

A black and white yin-yang symbol, also known as a Taijitu, is positioned in the top left corner. It features a black half with a white dot and a white half with a black dot, surrounded by a textured, brush-like border.

CEPC CDR updates

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b/c/g



Signal		250	240
Z	H		
H->qq			
ee	bb	1.30%	1.35%
	cc	11.78%	12.35%
	gg	6.17%	6.51%
$\mu\mu$	bb	1.00%	1.03%
	cc	9.44%	9.77%
	gg	4.90%	5.08%
qq	bb	0.47%	0.49%
	cc	11.19%	12.45%
	gg	3.65%	3.94%
vv	bb	0.40%	0.41%
	cc	3.84%	4.10%
	gg	1.49%	1.61%
vvH(WW fusion)			
vvH	bb	3.01%	3.16%
zh	bb	0.32%	0.32%
ZH			
Z	bb	0.28%	0.29%
	cc	3.27%	3.45%
	gg	1.28%	1.37%

WW/ZZ



Signal		250	240
Z	H		
H->WW			
ee	lvlv	9.36%	9.79%
	evqq	4.57%	4.77%
	$\mu\nu$ qq	3.95%	4.10%
$\mu\mu$	lvlv	7.35%	7.54%
	evqq	4.01%	4.07%
	$\mu\nu$ qq	3.97%	4.07%
vv	qqqq	1.98%	2.09%
	evqq	4.68%	4.88%
	$\mu\nu$ qq	4.18%	4.35%
	lvlv	11.30%	11.60%
qq	qqqq	1.84%	1.93%
H->ZZ			
vv	$\mu\mu$ qq	7.96%	8.21%
vv	eeqq	39.50%	42.19%
$\mu\mu$	vvqq	7.38%	7.56%
ZH			
Z	WW	1.00%	1.04%
	ZZ	5.12%	5.21%

Others



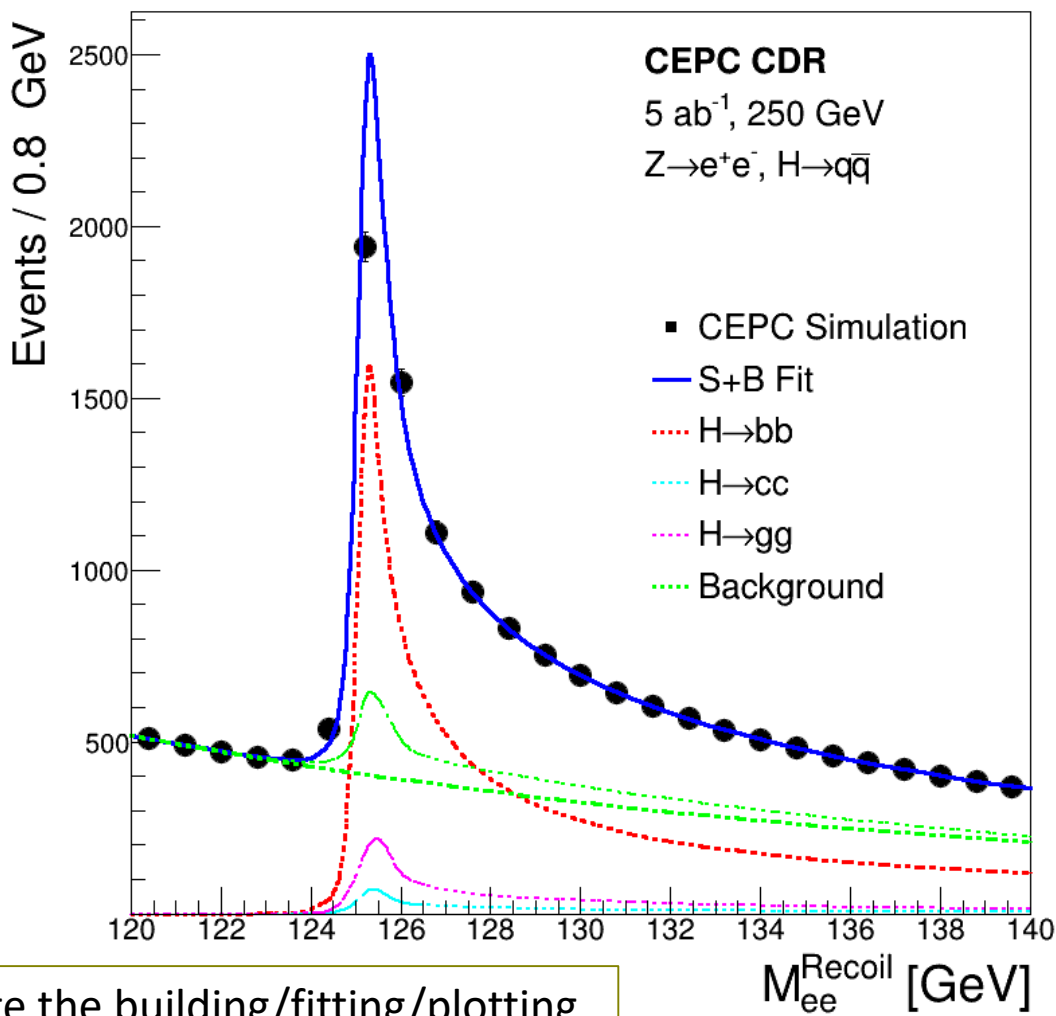
Signal		250	240
Z	H		
H→Invisible			
qq	zz(vvvv)	220.00%	245.00%
ee		325.00%	388.00%
μμ		229.00%	257.00%
Tot		150.24%	161.61%
H→γγ			
μμ+ττ	γγ	37.79%	41.13%
νν		9.86%	10.47%
qq		9.30%	10.39%
Tot		6.66%	7.38%
H→μμ			
qq	μμ	17.75%	18.70%
ee		61.38%	64.71%
μμ		86.10%	90.74%
νν		53.32%	56.93%
Tot		15.90%	16.84%
H→ττ			
ee	ττ	2.73%	2.86%
μμ		2.67%	2.74%
qq		0.98%	1.02%
νν		2.65%	2.81%
Tot		0.83%	0.87%

