

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

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(CERN)

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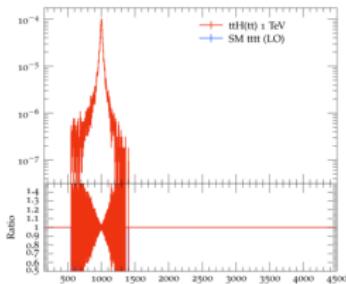
# Introduction

- ▶ 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)

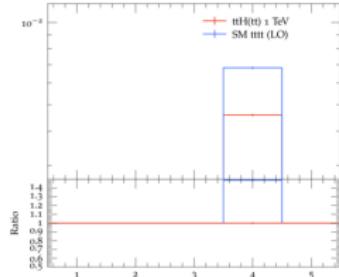
# Signal Mass and Width

Signal Mass (GeV)	Signal Width (GeV)
1000	30
1100	40
1200	40
1300	50
1400	50
1500	60
1750	90
2000	100
2250	110
2500	125

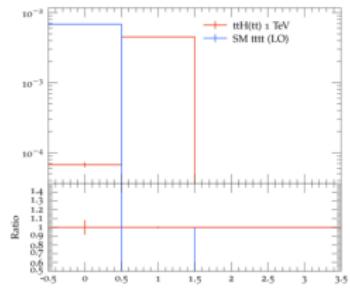
# Sample: ttH 1000 GeV - parton level plots



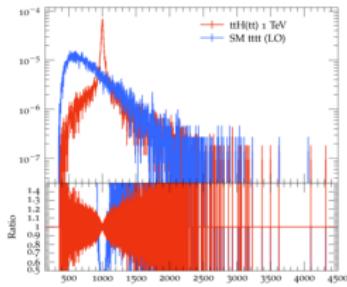
Inclusive  $mH$



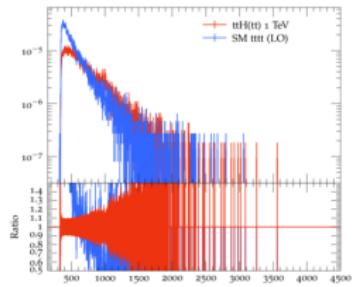
Inclusive  $nTop$



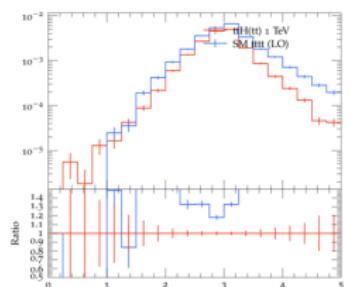
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

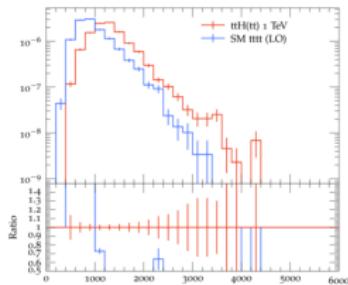


Inclusive  $InvM$   
 $ttbar34$

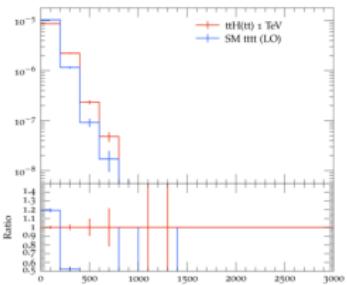


Inclusive  $dR$   $ttbar12$

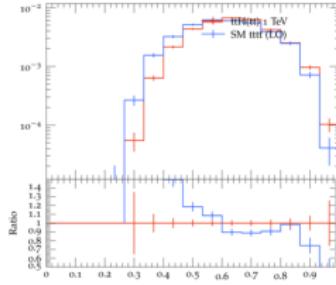
# Sample: ttH 1000 GeV - event level plots



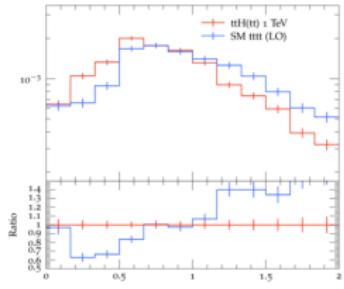
*BaselineSR HT 3*



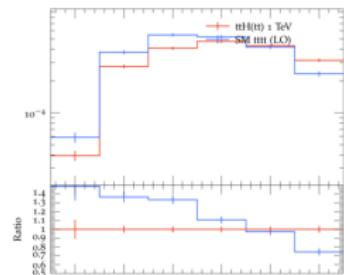
*BaselineSR MET*



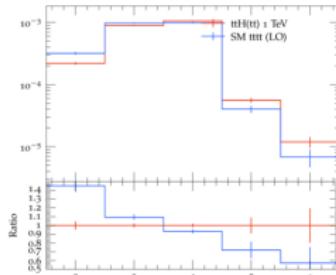
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

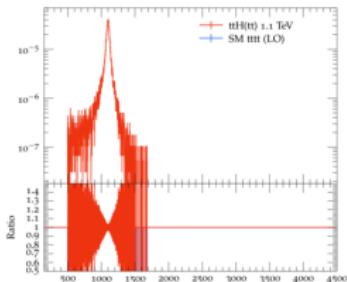


*BaselineSR nJets*

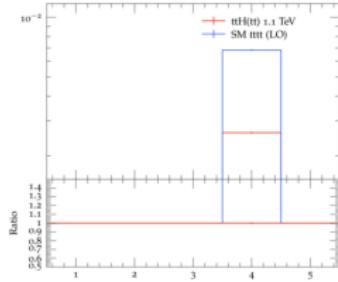


*BaselineSR nBjets*

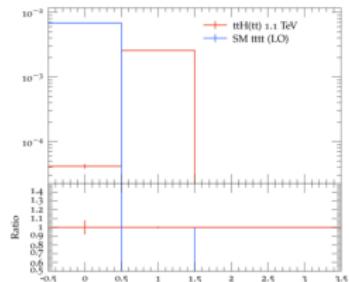
# Sample: ttH 1100 GeV - parton level plots



