

# Higgs study

ILC physics and software meeting

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# Current status

- Paper 1<sup>st</sup> draft just writing
  - Try to finalize as soon as possible
- $H \rightarrow WW^*$  reconstruction for DBD
- Estimate required samples for DBD generation
  - On going

# Current status

$e^+e^- \rightarrow \nu\nu H \rightarrow \nu\nu WW^*$  for DBD analysis

- $H \rightarrow WW^*$  reconstruction

1.  $WW \rightarrow qqqq$  (4j) : First candidate for analysis
2.  $WW \rightarrow \nu lqq$  (lepton+2j)
3.  $WW \rightarrow \nu l\nu l$  (di-lepton+missing)

At first, I will analyze for 250 GeV sample

and follow the Takubo-san's analysis scheme ( $H \rightarrow WW^*$  analysis)

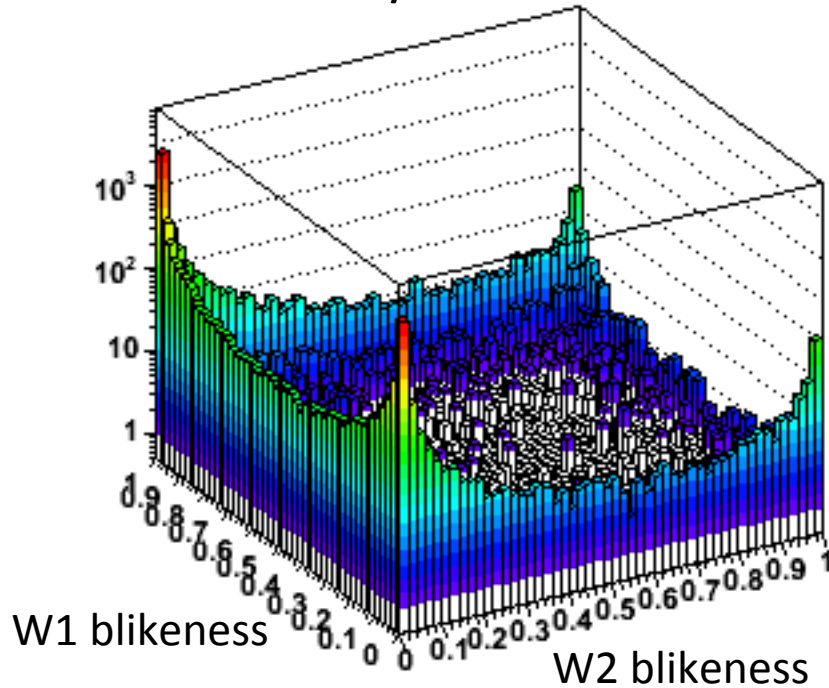
Forced four-jet clustering, then select best jets pair with minimum  $\chi^2$

$$\chi^2 = \left( \frac{M_W^{\text{Rec}} - M_W}{\sigma_W} \right)^2 + \left( \frac{M_H^{\text{Rec}} - M_H}{\sigma_H} \right)^2$$

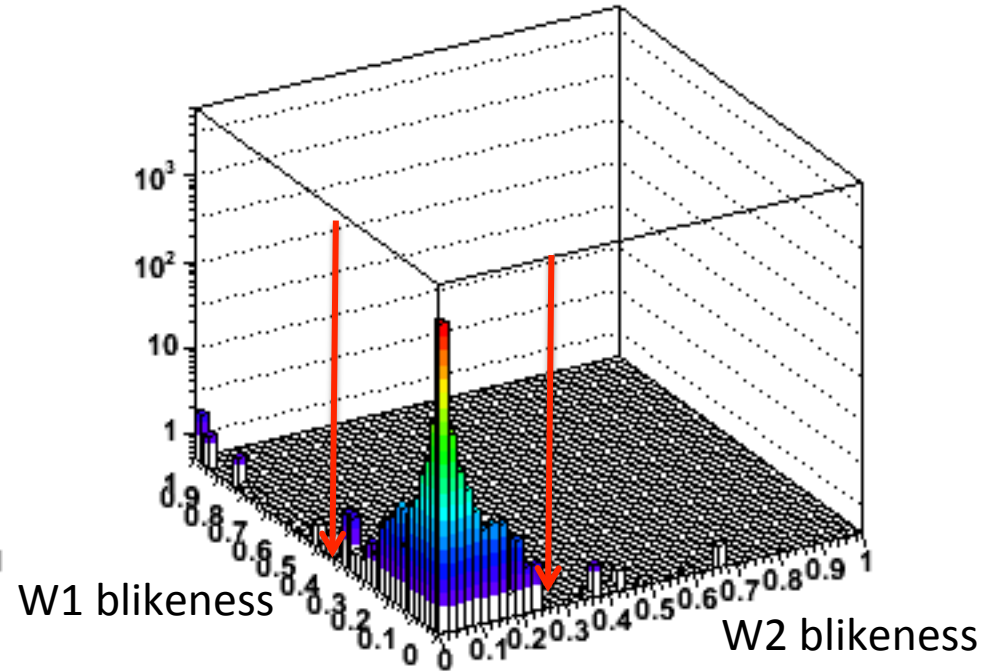
One W is on-shell at the Higgs mass below 160 GeV (120~140 GeV)

