Updates on Higgs Combination

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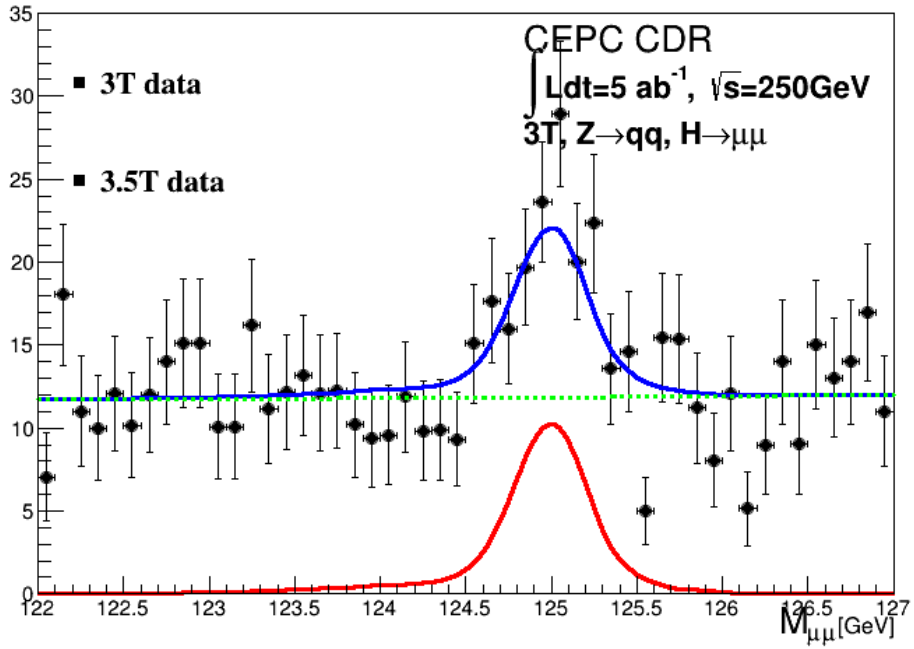
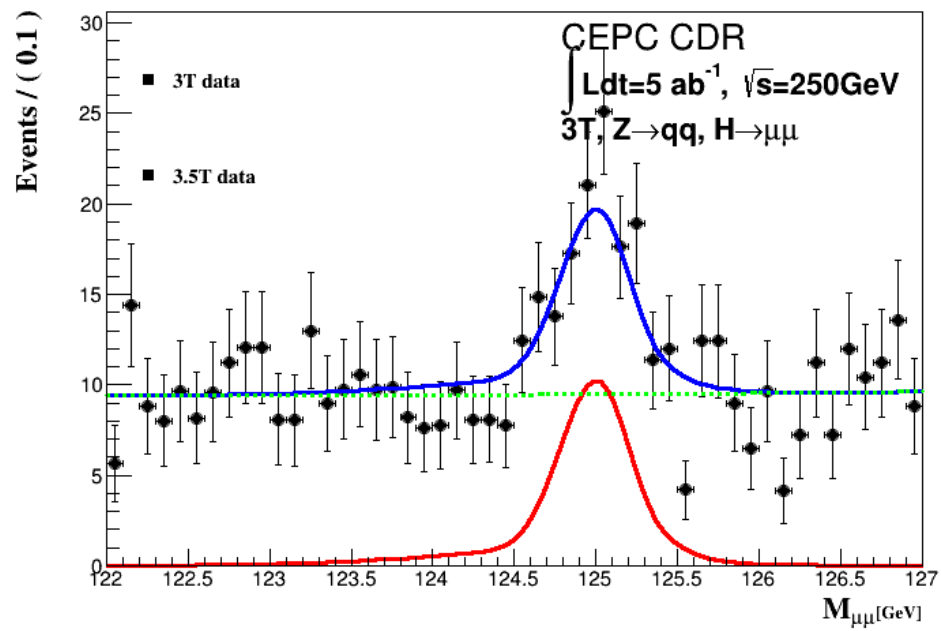
$Z \to qq,\ H \to \mu\mu$ Bkg reducing

