Alignment on mixed track samples straight/curved tracks (runs 5784/5/6+5772)

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Oct 25, 2016

Study of MP behavior on mixed track samples

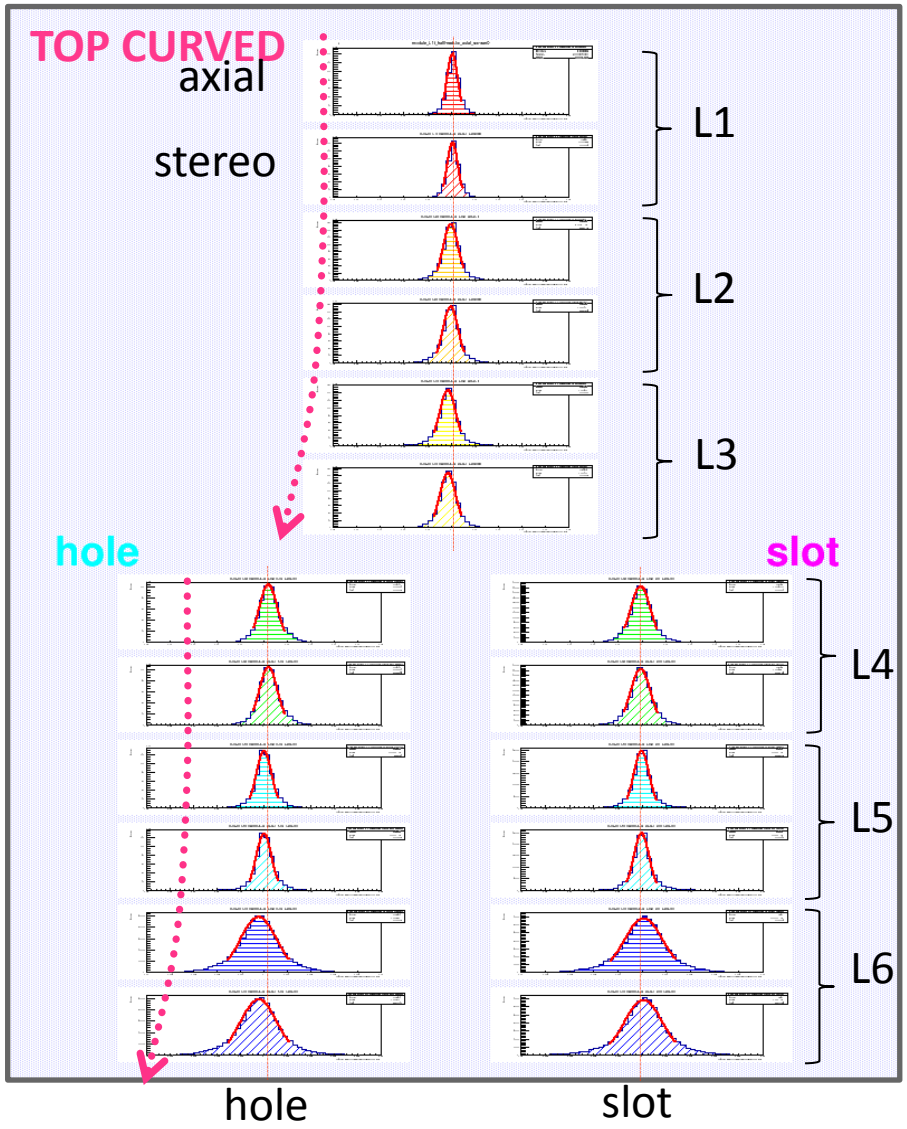
- Purpose: find a common geometry which fits both straight and curved tracks
- Start: nominal geometry including mechanical survey, no tweaks