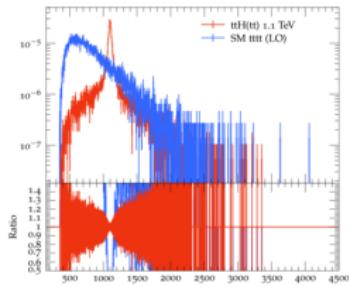
Inclusive  $m_H$



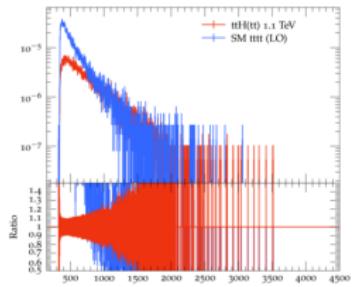
Inclusive  $n_{Top}$



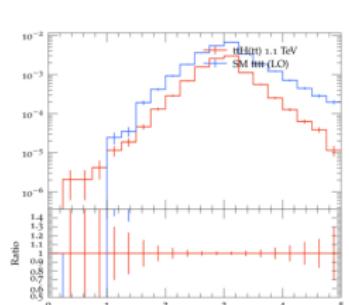
Inclusive  $n_H$



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

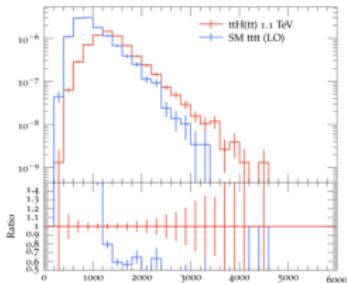


Inclusive  $InvM_{tt\bar{b}ar34}$

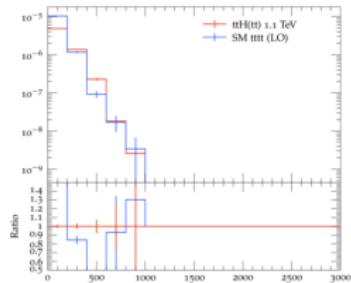


Inclusive  $dR_{tt\bar{b}ar12}$

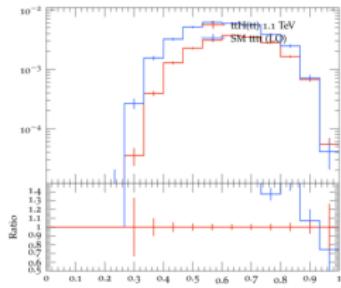
# Sample: ttH 1100 GeV - event level plots



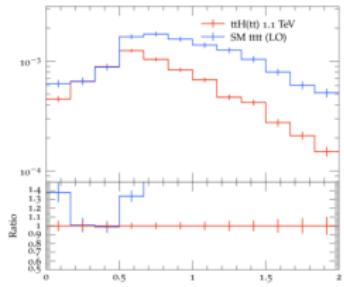
*BaselineSR HT 3*



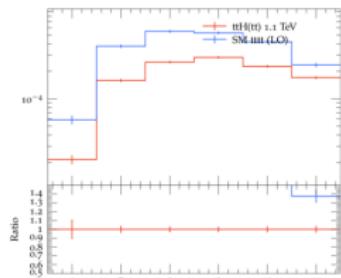
*BaselineSR MET*



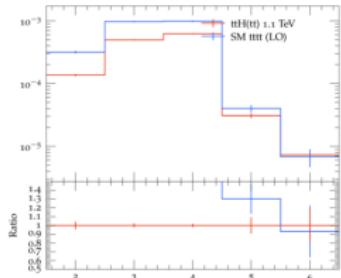
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

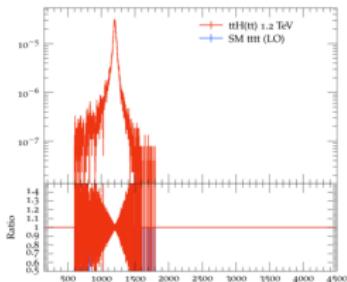


*BaselineSR nJets*

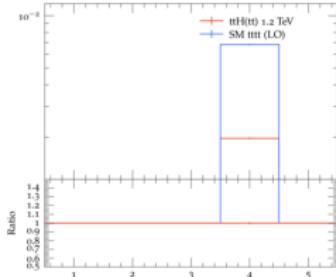


*BaselineSR nBjets*

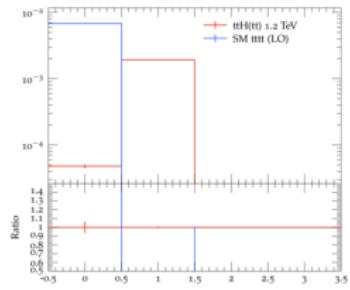
# Sample: ttH 1200 GeV - parton level plots



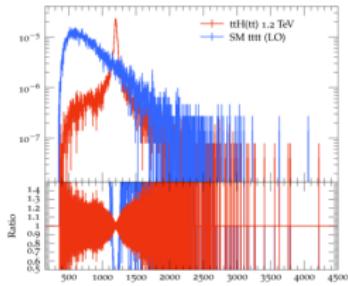
Inclusive  $mH$



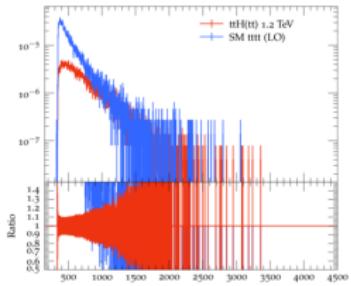
Inclusive  $nTop$



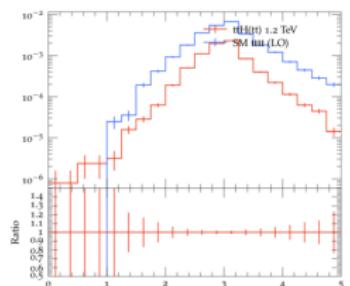
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

