

SVD EFFICIENCY WITH ROIs

RUNS77, 78 AND 1424

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Introduction

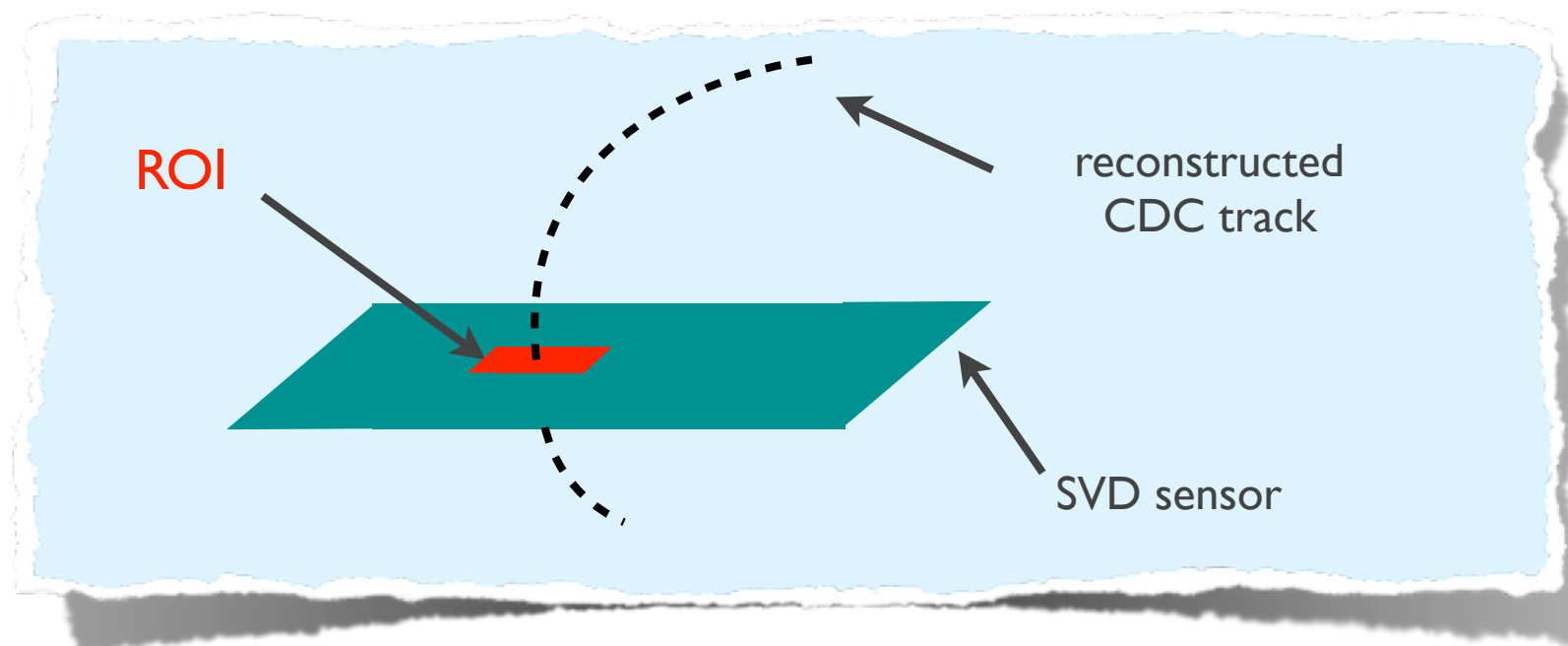
- ➔ I have reconstructed three runs, adding two steps to the standard reconstruction to reduce the impact of electronic noise on the measurement
- Zero Suppression (ZS) Emulator: at least one sample with $\text{SNR} > 5$
 - SVD Region Of Interest Finding

runs	# events	magnet	trigger	masking	ZS	latency
77	270567	on	ECL+CDC +1Hz rnd	<i>hard</i> online strip masking	SNR \geq 3	**158
78	282698					**159
1424	174564		ECL+CDC +100Hz rnd	<i>loose</i> on. str. masking		158

