LATEST ACCEPTANCE CALCULATIONS AND RESOLUTIONS

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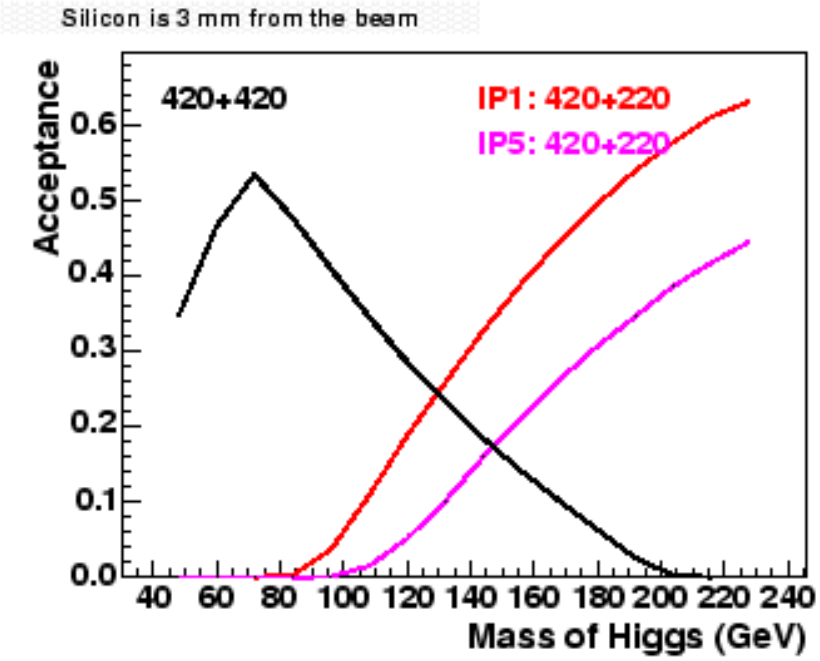
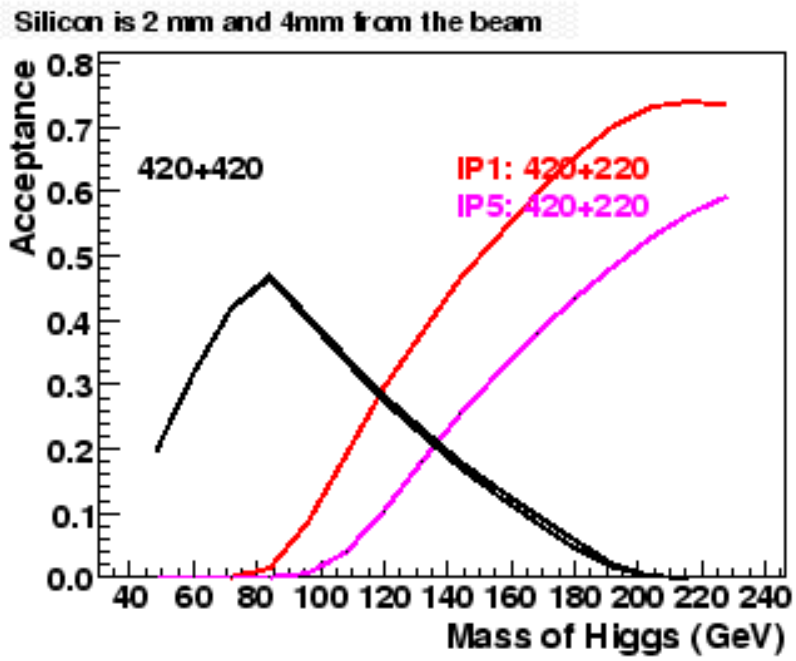
INTRODUCTION

More acceptance calculations have been made, again using same latest beamline optics as at Manchester in 2005.

Again, most of the distributions come from a 120 GeV Higgs Mass EXHUME file of 10000 events. Different Higgs masses are simulated by scaling the proton momenta.