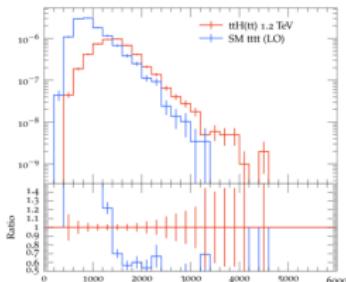


Inclusive  $InvM$   
 $ttbar34$

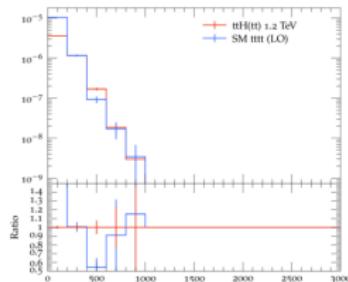


Inclusive  $dR$   $ttbar12$

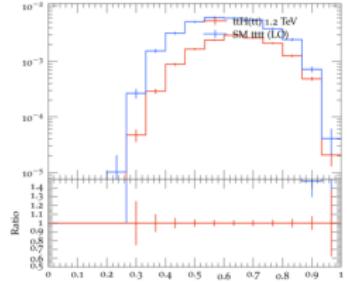
# Sample: ttH 1200 GeV - event level plots



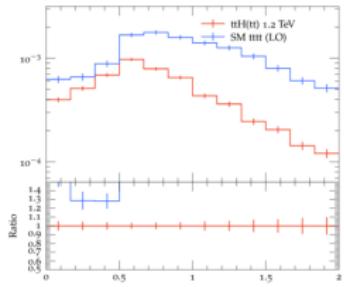
*BaselineSR HT 3*



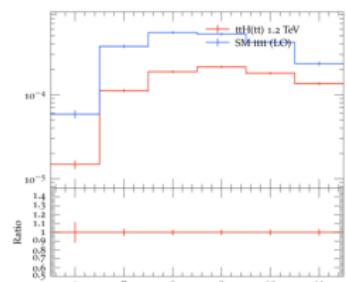
*BaselineSR MET*



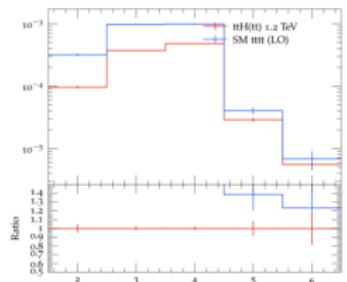
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

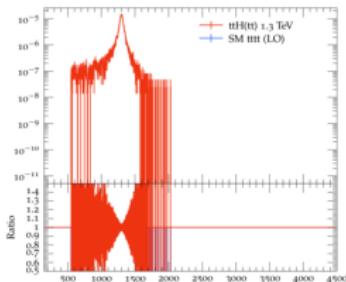


*BaselineSR nJets*

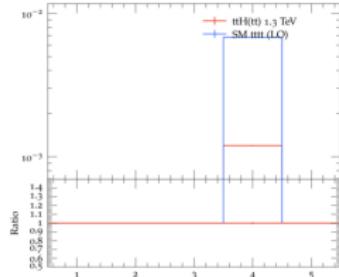


*BaselineSR nBjets*

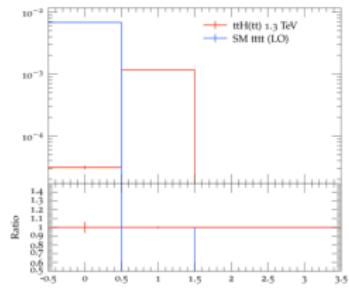
# Sample: ttH 1300 GeV - parton level plots



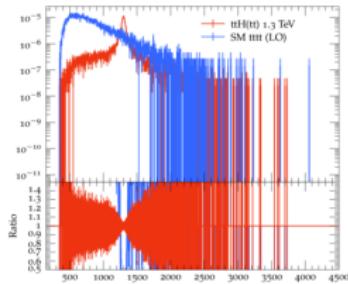
Inclusive  $mH$



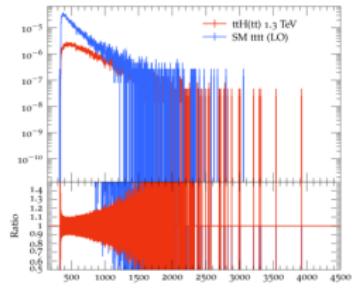
Inclusive  $nTop$



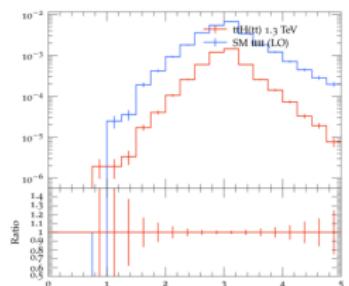
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

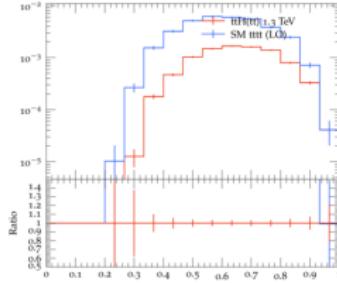
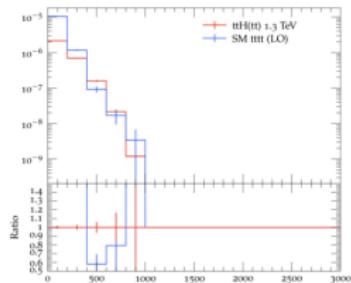
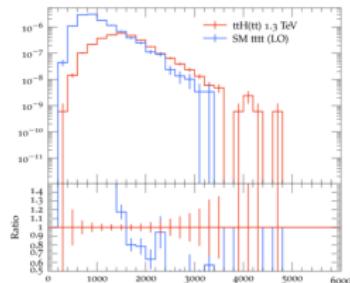