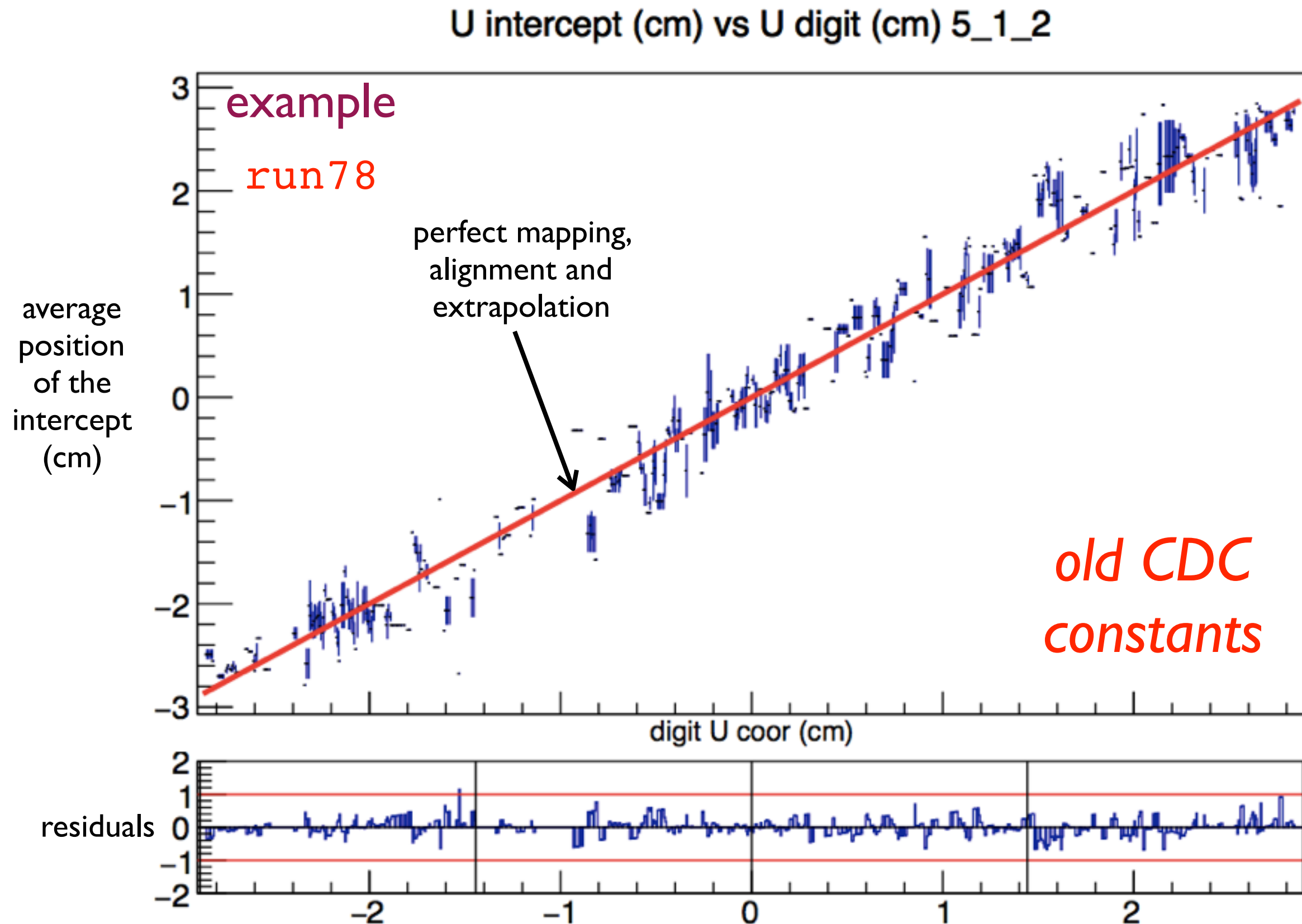
- ➔ new CDC calibration constants have been uploaded last week (8th March?):
- including CDC alignment,
 - produced with an “old” version of the B-Field, they will be updated when the new B-Field will be available

SVD ROI Finding

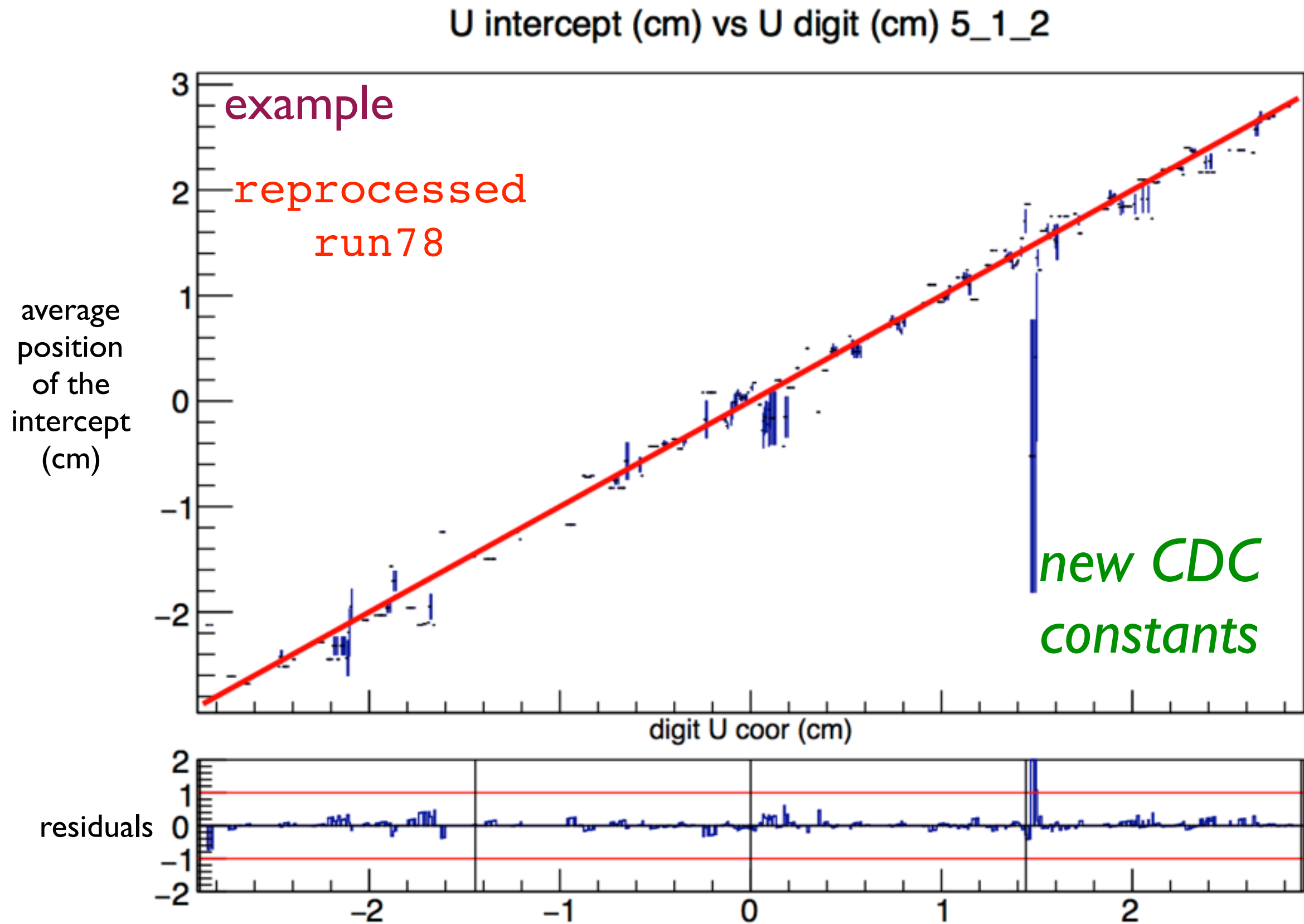
- ➔ In order to select the strips actually crossed by a cosmic, an SVD ROI Finder module has been written
- ➔ The idea is the same of the PXD ROI Finder module:
 1. takes CDC tracks
 2. extrapolates towards SVD sensors and find the intercept with the sensor plane
 3. defines a rectangular region around the intercept
 4. overlaps this region with the sensor, translating the ROI in min and max U/V strips



