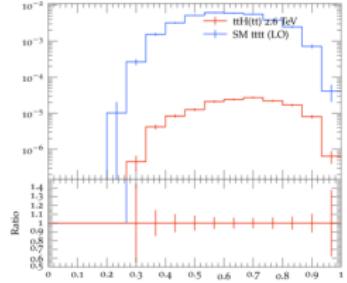
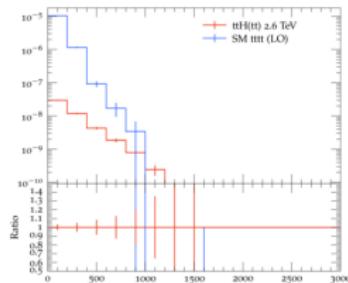
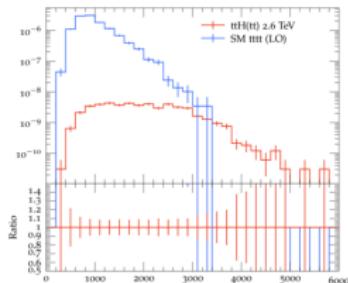


Inclusive $InvM$
 $ttbar34$

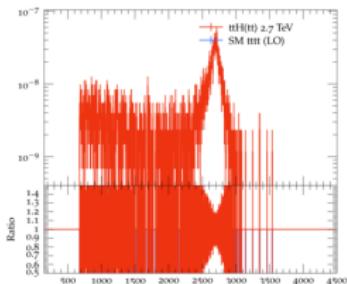


Inclusive dR $ttbar12$

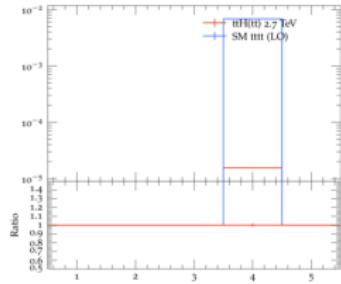
Sample: ttH 2600 GeV - event level plots



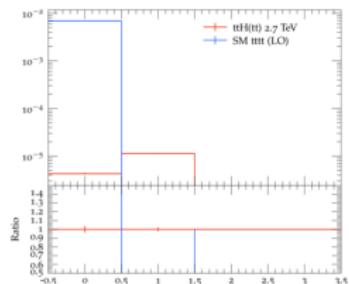
Sample: ttH 2700 GeV - parton level plots



