Little Higgs T-parity @ILC

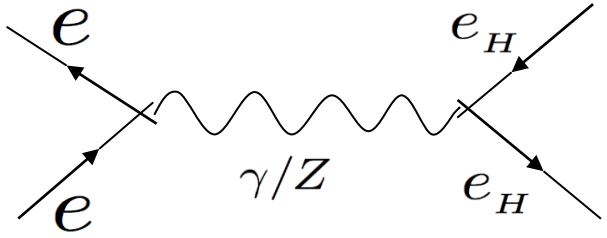
Optimization meeting

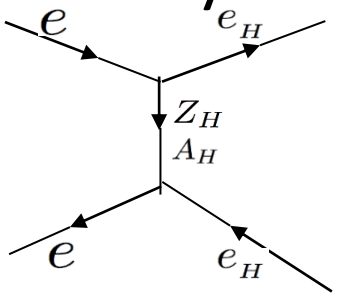
2011.03.04 Eriko Kato

Heavy electron analysis status

1st Aim of study:

Evaluate ILC's sensitivity on f&κ by measuring e_H mass.

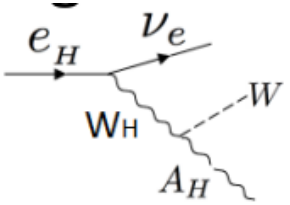




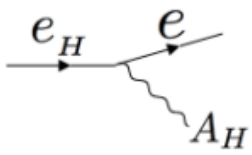
$m_{eH}=\sqrt{2}\kappa f=410GeV$

Analysis mode

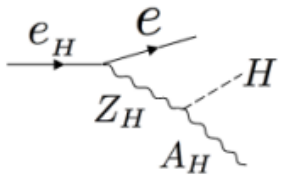
⇒ focus on $e_He_H \rightarrow eZ_HeZ_H$



45.1%



33.2%

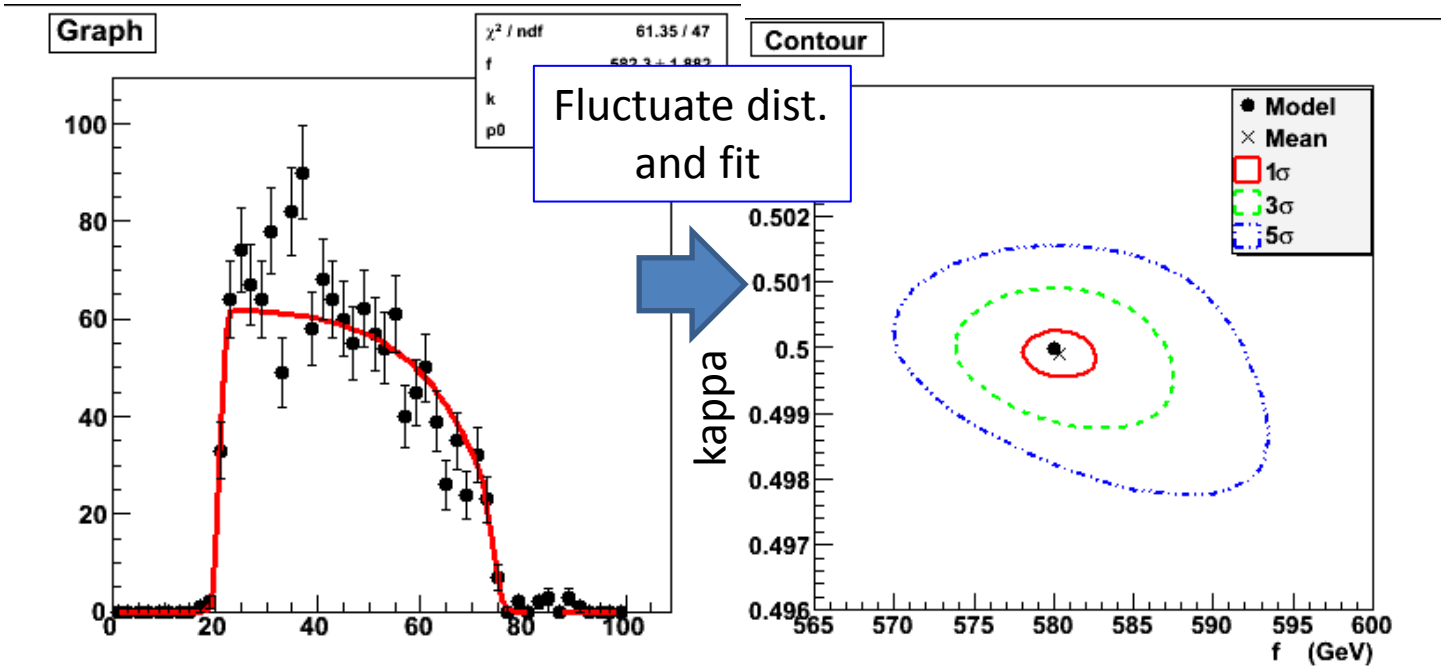


21.7%

e_H mass/parameter extraction

- Fit electron energy distribution
  - extract e_H mass → extract parameter f ,κ
- Fitting improved(include true value) by changing fitting method
  - Compare bin value and Integrated value of fit function