ACCEPTANCES

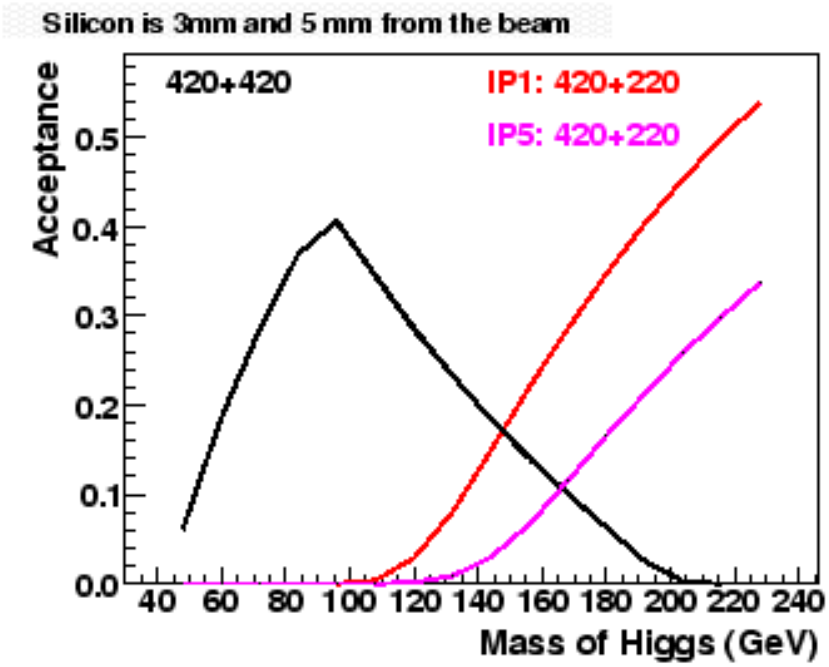


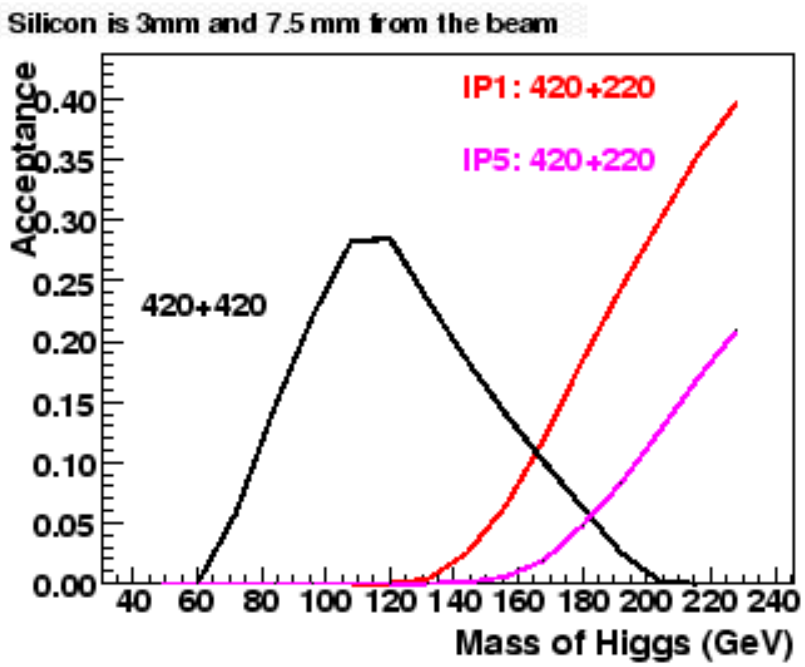


Compare silicon at 3mm at 220 and 420
with silicon at 2mm (220 m) and 4mm (420 mm).

420+220 is improved.

ACCEPTANCES





Acceptances for 3mm + 5mm (left) and 3mm + 7.5mm (right)

We will take 3mm + 5mm as our standard for what follows.

