# Recoil Mass & CP-mixture

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Current Status

- What I did recently is as follows.
  - introduced matrix element for both channel.
  - used CBSxNV to μμh distribution too.
  - fixed some bugs of processor.
   ➡ found a problem about $\cos\theta_{missing}$ cut.

Matrix Element ⇒ Likelihood

- **It seems to be better that I use dSigma value, from ME, as an input of likelihood cut.**
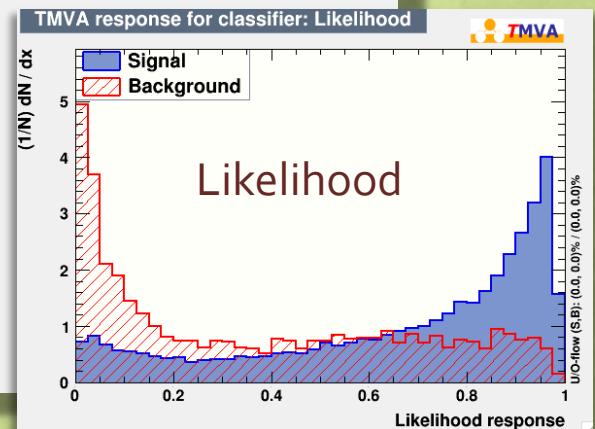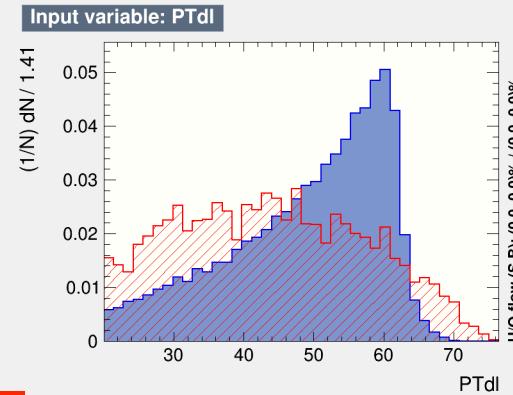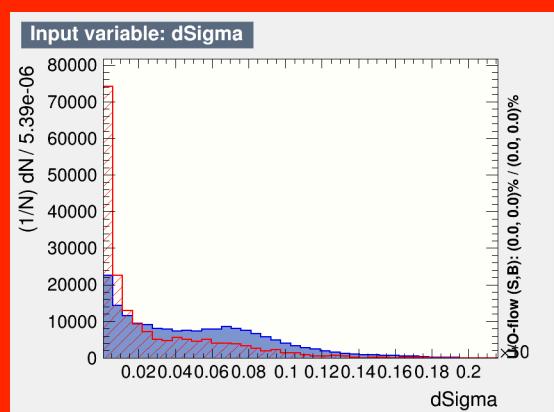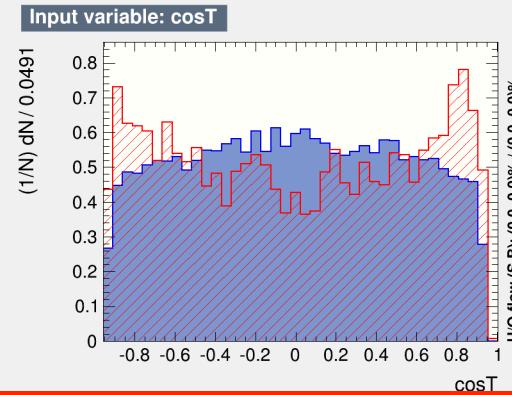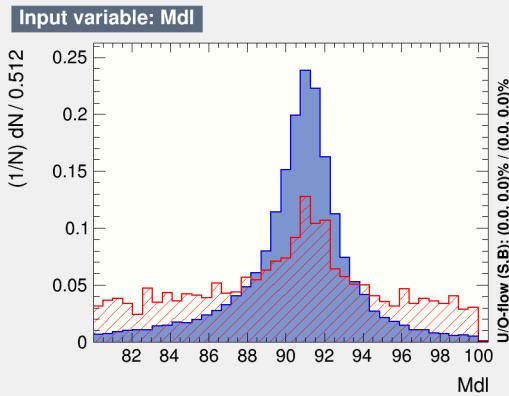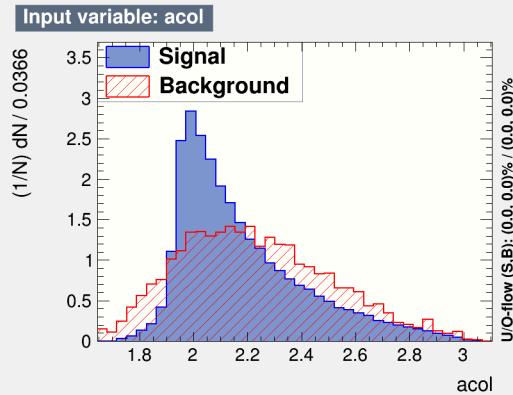
Matrix Element ⇒ Likelihood