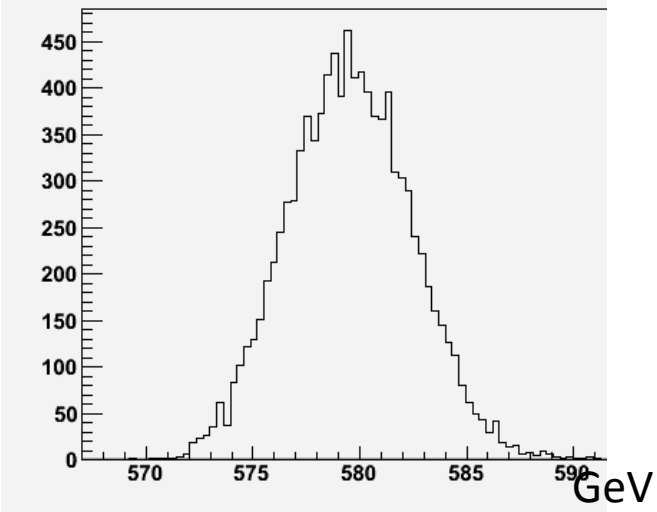
→confirm with toy MC.



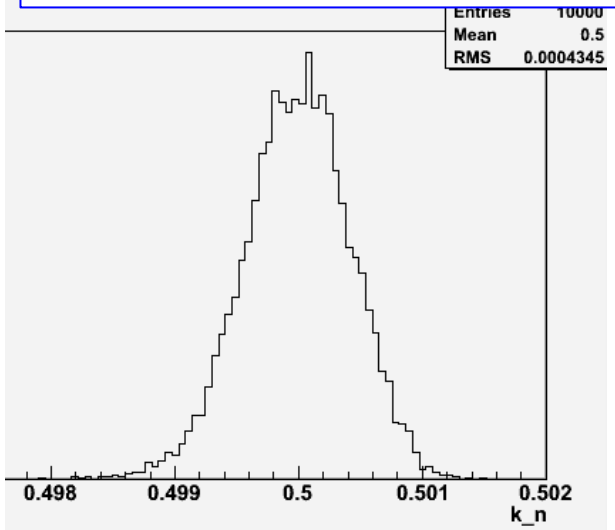
Toy MC confirmation

- Through Toy MC, Confirmed that fitting is valid.
  - extracted value: f=579.6±3.0(GeV) , κ=0.5±4e-4
  - True value: f=580(GeV) , κ=0.5
- Extracted parameters include true value

f (vacuum expectation value)

