

13TeV VBF $H \rightarrow \gamma\gamma$ analysis

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introduction

- simultaneous optimization
- Pythia $\gamma+1,2,3$ jet sample
 - h007, MxAOD, $P_{T\gamma}$ [17, 140]
 - after inclusive selection: 3135
 - require VBF preselection: 589
- data
 - period D~E 276262-279598: 336 pb⁻¹
 - From my understanding, AOD is ready and DAOD&MxAOD is running
- training sample
 - VBF: 75759 Sherpa: 21685 RevIso&RevID: 1916

simultaneous optimization

- loop loose cut [0,1],tight cut [light cut ,1]
- get the highest combined significance
- the result is totally same
- $m_{\nu\nu}$ [122,128]GeV,BDT cut [0.81,0.95,1]

	tight	loose	combined
ggF	0.069	0.359	0.428
VBF	0.296	0.629	0.925
background	0.122	3.152	3.274
significance	0.565	0.326	0.652

$$\sigma_{combined} = \sqrt{\sigma_{tight}^2 + \sigma_{loose}^2}$$

- if we require $N_{bkg} > 0.5$ in both MVA category

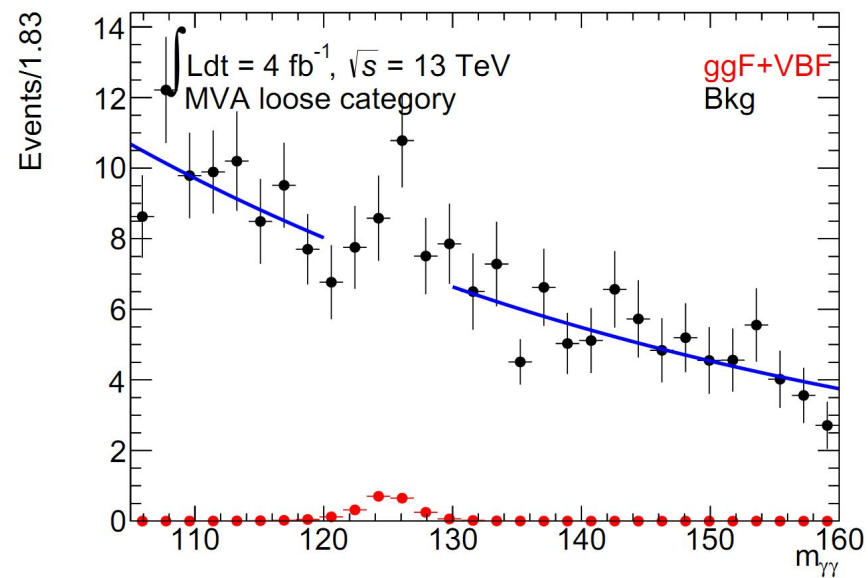
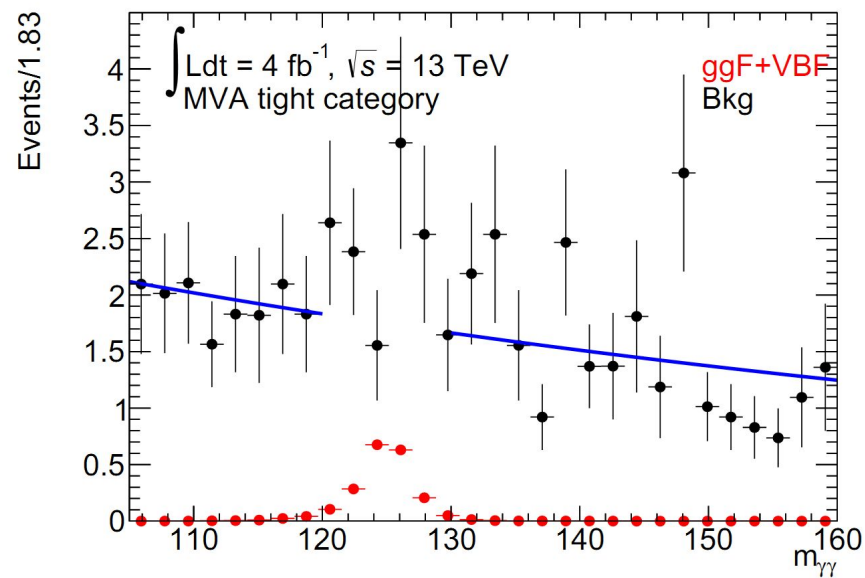
optimization

signal region[122,128],BDT cut [0.29,0.77,1]

