14/09/26

Impact of two ECAL options
Invisible higgs decay

July, 22, 2014

T. Ogawa

Upper Limit of BR(H➡invisible)

1. √s=250GeV (250fb^{-1}).

Si: ε_sig= 70.46[%], N_sig=448

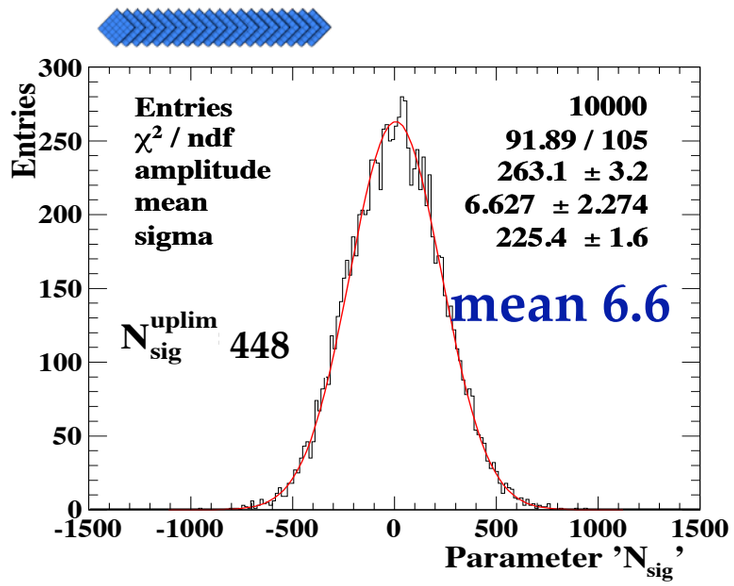
➡ σ = 2.54[fb]

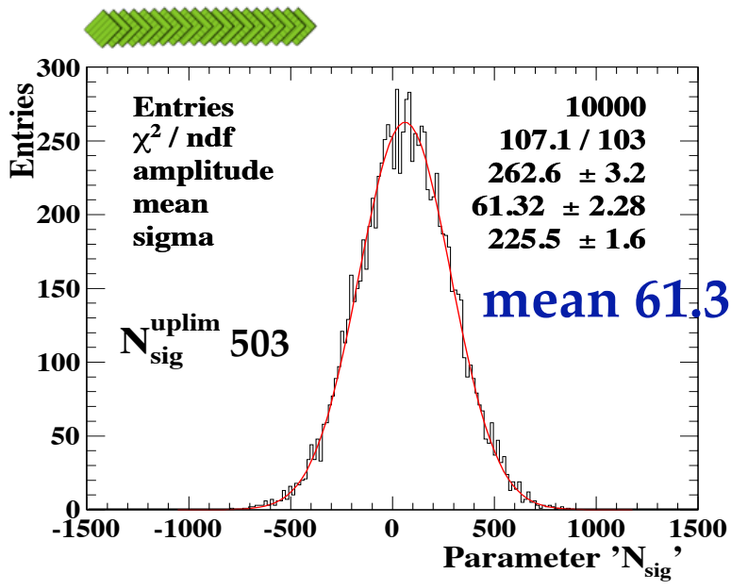
BR(H➡invisible) < 1.20% @95%C.L.

Sc: ε_sig= 71.03[%], N_sig=503

➡ σ = 2.83[fb]

BR(H➡invisible) < 1.33% @95%C.L.





➡ **The degradation of sensitivity is 11%**

2. √s=350GeV (350fb^{-1}).

