Pass1 vs Pass0 alignment quality (and other comparisons)

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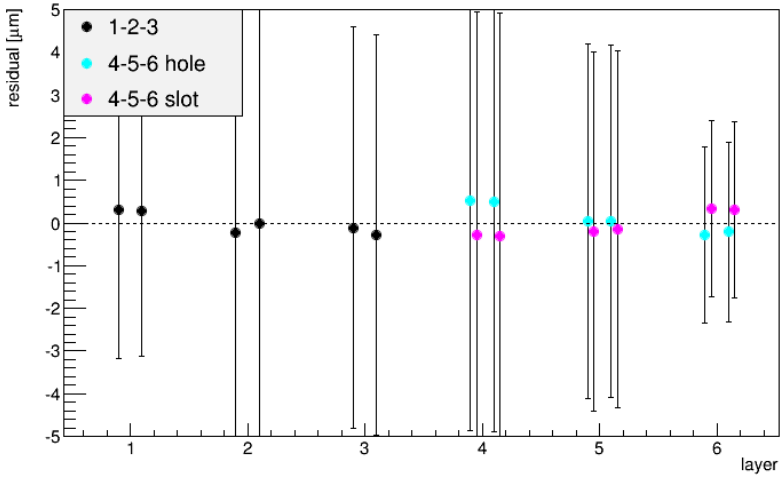
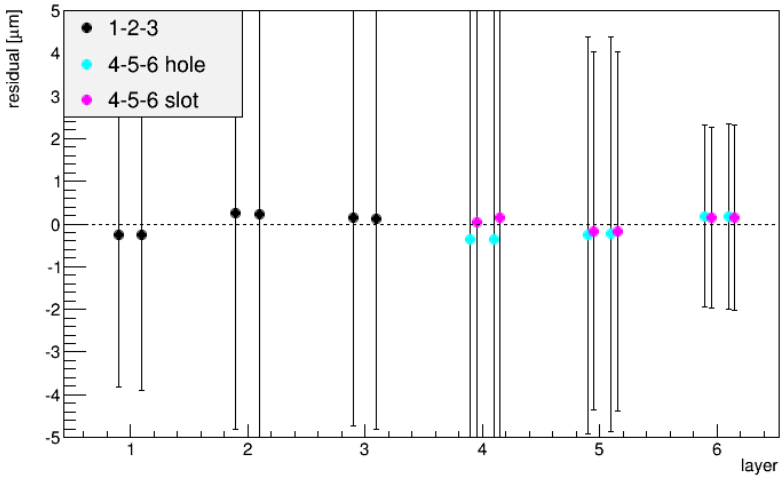
Pass1 vs Pass0

- Comparison of alignment quality
- Same runs: 16 files, 50000 tracks each
  - Comparison on the merged statistics
- Geometries:
  - tPass1_allign: version 5.3 including internal alignment + global offsets to bring the impact parameters to zero, read from the DB
  - Pass0: version 4.4-2015 including internal alignment + tweaks, no straight tracks included in the alignment

