

First look at WWZ

Tohoku group

Introduction

Charged Higgs in MSSM decays to fermions.
This is (relatively) easy to find for LHC.

In extended models, Charged Higgs can decay
to Vector Bosons.

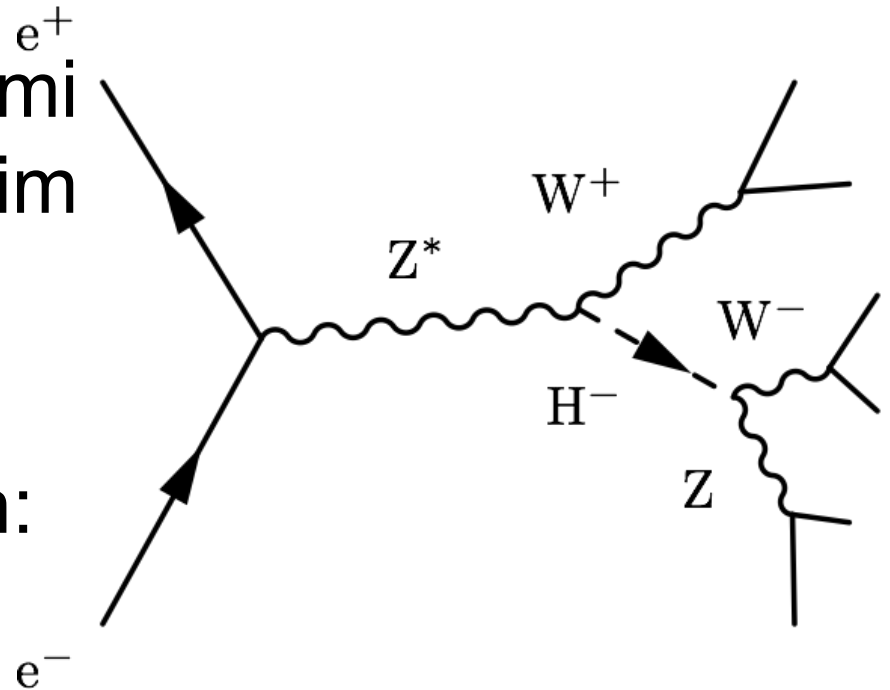
This is very difficult for LHC.

Fujii-san has coded up WHtoWWZStudy++ in
physsim to study these decays.

First look at actual events

I've implemented the lumi spectrum for this physsim mode.

One minor complication:
6 fermions. Different possibilities exist in pythia to hadronize these. Are they all equivalent?



Different Pythia Hadronization modes

How to hadronize?

3x2 (for each Vector boson)

2+4 (W+ separate from ZW-)

6 (all in one string)

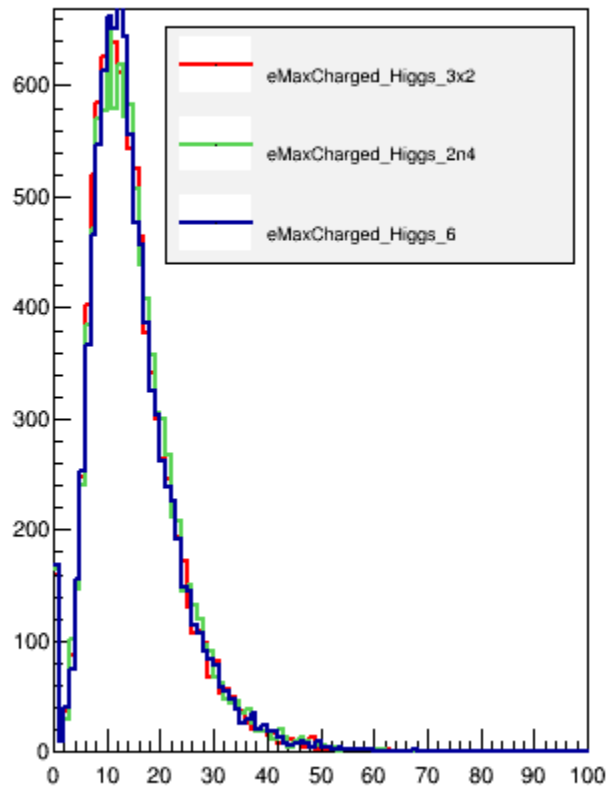
Two ways to compare:

First idea: look at the most and least energetic charged pion. E , $\cos\Theta$ → shows differences in fragmentation