Si: ε_sig= 53.20[%], N_sig=622

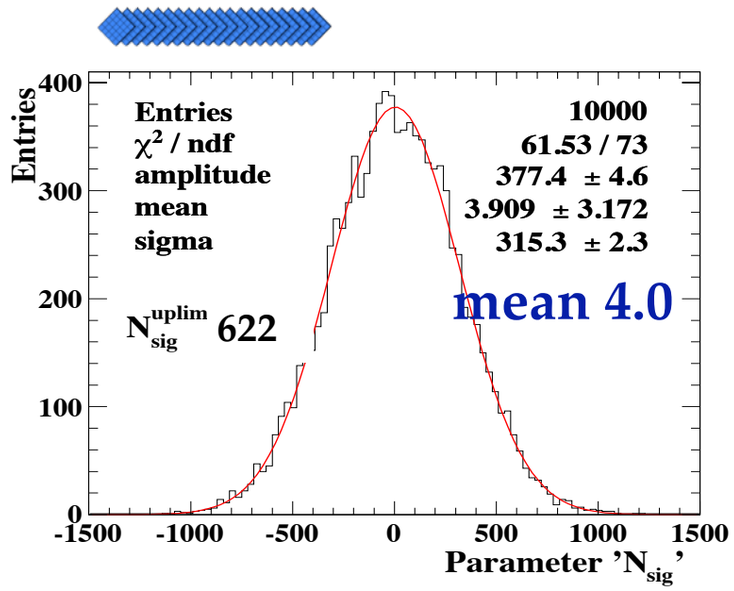
➡ σ = 3.35[fb]

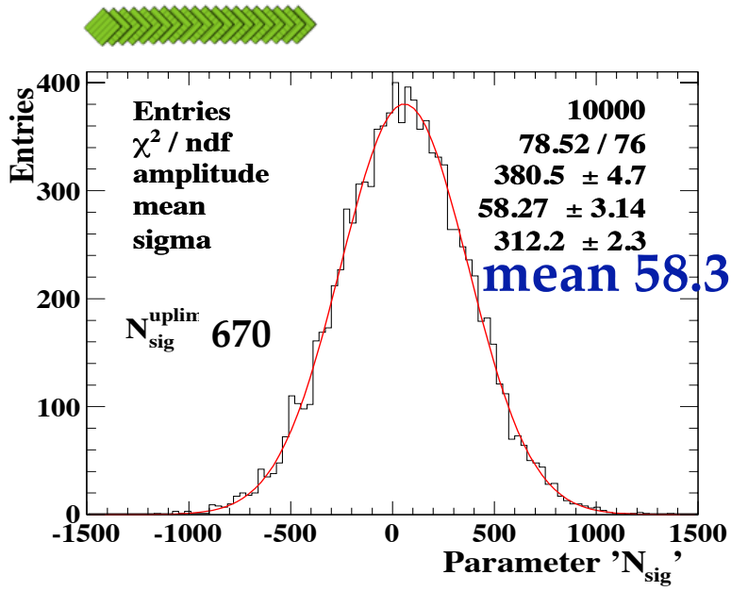
BR(H➡invisible) < 2.43% @95%C.L.

Sc: ε_sig= 53.82[%], N_sig=670

➡ σ = 3.56[fb]

BR(H➡invisible) < 2.58% @95%C.L.



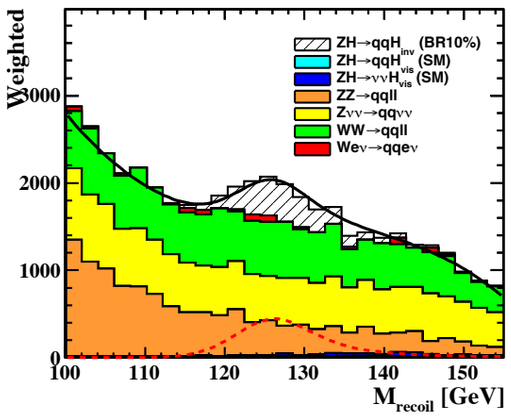


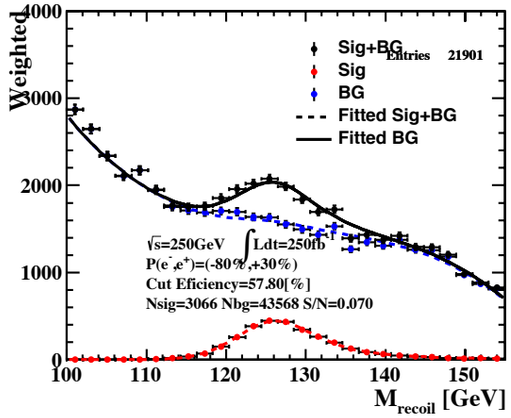
➡ **The degradation of sensitivity is 6.3%**

√s=250GeV (250fb^{-1}).