- This is eeX case.

- Input parameter of PTdl is omitted to avoid bias for BG dist.
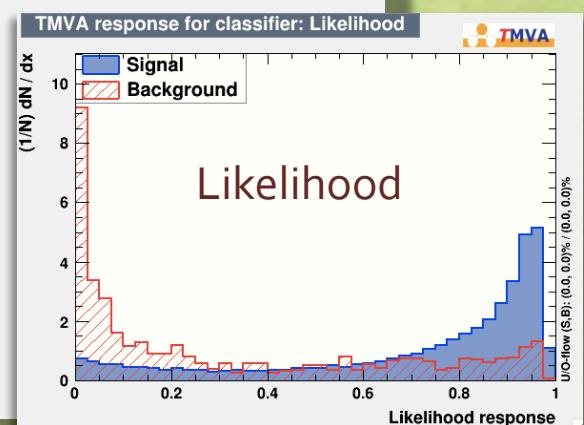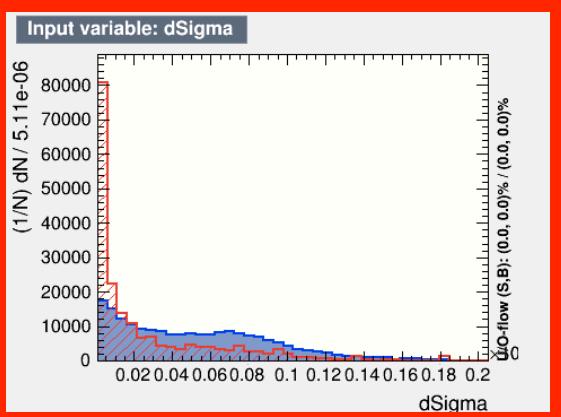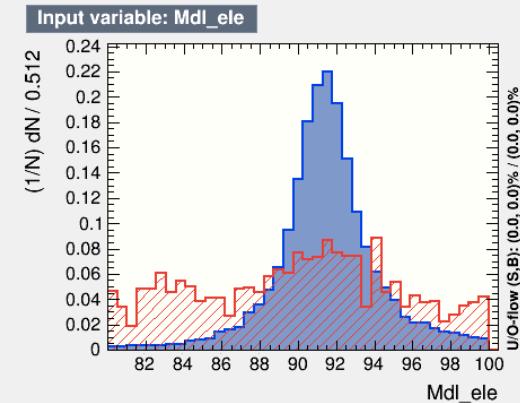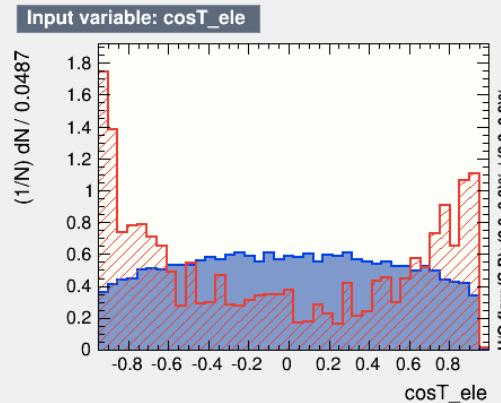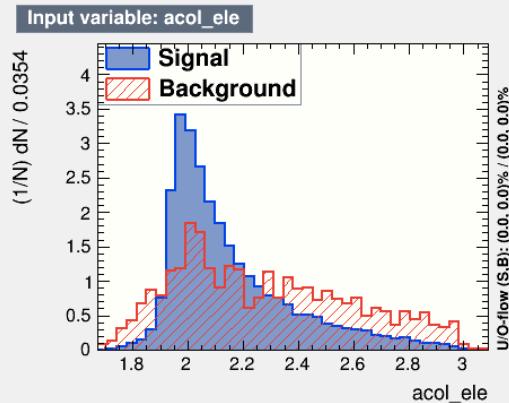
Comparison with Before
