



Comparison of S001 pulse shapes databases at different energies measured with a ^{152}Eu source

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S001 3D scans

^{137}Cs :

- Full Volume
- $\emptyset_{\text{coll}} = 1\text{mm}$
- $2 \times 2 \times 2\text{mm}^3$ grid
- reference point

^{152}Eu

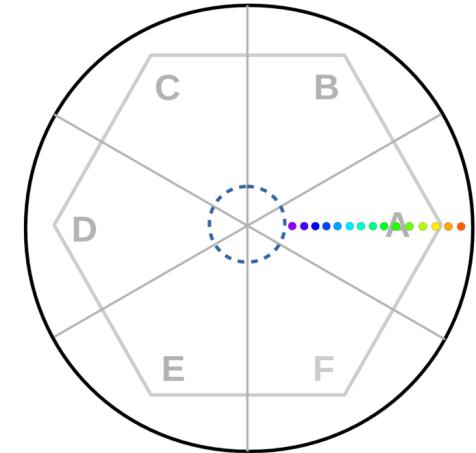
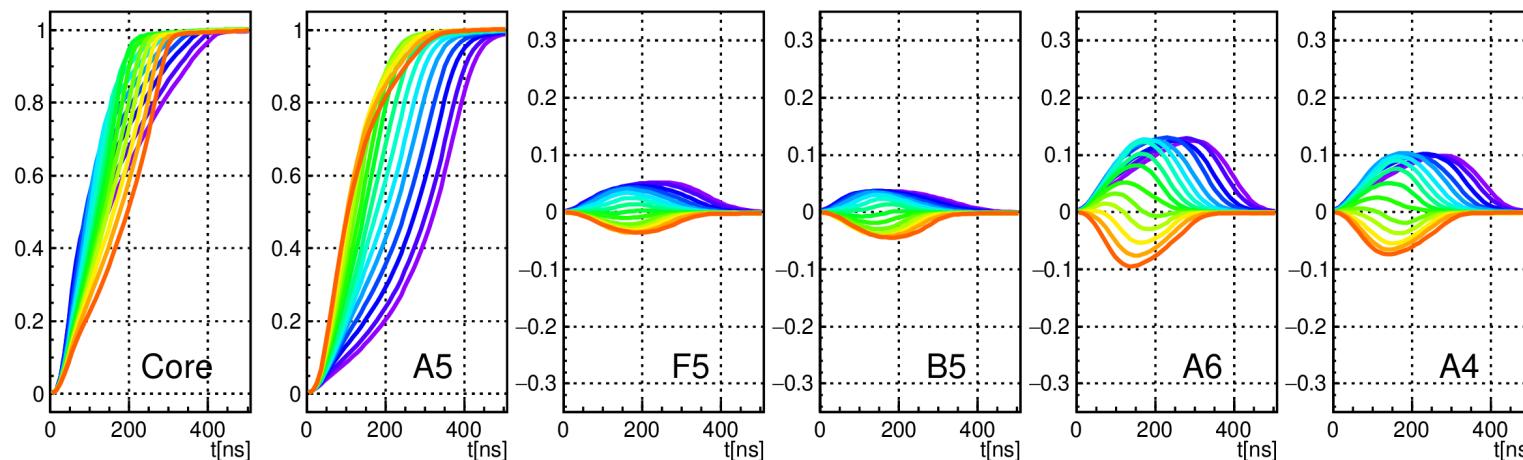
- Sector B
- $\emptyset_{\text{coll}} = 1\text{mm}$
- $2 \times 2 \times 2\text{mm}^3$ grid
- NEW!

Aim

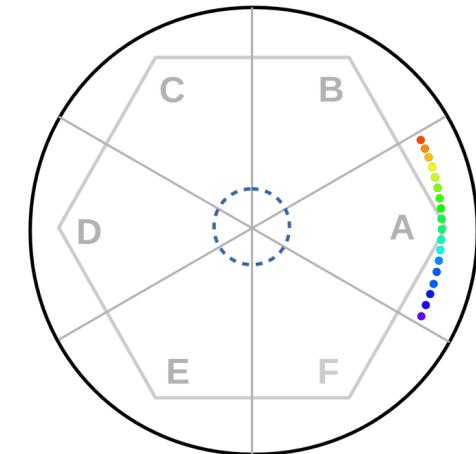
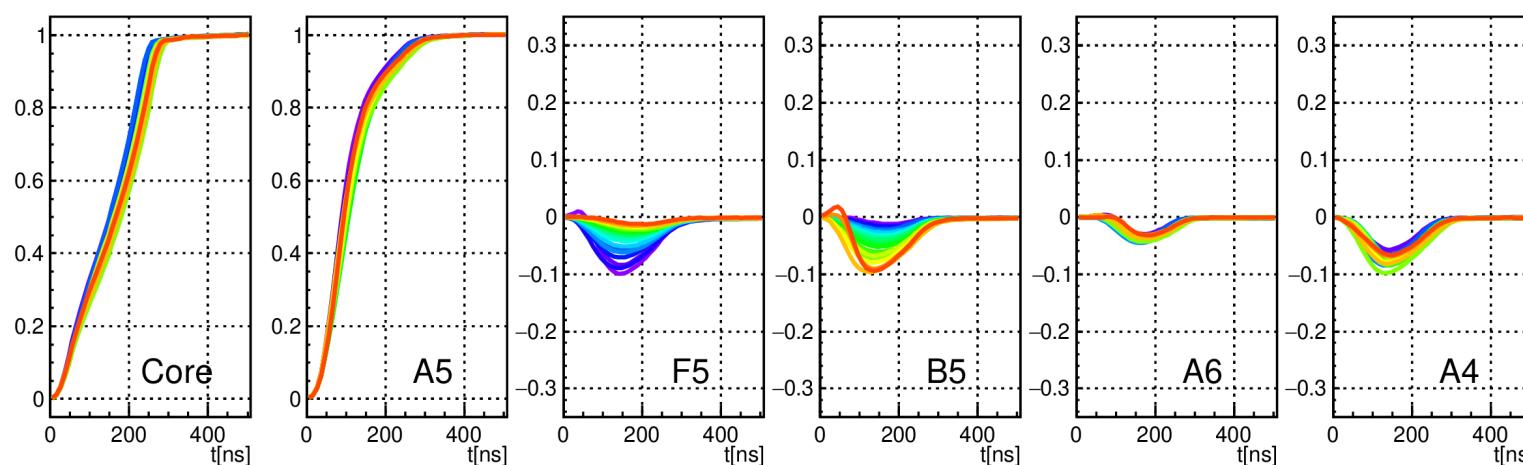
- Test the PSCS with ^{152}Eu
- Compare databases acquired at different energies

