13TeV VBF H->$\gamma\gamma$ Analysis

Yu Zhang

10-19

introduction

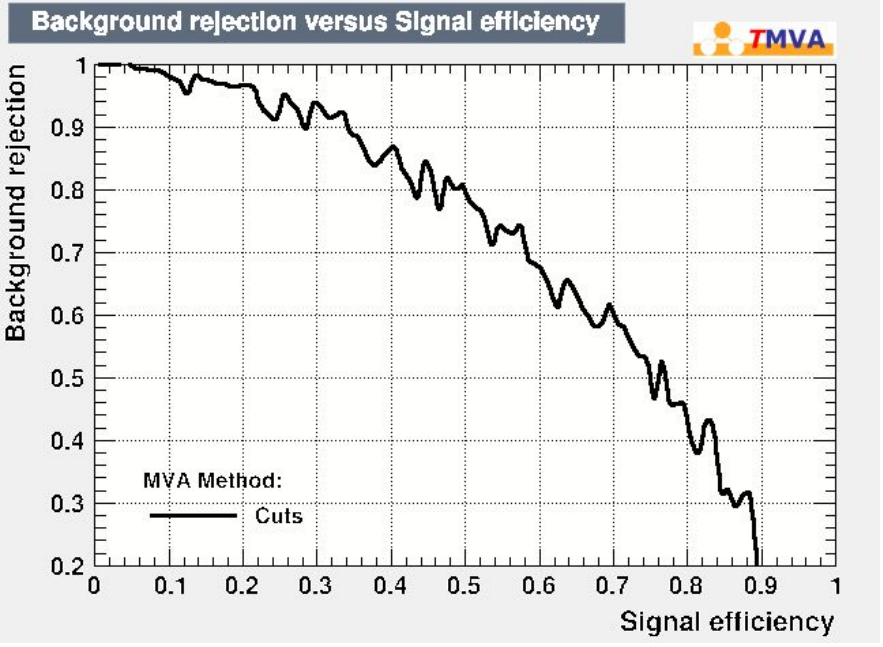
- data samples
  - h008 MxAOD 25ns :1.01fb-1
  - 276262-280614
- cut-based optimization
  - TMVA package
  - epected significance