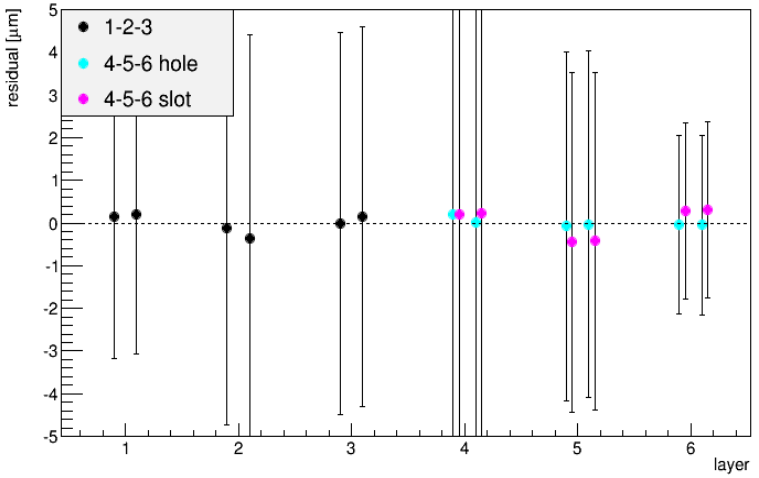
u residuals

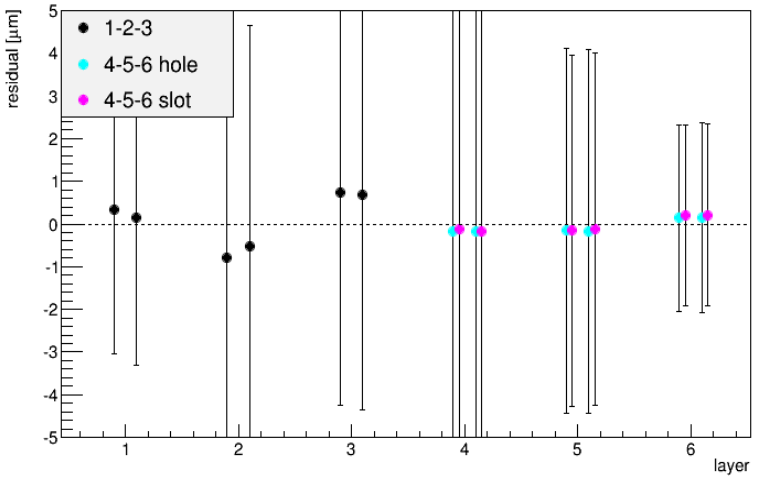
Pass1





Pass0

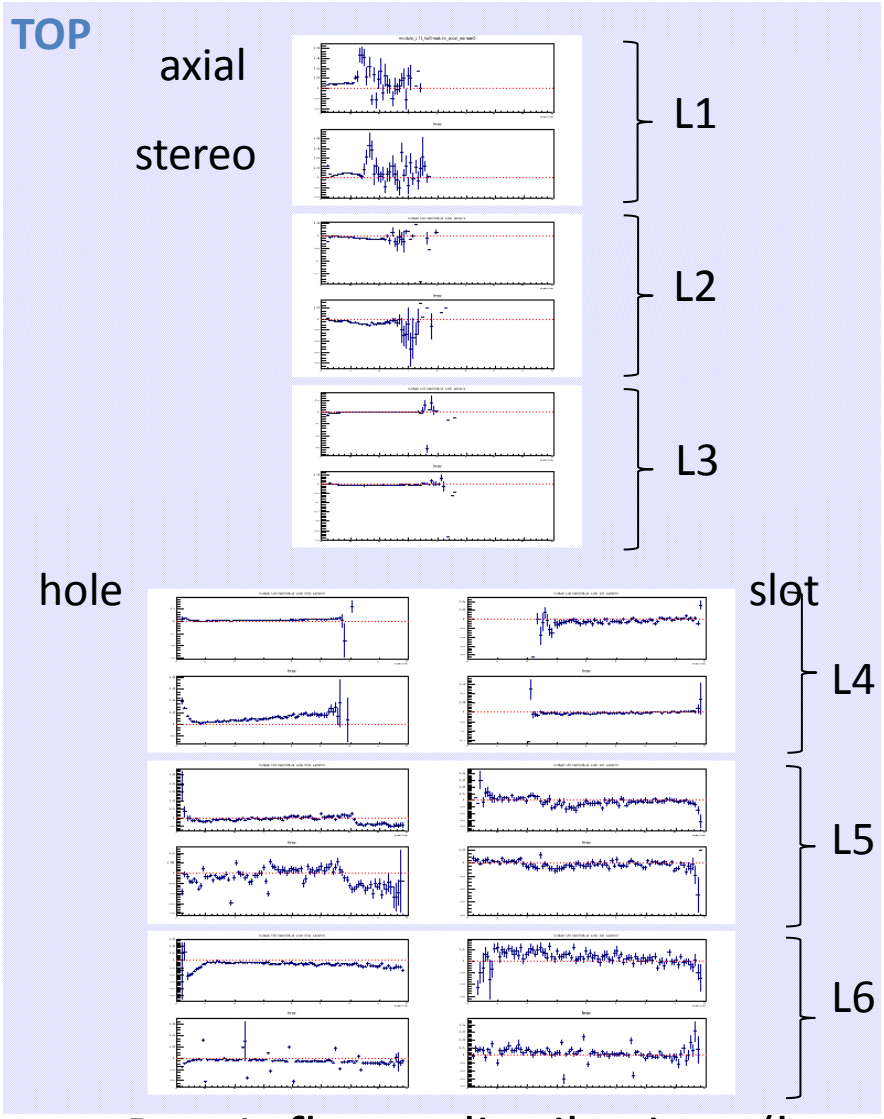




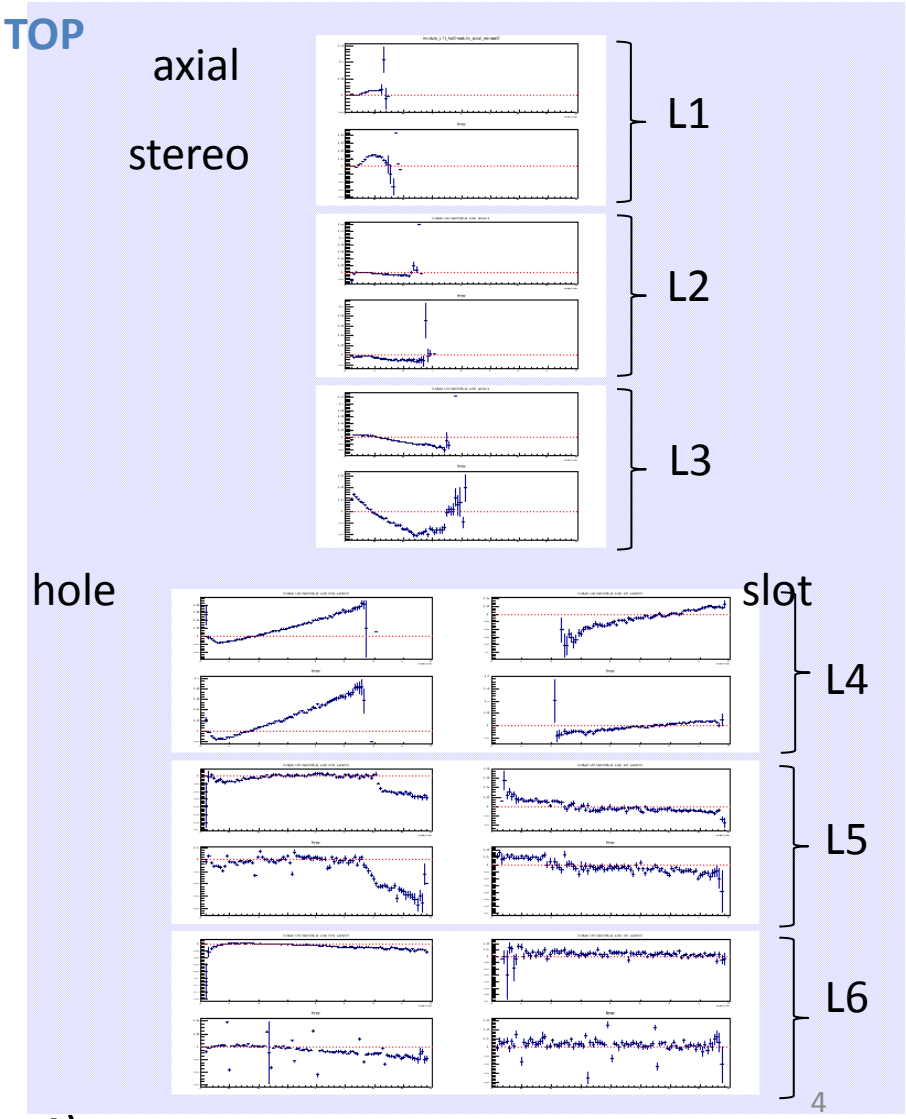
Pass1: improvement on bottom 1-2-3

u residuals vs position TOP

Pass1



Pass0



Pass1: flatter distributions (layer 3+4)