^{137}Cs scan results

Database points along **radius**

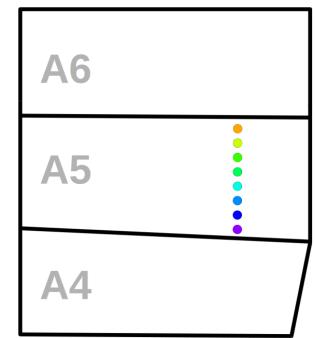
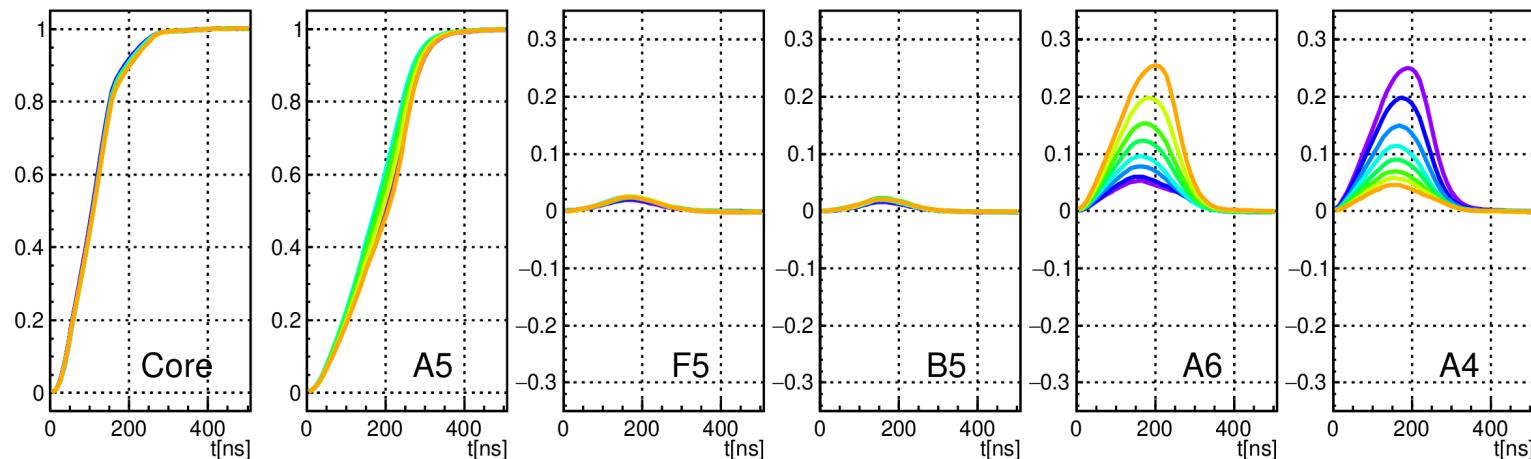


Database points along **circumference**



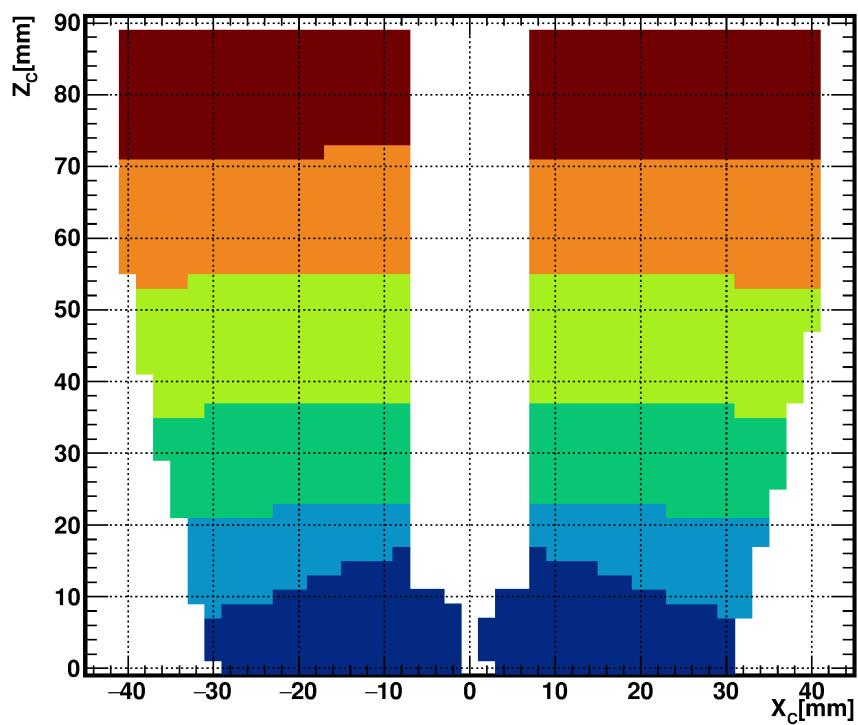
^{137}Cs scan results

Database points along length (Z_c)

