

Higgs Branching ratio study

ILC physics and software meeting

Mar. 04. 2011

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Current status

- Likelihood ratio cut is employed to improve background reduction at qqH
- Template sample statistics is increased at 350 GeV to reduce the fluctuation in template bins

Likelihood variable cut

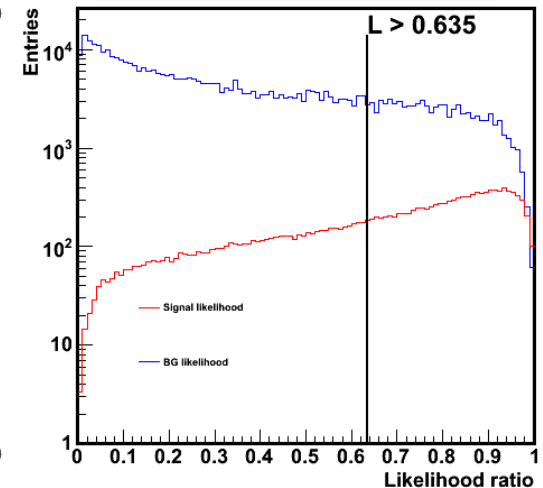
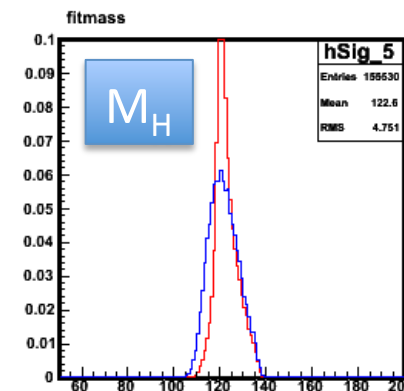
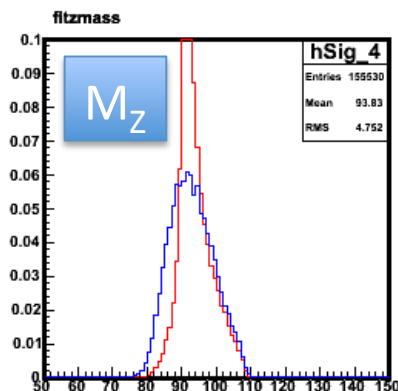
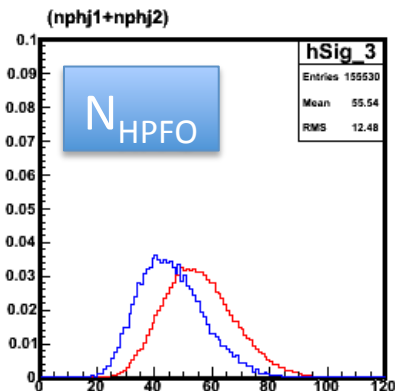
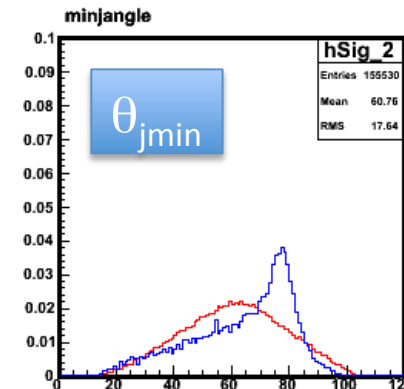
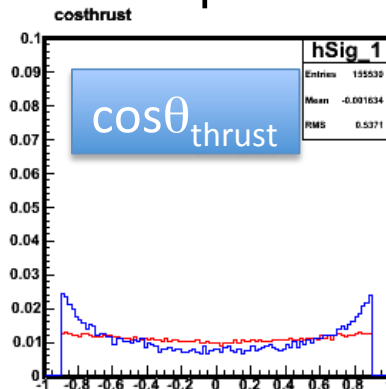
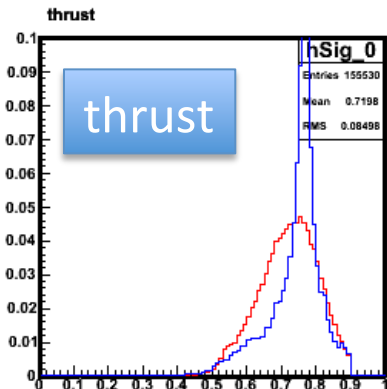
Likelihood variable cut has applied after all the cuts
for qqH Ecm=250 GeV

