Status of Zvertex measurement with new Ch-Mapping

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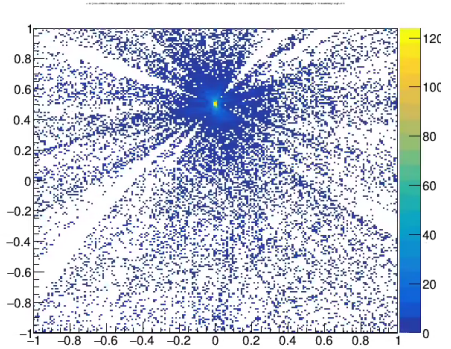
Introduction

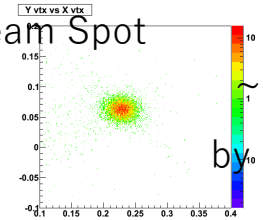
- After beamspot obtained, INTT Zvertex measured

- During the analysis, Ch-mapping (ladder-ID and position) was concerned at the last meeting.
  - Thanks Joseph for updating the ch-mapping quickly



- DCA position(x,y) of the INTT tracklet
  - Indicate the beam spot
- Beam spot is seen at (0, 5mm)
  - Away from (0,0)
- Joseph found INTT position is 3mm downward from the design position
- Next is to calculate Zvertex

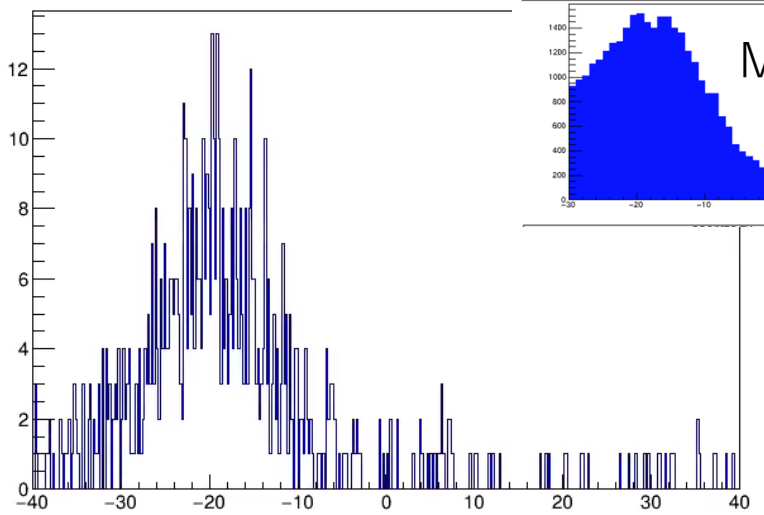
Beam Spot

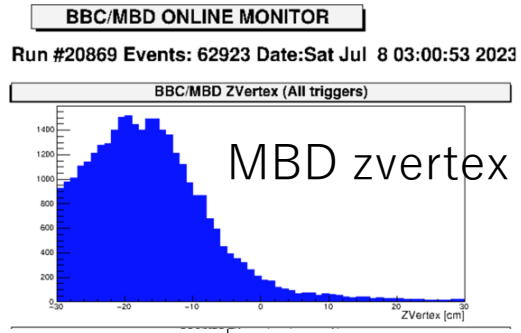


~2mm away from (0,0)

by PHENIX VTX

INTT zvertex

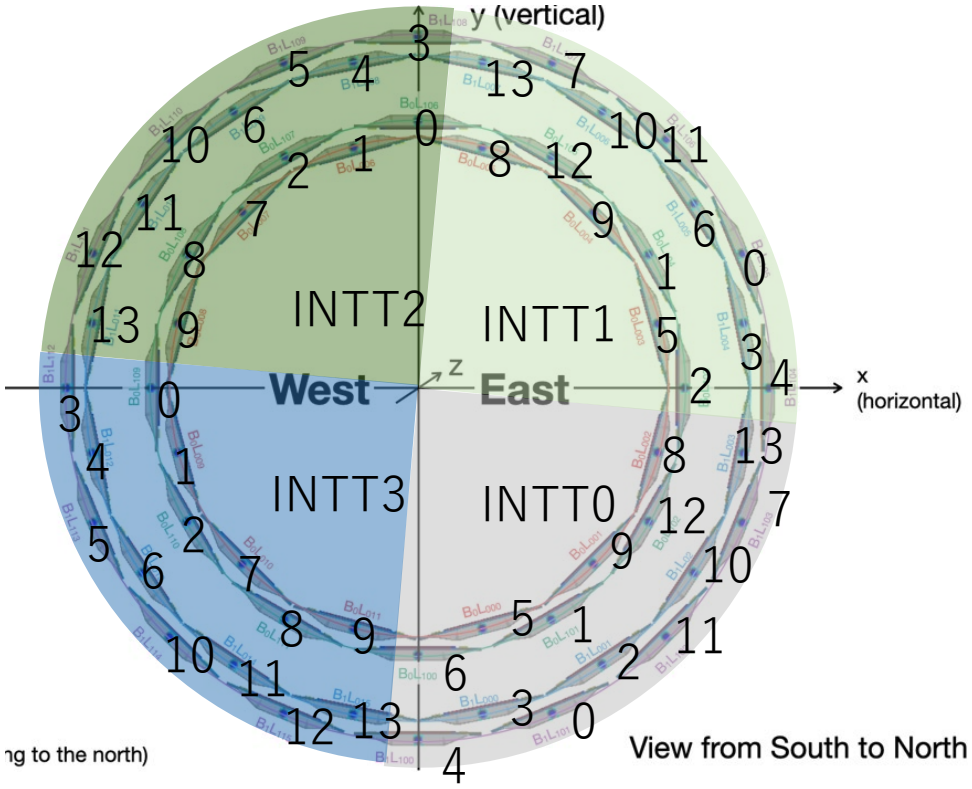




MBD zvertex

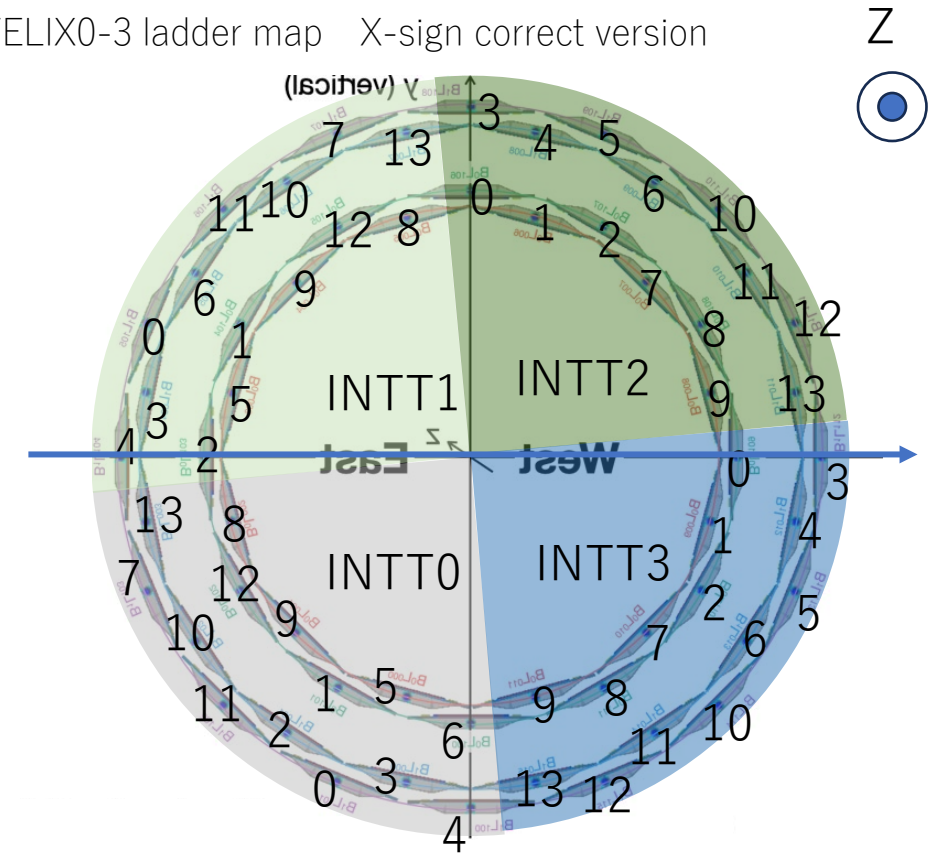
Reminder : Issue on Ch-Mapping

FELIX0-3 ladder map X-sign flipped version



X-sign flipped

FELIX0-3 ladder map X-sign correct version



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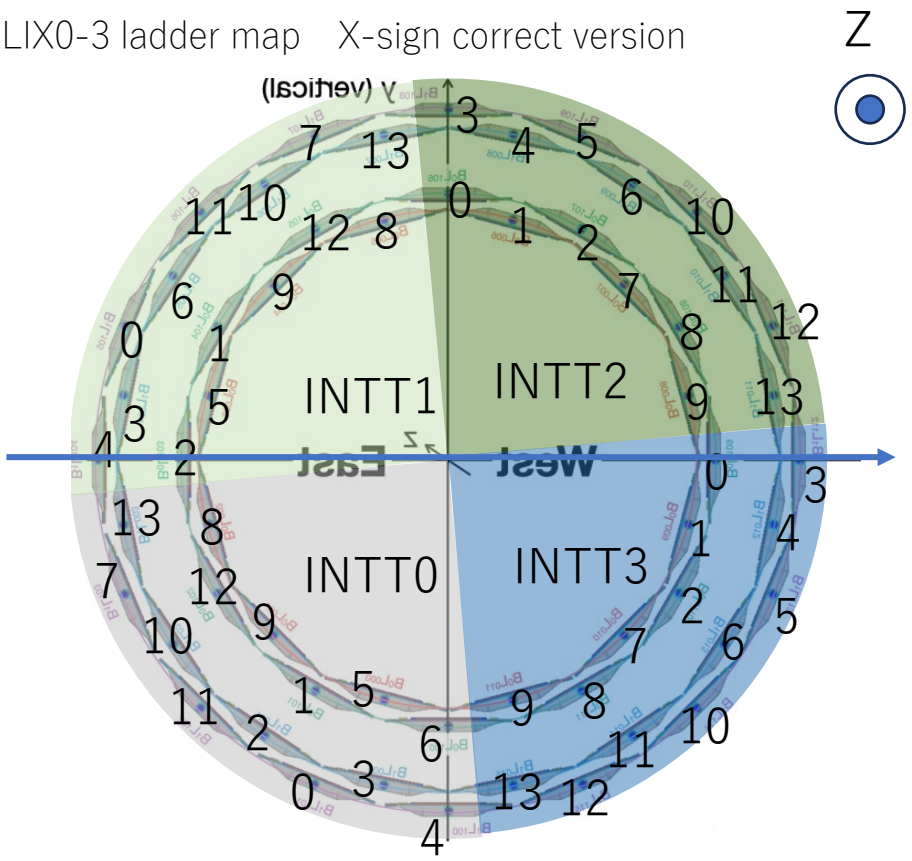
Reconstructed mapping w/ new mapping

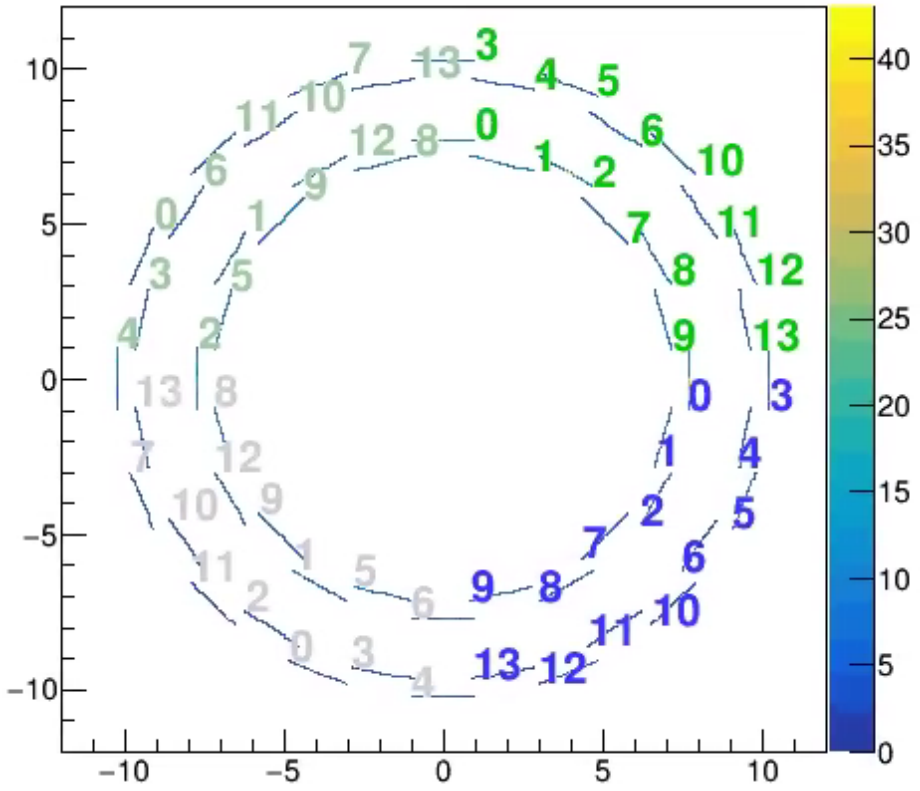
Joseph' s new mapping applied.

