

Update for Combination Measurement of CEPC

ZhangKaili

IHEP

2016-08-22

Subchannels Table

Dilepton channel like ee and emu have no specific Br so not included

Signal		abbr.	Who takes charge	Status	Signal		abbr.	Who takes charge	Status
Z	H				Z	H			
ee	bb	eebb	ZhenXing	Considering Algorithm method. Update Soon.	vv	ZZ(lljj)	vvzz	Yuqian	/
	cc	eecc			μμ	ZZ(vvjj)			
	gg	eegg			ee	ZZ(vvjj)			
μμ	bb	mmbb			μμ	WW(μνμν)		Libo	8.21
	cc	mmcc				WW(evev)			
						WW(eνμν)			
						WW(eνqq)			
gg	mmgg	WW(μνqq)							
qq	bb	qqbb			ee	WW(μνμν)		Libo	8.21
	cc	qqcc	WW(evev)						
			WW(eνμν)						
			WW(eνqq)						
gg	qqgg	WW(μνqq)							
ll	γγ	llaa	Feng		μμ	ττ	μμττ	Dan	?
vv		nnaa			Inclusive	μμ		Cui	July
qq		qqaa			qq	ZZ(vvvv)		Mo Xin	July

pdf shape check

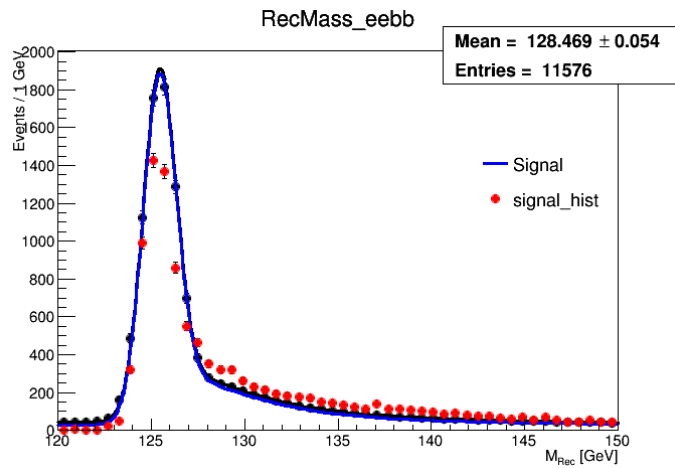
Max optimize the FCN to decide the what shape to use;

signal: CB+gaussian or CB+gaussian+Landau;

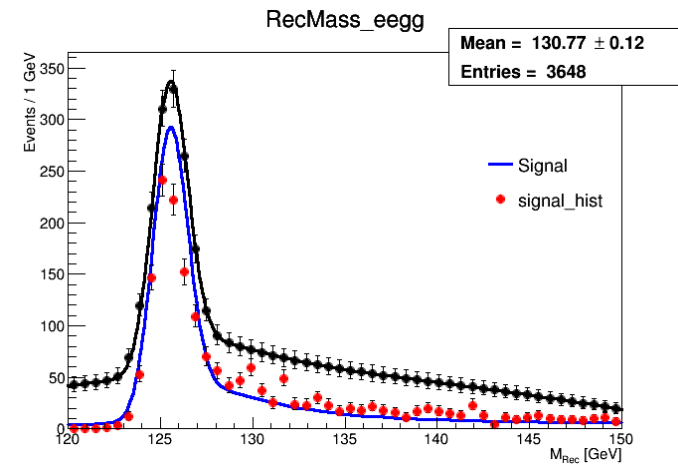
bkg: 2nd order exponential or 3rd cheb or CB+gaussian+Landau (for some ZH peak bkg)