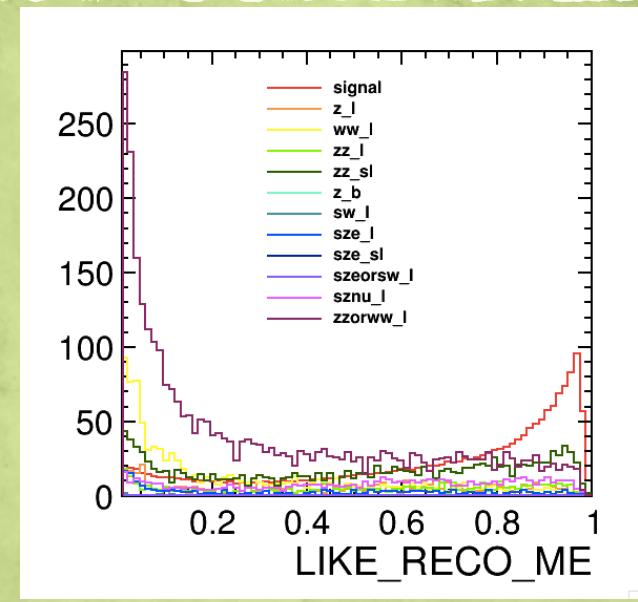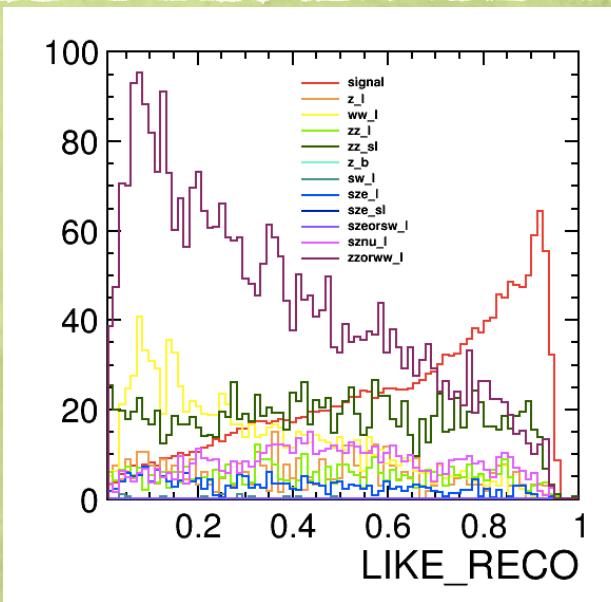
	mmh	mm	mmnn	mmff	mmh	mm	mmnn	mmff
Before Cut	2603	3245214	507179	390166	2603	3245214	507179	390166
After Cut	1322	228	1810	909	1365	239	1722	1037
S/√S+B	20.23				20.67			

- Significance changed better slightly.