Result



	250GeV	240GeV
$\sigma(ZH)$	0.50%	0.50%
$\sigma(ZH) * Br(H \rightarrow bb)$	0.28%	0.29%
$\sigma(ZH) * Br(H \rightarrow cc)$	3.27%	3.42%
$\sigma(ZH) * Br(H \rightarrow gg)$	1.28%	1.34%
$\sigma(ZH) * Br(H \rightarrow WW)$	1.00%	1.04%
$\sigma(ZH) * Br(H \rightarrow ZZ)$	5.12%	5.21%
$\sigma(ZH) * Br(H \rightarrow \tau\tau)$	0.83%	0.87%
$\sigma(ZH) * Br(H \rightarrow \gamma\gamma)$	6.66%	7.26%
$\sigma(ZH) * Br(H \rightarrow \mu\mu)$	15.9%	16.8%
$\sigma(\nu\nu H) * Br(H \rightarrow bb)$	3.01%	3.16%
$Br_{\text{upper}}(H \rightarrow inv.)$	0.42%	0.44%
$\sigma(ZH) * Br(H \rightarrow Z\gamma)$	19.26%	

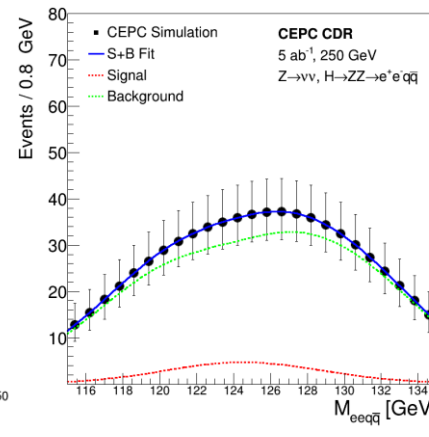
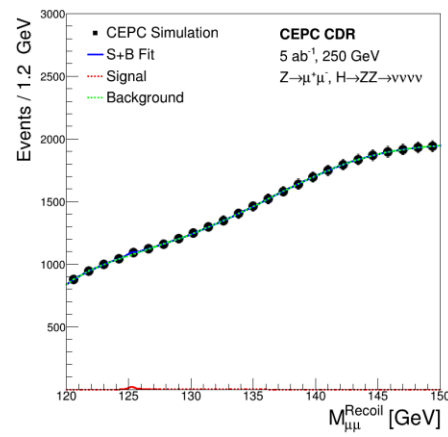
Final(?) plot style



would like to separate the building/fitting/plotting code in the future..... if I have time

Issues known (1)

