

# ACCEPTANCES USING LATEST BEAMLINER

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# INTRODUCTION

With the latest beamline optics, it is possible to make improved calculations of acceptances using a Root based program that tracks given particles through the beamline elements.

Comparisons between the two Interaction Points can also be made.

Most of the distributions here come from a 120 GeV Higgs Mass EXHUME file of 10000 events.

# X POSITION DISTRIBUTIONS

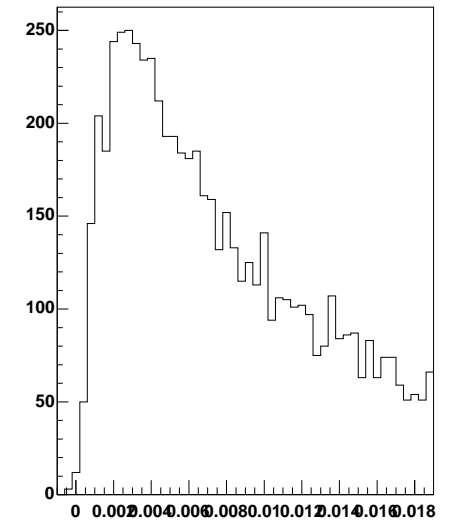
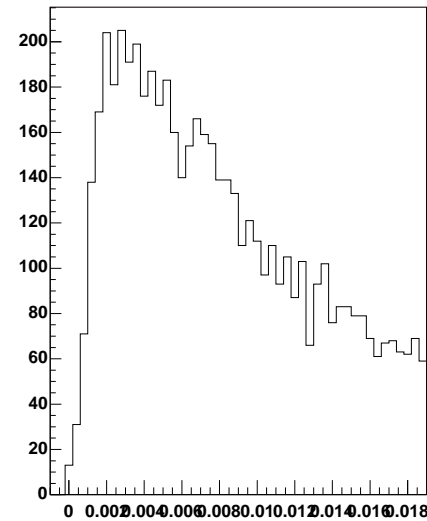
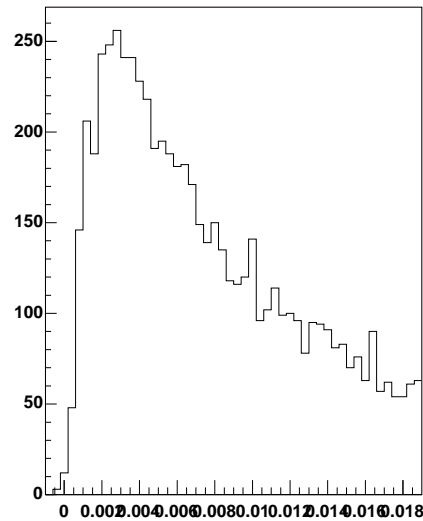
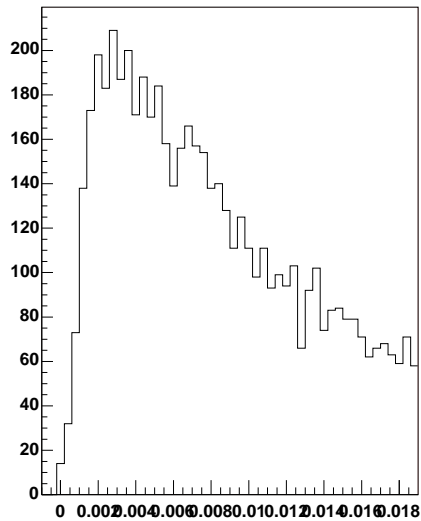
X distributions of hits at 420 m

IP1+;

IP1-;

IP5+;

IP5-



(Horizontal axis in m, total width of each plot is 2 cm)  
Similar distributions.