Millar version

FELIX0-3 ladder map　X-sign correct version



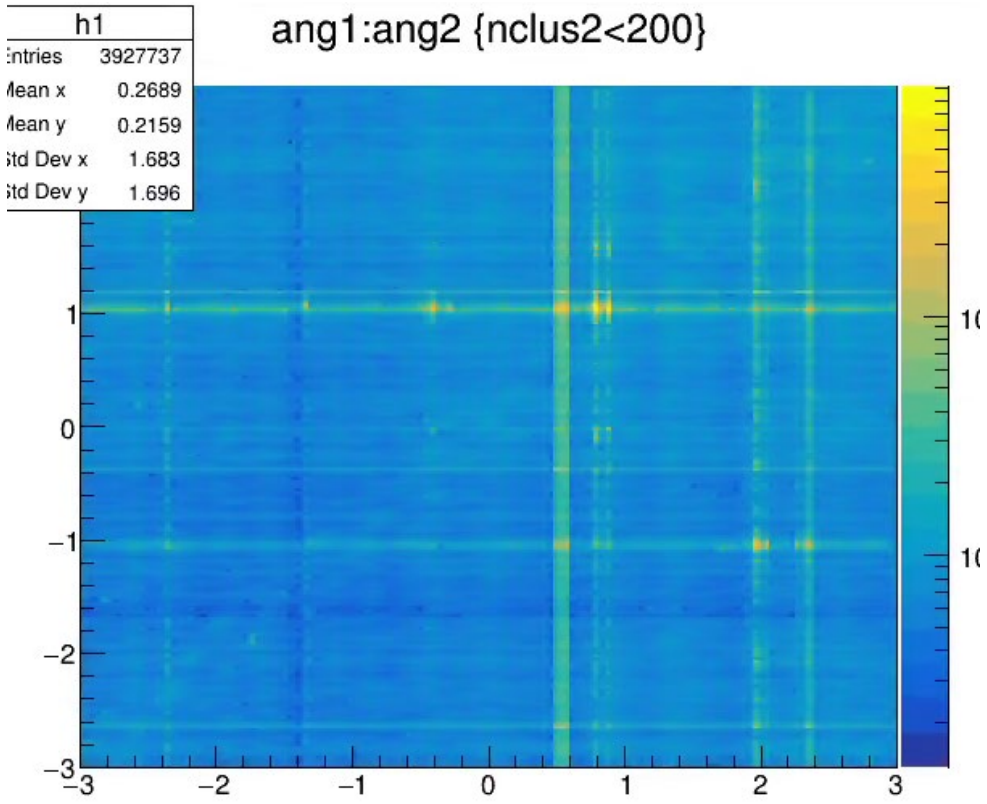
Reconstructed



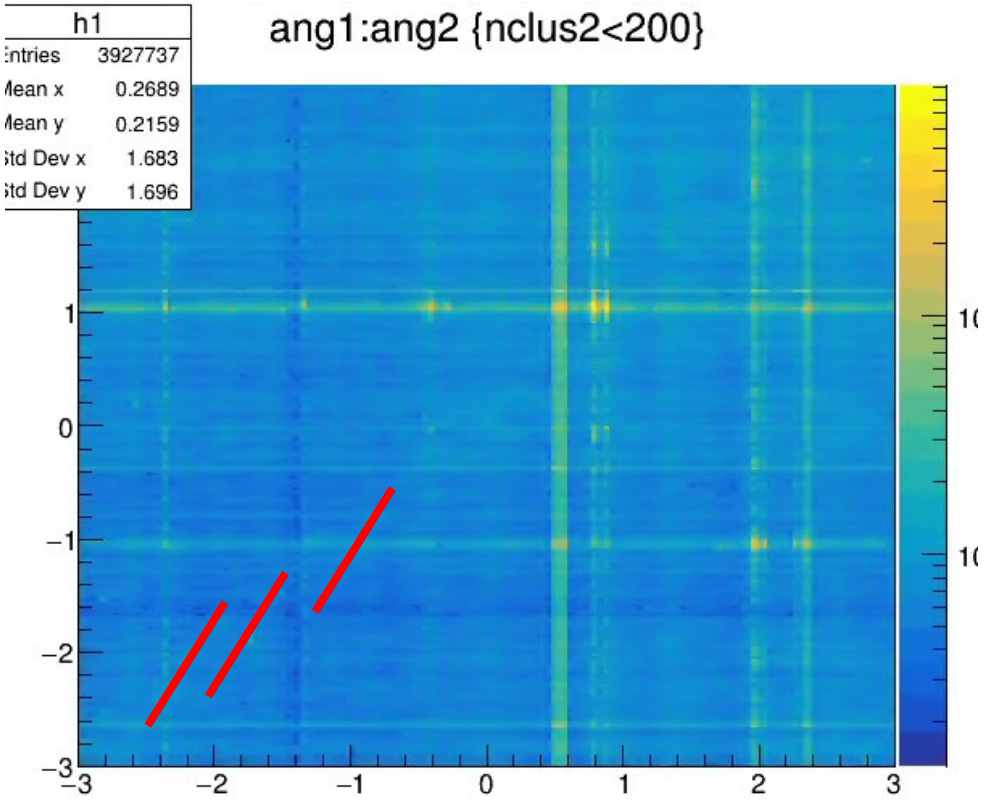
Thanks, Joseph. New mapping works well!

Side effect w/ new mapping Angle correlation

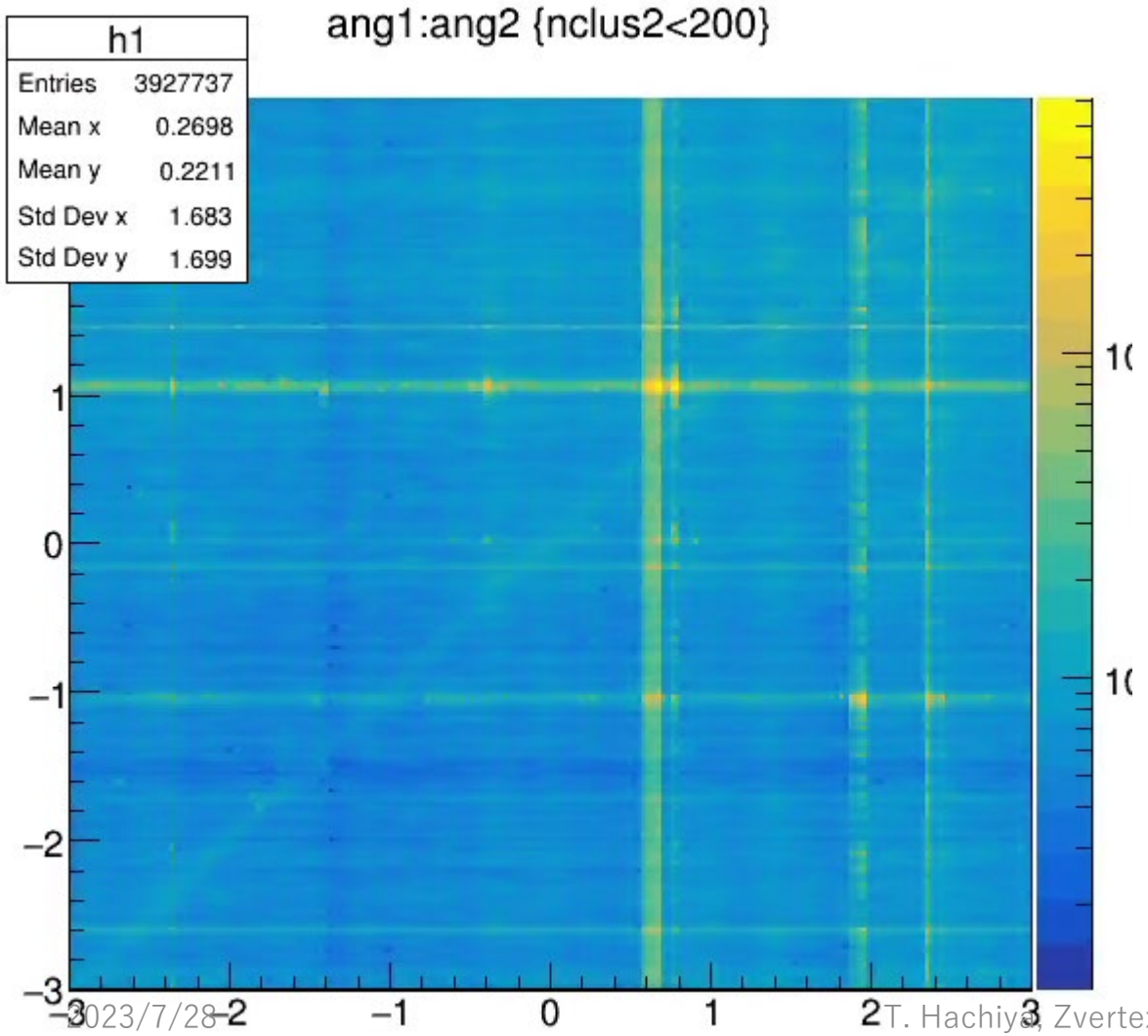
Y=X Correlation disappeared



w/ biased red line (I put in the left fig.)

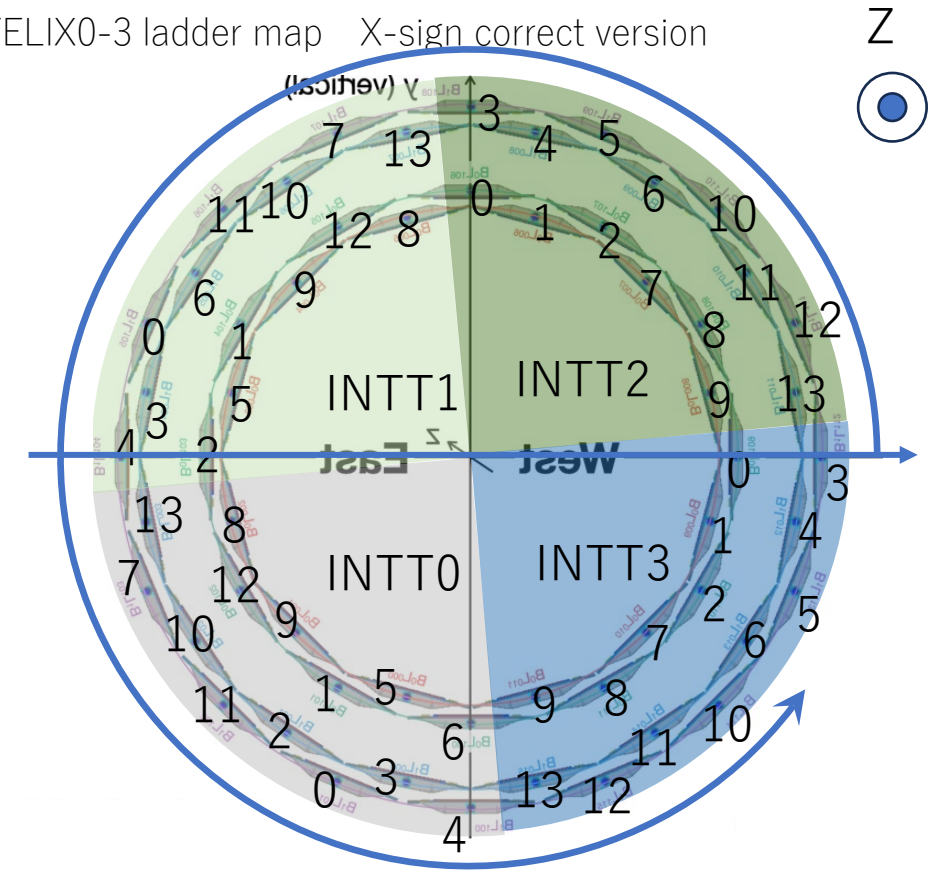


Ch swapped (0-255 -> 255-0)



version

FELIX0-3 ladder map X-sign correct version



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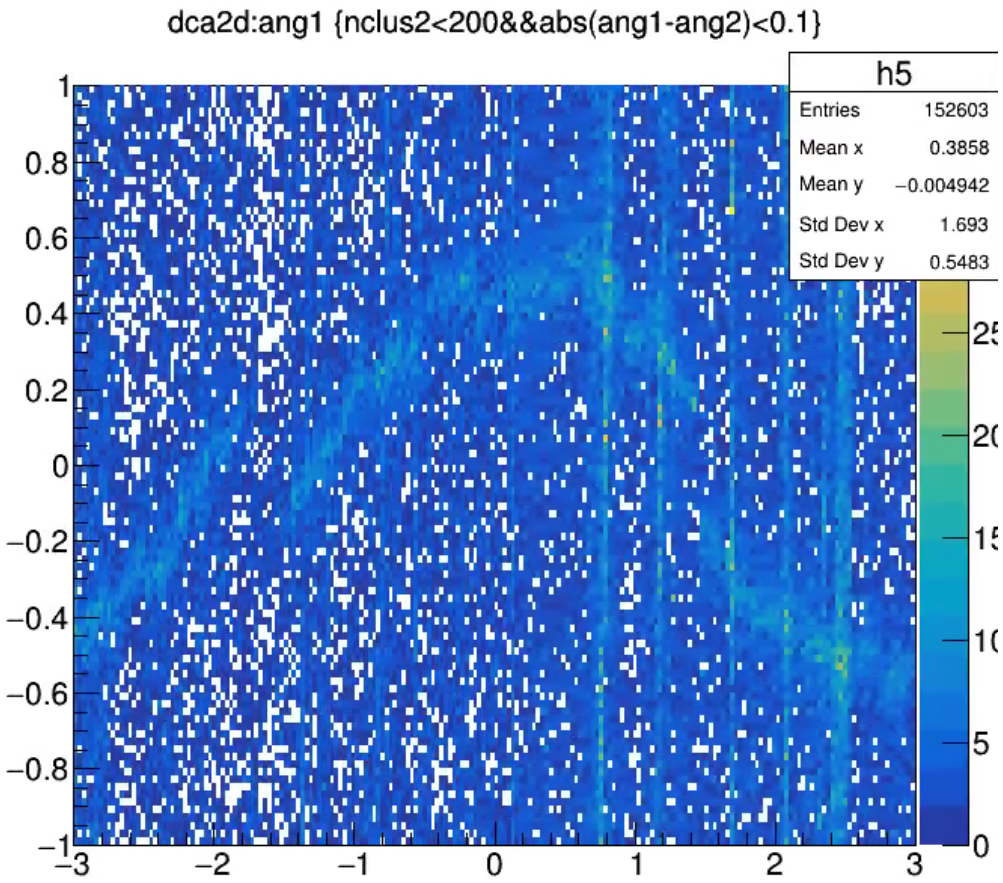
Swapping the ch works to fix the issue

