ACCEPTANCES USING LATEST BEAMLINE

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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.

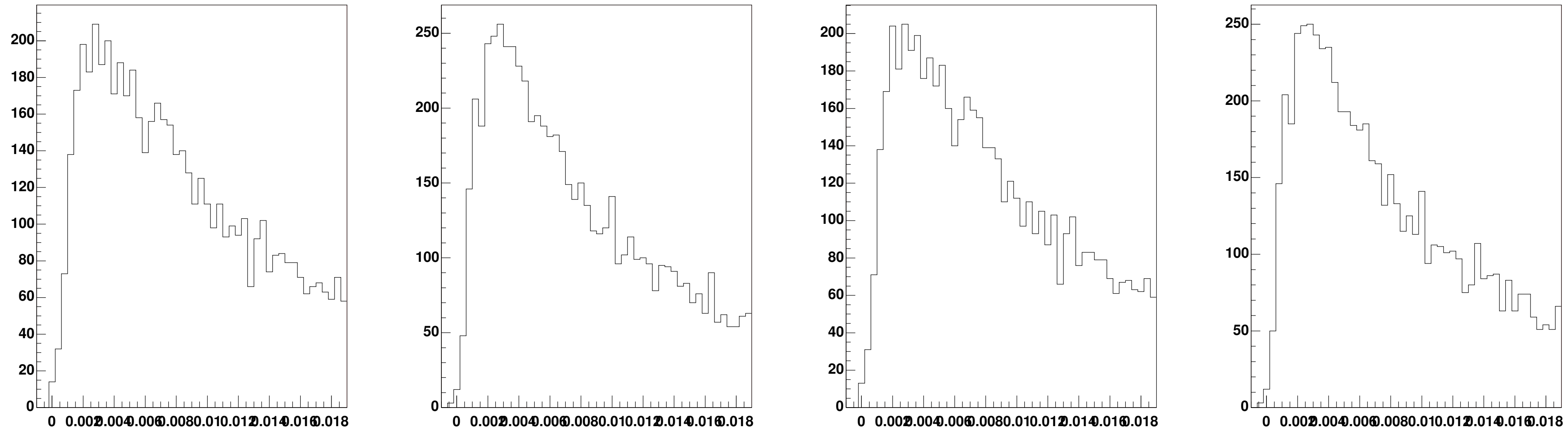
Comparisons between the two Interaction Points can also be made.