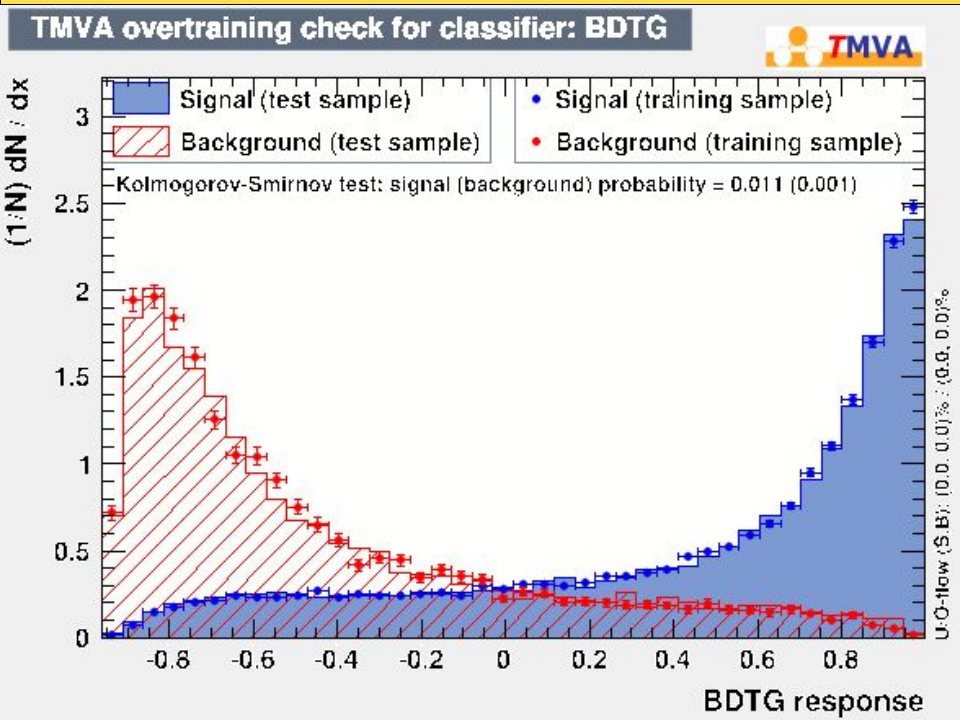
	tight	loose	combined
ggF	0.533	1.01247	1.545
VBF	1.033	0.634	1.667
background	4.875	20.436	25.311
significance	0.431	0.136	0.452

