Higgs self-coupling analysis with H→WW*

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Status

- Restart kinematic fitter
  - Start to construct 1TeV case – use to reject ttbar events
  - Vector Boson Fusion process sensitivity should be improved

- Vertex charge study
  - Ongoing… no results can be shown yet
  - Trying some ideas for vertex finding eff. & vertex charge assignment eff. improvement
  - So far, vertex charge assignment eff. improves up to 4%... – not significant improvement… of course need more
  - More precise study of each track on vertex is necessary
    - I found my estimator was wrong! →correct it and restart to check
    - Need some time

Kinematic Fitter@ 1TeV

- Construct $\nu\ \nu$ HH$\rightarrow \nu\ \nu$ (bb)(WW)$\rightarrow \nu\ \nu$ (bb)(jjjj)
  - Constraints: m(H1)=m(H2)
    m(jj)=m(W) on-shell
    $\vec{p} = \vec{0}$, include missing
    $\sum E = 1TeV$, include missing

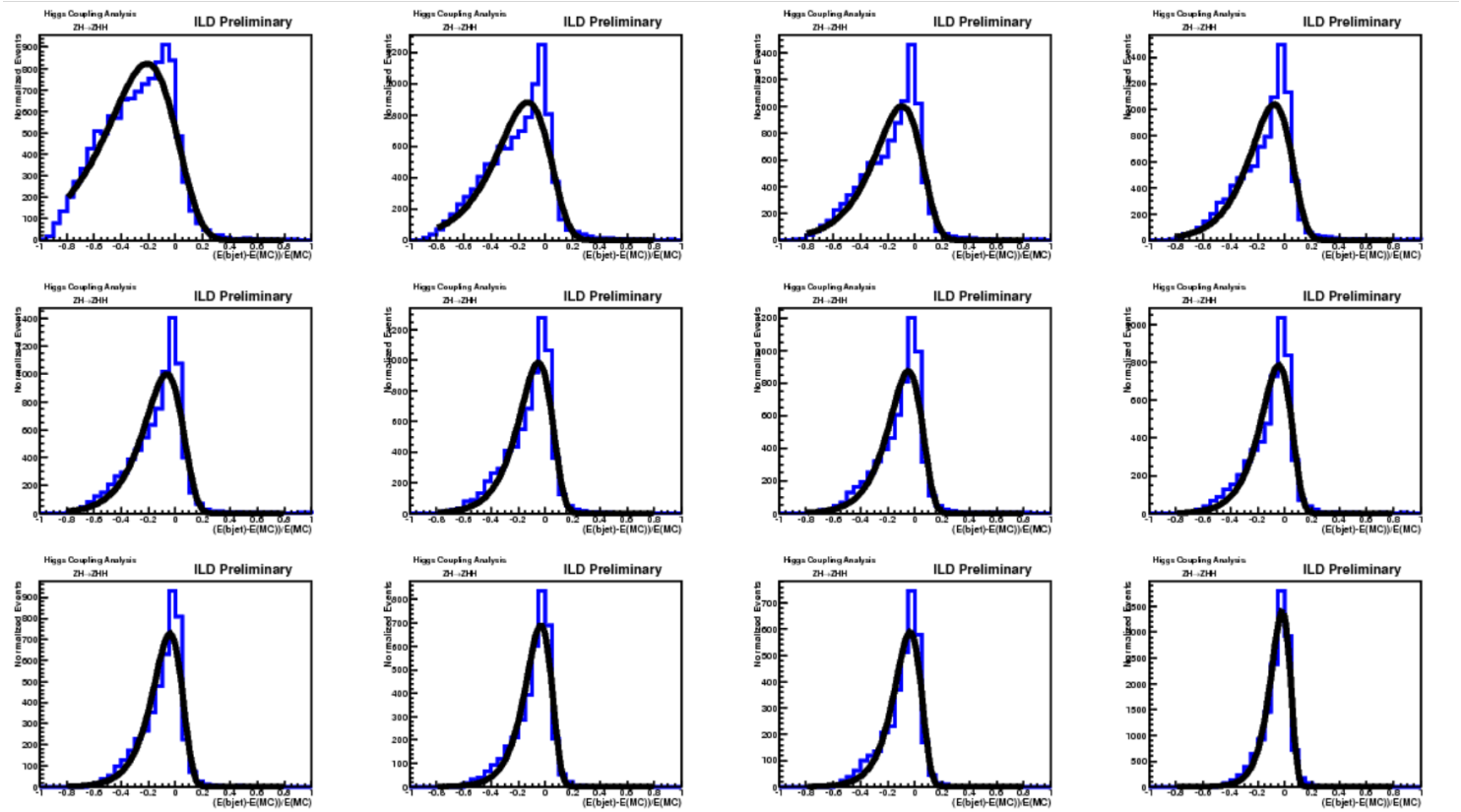
- Jet energy resolution effect is included to kinematic fitter
  - Same way as @500GeV
  - Energy dependence of jet energy resolution is considered