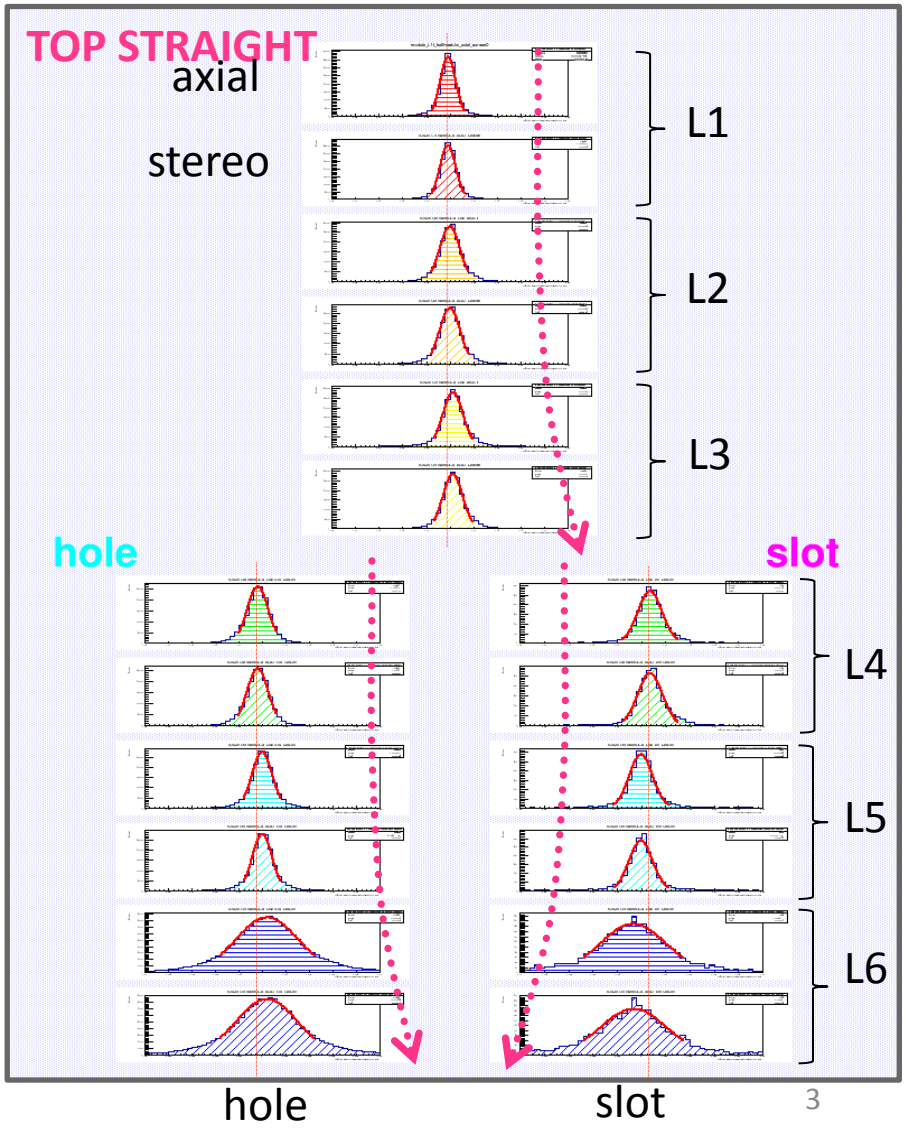
- MP can accept at most ~1.5M tracks
  - More straight tracks needed (the reconstruction selects only those with 12 hits each)
  - Run 5772 (curved) must be split to match the same amount of available tracks
    - Total sample: ~340000 straight tracks + ~340000 curved tracks

- 1st MP round: translations along u axis (axial+stereo, slot & hole)
  - First iteration: internal layers 3+4+5
  - Second iteration: external layers 1+6
  - Third iteration: internal layers 3+4+5

Curves vs straight tracks, TOP: GBL-u residuals quality

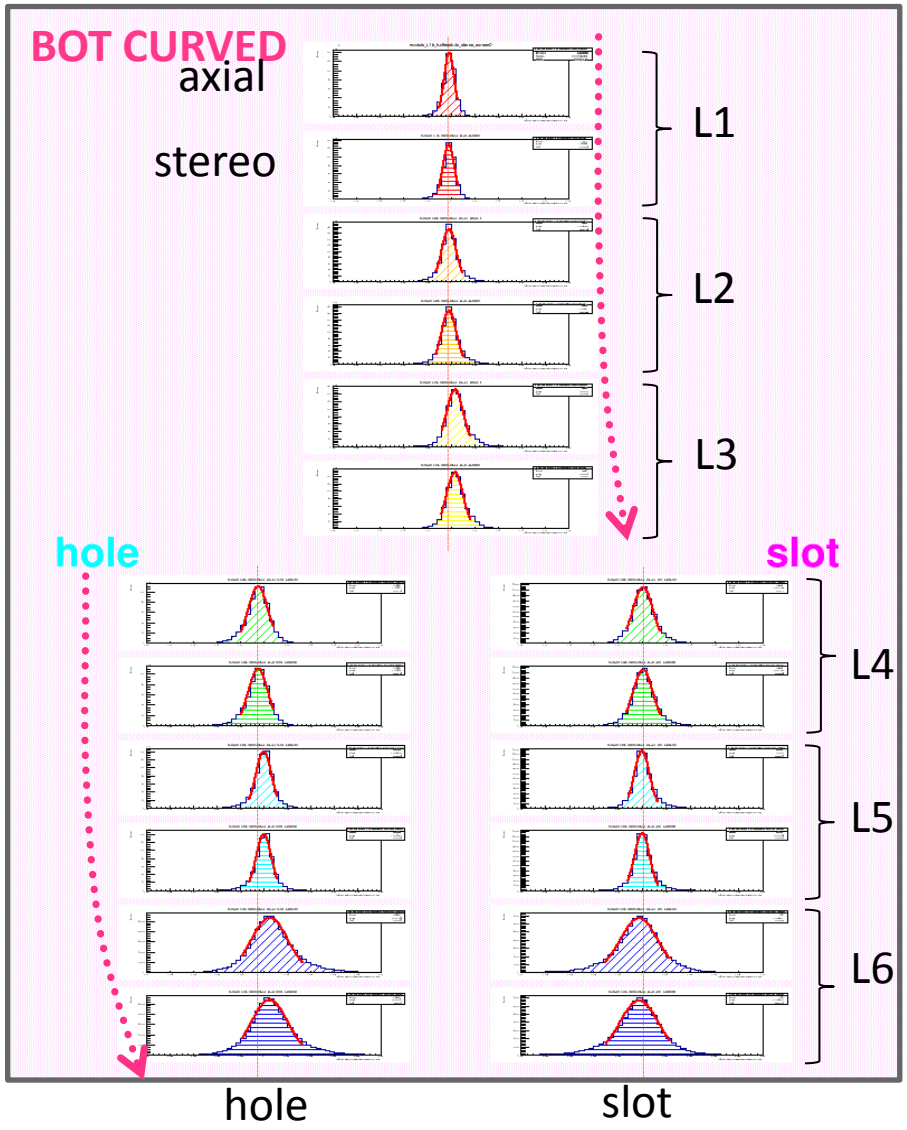
Curved tracks: small drifts for layers 1-3 and 4-6 hole towards the same side, slot side OK
Straight tracks: same effect on opposite direction, slot side WORSE of all