3T: before: 21.6%



3T: reduced:20.3%



(3.5T: 17.5%)

Channels Table

Done/Almost Done:

Signal		Precision
Z	H	
H->qq		
ee	bb	1.6%
	cc	23.6%
	gg	13.3%
μμ	bb	1.1%
	cc	14.8%
	gg	8.0%
qq	bb	0.5%
	cc	11.9%
	gg	3.9%
νν	bb	0.4%
	cc	3.9%
	gg	1.5%
H→ττ		
ee	ττ	3.0%
μμ		2.8%
qq		1.9%
νν		3.7%
H→γγ, Zγ		
μμ+ττ	γγ	24.8%
νν		11.7%
qq		12.8%
νν	Zγ(qqγ)	21.2%

Signal		Precision
Z	H	
H->WW		
μμ	μνμν	7.3%
	eνeν	
	eνμν	
	eνqq	4.0%
	μνqq	4.0%
ee	μνμν	9.2%
	eνeν	
	eνμν	
	eνqq	4.6%
	μνqq	3.9%
νν	qqqq	2.0%
	eνqq	4.7%
	μνqq	4.2%
qq	lνqq	2.2%(ILC)
ZH bkg contribution		3.0%
H->ZZ		
νν	μμqq	8.2%
νν	eeqq	35.2%
μμ	ννqq	7.3%
ee	eeqq	35.1%
ee	μμqq	23.0%
ZH bkg contribution		19.4%

Signal		Precision
Z	H	
ννH(WW fusion)		
νν	bb	3.1%
Rare Decays		
H→μμ		
qq	μμ	15.4%
ee		
μμ		
νν		
H->Invisible		Br, Upper
qq	ZZ(νννν)	0.3%
ee		1.1%
μμ		0.7%