Inclusive  $InvM$   
 $ttbar34$



Inclusive  $dR$   $ttbar12$

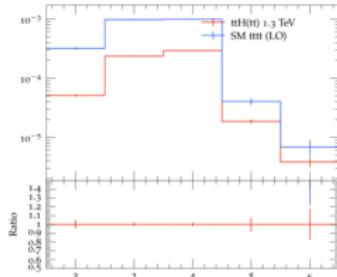
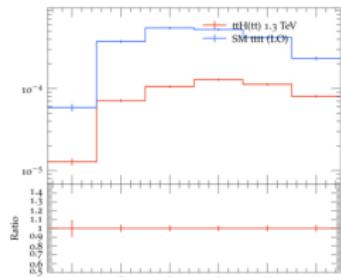
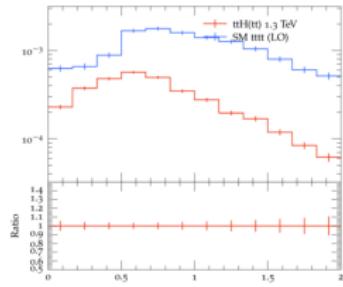
# Sample: ttH 1300 GeV - event level plots



BaselineSR HT 3

BaselineSR MET

BaselineSR centrality

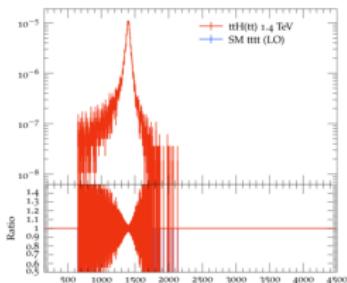


BaselineSR deltaR bl min

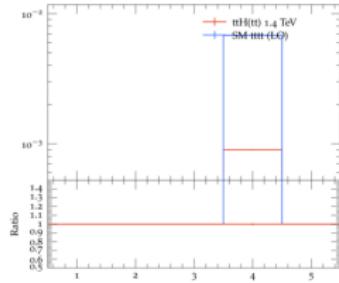
BaselineSR nJets

BaselineSR nBjets

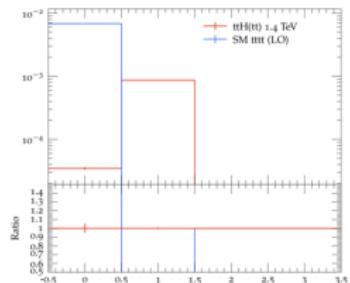
# Sample: ttH 1400 GeV - parton level plots



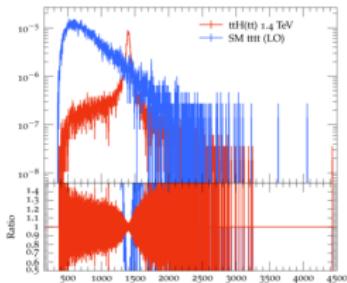
Inclusive  $mH$



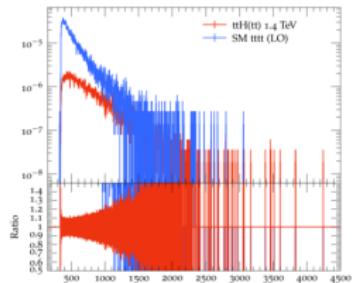
Inclusive  $nTop$



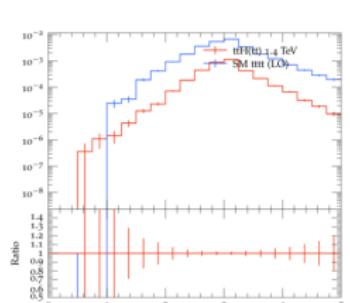
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

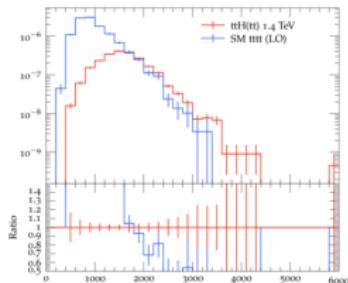


Inclusive  $InvM$   
 $ttbar34$

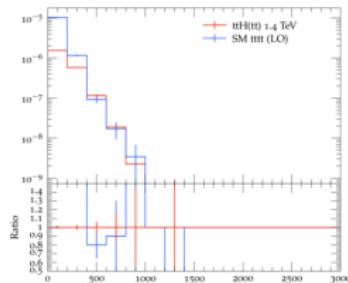


Inclusive  $dR$   $ttbar12$

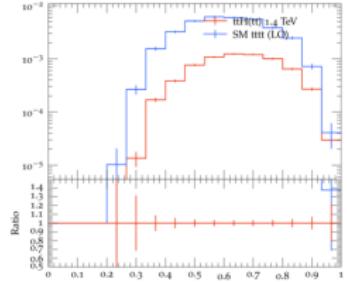
# Sample: ttH 1400 GeV - event level plots



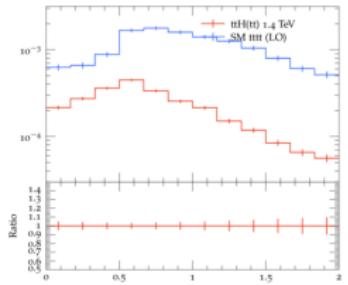
*BaselineSR HT 3*



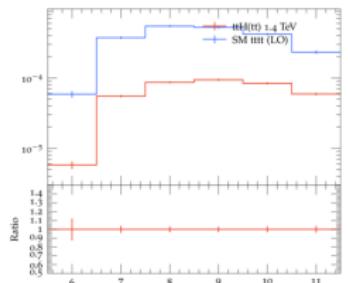
*BaselineSR MET*



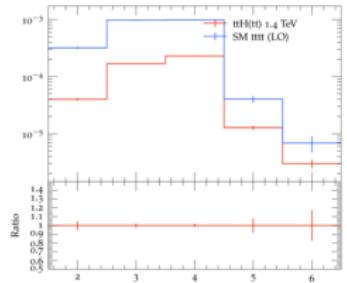
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