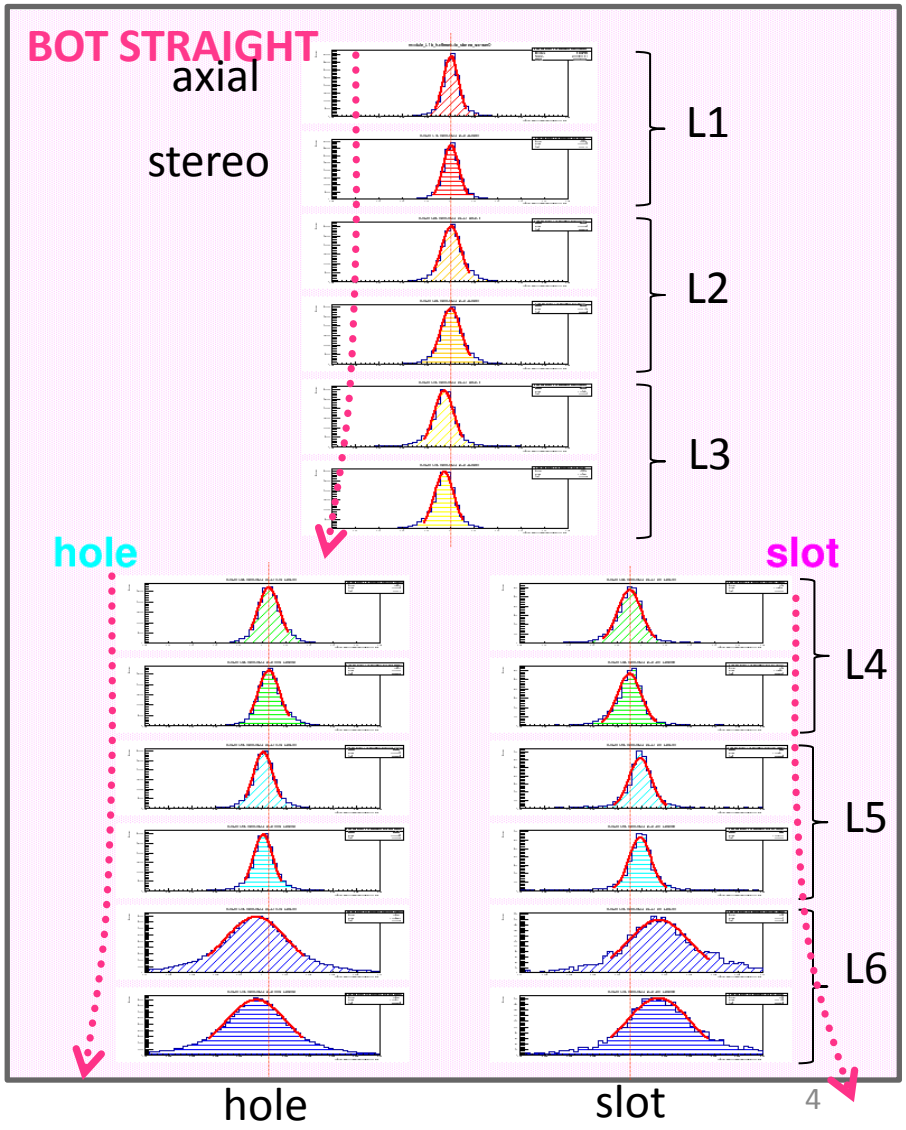




Curves vs straight tracks, BOT: GBL-u residuals quality

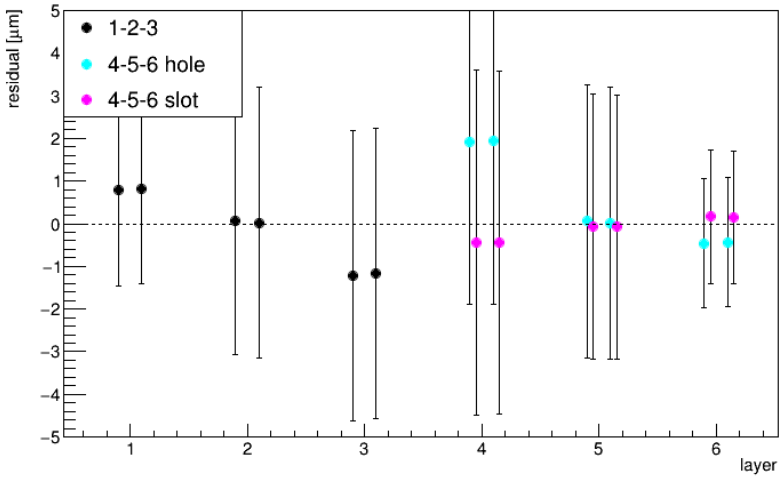
Same behaviour observed for the TOP, reversed directions of mean values drifts