# X POSITION DISTRIBUTIONS

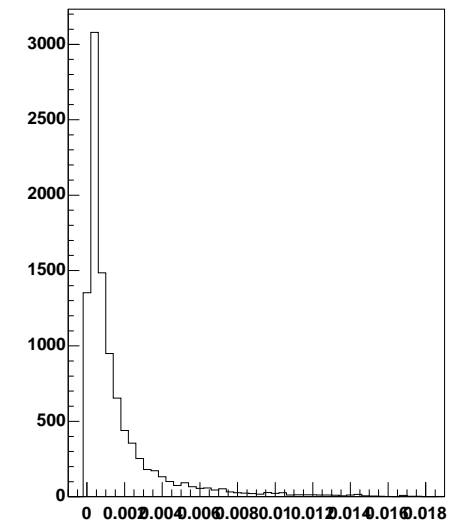
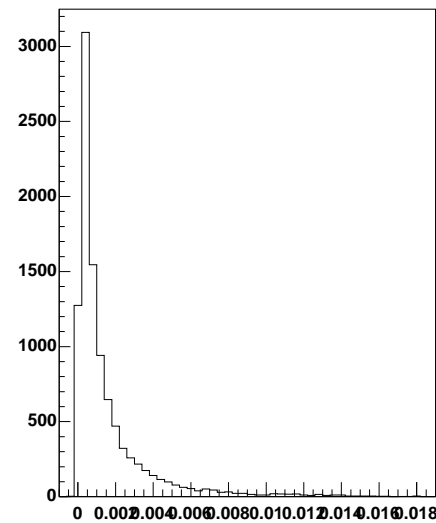
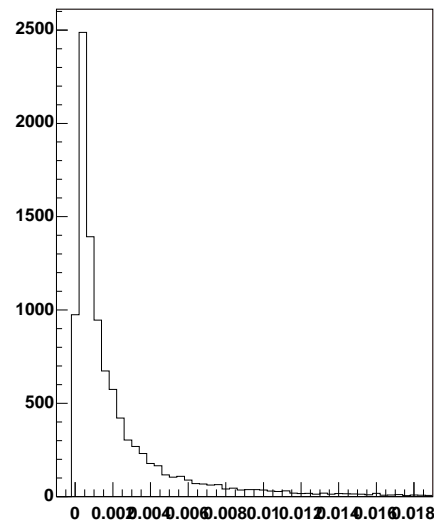
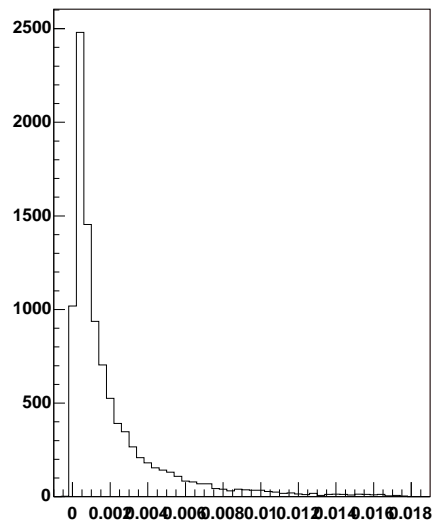
X distributions of hits at 220 m

IP1+;

IP1-;

IP5+;

IP5-



(Horizontal axis in m, total width of each plot is 2 cm)  
Similar again.



