



General Meeting vol.08

2014.08.30

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generating ideas

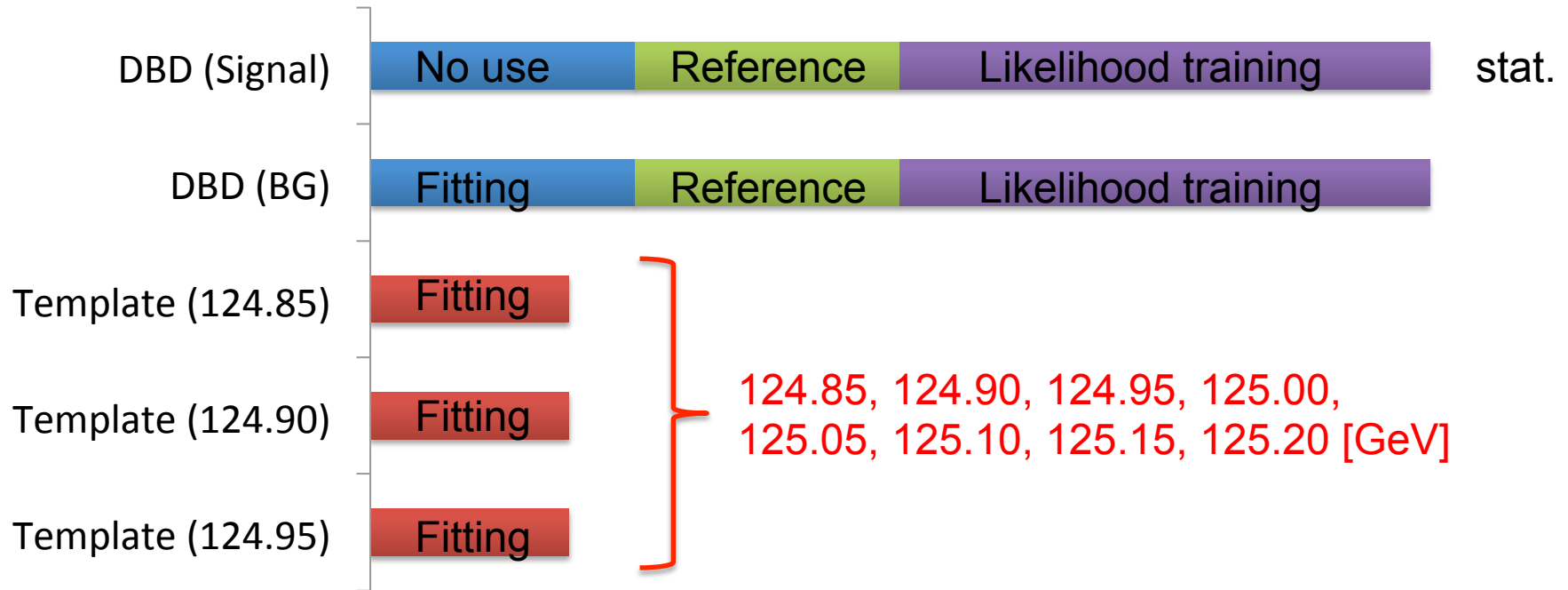
- My targets are measurement of Higgs **mass**, **cross section** and **CP-mixture** using recoil method in Zh events at 250GeV.

Higgs mass	Center of Mass Energy	Integrated Luminosity	Spin Polarization	Detector Simulation
125 [GeV]	250 [GeV]	250 fb ⁻¹	P(e ⁻ , e ⁺) =(-0.8, +0.3)	ILD_01_v05 (DBD ver.)

- Method (recoil mass) :
 - Reconstruct Higgs mass of Zh events by recoil
 - Reject BG events
 - Fit recoil mass distribution
 - Do toy-MC study and estimate statistical error
- Method (CP-mixture) :
 - Look asymmetry of Z production angle

- Mass template method is tried.
 - Plot of chi-square is obtained, but there are some fluctuated point.
 - Width of parabola is unnaturally small.
- Improvement of bias for $\cos\theta_{\text{missing}}$ cut.
 - Cut with condition of Z production angle seems to solve the bias problem, but has also demerits (worse BG rejection).
- CP-mixture (halfway)
 - Recoil mass plots for each bins are obtained.