JET ENERGY RESOLUTION

- Jet energy resolution has the dependence of jet energy itself
  - So, parameterize energy dependence, which is save was as @ 500GeV
- e.g.) bjet jet energy resolution

Fit: Gumbel dist.

$$f(x) = \frac{1}{\beta}\exp\left(\frac{x-\alpha}{\beta}\right)\exp(-\exp(\frac{x-\alpha}{\beta}))$$

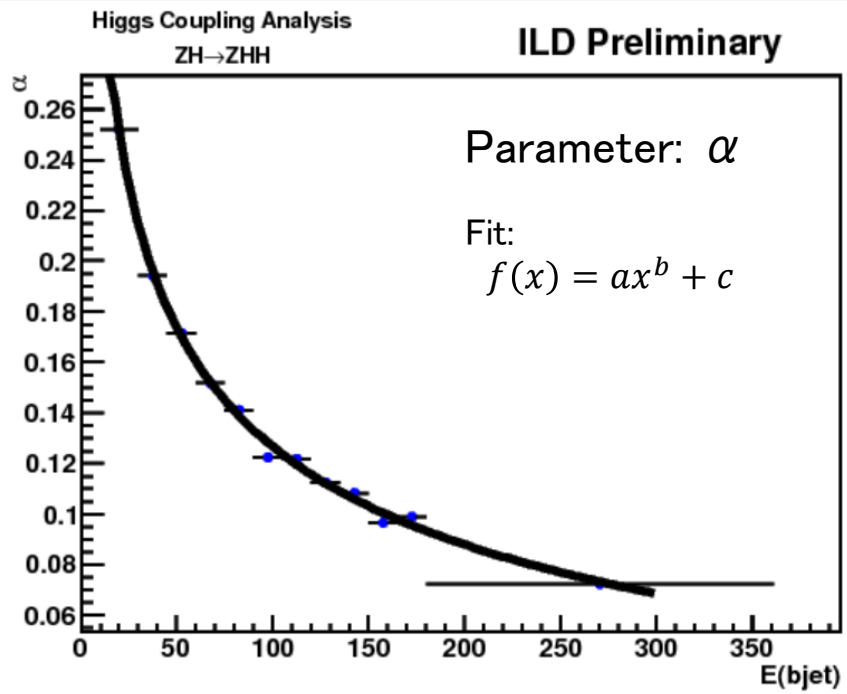


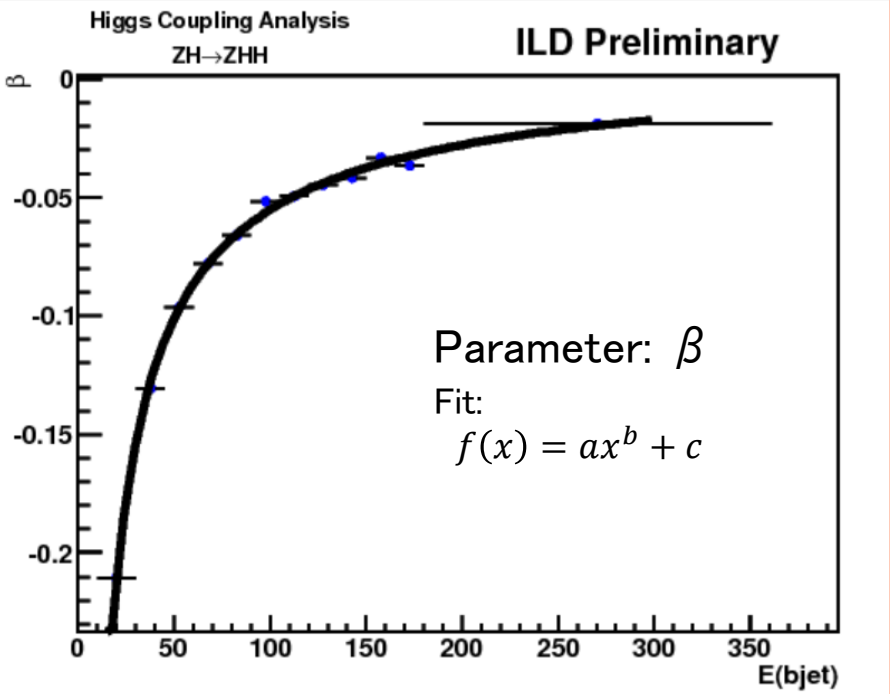