Likelihood input variables

$$L = P_S / (P_S + P_B)$$

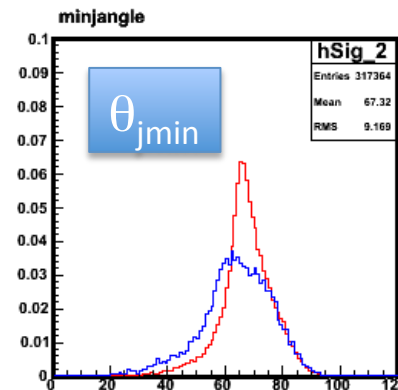
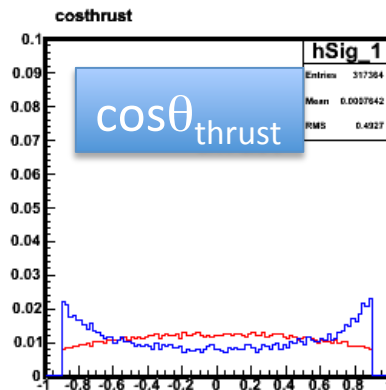
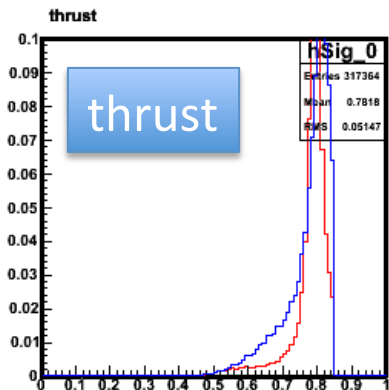
L cut position is defined
at maximum significance

Likelihood ratio

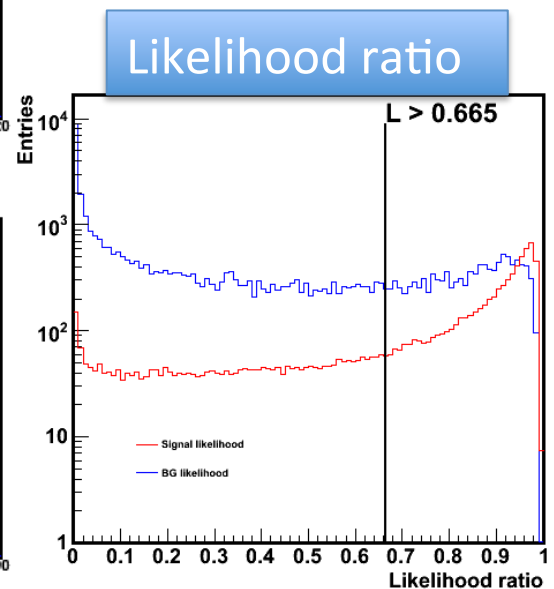
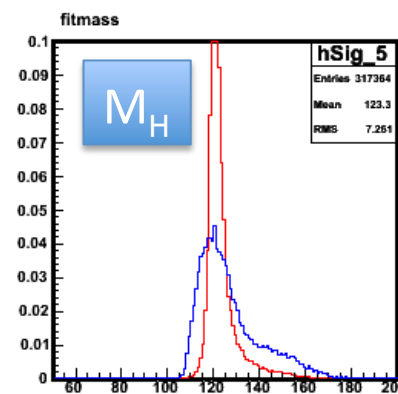
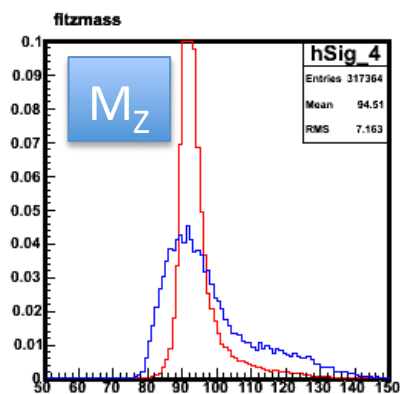
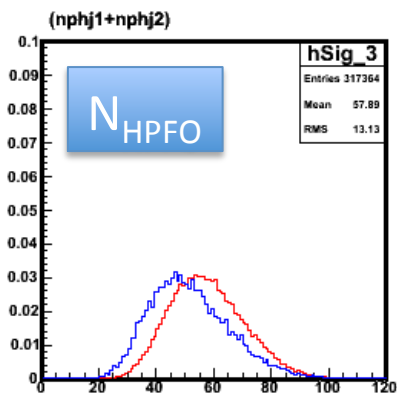