# X POSITION vs ANGLE DISTRIBUTIONS

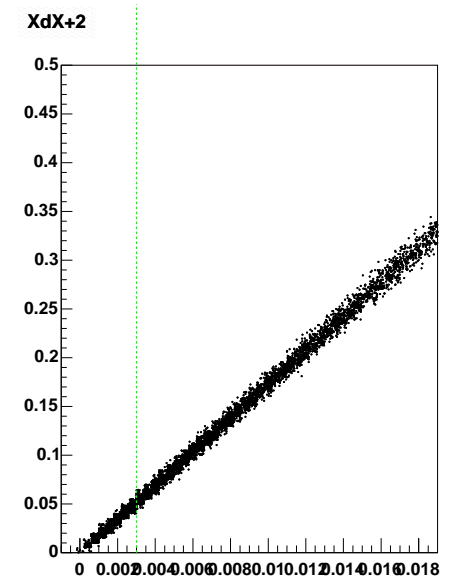
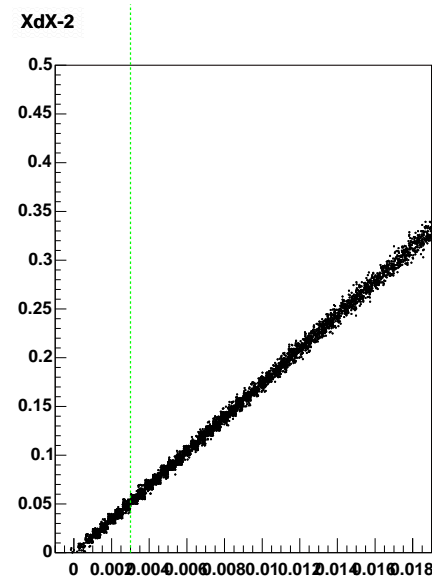
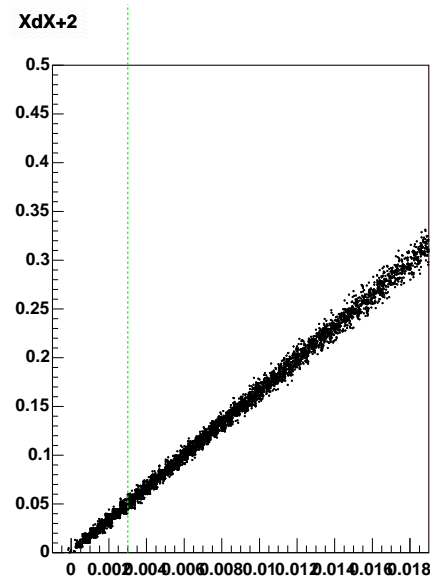
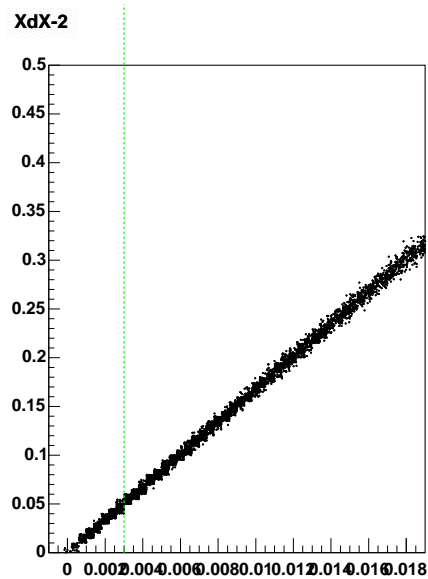
X vs dX/dZ (milliradians) at 420 m

IP1+;

IP1-;

IP5+;

IP5-



**Strong correlation**

**Suggests a pattern that may be potentially useful in pattern recognition in cases of multiple hits in the set of Roman Pots.**

**Possible aid to rejection of protons not coming from IP.**

# X vs Y DISTRIBUTIONS

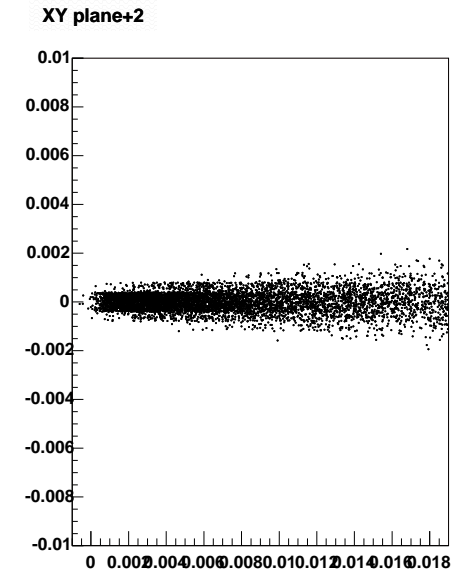
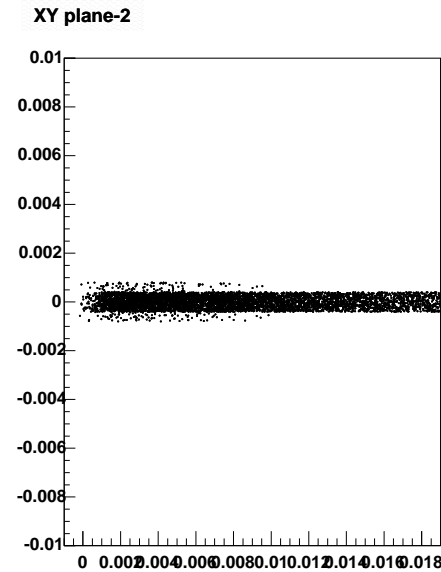
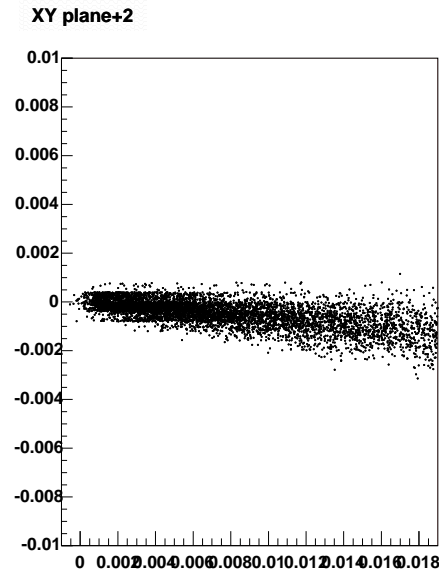
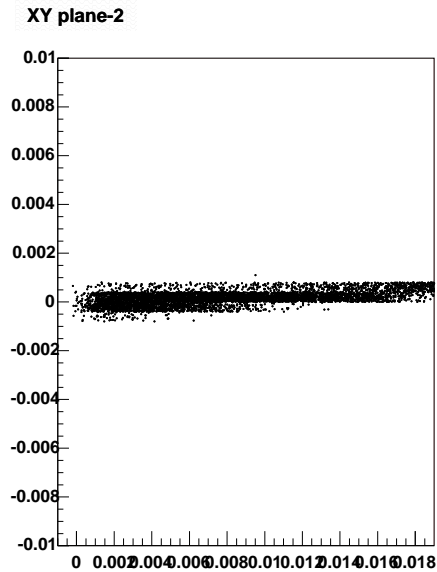
X vs Y (m) at 420 m