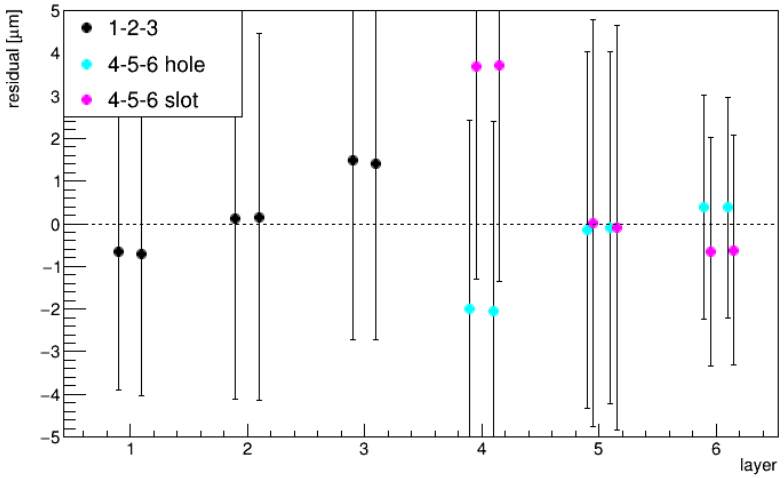


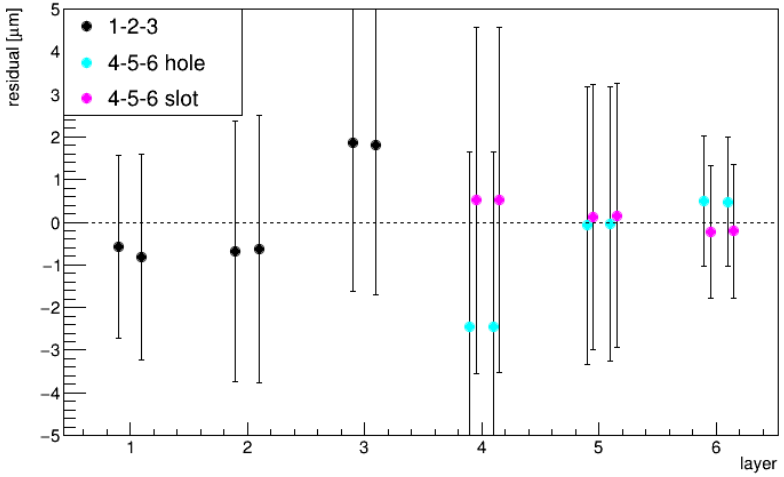


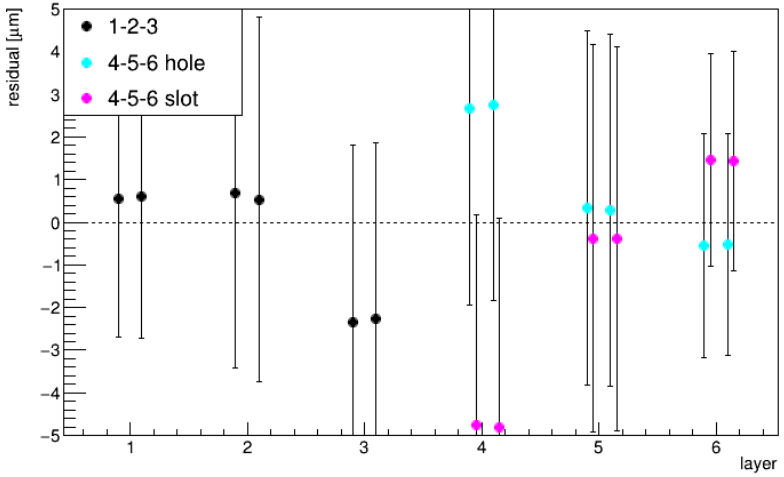
Mean values of GBL residual, curved vs straight tracks