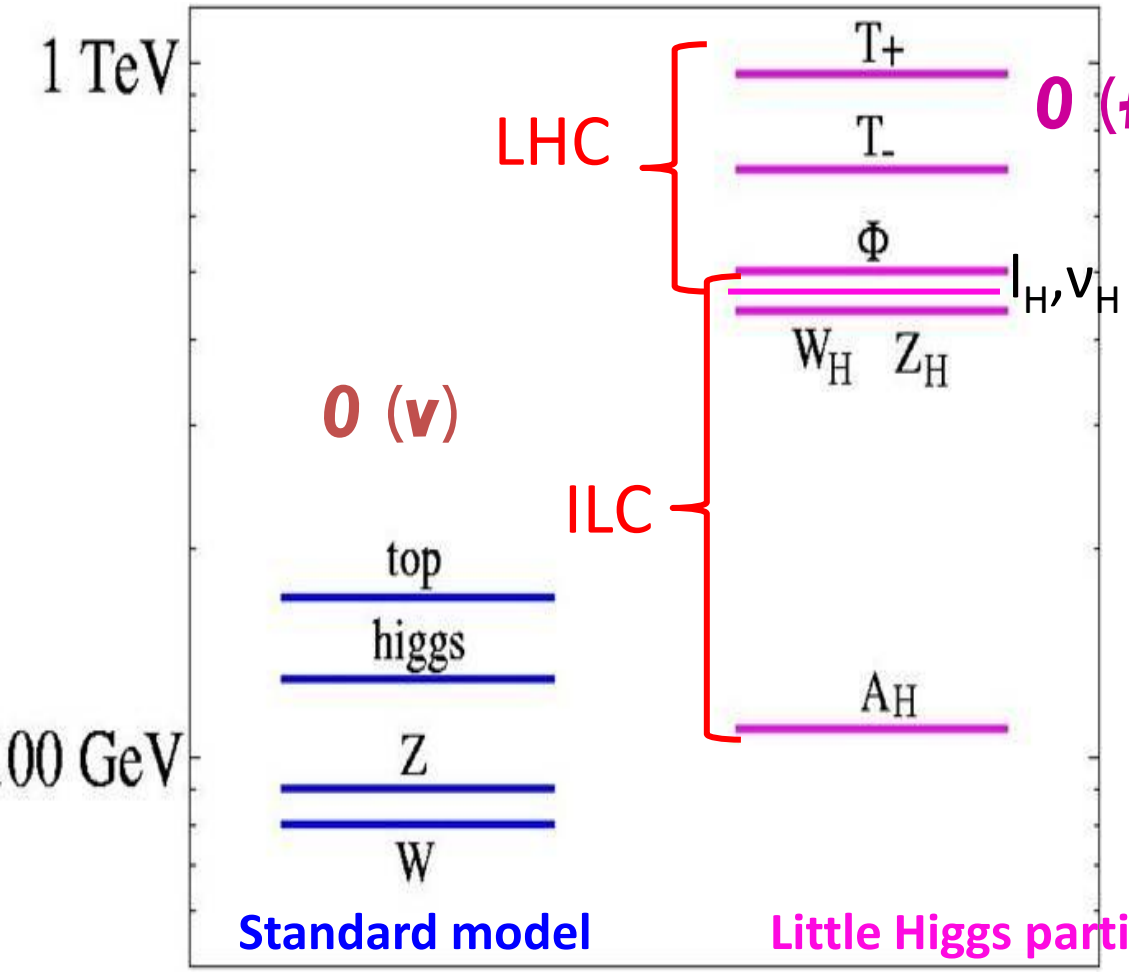


kappa(lepton yukawa coupling)



2nd aim of study

■ Mass spectrum



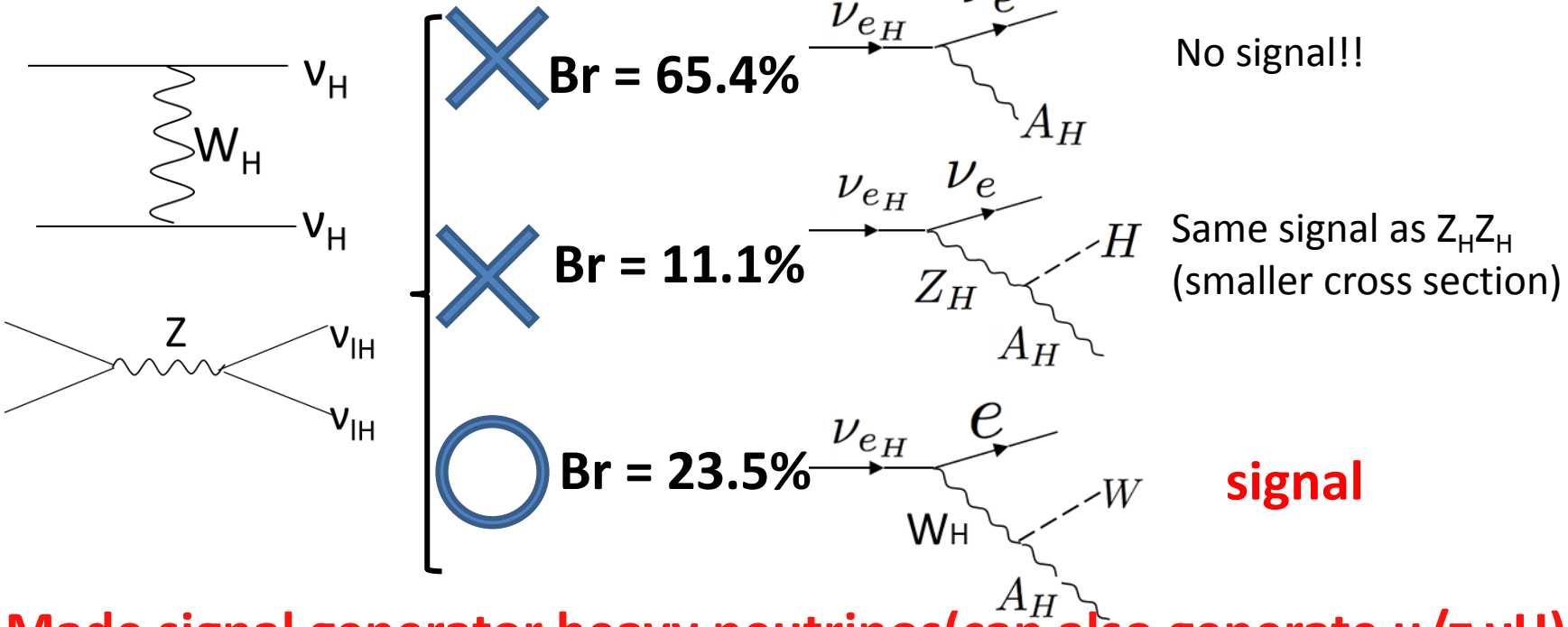
particle	mass	sensitivity
A_H	81.9(GeV)	1.3%
W_H	369(GeV)	0.20%
Z_H	368(GeV)	0.56%
e_H	410(GeV)	0.46%
ν_H	400(GeV)	?