VBF purity decreases

fit sideband



overtraining



- signal:0.011
- bkg;0.001
- example code from TMVA

from Jin's code :overtrain.cxx

---Perform Kolmogorov-Smirnov tests

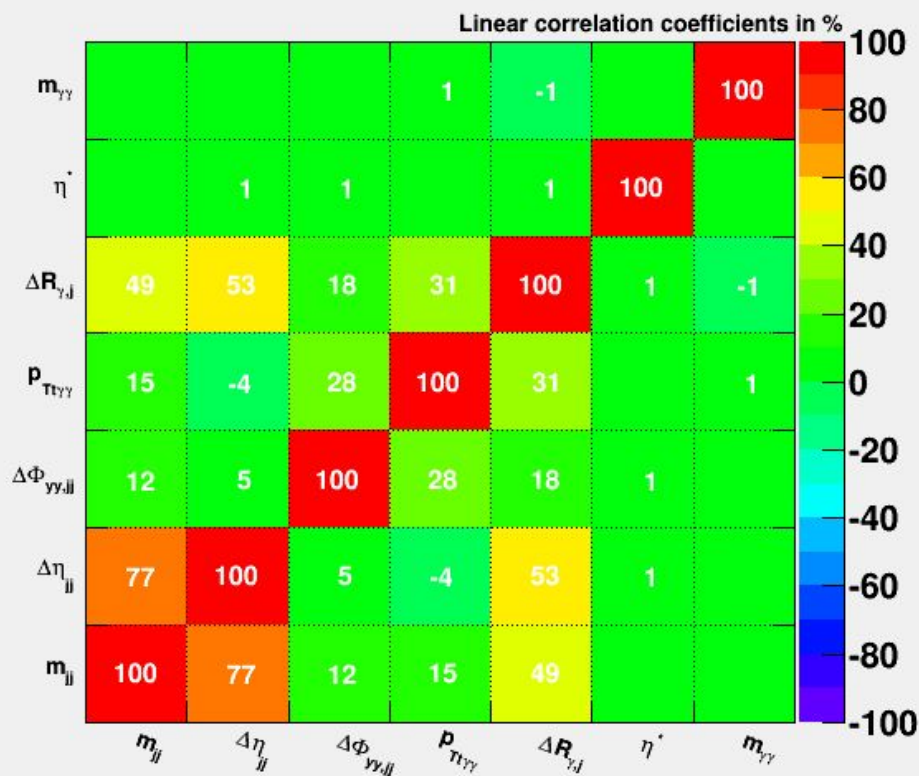
--- Goodness of signal (background)

consistency: 1 (1)

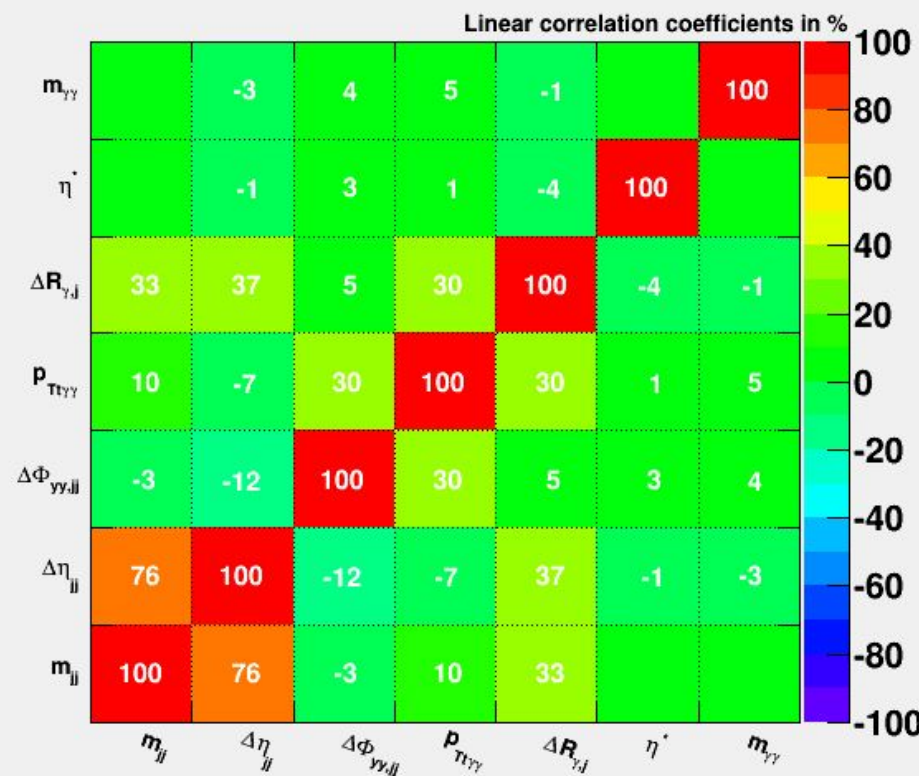
(Training VBF:75759 Test VBF:75759)

correlation

Correlation Matrix (signal)



Correlation Matrix (background)



- low correlation with $m_{\gamma\gamma}$

to do list

- check MVA carefully
- qualification
- shift