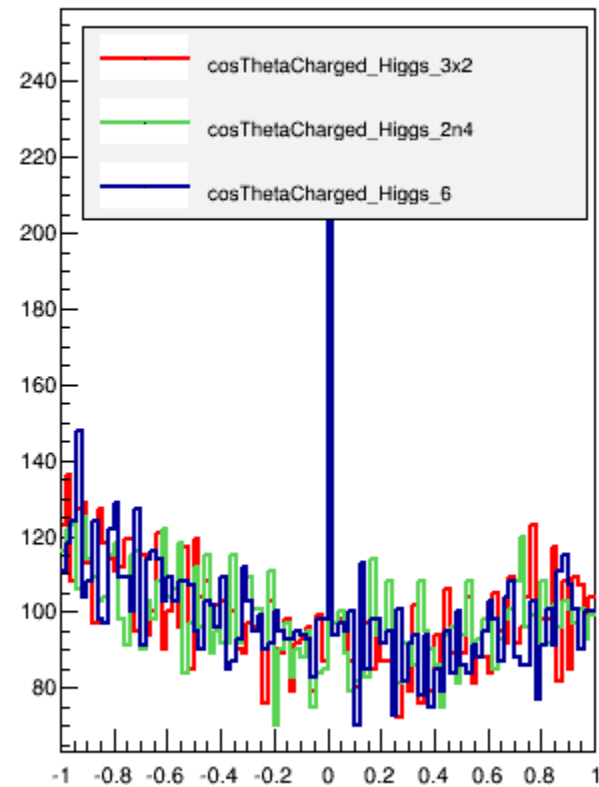
Better: look at jet clustering. → This is more relevant for signal / background separation

Most energetic charged pions

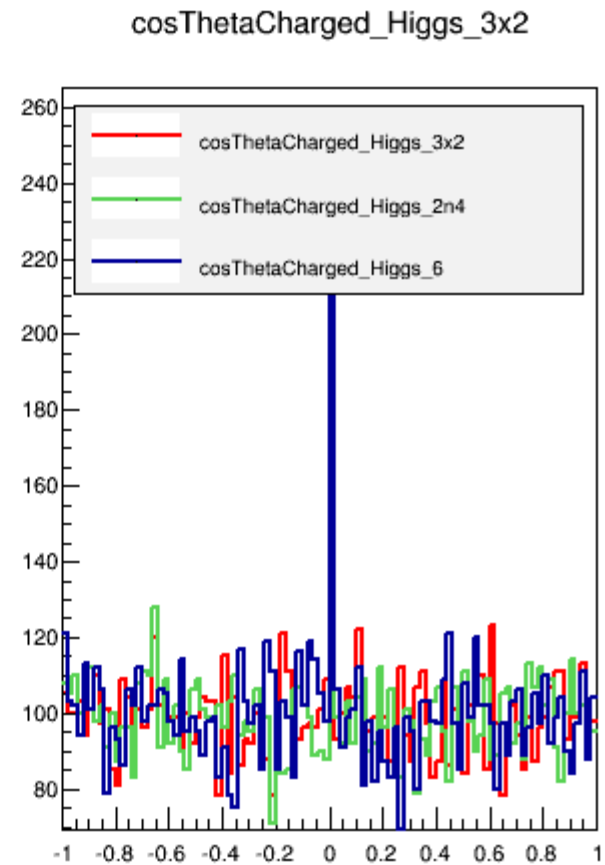
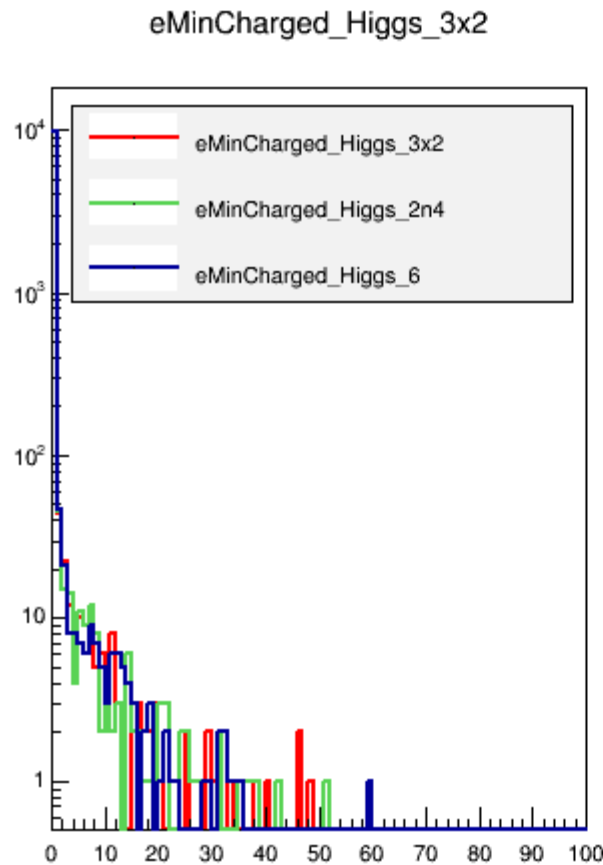
eMaxCharged_Higgs_3x2