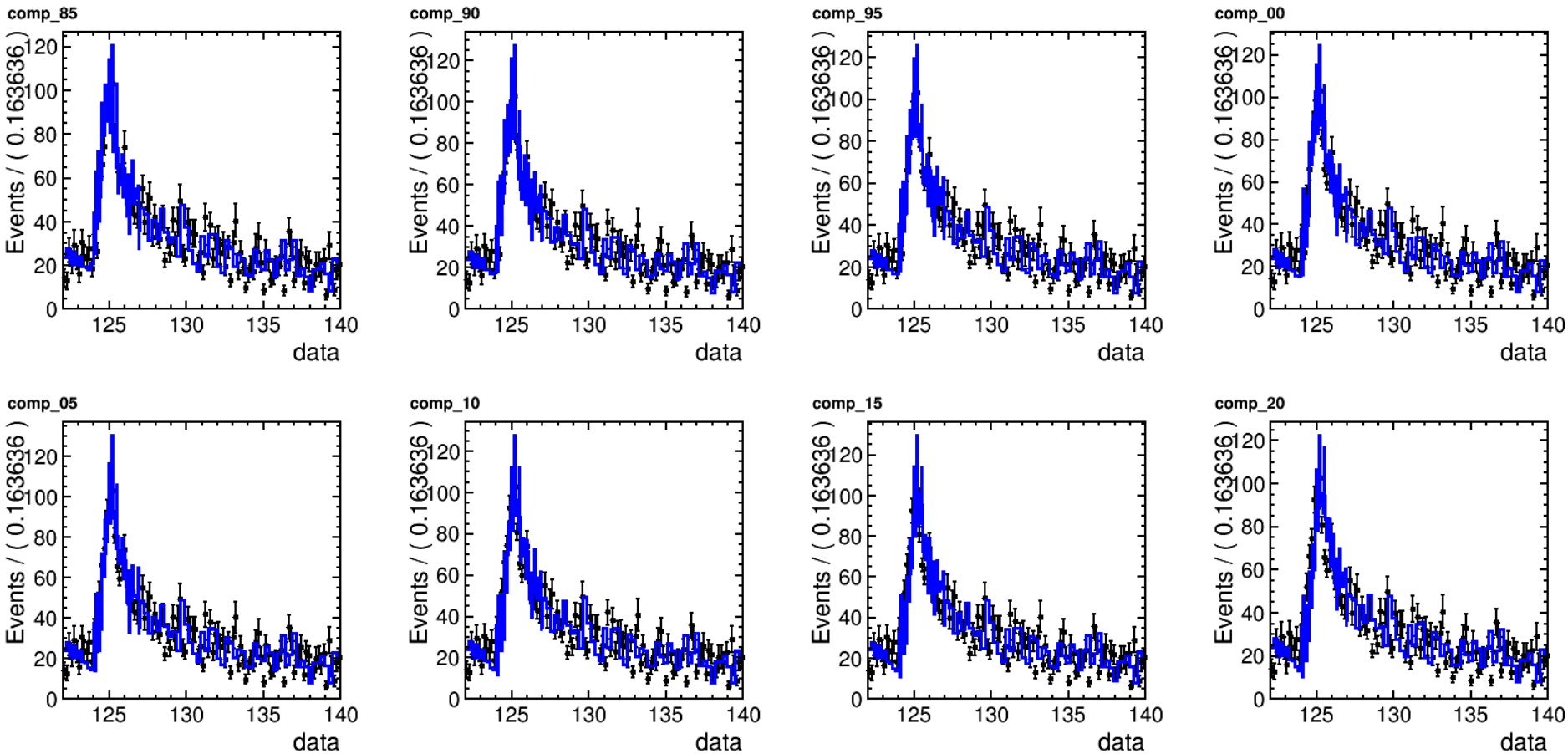
Condition of Mass Templates Method



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- To estimate systematic & statistics error of mass measurement, I tried mass template method.
- DBD samples are used as reference dataset.
- BG of fitting RooHistPdf, which is from DBD, is common for each template.
- Signal of RooHistPdf is from **template samples** made by Jan-san.