# $H \rightarrow WW^*$ select from $H \rightarrow \text{All}$

$H \rightarrow \text{All w/o } WW^*$



$H \rightarrow WW^*$



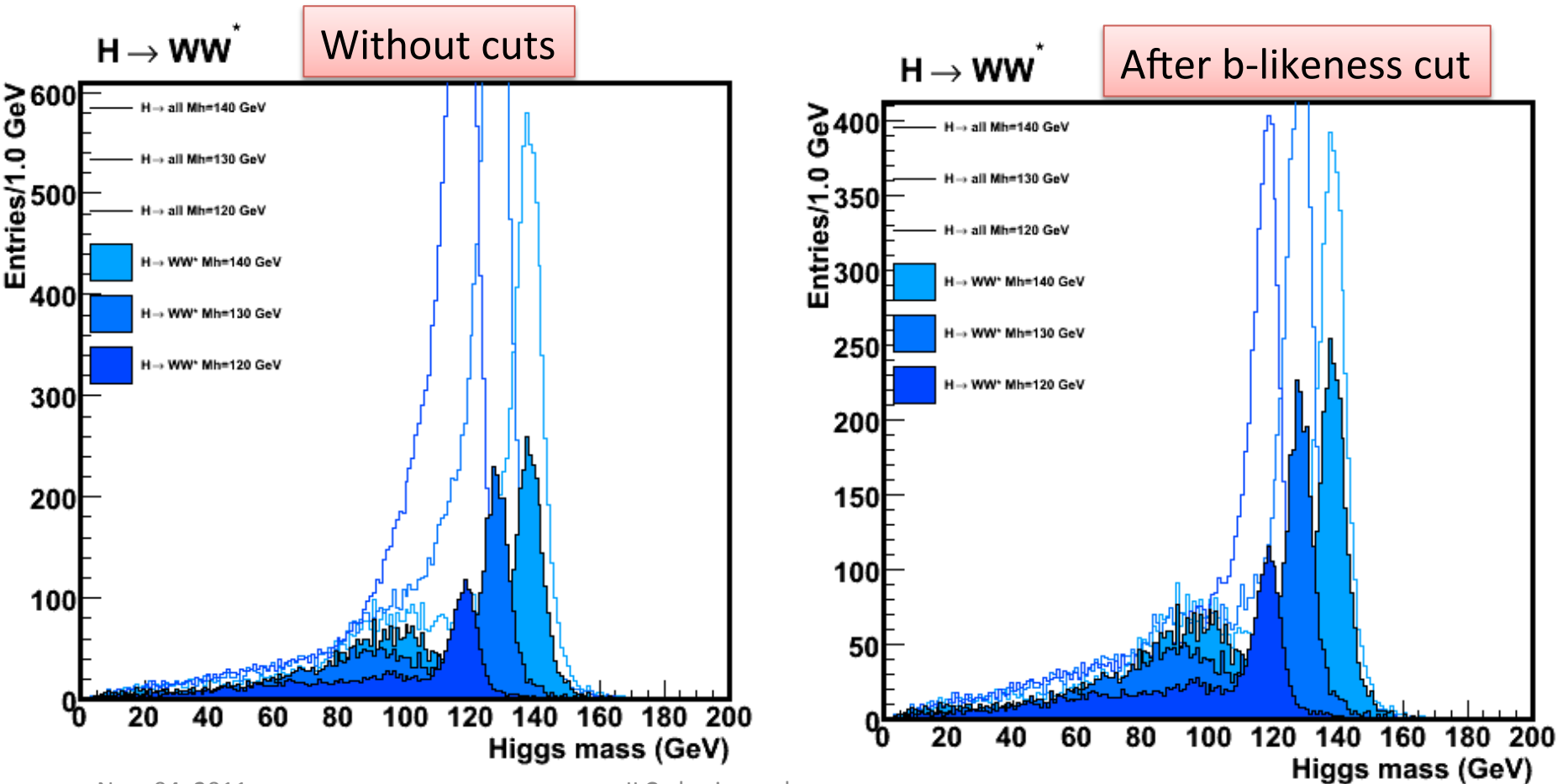
$H \rightarrow bb$  will be a background for  $H \rightarrow WW^*$   
# of b-tagged jet rejection