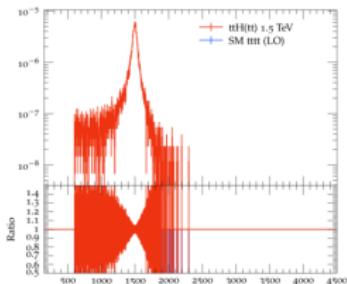


*BaselineSR nJets*

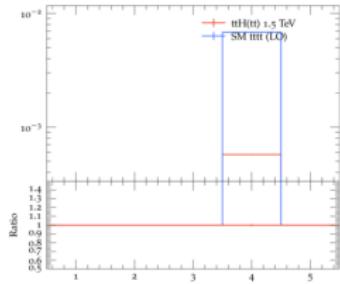


*BaselineSR nBjets*

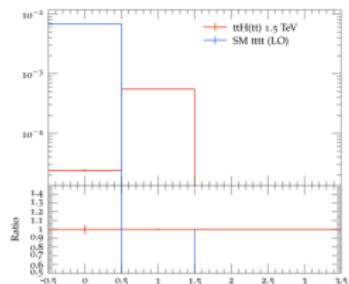
# Sample: ttH 1500 GeV - parton level plots



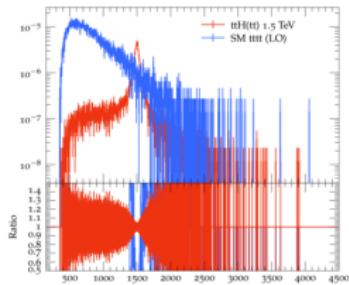
Inclusive  $mH$



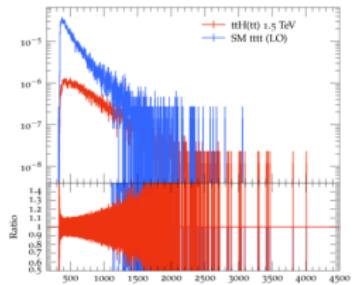
Inclusive  $nTop$



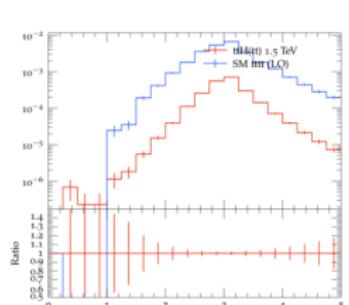
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

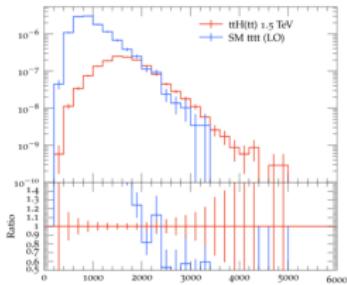


Inclusive  $InvM$   
 $ttbar34$

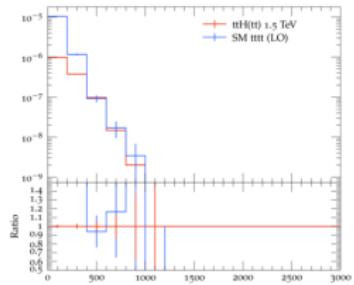


Inclusive  $dR$   $ttbar12$

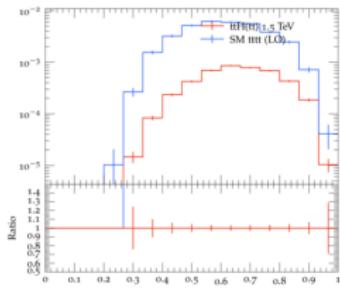
# Sample: ttH 1500 GeV - event level plots



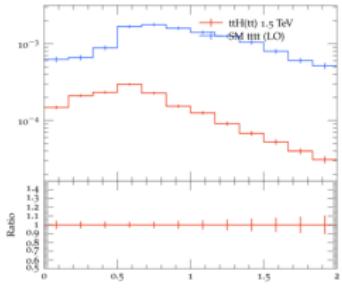
*BaselineSR HT 3*



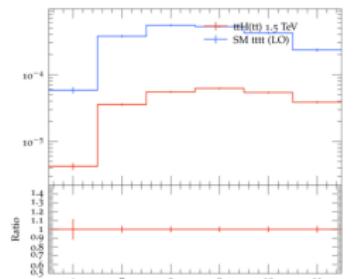
*BaselineSR MET*



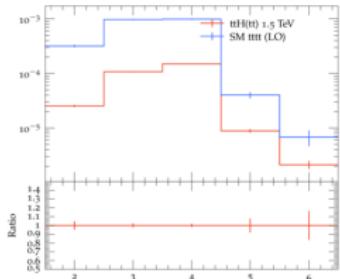
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

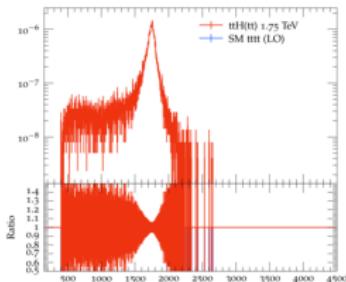


*BaselineSR nJets*

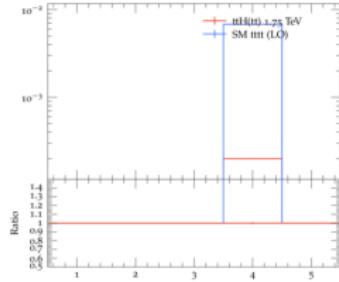


*BaselineSR nBjets*

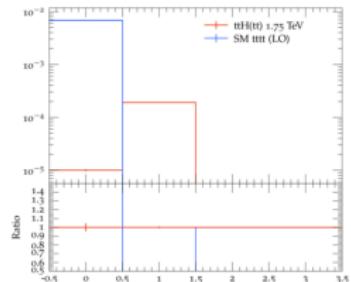
# Sample: ttH 1750 GeV - parton level plots