Comparison with Before
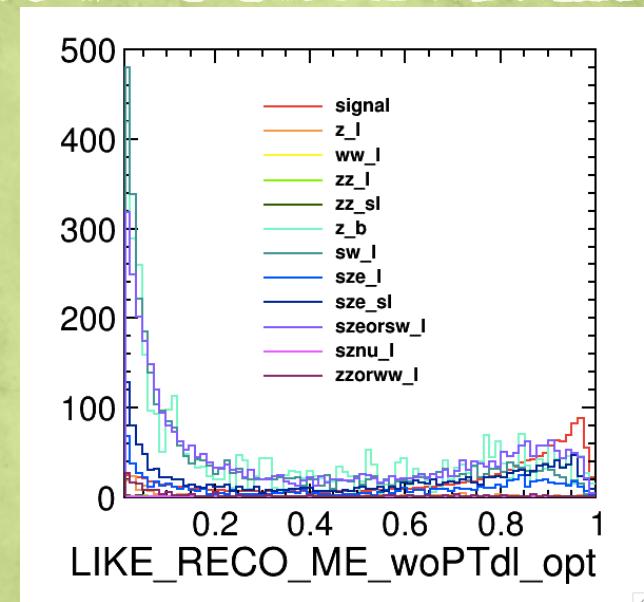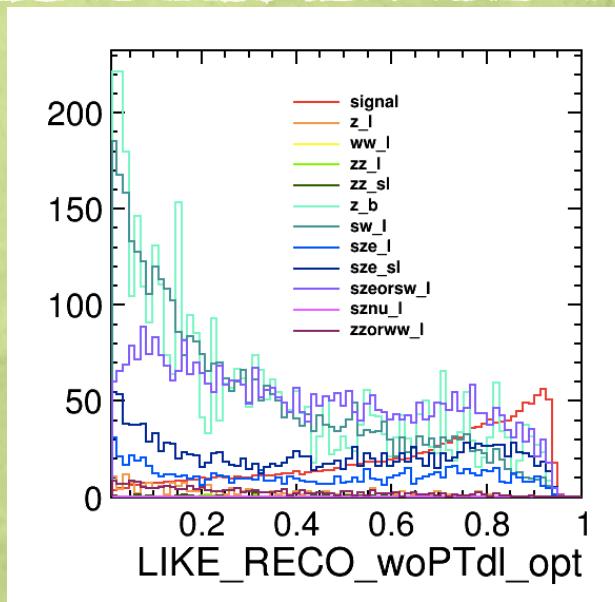
	eeh	ee	eenn	eeff	eeh	ee	eenn	eeff
Before Cut	2729	7831558	404298	430167	2729	7831558	404298	430167
After Cut	1133	1212	2876	952	1105	1242	2574	988
S/√S+B		14.42				14.36		

- Significance would not be better.