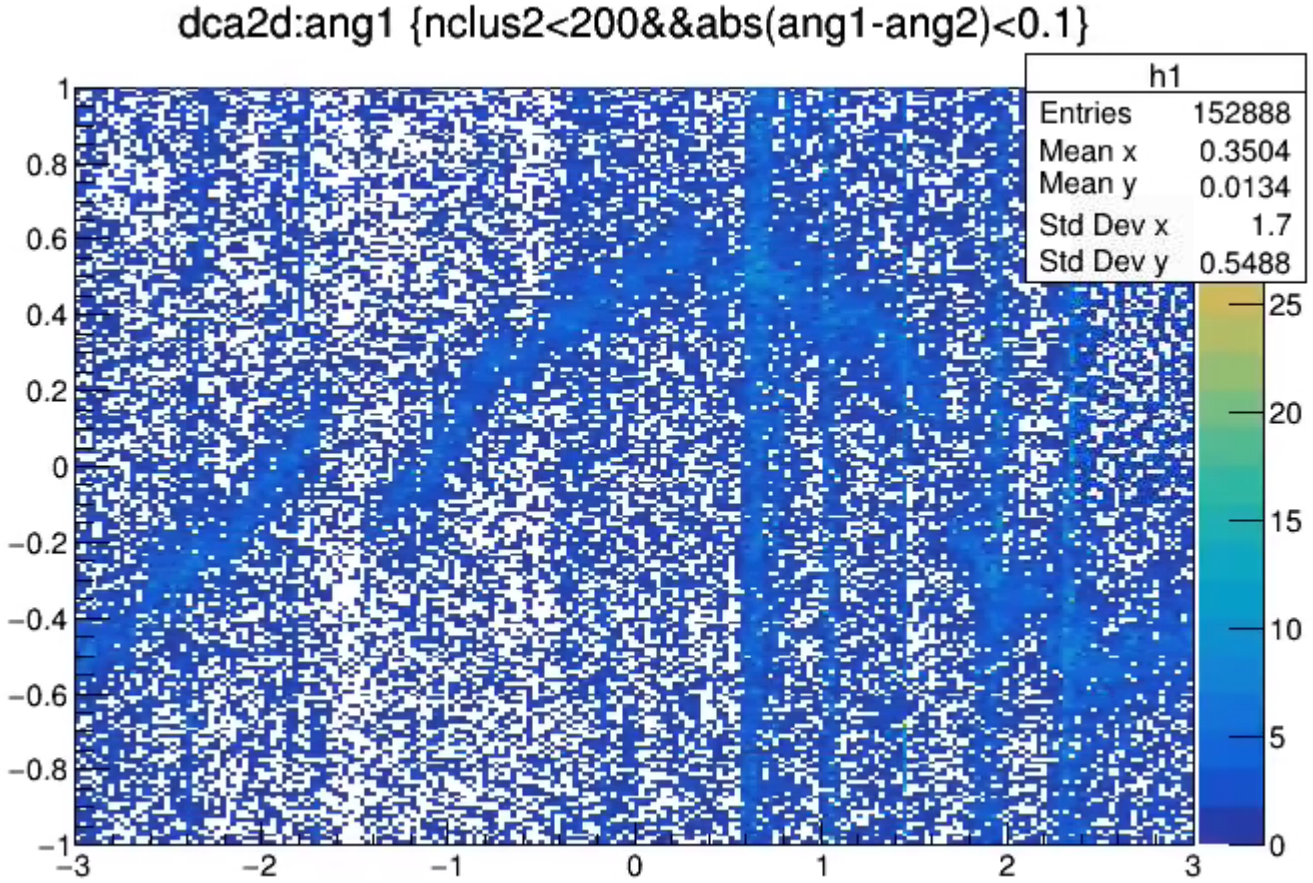
A clear X-Y correlation is seen again

DCA2D vs angle : discontinuity still remain

Original mapping

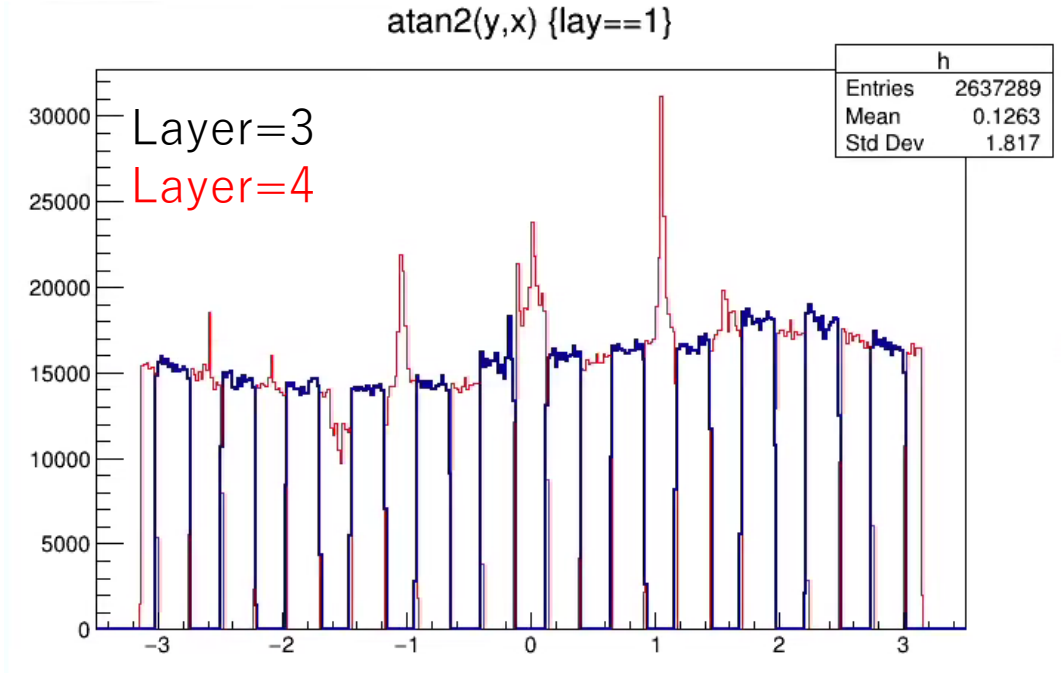


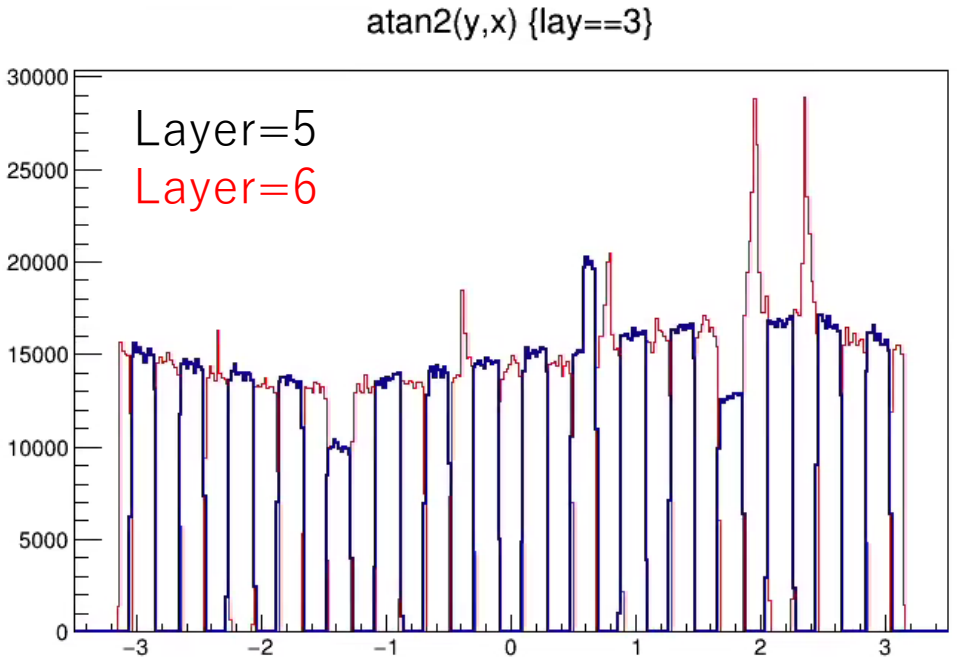
New mapping



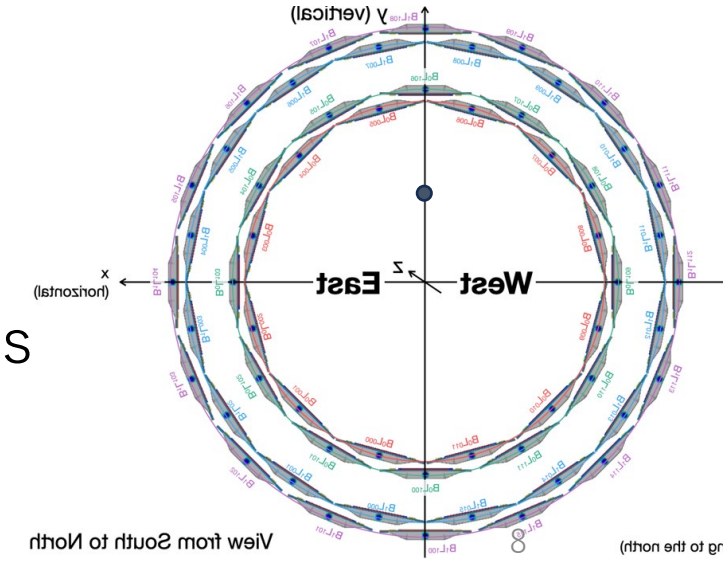
I thought the sign of the phi angle for phi<+- 1.5 must be flipped.
To investigate this assumption, I checked the cluster phi distribution

Cluster Phi distribution (Run20869ZF)





- Phi distribution smoothly connected
  - Sign-wave like structure can be made by the displaced beam stop
  - Flipping the sign of phi angle is not likely
  - Counts at phi=-1.5 is slightly smaller than other ladders
- Some peaks which should be caused by hot (warm) channels
  - These hot/warn channels needs to be removed

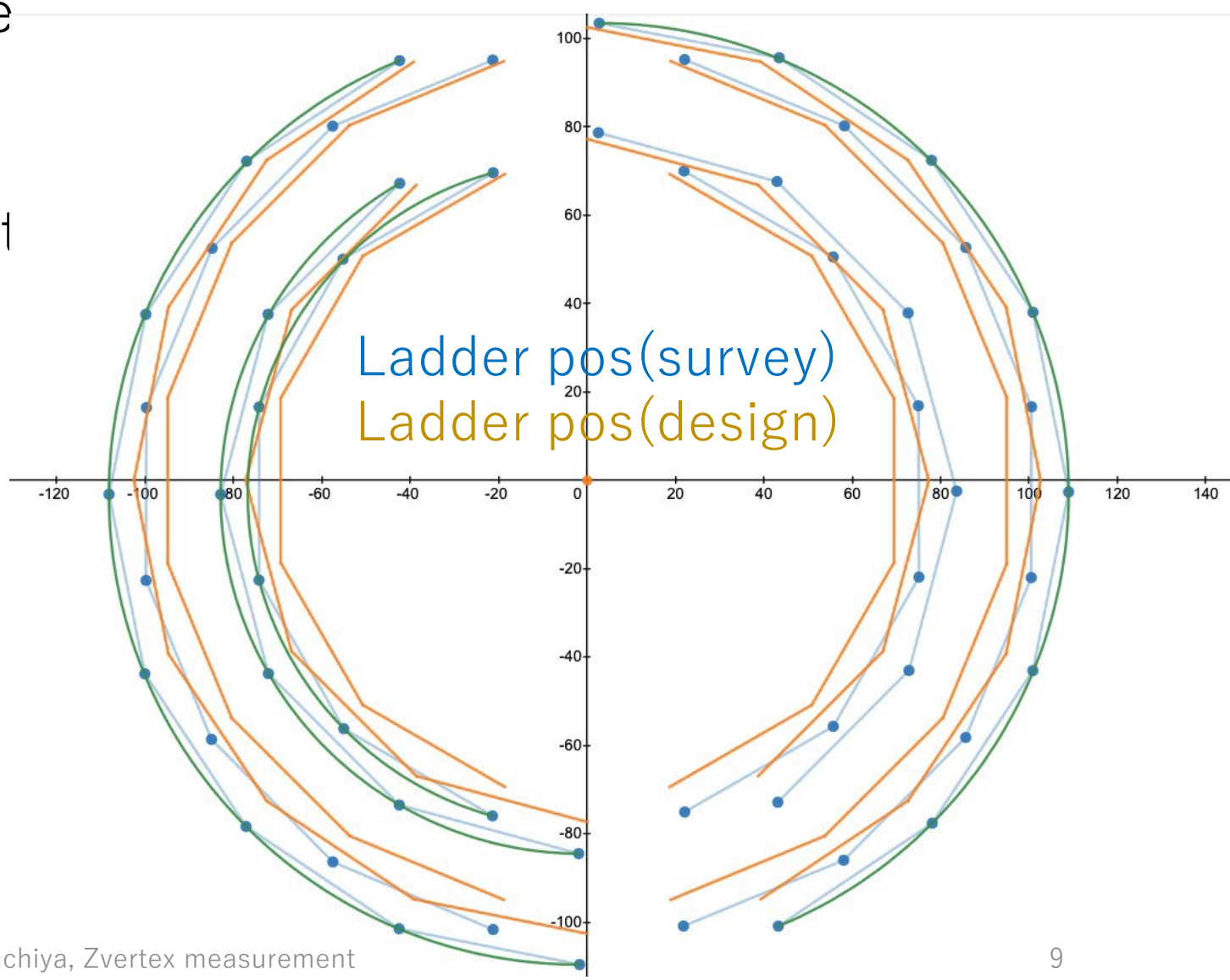


ChengWei's comparison w/ survey geometry

- Thanks Joseph for compiling the survey geometry
- Thanks ChengWei for investigating the issue and making the nice comparison plot

- Points represents ladder pos
  - Center of the sensor at surface
  - The lines just for clarity

- Bottom part shows big difference
  - ~1 cm at bottom



Comparison w/ survey geometry

Ladder pos(survey)
Ladder pos(design)