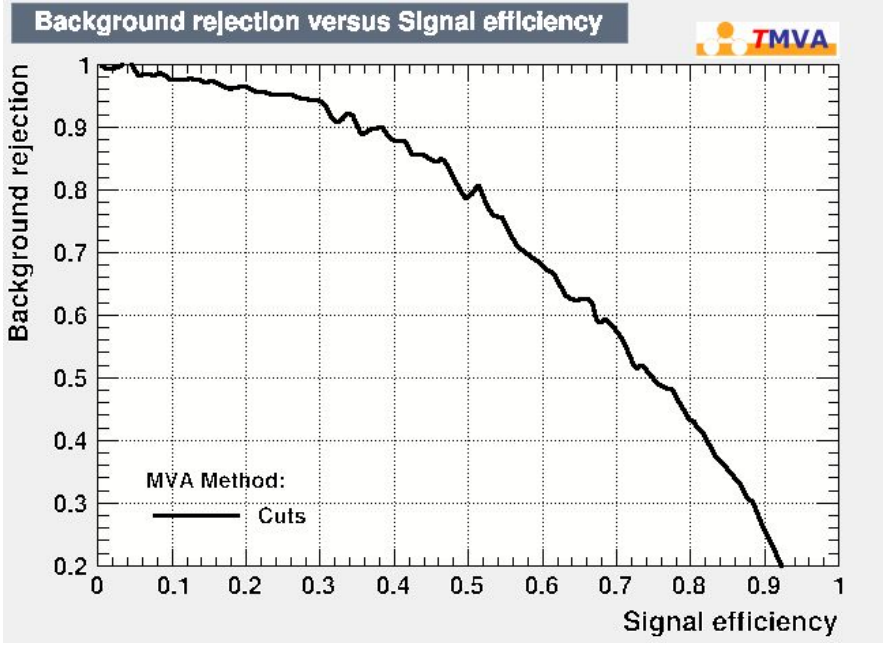
cut-based optimization

- TMVA configuration
  - factory->BookMethod(TMVA::Types::kCuts, "Cuts"
  - reader->BookMVA("Cuts",weightfile)
  - reader->EvaluateMVA("Cuts",signal_eff);
- Input variables
  - tight:m_{jj},$\Delta\eta_{jj}$,$\Delta\Phi_{\gamma\gamma,jj}$,$\Delta R_{\gamma,j}^{min}$,$\eta^*=\eta_{\gamma\gamma}-0.5*(\eta_{jet1}+\eta_{jet2})$
  - loose:m_{jj},$\Delta\eta_{jj}$,$\Delta\Phi_{\gamma\gamma,jj}$
  - variable combination as run1,to be optimized
- Input samples
  - Signal: VBF
  - Bkg:Sherpa $\gamma\gamma$,RevID ,RevIso

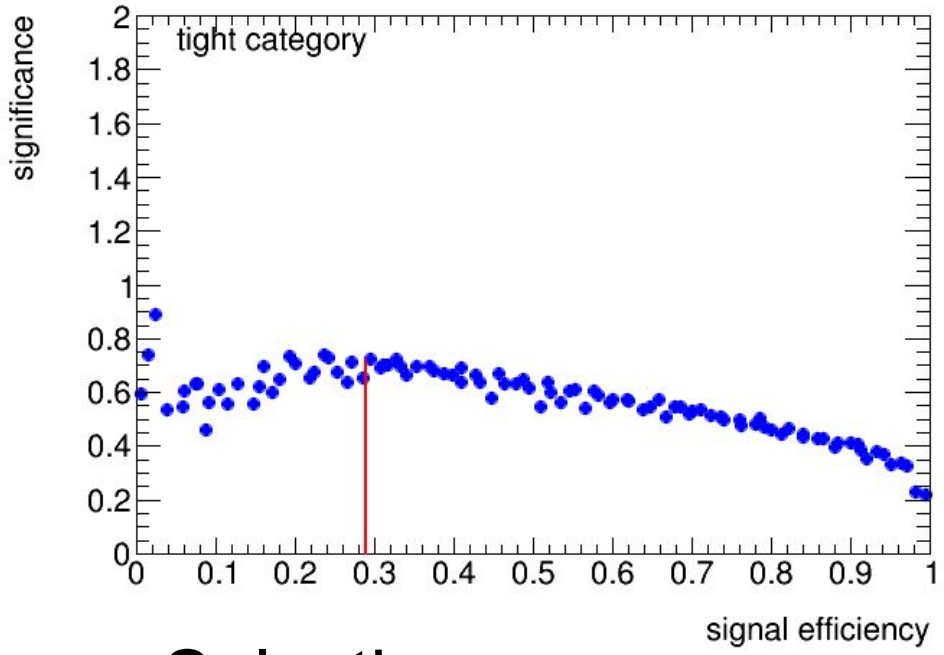
cut-based optimization

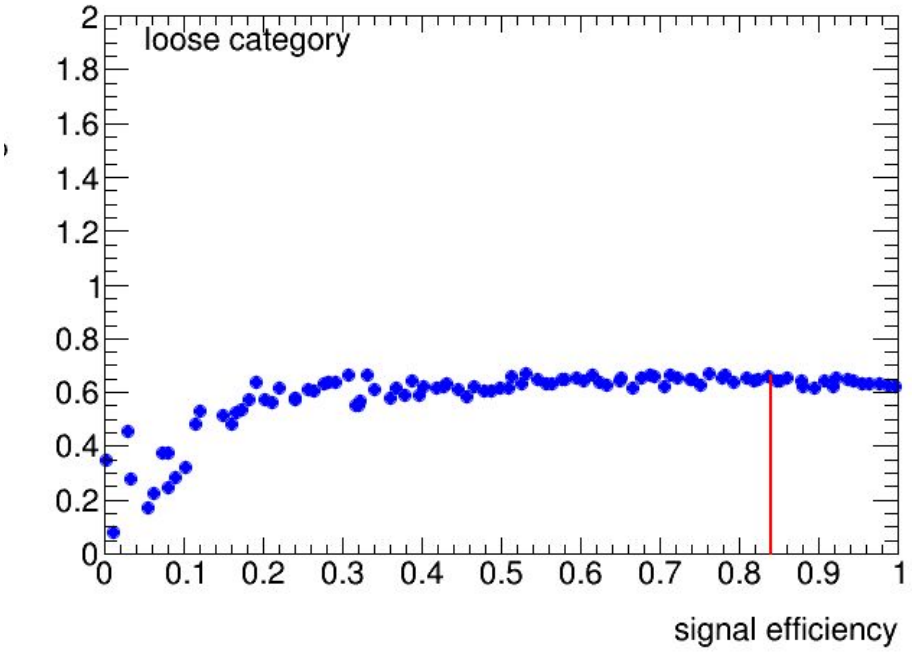
- category optimization
  - scan signal eff and get hightest significance
  - do tight selection and train again with remaining events
  - obtain the tight and loose category
  - require Nbkg > 50