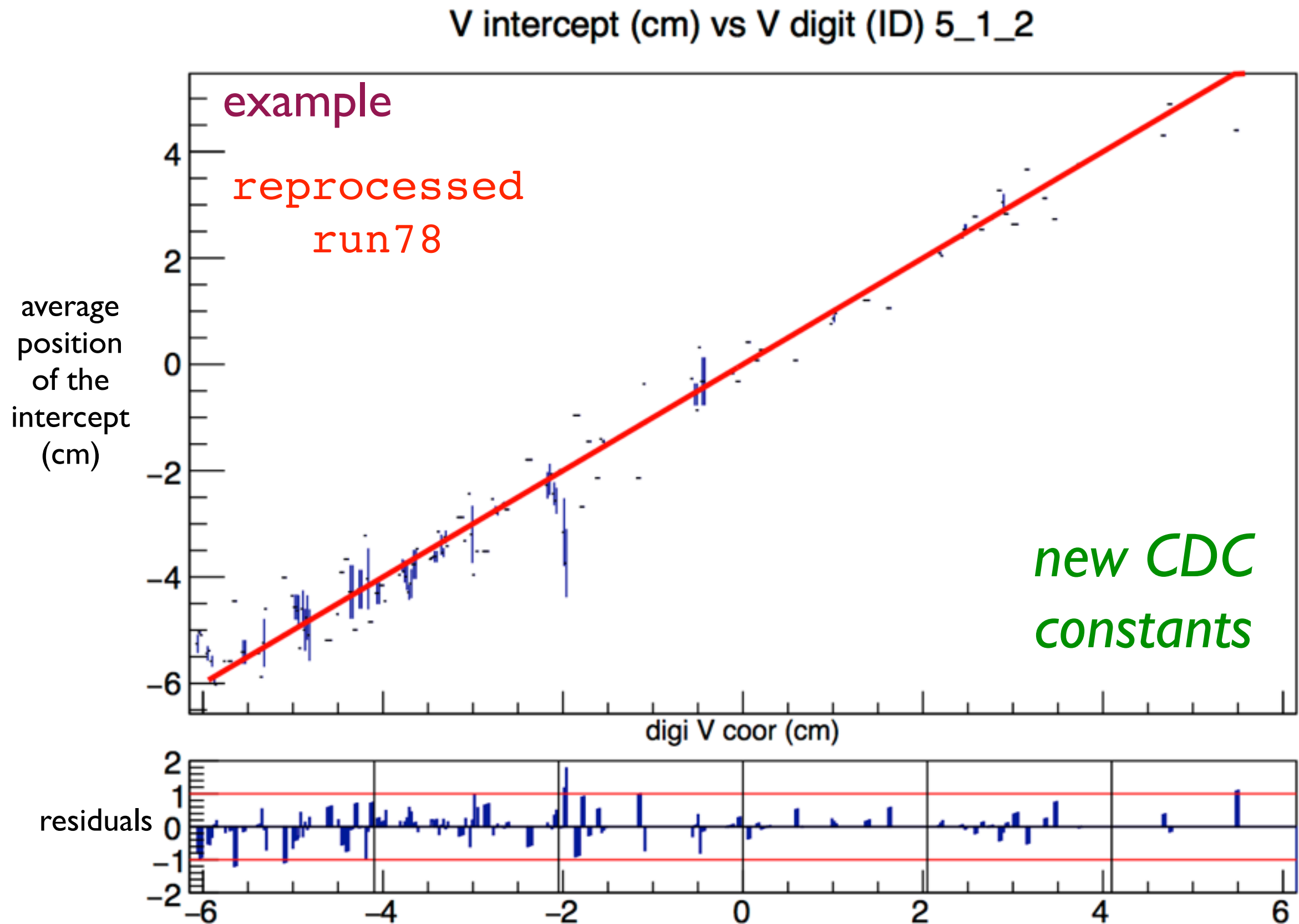
Residuals of Good Strips



Residuals of Good Strips



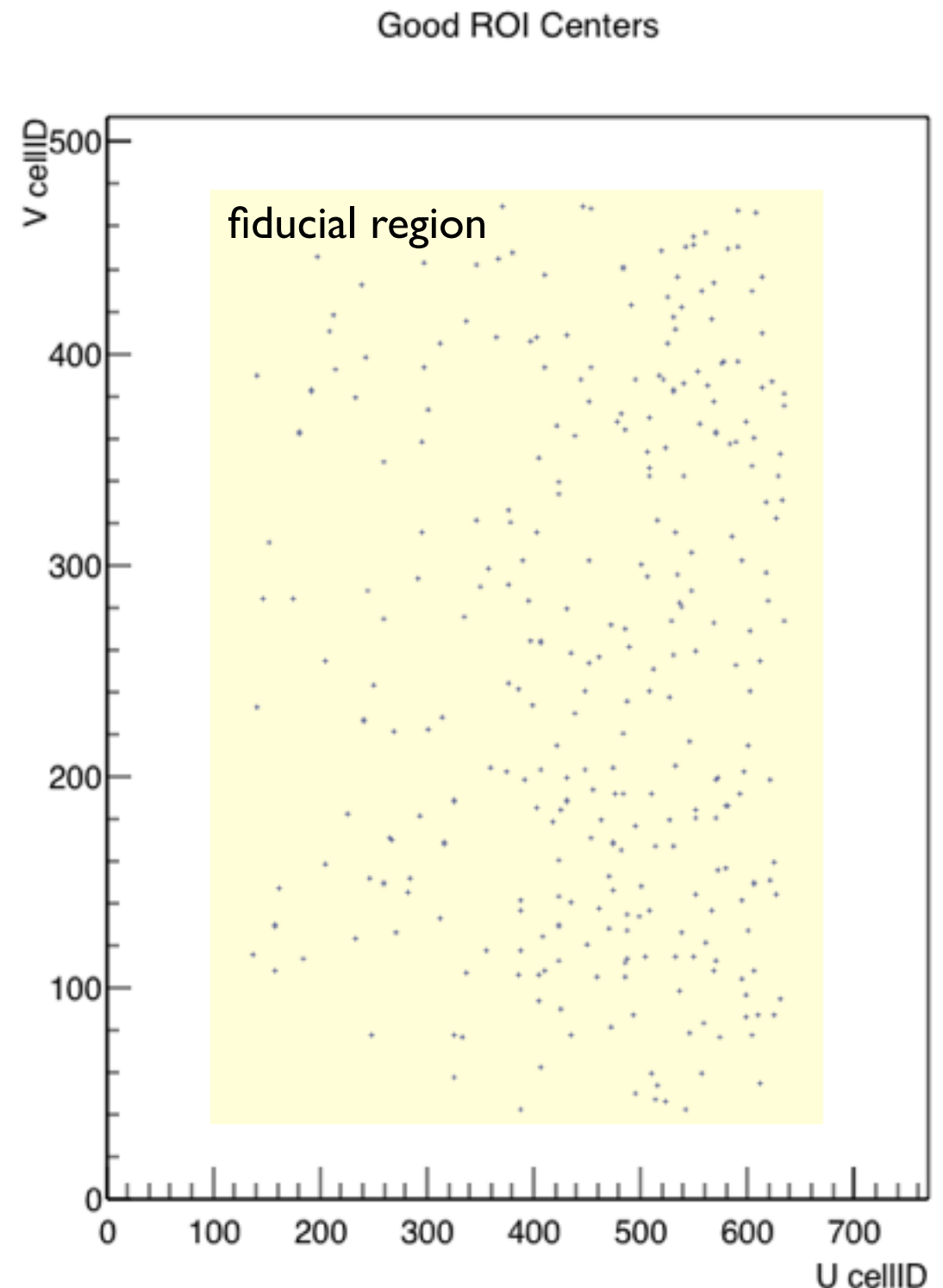
Residuals of Good Strips



SVD Efficiency Measurement

The SVD efficiency is estimate counting the number of *empty* ROIs, assuming that each ROI contains at least one good strip.

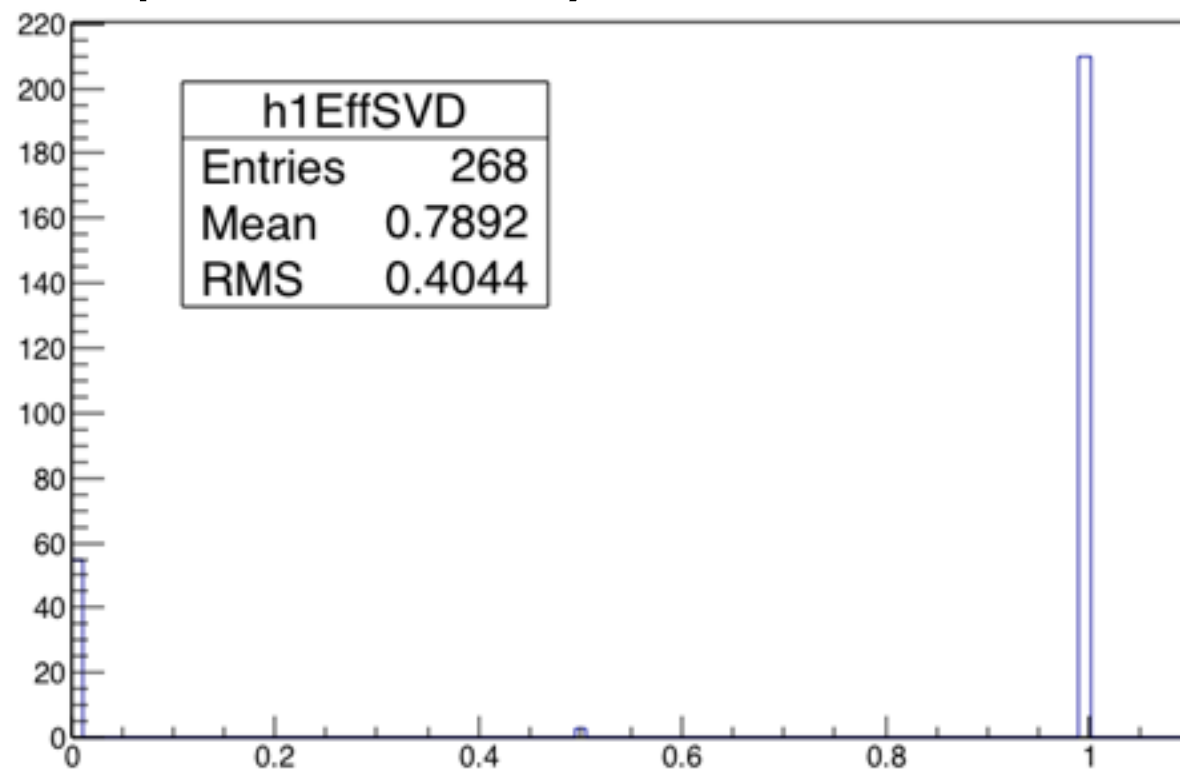
- ➔ Apply a selection on the tracks and on the ROIs position (*good ROIs*):
 - track P-Value > 0.1%
 - ROI center within 1 cm (1.5 cm) from the short (long) edge
- ➔ Some numbers:
 - **Run78**, 282690 events
 - max ROI size 1 cm along U, 1.5cm along V
 - number of events = 282689
number of tracks = 487100
number of Intercepts = 81542
 - improvements w.r.t. old CDC constants:
number of events = 282689
number of tracks = 382511
number of Intercepts = 71129