Shape examination

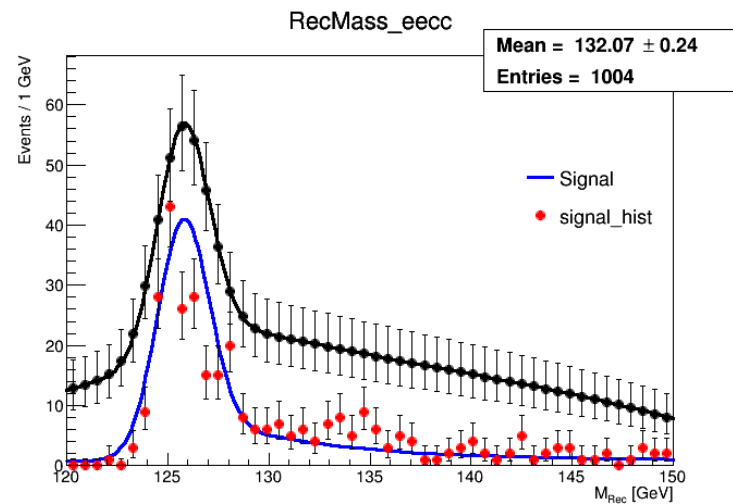
eebb



eegg

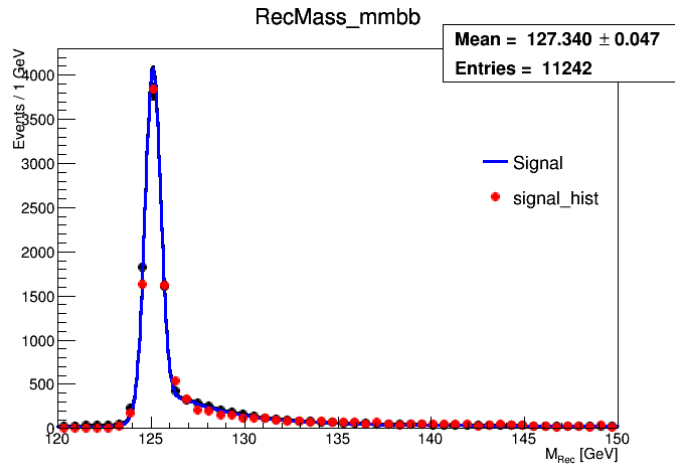


eecc

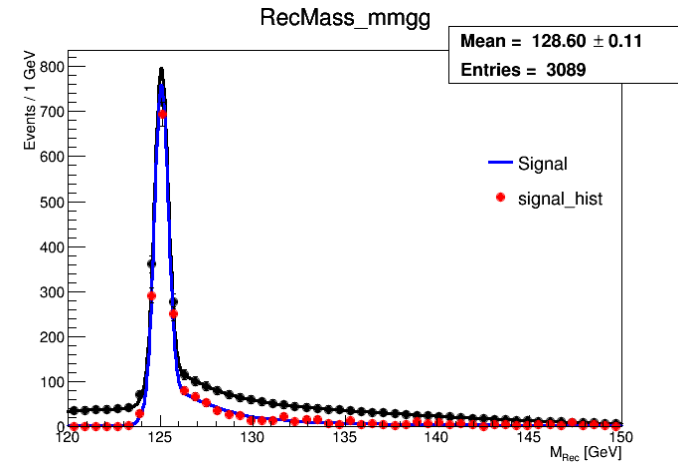


Shape examination

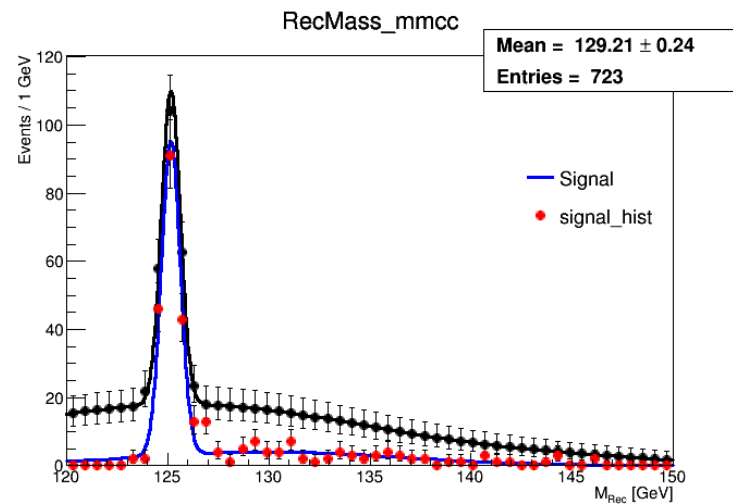
$\mu\mu b\bar{b}$



$\mu\mu g\bar{g}$

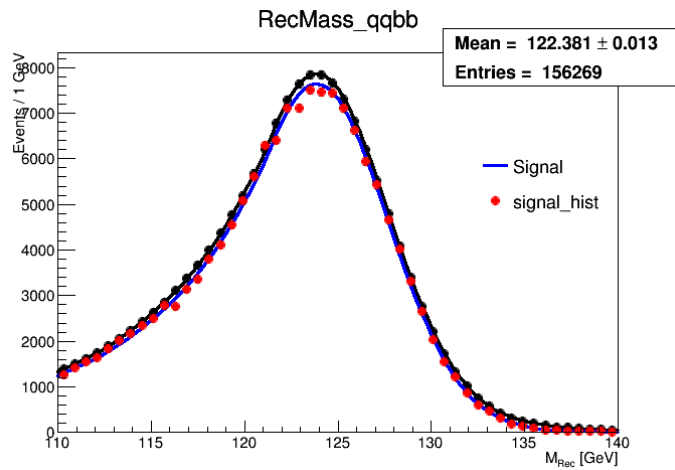