cut-based optimization

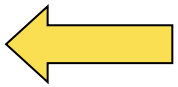




- Selection
  - tight:m_{jj}>810GeV,$\Delta\eta_{jj}$>3.3,$\Delta\Phi_{yy,jj}$>2.84,$\Delta R_{\gamma,j}^{min}$>1.74,$\eta^*$>-3
  - loose:m_{jj}>753GeV,$\Delta\eta_{jj}$<8.3,$\Delta\Phi_{yy,jj}$>2.97
  - ➢ run1 tight selection
    - ✓$\Delta\eta_{jj}$>2.8,m_{jj}>520GeV,$\Delta\Phi_{yy,jj}$>2.6,η^*<2.4,$\Delta R_{y,j}^{min}$>2
  - ➢ run1 loose selection
    - ✓$\Delta\eta_{jj}$>2.8,m_{jj}>400GeV,$\Delta\Phi_{yy,jj}$>2.6

cut-based optimization

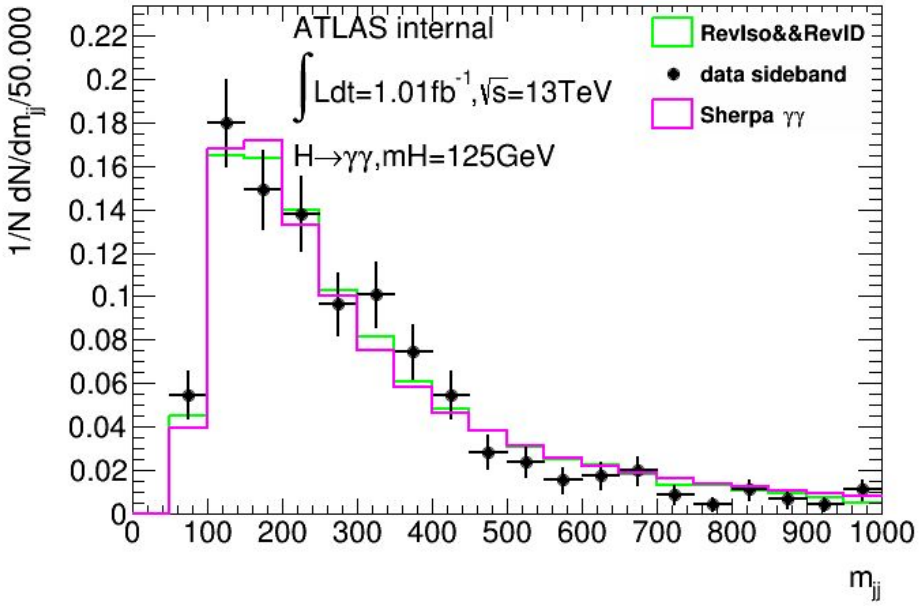
	cut-based tight	cut-based loose
VBF	2.12	2.06
ggF	0.75	0.73
bkg	7.13	8.13
VBF purity	0.74	0.74
significance	0.726	0.667
combined significance	0.986	