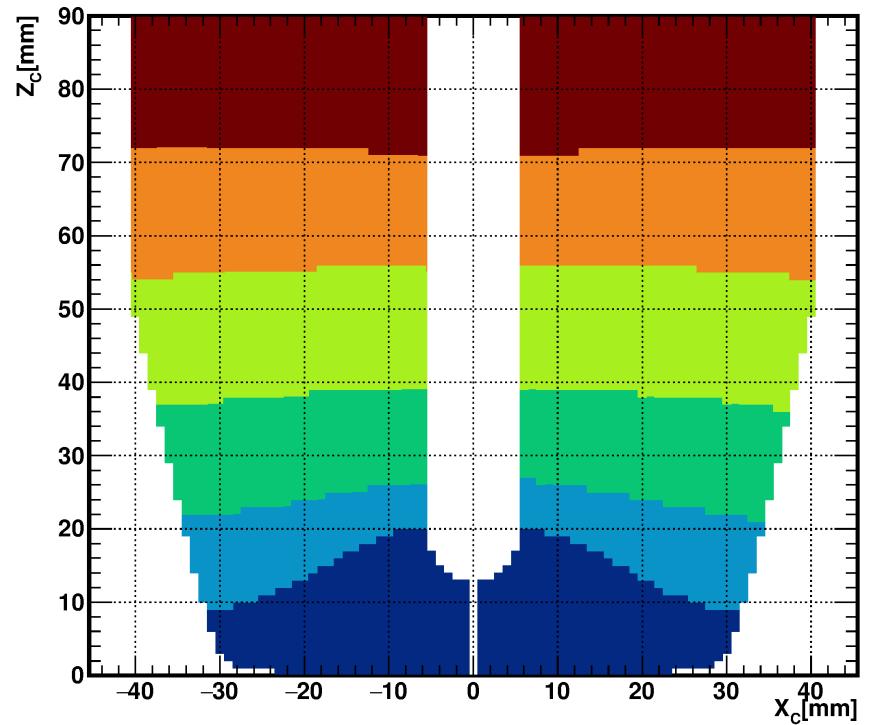


S001 segment map

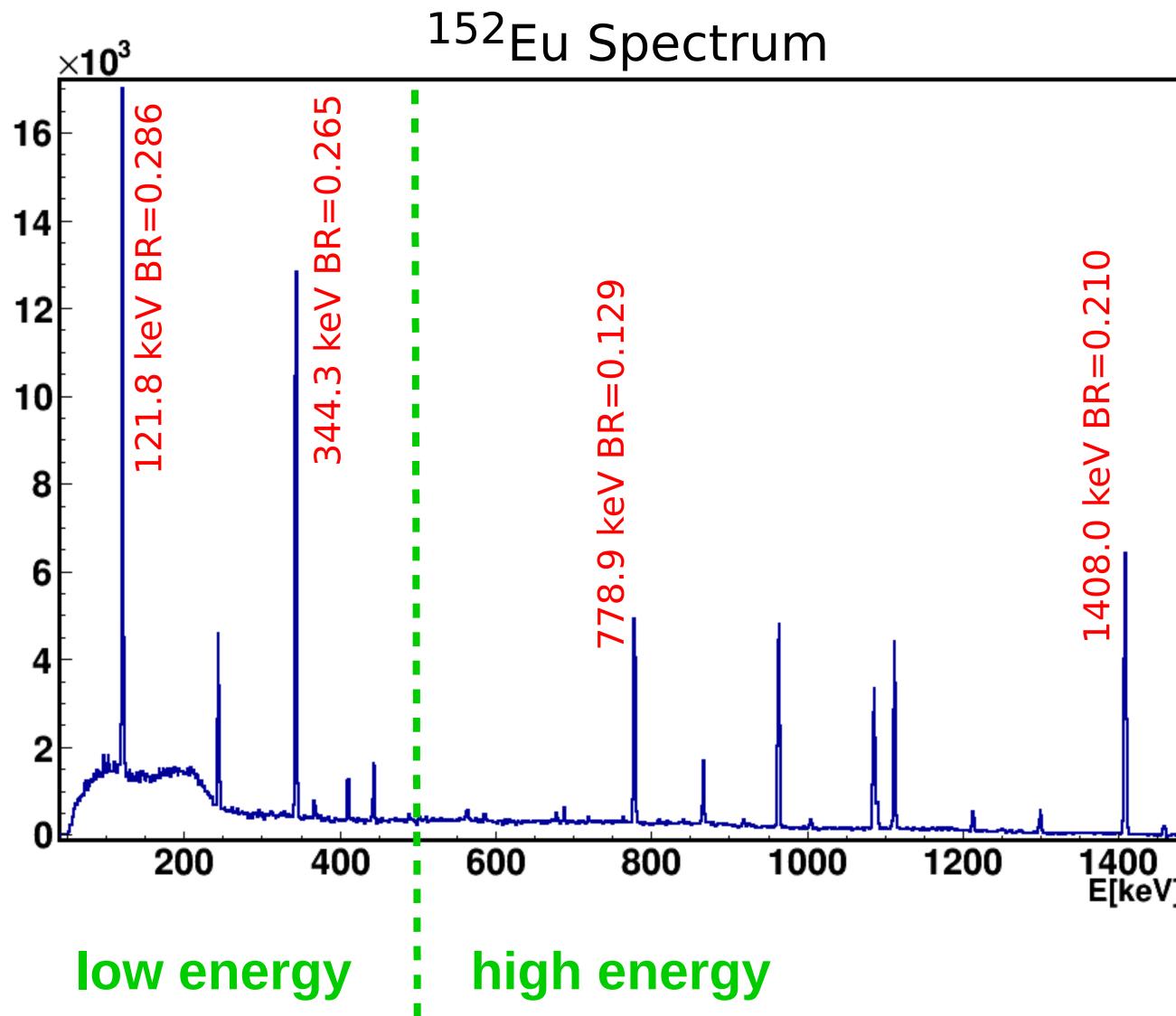
^{137}Cs Real Scan [2x2x2mm 3]



ADL/SIMION [1x1x1mm 3]