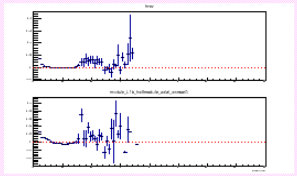
u residuals vs position BOTTOM

Pass1

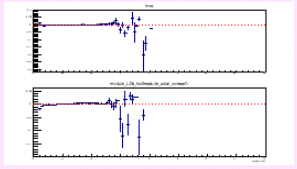
BOT

stereo

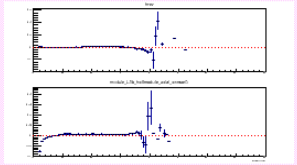
axial



L1

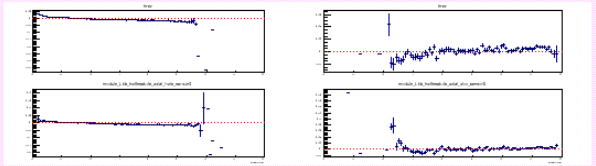


L2



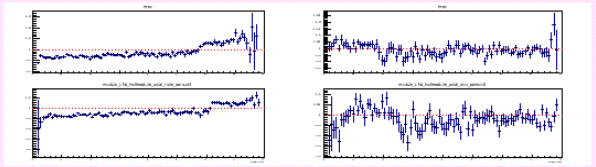
L3

hole

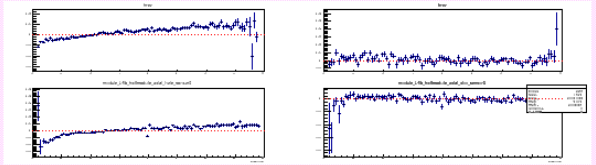


slot

L4



L5



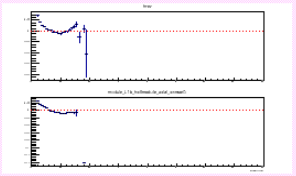
L6

Pass0

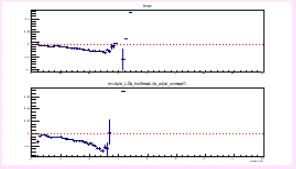
BOT

stereo

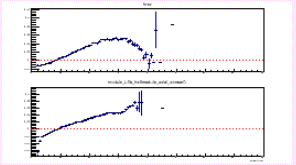
axial



L1

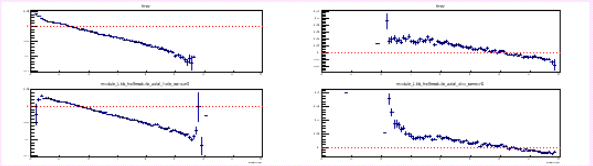


L2