PARAMETERIZATION

- 2 parameters: α and β
- Same way as @500GeV

- Parameterize jets from W boson too

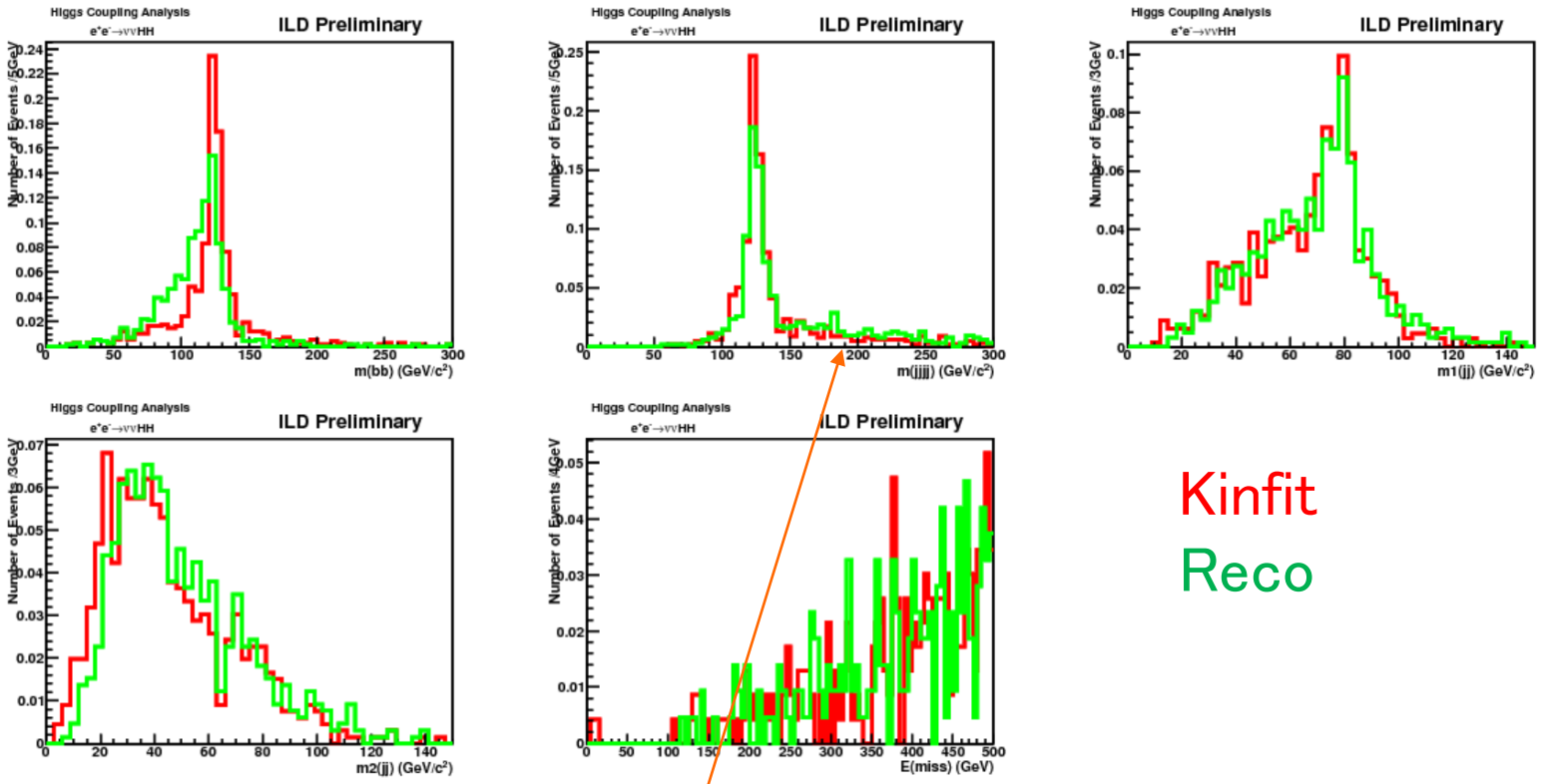
- e.g.) bjet jet energy resolution parameterization





KINEMATIC FITTER FOR ALL HADRONIC @1TEV

- Process of $\nu\ \nu$ HH$\rightarrow \nu\ \nu$ (bb)(WW)$\rightarrow \nu\ \nu$ (bb)(jjjj)
- Mass resolution become better??



