

LCWS Sitges, April 1999

A Direct Measurement of $\tan \beta$:

$e^+e^- \rightarrow b\bar{b} \rightarrow b\bar{b}A$

at a Future e^+e^- LC

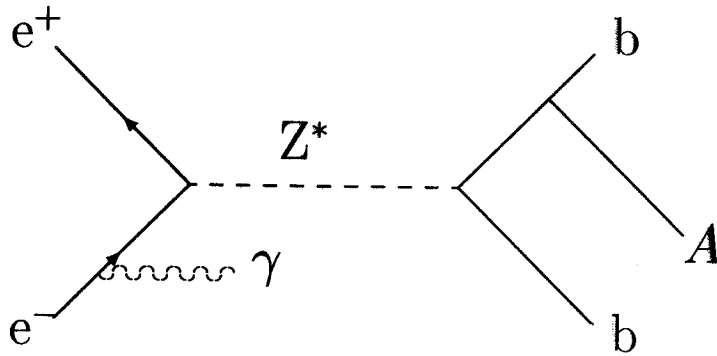
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Basic Process



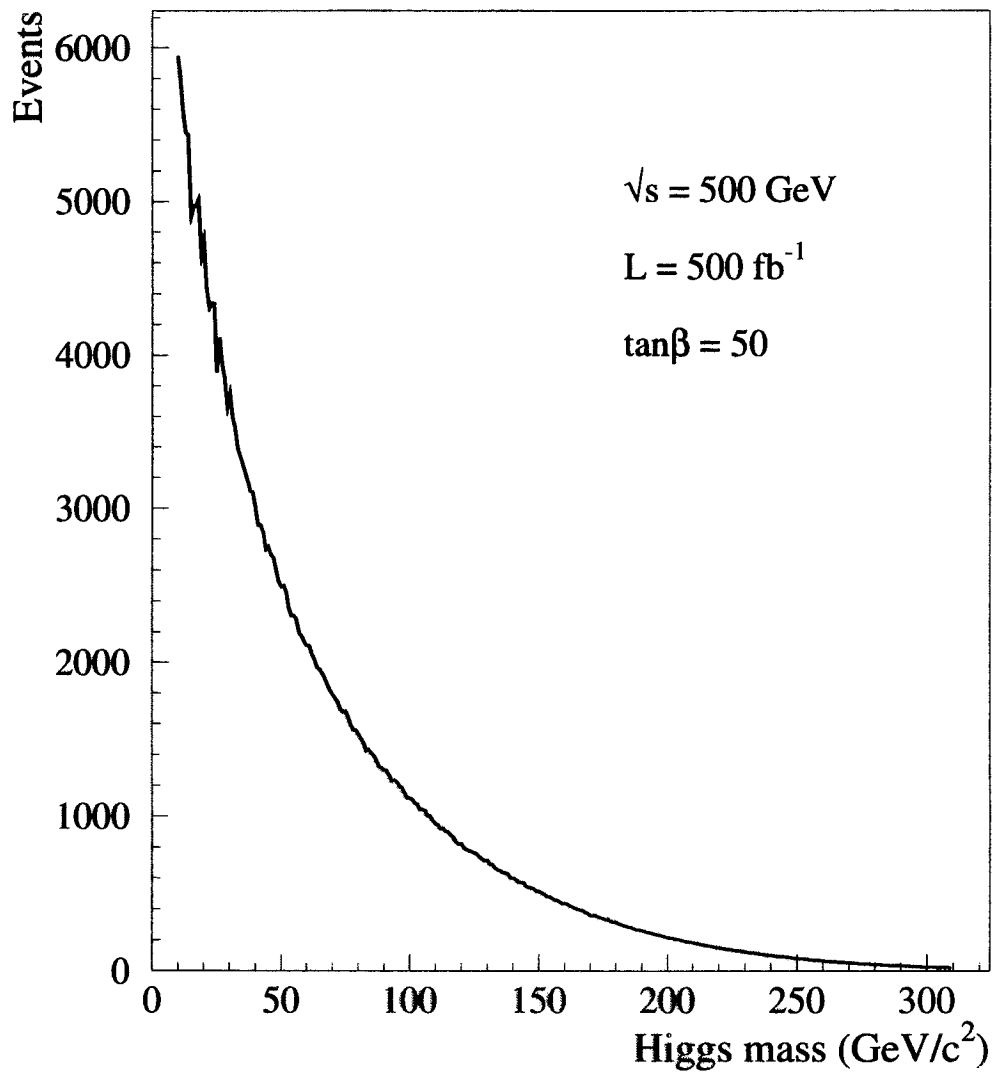
Idea: bbA coupling is proportional to $\tan \beta$.