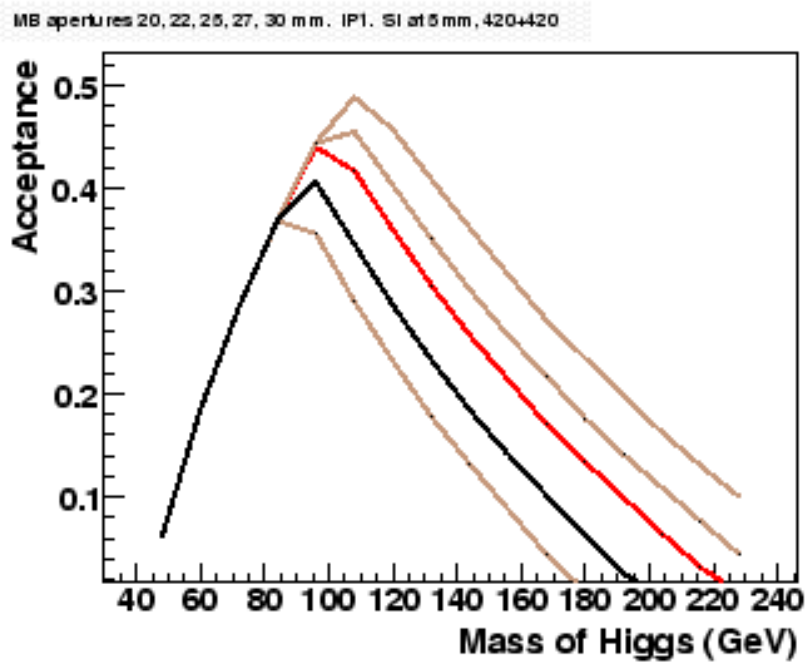
ACCEPTANCES

What apertures are critical? It appears that all the Main Bend magnets are critical for the Higgs acceptance: opening up the first pair at 250m makes the protons hit the second pair, etc.

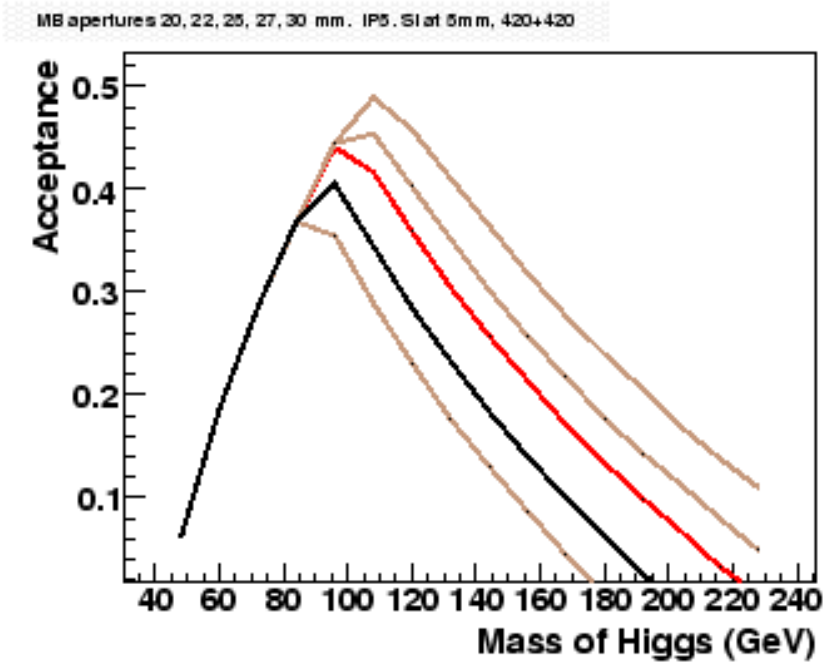
See the affect of opening the MB acceptances from their nominal value of 22.02 mm.