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-

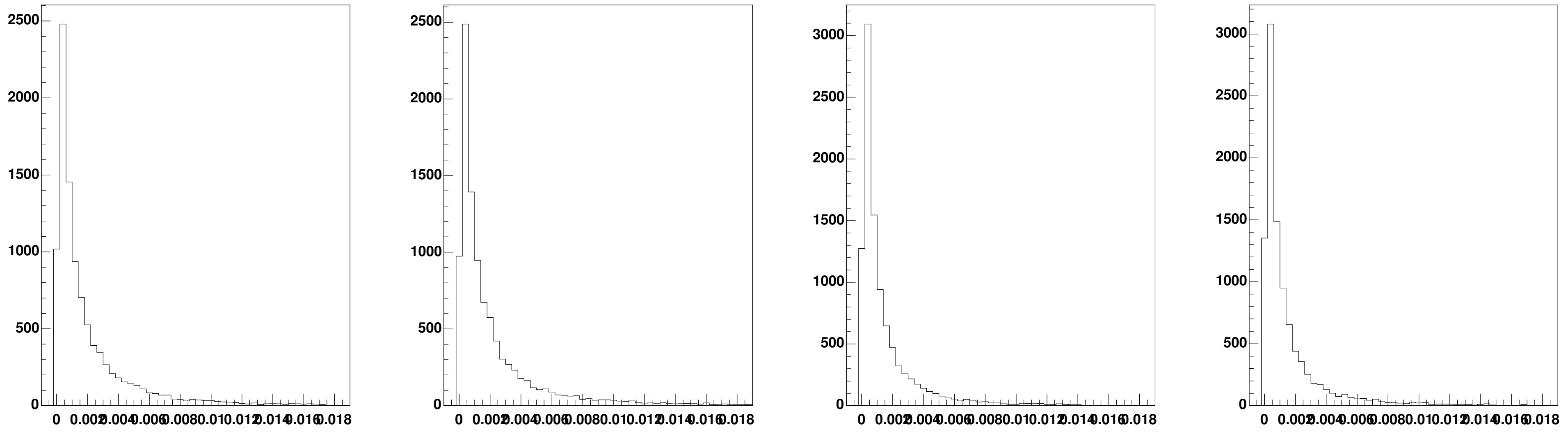


(Horizontal axis in m, total width of each plot is 2 cm)

Similar distributions.

X distributions of hits at 220 m

IP1+; IP1-; IP5+; IP5-

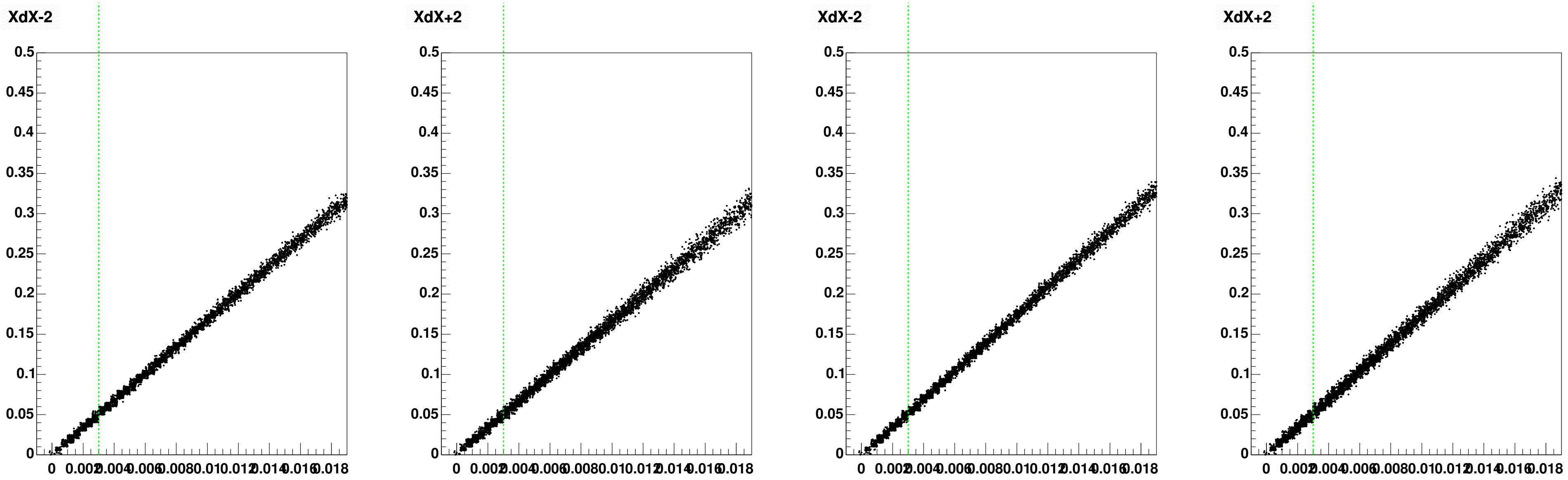


(Horizontal axis in m, total width of each plot is 2 cm)

Similar again.