Needs adjustment for both curved & straight tracks: layer 4 (man values with reversed sign
-> try rotations? z translation of level 4?
Layer 5 OK, Layer 3 could be better



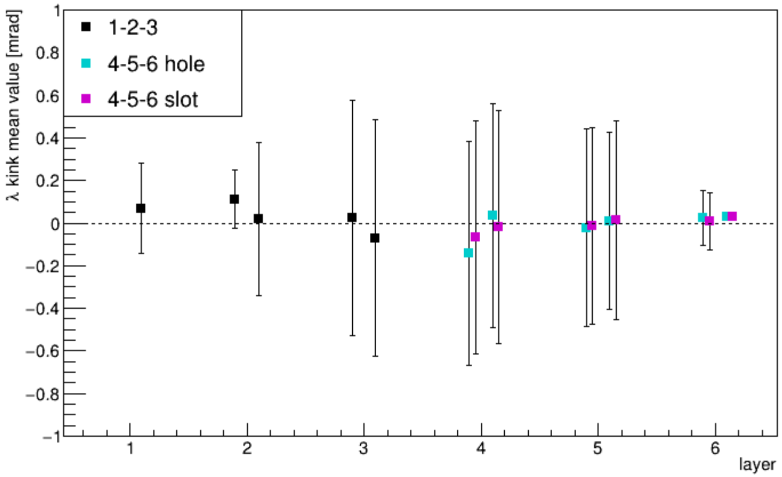


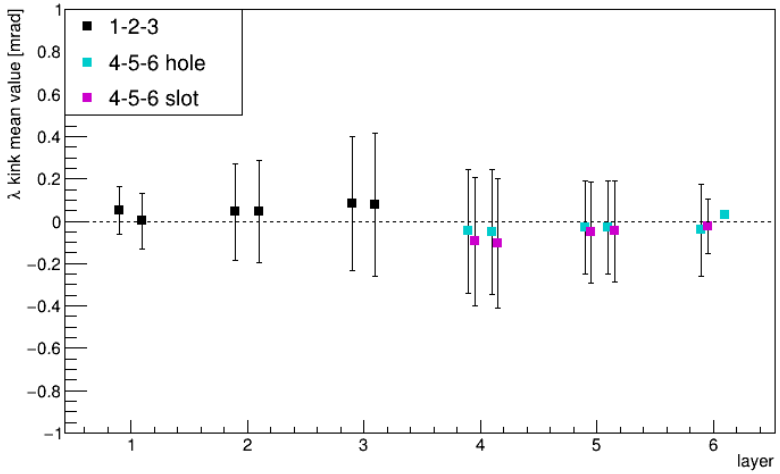


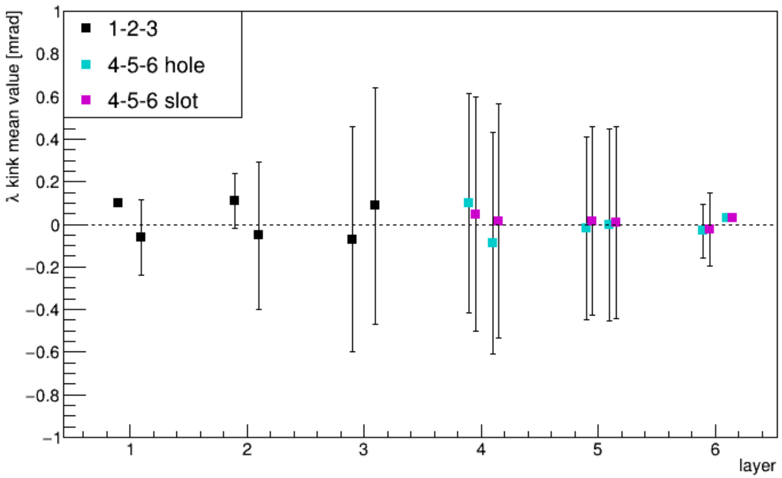


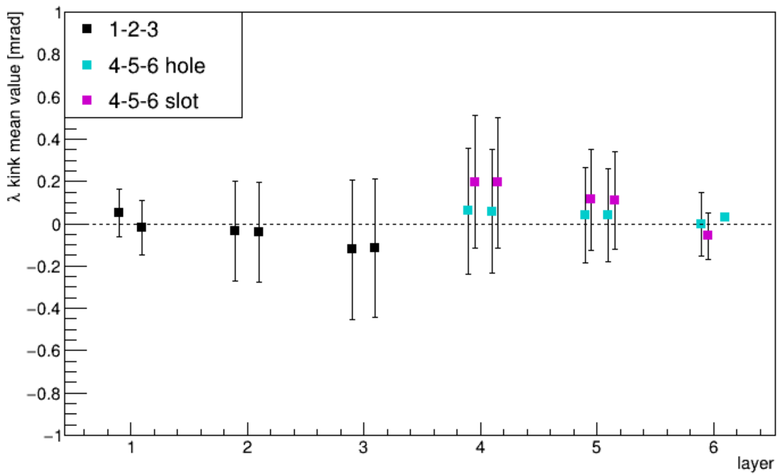
Mean values of λ kinks, curved vs straight tracks