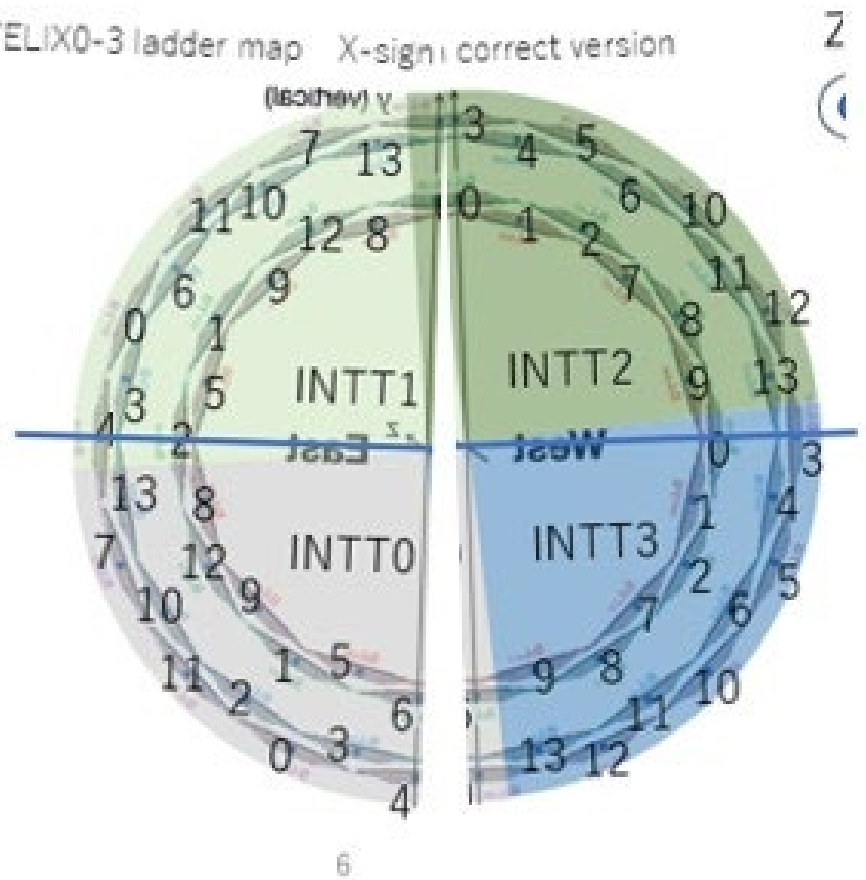
- Thanks Joseph for compiling the survey geometry
- Thanks ChengWei for investigating the issue and making the nice comparison plot

- Points represents ladder pos
  - Center of the sensor at surface
  - The lines just for clarity

- Bottom part shows big difference

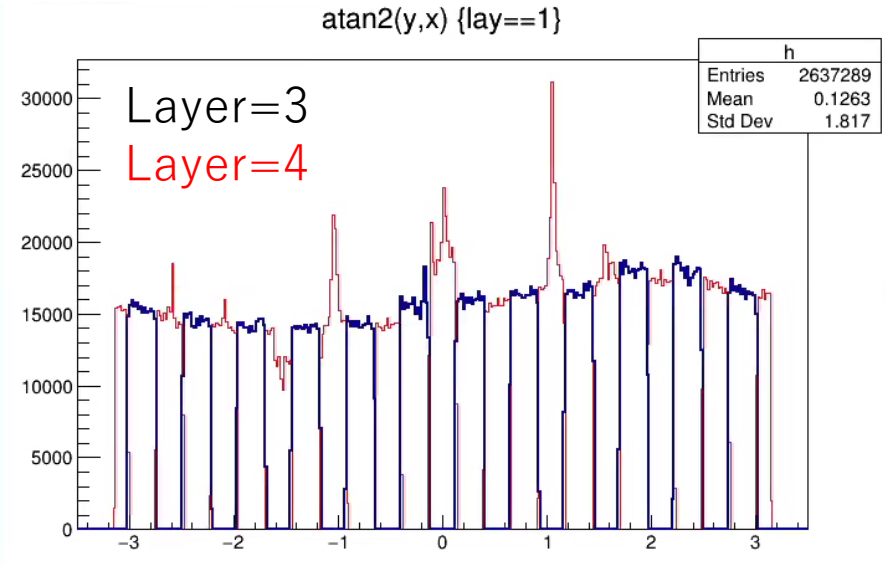
- Barrel assembly could be like this
  - Bottom part slightly open

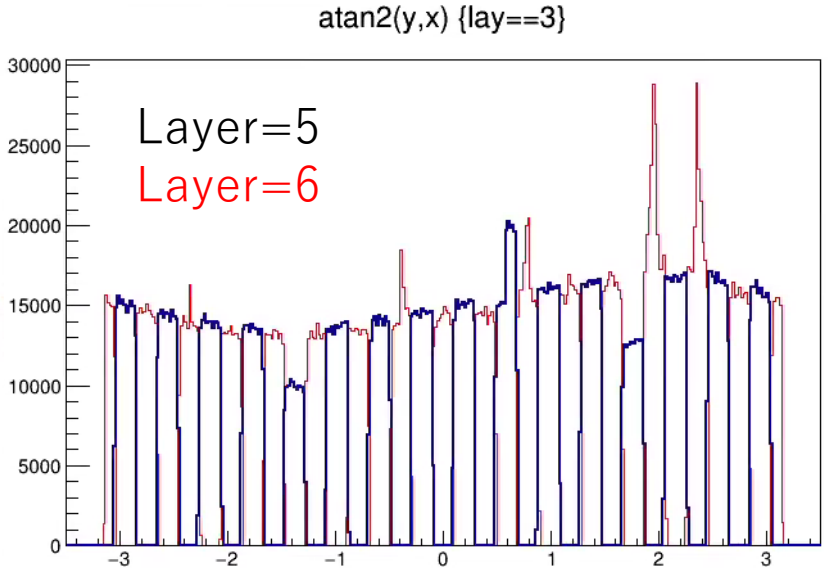
  - I remembered that it was hard to mate two half barrels at 1008

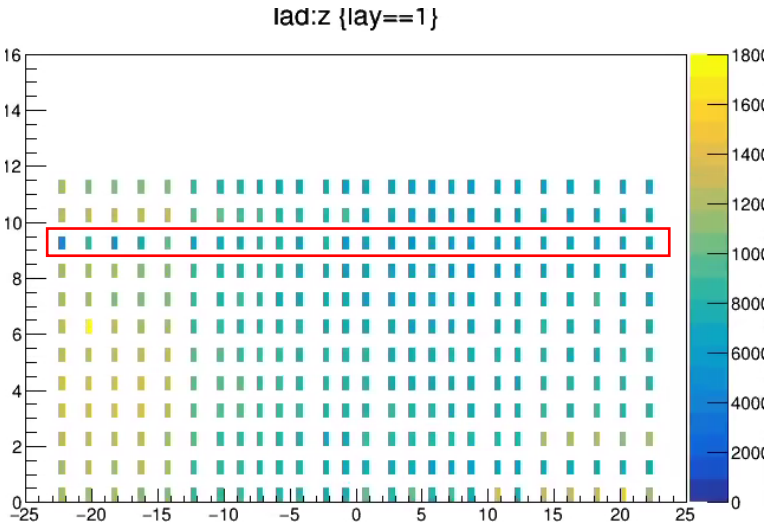


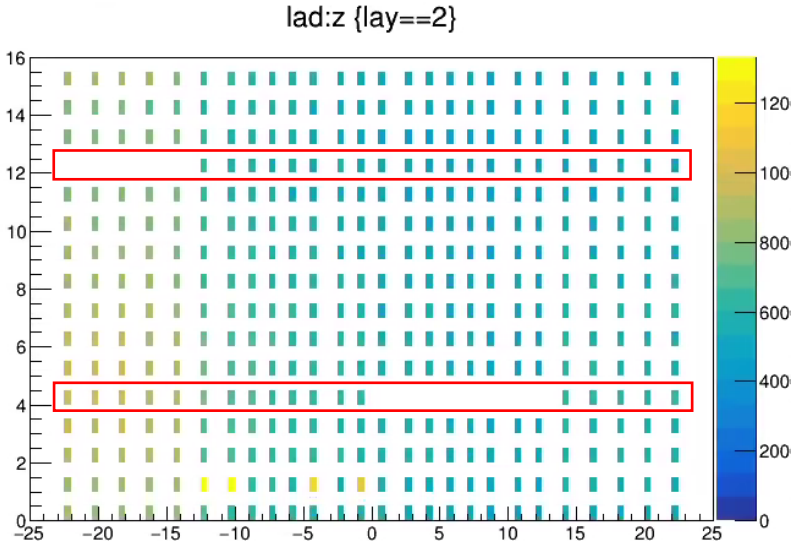
Cluster Phi distribution (Run20869ZF)

- Counts at Phi~+1.5 are smaller than other ladders
  - The ladders could be damaged during the installation? Needs to be checked