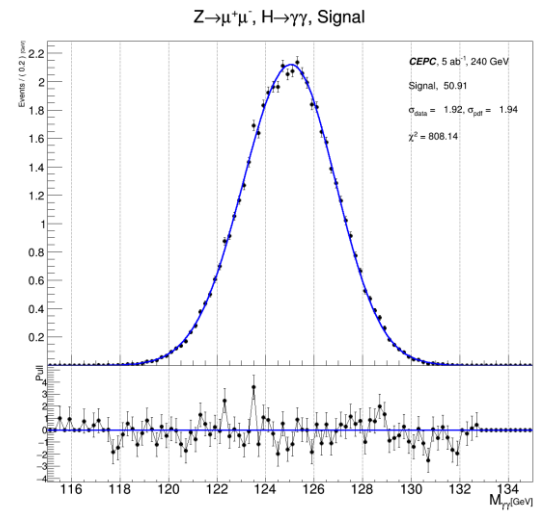
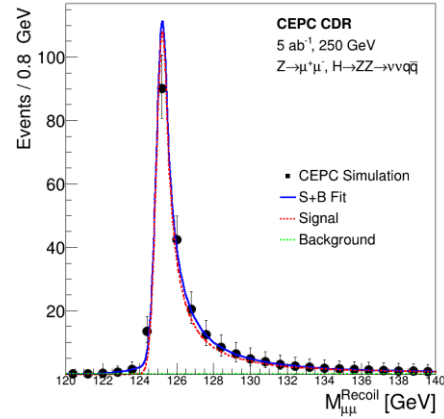
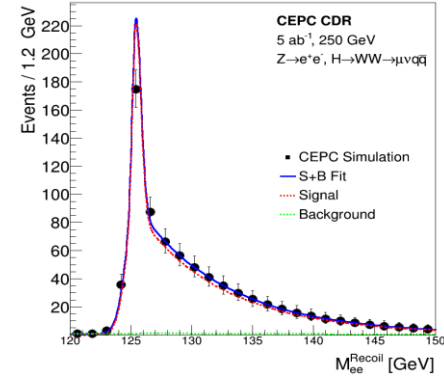
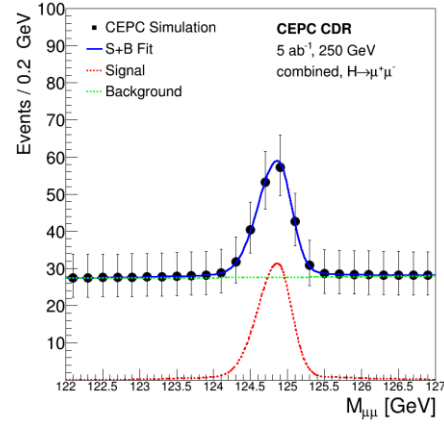
- $\sigma(ZH)$;
- μ_{bb} 0.28% and $\mu_{ZH \rightarrow bb}$ 0.32%
 - 0.28%: take account all ZH and $\nu\nu H$;
 - 0.32%: differ the ZH and $\nu\nu H$, consider the correlation
- Study with the same final states
 - Mix study in $H \rightarrow 2j(b/c/g)$ and $4j(W/Z)$
 - W/Z leptonic decay:
 - $Z \rightarrow ll, H \rightarrow ZZ \rightarrow \nu\nu\nu\nu$ (invisible)
 - $Z \rightarrow \nu\nu, H \rightarrow ZZ \rightarrow ll\nu\nu$
 - $Z \rightarrow \nu\nu, H \rightarrow WW \rightarrow l\nu l\nu$
 - $Z \rightarrow ll, H \rightarrow ZZ \rightarrow \nu\nu jj, Z \rightarrow \nu\nu, H \rightarrow ZZ \rightarrow lljj$
- Some strange distribution
 - $Z \rightarrow \mu\mu, H \rightarrow \nu\nu\nu\nu$
 - $Z \rightarrow \nu\nu, H \rightarrow ZZ \rightarrow ll\nu\nu$



Issues known (2)

- MC stats not enough:
 - $H \rightarrow \mu\mu$: Scale down the bkg;
 - $H \rightarrow \tau\tau$: Some bkg channel with weight ~ 10 ;
 - More stats can benefit the 2d impact fit;
- Some channels are so “clean”
 - 800 signal and 2 bkg?
- $H \rightarrow \gamma\gamma$ tail;

full simulation
should be Asymmetric?
Photon convention?



Interesting topic: Multi dimensional fit



- ideally all channels can do this
 - invMass and recMass; or other independent variables;
 - diphoton 7.9%→6.6%
- bb/cc/gg template;
 - 20*20 bin too rough?
- vvH fusion
 - 3.11%→3.01%
- tautau impact parameter;
-

backup

Cross Section current

Cross Section, 250GeV cited from [Moxin's note on cepcdoc](#) and 240GeV calculated by Gang in Whizard 1.9.5

Type	250 GeV	240 GeV	Ratio
Signal (fb)			
Total	212.13	200.66	96.0%
Sum	214.13	203.65	95.1%
eeH	7.60	7.05	92.8%
mmH	7.10	6.77	95.4%
$\tau\tau$ H	7.08	6.75	95.3%
$\nu\nu$ H	48.96	46.32	94.6%
qqH	143.39	136.76	95.4%
eeH(ZZ fusion)	0.63	0.28	44.4%
$\nu\nu$ H(WW fusion)	6.85	6.19	90.3%

Ratio=250GeV/240GeV;

Technical issue makes a difference in Total Cx and Sum Cx.

These 5 channels conclude fusion.

Calculated by e1e1h-e2e2h, n1n1h-n2n2h. (Ignore the interference)
 WW fraction from 14%(250GeV) to 13.3%(240GeV).
 Add all the interferences to $\nu\nu$ H would underestimate 250GeV result, and overestimate 240GeV result.