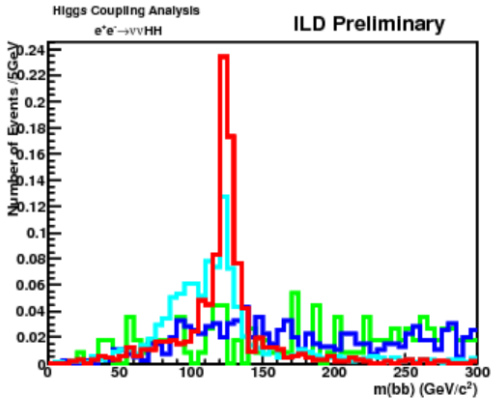
Kinfit

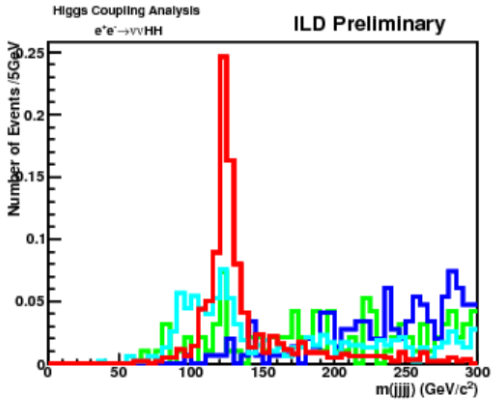
Reco

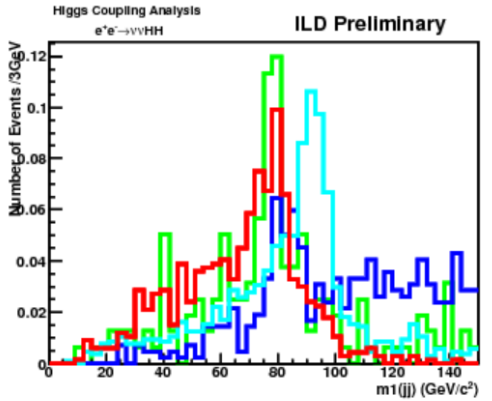
- Higgs mass resolutions become well
- Can this tail be recovered more?
  - Where is this tail coming?

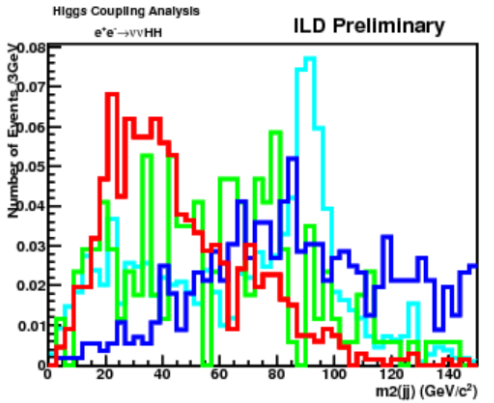
KINEMATIC FITTER FOR ALL HADRONIC @1TEV

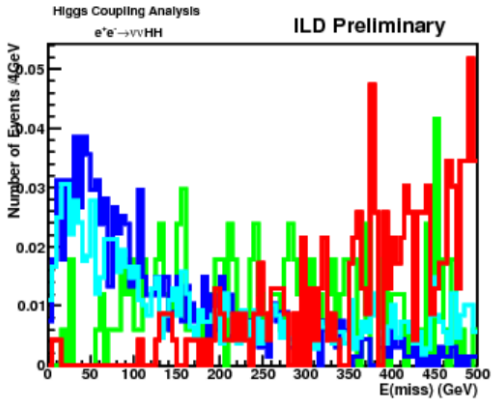
- Process of $\nu\ \nu$ HH→ $\nu\ \nu$ (bb)(WW)→ $\nu\ \nu$ (bb)(jjjj)
- Comparison between signal and some backgrounds











Signal
ttbar: lep+jets
ttbar+g
ZZH

- Separation of W and Z can be seen
- ZZH rejection will be better
- How is non-resonant $\nu\ \nu$ backgrounds? → checking on going
- Need more stat… it is very preliminary!

NEXT

- Need more stat.
- Non-resonant $\nu\ \nu$ backgrounds

- Check $\chi 2$ distribution

- Check more kinematic variables
  - E(miss) for wider range
  - Missing mass
  - etc.