X vs dX/dZ (milliradians) at 420 m

IP1+; IP1-; IP5+; IP5-

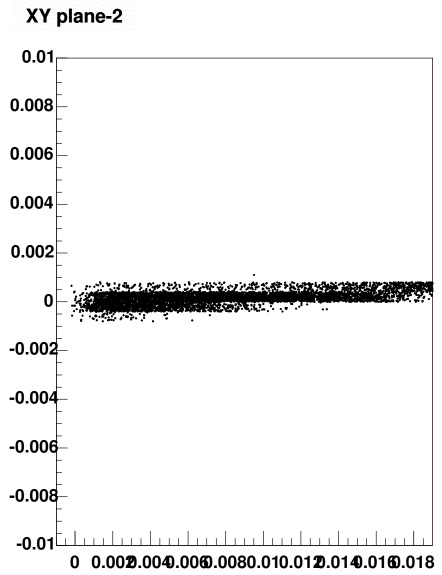


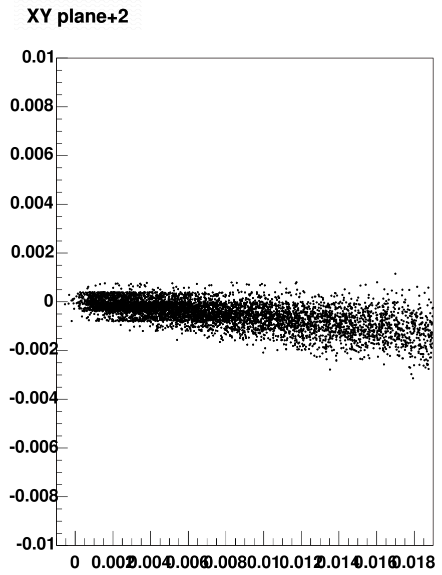
Strong correlation

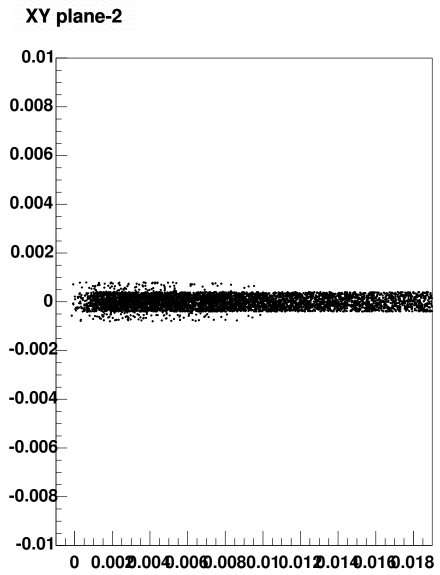
Suggests a pattern that may be potentially useful in pattern recognition in cases of multiple hits in the set of Roman Pots.
Possible aid to rejection of protons not coming from IP.