IP1+;

IP1-;

IP5+;

IP5-



Again, the X-Y scatter plot at 420 m is fairly similar for IP1 and IP5

# X vs Y DISTRIBUTIONS

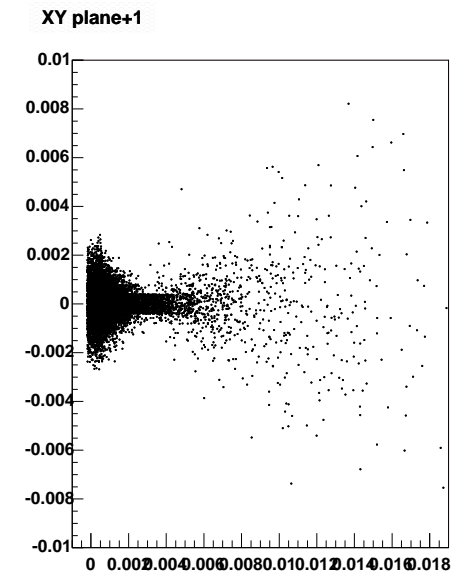
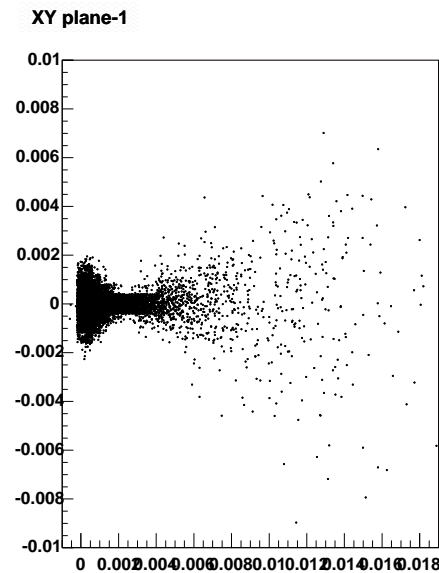
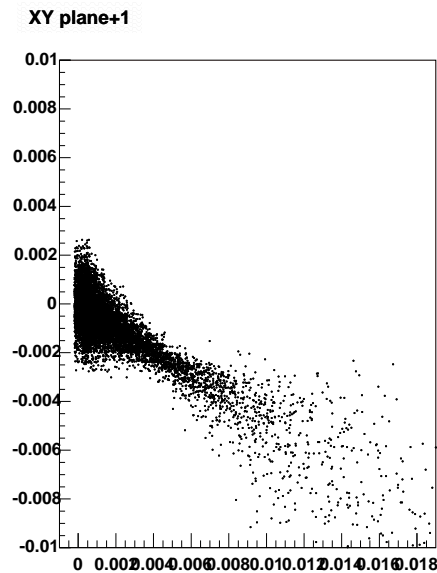
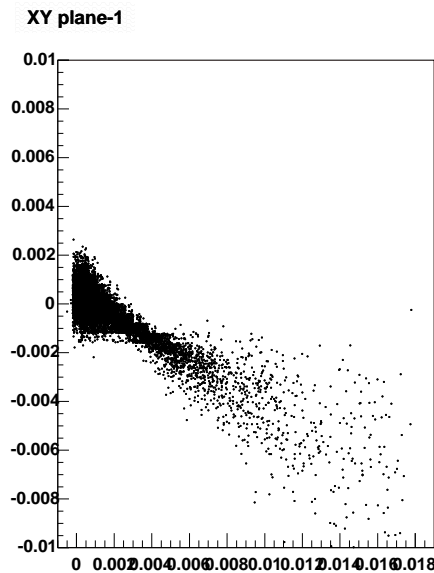
X vs Y (m) at 220 m