Why Not So Better?
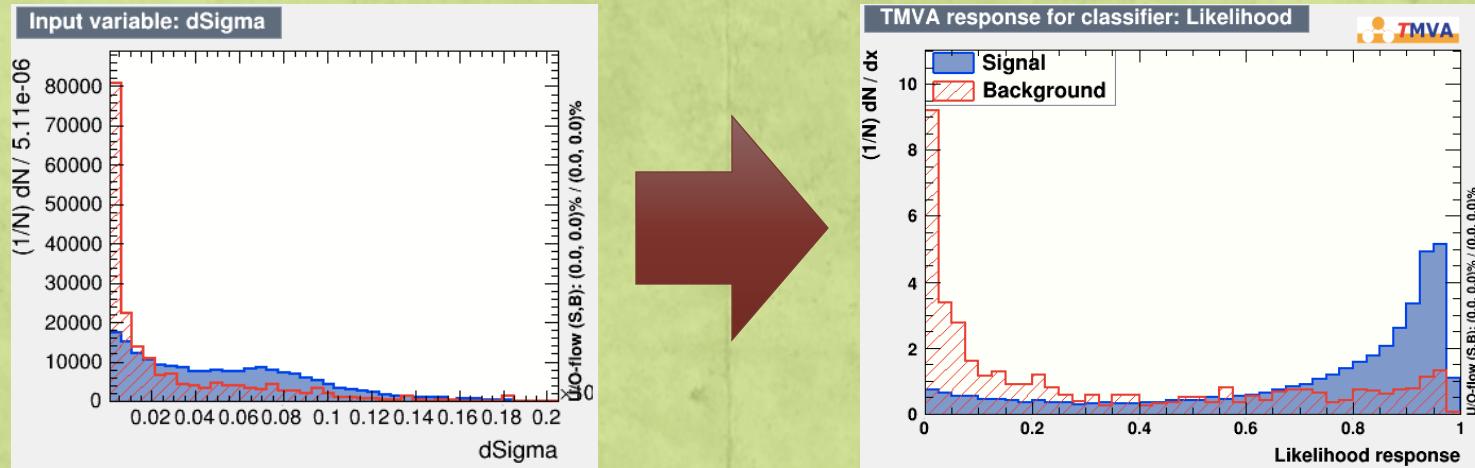
- In distribution of dSigma from matrix element, signal has peak at zero, which is also BG peak.

- Maybe it makes signal likelihood have BG like peak.

Why Not Better?
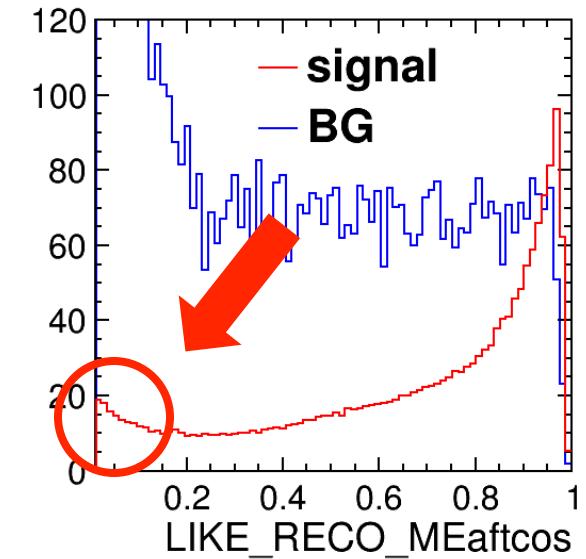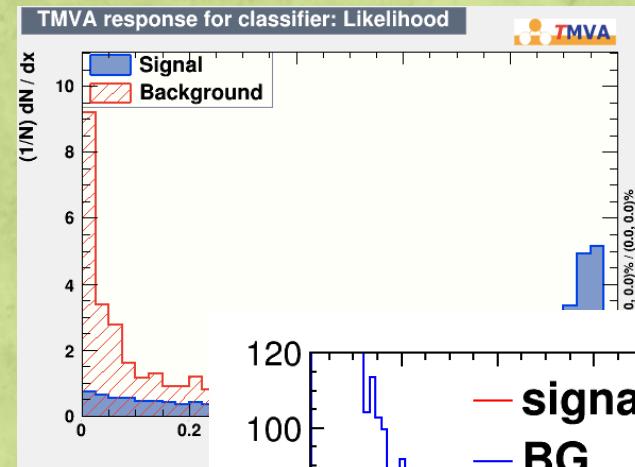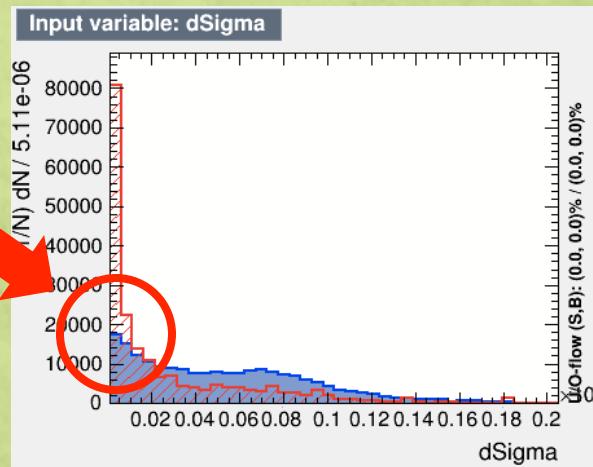
- In distribution of dSigma from ma[...]
signal has peak at zero, which is a[...]