cosThetaCharged_Higgs_3x2

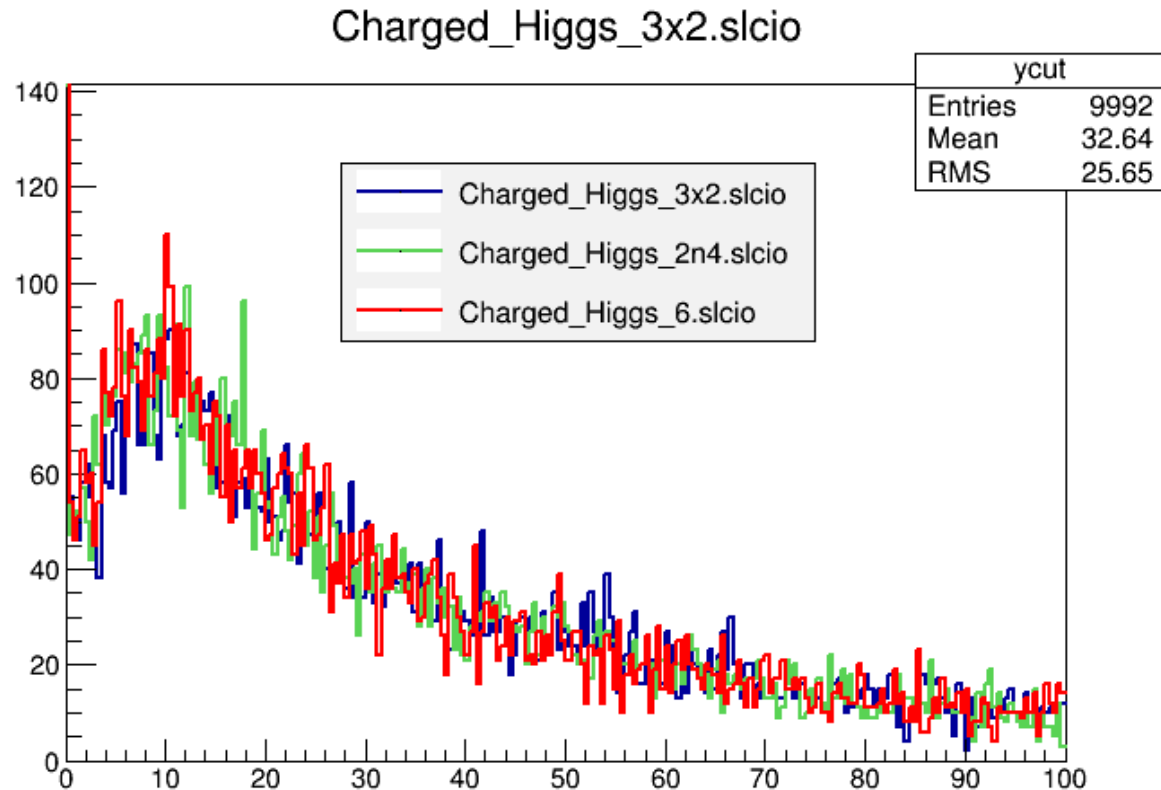


Least energetic charged pions



Jet Clustering

- MCParticles
- Durham clustering
- Event forced into 6 jets
- plot the ycut to go from 7 \rightarrow 6 jets



Summary / Conclusions

- ILC beam spectrum has been implemented in WHtoWWZStudy++ (including some bug fixes)
- `/home/ilc/jstrube/public/work/Higgs_CP/WHtoWWZStudy++`
- different ways to hadronize fermions in pythia show no significant difference
- Propose to go with 2 (from W) + 4 (from $H^+ \rightarrow ZW^+$) scheme