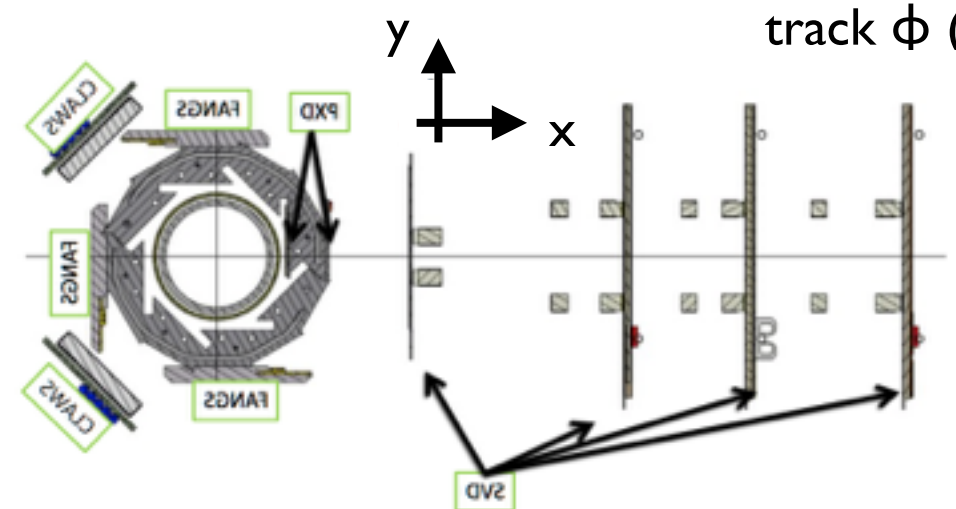
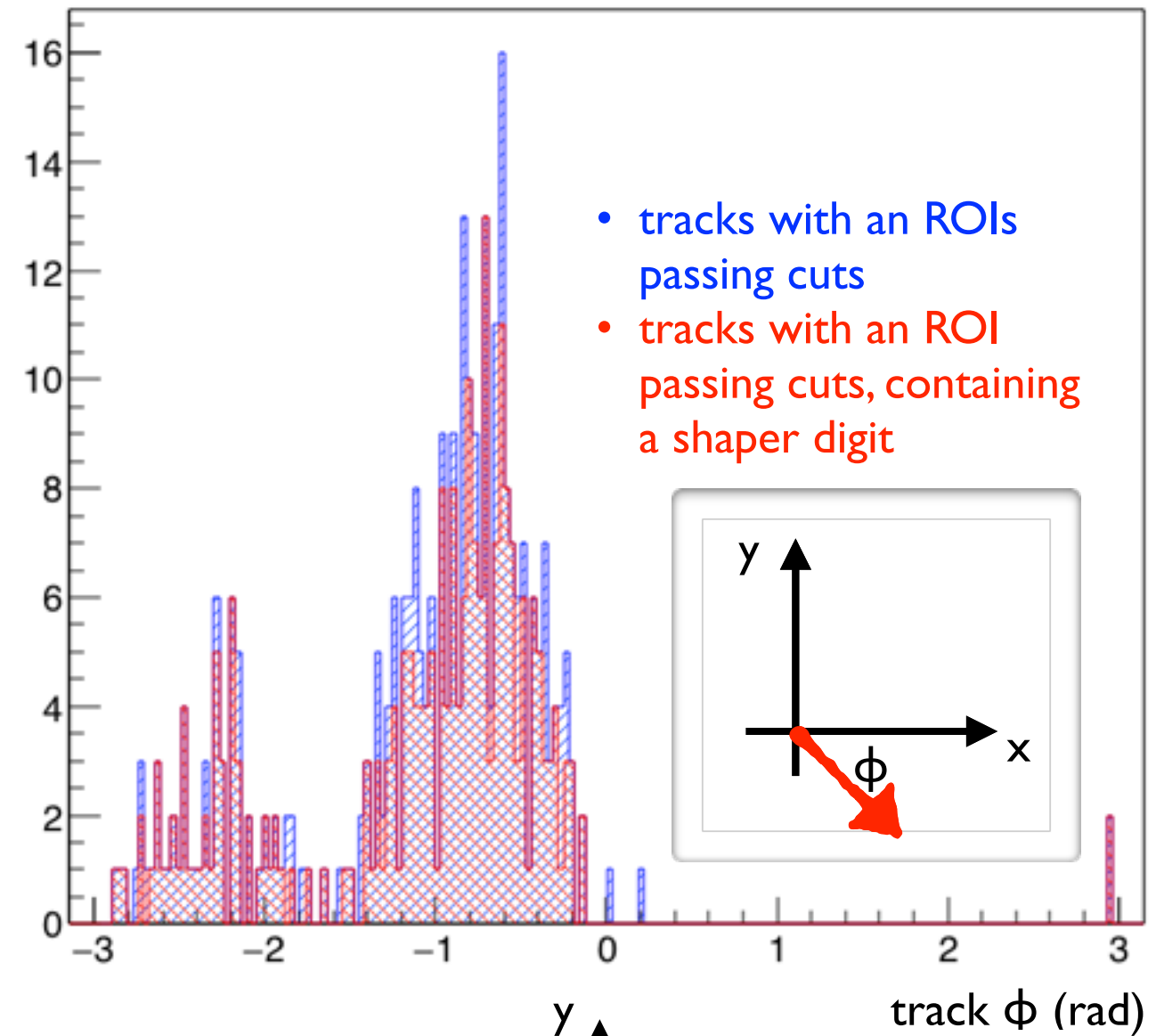
Preliminary Results

