

$e^+e^- \rightarrow \gamma h (h \rightarrow WW)$

status report

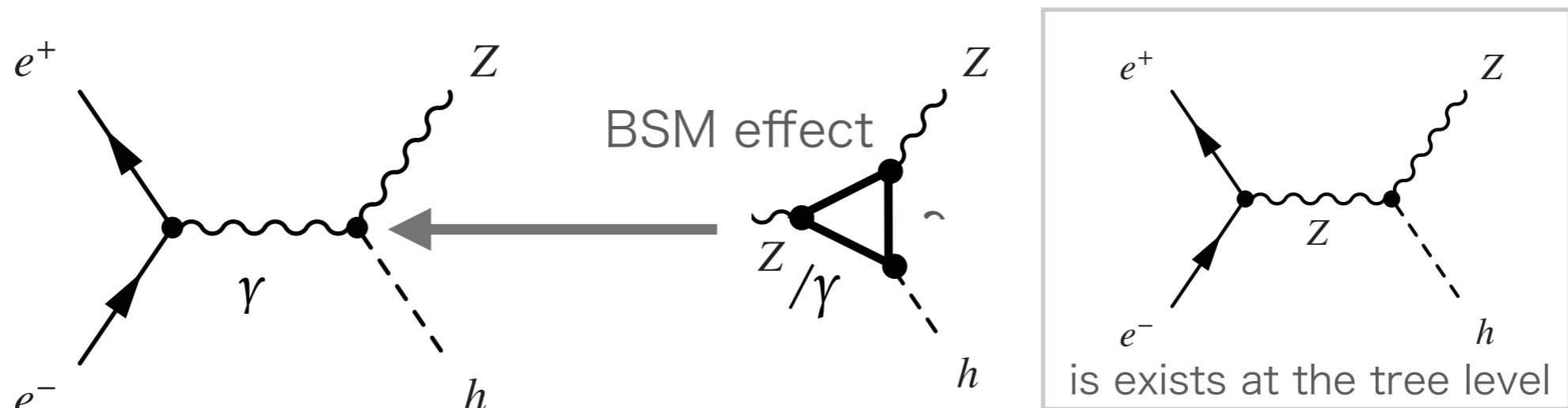


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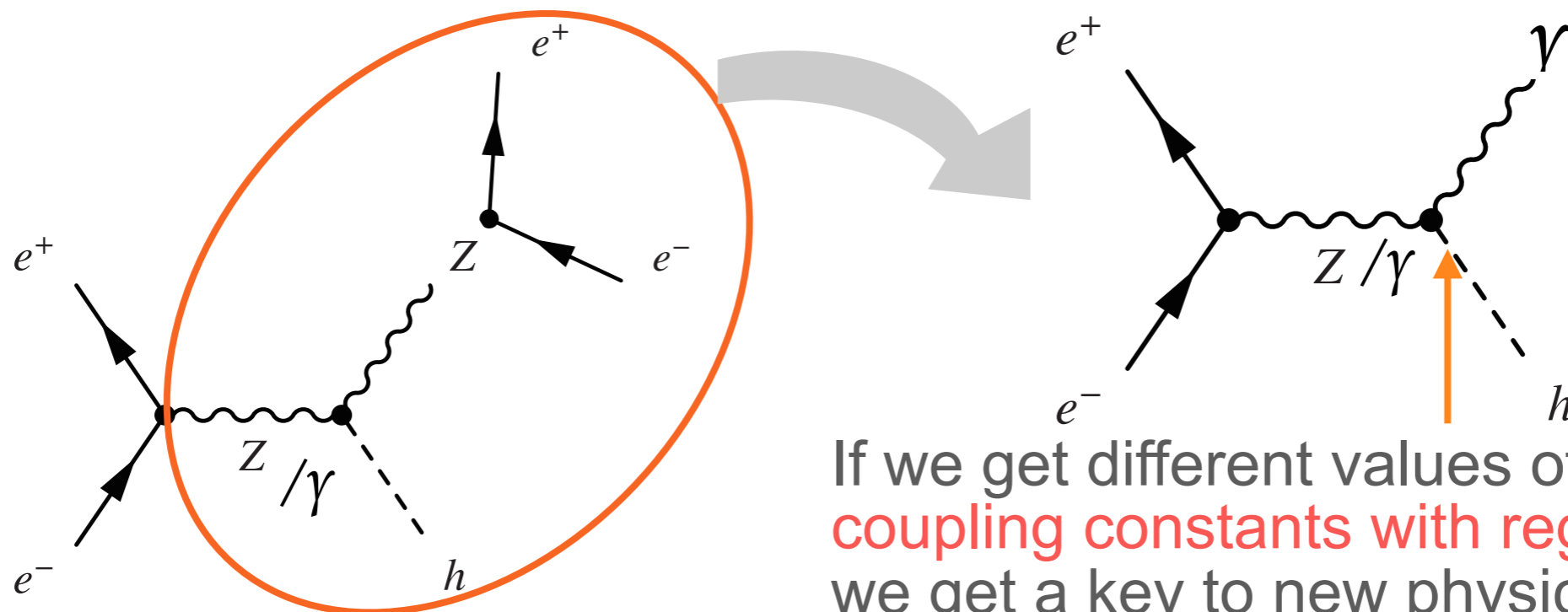
# 1. Motivation