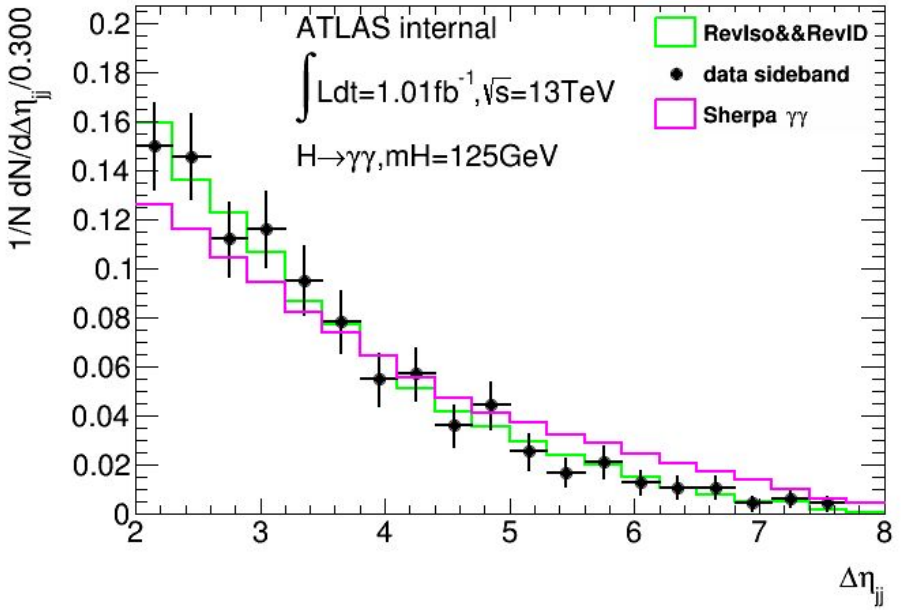


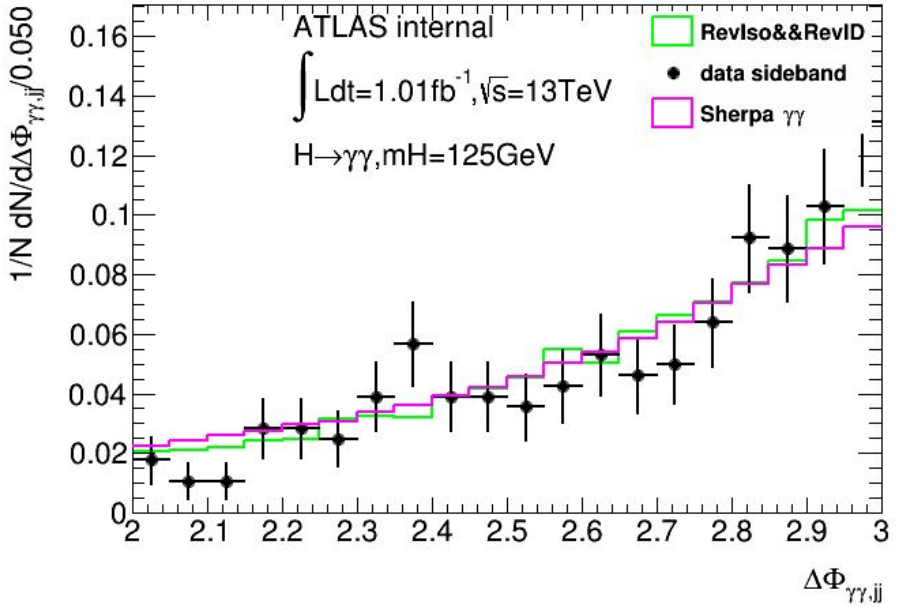
Attention!