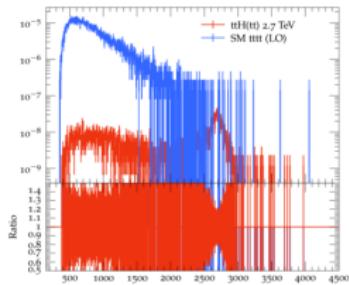
Inclusive mH



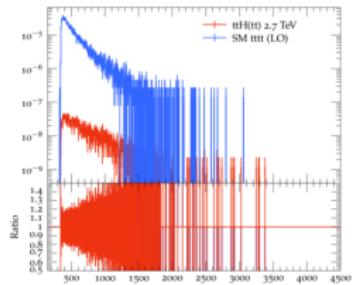
Inclusive $nTop$



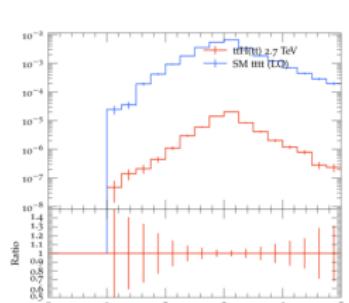
Inclusive nH



Inclusive $InvM$
 $ttbar12$

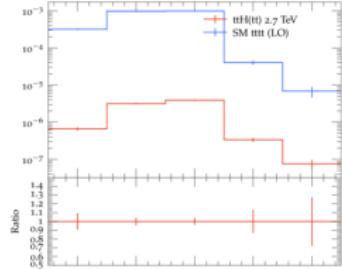
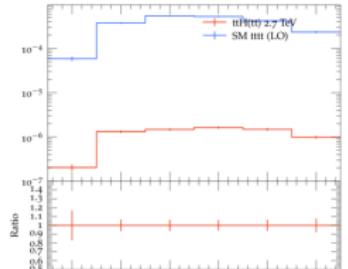
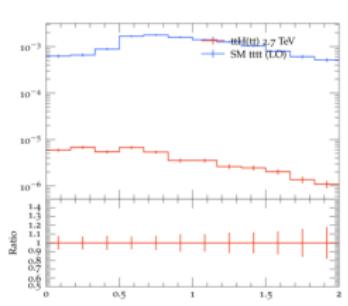
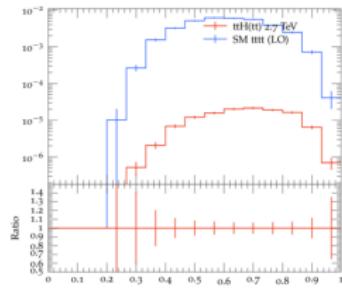
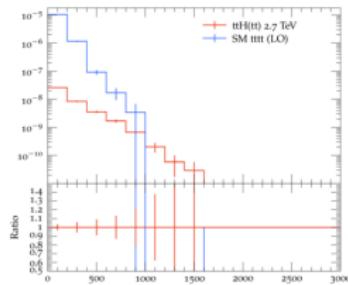
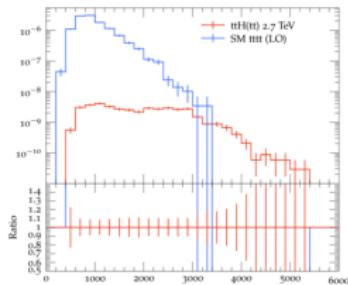


Inclusive $InvM$
 $ttbar34$

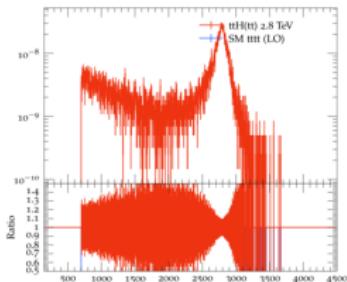


Inclusive dR $ttbar12$

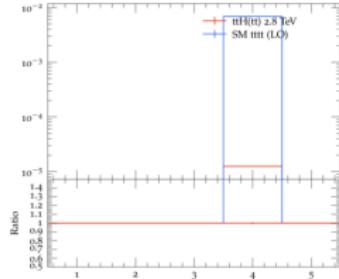
Sample: ttH 2700 GeV - event level plots



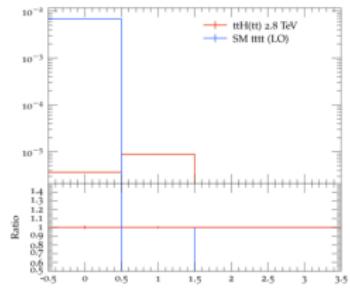
Sample: ttH 2800 GeV - parton level plots



