

Recoil mass study in jet mode. Preliminary

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Motivation

- Sigma(ZH) measurement by $e^+e^-/\mu^+\mu^-$ recoil mass technique.
at 250 GeV/ 250 fb⁻¹ : 2.6%
 - ◆ Precision is limited by event statistics.
 - ◆ Very important observable for the absolute Higgs coupling measurement.

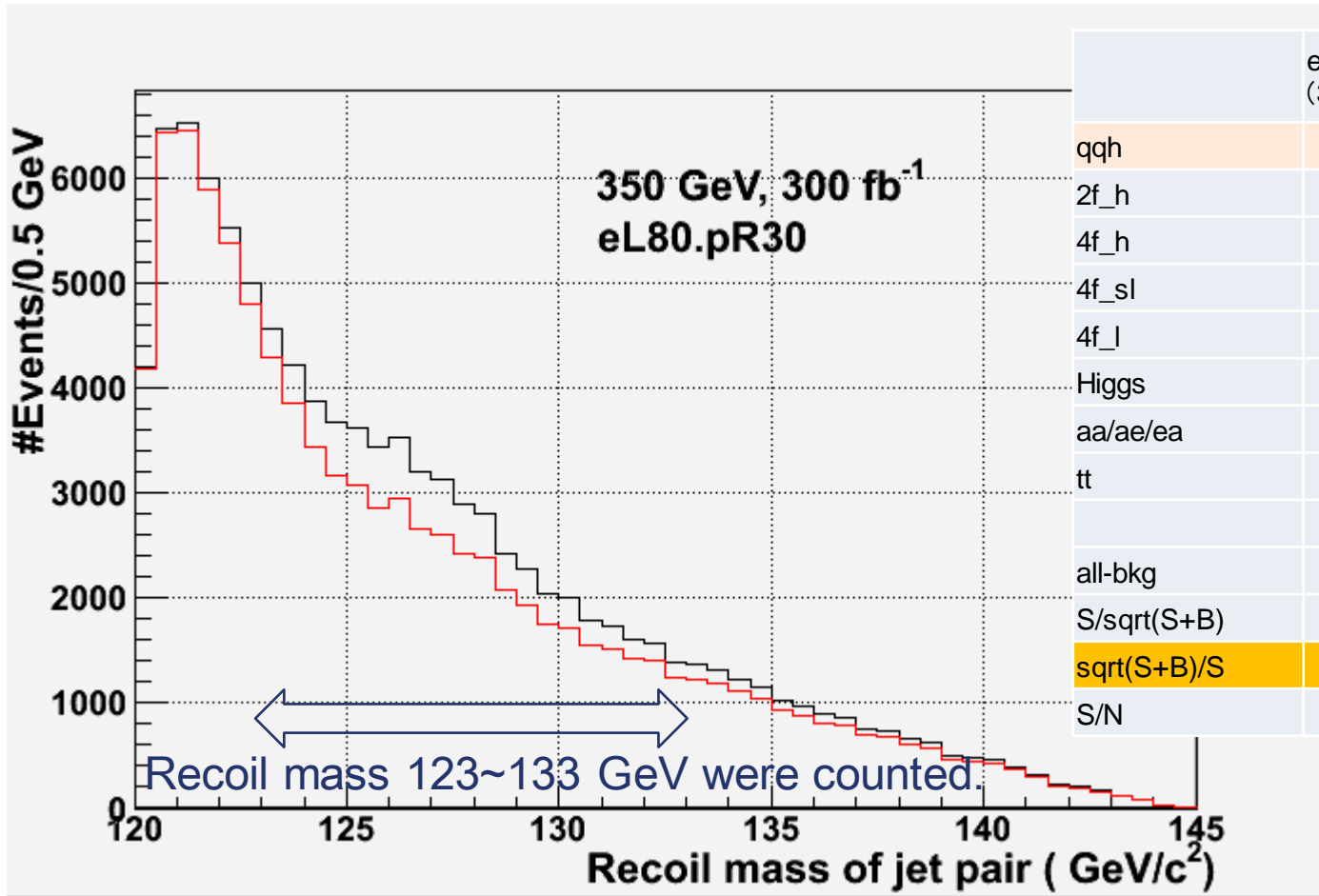
- Possible way to improve would be
 - ◆ High Luminosity ILC : with 1150 fb⁻¹ → 1.2% (Junping)
 - ◆ Another channel : $Z \rightarrow q\bar{q}$
 - Procedure:
 - Find jet pair with mass M_Z inclusively.
 - Measure Higgs from a recoil mass of jet pair.
 - Measured yield will not depend on Higgs decay mode.

Status so far.

- Event selection strategy
 - ◆ k_t jet clustering with R=1.2
 - ◆ Select good jet by kt2
 - ◆ Observed correlation in jet mass and jet energy was corrected.
 - improved S/N of recoil mass distribution
- 250 GeV: Jets in Higgs events are fat, though jet from Z or W are not
- For the moment, the study is focused on 350 GeV, where jets are more sharp.
- All SM backgrounds at 350 GeV were considered.
- ILD full simulation.
- Selection conditions were optimized manually.
 - kt2(jet1): 4000~ 6000, kt22>500, Mcorr(j1+j2): 85~100 GeV/c²
 - E(jet1+jet2): 140~180GeV, Egmax<80 GeV
- $\Delta\sigma/\sigma$ were obtained as $S/\sqrt{S+B}$