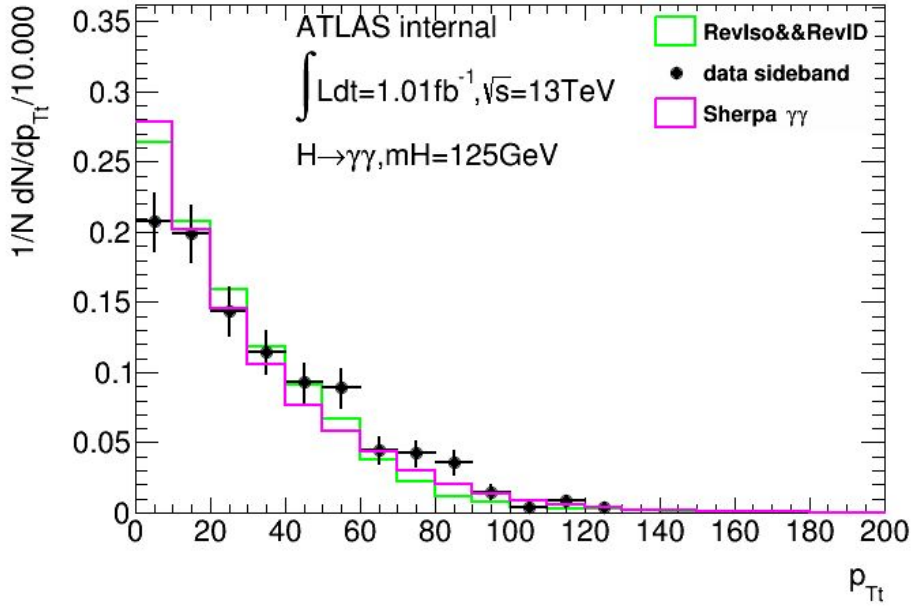
	cut-based loose	cut-base tight	MVA loose	MVA tight
VBF signal	2.849	1.829	1.816	1.858
ggF	2.561	0.958	1.612	0.593
fitted background	40.861	9.840	11.628	2.299
VBF purity	0.527	0.656	0.529	0.758
VBF significance	0.428	0.541	0.471	0.981
Combined significance	0.690		1.088	