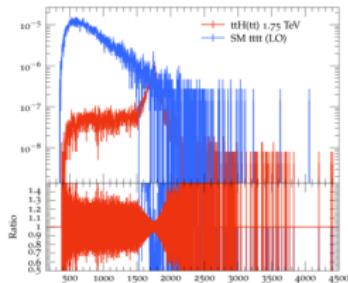
Inclusive  $mH$



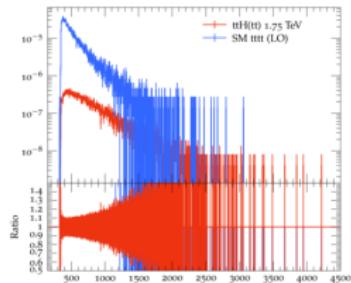
Inclusive  $nTop$



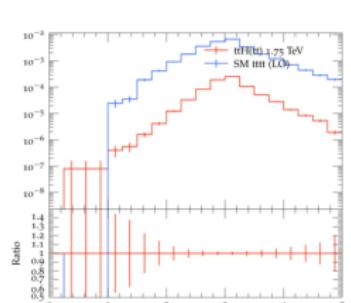
Inclusive  $nH$



Inclusive  $InvM_{ttbar12}$

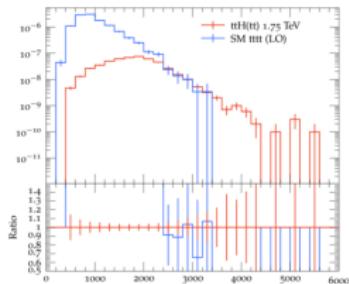


Inclusive  $InvM_{ttbar34}$

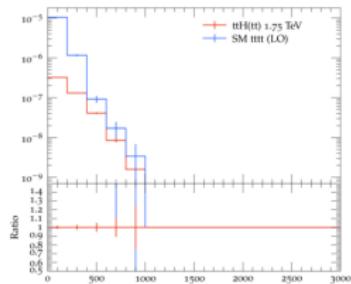


Inclusive  $dR_{ttbar12}$

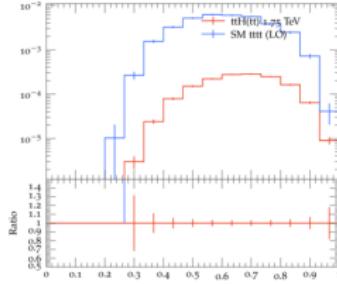
# Sample: ttH 1750 GeV - event level plots



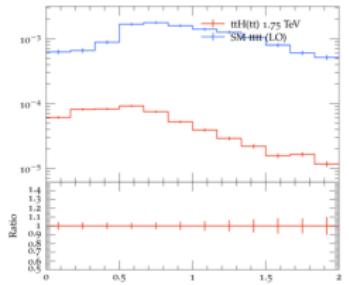
*BaselineSR HT 3*



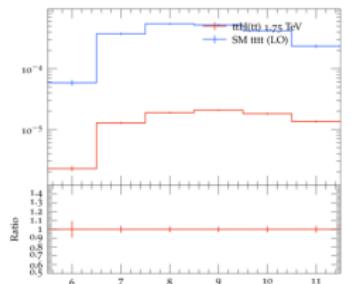
*BaselineSR MET*



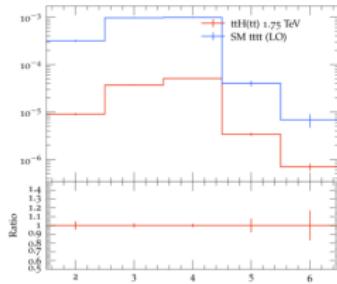
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

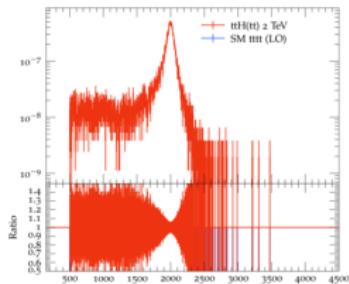


*BaselineSR nJets*

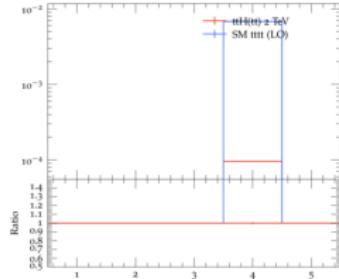


*BaselineSR nBjets*

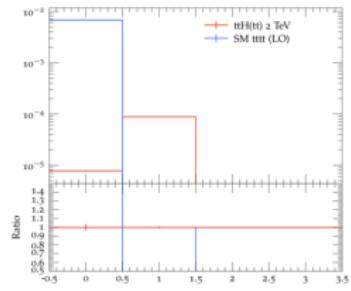
# Sample: ttH 2000 GeV - parton level plots