Can this process help to determine $\tan \beta$?

Recall, generator based on matrix element calculation from

J.Kalinowski and M.Krawczyk.

$e^+e^- \rightarrow b\bar{b} \rightarrow b\bar{b}A$ Rate



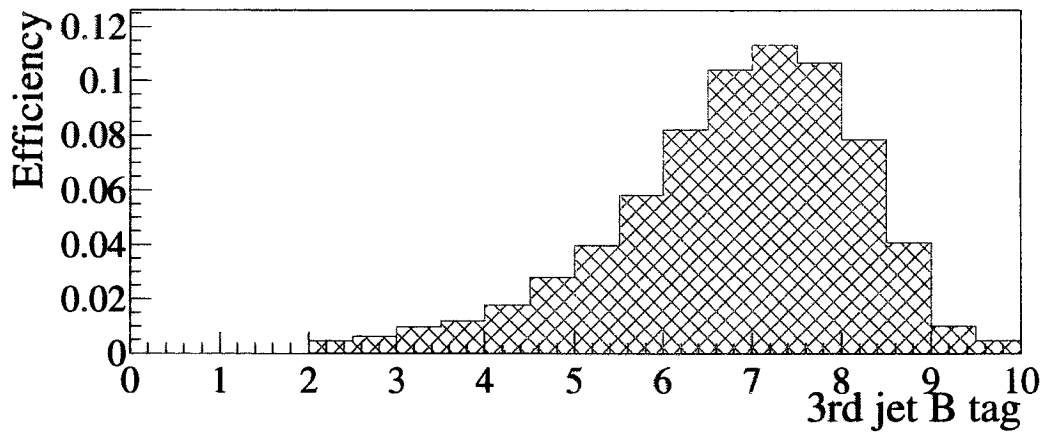
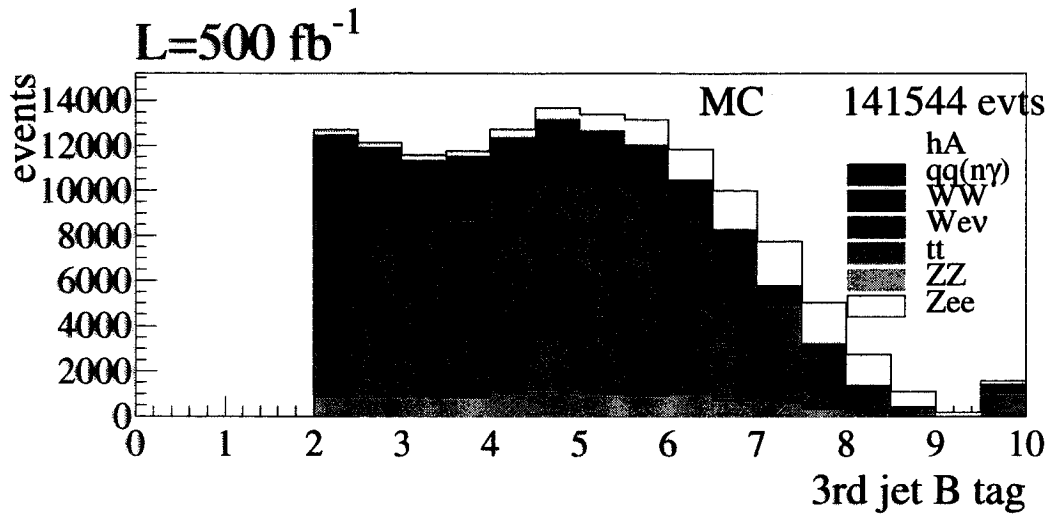
Event Pre-Selection