ACCEPTANCES

IP1



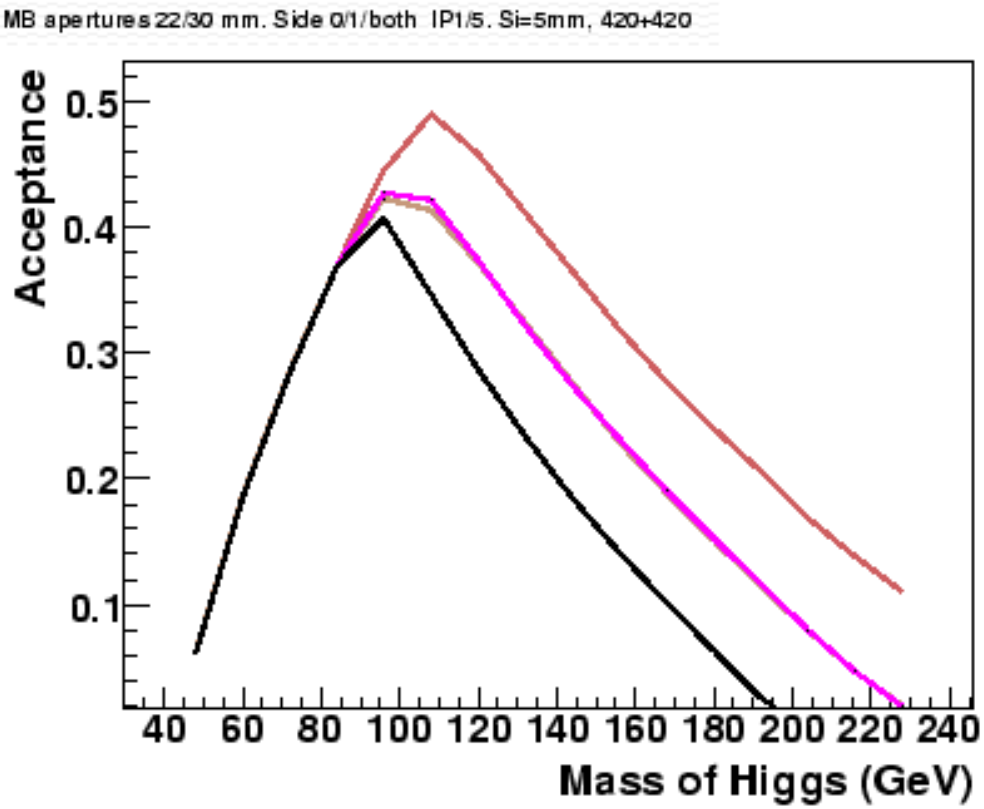
IP5



MB aperture 20, 22, 25, 27, 30 mm

There is a significant variation of acceptance with MB aperture constant.

ACCEPTANCES



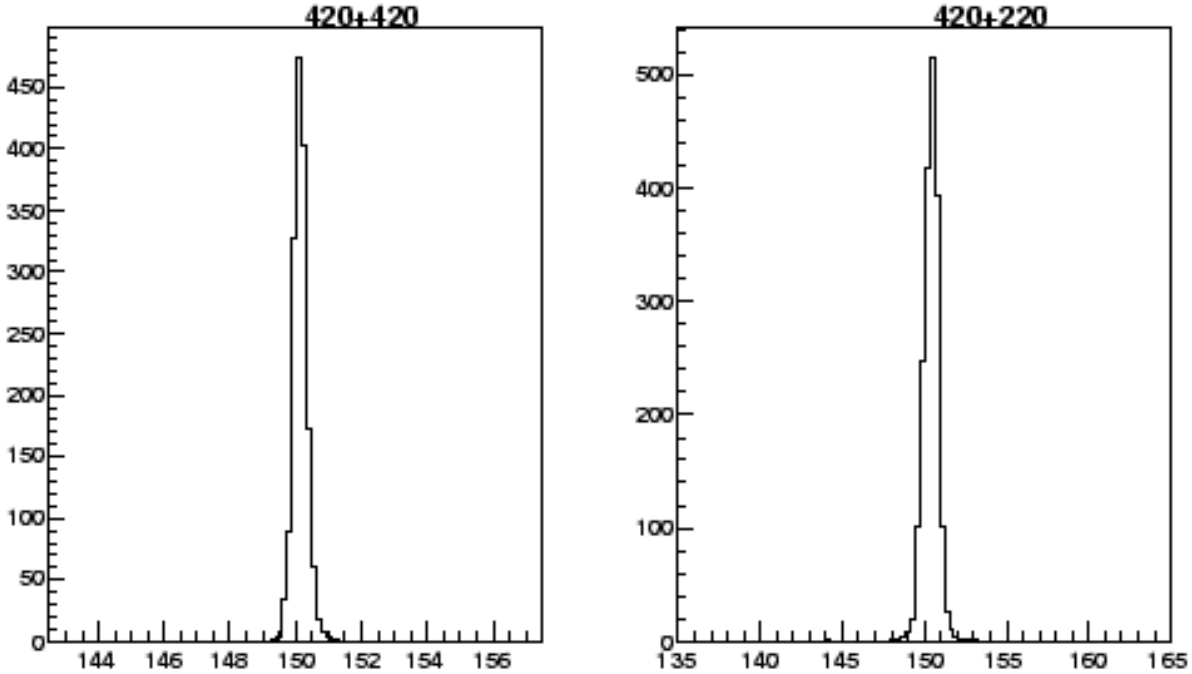
Try just varying MB apertures on one side.