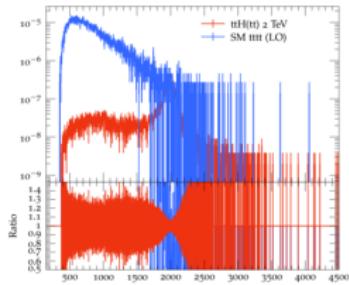
Inclusive  $mH$



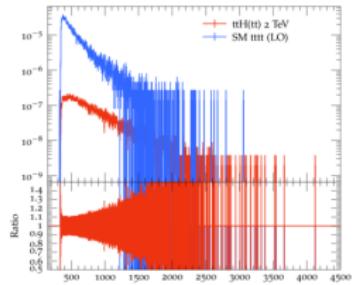
Inclusive  $nTop$



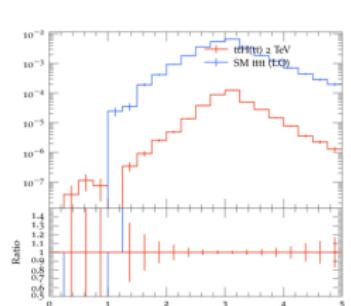
Inclusive  $nH$



Inclusive  $InvM_{ttbar12}$

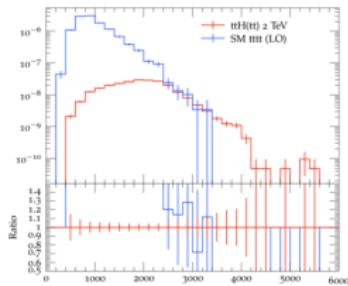


Inclusive  $InvM_{ttbar34}$

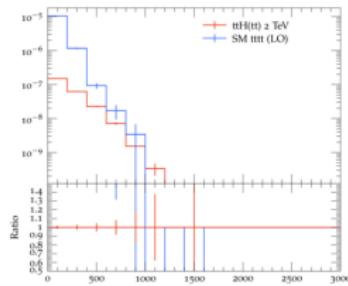


Inclusive  $dR_{ttbar12}$

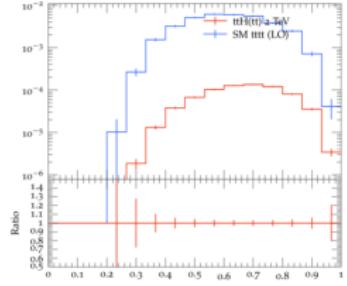
# Sample: ttH 2000 GeV - event level plots



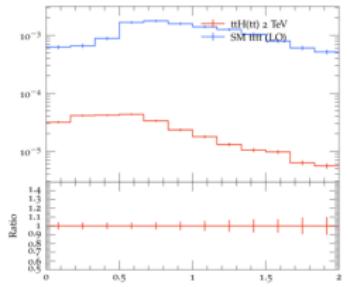
*BaselineSR HT 3*



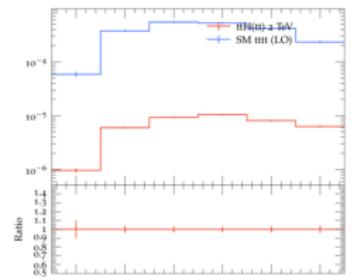
*BaselineSR MET*



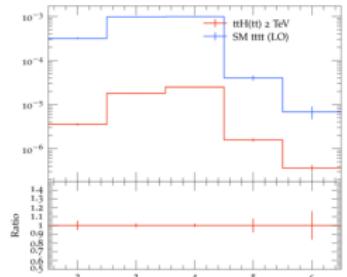
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

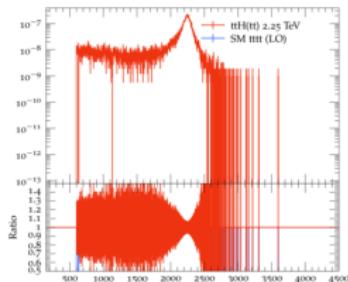


*BaselineSR nJets*

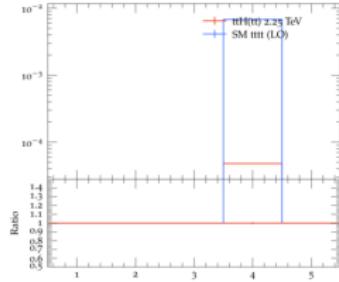


*BaselineSR nBjets*

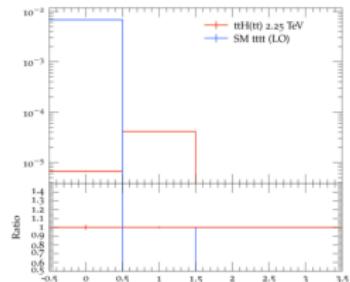
# Sample: ttH 2250 GeV - parton level plots



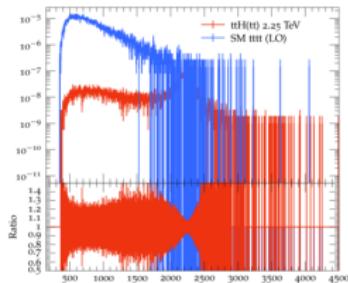
Inclusive  $mH$



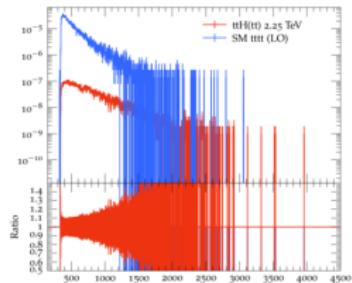
Inclusive  $n_{Top}$



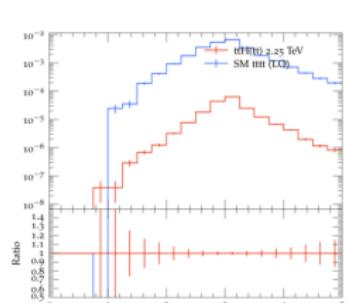
Inclusive  $nH$



Inclusive  $InvM$   
 $ttbar12$

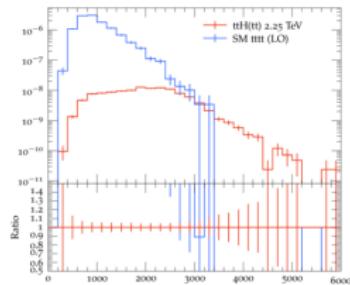


Inclusive  $InvM$   
 $ttbar34$

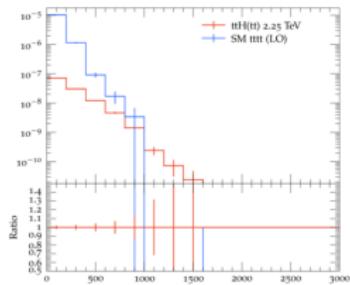


Inclusive  $dR$   $ttbar12$

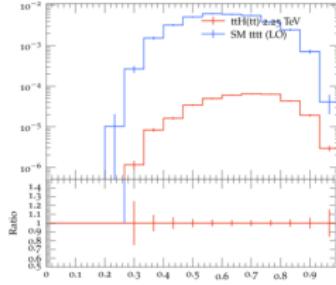
# Sample: ttH 2250 GeV - event level plots