Simulated Higgs boson mass: 100 GeV

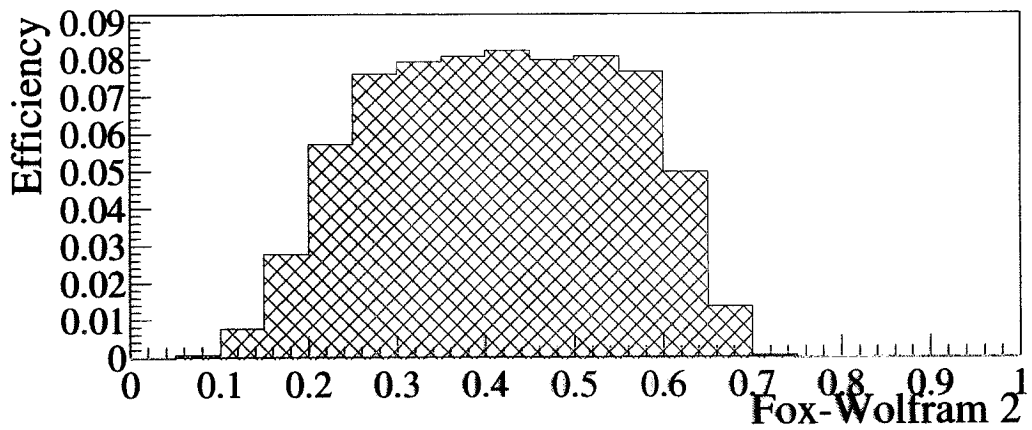
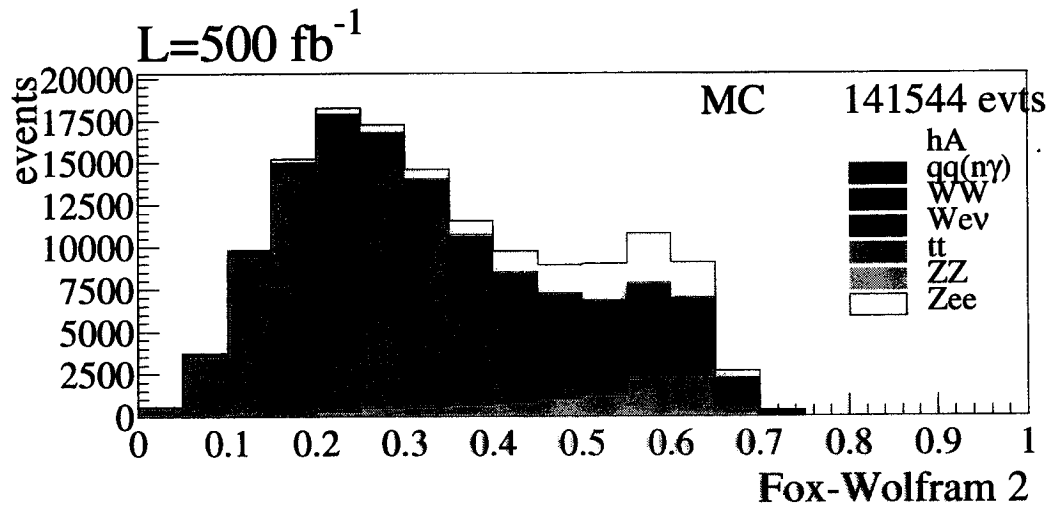
Channel (in 1000)	bbA	qq	WW	eW ν	tt	ZZ	eeZ	hA	sum
After Presel.	73%	20991	7481	0	89983	10278	145	12665	141544

- B-tag (3rd jet) > 2
- $N_{\text{Cluster}} > 17$
- $E_{\text{El-magn}} < 0.5\sqrt{s}$
- $E_{\text{tot}} > 0.6\sqrt{s}$
- $E_{\gamma} < 30 \text{ GeV}$
- Thrust < 0.92