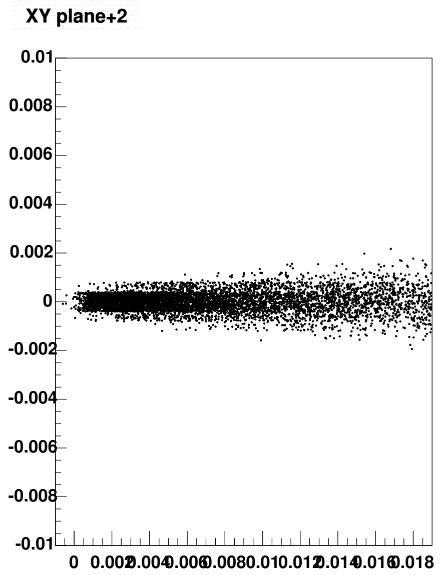
X vs Y (m) at 420 m

IP1+; IP1-; IP5+; IP5-





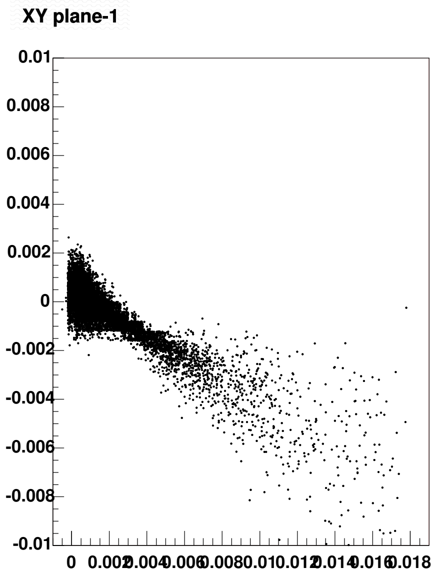




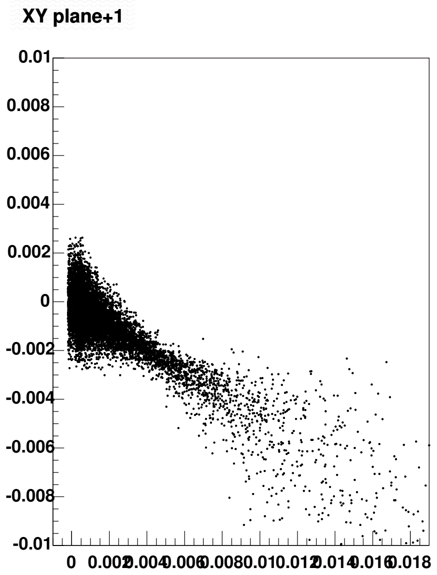
Again, the X-Y scatter plot at 420 m is fairly similar for IP1 and IP5

X vs Y (m) at 220 m

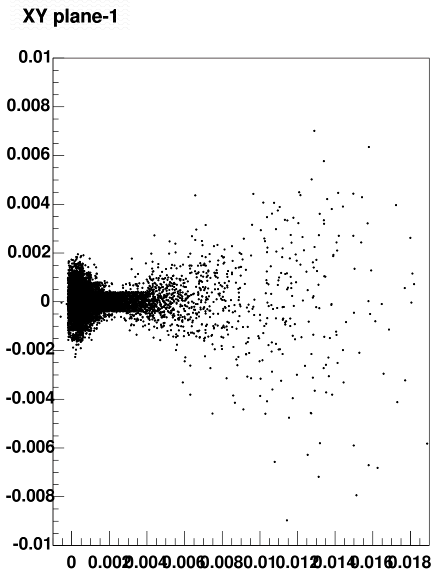
IP1+;



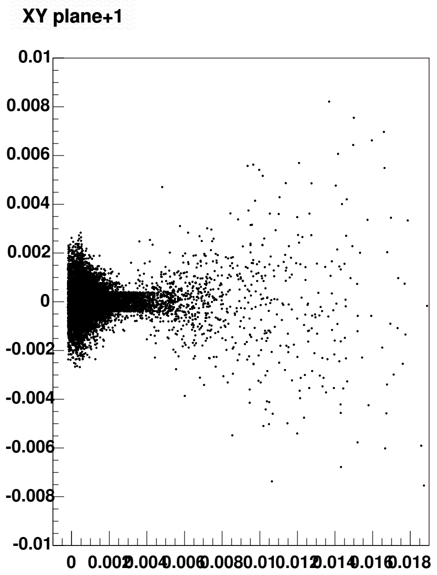
IP1-;



IP5+;