# Reconstructed Higgs mass

$H \rightarrow WW^*$  with forced four-jet clustering,  $M_h = 120, 130, 140$  GeV

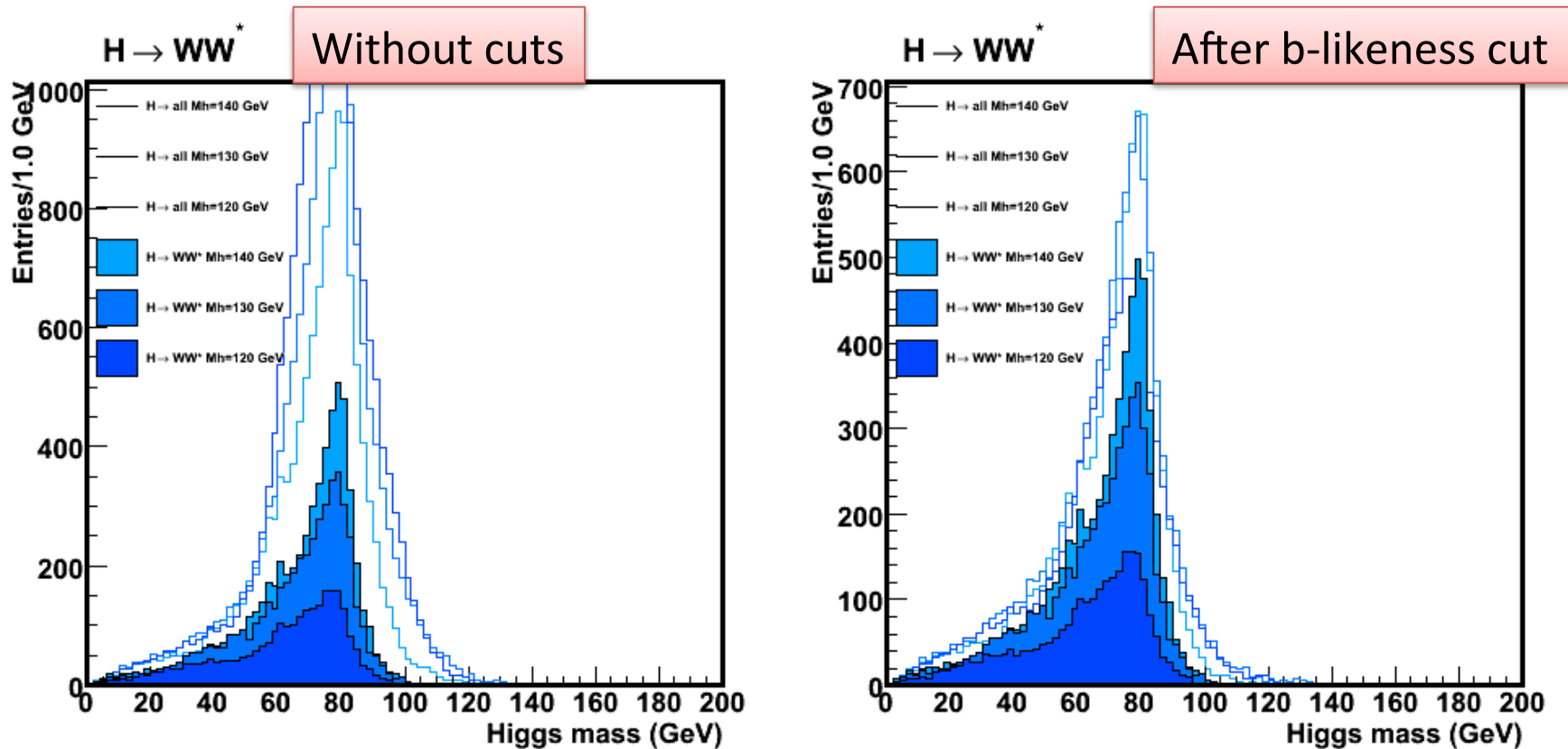
$E_{cm} = 250$  GeV,  $L = 250 \text{ fb}^{-1}$ ,  $P(e^+, e^-) = (+30\%, -80\%)$

W semi-leptonic decays are also included



# On-shell W mass distribution

W semi-leptonic decays are also included



Need to be improved with # of b-tagged jets cut

# Reconstructed Higgs mass dist.

BG: WW, ZZ (vvqq, vlqq, llaa. aaaa. aa. vvll)

80 < MissingMass < 140 GeV  
Pjmax < 30 GeV  
-Log(Yminus) < 4  
-Log(Yplus) < 4  
W1blikeness < 0.2  
W2blikeness < 0.2

Need to improve with

- # of b-jets cut
- Likelihood variable cut