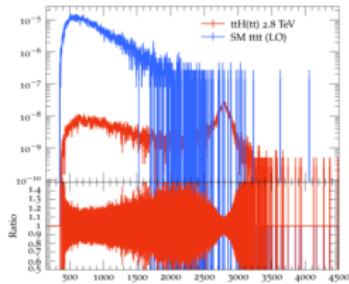
Inclusive mH



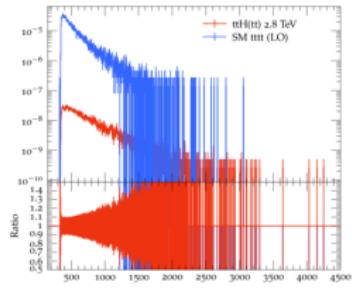
Inclusive $nTop$



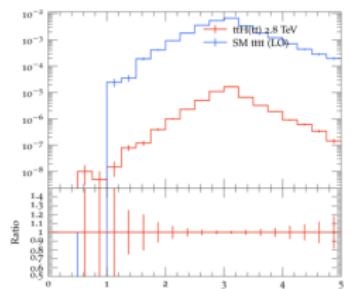
Inclusive nH



Inclusive $InvM_{ttbar12}$

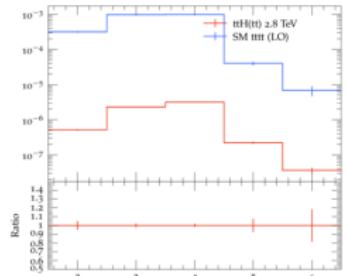
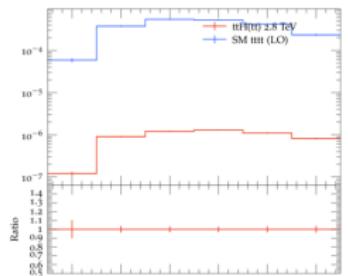
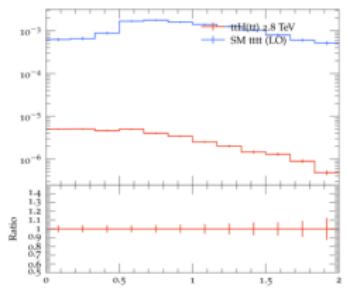
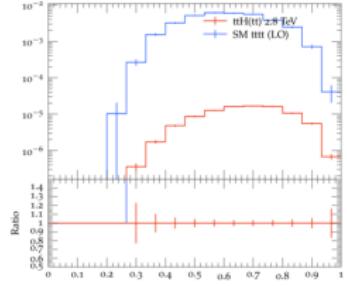
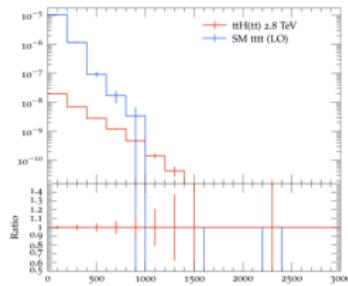
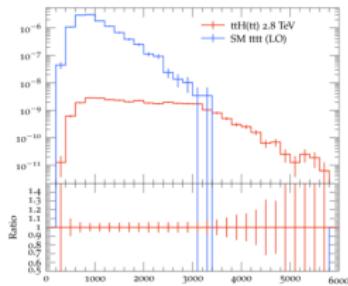


Inclusive $InvM_{ttbar34}$

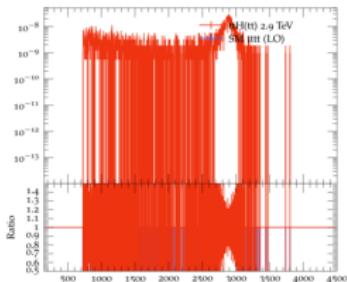


Inclusive $dR_{ttbar12}$

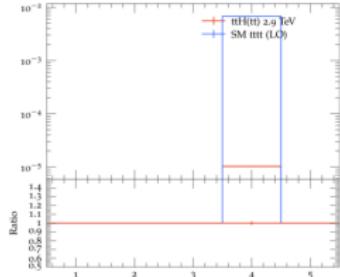
Sample: ttH 2800 GeV - event level plots



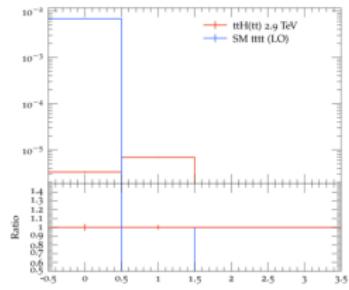
Sample: ttH 2900 GeV - parton level plots



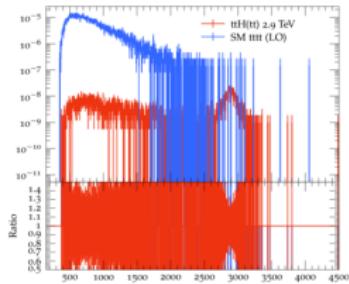
Inclusive mH



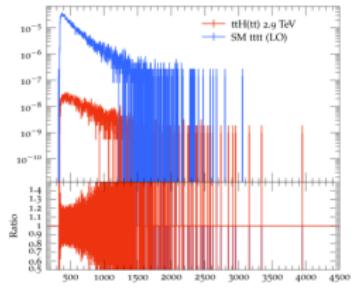
Inclusive $nTop$



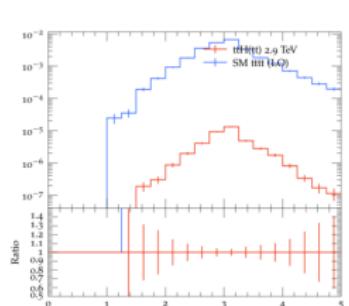
Inclusive nH



Inclusive $InvM_{ttbar12}$

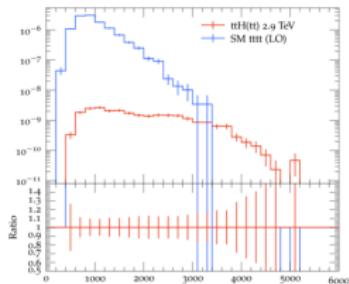


Inclusive $InvM_{ttbar34}$

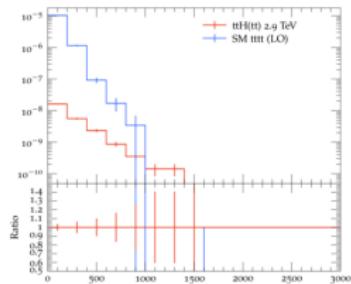


Inclusive $dR_{ttbar12}$

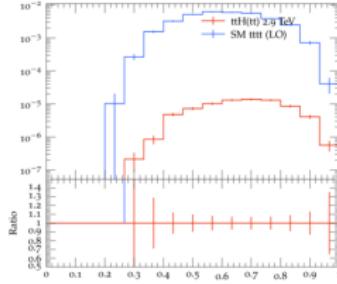
Sample: ttH 2900 GeV - event level plots