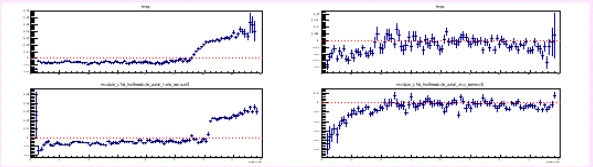
L3

hole

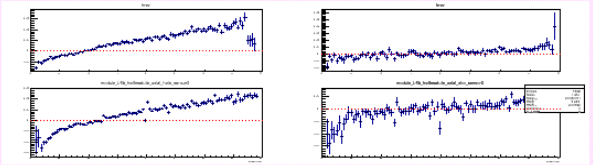


slot

L4



L5

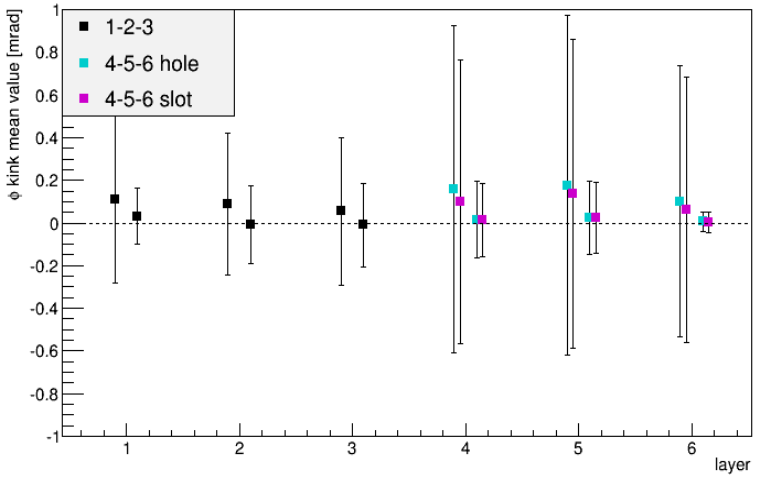


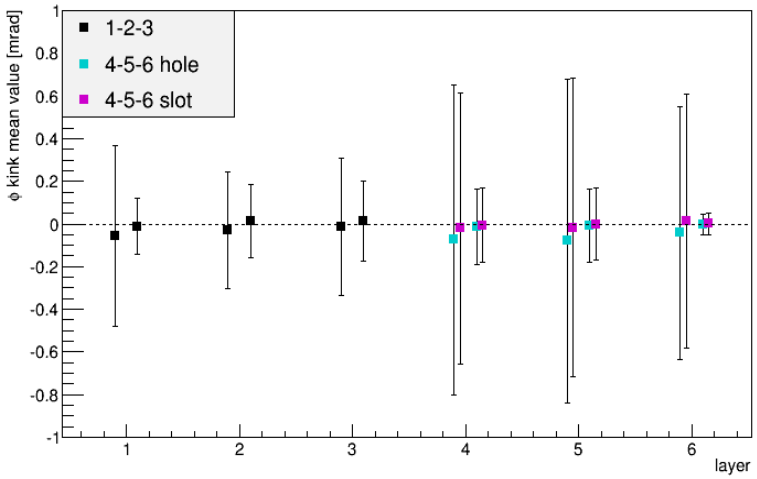
L6

Pass1: flatter distributions (layer 2+3+4+5), improved for layer 5

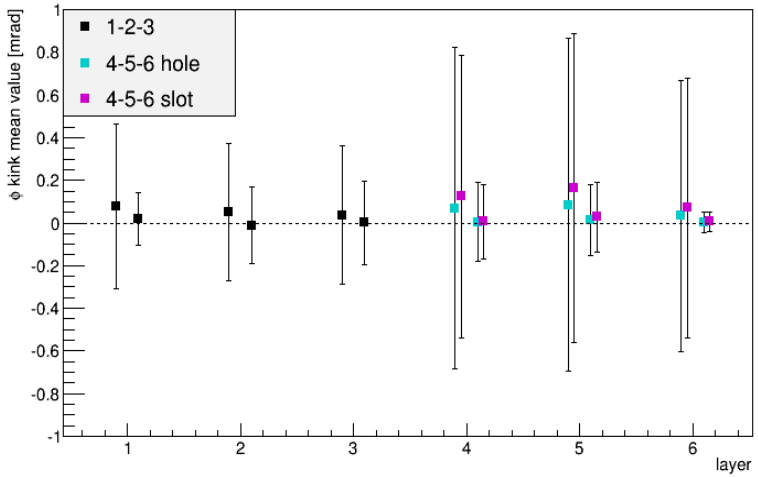
φ kinks

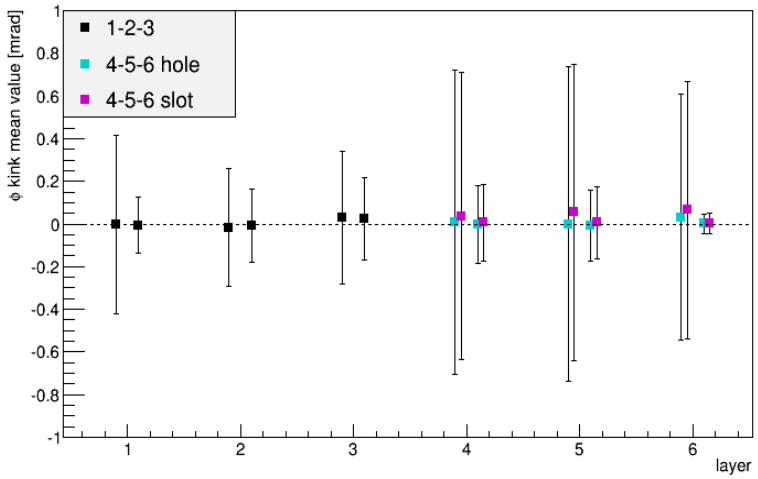
Pass1





Pass0

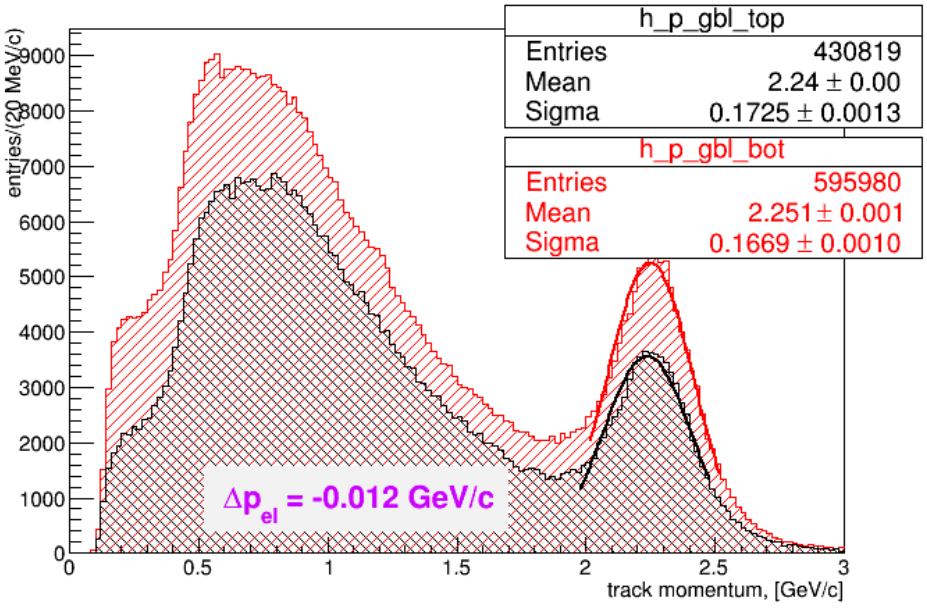




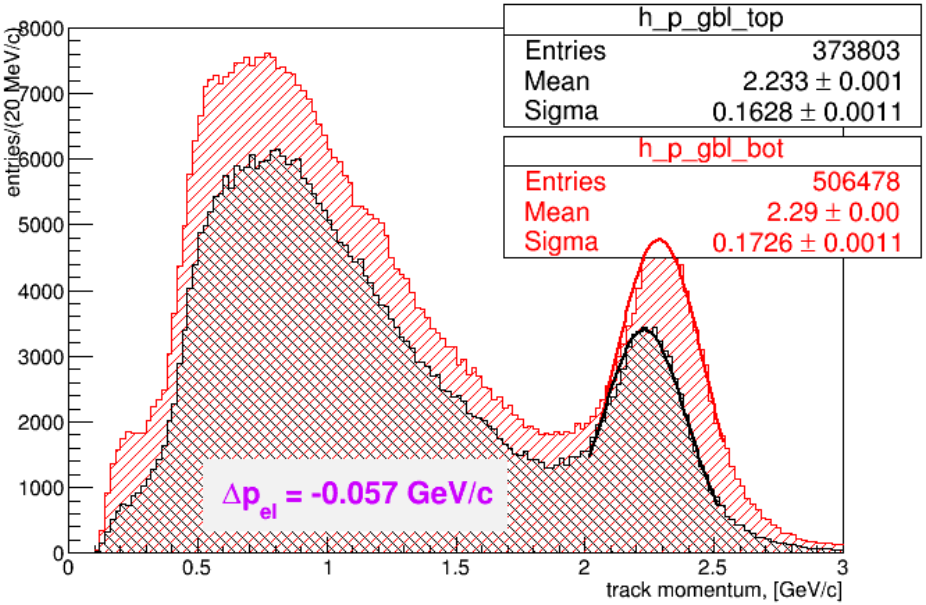
Very similar in the two passes

Momentum spectrum

Pass1



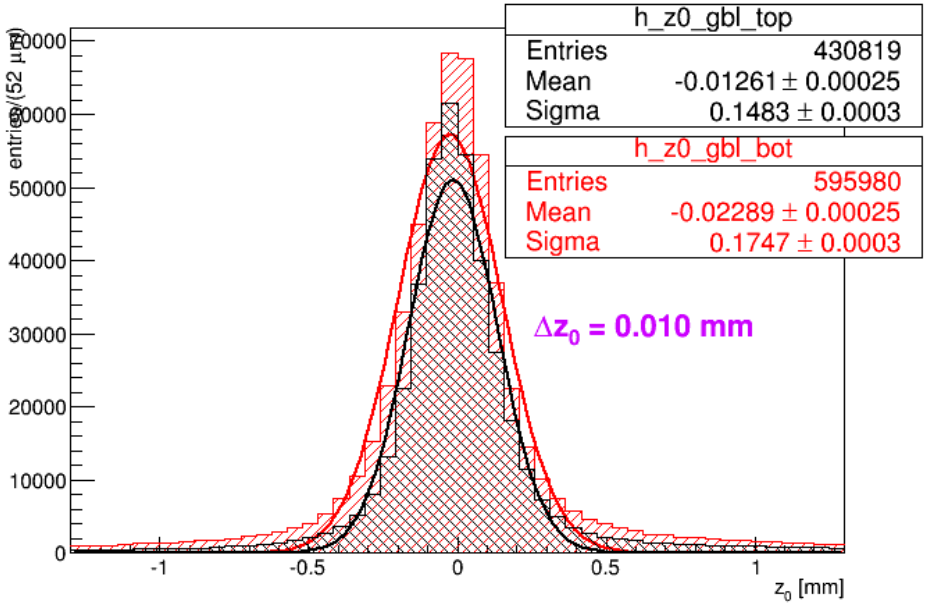
Pass0



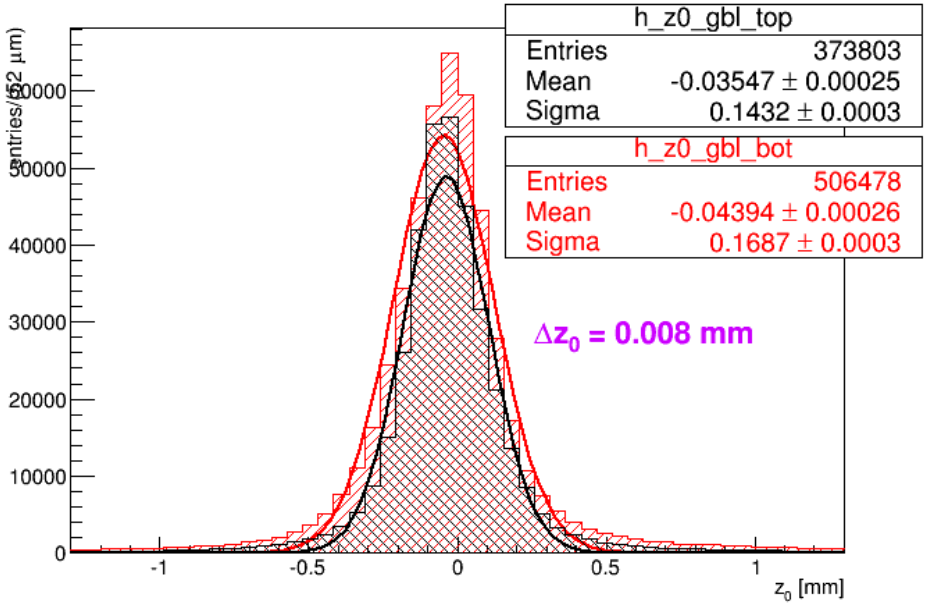
