

Belle II VXD TB Alignment

Quick Analysis of RUN 104/202

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Overview

- Quick Intro
- Processing Steps
- „Results“ (=images)
 - Masking
 - Kalman Residuals
 - Beam DQM for pre-alignment
- Conclusion

Quick Intro

- Everything analyzed inside basf2
- Plots from RUN 104 + 202: SVD only
- Full chain up to Millepede II (MP2) alignment is working
- However data quality still too low for MP2 alignment
 - Next to noise, there can be still be some coordinate mismatch ... under investigation

Processing Steps

- Geometry: FullTelescopeVXDTB_v1.xml
 - FieldOn = False
- Input of unpacked data
- Masking of SVD sensors
 - SVDDigitFilter Module

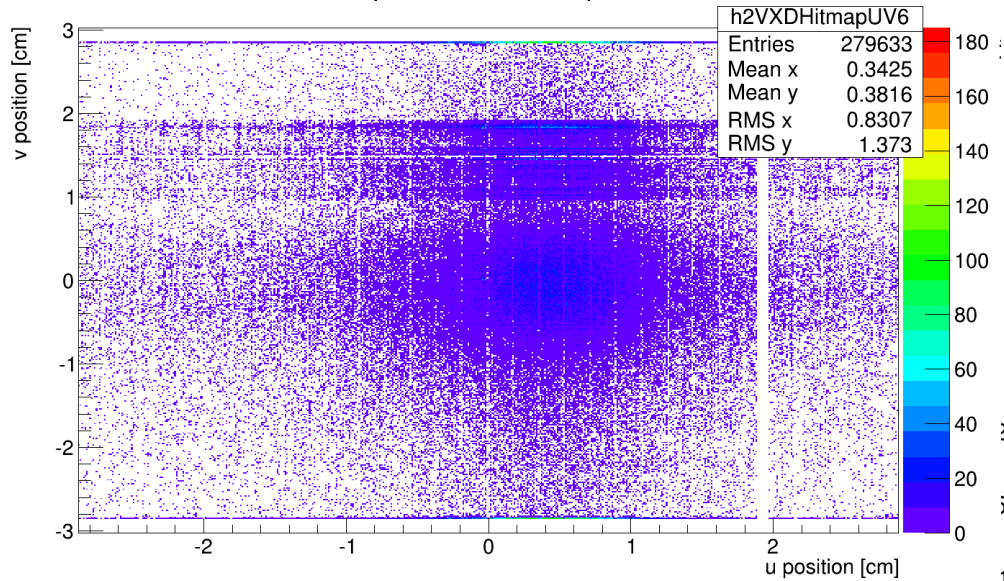
```
106 SVDFiltersVD5.param('maskStripsU', [])
107 SVDFiltersVD5.param('maskStripsV', [110,111,112,113,114,300,301,302,303,304,305,306,307,308,309])
108
109 SVDFiltersVD4 = register_module('SVDDigitFilter')
110 SVDFiltersVD4.param('sensorID', '4.1.4')
111 SVDFiltersVD4.param('maskUupTo', 8)
112 SVDFiltersVD4.param('maskVupTo', 150)
113 SVDFiltersVD4.param('maskUfrom', 600)
114 SVDFiltersVD4.param('maskVfrom', 470)
```

- Track Finding & Kalman Fit
- DQMs: SVD, VXDTF, Trackfit, **Beam**
- Fitting with General Broken Lines => binary file
- Binary file => Millepede II alignment => text results => xml