Find new physics via  $H\gamma\gamma$  and  $H\gamma Z$  couplings

Higgs to  $\gamma Z$  coupling in the Standard Model (SM) is a loop induced coupling.



However we can't notice which particle is in the loop.



# 4. Simulation framework

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Event generation

- Physsim  $\sqrt{s}=250$  GeV  
Integrated Luminosity: 2000 fb<sup>-1</sup>  
back ground : DBD sample

Detector simulation

- ILD full simulation (Mokka)

Event reconstruction

- iLCSoft v01-16-02  
MarlinReco, PandoraPFA,  
LCFI+, Isolated photon finder, jet clustering

Pre selection

Final selection

# 5. Event selection

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Signal:  $e^+e^- \rightarrow \gamma H \rightarrow \gamma(b\bar{b})$

## Signal signatures

1. Isolated monochromatic photon with energy 93 GeV
2. 2 b jets
3.  $m(bb)$  (invariant mass) = higgs mass

## Main backgrounds

$e^+e^- \rightarrow \gamma qq(\bar{q})$  dominated by  $e^+e^- \rightarrow \gamma Z$  (radiative return)

# Status



I finished to check  $h \rightarrow bb$ . channel  
-> the result

(branching ratio)  $h \rightarrow bb$  : 58 %

$h \rightarrow WW$  : 21%~

The main background :  $Z\gamma$   
~I expect  $5\sigma$

I created the new processor for  $WW$  channel, and I realize this channel is useful.

①  $h \rightarrow WW^*$  channel

(branching ratio)  $h \rightarrow bb$  : 58 %

$h \rightarrow WW$  : 21%~

The main background :  $Z\gamma$

~I expect  $5\sigma$

I created the new processor for  $WW$  channel,  
and I realize this channel is useful.