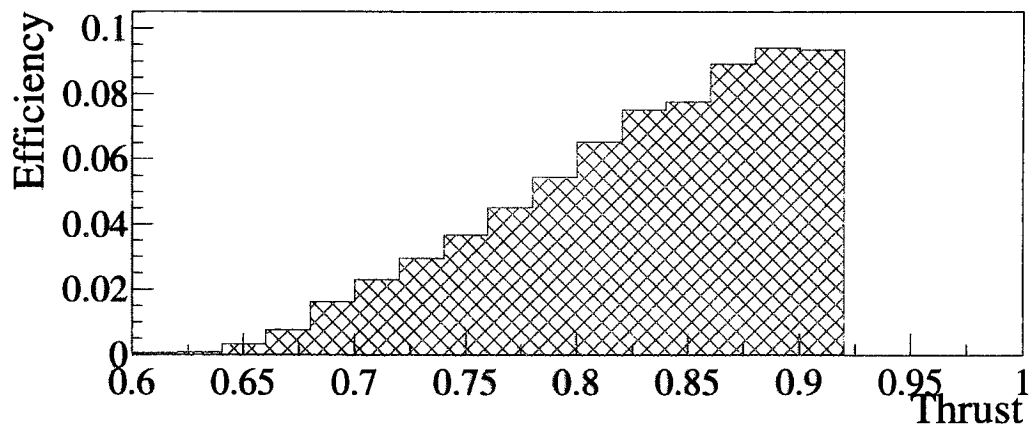
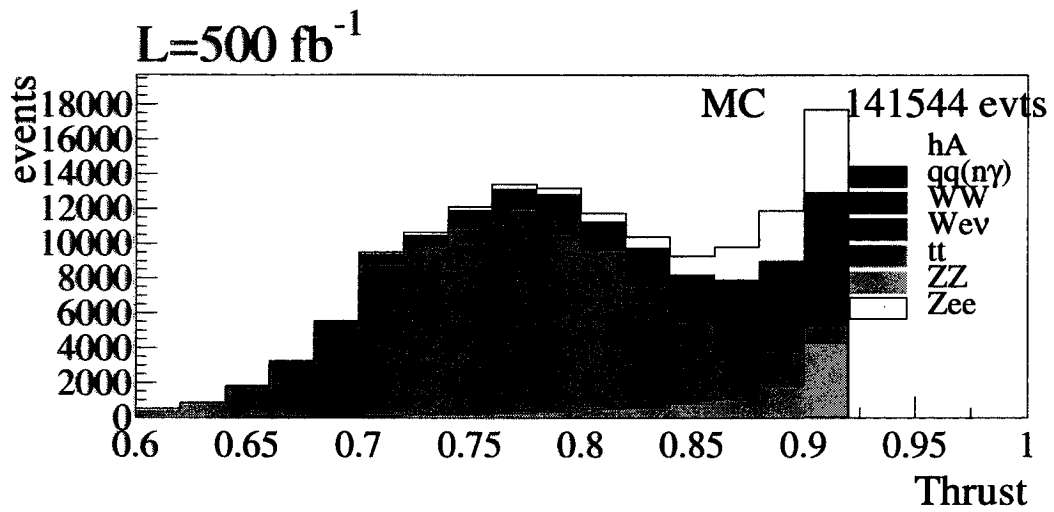
Event Selection



Event Selection

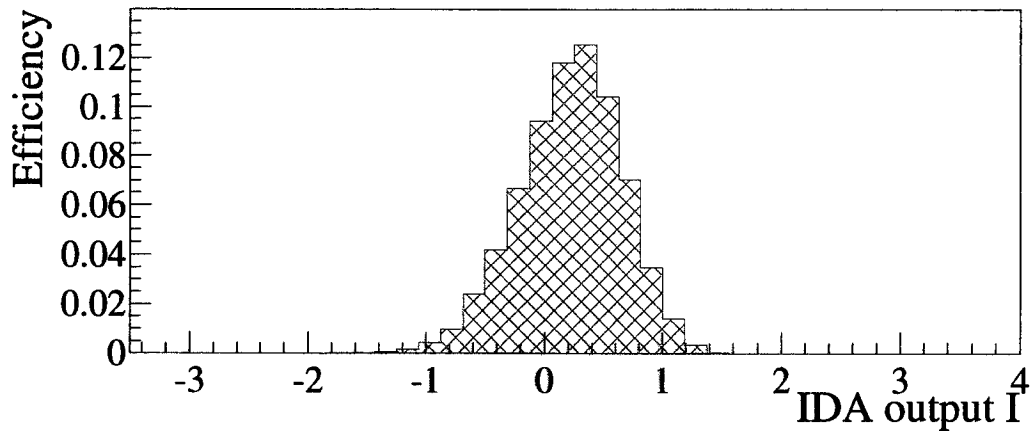
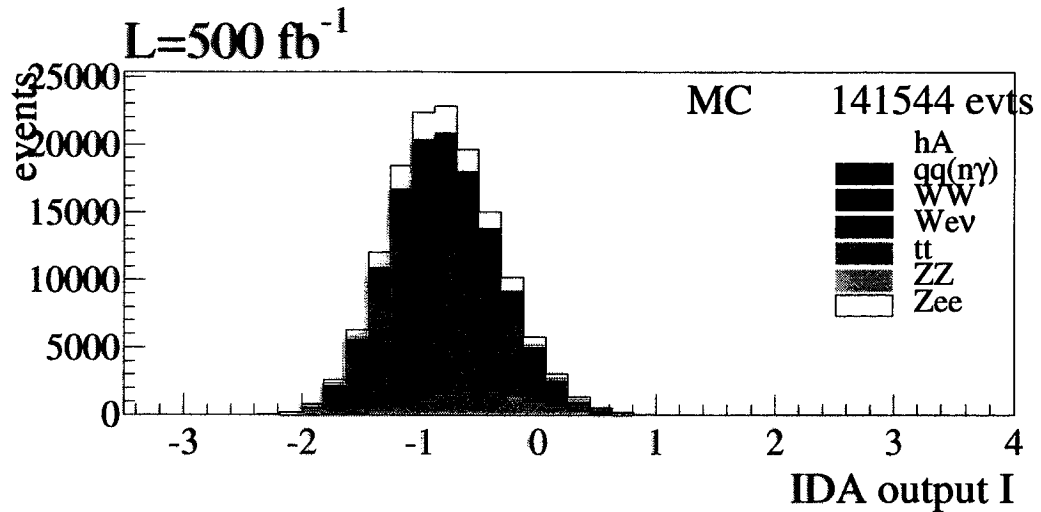