Black = standard, Brown = 30mm (both sides)

Central = superposition of 1-side increases to 30mm for IP1 and IP5.

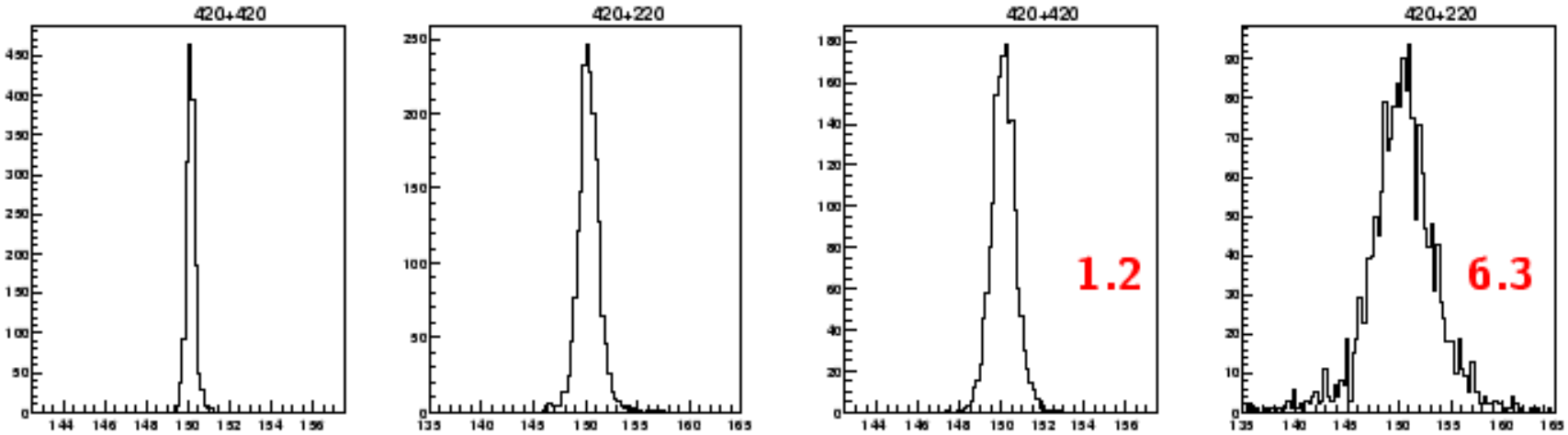
Conclusion: nothing asymmetric about this.

MASS RESOLUTION



(As shown at Manchester,) parameterise the proton momenta in the 220 and 420 m regions in terms of the positions and the angles there. Reconstruct Higgs mass from the reconstructed momenta. (Not perfect but good enough as we shall see.)