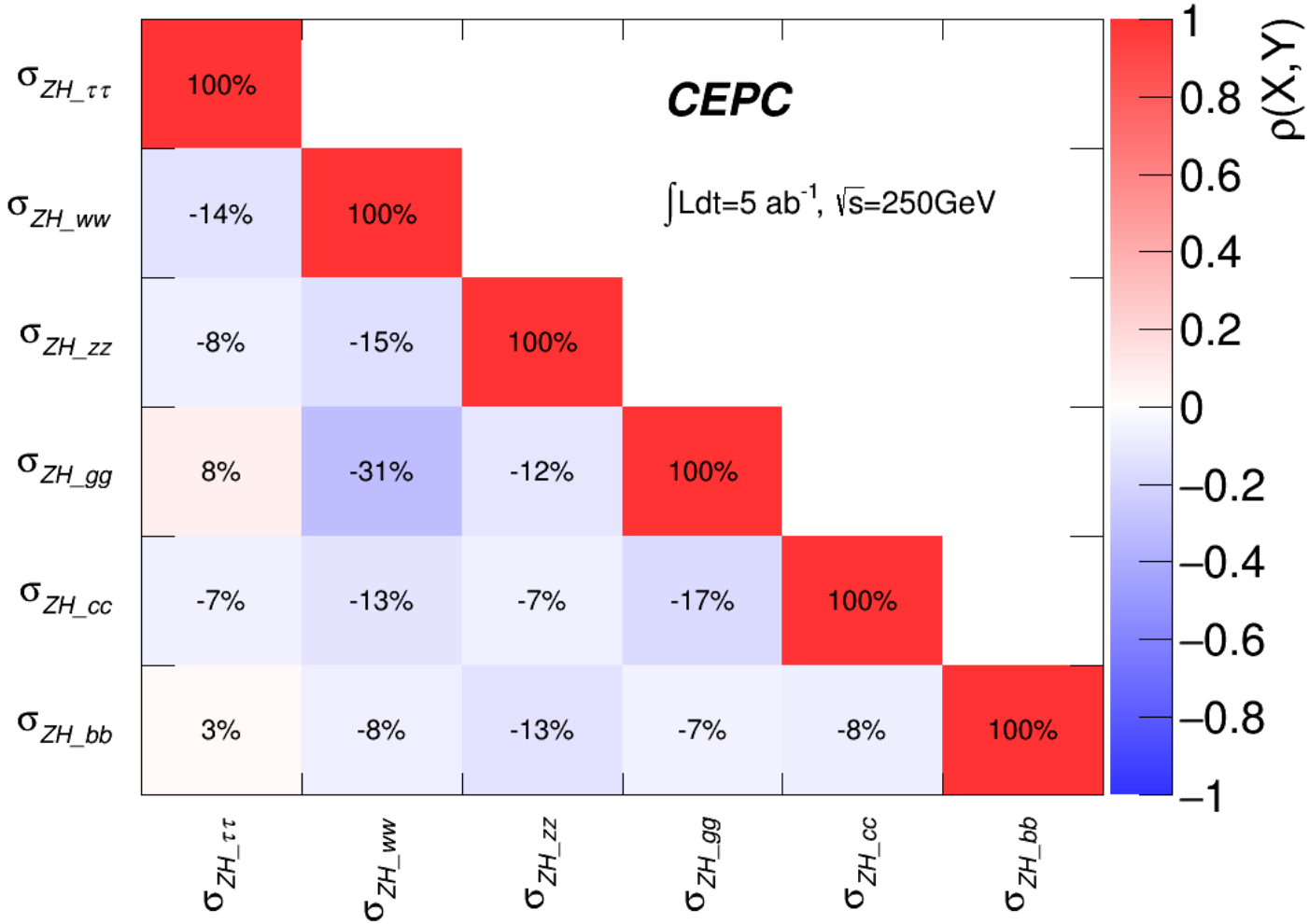
Need to be done:	
Z	H
ττ	Anything
qq	WW
	ZZ
ee	γγ
ee	ττ

Fit results

Standalone: Regardless any ZH bkg contribution;
Different impact on w/z and b/c/g/τ.

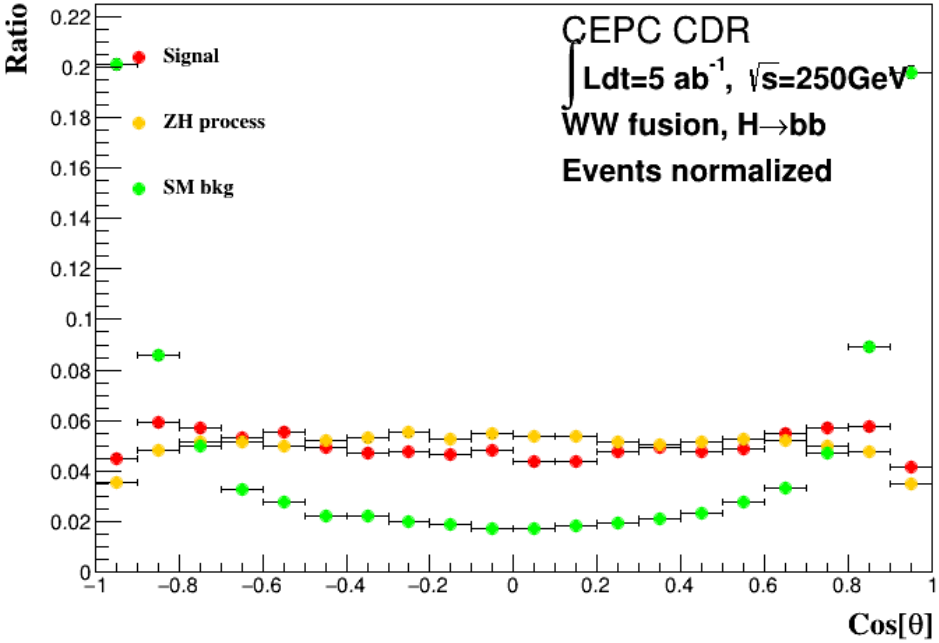
($5ab^{-1}$)	Pre_CDR	Combined	Standalone
$\sigma(ZH)$	0.51%	0.50%	
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mathrm{bb})$	0.28%	0.3%	0.3%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mathrm{cc})$	2.20%	3.5%	3.5%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mathrm{gg})$	1.60%	1.4%	1.4%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mathrm{WW})$	1.50%	1.0%	1.2%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mathrm{ZZ})$	4.30%	5.0%	5.2%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \tau\tau)$	1.20%	1.3%	1.3%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \gamma\gamma)$	9.00%	8.1%	8.2%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to \mu\mu)$	17%	15.4%	15.4%
$\sigma(\mathrm{vv}H) * \mathrm{Br}(\mathrm{H} \to \mathrm{bb})$	2.80%	3.1%	3.1%
$\mathrm{Br}_{\mathrm{upper}}(\mathrm{H} \to \mathrm{inv.})$	0.28%	0.24%	0.24%
$\sigma(ZH) * \mathrm{Br}(\mathrm{H} \to Z\gamma)$	\	4σ	4σ