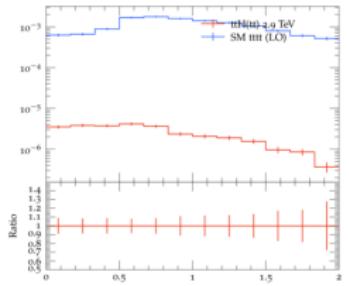
BaselineSR HT 3



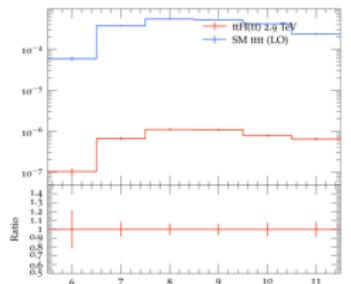
BaselineSR MET



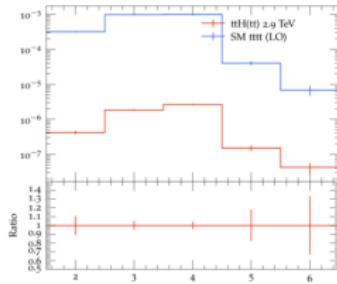
BaselineSR centrality



*BaselineSR deltaR bl
min*

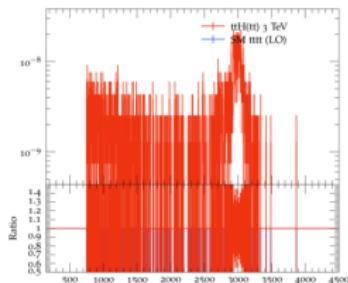


BaselineSR nJets

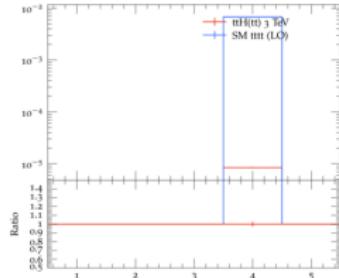


BaselineSR nBjets

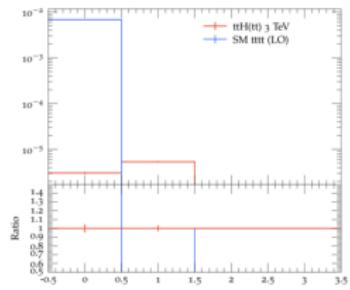
Sample: ttH 3000 GeV - parton level plots



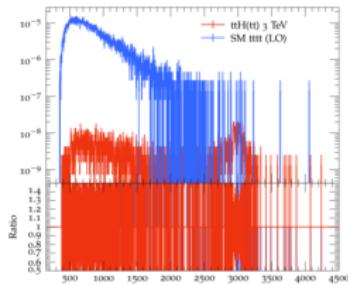
Inclusive m_H



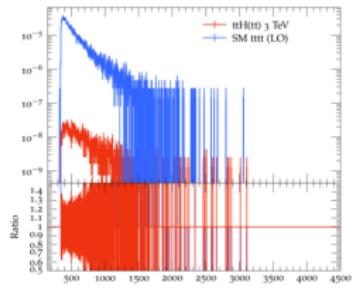
Inclusive n_{Top}



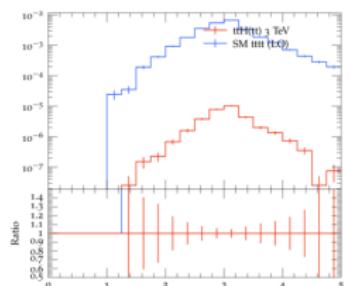
Inclusive n_H



Inclusive $\text{InvM}_{tt\bar{b}12}$



Inclusive $\text{InvM}_{tt\bar{b}34}$



Inclusive $dR_{tt\bar{b}12}$

Sample: ttH 3000 GeV - event level plots