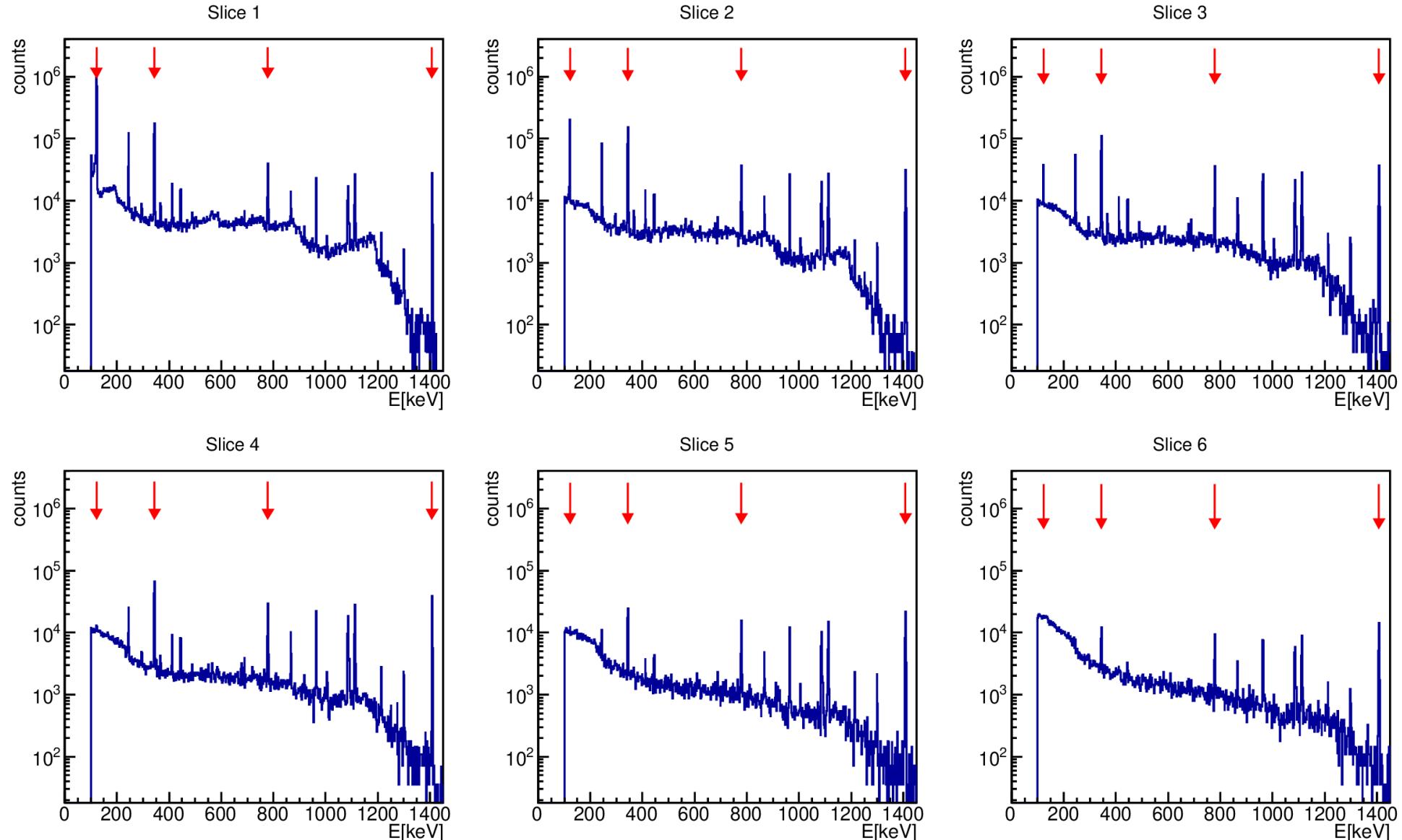


^{152}Eu scan: energies of interest



P/T analysis

- Vertical beam irradiating sec. B
- Spectra populated with **1-fold events**



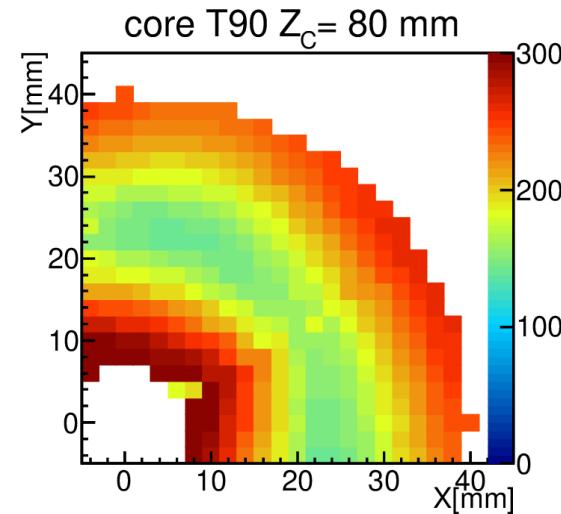
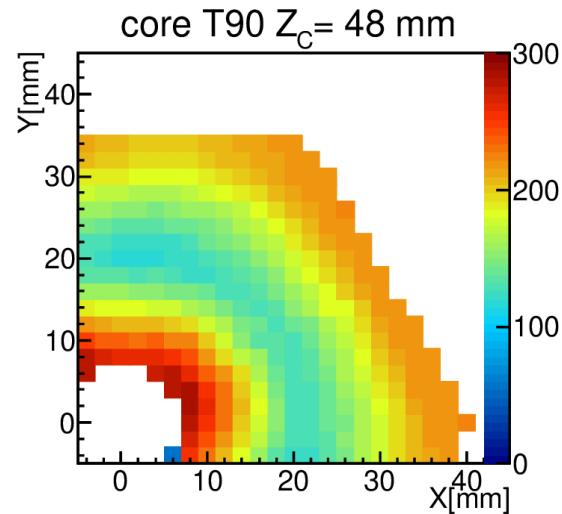
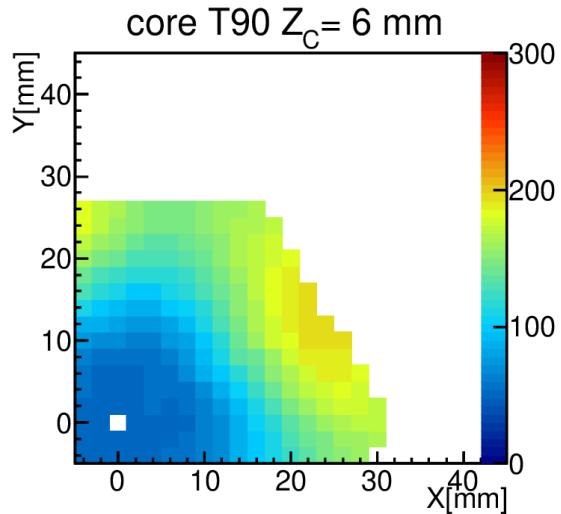
P/T analysis

Slice (Seg)	122 keV	344 keV	779 keV	1408 keV
1 (7)	97%	97%	87%	99%
2 (8)	90%	97%	89%	98%
3 (9)	66%	97%	92%	98%
4 (10)	0%	93%	91%	99%
5 (11)	0%	87%	90%	98%
6 (12)	0%	67%	82%	96%