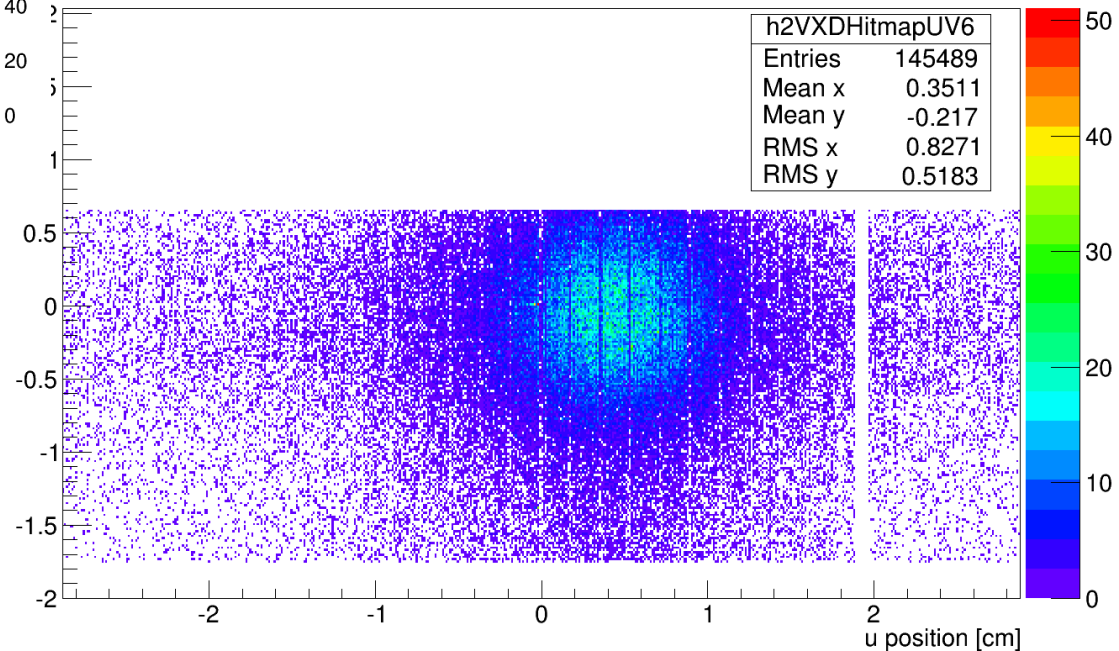
Masking of SVDs

- Mainly because of this in SVD6:

Hitmap VXD in U x V, plane 6

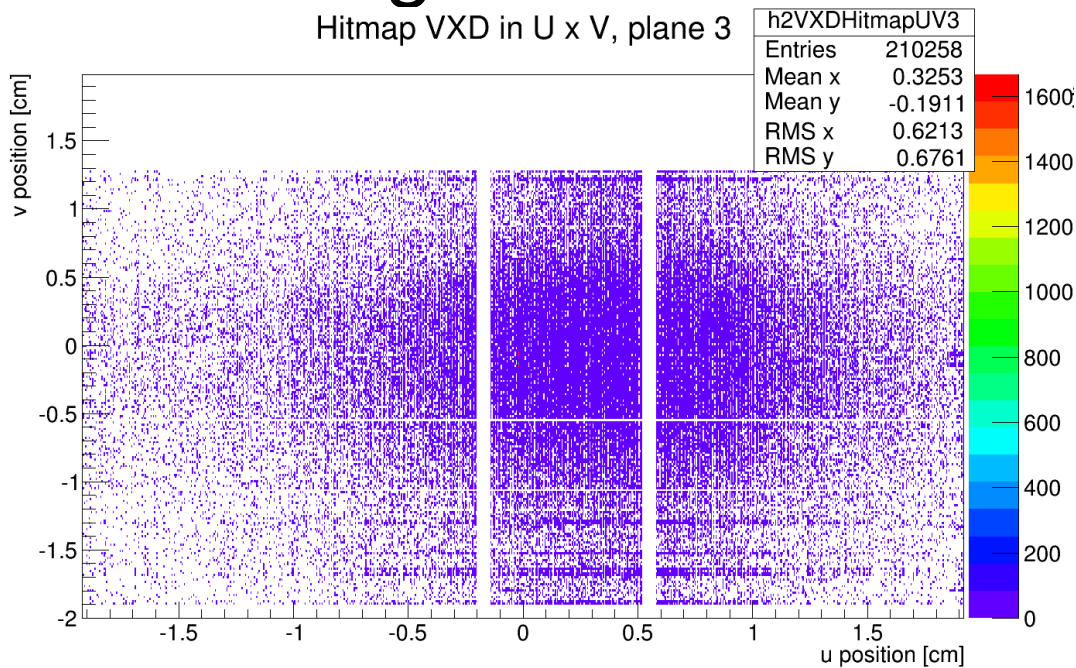


Hitmap VXD in U x V, plane 6

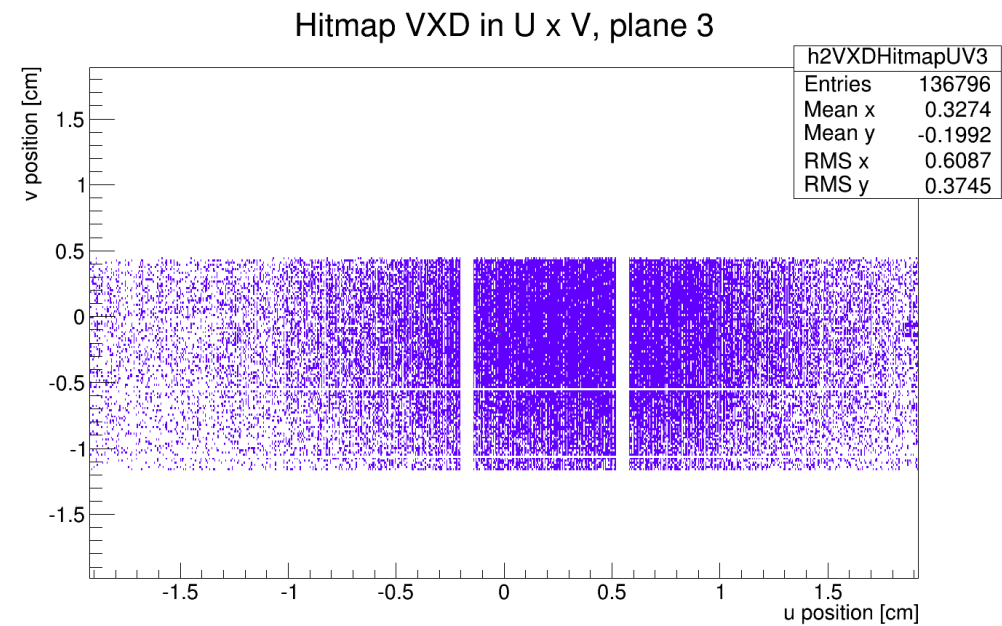


Masking of SVDs

- Brute-force masking to get rid of everything strange



OK, this was too much :)



Browser Eve Camera Scene

Event Control | Tab 1

Event

45 / 44531

Delay (s): 0,3

Jump to event/run/exp...

Event: 34
Run: 220
Experiment: 0

Options

- Show MC info