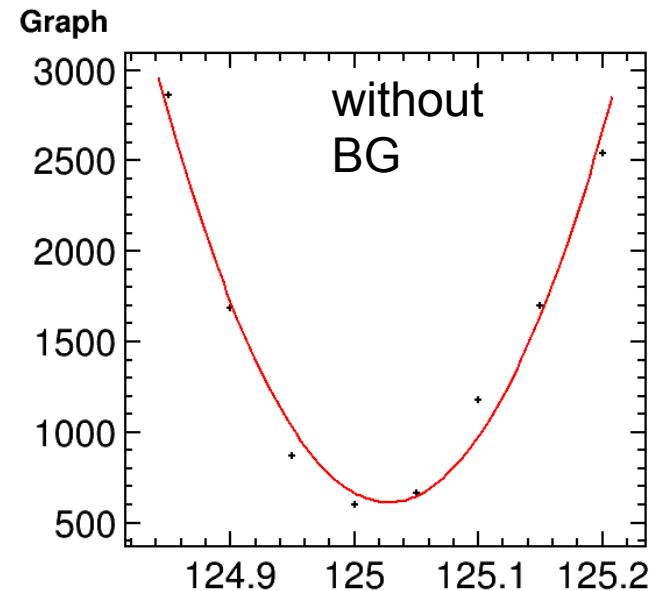
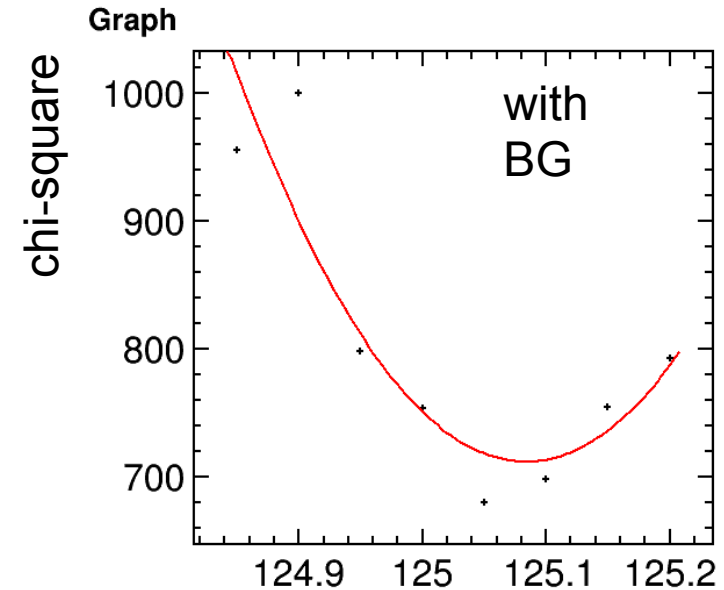
Recoil Mass Plots and Binning



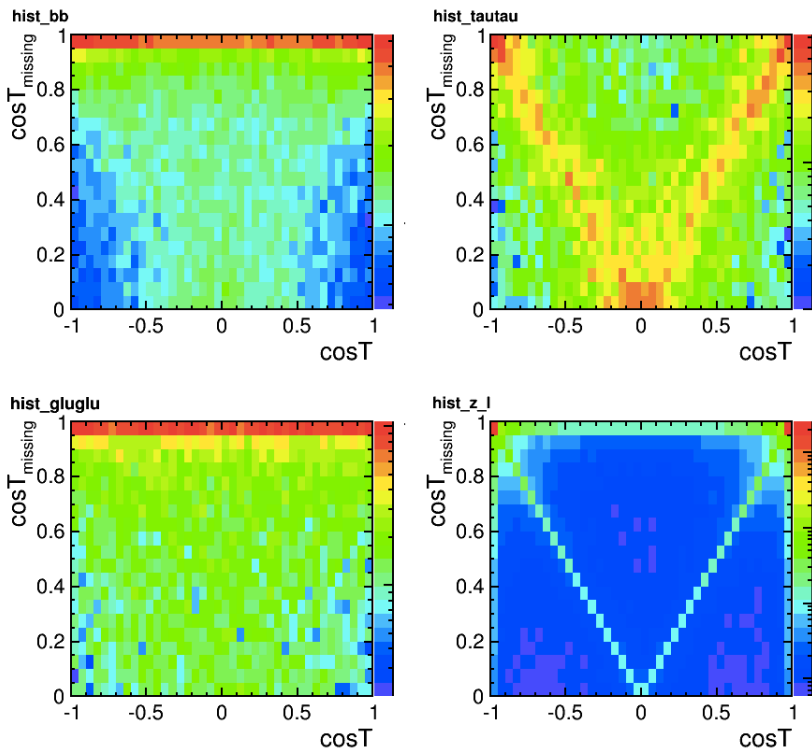
- Ununiform bin is used.

region [GeV]	[122, 124]	[124, 127]	[127, 140]
# of bins	10	50	50

- Some points fluctuate.
 - Problem of statistics?
 - Effect of arbitrary binning?
 - Effect of BG?
 - Similar plot without BG has less fluctuation and bias.
 - Bugs of my analysis?
- Minimum point :
 $x = 125.084 \pm 0.013$
 $(x = 125.027 \pm 0.003) \text{ ✖w/o BG}$
 - Systematic error seems to be large.
 - Width of parabola is too small?
- Anyway, more improvement is needed.