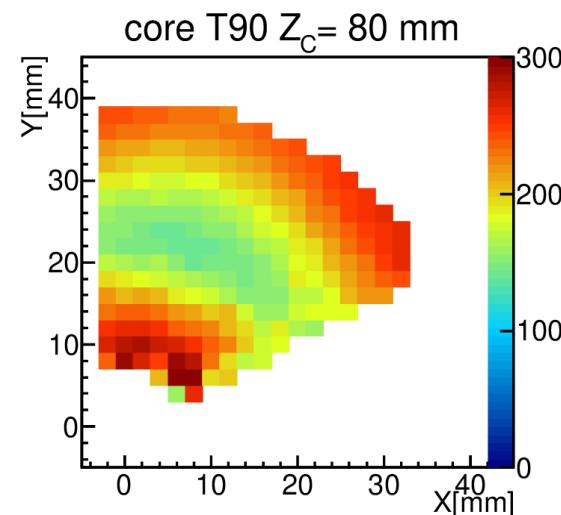
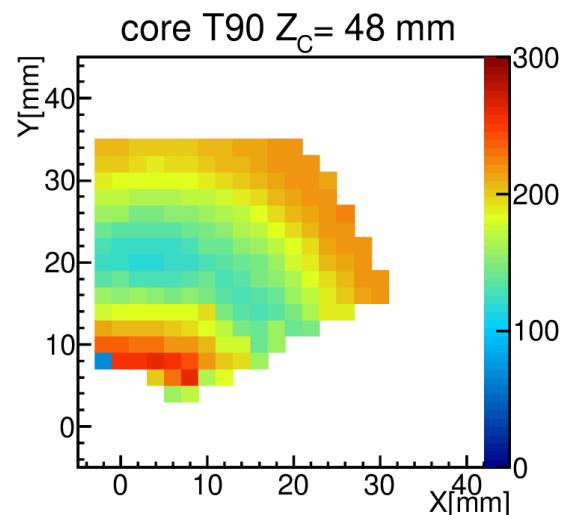
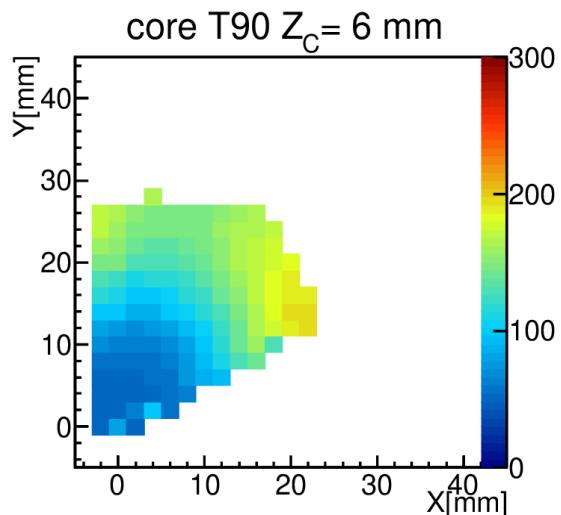
Data from **red highlighted** slices are not used