variable modelling validation

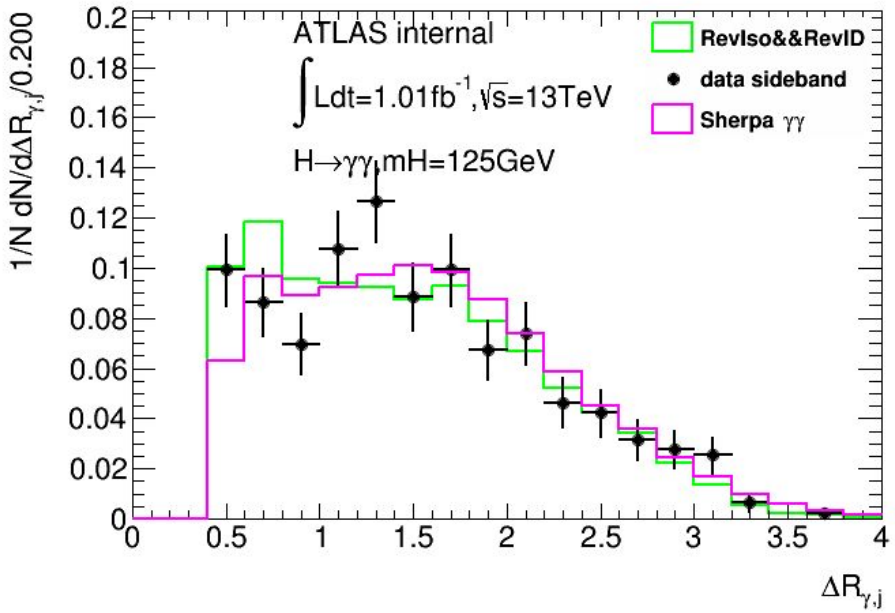


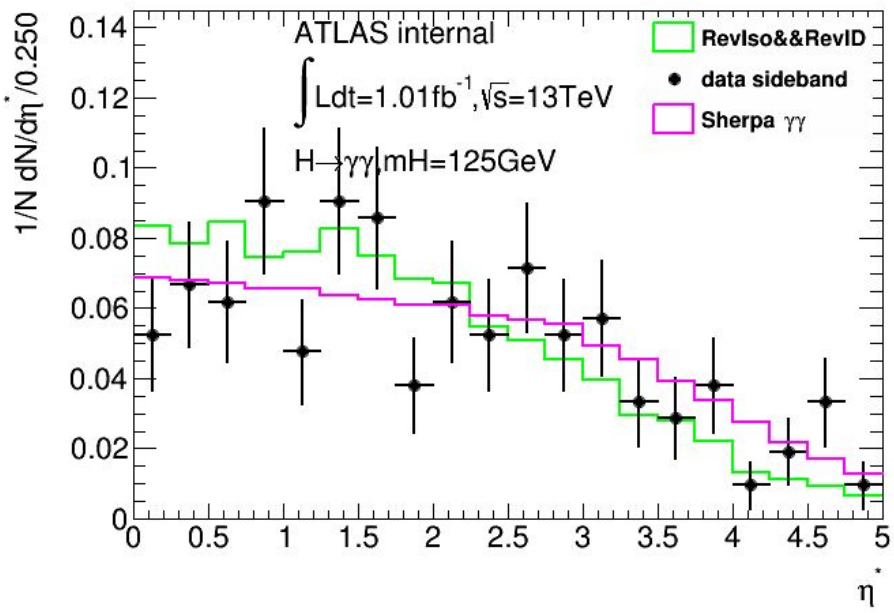






variable modelling validation





- a preliminary way of validation
- see what if hight statistic
- reweight

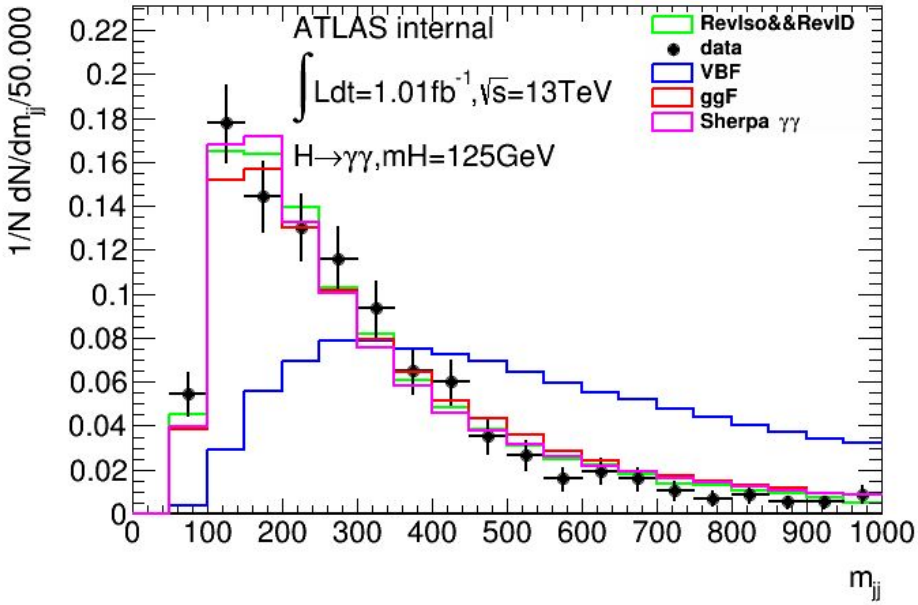
to-do list

