

Current State of $H \rightarrow ZZ^*$ analysis

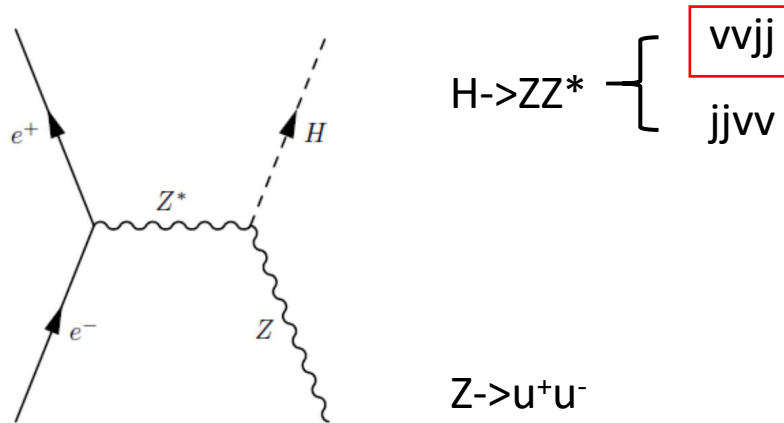


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➤ Review the analysis project by Ryuta and LingTen

Chanel:

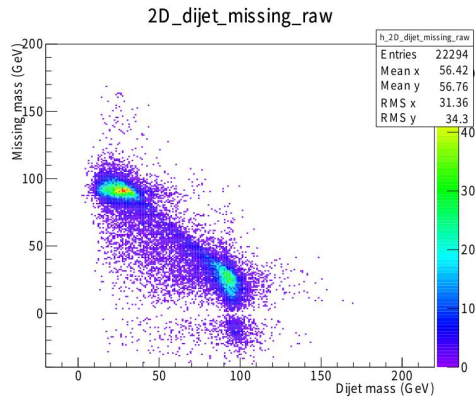


Samples:

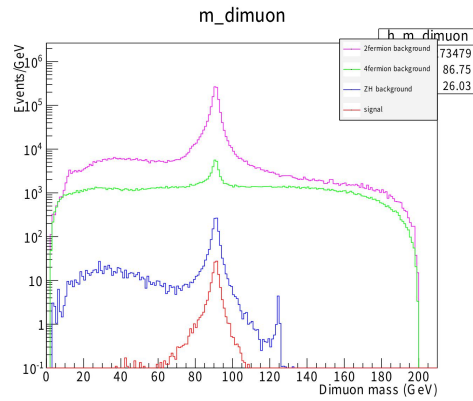
- Z_H: `cefs/data/DstData/CEPC240/CEPC_v4/higgs/...`
- Signal: `/cefs/data/DstData/CEPC240/CEPC_v4/higgs/E240.Pe2e2h_zz.e0.p0.whizard195`
- BG: `/cefs/data/DstData/CEPC240/CEPC_v4/...`

Jet reconstruction: Malin FastJet

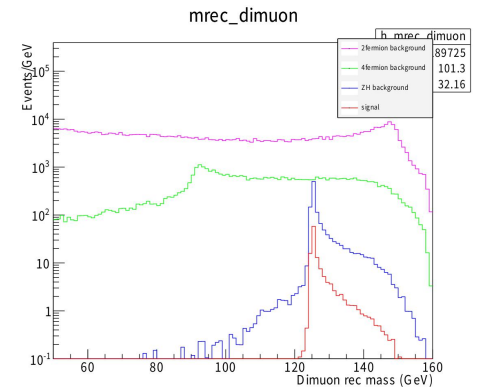
Cut flow : (vvjj)