Likelihood variable cut

Likelihood variable cut has applied after all the cuts
for qqH Ecm=250 GeV
Likelihood input variables



L cut position is defined
at maximum significance



Cut summary with likelihood cut

Ecm=250 GeV	Generated	After all cuts	Likelihood cut	Efficiency
qqcc	1916	755	388	20.26%
qqbb	34963	12746	7832	22.40%
ZH all	52507	16350	10101	19.24%
SM Bkg	44827100	411785	79401	0.18%
Significance	7.84	24.99	33.76	

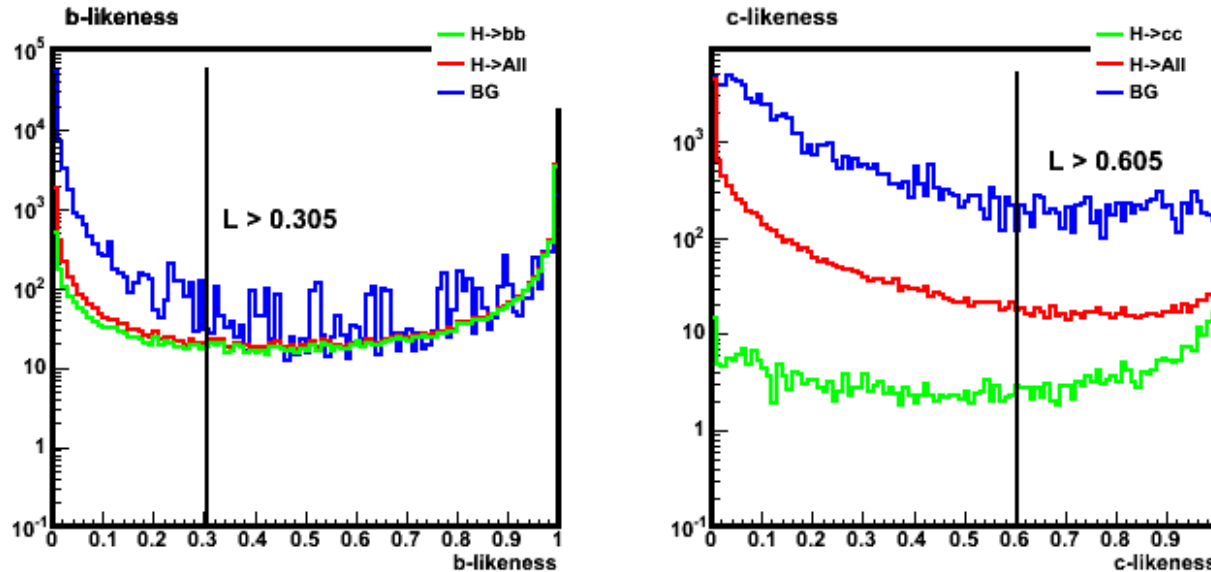
Ecm=350 GeV	Generated	After all cuts	Likelihood cut	Efficiency
qqcc	1315	452	293	22.26%
qqbb	24022	7467	5083	21.16%
ZH all	36099	9447	6396	17.72%
SM Bkg	20544400	44395	10789	0.05%
Significance	7.96	40.71	48.79	

Signal significance has improved

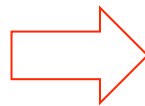
Likelihood cut position will tune for template fitting

Simple cut for qqH channel

Simple flavor tagging cut with likelihood ratio cut



qqH w/o LR cut	$\Delta\sigma_{bb}/\sigma_{bb}$	$\Delta\sigma_{cc}/\sigma_{cc}$
E _{cm} =250 GeV	1.81%	58.2%
E _{cm} =350 GeV	1.87%	30.6%



qqH w/ LR cut	$\Delta\sigma_{bb}/\sigma_{bb}$	$\Delta\sigma_{cc}/\sigma_{cc}$
E _{cm} =250 GeV	1.79%	49.2%
E _{cm} =350 GeV	1.71%	24.1%

Measurement accuracy can improve with LR cut. Now apply with template fitting