Fairly acceptable both for curved and straight tracks



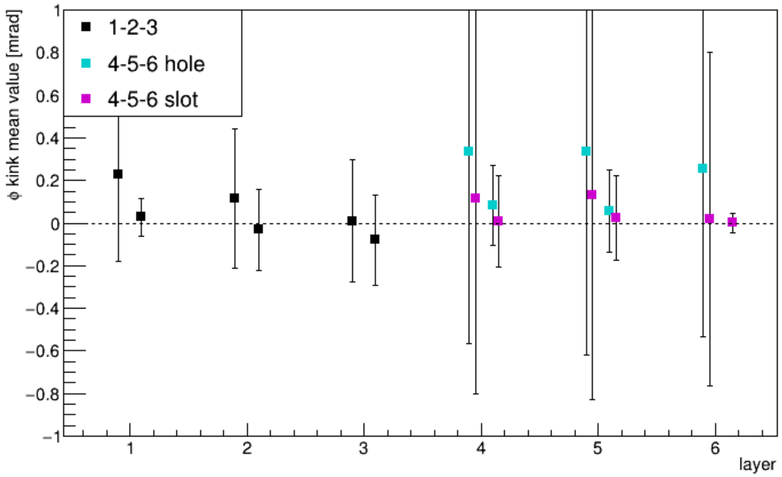


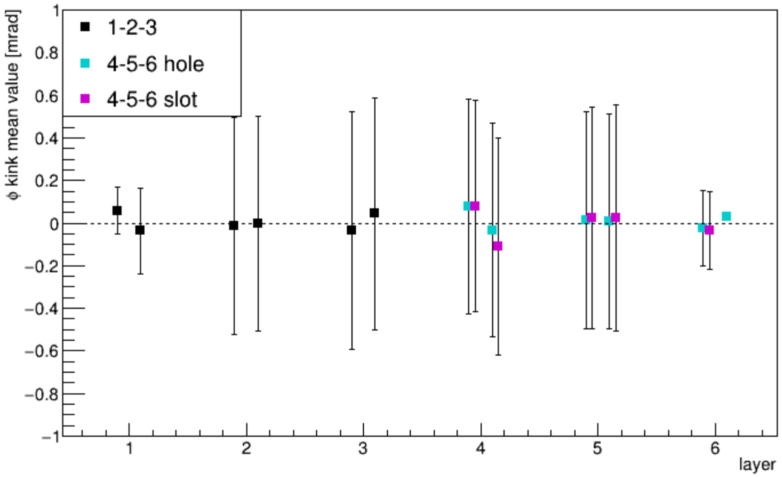


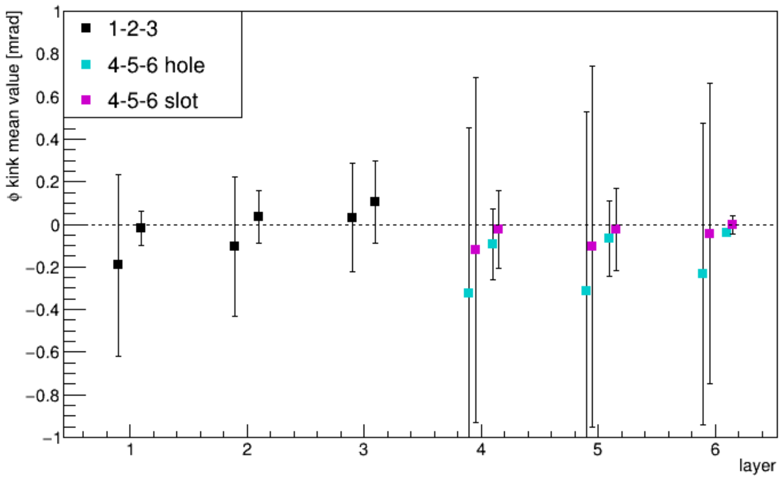


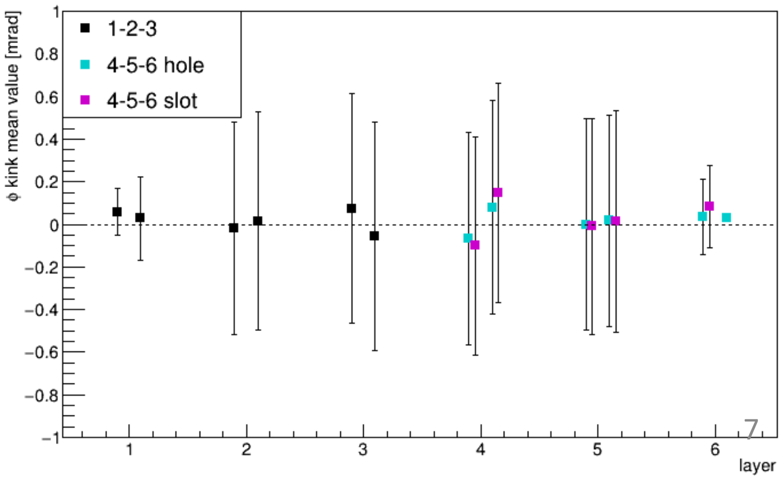
Mean values of φ kinks, curved vs straight tracks