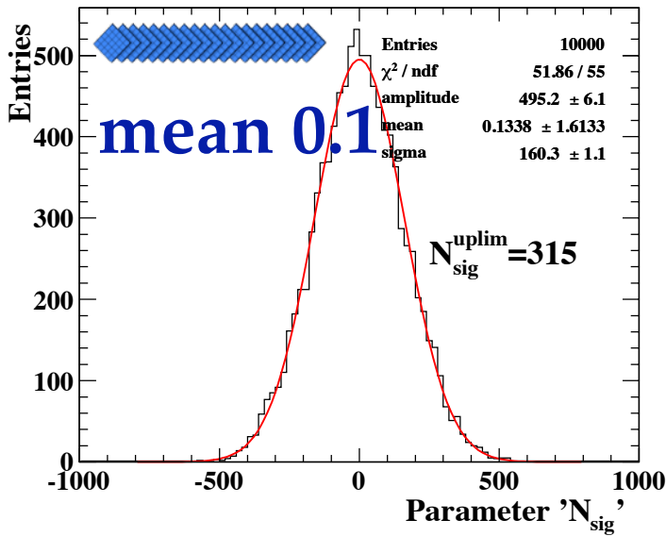
- 1. Applied more tight Mz cut.
- 2. GPET + 3rd Pol

Si ECAL





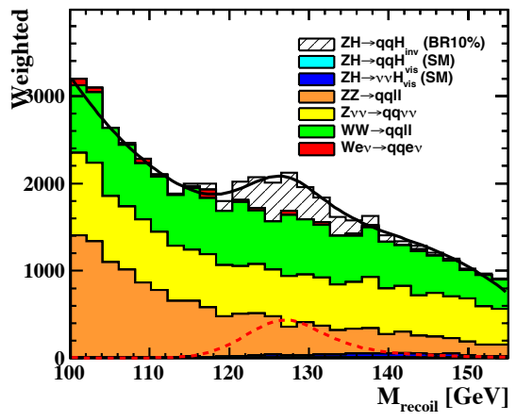
ToyMC

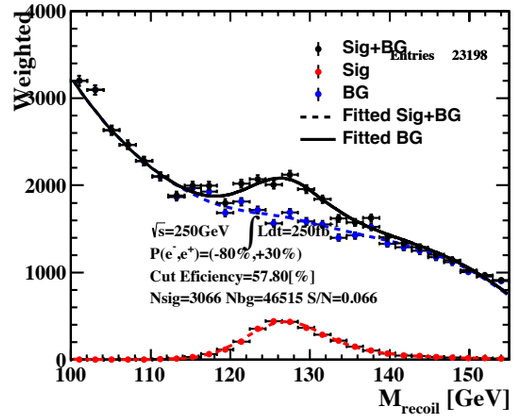


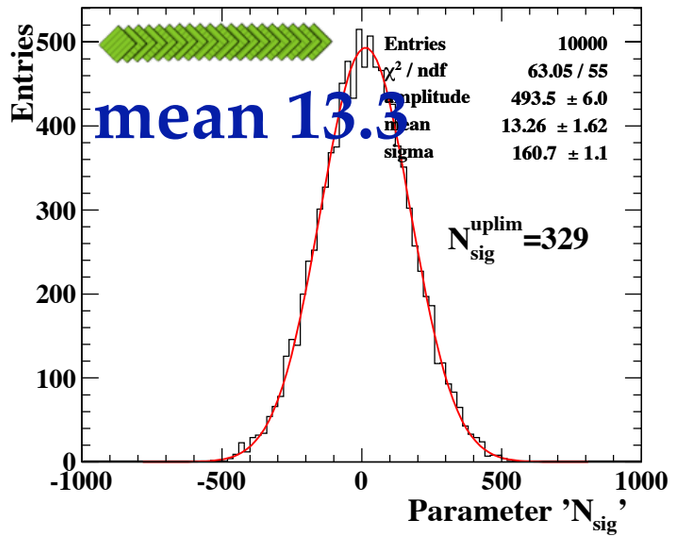
ε_sig= 57.80[%], N_sig=315 ➡ σ = 2.18[fb]