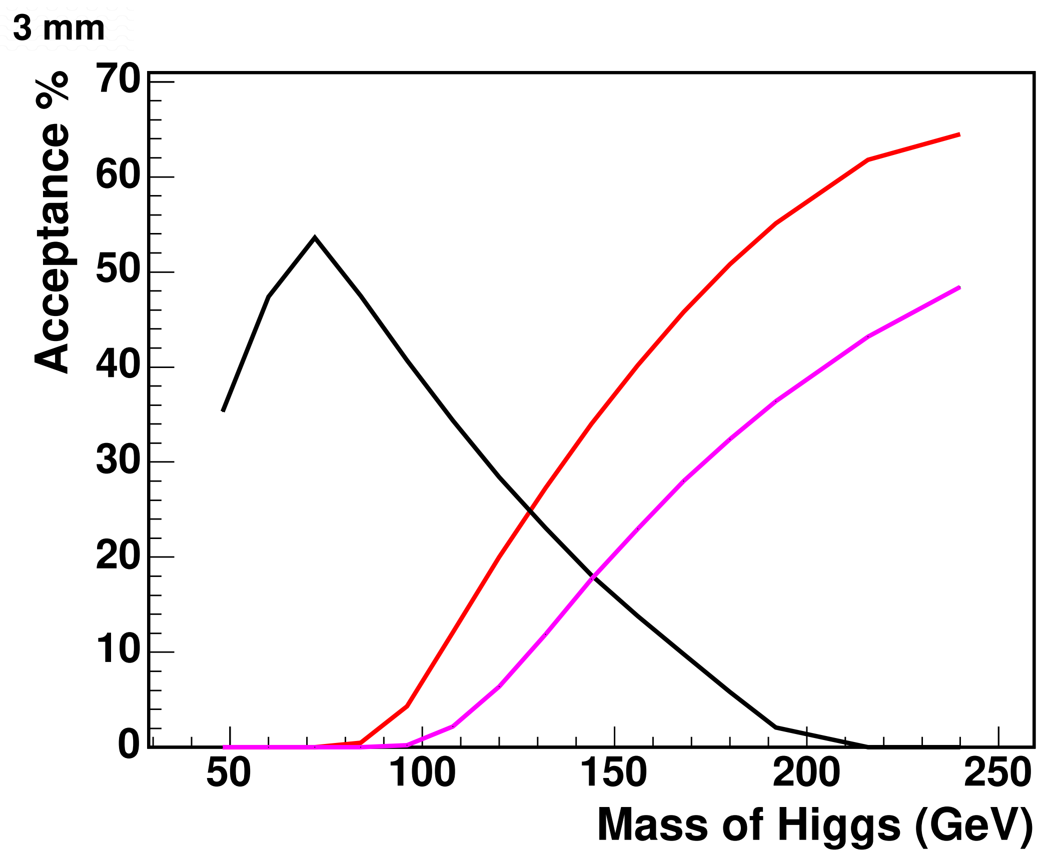
IP5-



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.

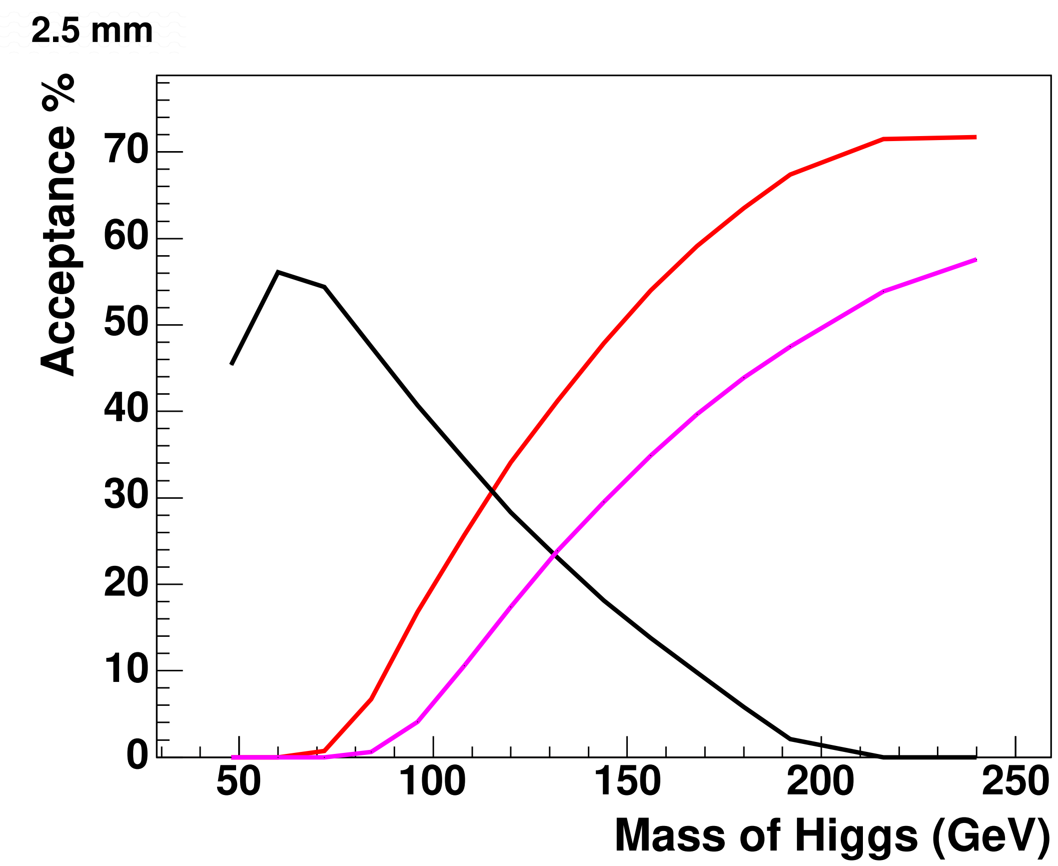
Examine acceptances. Vary Higgs mass by scaling the momenta that were generated for 120 GeV Higgs.