$\mu\mu c\bar{c}$

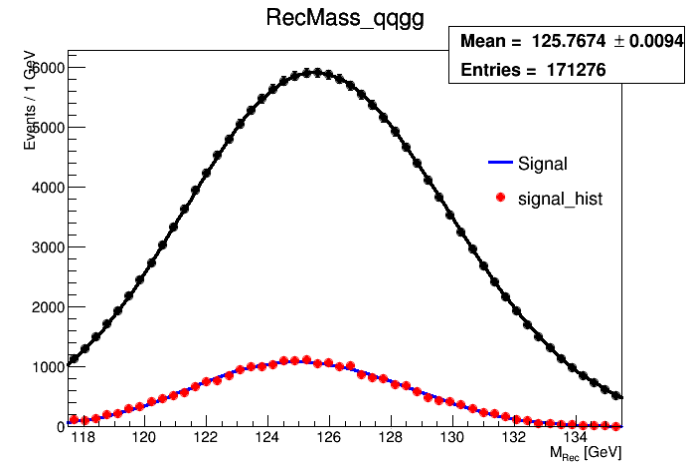


Shape examination

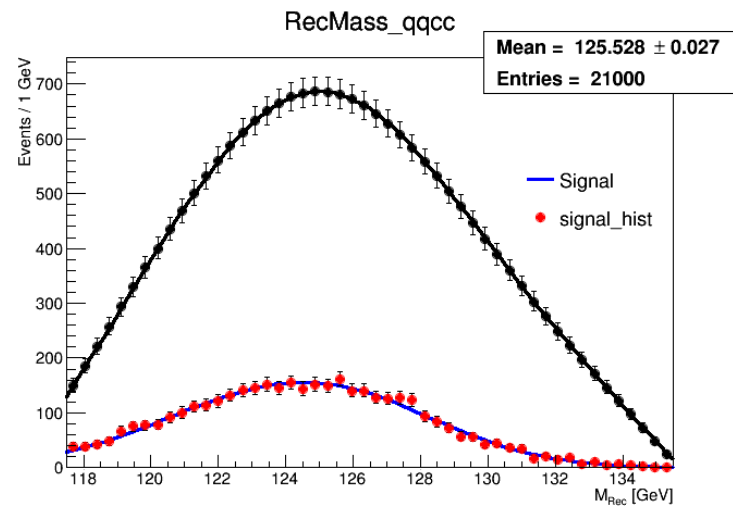
qqbb



qqgg

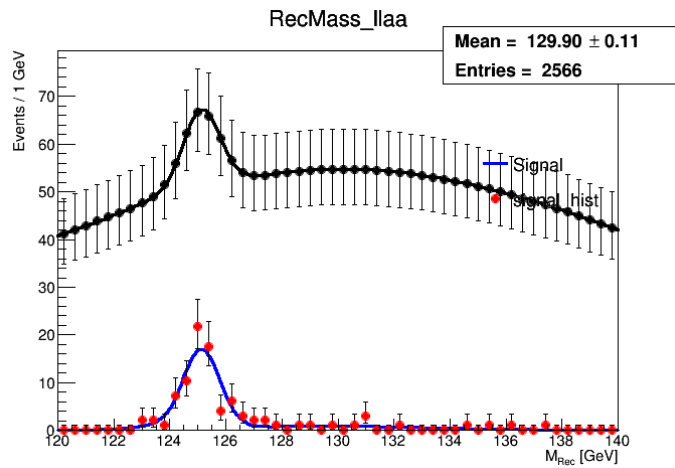


qqcc

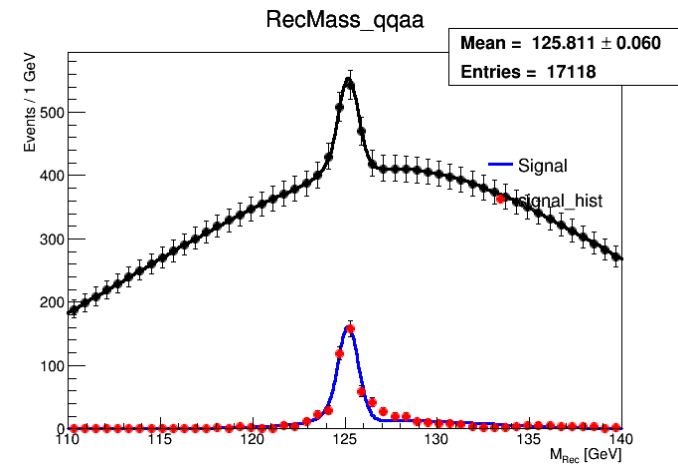


Shape examination

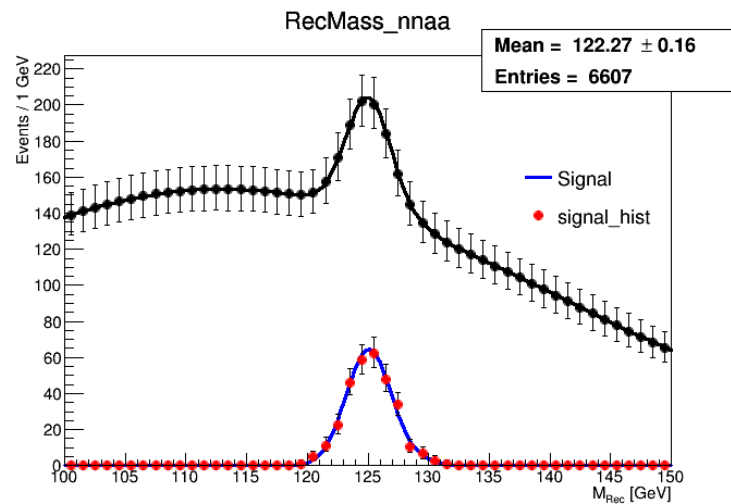