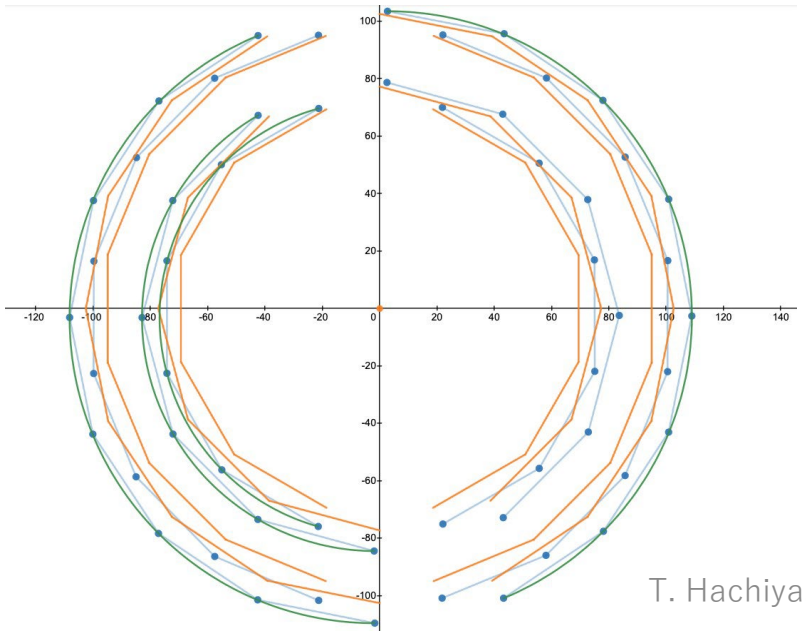


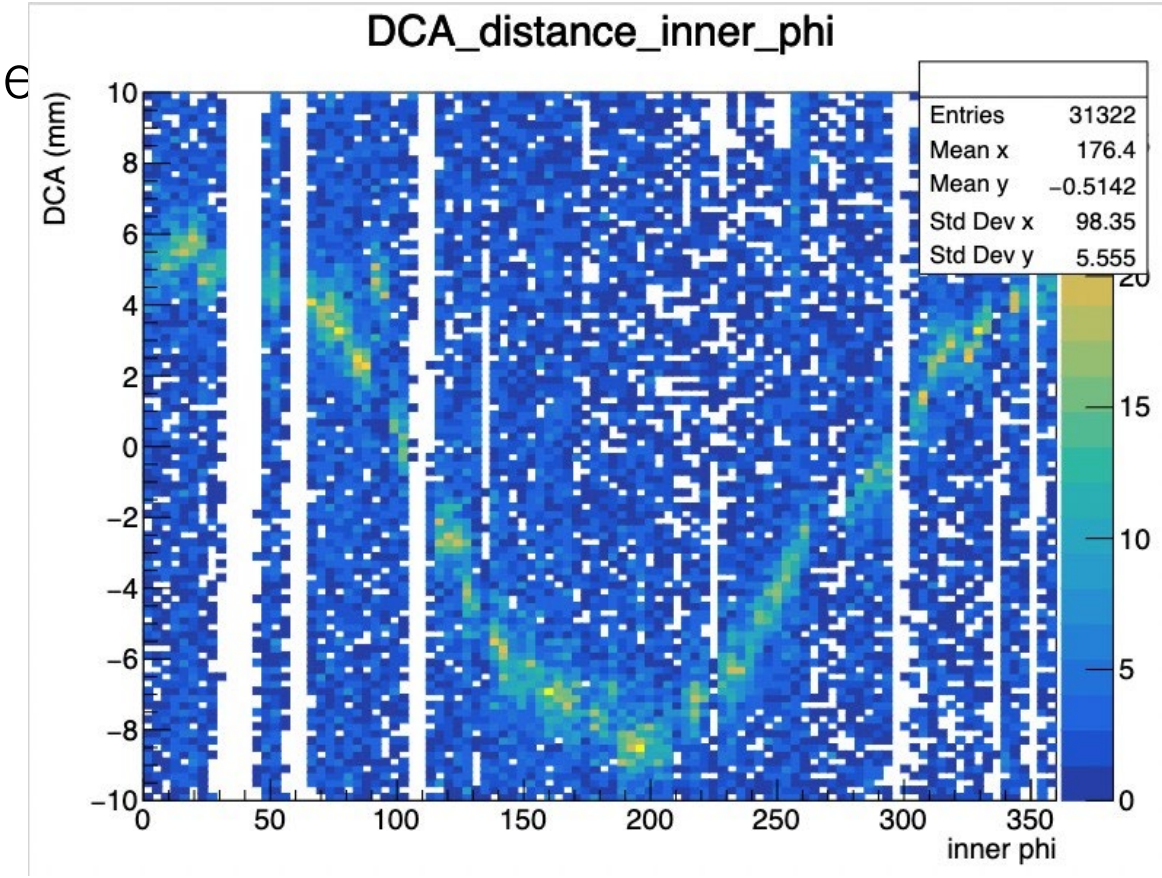




ChengWei's new DCA w/ clusters shifted

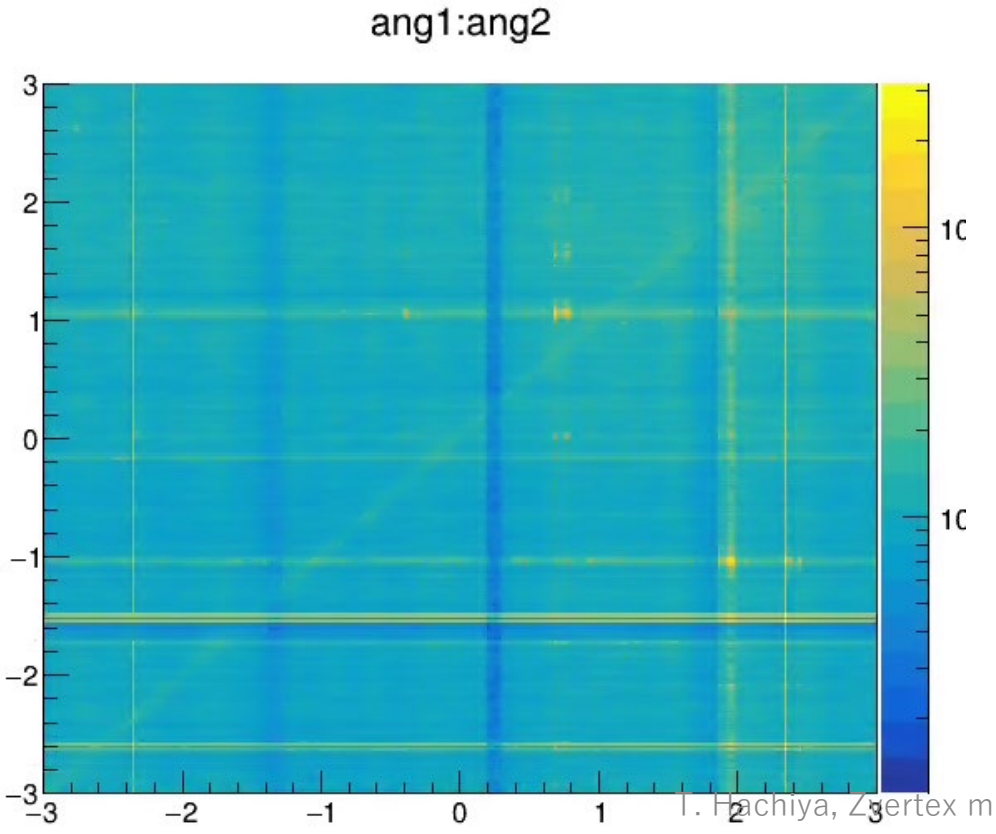
- After finding the geometry issue, ChengWe calculated DCA2D vs phi w/ cluster position shifted as survey by hand
  - (3, -3)mm shifted for west barrel
- Correlation smoothly connected
  - The position shift works nicely

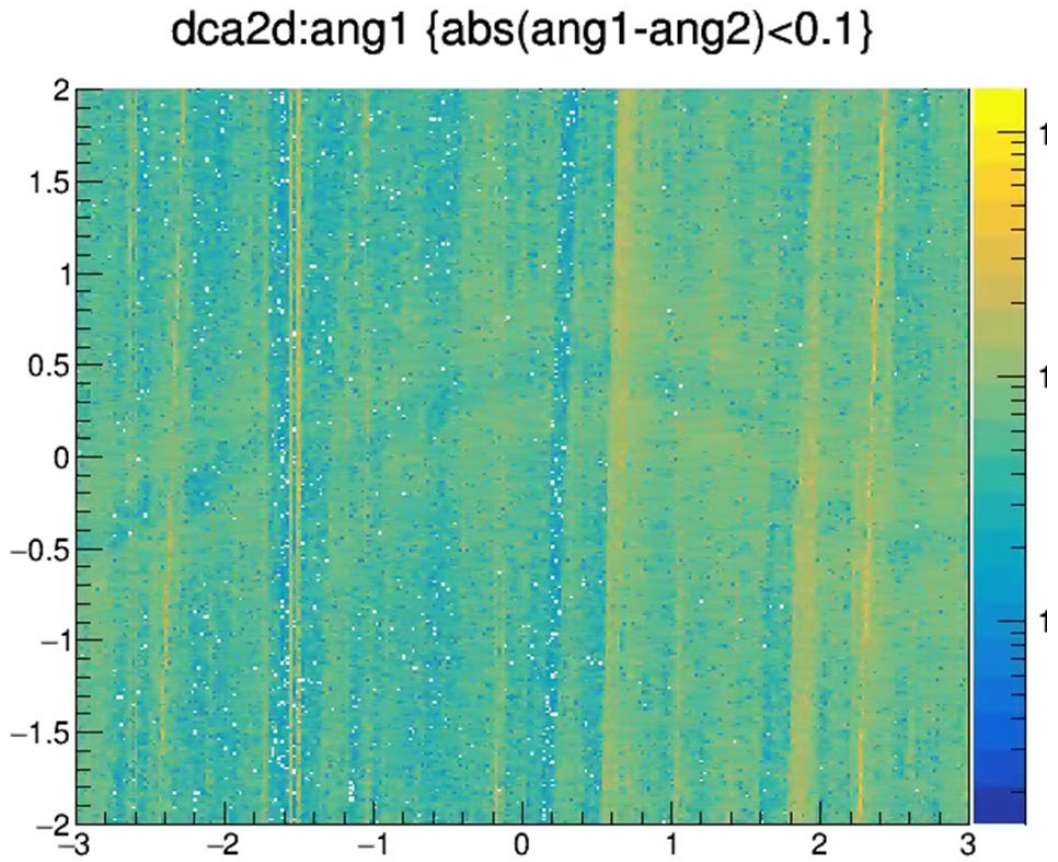




Toward Z-vertex correlation w/ MBD

- Run 20708 (full field)
- Clear X-Y correlation in inner and outer clusters
- DCA2D vs phi (inner) show also clear correlation. Splitted to two peaks because of B-field ON.

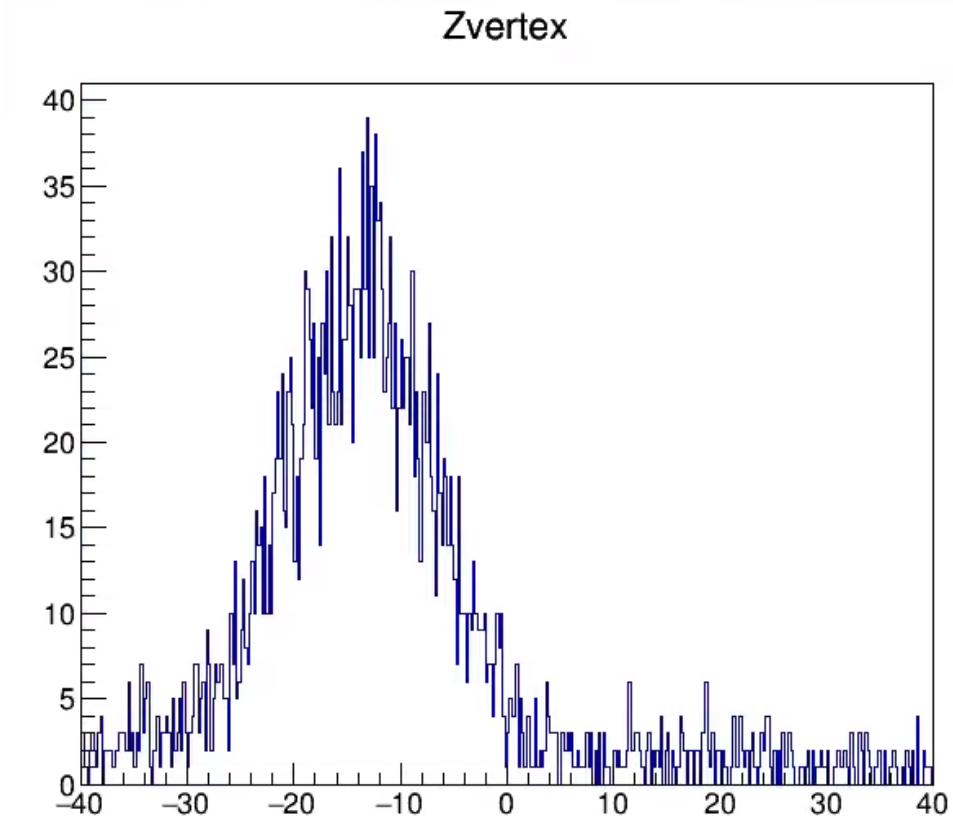


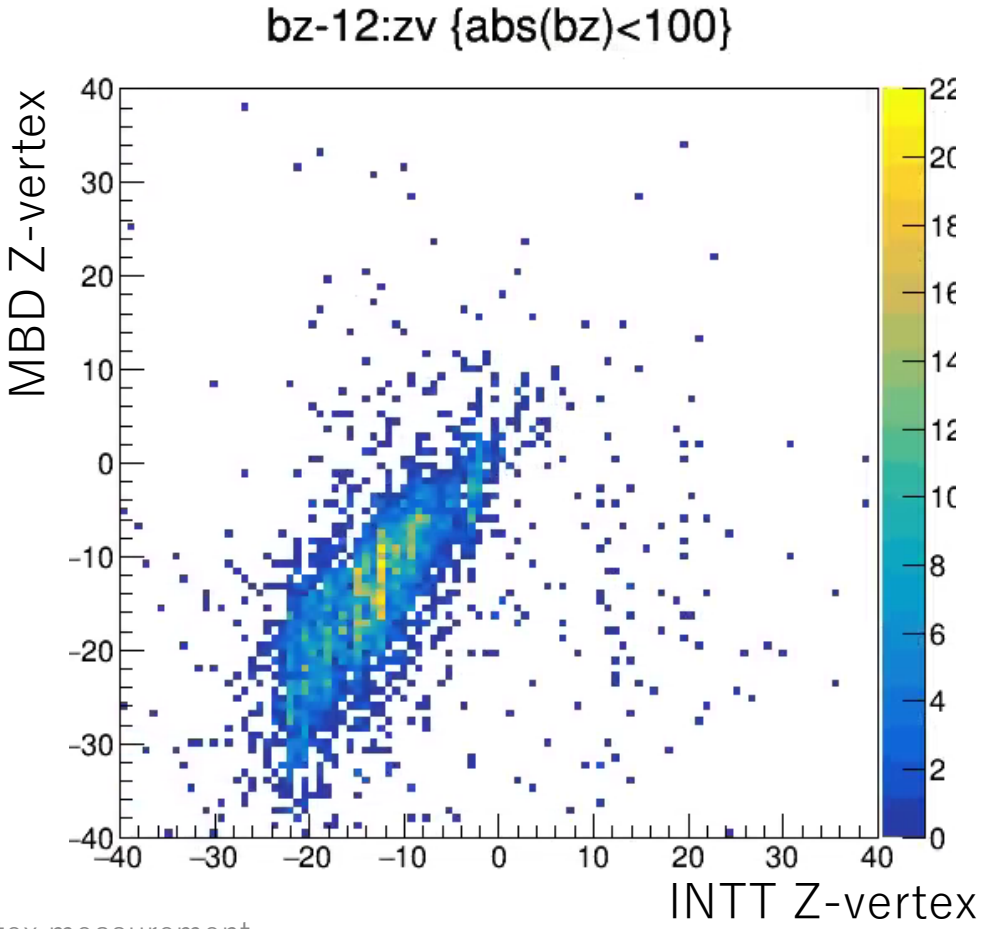


Zvertex correlation: INTT vs MBD

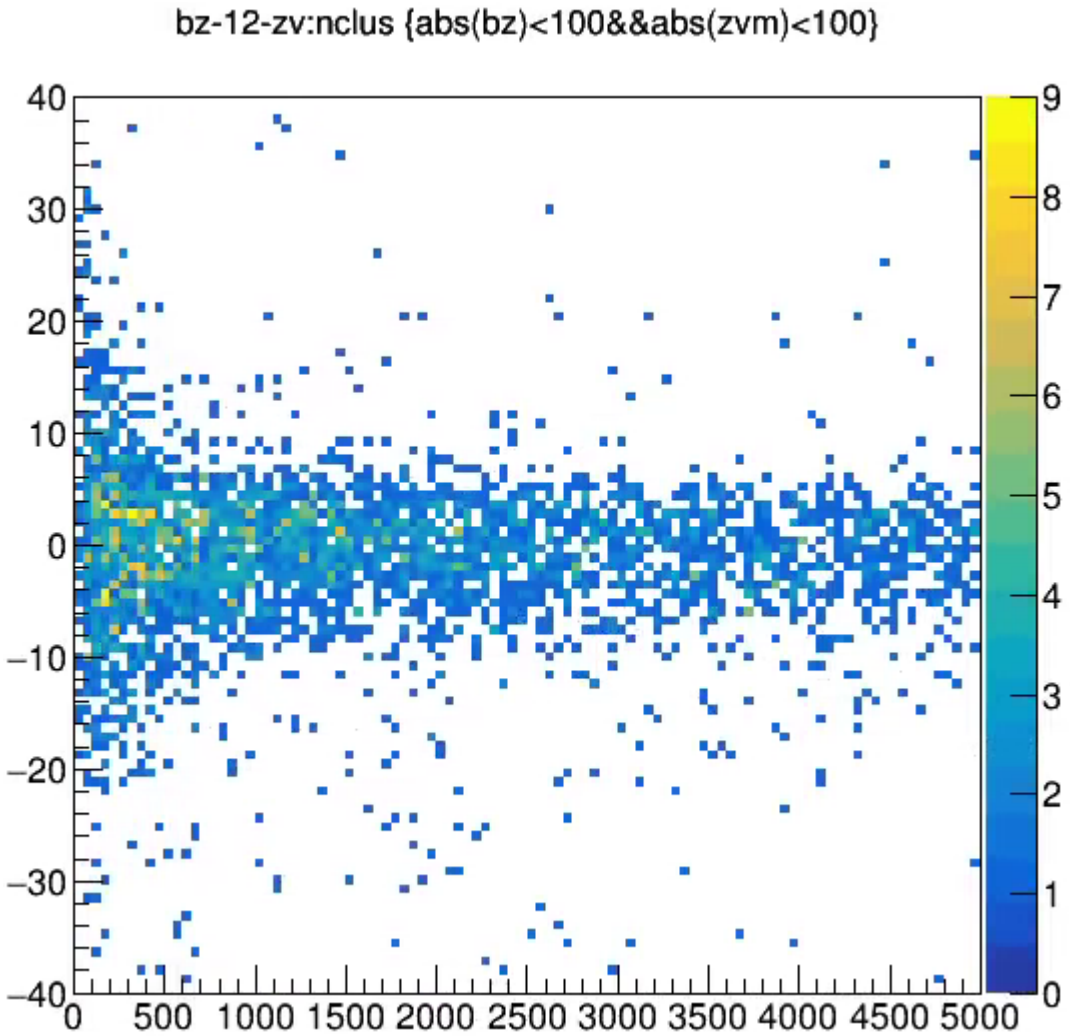
- Zvertex with B-ON data for the first time
- Clear correlation between INTT and MBD