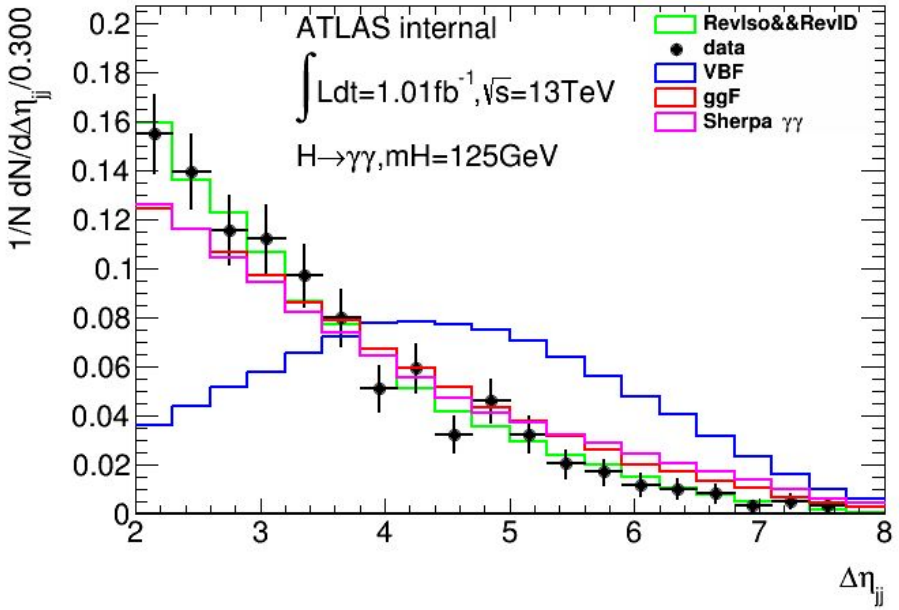
- check cut-based optimization
- give update significance result with HL data
- propose a review talk on the systematic of interest (recommended by the convenor)
- prepair VBF documentation
- touch in derivation work
- qualification,ITK granularity
- offline shift(not reply)