662keV vs 779keV: T90

662 keV

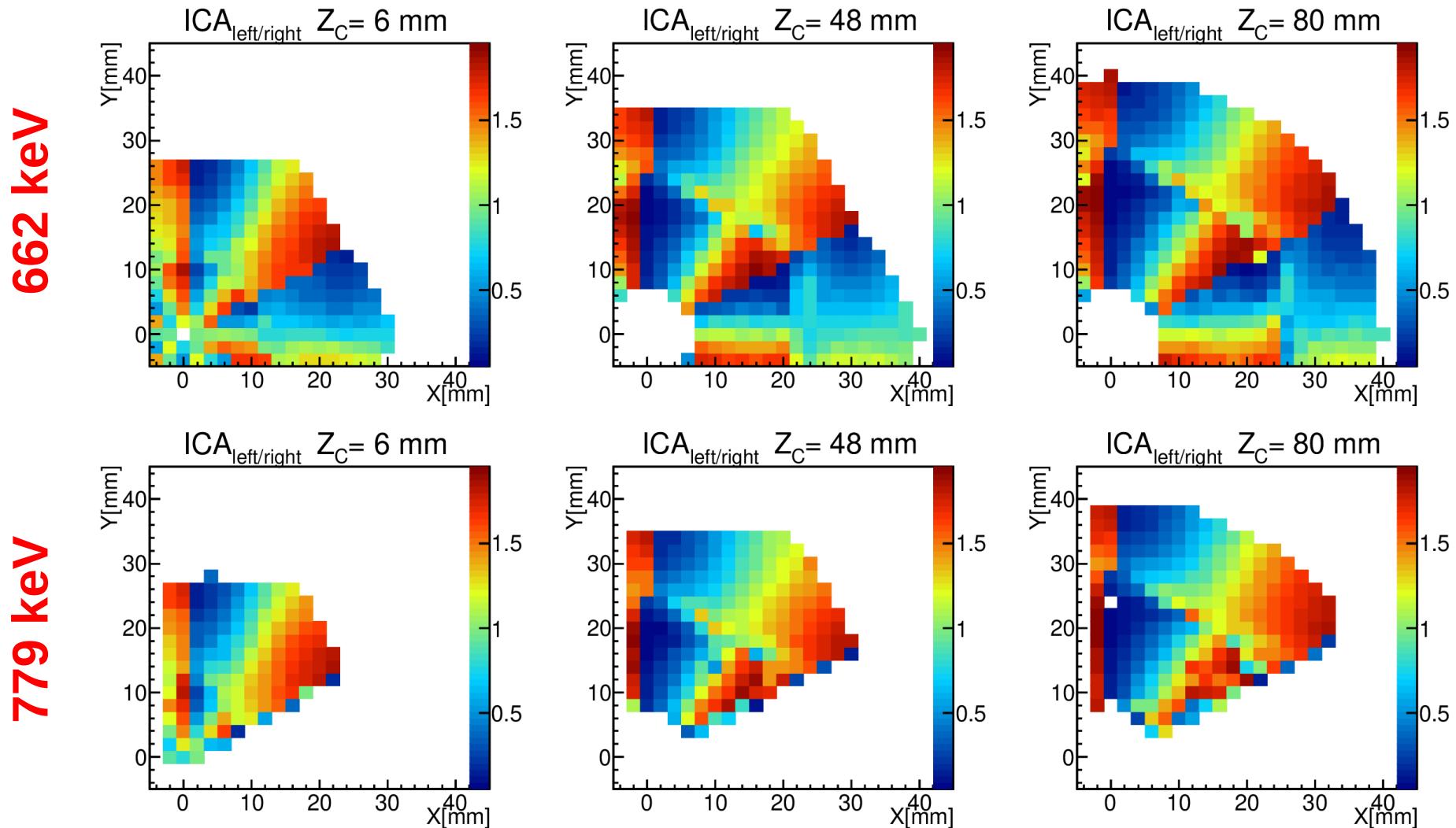


779 keV



662keV vs 779keV: left/right ICA

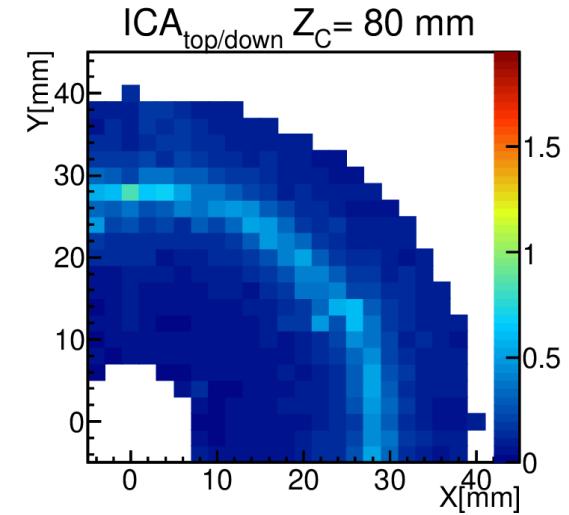
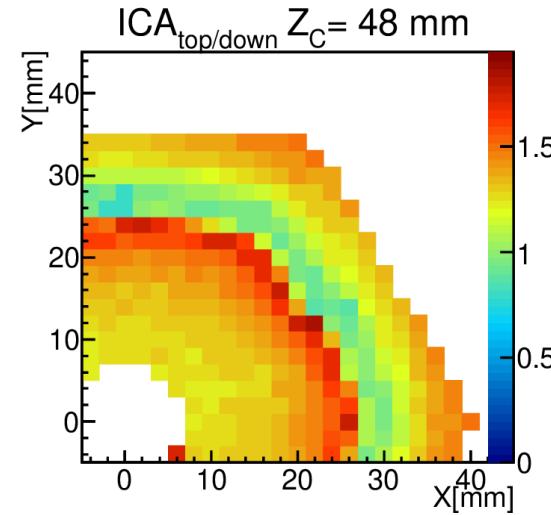
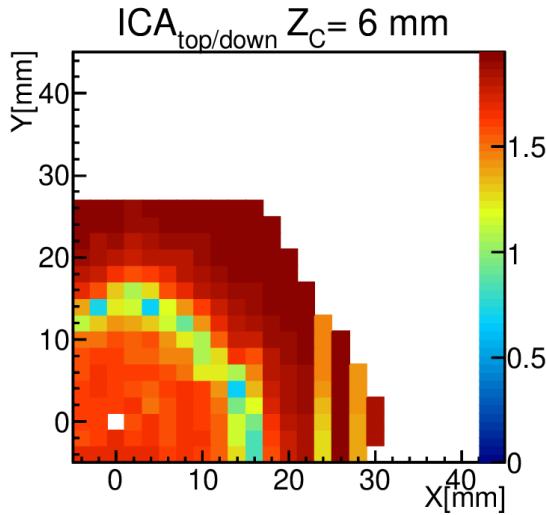
$$ICA_{left/right} = \frac{I_{left} - I_{right}}{I_{left} + I_{right}} + 1$$



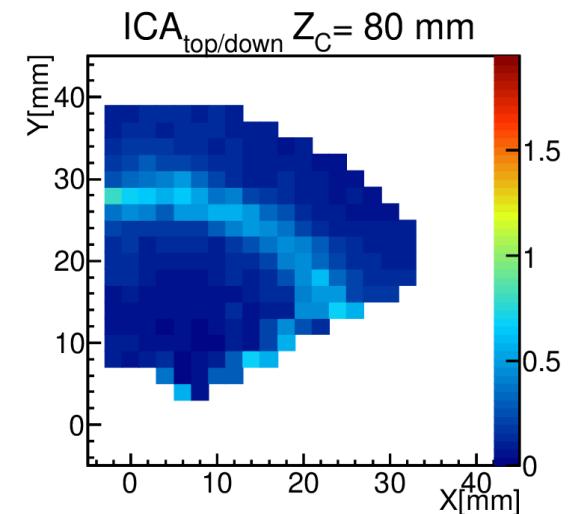
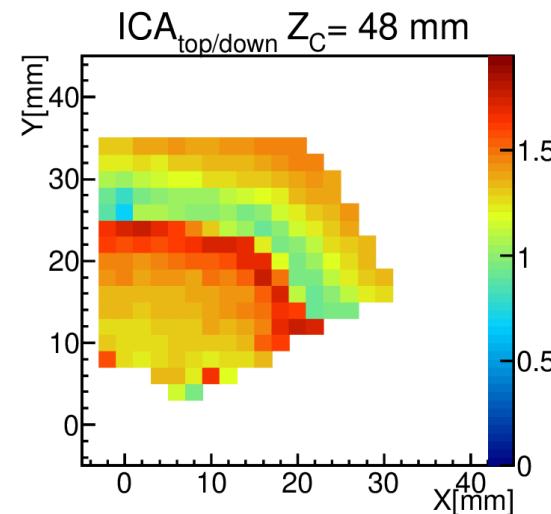
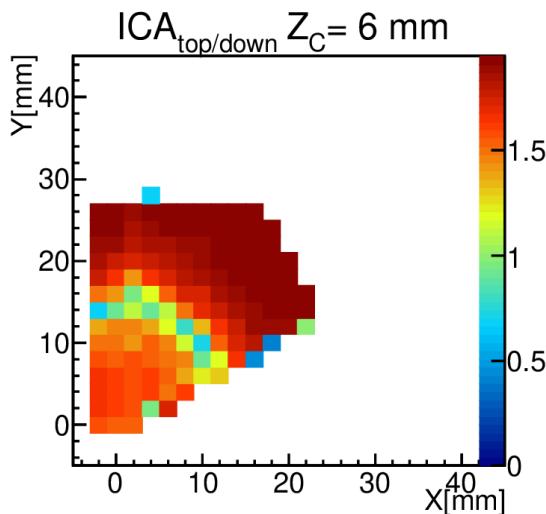
662keV vs 779keV: top/down ICA