- ➔ Efficiency is determined as the fraction of good ROIs that contain a good SVDSHaperDigit.
- ➔ The current *integrated* estimation, indicates something around 80%
- ➔ significantly improved with new CDC constants

per-event efficiency distribution

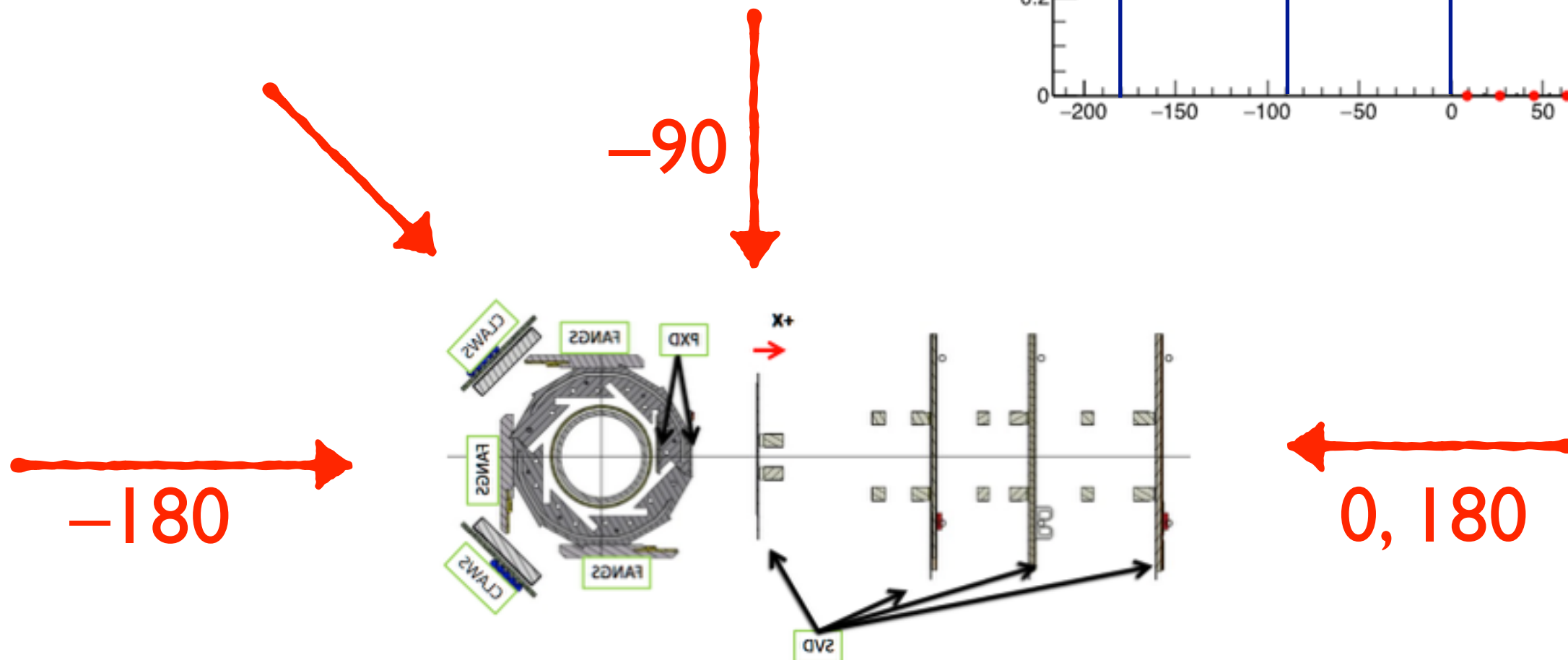
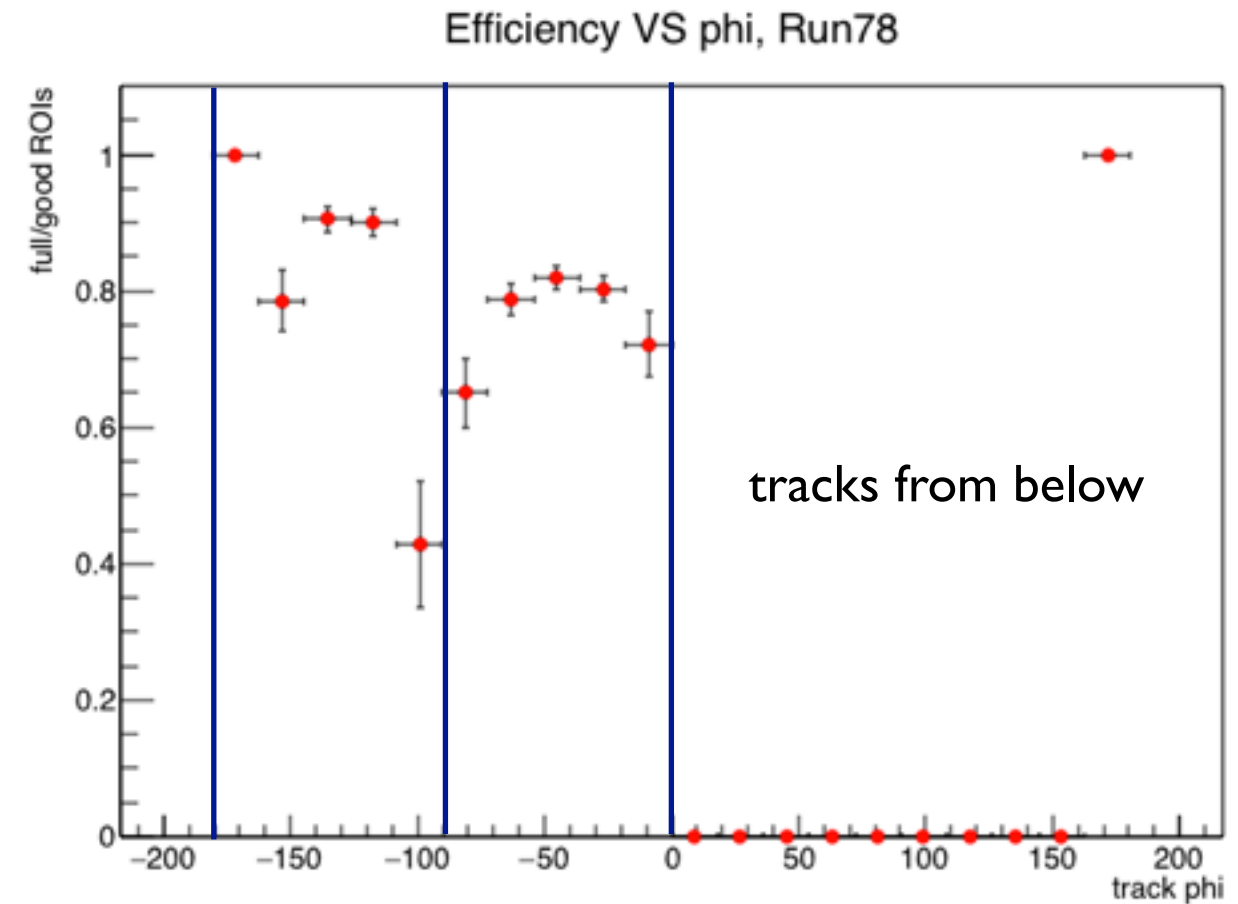