- Assign hits to primary partic.
- Show all primaries
- Show all charged particles
- Show all neutral particles
- Hide secondaries
- Show candidates and rec. hits
- Show tracks, vertices, gammas

Viewer

Dark/light colors

Save As... Save As (High-Res)...

Cumulative mode (experimental)

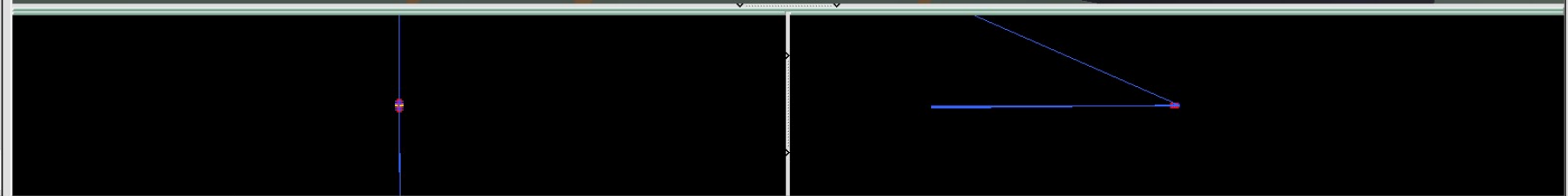
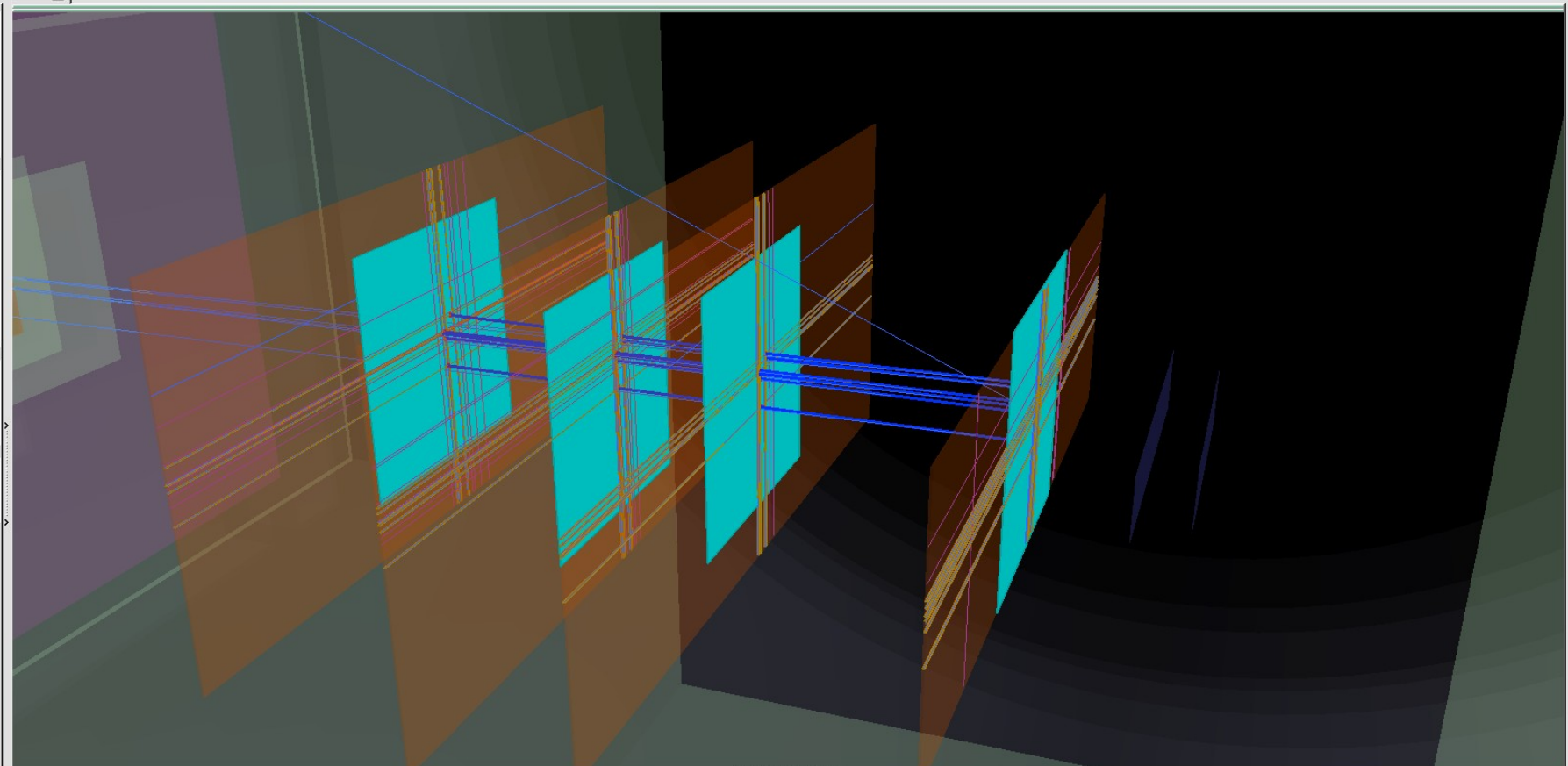
Automatic Saving (experimental)