Event Selection



Iterative Discriminant Analysis

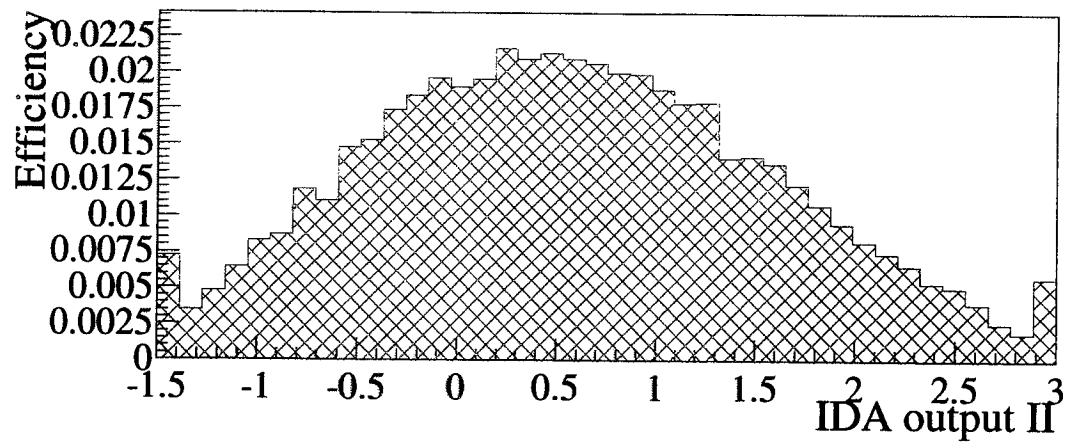
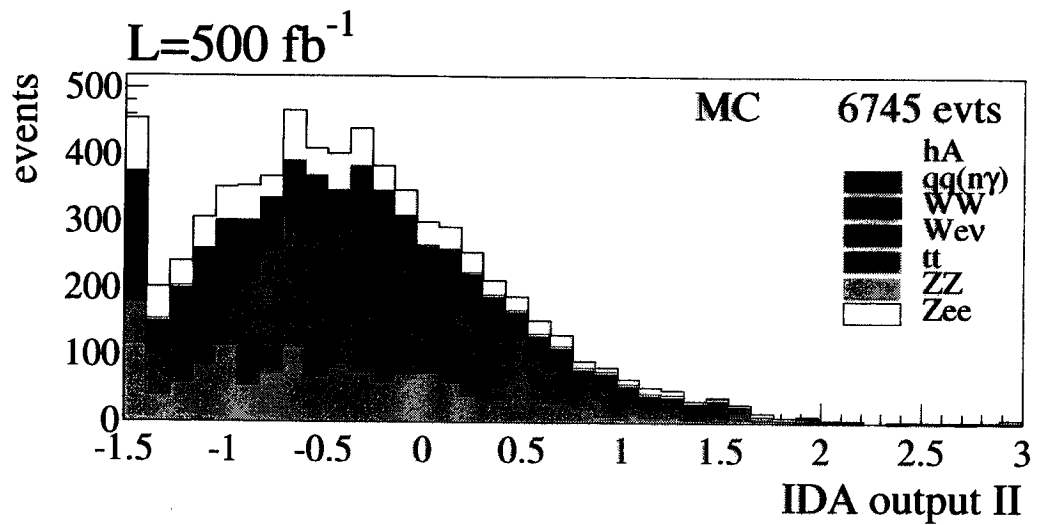
1st step