Track with an attached Good ROI, Momentum Phi



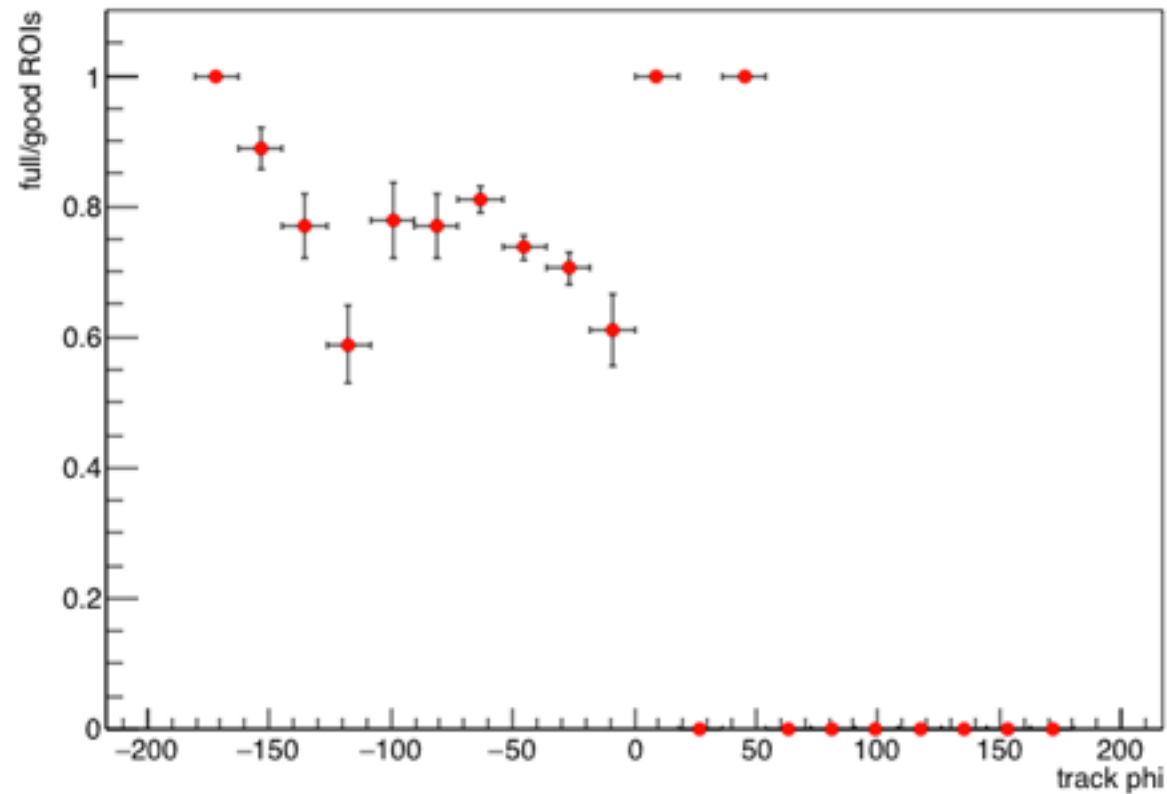
Track Azimuthal Angle Dependence

- ➔ Almost no ROIs from tracks from below
- ➔ Higher efficiency for horizontal tracks, deep at -90 deg
- ➔ Intercept extrapolation becomes more critical when tracks approach the -90 deg.
- ➔ *Alignment* along x becomes critical when tracks approach the -90 deg