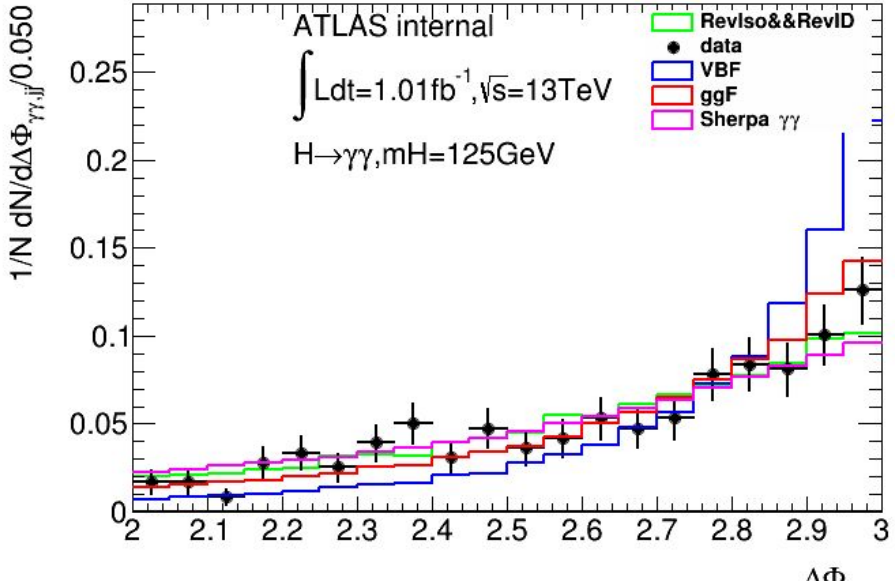
Contents

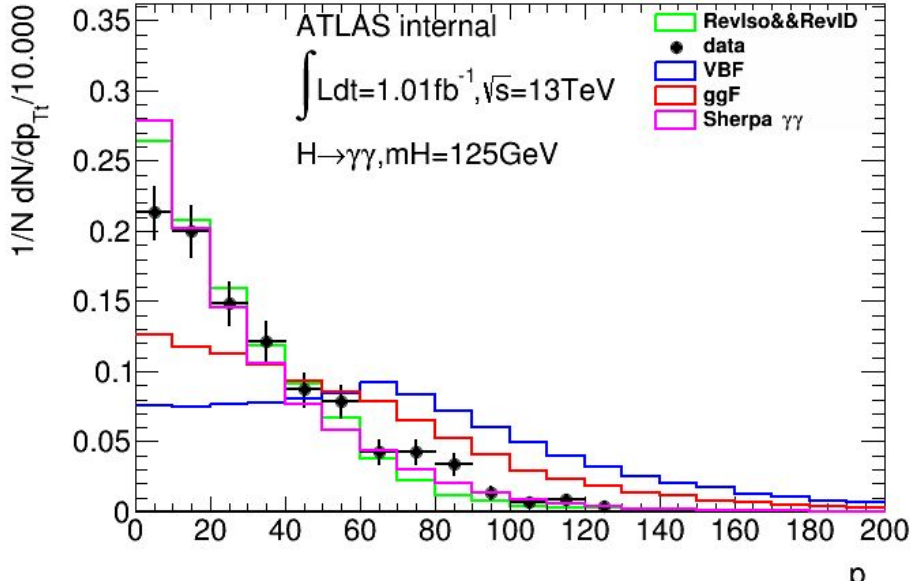
Back up

variable modelling validation

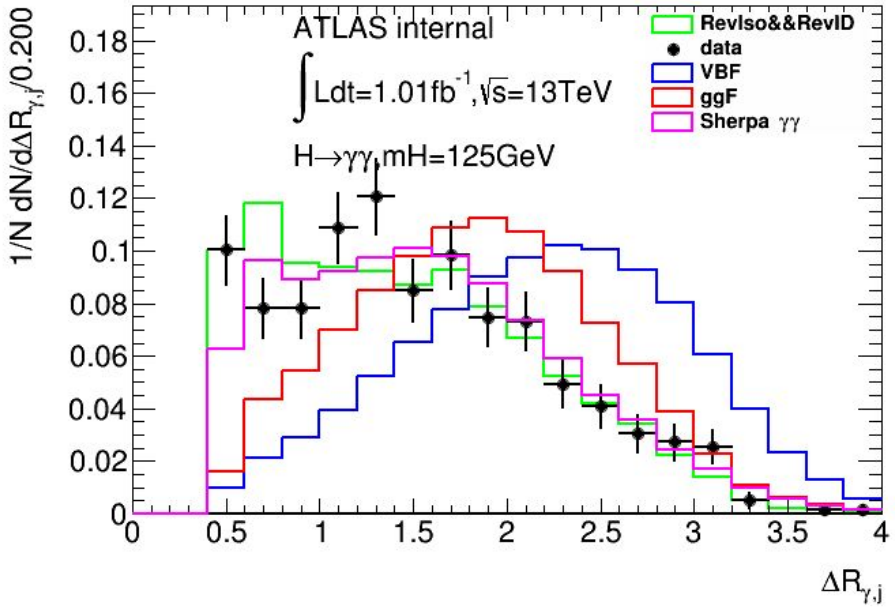


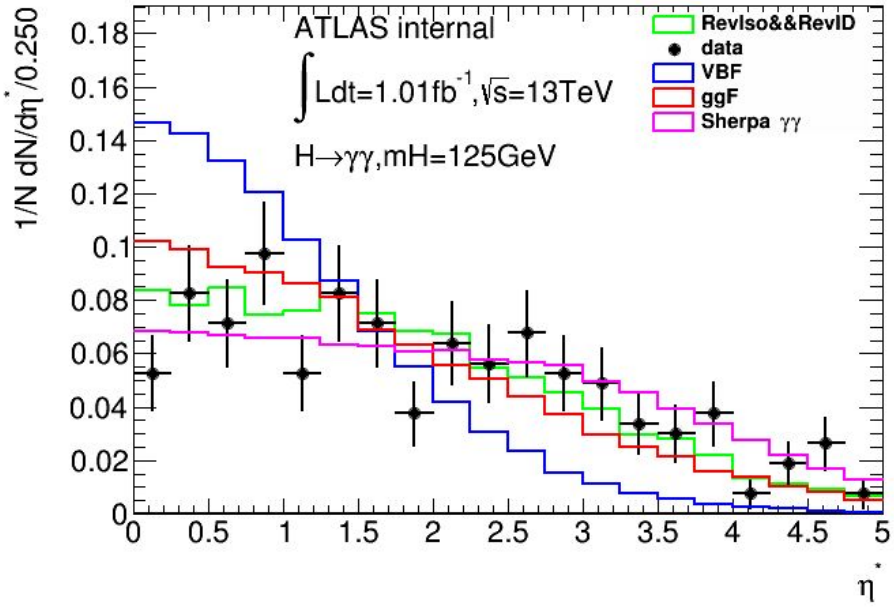






variable modelling validation





- if not consistent when the statistic is higher, reweight with some variables to obtain the correct background modelling