MASS RESOLUTION



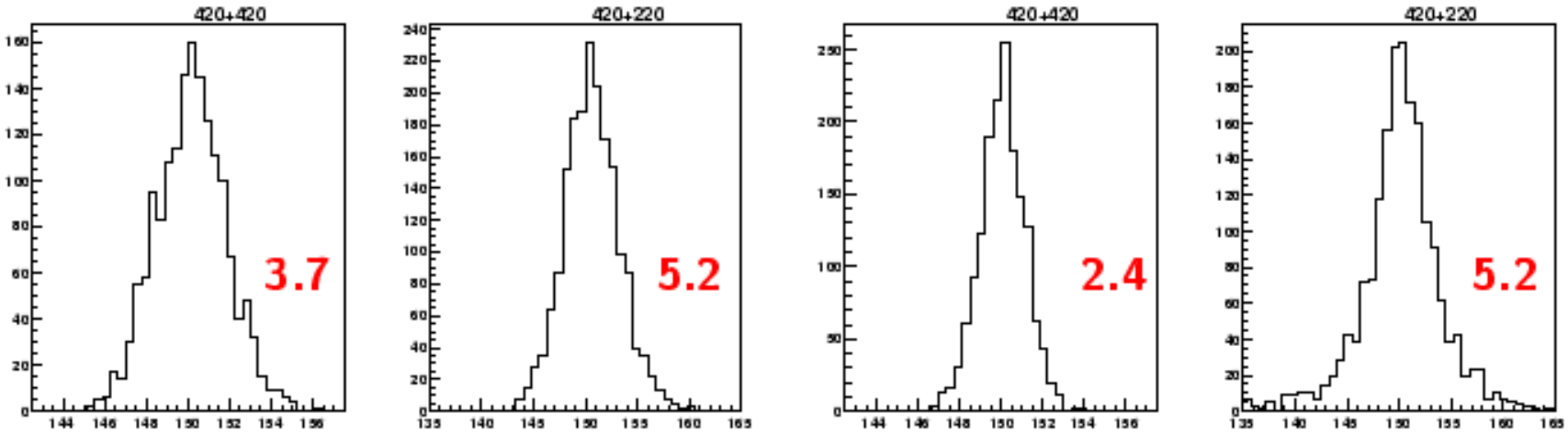
FWHH estimate in GeV is indicated.

For these plots: 150 GeV Higgs, 3mm + 5mm silicon distances, IP1.

Left: smear the position measurement at 220/420 by 20 microns.
Right: smear the angle measurement at 220/420 by 1 microradian.

The angle measurement is more critical.

MASS RESOLUTION



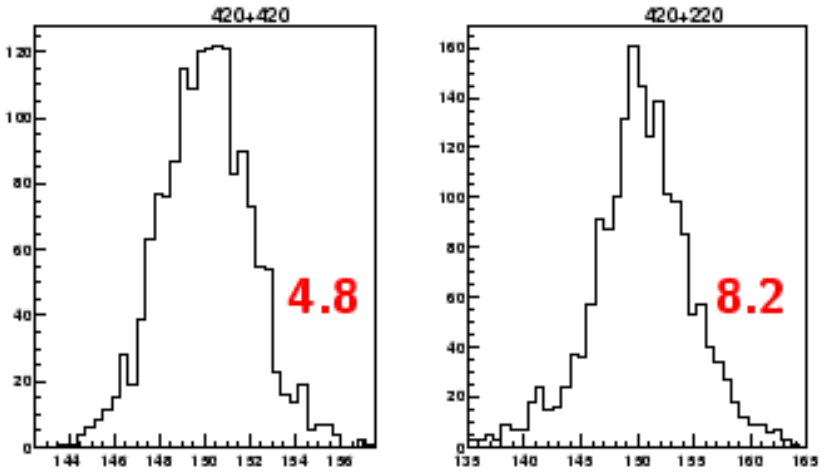
(IP1)

Left: smear the incident beam momentum by 0.77 GeV.

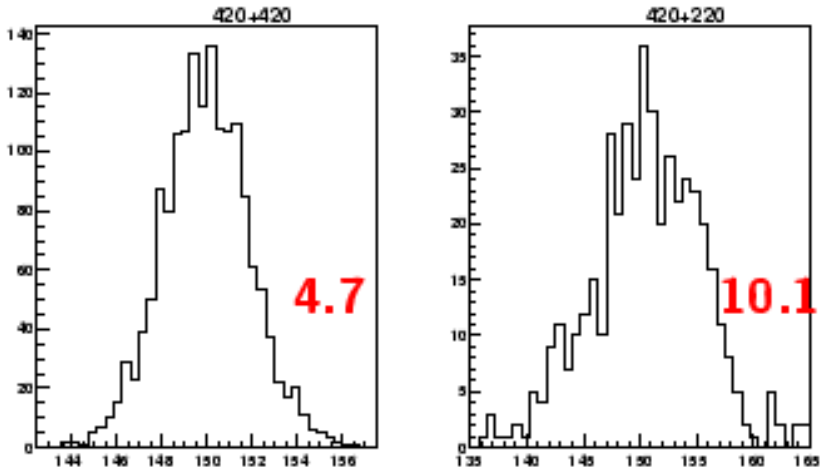
Right: smear the interaction point in x by $16.8/\sqrt{2}$ μm.