# Strategy

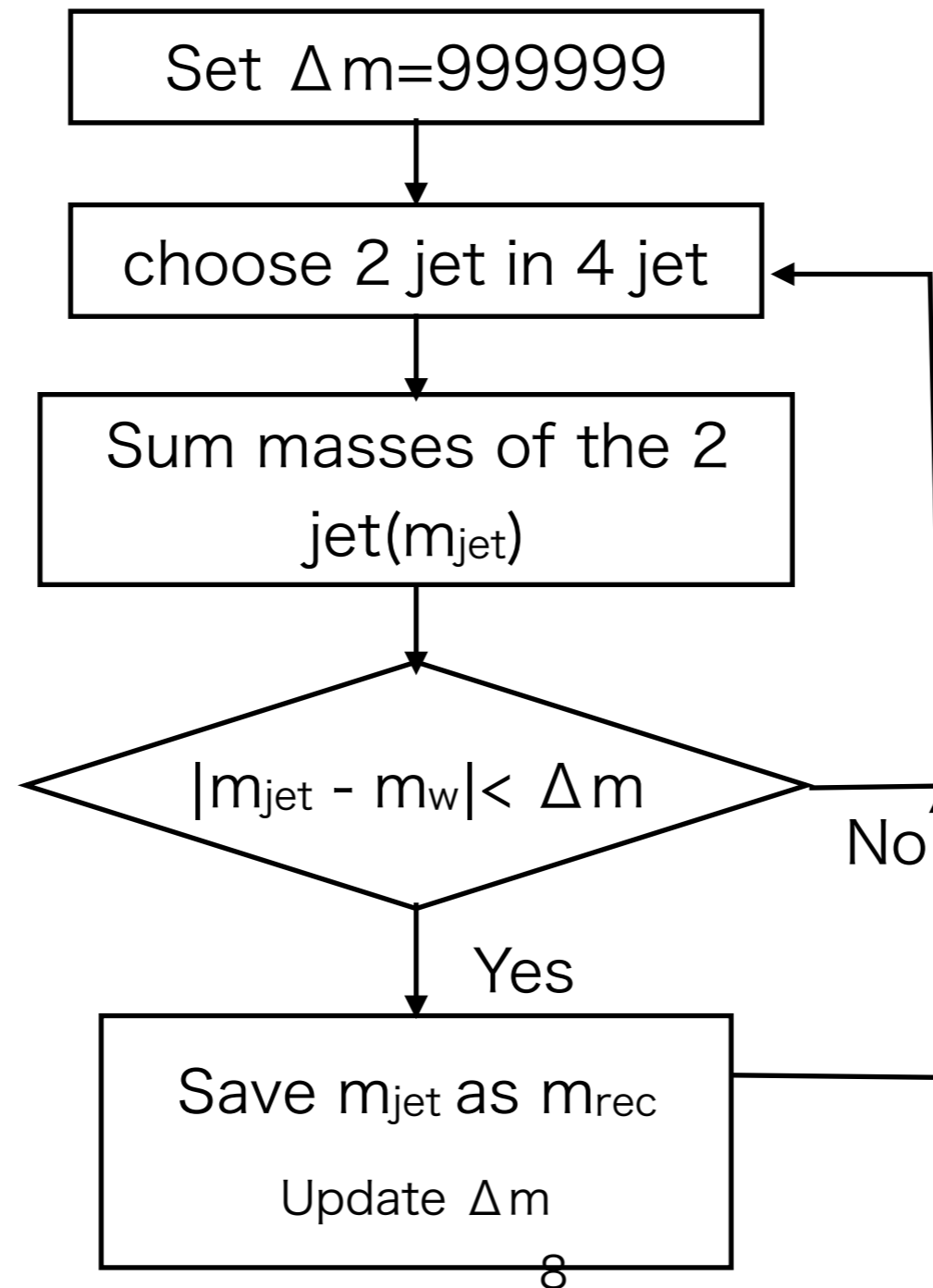


1. select isolated photon ← same as bb
2. 4jet clustering
3. find real W pair of 2jets of 4jets
4. reconstruct h