IP1+;

IP1-;

IP5+;

IP5-

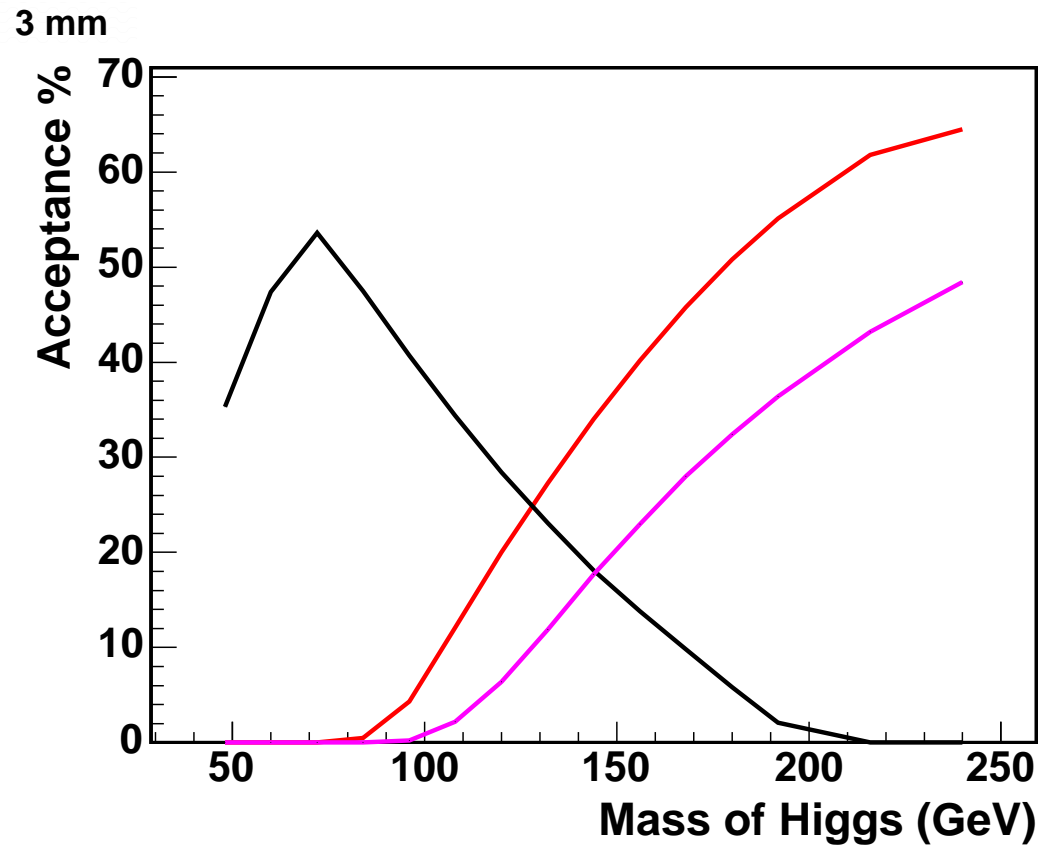


X-Y scatter plot at 220 m shows differences between IP1 and IP5

The kicker magnets are in the vertical plane for IP1 but the horizontal plane for IP5, and still have an effect at the 220 m region.