ll+gammagamma



qq+gammagamma

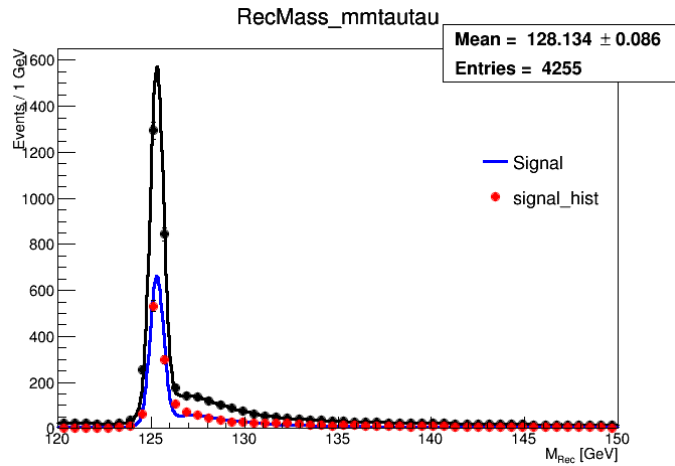


vv+gammagamma

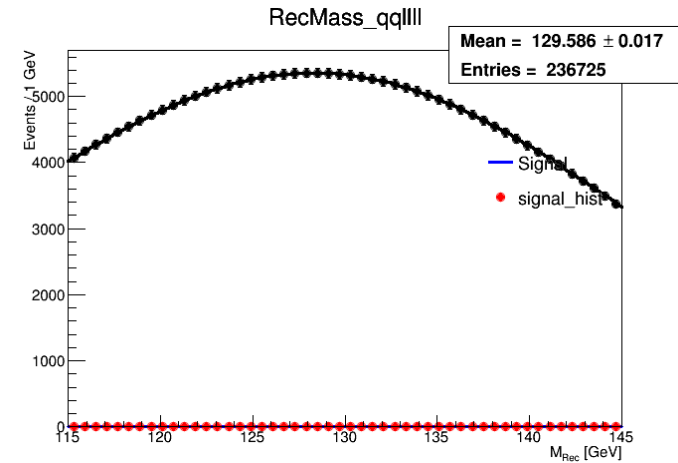


Shape examination

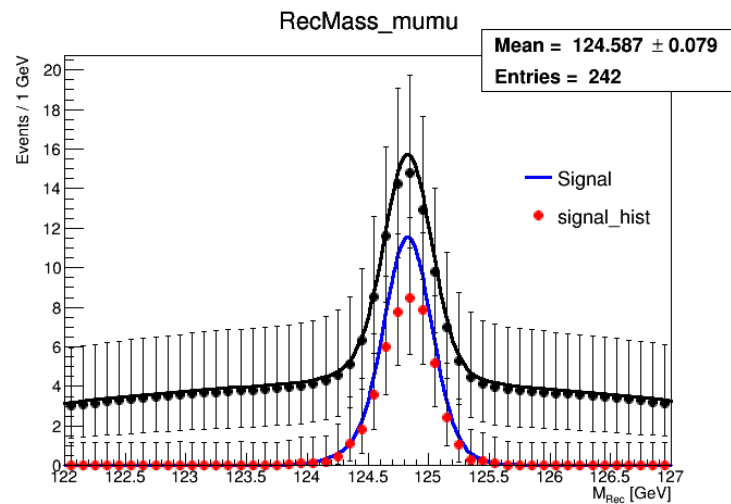
$\mu\mu+\tau\tau$? Need Recheck



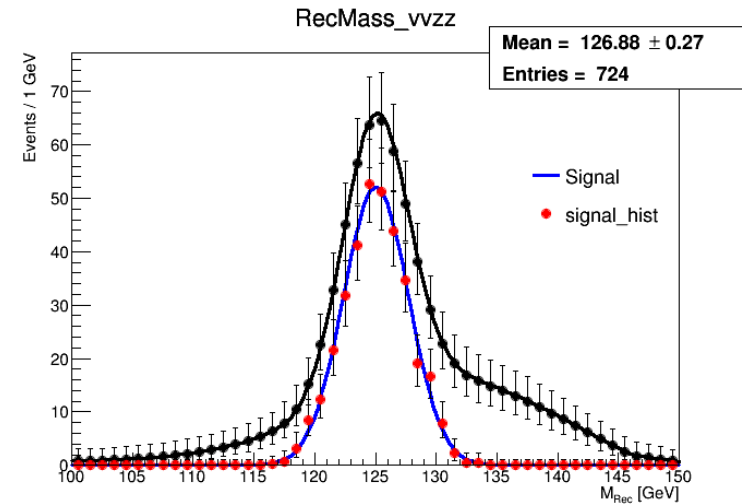
$qq+4l(\text{invisible})$