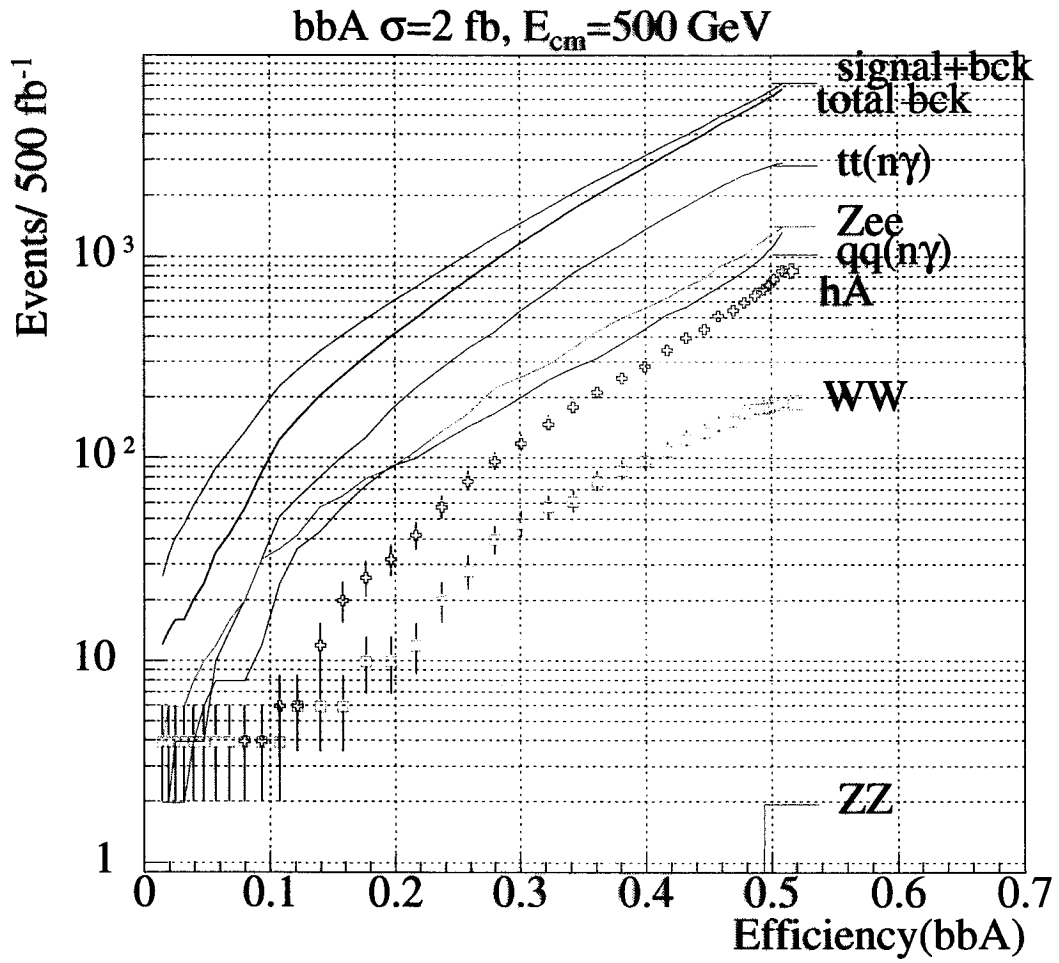
Cut at zero (30% signal reduction)

Iterative Discriminant Analysis

2nd step



Signal and Background



Results and Conclusions

- 500 fb^{-1} simulated: 16 million events.
- A signal of bbA will be visible:
100 signal over 100 background events
- $\Delta \text{tg}^2 \beta / \text{tg}^2 \beta = \Delta N_s / N_s = 0.15$