MASS RESOLUTION

IP1



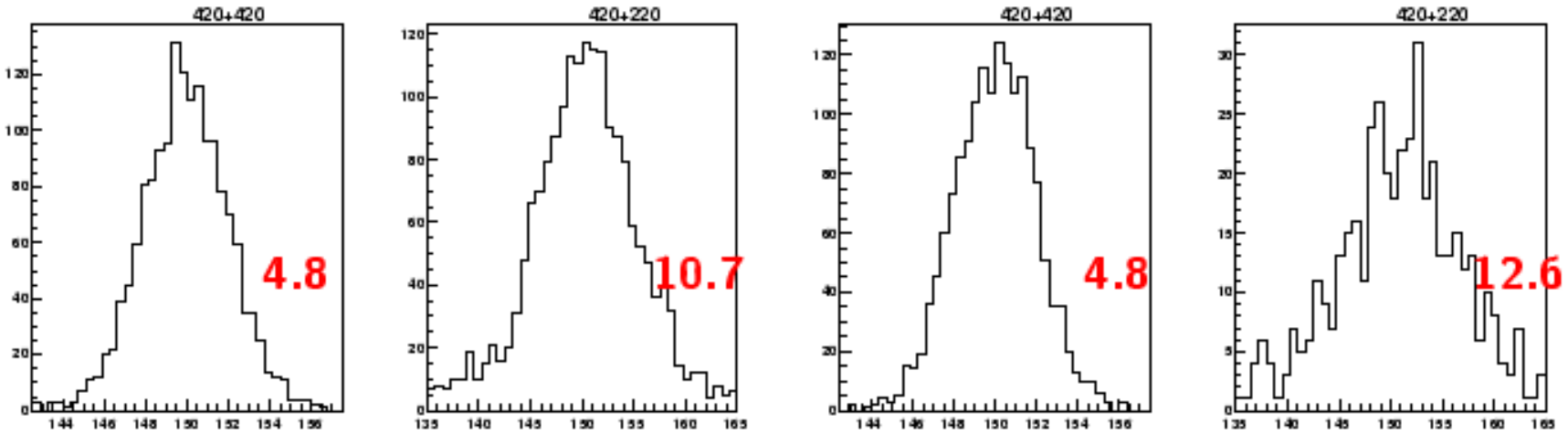
IP5



Smear both the incident beam momentum and the interaction point. (but not the angular or position measurement.)