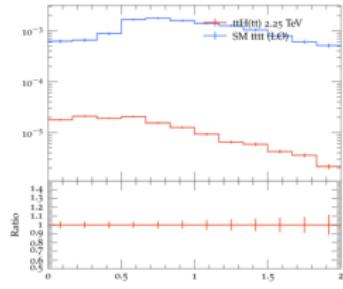
*BaselineSR HT 3*



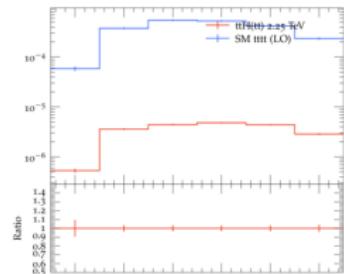
*BaselineSR MET*



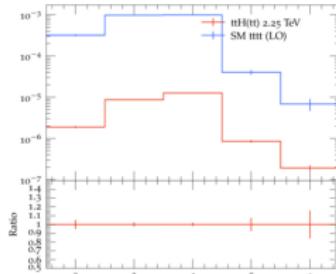
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*

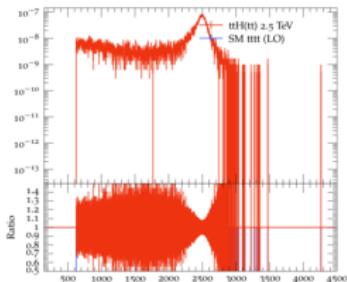


*BaselineSR nJets*

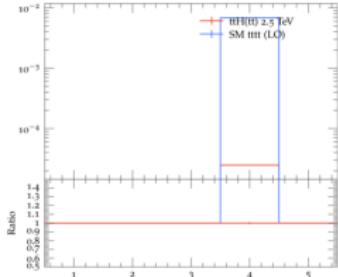


*BaselineSR nBjets*

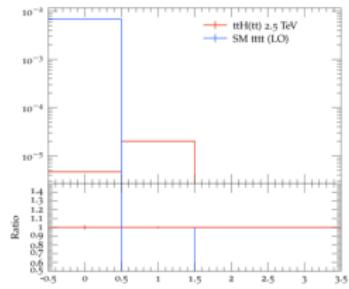
# Sample: ttH 2500 GeV - parton level plots



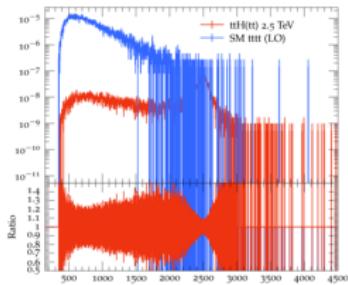
Inclusive  $mH$



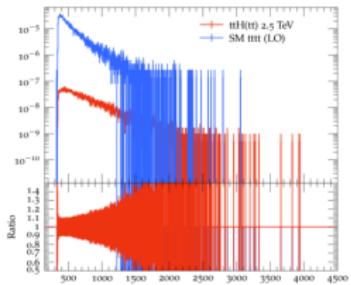
Inclusive  $nTop$



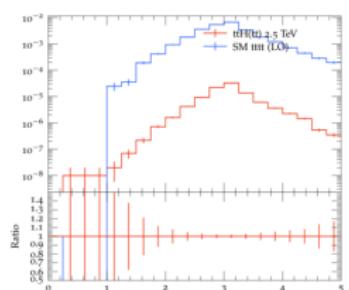
Inclusive  $nH$



Inclusive  $\text{InvM}_{ttbar12}$

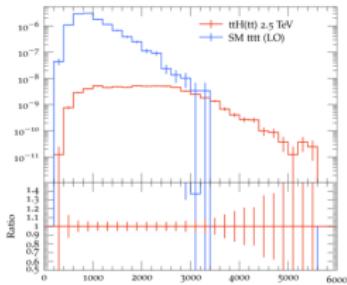


Inclusive  $\text{InvM}_{ttbar34}$

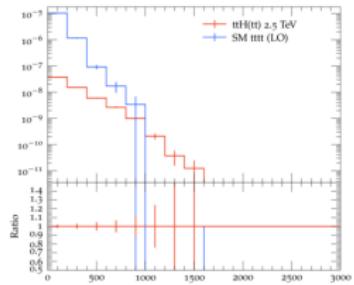


Inclusive  $dR_{ttbar12}$

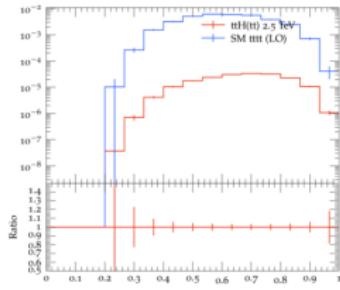
# Sample: ttH 2500 GeV - event level plots



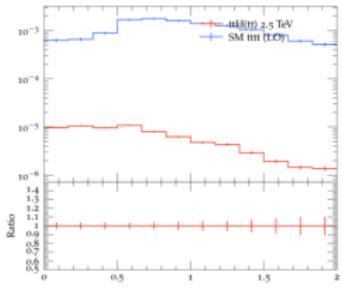
*BaselineSR HT 3*



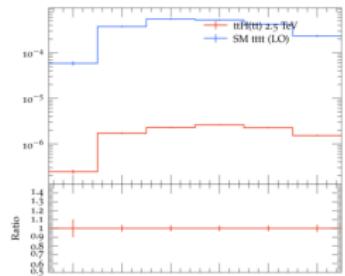
*BaselineSR MET*



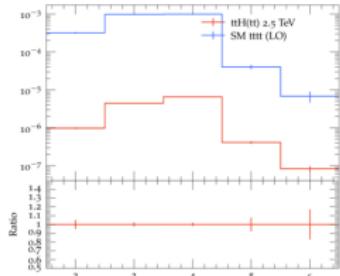
*BaselineSR centrality*



*BaselineSR deltaR bl  
min*



*BaselineSR nJets*



*BaselineSR nBjets*