INTT Z-vertex



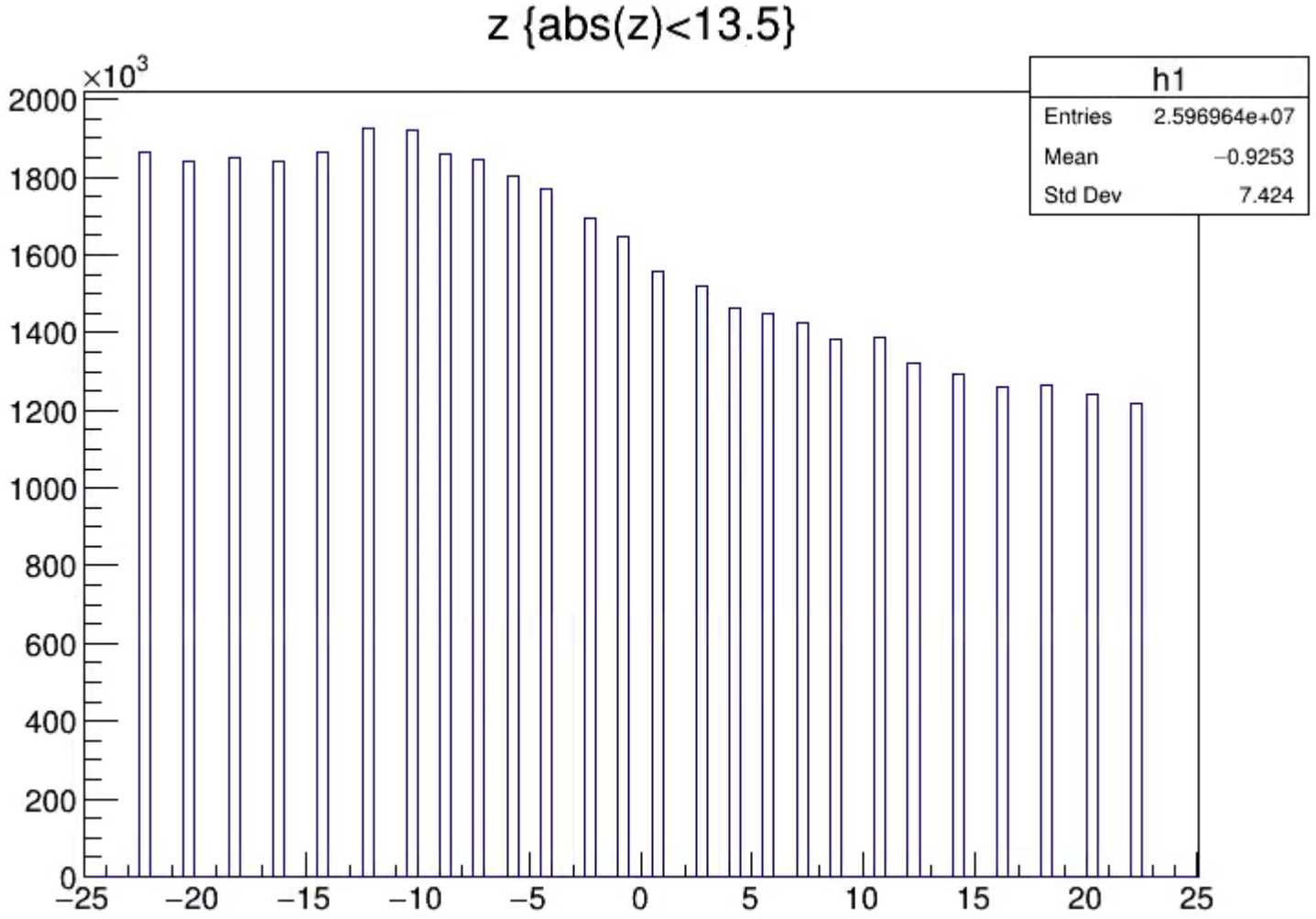


Zvertex difference vs multiplicity



- The difference get smaller for higher multiplicity
  - Geometry issue still remain

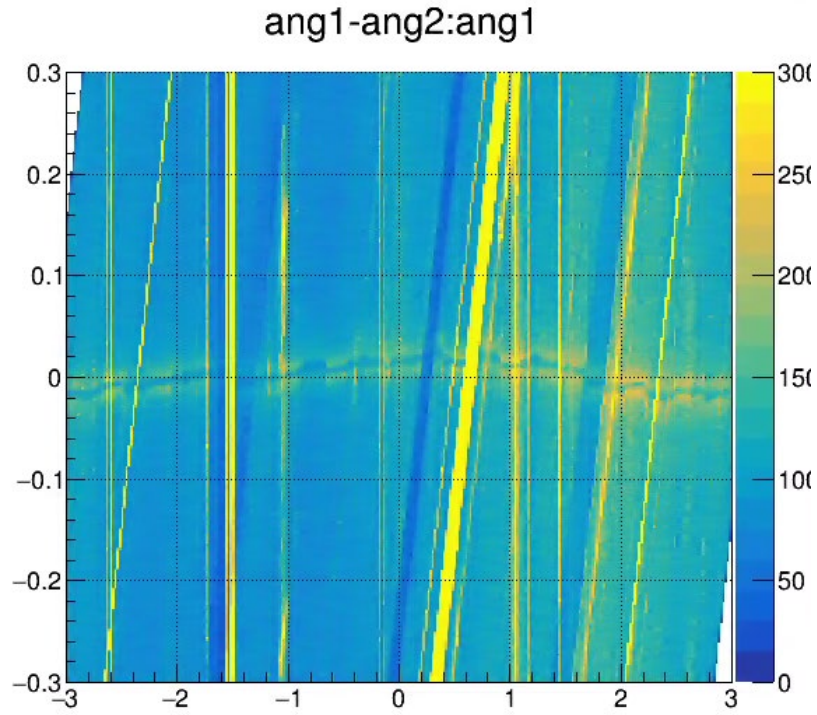
Cluster multiplicity w/ Z position

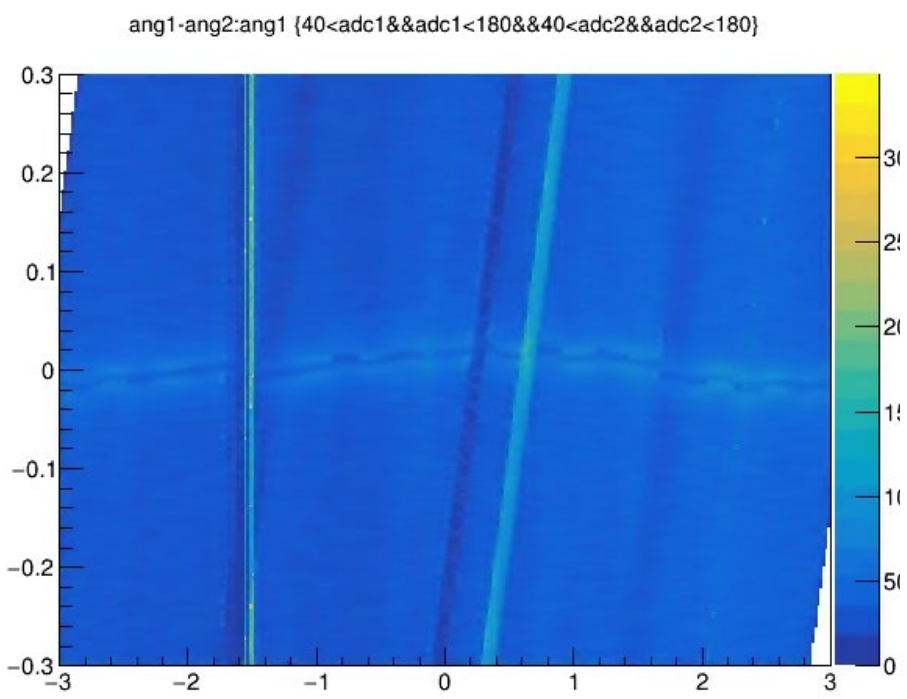


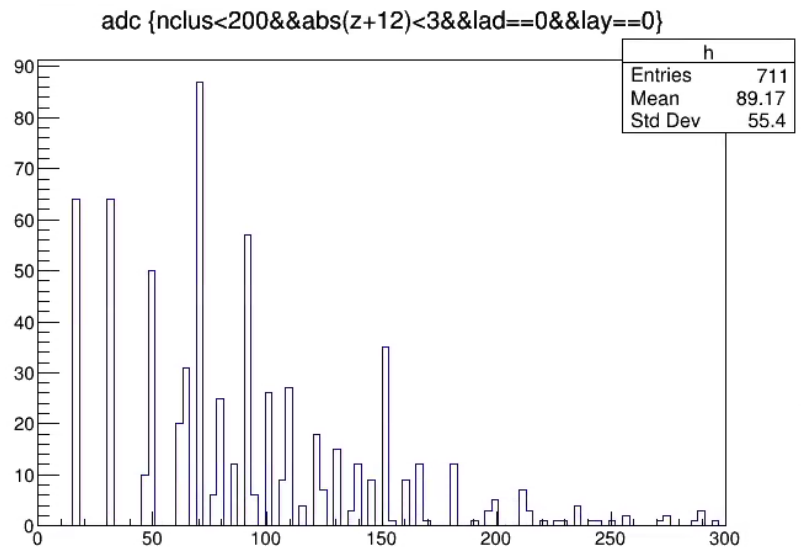
- Sensor size for A/B is normalized.
- Multiplicity shows smooth distribution
- Peak at Z=-12cm, consistent w/ Zvertex peak

Hot channel rejection by ADC

ADC>40





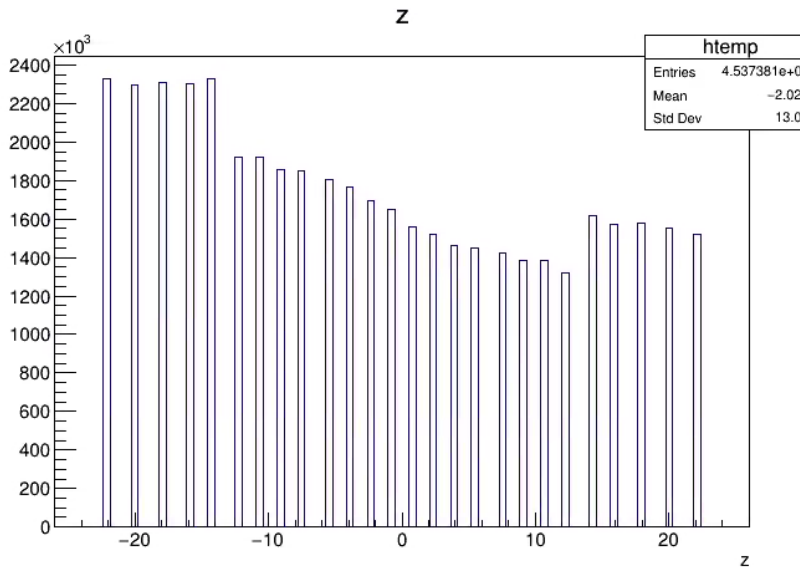


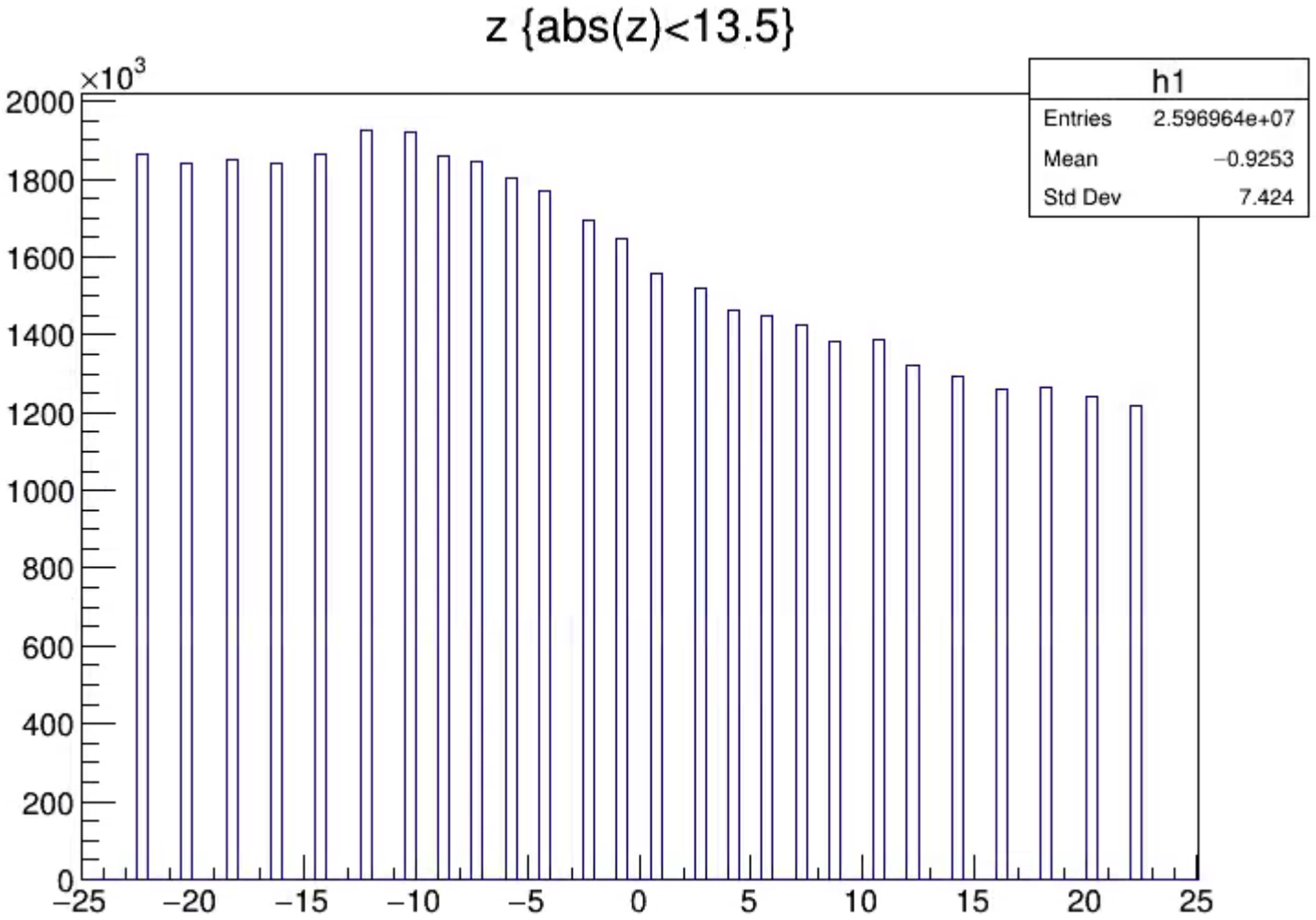
- ADC cut help to reduce noise (hot channel)