Inclusive+ $\mu\mu$

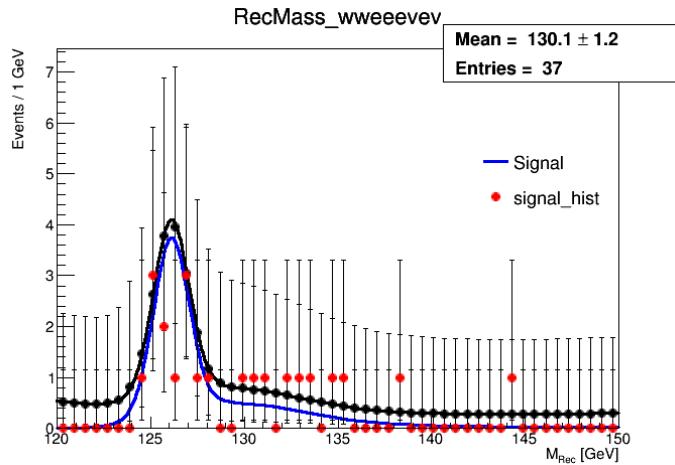


$\nu\nu+ZZ$

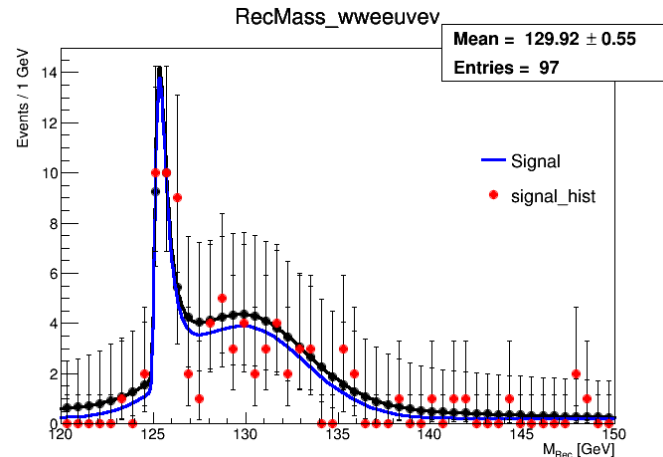


Shape examination ee+WW

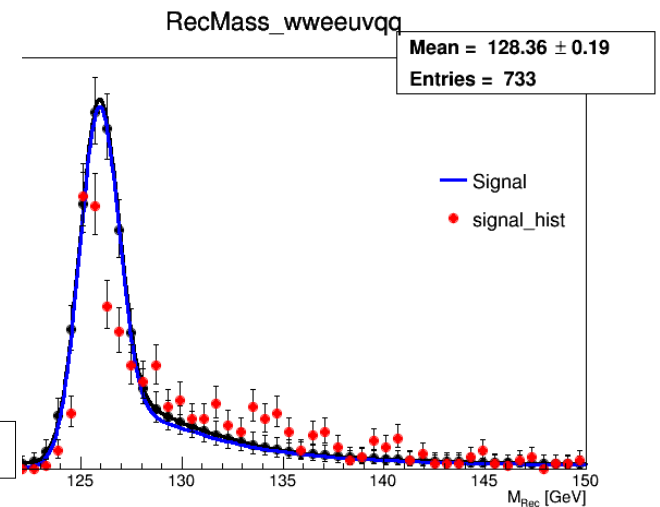
WW(evev)



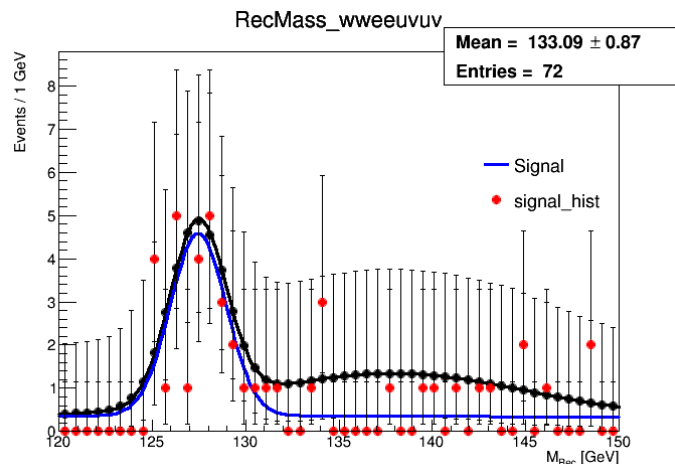
WW(uvev)



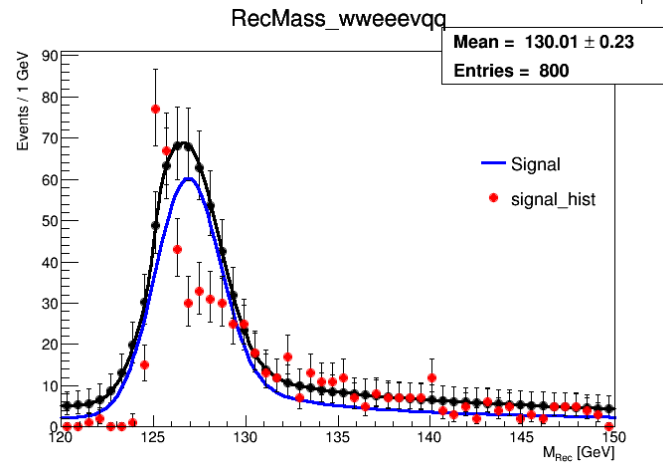
WW(uvqq)