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

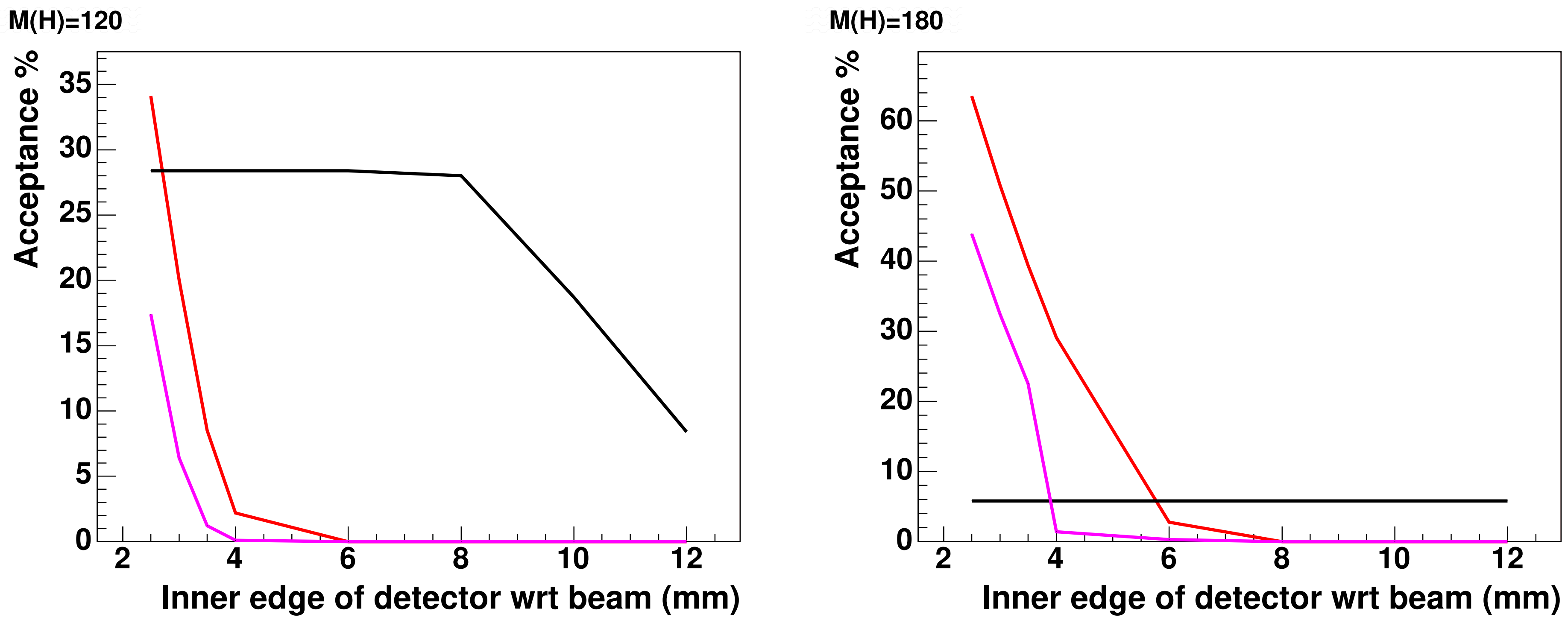
Acceptance vs Higgs mass
for detectors whose inner edge is **3.0 mm** from the beam

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



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.)