Typical distribution

Selection statistics

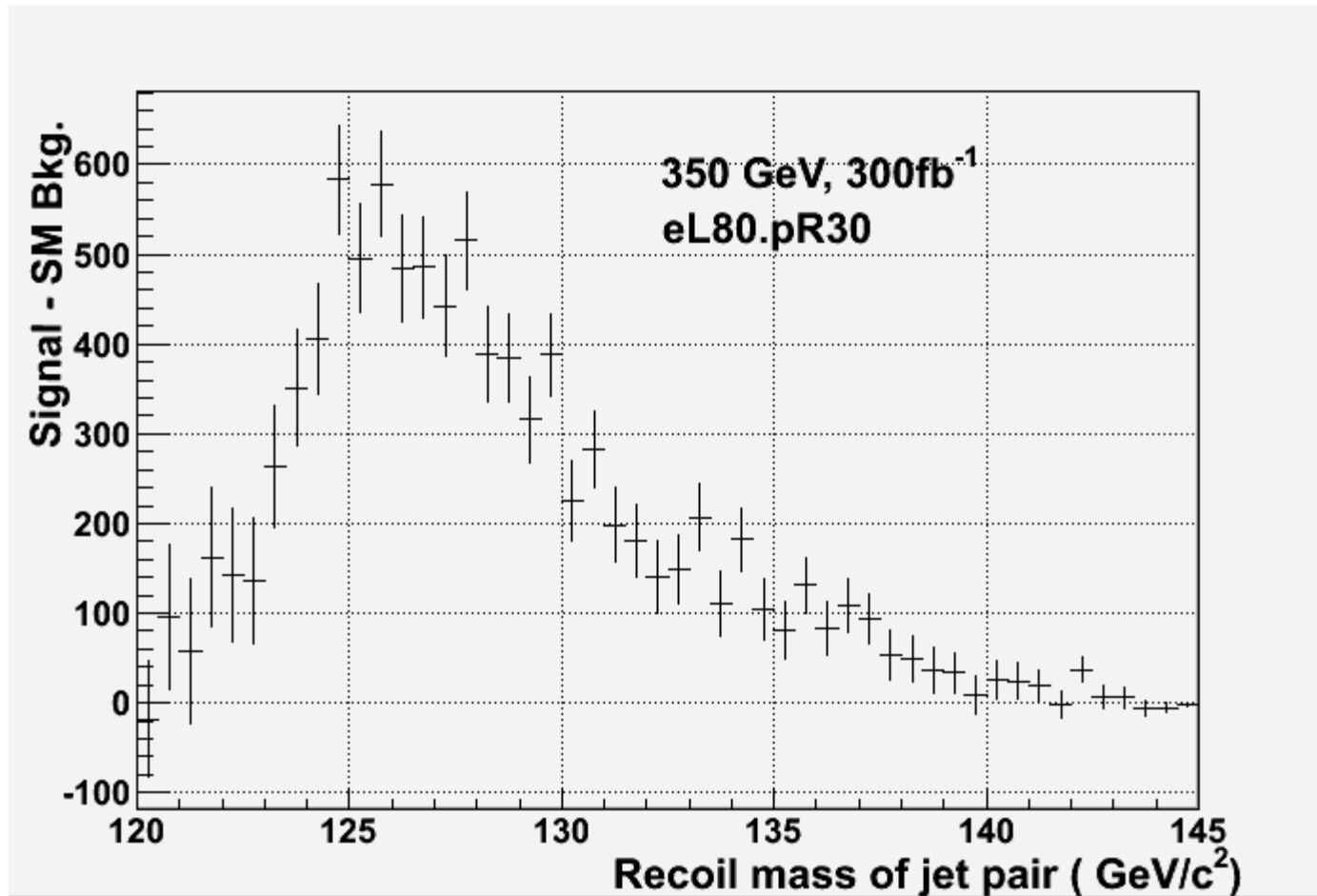


	eR80.pR30 (300fb ⁻¹)	eL80.pR30 (300fb ⁻¹)
qqh	7581	11263
2f_h	13049	33326
4f_h	15726	109011
4f_sl	10767	65971
4f_l	597	1755
Higgs	1313	1975
aa/ae/ea	3971	7320
tt	4124	8441
all-bkg	49546	227800
S/sqrt(S+B)	31.72	23.04
sqrt(S+B)/S	0.03153	0.04341
S/N	0.153	0.049

150 fb⁻¹ each to
-80/+30 & +80/-30%

$\Delta\sigma/\sigma \sim 3.6\%$

Typical distribution



Summary

- Preliminary results of the recoil mass study of jet pair at 350 GeV, combining eL80/eR30 150fb⁻¹ and eR80/eL30 150fb⁻¹,
 $\Delta\sigma/\sigma \sim 3.6\%$
- Assuming 2.6% from e+e-/ mu+mu- recoil mass measurement at 350 GeV, $\Delta\sigma/\sigma(\text{ZH}) \sim 2.1\%$ could be obtained with 300 fb⁻¹(300 days) by combining leptonic and hadronic mode.
- Combining $\Delta\sigma/\sigma(\text{ZH}) \sim 2.6\%$ (leptonic only) at 250 fb⁻¹@250 GeV, $\Delta\sigma/\sigma(\text{ZH}) \sim 1.6\%$ by running 250 GeV and 350 GeV with TDR nominal design. (without HL ILC)
- Event selection is very primitive. Further improvement would be possible.
- Feasibility of 2 jet mode at 250 GeV should be investigated.