- Pass1: total track statistics improved: +15% top, +17% bottom
- Discrepancy between top and bottom: top ~ -40% bottom
  - Also in pass0 (slightly less)
- Alignment of the elastic peak to nominal value: pass1 2.25 GeV/c vs pass0 2.26 GeV/c (fits can be improved)
- Improved agreement of top/bottom to the elastic peak calibration: 12 MeV/c pass1 vs 57 MeV/c pass0

Impact parameters: z_0

Pass1



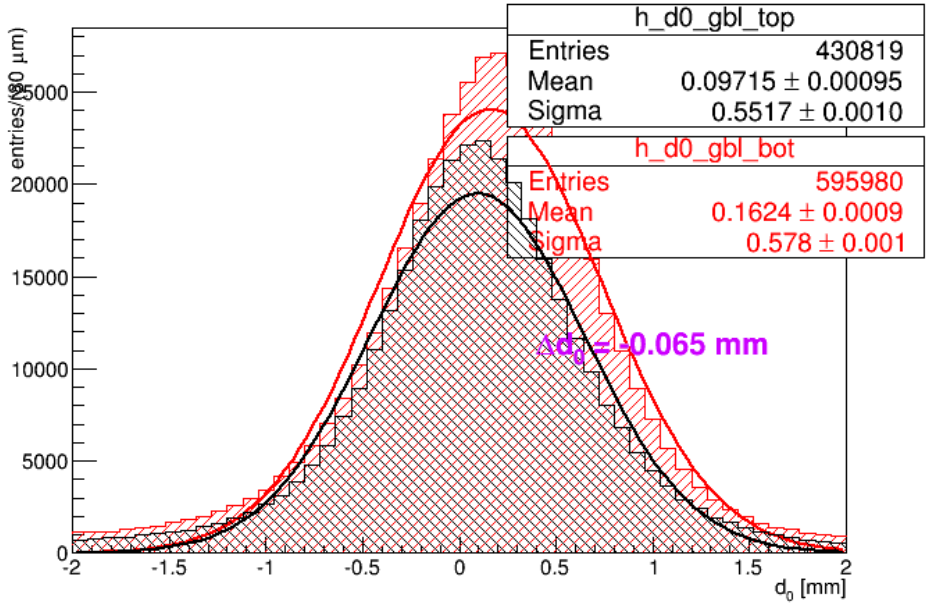
Pass0



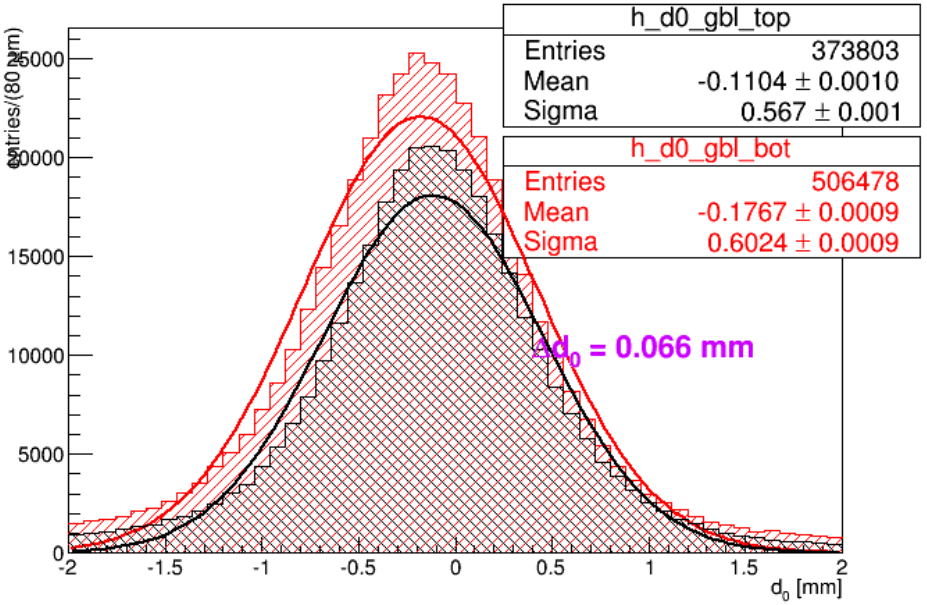
- Mean value: pass1 -0.018 mm vs pass0 -0.040 mm
  - Pass1 improved