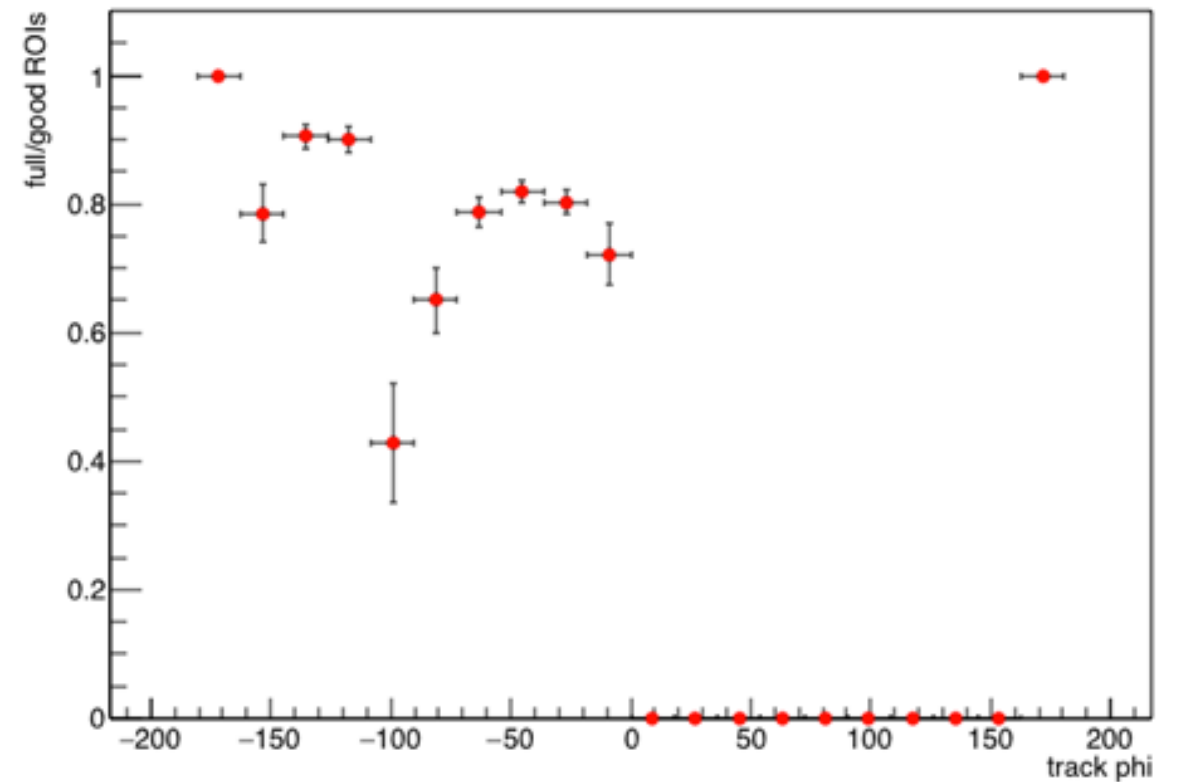


Efficiency Vs phi

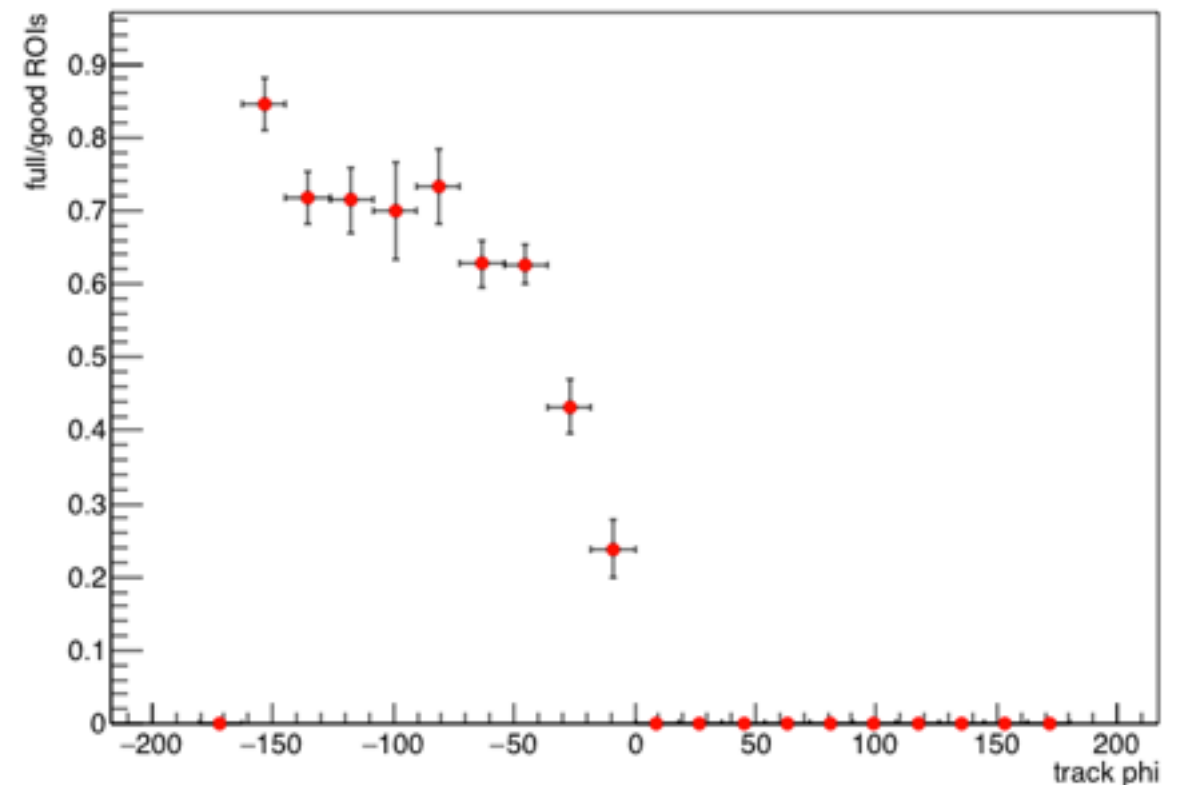
Efficiency VS phi, Run77



Efficiency VS phi, Run78



Efficiency VS phi, Run1424



- ➔ Different runs show different phi dependence due to the low statistics
- ➔ The bins corresponding to horizontal tracks contains less than 10 tracks!!

Conclusions

- ➡ We believe that the SVD Efficiency should be estimated on cosmics that are *similar* to the tracks that we will get from collisions, i.e. mostly perpendicular to SVD sensors
- ➡ SVD Efficiency is *significantly* dependent on tracking, CDC calibrations, alignment, and B-Field
 - elements that are not under SVD control
 - not straightforward to understand *which* set of constants are used to reconstruct a specific run
- ➡ Plan/proposal:
 - repeat this study on a long run, with new B-Field map, updated CDC constants, possibly SVD alignment
 - estimate the efficiency using *only* the horizontal tracks ($\pm\Delta\phi$)

Event-by-Event Strip Classification