Not yet obtained!!

ν_H analysis mode

- **AIM:: extract ν_H mass and complete LHT mass spectrum**
- **$\nu_H\nu_H(eW_HeW_H)$ (tot xsec :1320fb)**
  - Signal: $eeqqqq(2W)A_HA_H$ (55.74fb)
  - BG: same as $e_He_H(eZ_HeZ_H \rightarrow eeHHA_HA_H)$

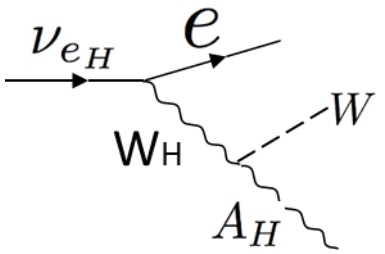
$M_{\nu H} \doteqdot \sqrt{2}\kappa f = 400GeV$



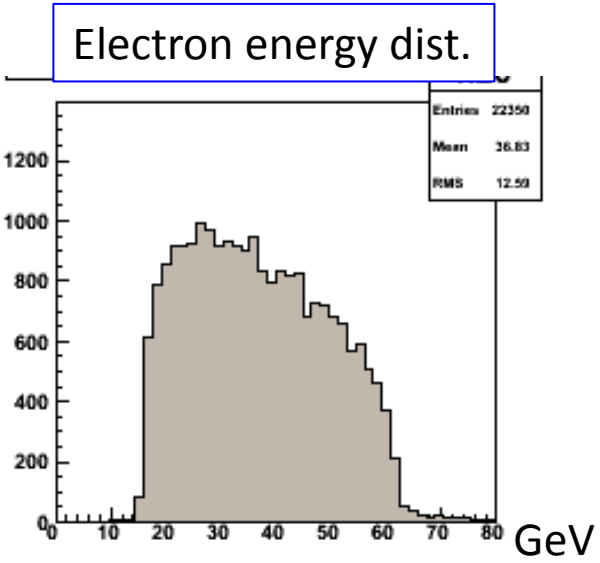
Made signal generator heavy neutrinos(can also generate μ/τ νH)

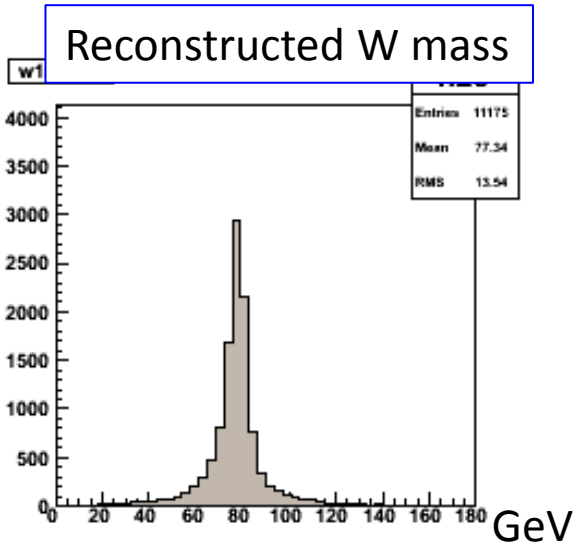
ν_H analysis mode

- **$\nu_H\nu_H(eW_HeW_H)$**
- Signal: 2e+4q(2W)+2A_H(missing)
- Extract 2 isolated lepton→force rest to 4jets



- Electron energy edge consistent with kinematics
- Able to reconstruct W bosons





Summary & plan

- Fitting improved in e_H mass extraction.
- We were able to extract all parameters involving the LHT lepton and gauge boson sector.
- The mass spectrum will be complete with the mass extraction of $\nu_{H.}$