Summary

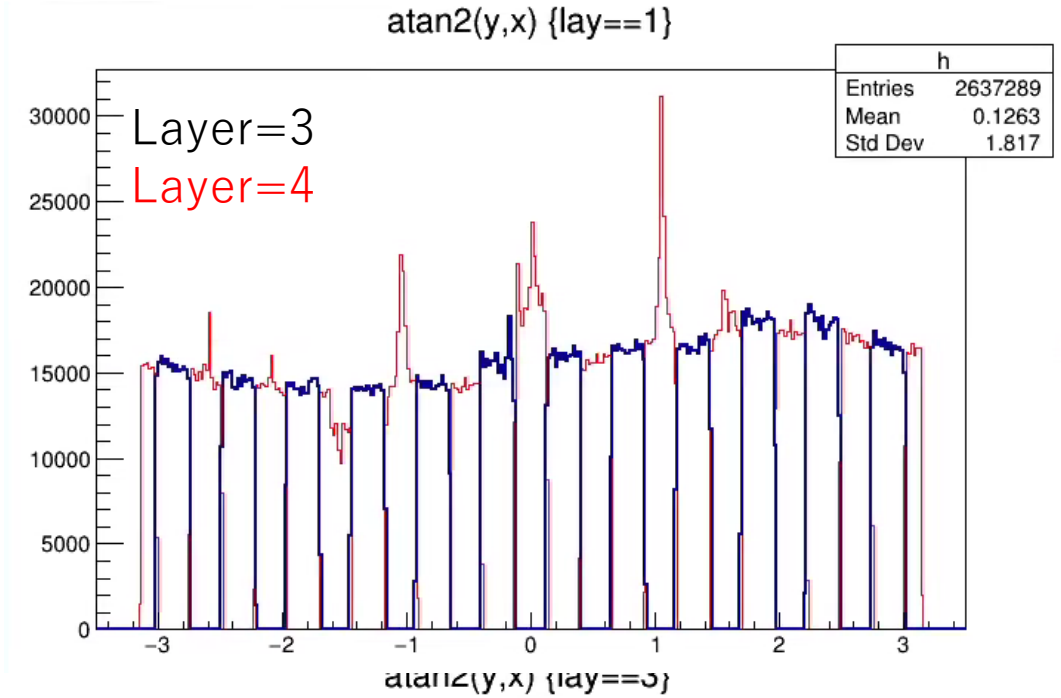
- Ch-mapping issue solved and Geometry issue found
  - Thanks Joseph and ChengWei
- Z-vertex measured in B-ON data and clear correlation w/ MBD
  - Confirmed by Cluster Z distribution

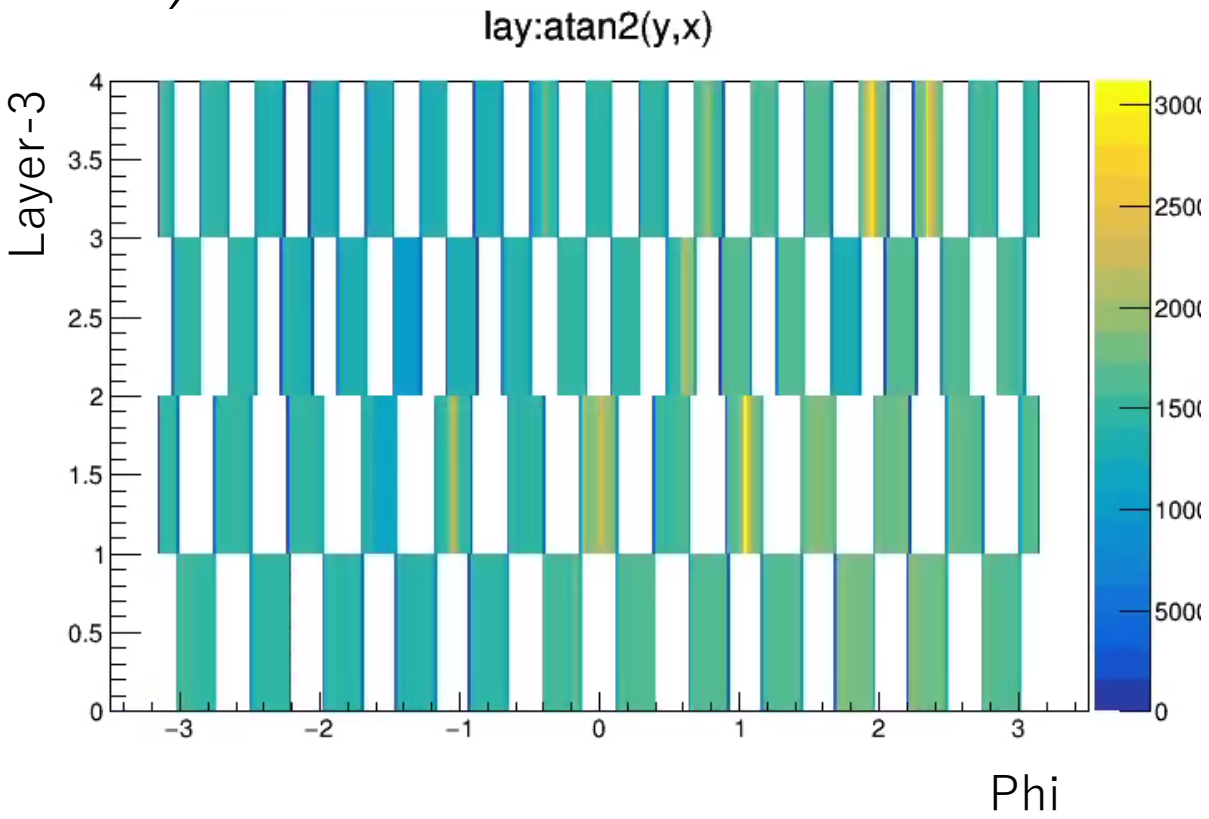
クラスタ分布　センサーサイズで規格化した





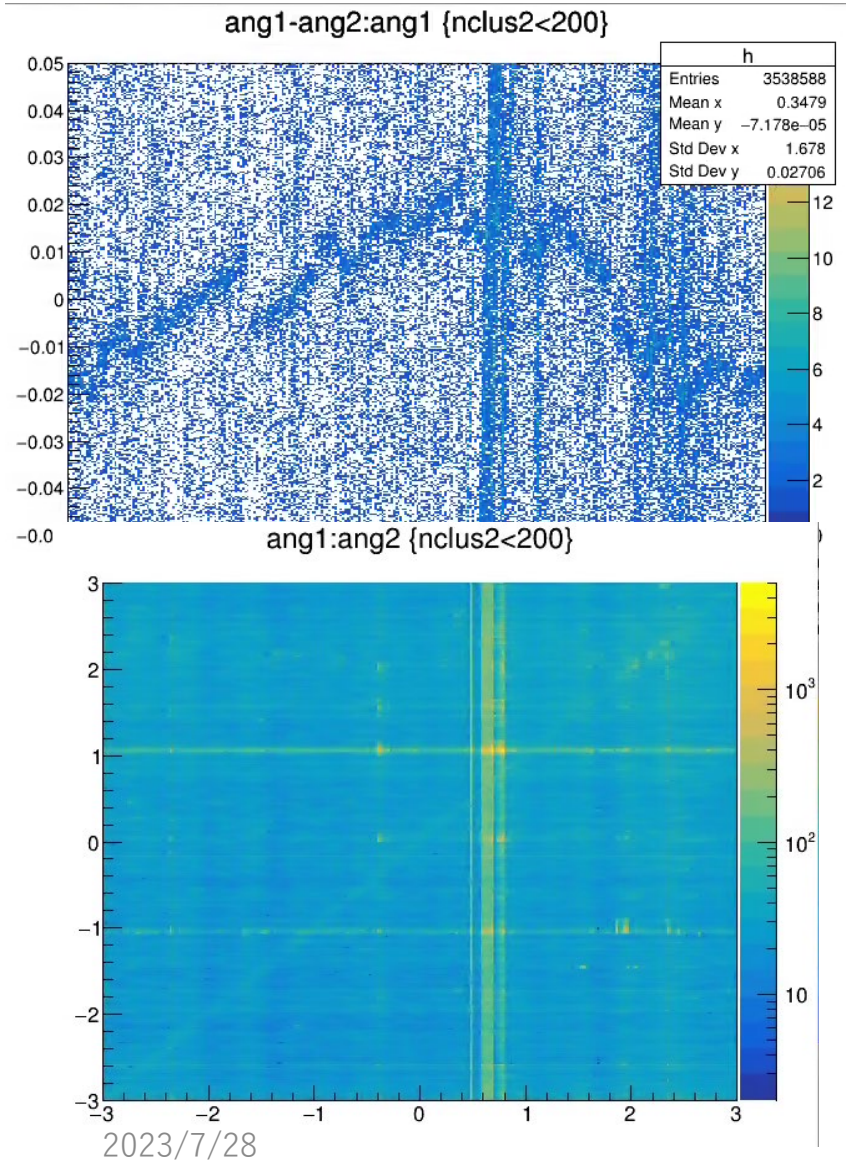
Cluster Phi distribution (Data)

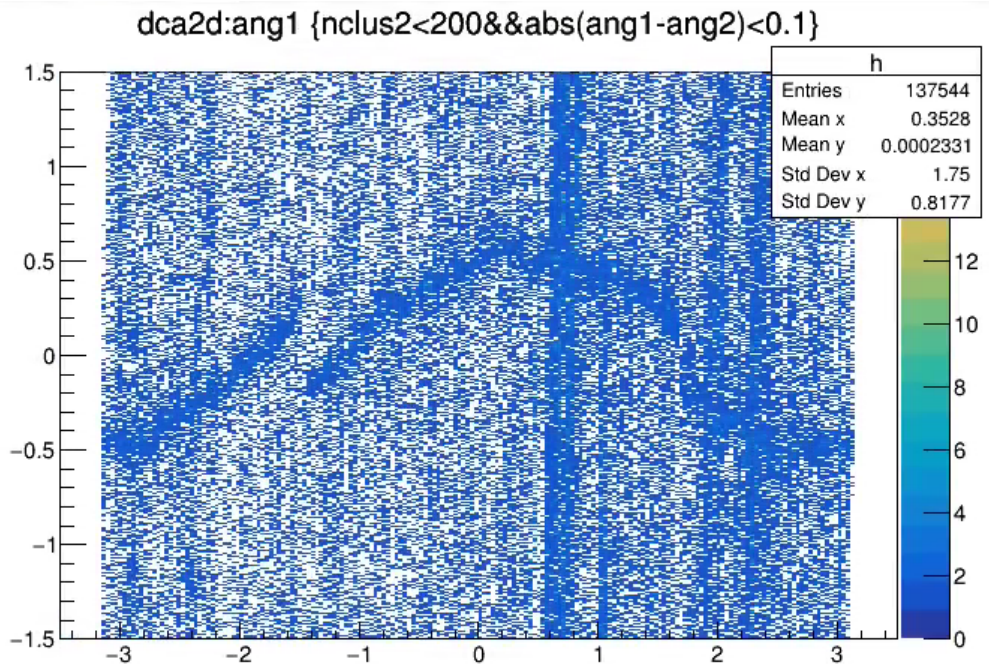




- ラダーに対して、NClusterが滑らかにつながっている。
  - ラダーの並びが入れ替わっていないのではないか
- HotChannel除去が必要

Run 20885 (ZF)