WW(uvvv)

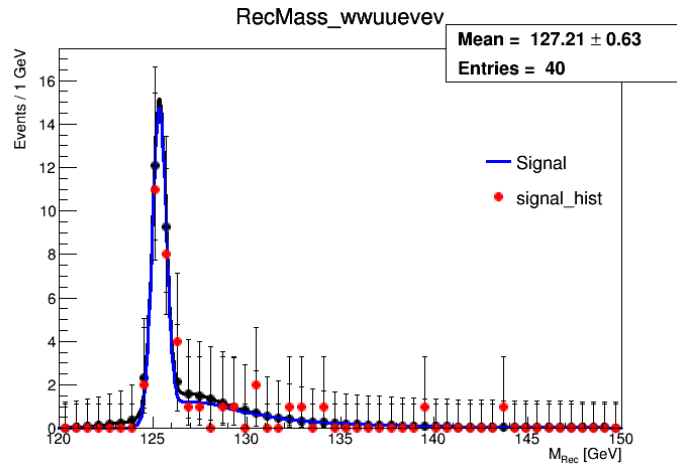


WW(evqq) Bad fit

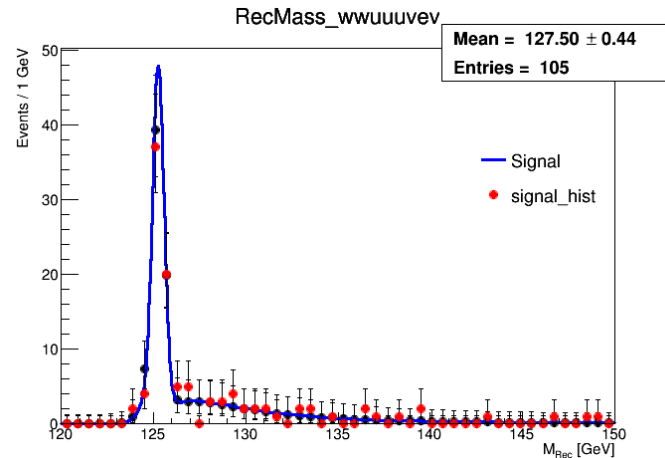


Shape examination uu+WW

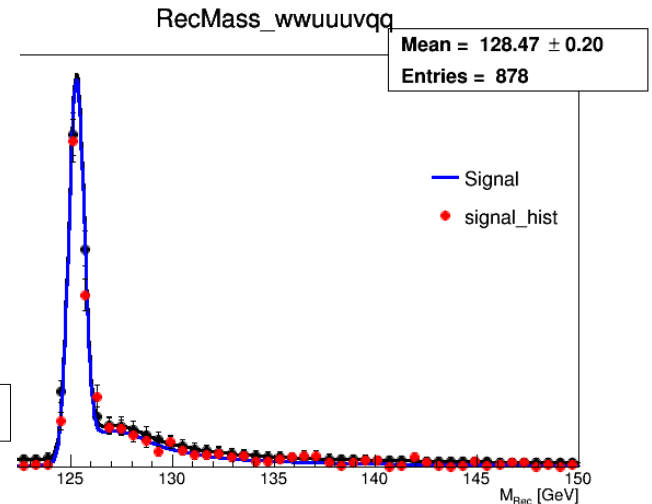
WW(evev)



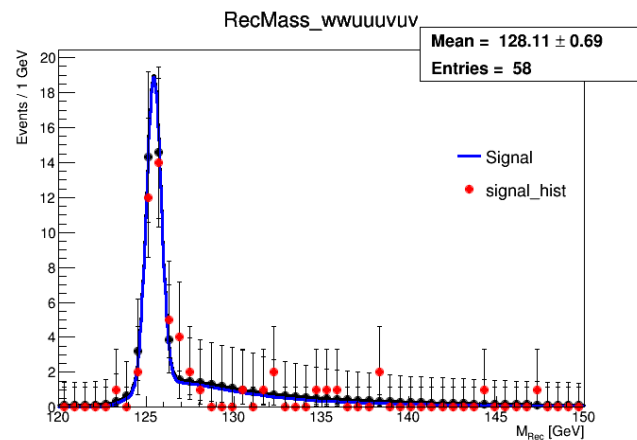
WW(uvev)



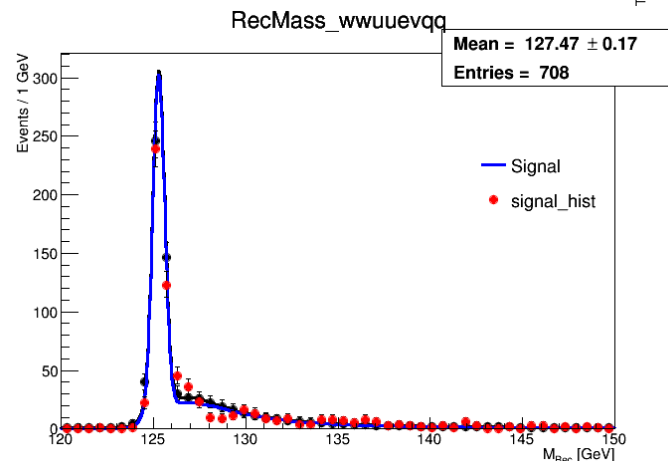
WW(uvqq)