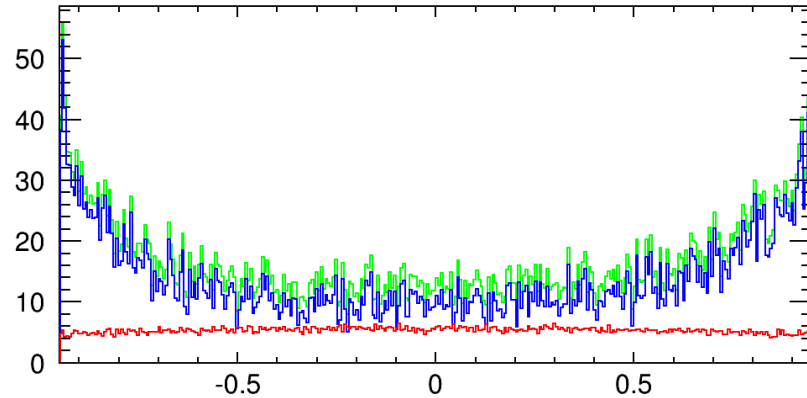


Improvement of $\cos\theta_{\text{missing}}$ Cut



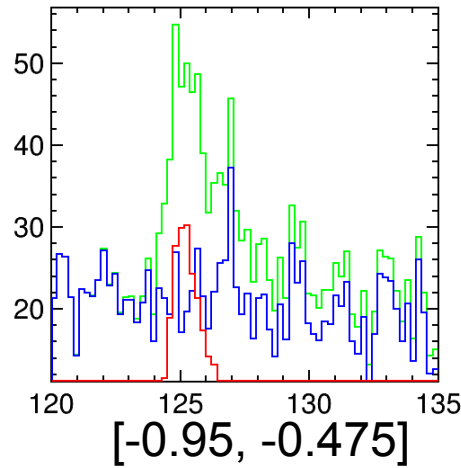
- Production angle of Z boson can be additional condition.
- BG rejection is worse, but bias of Higgs decay is banished.
- ✂ efficiency of following table is only for $\cos\theta_{\text{missing}}$ cut

	bb	glu-glu	$\tau\tau$	BG ($ee \rightarrow \mu\mu$)
$\cos\theta_{\text{miss}} < 0.99$	95.1%	92.8%	99.2%	41.1%
$\cos\theta_{\text{miss}} < 0.99$ or $ \cos\theta < 0.8$	99.3%	99.1%	99.8%	74.6%

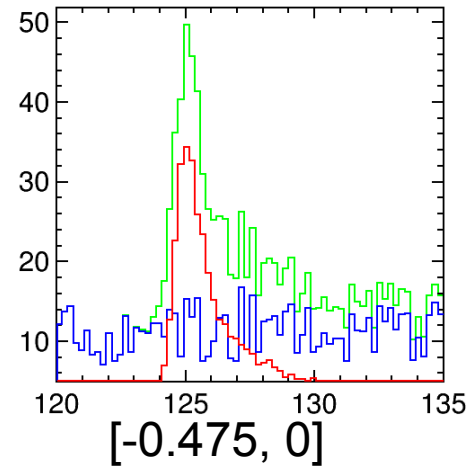


- DBD samples.
- Only model independent cuts are performed.

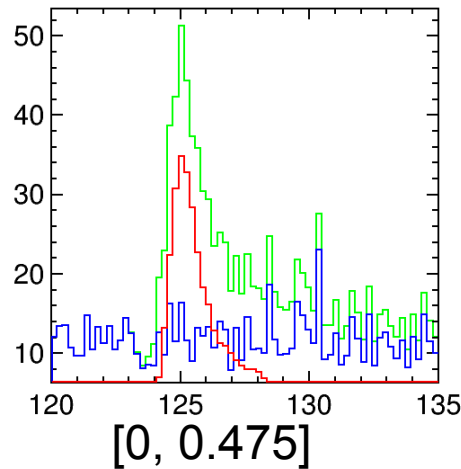
Qrecoil all



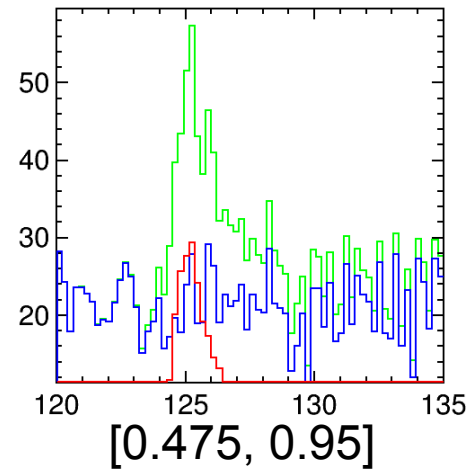
Qrecoil all



Qrecoil all



Qrecoil all



Recoil Mass Study	CP mixture Study
P_{Tdl}	P_{dl}
M_{dl}	M_{dl}
acop	acol
dP_{Tbal}	dP_{bal}
$\cos q_{missing}$	
M_{recoil}	M_{recoil}
Likelihood	

2014/08/30

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generating ideas

- Solve the fluctuation problem of chi2 plot in mass template.
 - Maybe BG affects significantly, so I will make BG toy-MC.
- Check how worse is precision of measurement when fixed $\cos\theta_{\text{missing}}$ cut is performed.
- Fit recoil mass in region of each $\cos\theta$, and estimate number of events so that I can check sensitivity to asymmetry of $\cos\theta$.
- Analyze same method with anomalous coupling samples.