

Weekly report

FANGYI GUO

Working status

HGTD: Approval meeting was postponed.

One additional working point: PU50, remove 50% PU jets in forward region.

	ITK	PU50	rmfwdPU
$\sigma(\text{precut})$	4.62 ± 0.03	4.69 ± 0.03	4.77 ± 0.03
$\sigma(\text{BDT combined})$	14.58 ± 0.25	14.30 ± 0.27	15.15 ± 0.33
S/B (BDT combined)	0.391 ± 0.016	0.391 ± 0.019	0.464 ± 0.026

After BDT PU50 is not between ITK and rmfwdPU. Need some further study.

Working status

Cut flow

cut flow	ggH	VBF	background
2 photons	23.082%	26.877%	19.277%
Rel.pT	93.240%	89.157%	85.522%
Mass window	97.363%	95.403%	57.394%
2 jets	13.059%	41.212%	12.237%
$\Delta\eta_{jj} > 2$	40.177%	74.984%	37.631%
$ \eta_{\gamma\gamma}^{ZepP} < 5$	99.572%	99.921%	98.246%
Total	1.095%	7.059%	0.428%
Scale to 3 ab-1	4075.59	2056.55	903483.7
$m_{\gamma\gamma} \in [120, 130]$	3833.98	1935.33	171160.76

ITK, $\sigma = 4.62 \pm 0.03$
(4.63 for s/\sqrt{b})

cut flow	ggH	VBF	background
2 photons	23.082%	26.877%	19.272%
Rel.pT	93.240%	89.157%	85.539%
Mass window	97.363%	95.403%	57.392%
2 jets	12.748%	40.804%	11.726%
$\Delta\eta_{jj} > 2$	39.278%	75.139%	35.421%
$ \eta_{\gamma\gamma}^{ZepP} < 5$	99.628%	99.929%	98.755%
Total	1.045%	7.004%	0.388%
Scale to 3 ab-1	3891.67	2040.57	819094
$m_{\gamma\gamma} \in [120, 130]$	3658.246	1920.014	163565.1

PU50, $\sigma = 4.69 \pm 0.03$
(4.70 for s/\sqrt{b})

cut flow	ggH	VBF	background
2 photons	23.082%	26.877%	19.275%
Rel.pT	93.240%	89.157%	85.535%
Mass window	97.363%	95.403%	57.388%
2 jets	12.424%	40.413%	11.421%
$\Delta\eta_{jj} > 2$	38.418%	75.279%	34.506%
$ \eta_{\gamma\gamma}^{ZepP} < 5$	99.750%	99.930%	98.874%
Total	0.998%	6.950%	0.369%
Scale to 3 ab-1	3714.08	2024.80	778098.6
$m_{\gamma\gamma} \in [120, 130]$	3489.97	1905.53	155338.8

rmfwdPU, $\sigma = 4.77 \pm 0.03$
(4.78 for s/\sqrt{b})

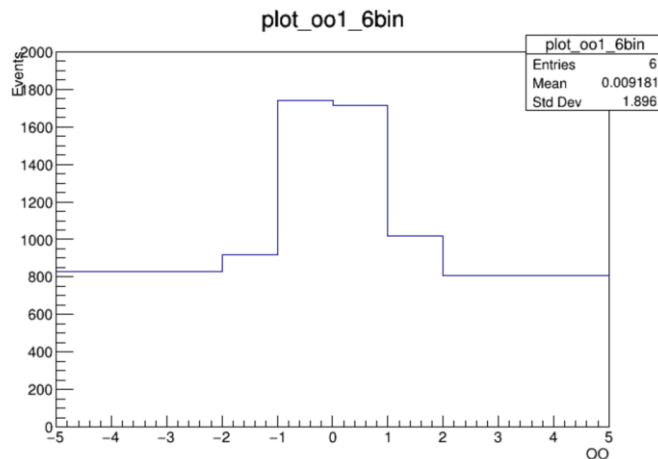
Cut flow shows before BDT everything is reasonable.

Tried to re-train BDT with more bkg MC, but new result is even worse.

Some fluctuation in BDT?