## 120 GeV HIGGS FILE

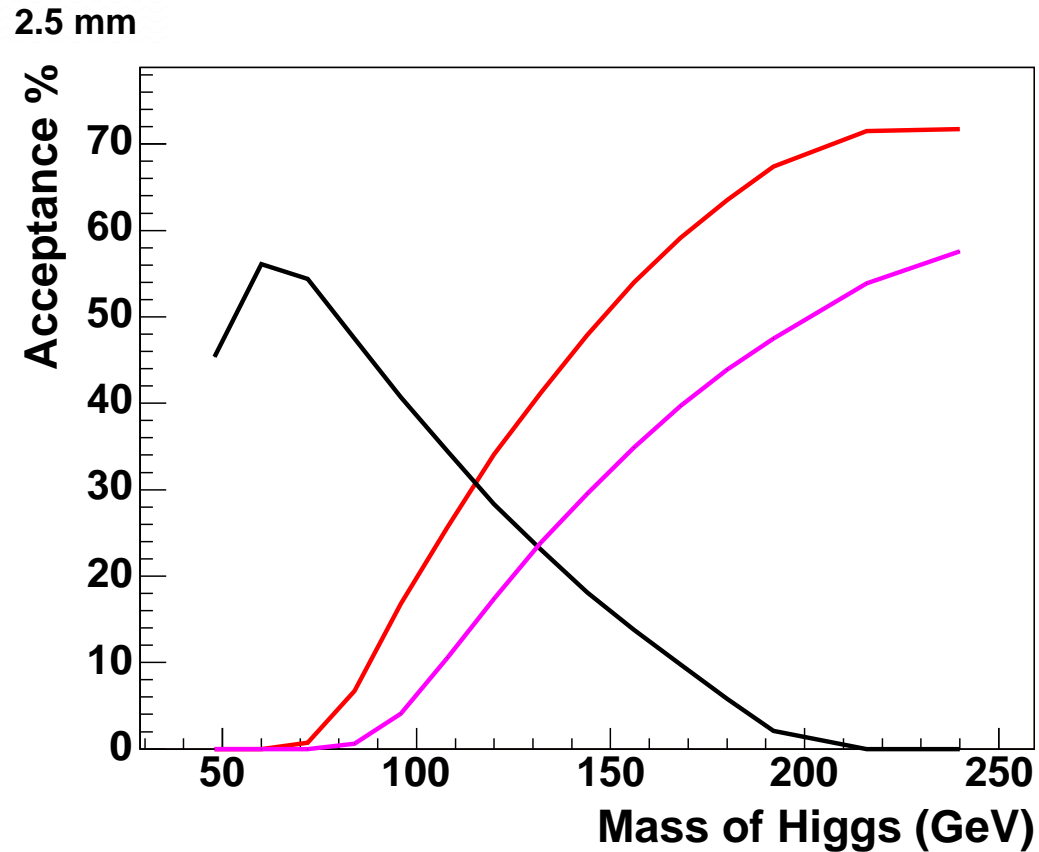
Examine acceptances. Vary Higgs mass by scaling the momenta that were generated for 120 GeV Higgs.



IP1 = IP5  
for 420+420m detection  
IP1 for 420+220m detection  
IP5 for 420+220m detection

Acceptance vs Higgs mass  
for detectors whose inner edge is 3.0 mm from the beam