Prefix: display

Width (px): 800 Save PNGs

Closing

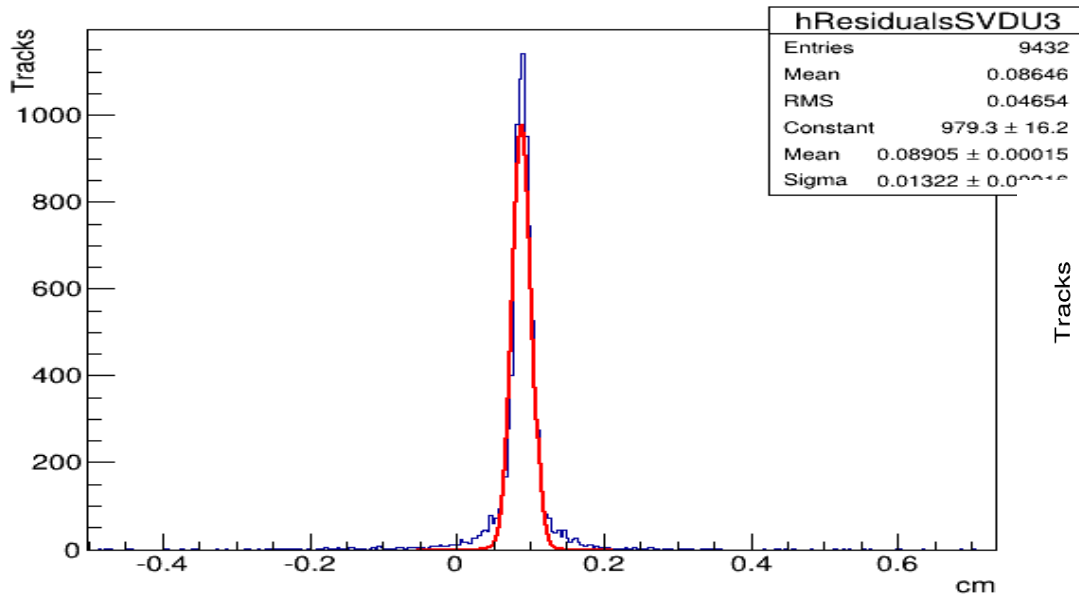
Continue without display Exit



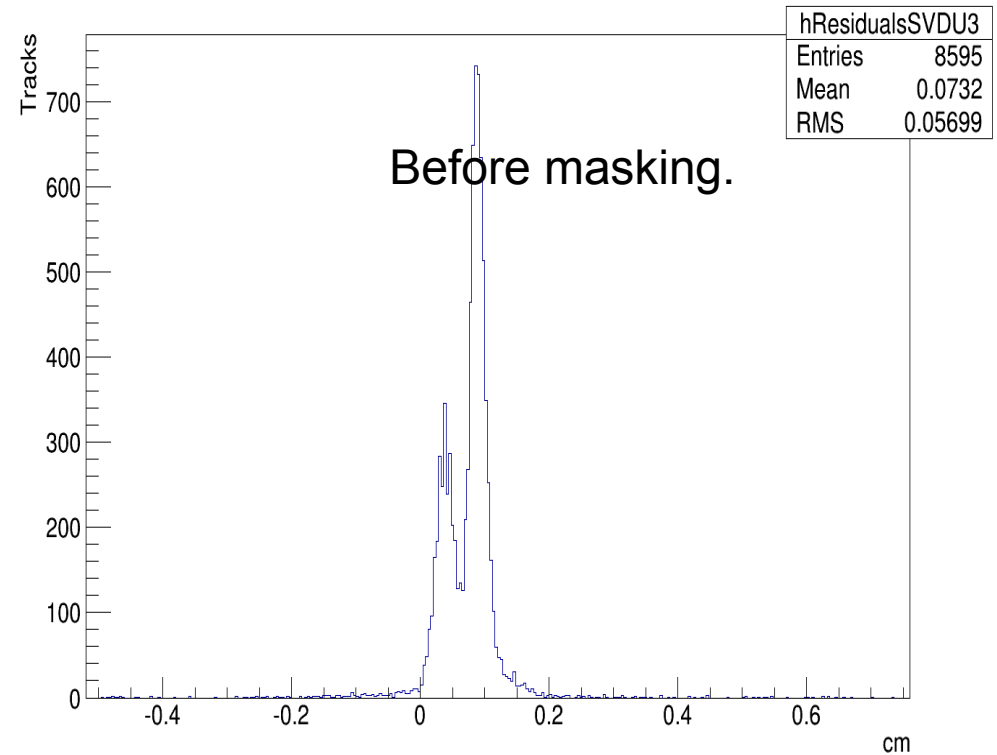
User clicked on: "VXDBox-Window2"