Working status

VBF CP test



Divide all events into 6

OO bins:

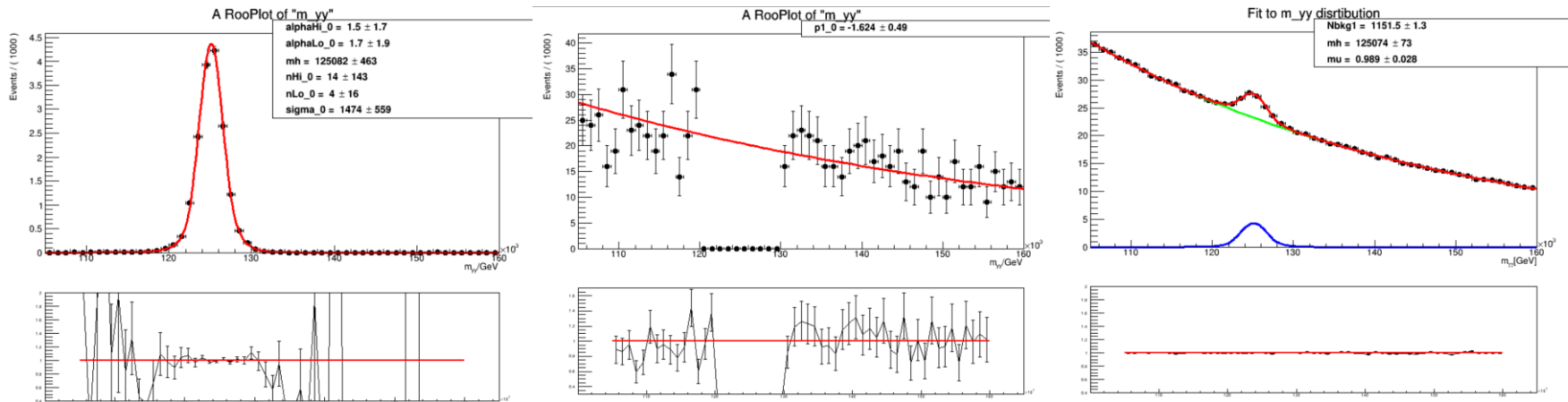
$[-\infty, -2]$, $[-2, -1]$, $[-1, 0]$,
 $[0, 1]$, $[1, 2]$, $[2, \infty]$

	VBF	ggh	bkg
$[-\infty, -2]$	11.1591	5.79905	1033.599
$[-2, -1]$	11.7585	6.54482	1151.412
$[-1, 0]$	13.4697	13.6953	2187.73
$[0, 1]$	13.9827	13.6982	2153.379
$[1, 2]$	11.3978	6.47872	1280.777
$[2, \infty]$	11.1858	5.60663	1004.576

Working status

Fit model: simultaneous fit in 6 bins

- Signal: double-side CB
- Background: exponential (Asimov data)

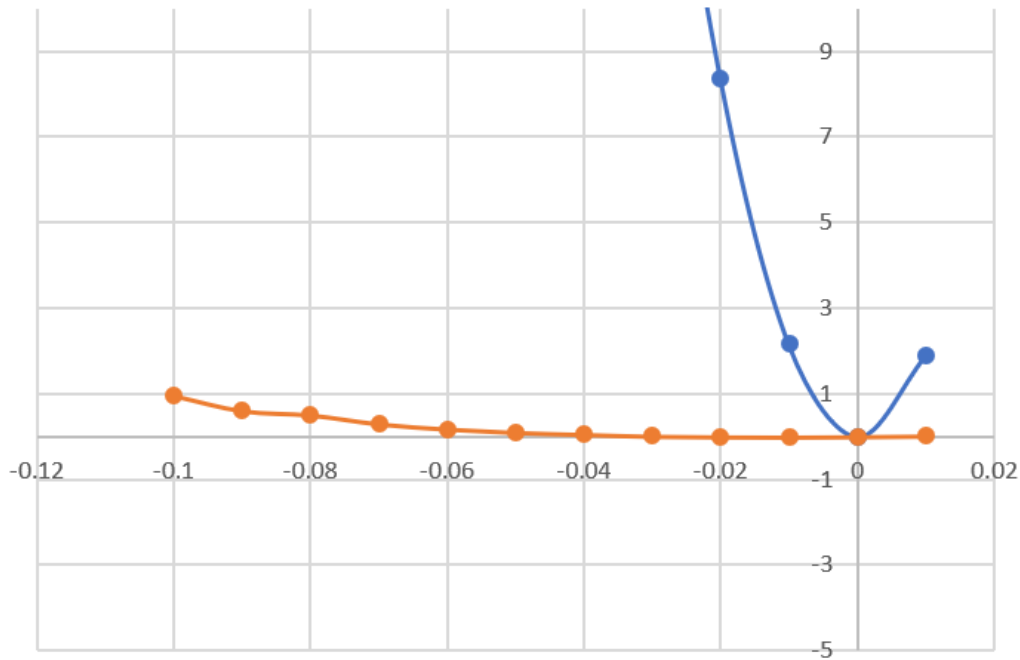


Signal(left), sideband data(middle) and S+B(right) fit in first OO bin

Working status

Δ NLL curve for 2 method

NLL curve



Bifit

$m_{\gamma\gamma} \times 00$ fit