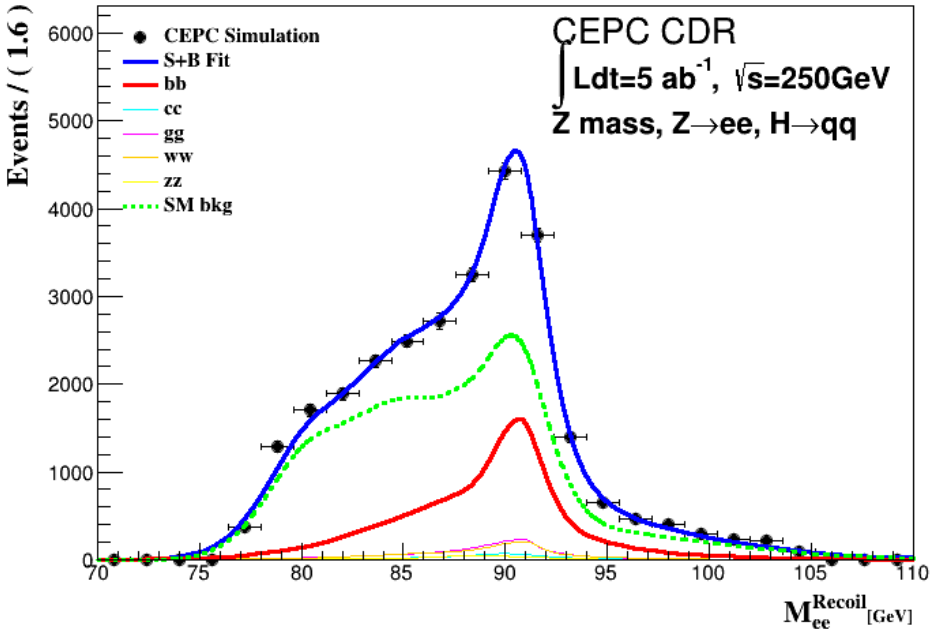
Correlations in channel



Esp., $vvH \rightarrow bb$ and $ZH \rightarrow bb$ is -46%.

Plot


CEPC CDR
∫Ldt=5 ab^{-1}, √s=250GeV
WW fusion, H→bb
Events normalized
Signal
ZH process
SM bkg
Ratio
Cos[θ]


CEPC CDR
∫Ldt=5 ab^{-1}, √s=250GeV
Z mass, Z→ee, H→qq
CEPC Simulation
S+B Fit
bb
cc
gg
ww
zz
SM bkg
Events / (1.6)
M_{ee}^{Recoil} [GeV]