BR(H➡invisible) < 1.03% @95% C.L.

Sc ECAL







ε_sig= 57.80[%], N_sig=329 ➡ σ = 2.28[fb]

BR(H➡invisible) < 1.07% @95% C.L.

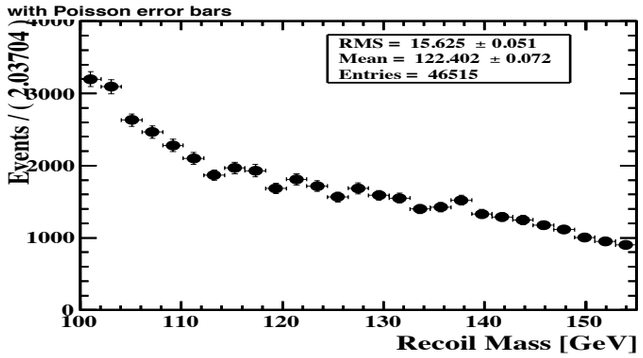
For now the difference is only 0.05%

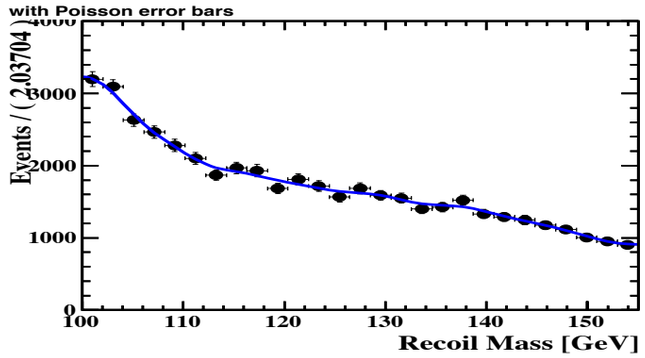
➡ The degradation of sensitivity is 3.8%

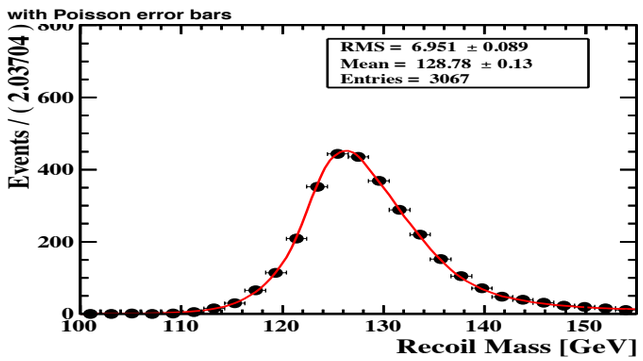
still biased

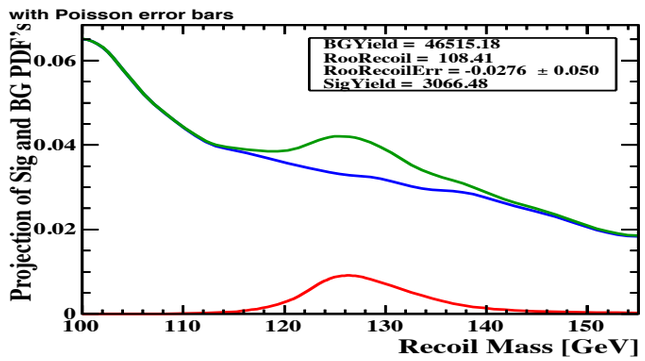
√s=250GeV (250fb^{-1}).