MASS RESOLUTION

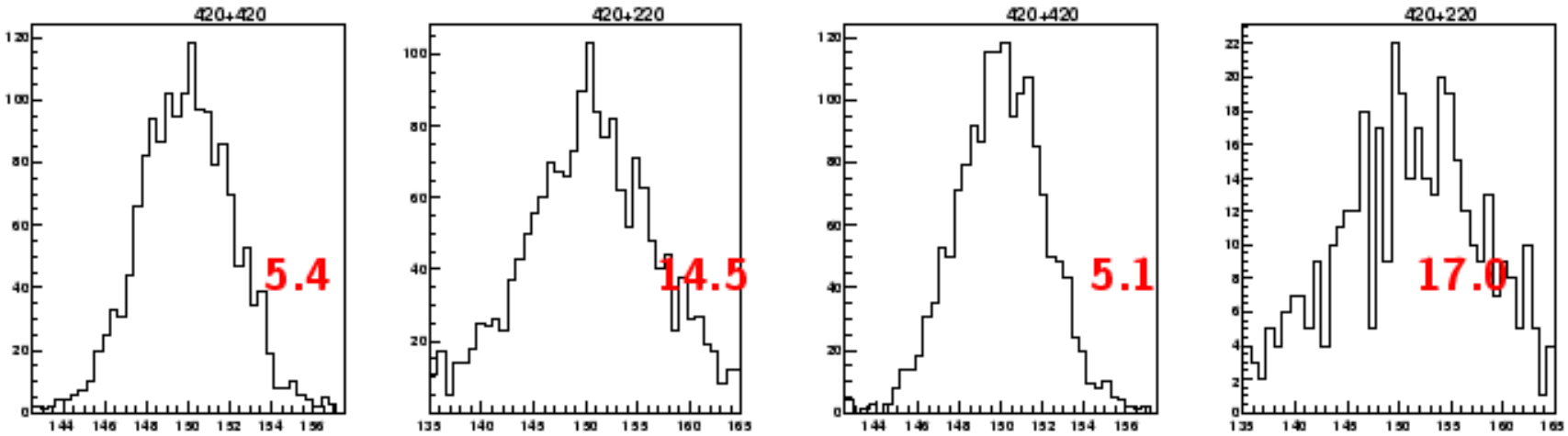
IP1 **IP5**



Smear both the incident beam momentum and the interaction point, and also the angular measurement by 1 microradian.

MASS RESOLUTION

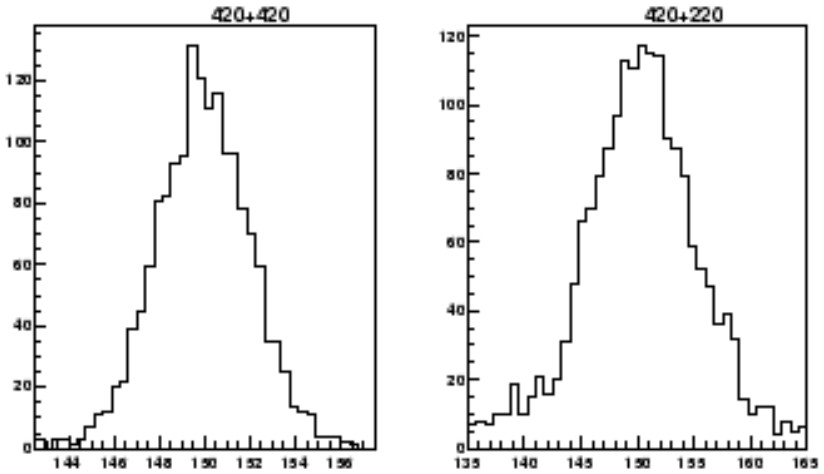
IP1 **IP5**



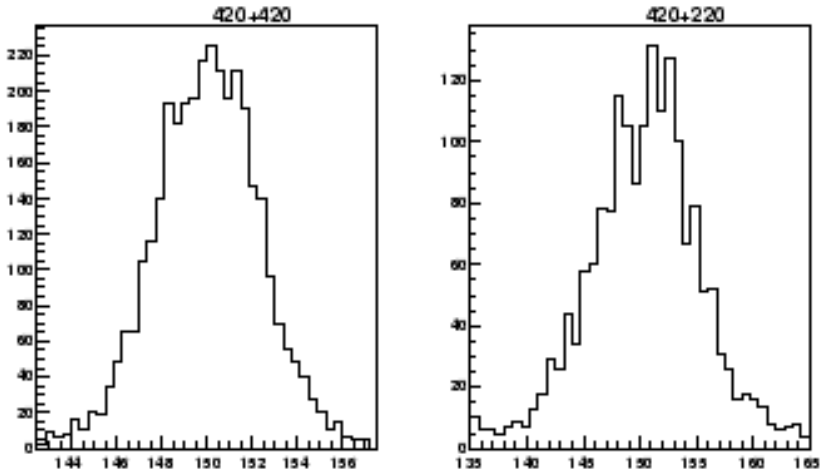
Smear both the incident beam momentum and the interaction point, and also the angular measurement by 2 microradian.
Noticeably worse.

MASS RESOLUTION

IP1



IP1



Left: IP1 with all smearings as before (1 microradian)
Right: Open the MB apertures to 30 mm.

More 420+420 events, no big difference in resolution

CONCLUSIONS

- Effect of different silicon distances from beam.
- The Main Bend apertures have a significant effect.
- Mass resolutions depend on all the parameters, but angle measurement resolution is particularly critical.