Kalman Residuals: 2 worst examples

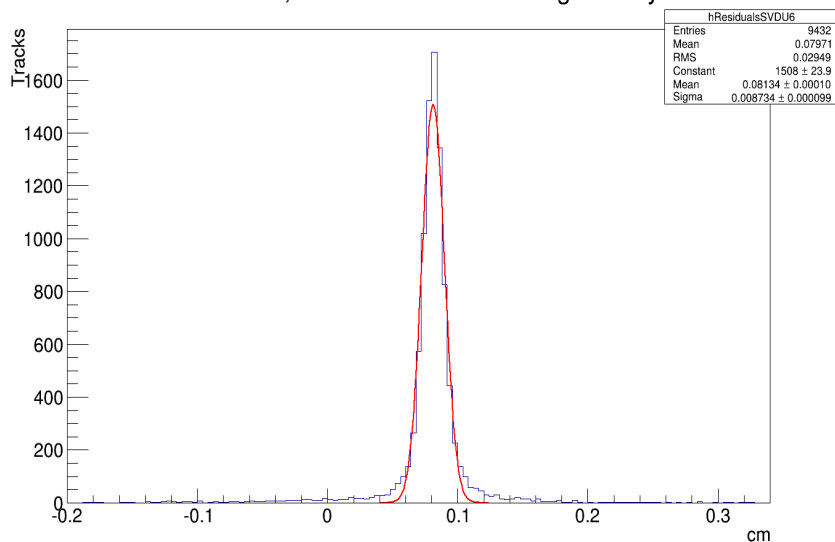
unnormalized, unbiased residuals along U in layer 3



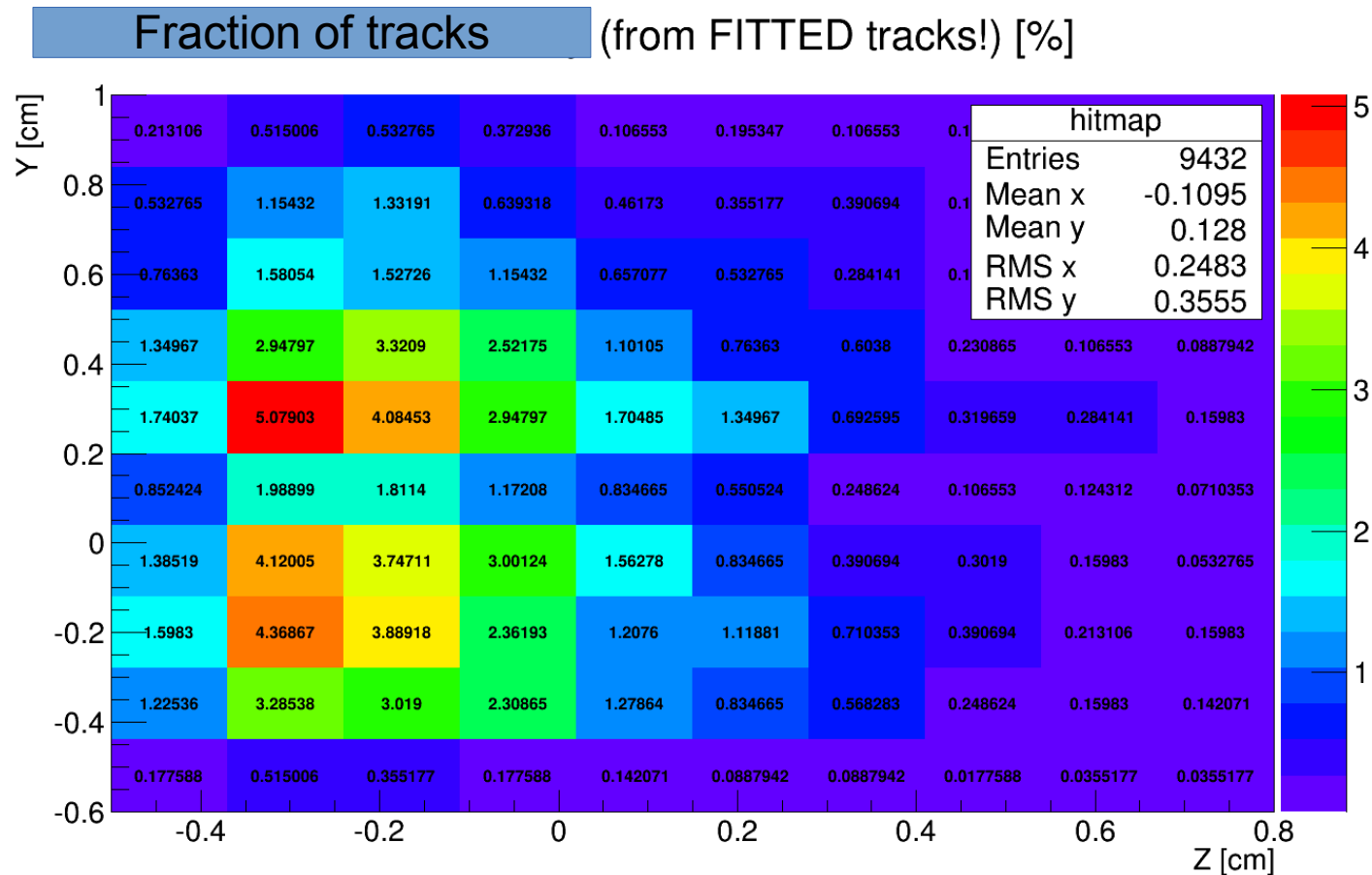
unnormalized, unbiased residuals along U in layer 3