Impact parameters: d_0

Pass1



Pass0



- Mean value: pass1 +0.130 mm vs pass0 -0.143 mm
  - Positive offset pass1, negative offset pass0 (almost symmetric wrt 0)
  - Bottom sector shows the largest displacement in both the cases (as large as 160-170 μm)

3D hits coordinates on SVT, all tracks

Tracking (jlab) coordinates, same for all sensors

TOP

BOTTOM

+60

-10

-80

130

+10

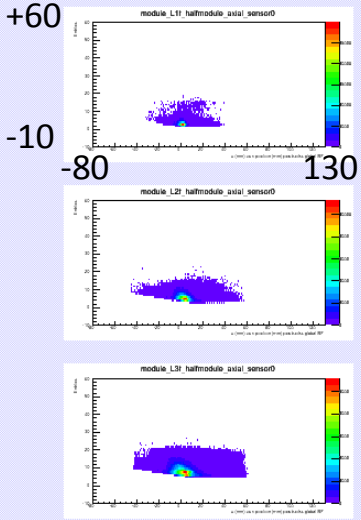
-60

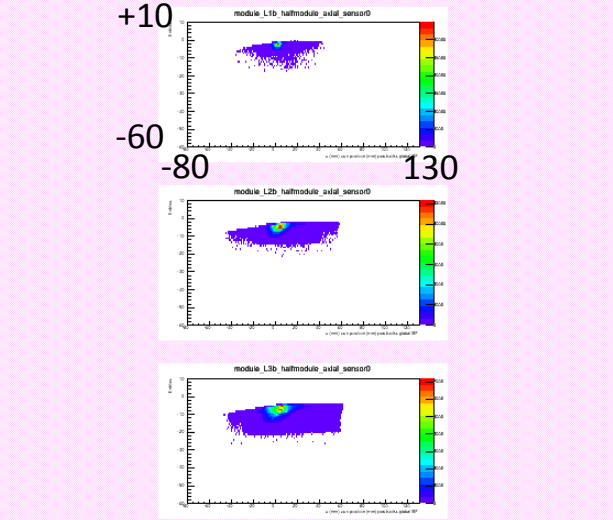
-80

130

hole

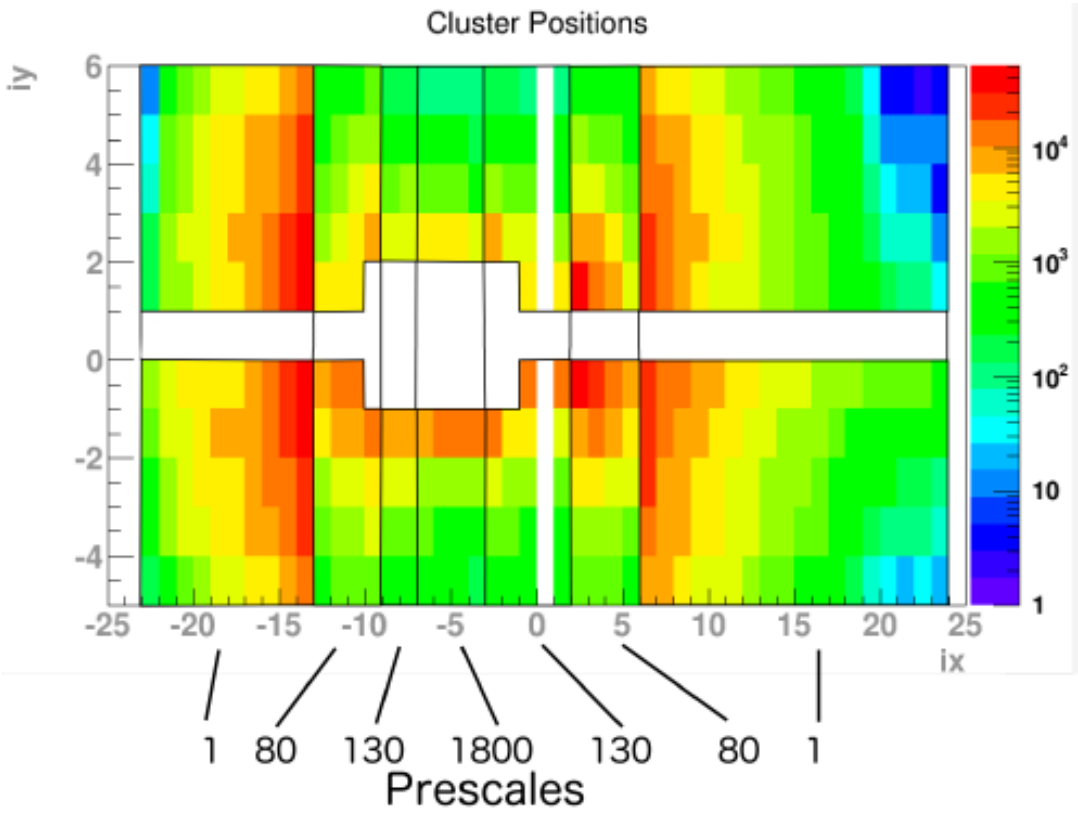
slot





Pass0/pass1 very similar (only pass1 shown): 4-6 slot?

Pattern on L4-6 slot due to trigger?