- Maybe it makes signal likelihood [...]

Novosibirsk Function

- CBS x Novosibirsk function was useful to fit eeX recoil distribution.
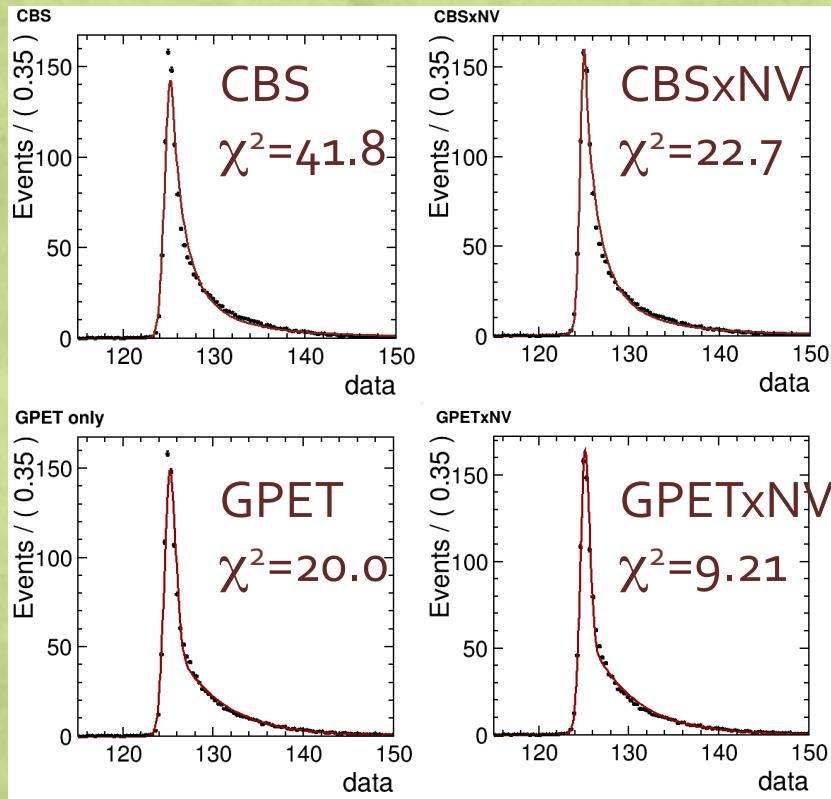
- This is also available for μμh distribution.

- GPET x Novosibirsk seems to be more relevant to fit.

About $\cos\theta_{missing}$ cut

- $\cos\theta_{missing}$ cut is now fixed its bugs.

- It had not good efficiency and did not have any bias for Higgs decay previously.

- BG of 2fermion would be rejected more efficiently.

- The cut also came to have bias for some Higgs decay mode.
  - h->$\tau\tau$ will remain more
  - h->glugglu will be rejected more

mode	bb	gg	$\tau\tau$
$\cos\theta_{missing}$ efficiency	95.1%	92.8%	99.2%

- For fully model independent analysis, some **additional requirements** are needed.

Next Plan

- Find optimal condition to avoid bias of $\cos\theta_{missing}$ in model independent study.

- For semi-model independent analysis, it is useful to use cut about number of tracks.

- I can try template fit method for mass analysis also. I have some reconstructed date sets in which mH = 124.85, 124.90, 124.95, 125.05, 125.10 [GeV], so now I can obtain PDFs for each date sets.