$$ICA_{top/down} = \frac{I_{top} - I_{down}}{I_{top} + I_{down}} + 1$$

662 keV



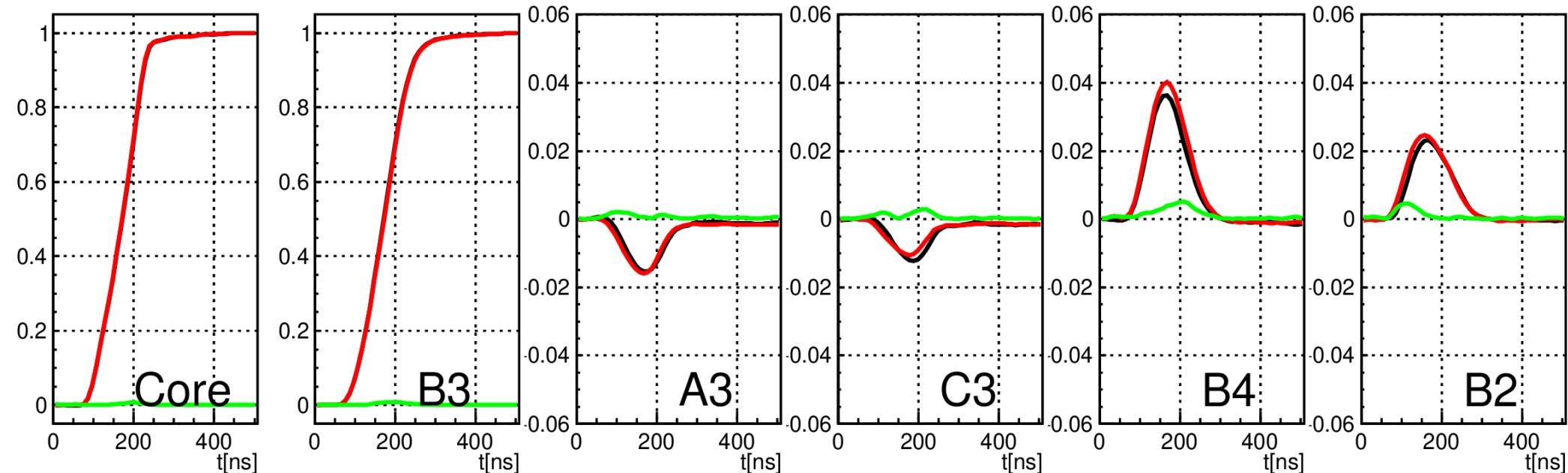
779 keV



662keV vs 779keV: residuals

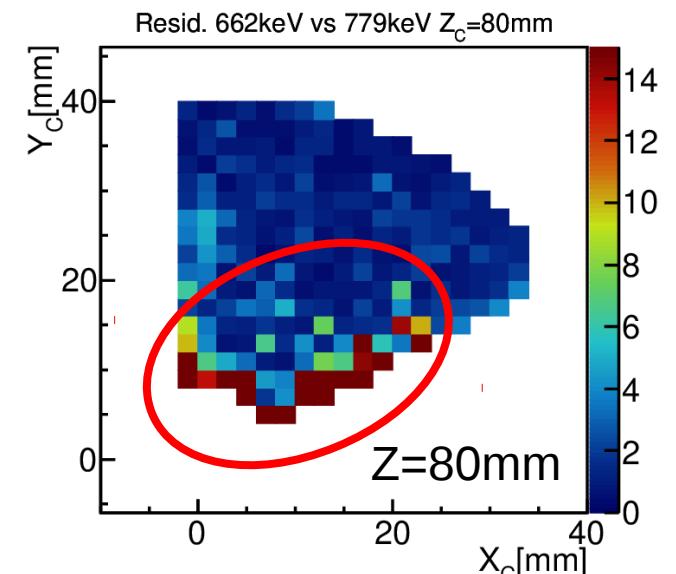
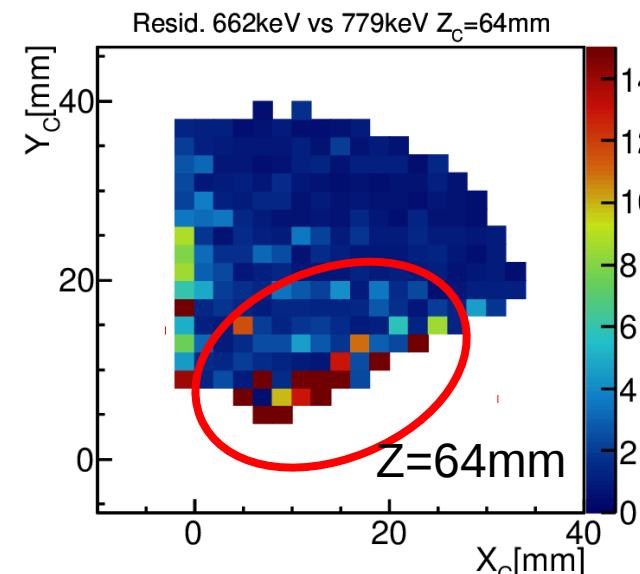
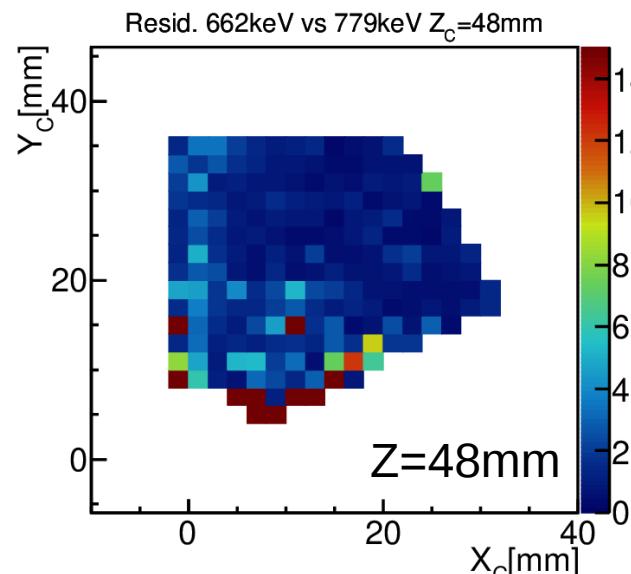
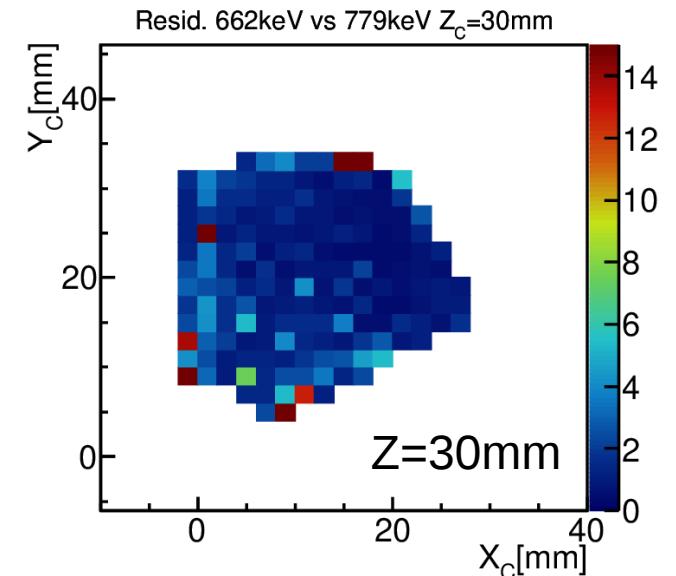
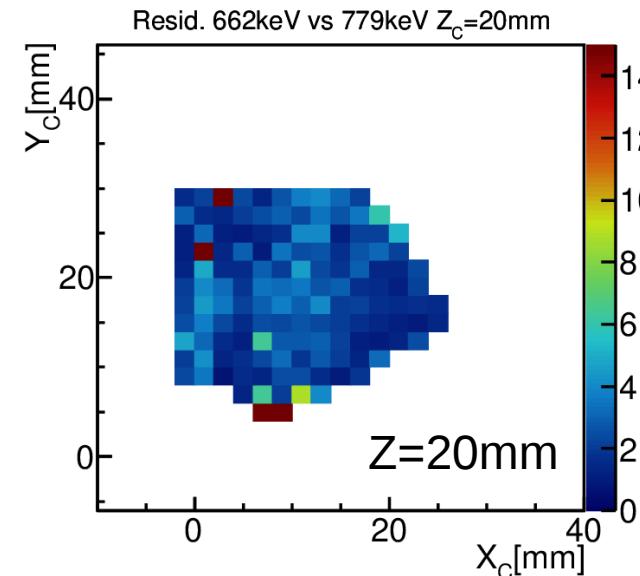
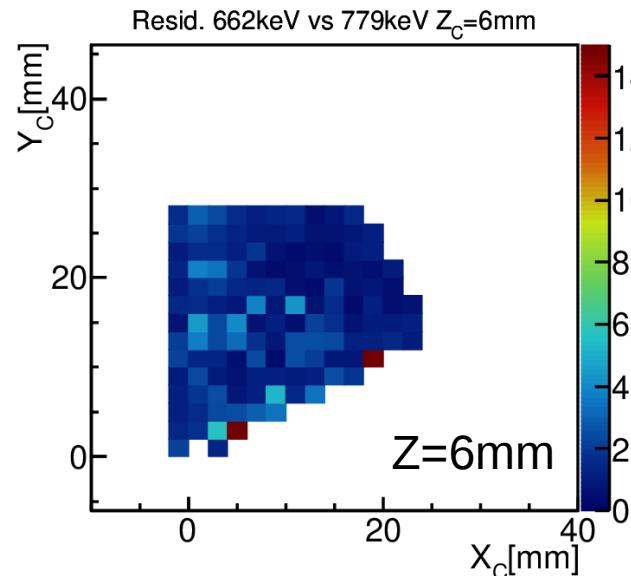
— 662 keV
— 779 keV
— Residual