- 1. Kernel (sig) + Kernel (bg)

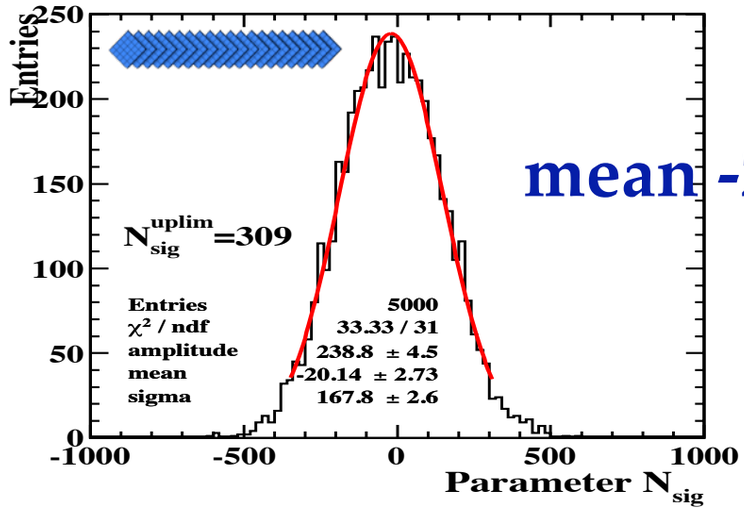








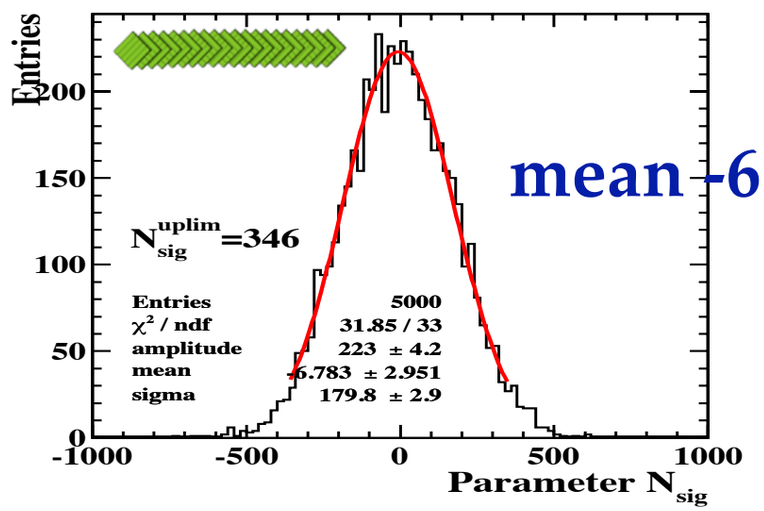
ToyMC



mean -20.1

ε_sig= 57.80[%], N_sig=309 ➡ σ = 2.14[fb]

BR(H➡invisible) < 1.01% @95%C.L.



mean -6.8

ε_sig= 57.80[%], N_sig=346 ➡ σ = 2.40[fb]

BR(H➡invisible) < 1.13% @95%C.L.