unnormalized, unbiased residuals along U in layer 6

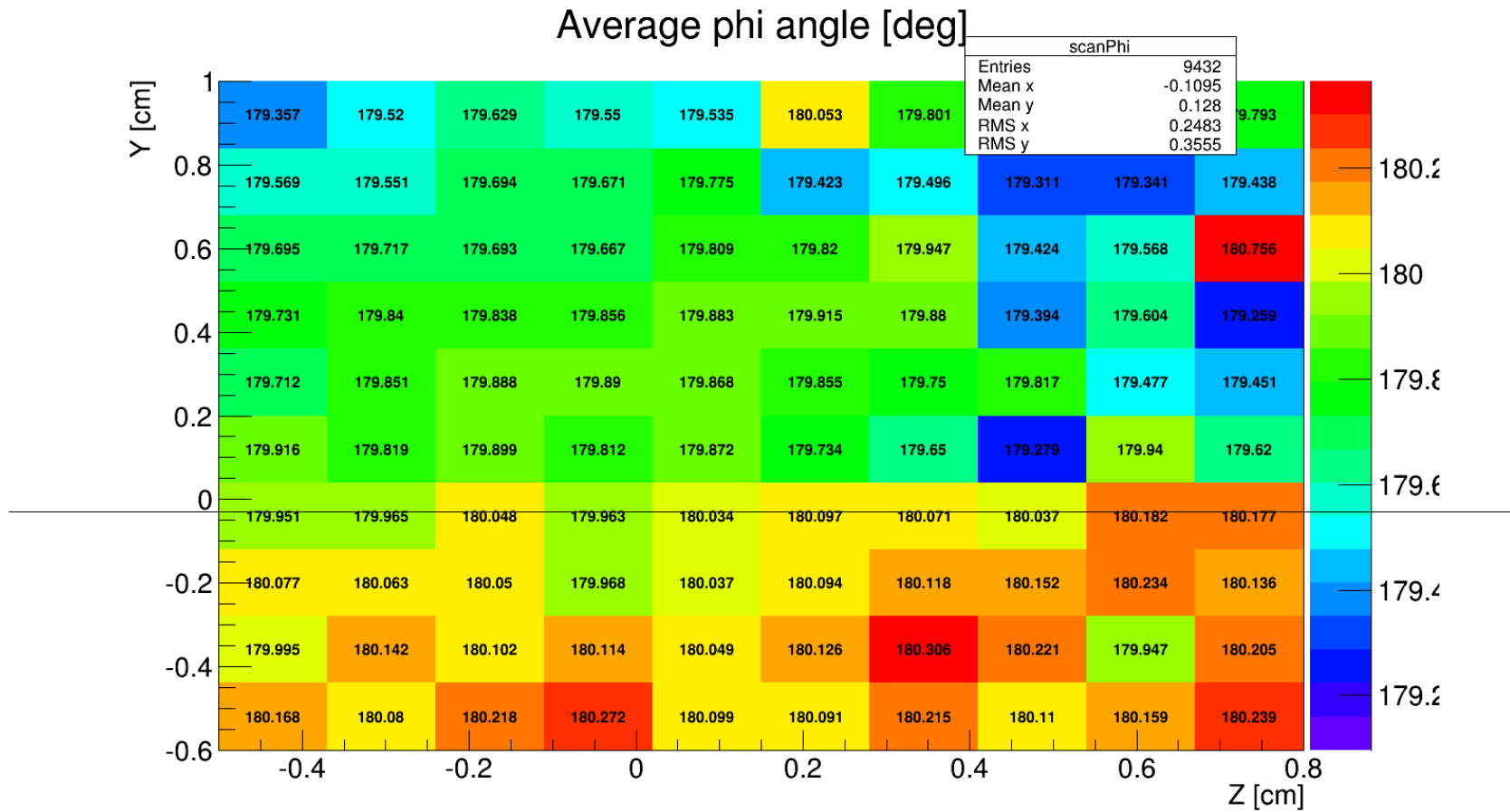


Beam DQM at SVD3 RUN 202



- Histogram average fitted track momentum vector from Kalman filter over sensor area
- „BeamDQM“ in basf2

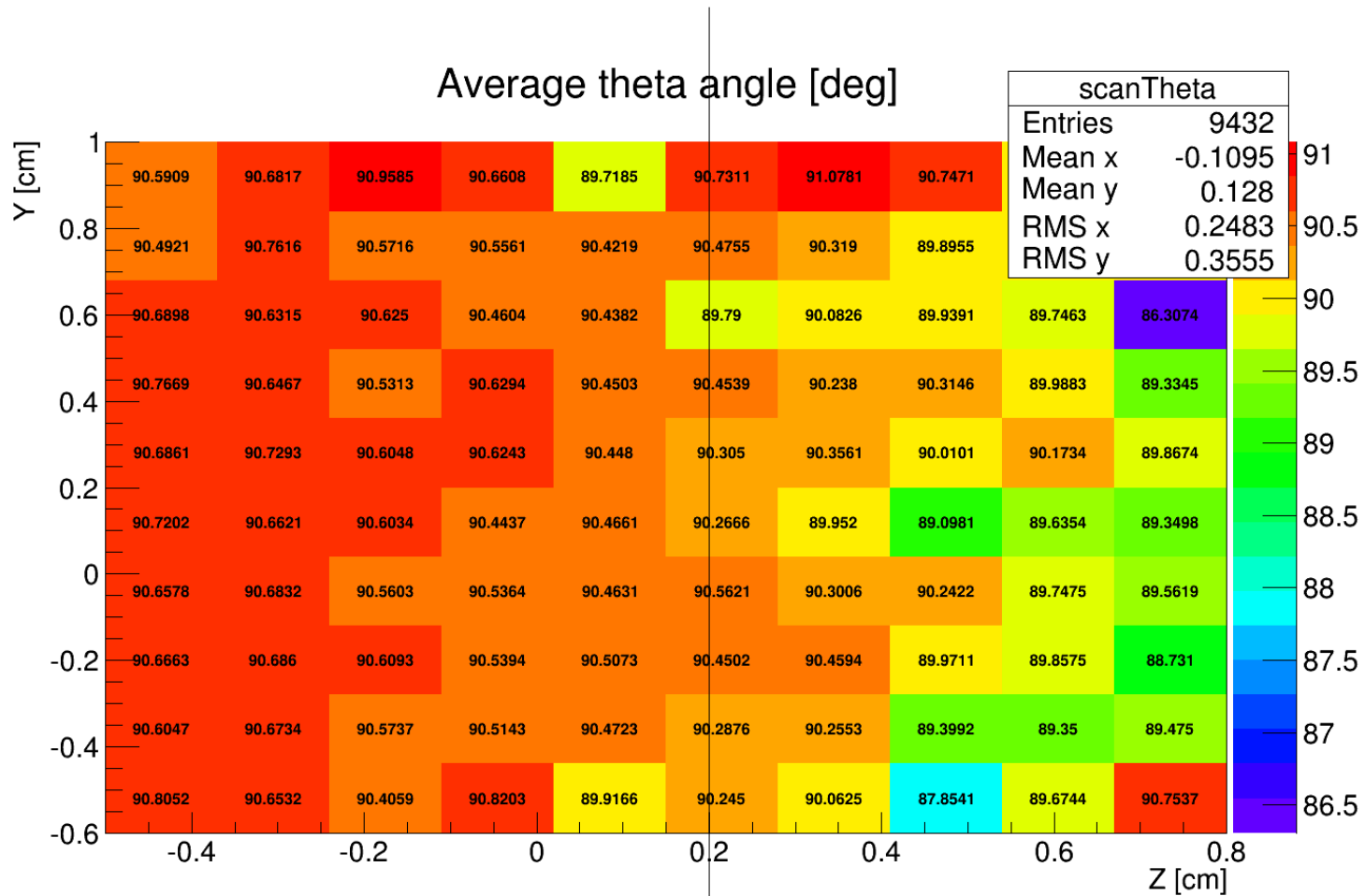
Beam DQM



Correlation between track position and slope from transport in 15m of air from collimator