# 4jet clustering

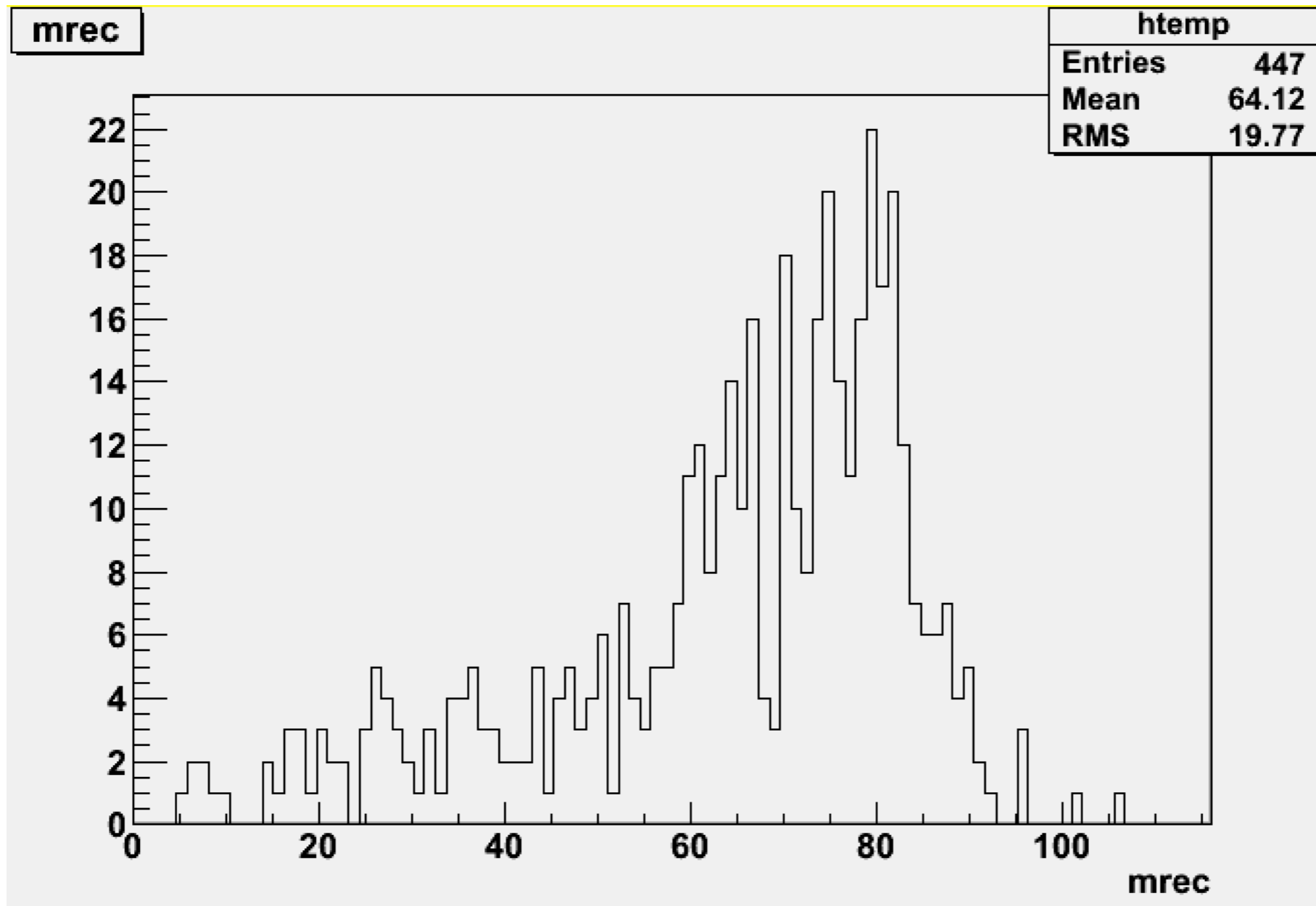


- We need to find combination of 2 jet from 4 jet of real W ( $m_w=80.379$ )