Picture from Sebouh's presentation at Nov2016 CM

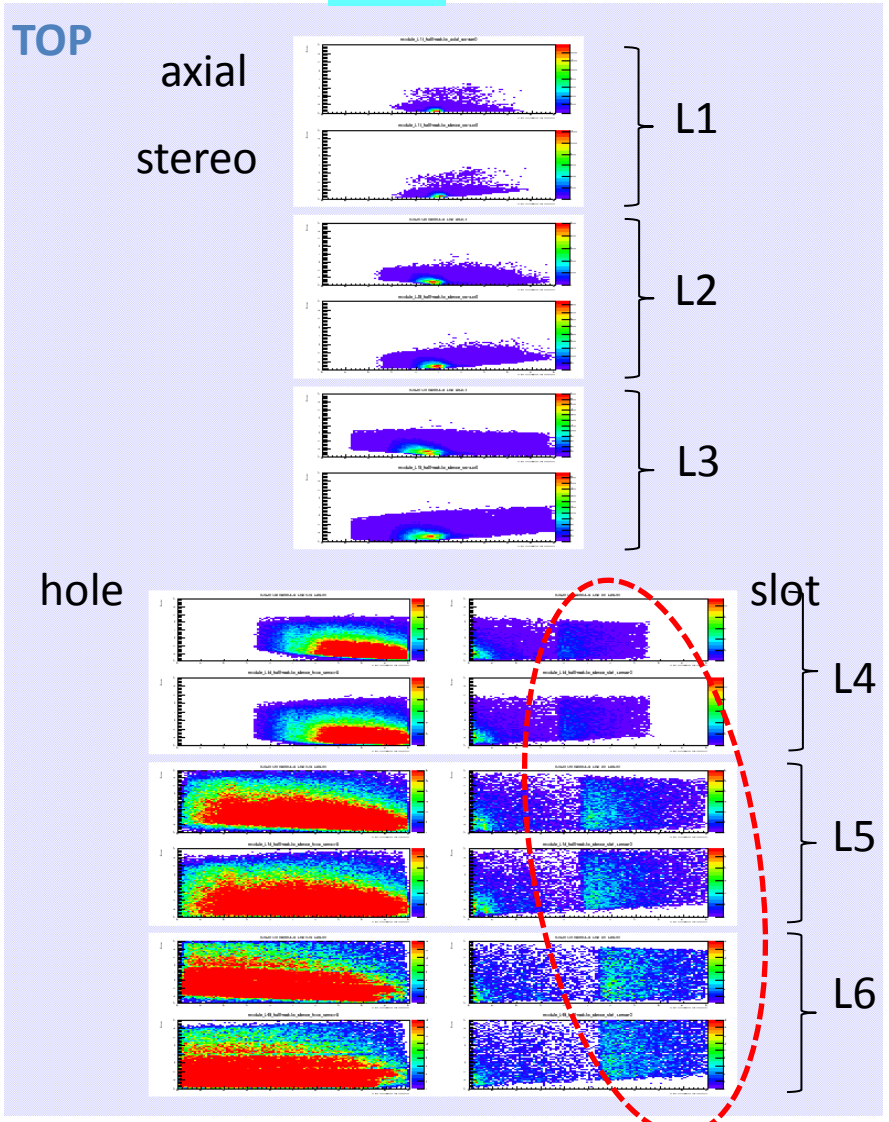
Why is it only visible in the slot section?

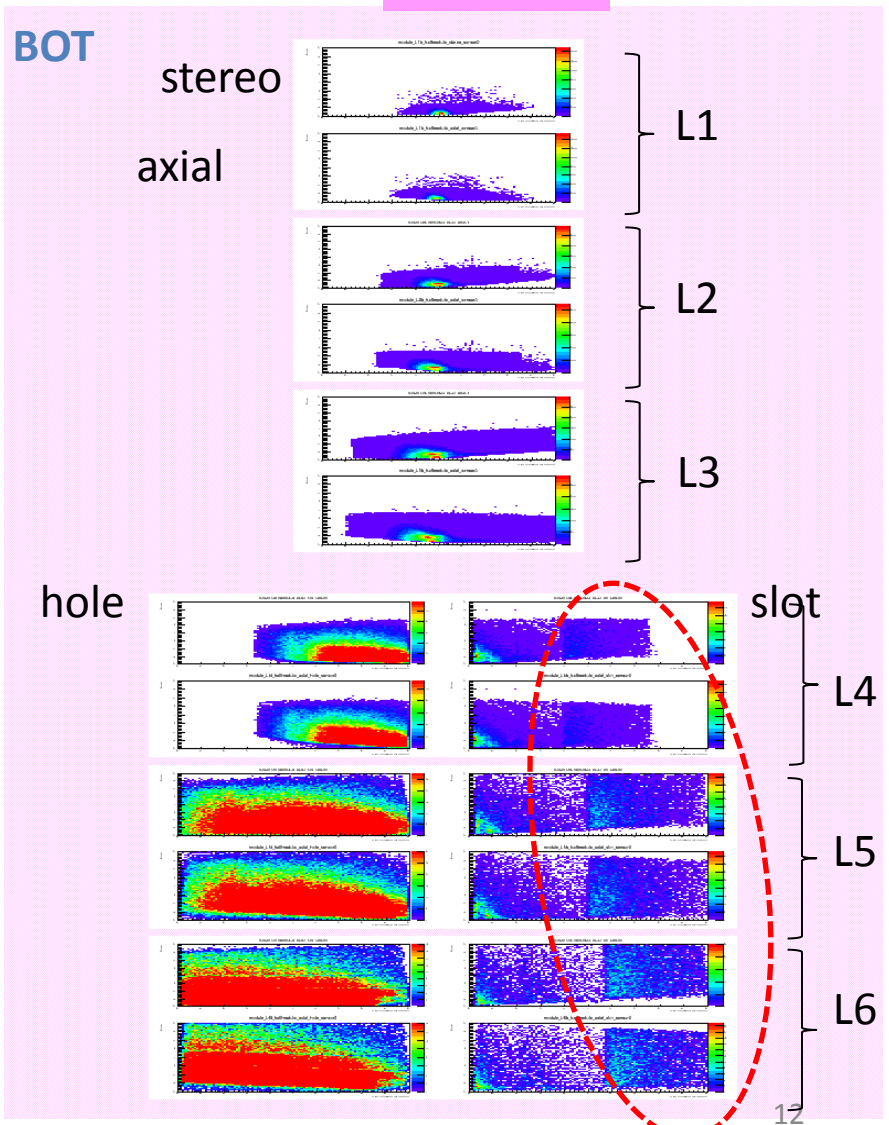
Wouldn't we expect a step also on the other side?

Predicted position of track hits on SVT: negative tracks (pass1)