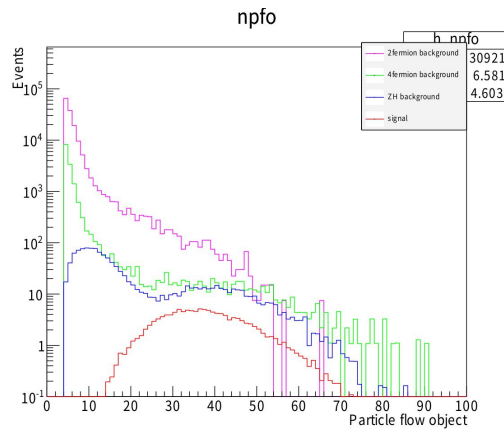
$$M_{miss} > M_{dijets}$$



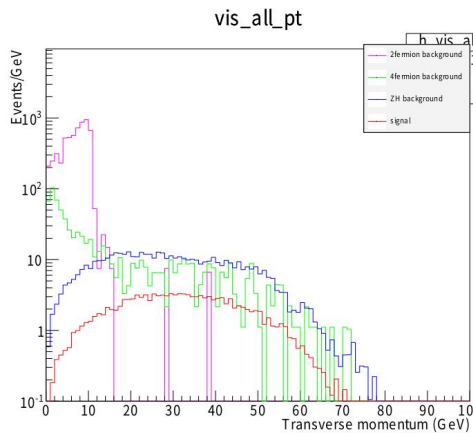
$$80\text{GeV} < M_{\mu^+\mu^-} < 100\text{GeV}$$



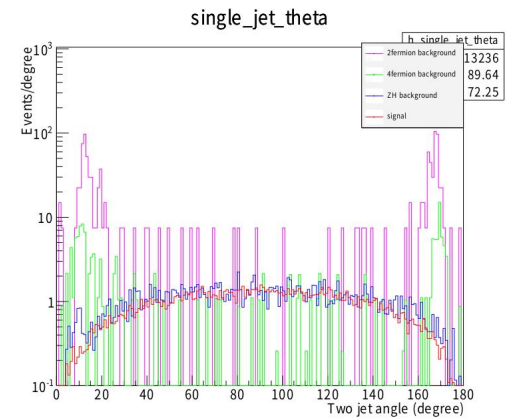
$$120\text{GeV} < M_{Recoil} < 150\text{GeV}$$



$$15 < N_{pfo}$$



$$10\text{GeV} < P_{t\text{visible}}$$



$$\text{Min angle} > 17.2^\circ$$

?



Cut information : (vvjj)

cut	signal	zh background	2f background	4f background	
Raw events	1212	12557950	8828594187	1180400980	
<i>Pre – selection</i>	817	31794	4170834	735206	735047
<i>Signal or not</i>	270	31571	4170834	735206	735047
$M_{miss} > M_{dijets}$	138	2132	1945599	240838	240770
$80\text{GeV} < M_{\mu^+\mu^-} < 100\text{GeV}$	127	1254	1338593	48117	48114
$120\text{GeV} < M_{Recoil} < 150\text{GeV}$	126	1227	152297	15384	15389
$15 < N_{pfo}$	125	506	5953	760	758
$10\text{GeV} < P_{t\text{visible}}$	118	462	783	321	320
<i>Min angle</i> $> 17.2^\circ$	109	429	582	194	194
$M_{miss} > 80\text{GeV}, M_{dijets} < 35\text{GeV}$	79	90	553	78	78
$P_{t\text{jet}1,2} > 3\text{GeV}, E_{\text{jet}1,2} > 5\text{GeV}$	68	72	0	8	8

Main background (>10): (vvjj)

name	scale	final
e2e2h_ww	0.0818403	12
nnh_zz	0.0683871	55



➤ Problem

Crash when fit vvjj result... (fit code copy from Zhang Kaili in HZZ project)

```
JUNE 2018
Please enter your option:
0.4.5
plot pictures and save results
fit results...
compiling ./src/shapeFit.cxx
compiling and linking shapeFit
Begin 240 workspace building
Makeing workspace for channel mvvj
primez_label=s,mvvj, 1st func=DSCB
primez_label=zz,mvvj, 1st func=DSCB
Info in <Minuit2>: Minuit2Minimizer::Minimize : Minimization did NOT converge, Edm is above max
primez_label=ww,mvvj, 1st func=DSCB
primez_label=tt,mvvj, 1st func=DSCB
primez_label=zy,mvvj, 1st func=keys
primez_label=b,mvvj, 1st func=keys

*** Break *** segmentation violation
```

KaiLi's suggestion : check the input configuration in fit function...

➤ Plan

- Get the jjvv results and reproduce LingTen's results
- Try to fix the crash based on Kai's fit code , maybe extract the HZZ part in our project...