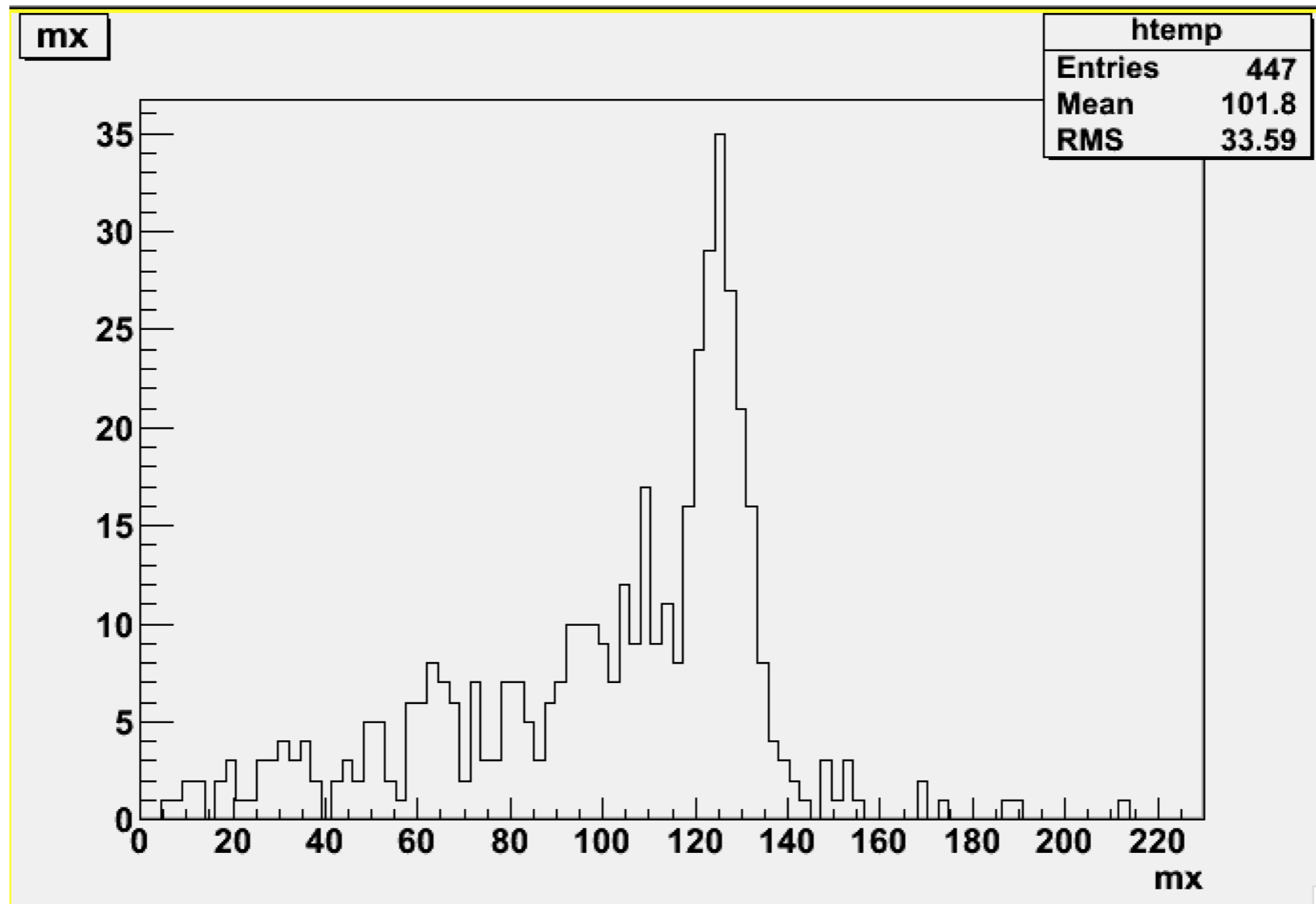
# mass of real W



# mass of Higgs



Just sum of 4 jet mass



(Including semi leptonic)

# Next steps



What we need is that exclude overlap between  $h \rightarrow bb$  and  $h \rightarrow WW$

- optimize cut
  - exclude other than 4jet (exclude  $h$  to invisible)