For now the difference is only 0.12%

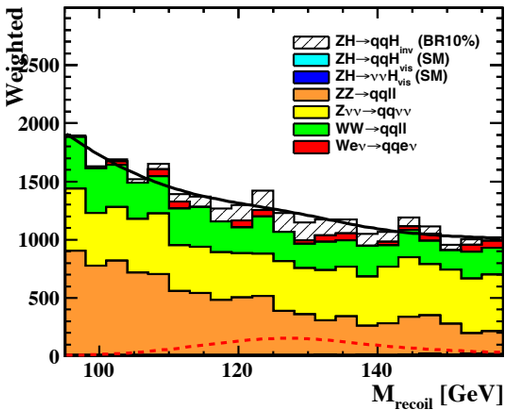
➡ The degradation of sensitivity is 12%

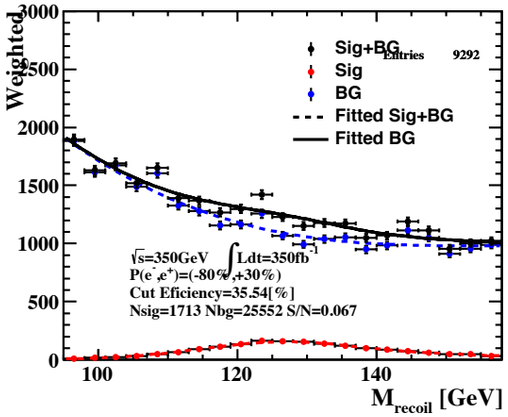
not good

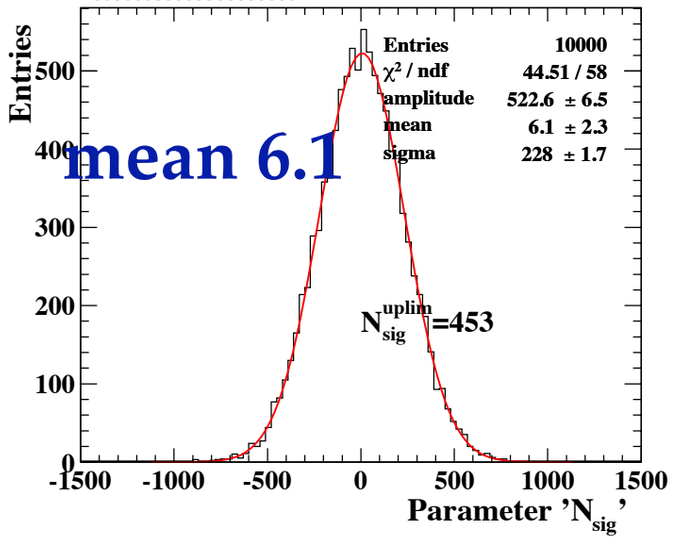
√s=350GeV (350fb^{-1}).

- Applied more tight Mz cut.
- GPET + 3rd Pol

Si ECAL





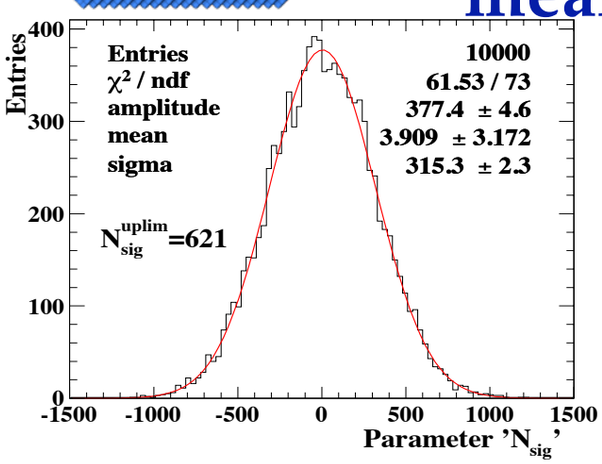


ε_sig= 35.54[%], N_sig=453 ➡ σ = 3.62[fb]

BR(H➡invisible) < 2.64% @95%C.L.

Previous result

mean 3.9



Si: ε_sig= 53.20[%], N_sig=622 ➡ σ = 3.35[fb]

BR(H➡invisible) < 2.43% @95%C.L.

need to optimize cut parameter

Next step

- Need to modify seed sample.

- To reject bias of fitting function.

  - Need to consider two BG processes like signal process.

$$ZH \to q\bar{q}ZZ^* \to q\bar{q}\nu\nu\nu\nu$$

Z

$$ZH \to \nu\nu ZZ^* \to \nu\nu q\bar{q}\nu\nu$$

Z

- Concerning fitting function itself.

- Search good result while changing cut parameter.