WW(uvvv)



WW(evqq)



Signal events check

H	Z	Ntuple	Theory (before cut)	Newer version
bb	ee	10853	20586	7805
cc		319	961	361
gg		1176	3062	1242
bb	$\mu\mu$	10773	20586	12326
cc		283	961	615
gg		1815	3062	1755
bb	qq	148749	428876	
cc		3887	20034	
gg		25564	63812	
$\gamma\gamma$	ll	90	164	
	vv	328	488	
	qq	630	1707	
ZZ(lljj)	vv	563	548+54.8	
$\tau\tau$	$\mu\mu$	1658	2257	
ZZ(vvvv)	qq	225	784	
$\mu\mu$	Inclusive	47	233	

Theoretic number
calculated by
 $1.06e6(5000\text{ifb}) \cdot \text{Br}$
Which recorded in
PDG or Pre_CDR.

Z	H	Ntuple	theory
$\mu\mu$	WW($\mu\nu\mu\nu$)	52	77
	WW(even)	36	77
	WW(e $\nu\mu\nu$)	105	154
	WW(e ν qq)	663	1029
	WW($\mu\nu$ qq)	717	1029
ee	WW($\mu\nu\mu\nu$)	44	77
	WW(eeven)	22	77
	WW(e $\nu\mu\nu$)	81	154
	WW(e ν qq)	612	1029
	WW($\mu\nu$ qq)	684	1029

$$\text{Current} \frac{\Delta(Br * CrossX)}{Br * CrossX} \text{Fit result}$$

CrossSection Precision set to 0.5%;
For 5000ifb;

	Fit type	μ	μ_{bb}	μ_{cc}	μ_{gg}	μ_{zz}	μ_{aa}	μ_{tt}	μ_{ww}	invisible	$\mu\mu$
Now	$\frac{\Delta Br}{Br}$	0.554%	0.558%	3.049%	1.327%	6.446%	7.460%	4.001%	1.992%	165%	22.0%
	$\frac{\Delta(Br * CrossX)}{Br * CrossX}$	0.240%	0.248%	3.008%	1.229%	6.427%	7.444%	3.970%	1.929%	165%	22.0%
CDR's	$\frac{\Delta Br}{Br}$	\	0.57%	2.30%	1.70%	6.90%	9.00%	1.3%	1.60%	0.28%	17%
	$\frac{\Delta(Br * CrossX)}{Br * CrossX}$	0.28%	0.28%	2.20%	1.60%	6.90%	9.00%	1.2%	1.50%	/	17%

After changing fitting pdf, most channels' precision improved.

Template Fit

use cut to get ntuple, and use migrate ratio and cut as NP in the fit, to describe.

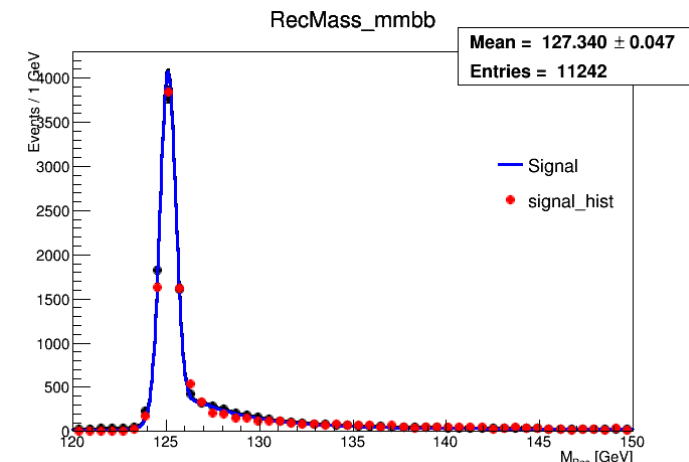
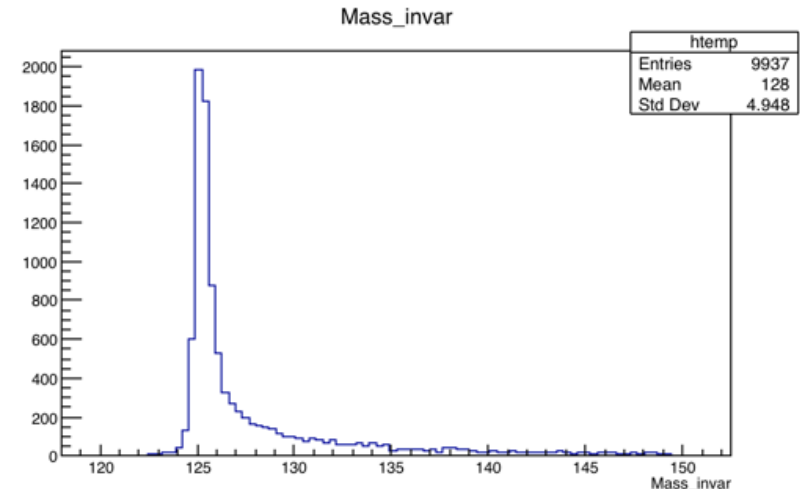
H	Z	Ntuple	Theory (before cut)	Newer version	Likeness> 0.98	Likeness> 0.99
bb	ee	10853	20586	7805		
cc		319	961	361		
gg		1176	3062	1242		
bb	$\mu\mu$	10773	20586	12326	13174	9937
cc		283	961	615		
gg		1815	3062	1755		