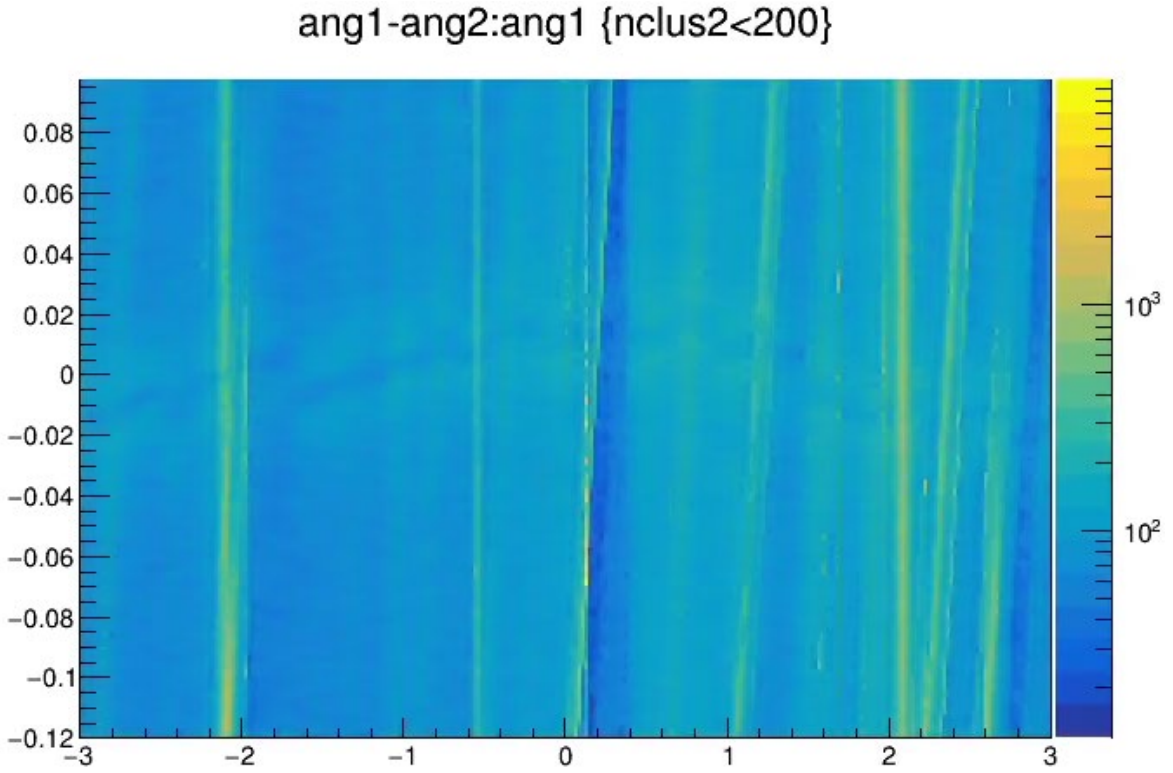




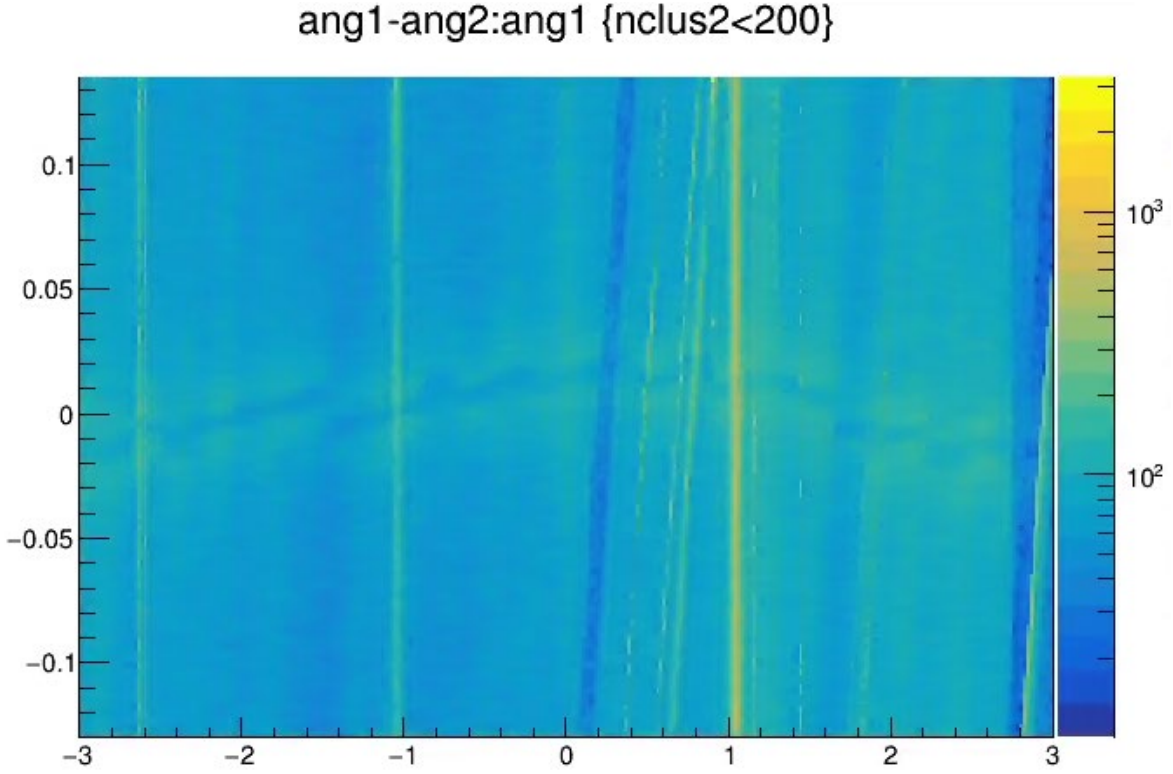
- 7cm * 0.02 = 0.14cm

Full Fieldの比較

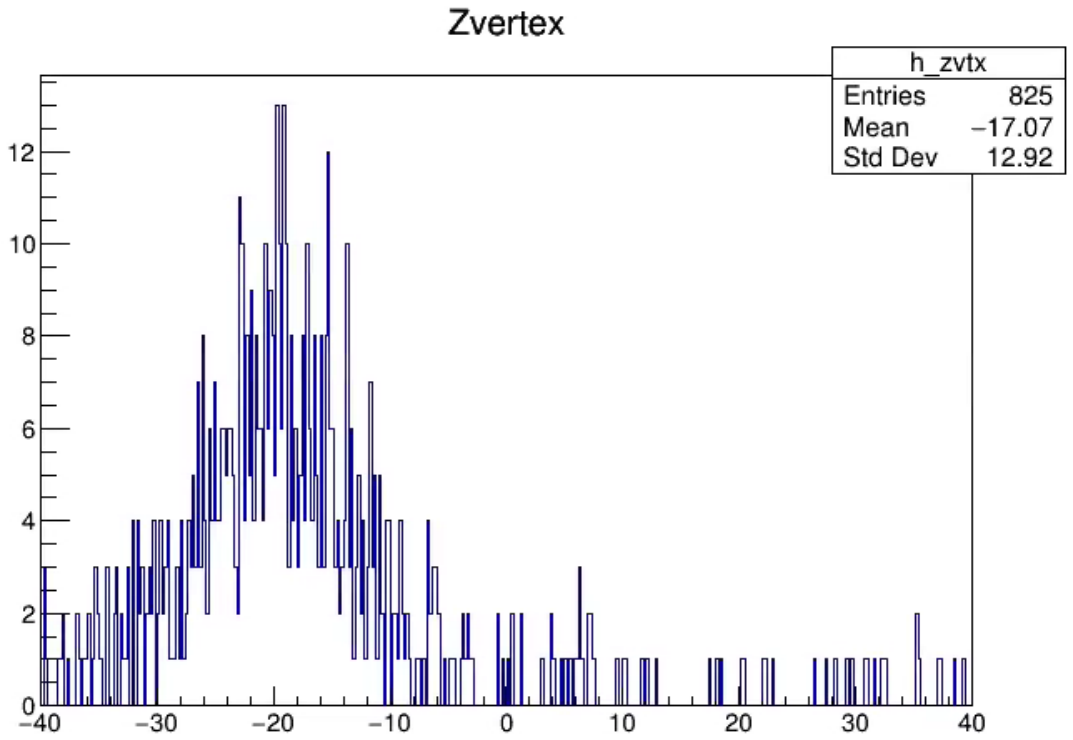
Old mapping



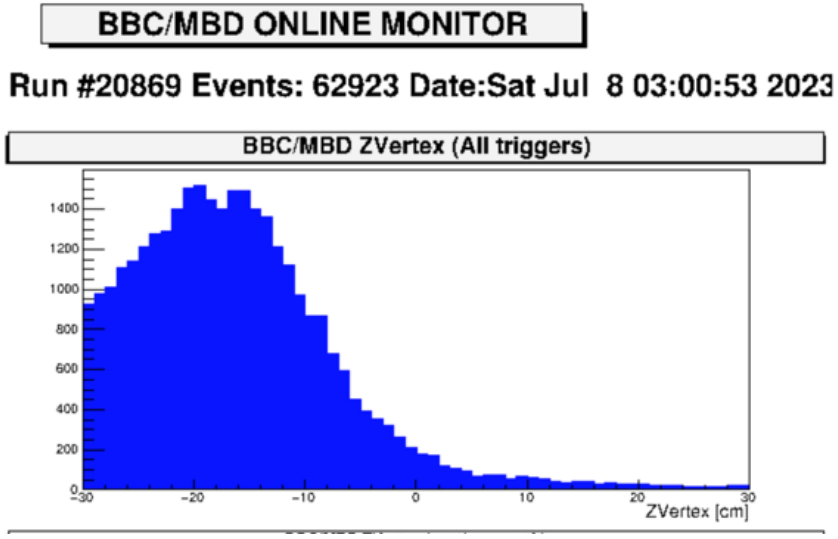
New mapping

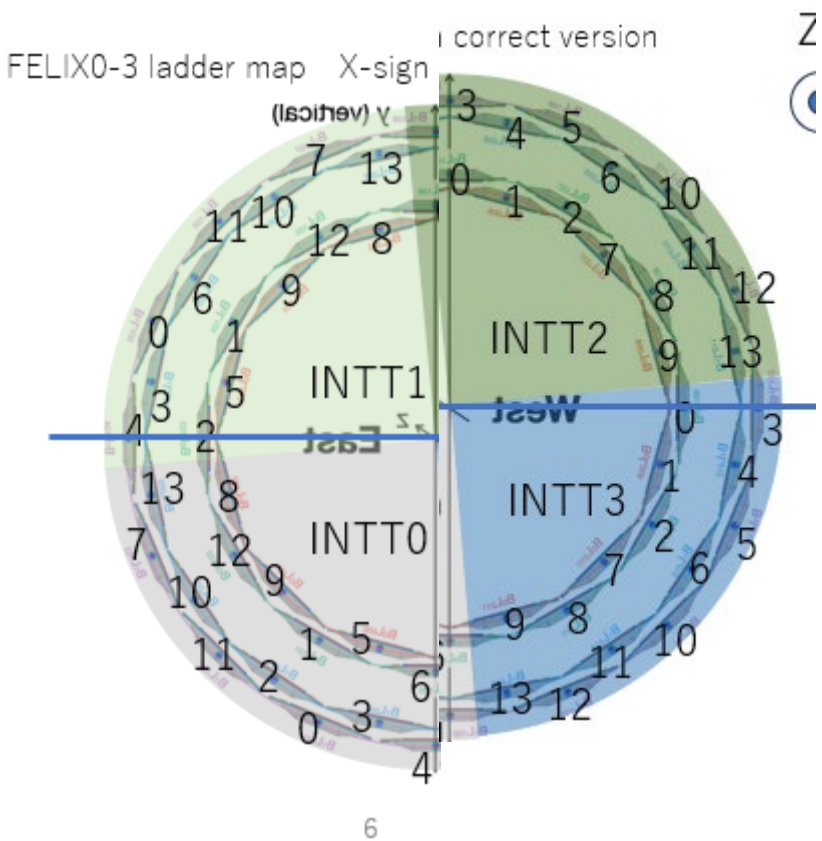


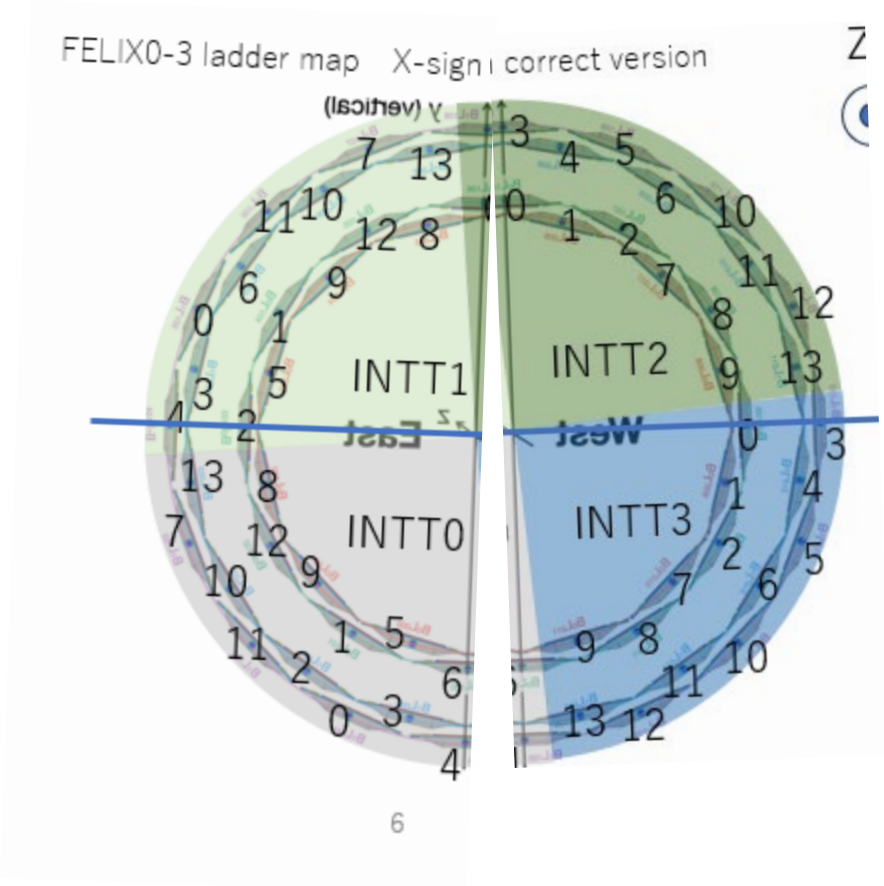
Run 20869 ZF Z-vertex distribution



- First measurement of INTT Z-vertex distribution
  - Software needs to be tuned
- Z-vertex position is -20 cm off from zero
  - This result is consistent with MBD




FELIX0-3 ladder map
correct version
INTT1
INTT2
INTT0
INTT3


FELIX0-3 ladder map
correct version
INTT1
INTT2
INTT0
INTT3