TOP

BOTTOM



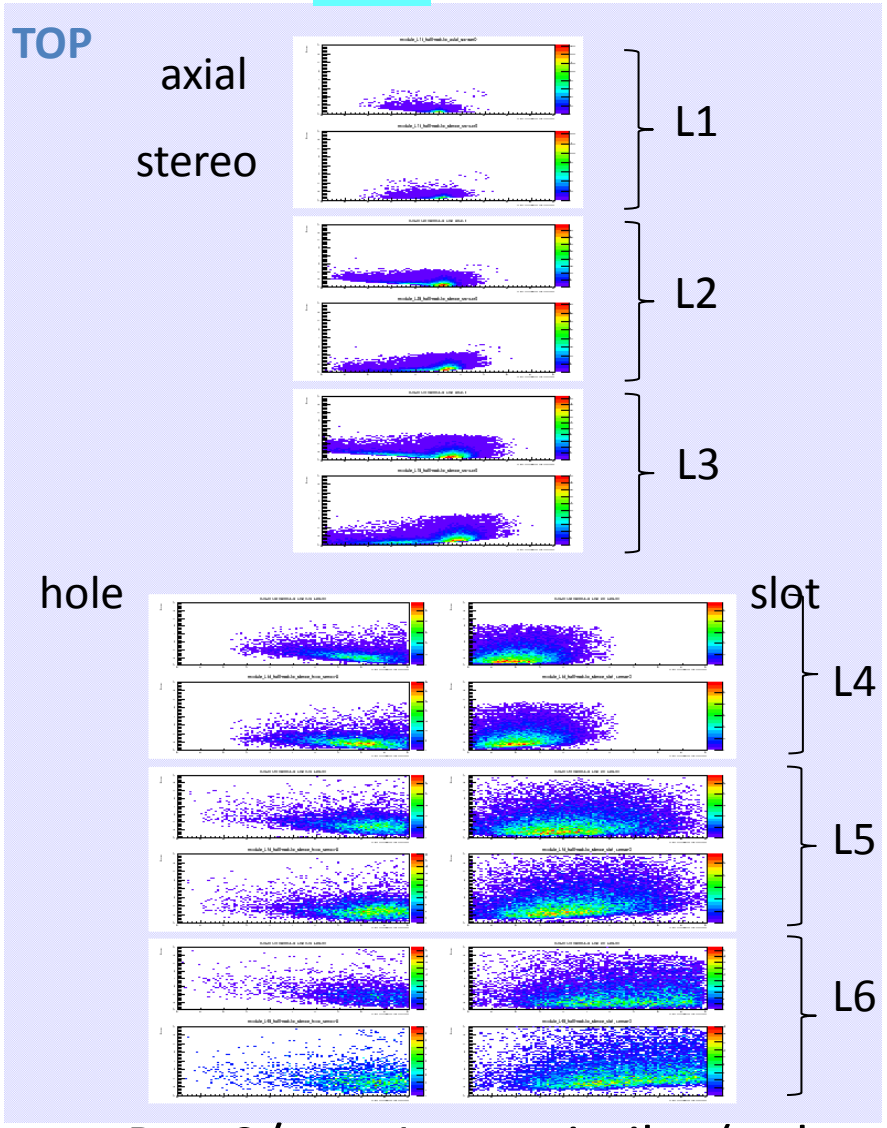


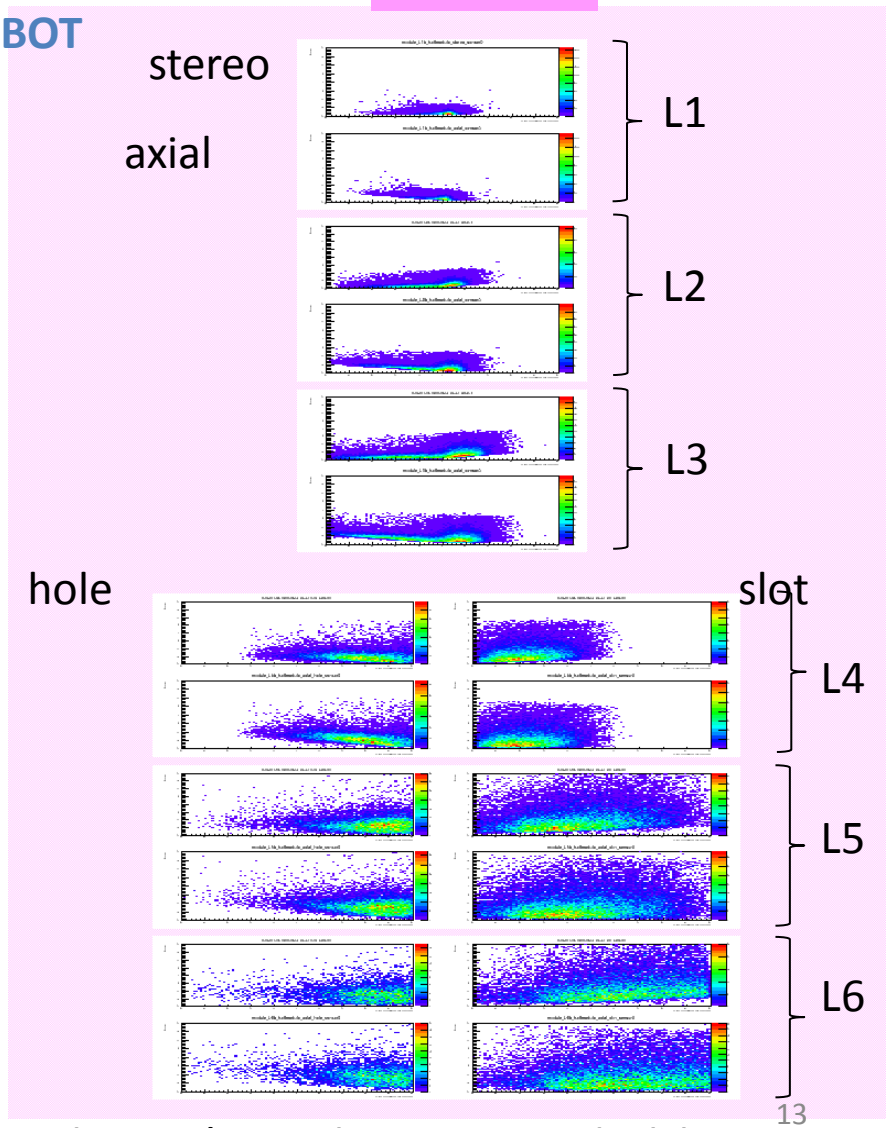
Pass0/pass1 very similar (only pass1 shown): TOP axial/stereo 4-6 slot?

Predicted position of track hits on SVT: positive tracks (pass1)

TOP

BOTTOM





Pass0/pass1 very similar (only pass1 shown): nothing remarkable

Summary

- Pass1 shows an overall improvement (not spectacular, but noticeable), especially on:
  - u residuals vs u coordinate profiles
  - Top vs bottom momentum match
  - Absolute calibration of z_0 impact parameter
  - Increase of reconstructed tracks: ~ +30%
    - BUT: larger amount of GBL errors (weird curvatures, unacceptable angles and residuals)
- v5-3-globalAlign-2016 can be considered as validated, as far as the alignment quality is concerned
- Same weird patterns for the predicted position of track hits on SVT modules (in particular: positive tracks, layers 4-6 slot)
  - Due to trigger?
  - Problems with GBL? only for positive tracks?