Fairly acceptable both for curved and straight tracks







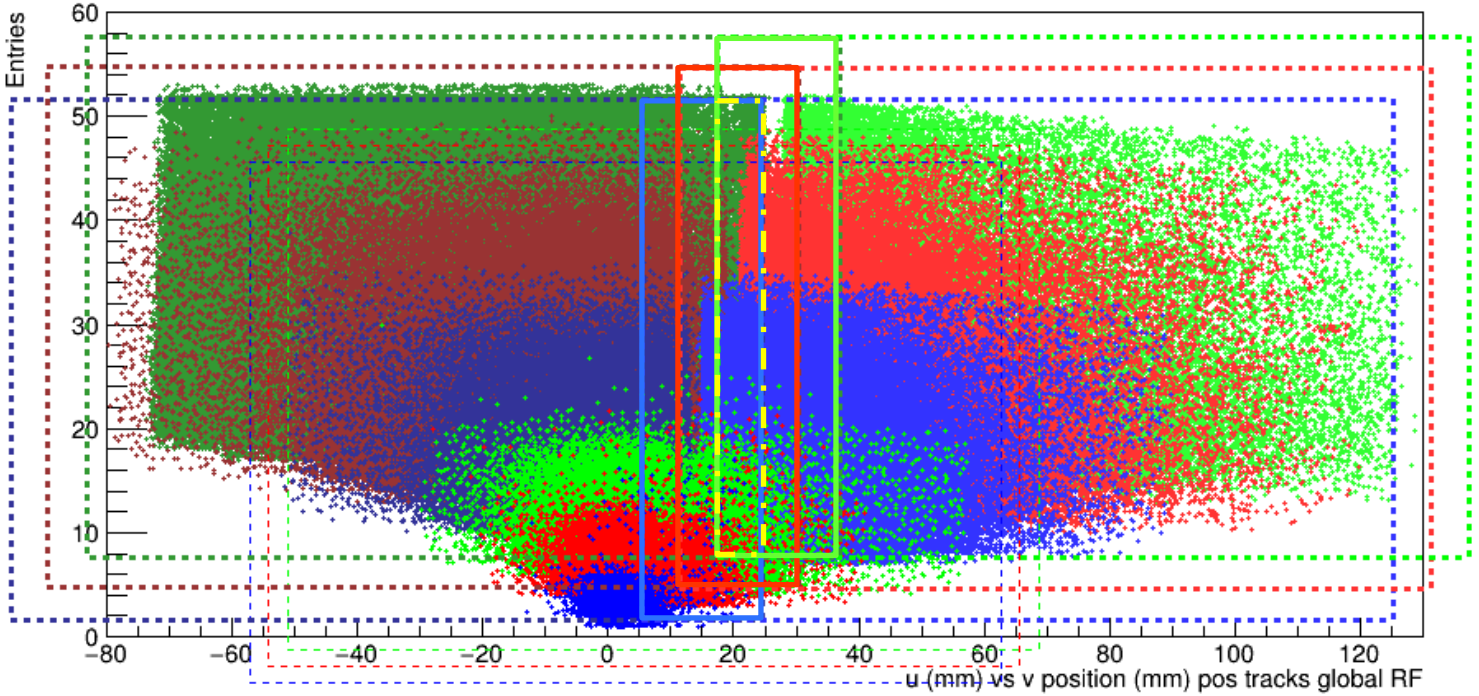


~~space~~ Position Oddities (& questions)

- Is it true that there is a non-zero overlap between hole/slot sensors of the same layer? So that some tracks can have up to 2*3+2*2*3 = 18 hits?
  - These tracks are (likely) discarded in the reconstruction/GBL tracking… so there is (might be) an inefficiency in the overlap region
- Is it true that the magnetic field goes from top to bottom?
  - in the code B_mag is negative… and positive particles go towards the hole side