# 120 GeV HIGGS FILE



**IP1 = IP5**

**for 420+420m detection**

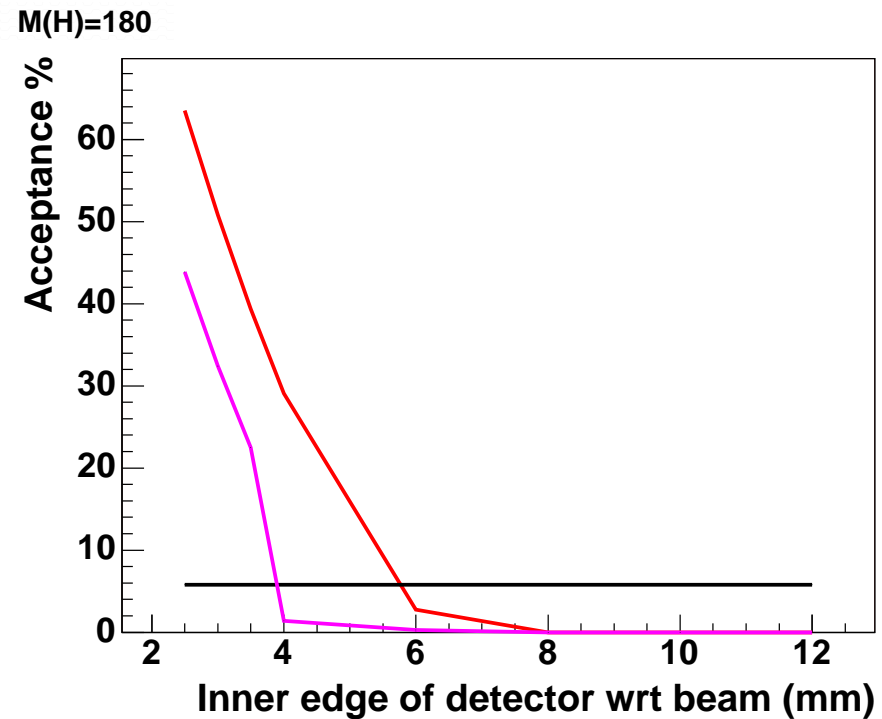
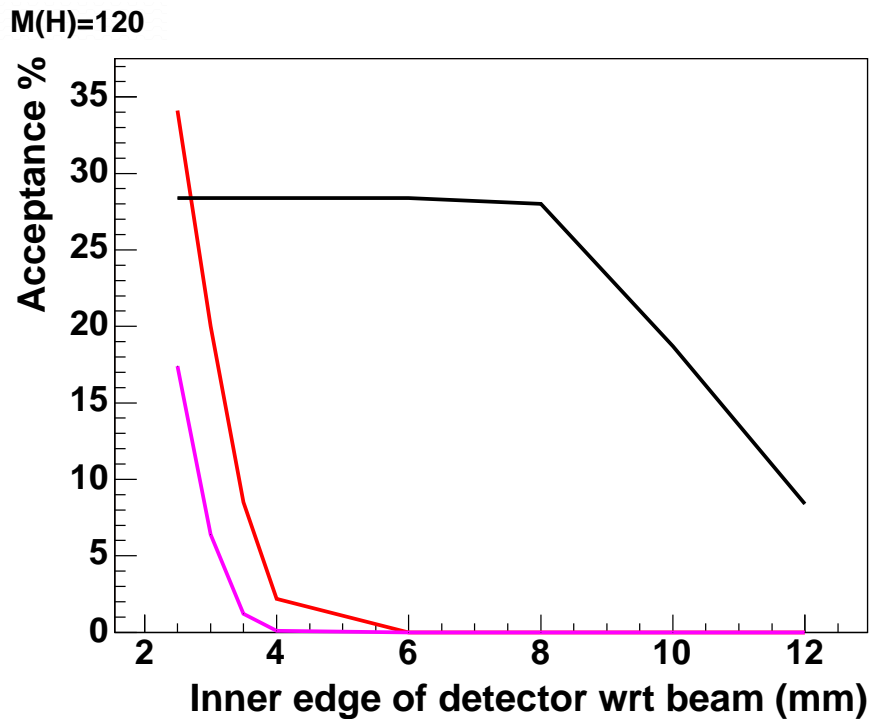
**IP1 for 420+220m detection**

**IP5 for 420+220m detection**

**Acceptance vs Higgs mass (GeV)**

**for detectors whose inner edge is 2.5 mm from the beam**

# 120 GeV HIGGS FILE



Acceptance % is plotted for detectors as a function of inner edge of detector from the beam in mm

Left:  $M(H) = 120$  GeV; Right:  $M(H) = 180$  GeV

**IP1 = IP5 for 420+420m detection; IP1 for 420+220m detection;**  
**IP5 for 420+220m detection**

## CONCLUSIONS

- We are in a position to make very detailed studies.
- IP1 and IP5 have identical acceptances at 420+420m
- There are some differences for 420+220m detection
- The 420+420m detection is not obviously dependent on having detectors very close to the beam. Here the proton momenta are fairly similar.
- However for the asymmetric 420+220m case, this distance is important. (Have not yet tried varying the 220m and 420m distances independently.)