Track perpendicular almost at the beam spot center: OK

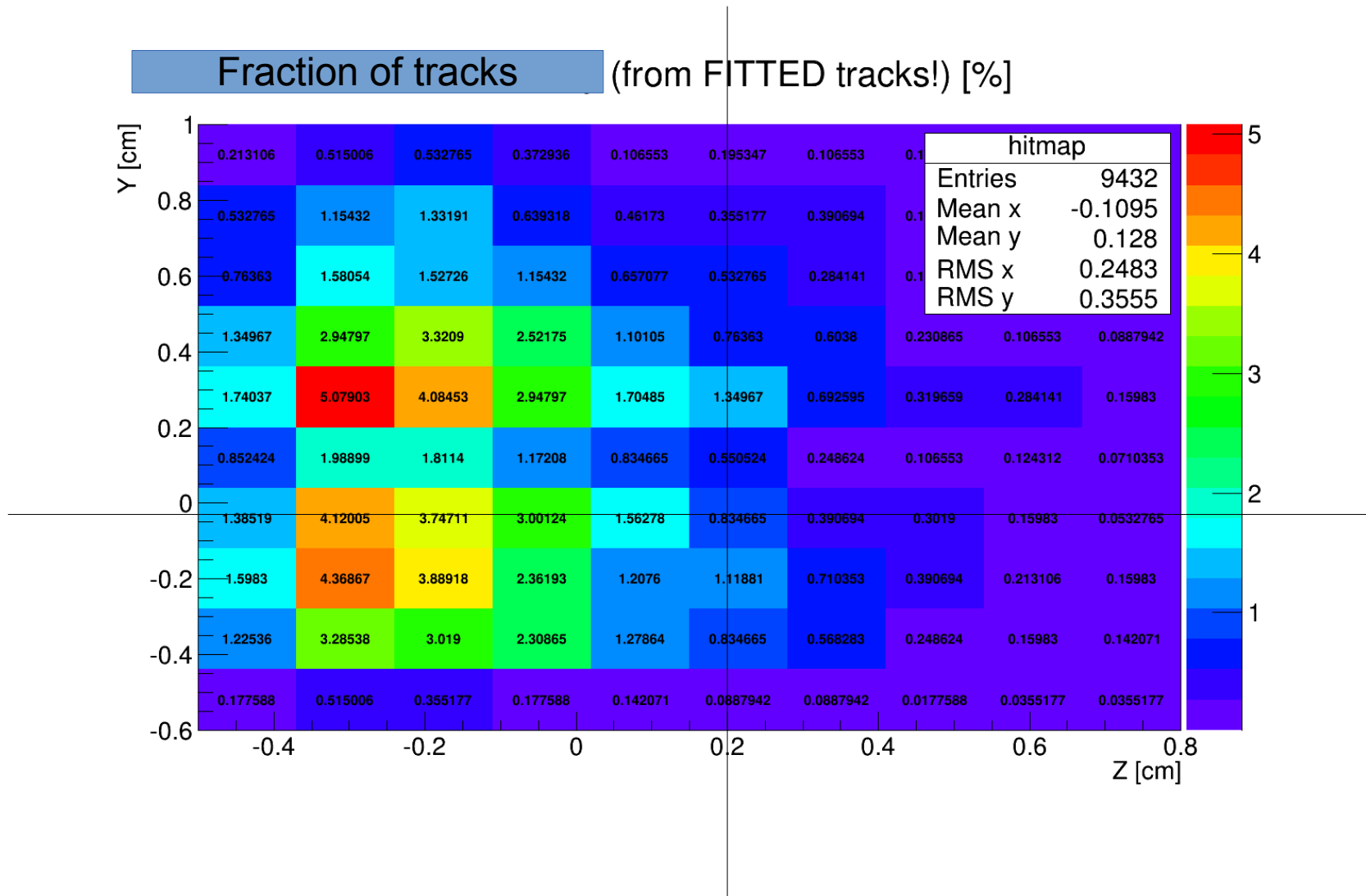
Beam DQM



Correlation between track position and slope from transport in 15m of air from collimator

Track perpendicular out of the beam spot center: PCMag rotated a bit ... (?)

Beam DQM



Track perpendicular out of the beam spot center: PCMag rotated a bit ... (?)

Conclusion

- Improving data quality
- Improving interface to General Broken Lines and Millepede II
- Claus Kleinwort is helping me with the alignment in Millepede II
 - I hope to debug it and have working MP2 alignment as soon as possible
- At least, we can use the beam (without field) for alignment (and residuals ... iterations ...)
- In the middle of testbeam, the alignment almost works :)