Plot of y vs x of the hit in the laboratory reference system, TOP, curved tracks

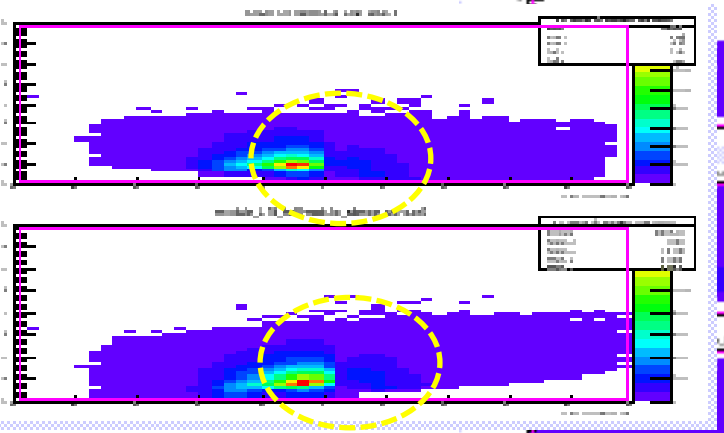
H

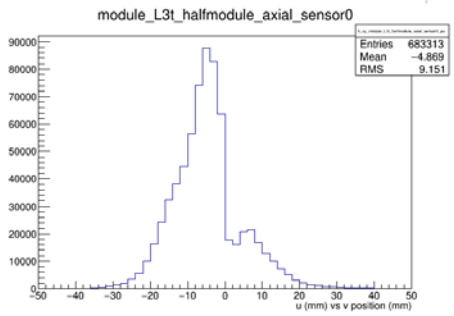


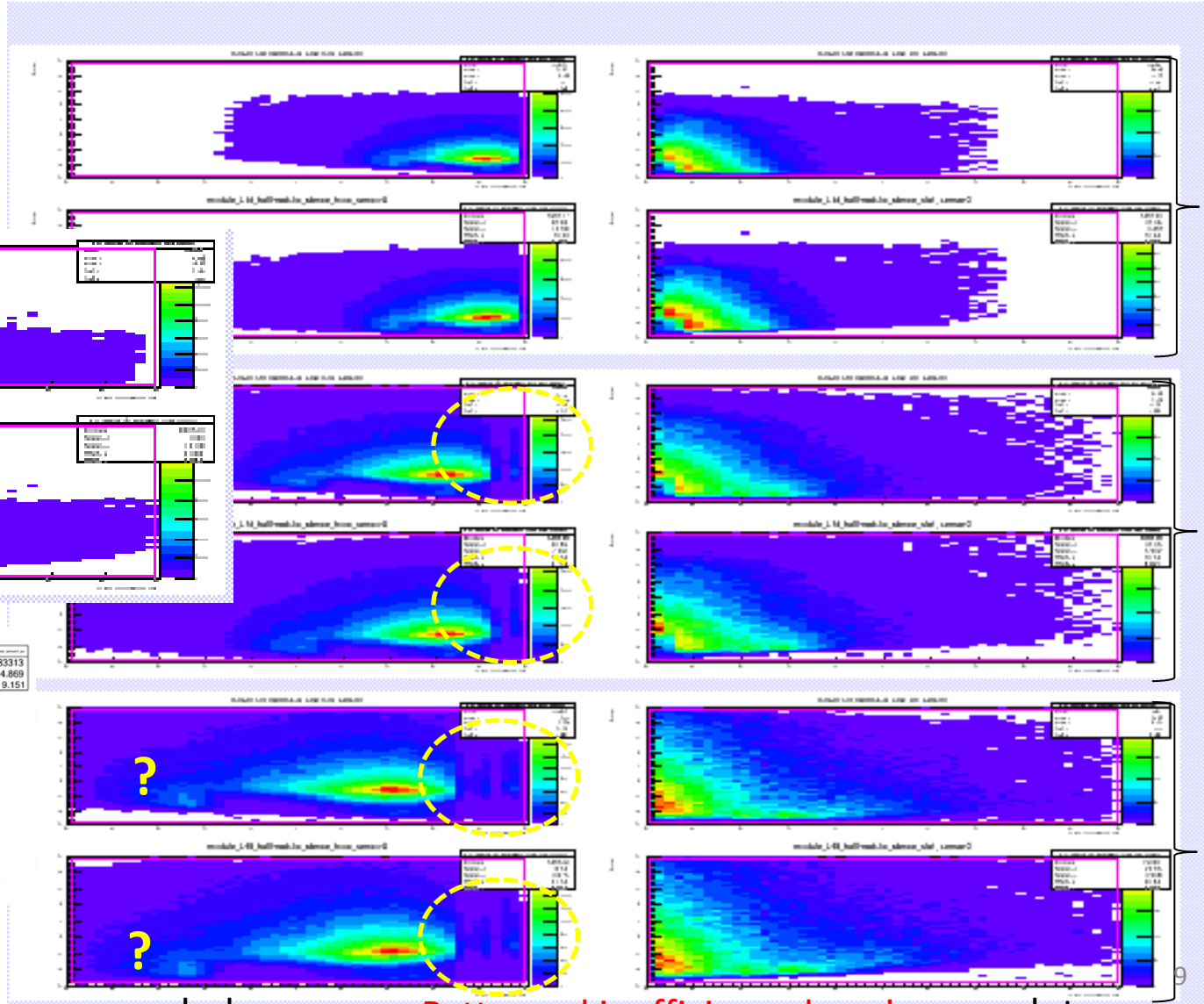
S

u vs v track predicted positions in the sensor RF

Layer3:
dip at v ~ 2 mm







Next steps

- Improved mixed sample alignment starting from moving/rotation sensor 4
- Understand better the odd distribution of hits close to the inner border
- Apply some more track quality selections especially on curved tracks