For $\frac{\Delta(Br*CrossX)}{Br*CrossX}$ measurement, since both observed/expected value has the norm factor $\frac{12326}{9937}$, so selection efficacy can be ignored.

Next step is to quantify the imported uncertainty by choosing b likeness>0.99.

And add the prob bc and pro cb for migration.

Same shape strcture

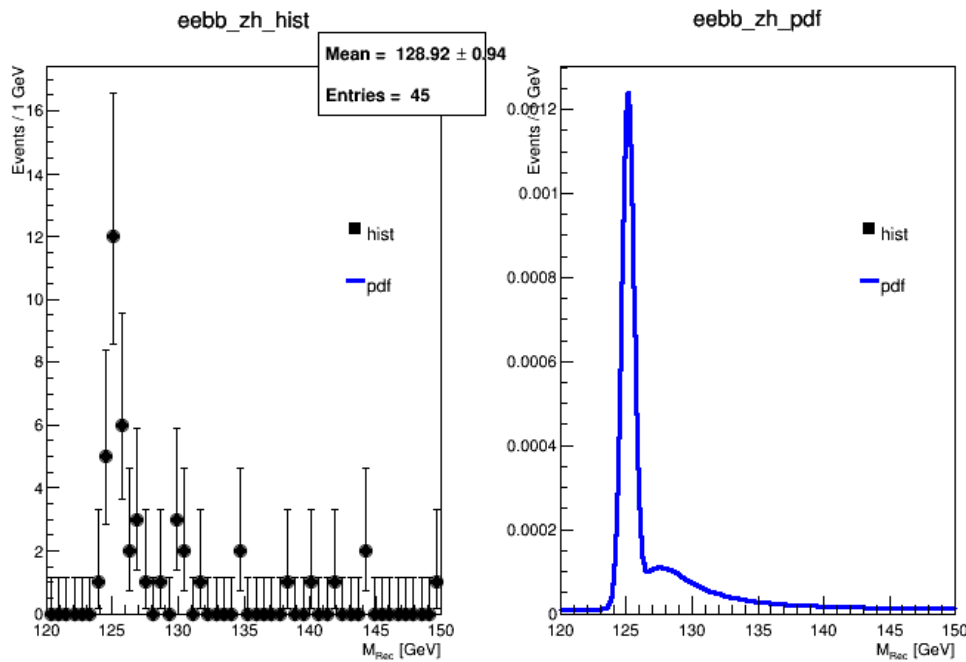


Undergoing Tasks

- Improve Fit quality
- Recoil Mass avoids the Higgs internal uncertainty, so the cut in analysis should be totally irrelevant with Higgs.
 - Should do check with present ntuples and use NP to describe.
- Estimates possible NP into analysis
 - Like Luminosity, Lepton Energy Scale/Resolution.....
- Coupling constants
 - Need new data
- Prepare Wednesday's Talk.

Backup: bkg shape

Fit result like:



RooFitResult: minimized FCN value: 106.623, estimated distance to minimum: 0.000261677
covariance matrix quality: Full, accurate covariance matrix
Status : MINIMIZE=0 HESSE=0

Floating Parameter	InitialValue	FinalValue +/-	Error	GblCorr.
frac_value1	8.0000e-01	6.0000e-01 +/-	3.89e-02	<none>
frac_value2	1.0000e-01	1.2940e-01 +/-	9.63e-02	<none>
mRes_value	1.5000e+00	4.5956e-01 +/-	9.03e-02	<none>
mTail2_value	1.2500e+02	1.2786e+02 +/-	5.47e+00	<none>
mTail_value	1.2500e+02	1.3000e+02 +/-	7.25e+00	<none>
sig1Tail_value	8.0000e+00	4.9990e+01 +/-	2.91e+01	<none>
sigTail_value	8.0000e+00	1.2288e+00 +/-	8.38e-01	<none>
signal_mean	1.2500e+02	1.2513e+02 +/-	1.09e-01	<none>
tailAlpha_value	1.5000e+00	3.8942e+00 +/-	4.17e+00	<none>
tailN	1.0000e+01	1.9778e+01 +/-	1.42e+01	<none>

primez_chi_bkg=peak,zh,eebb

Primez: EDM=0.000261677 minNLL=106.623 covQual=3 status=0