X=10mm, Y=20mm, Z=30mm
(Bulk of seg B3)



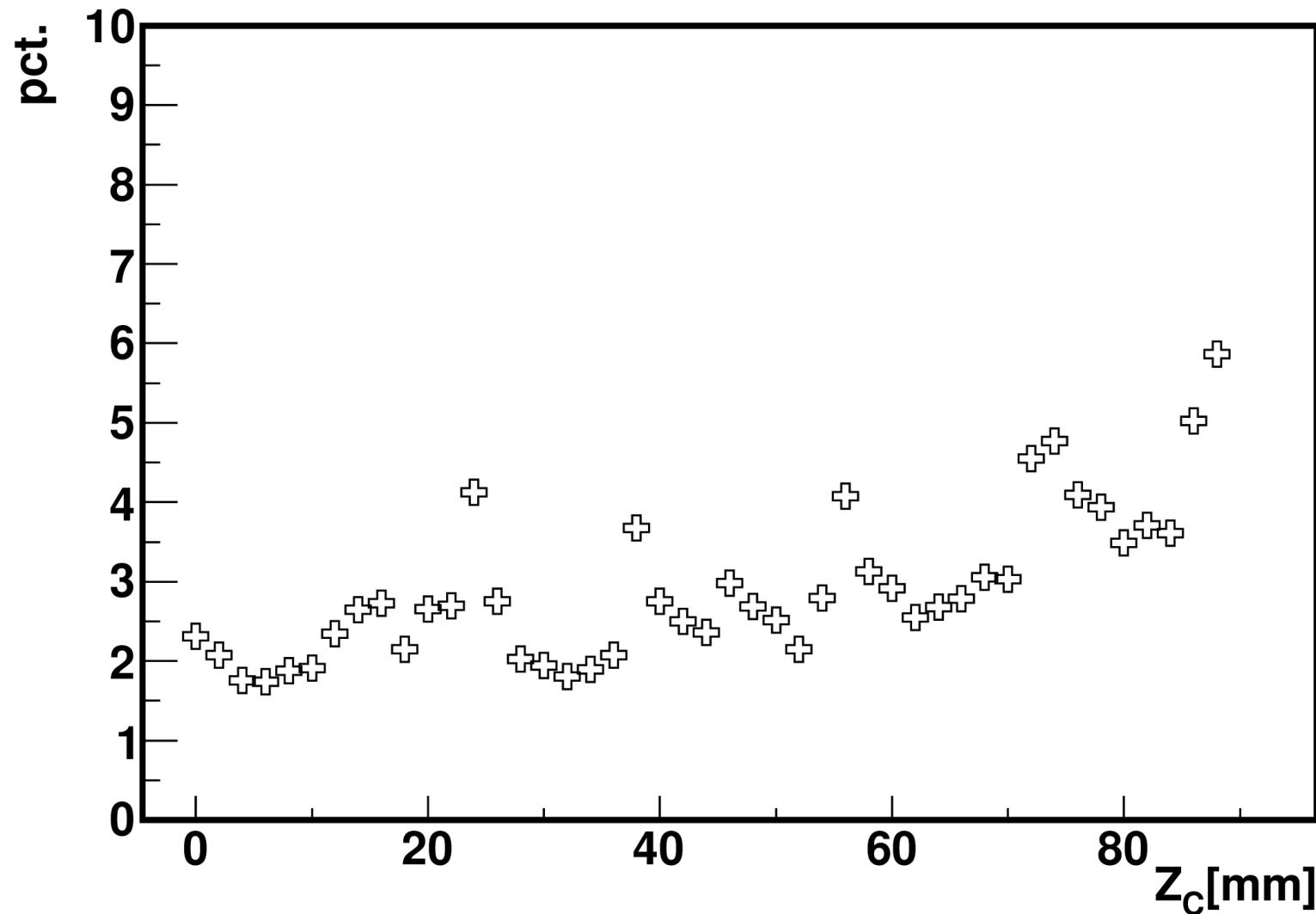
662keV vs 779keV: residuals

- Maximum residual distributions



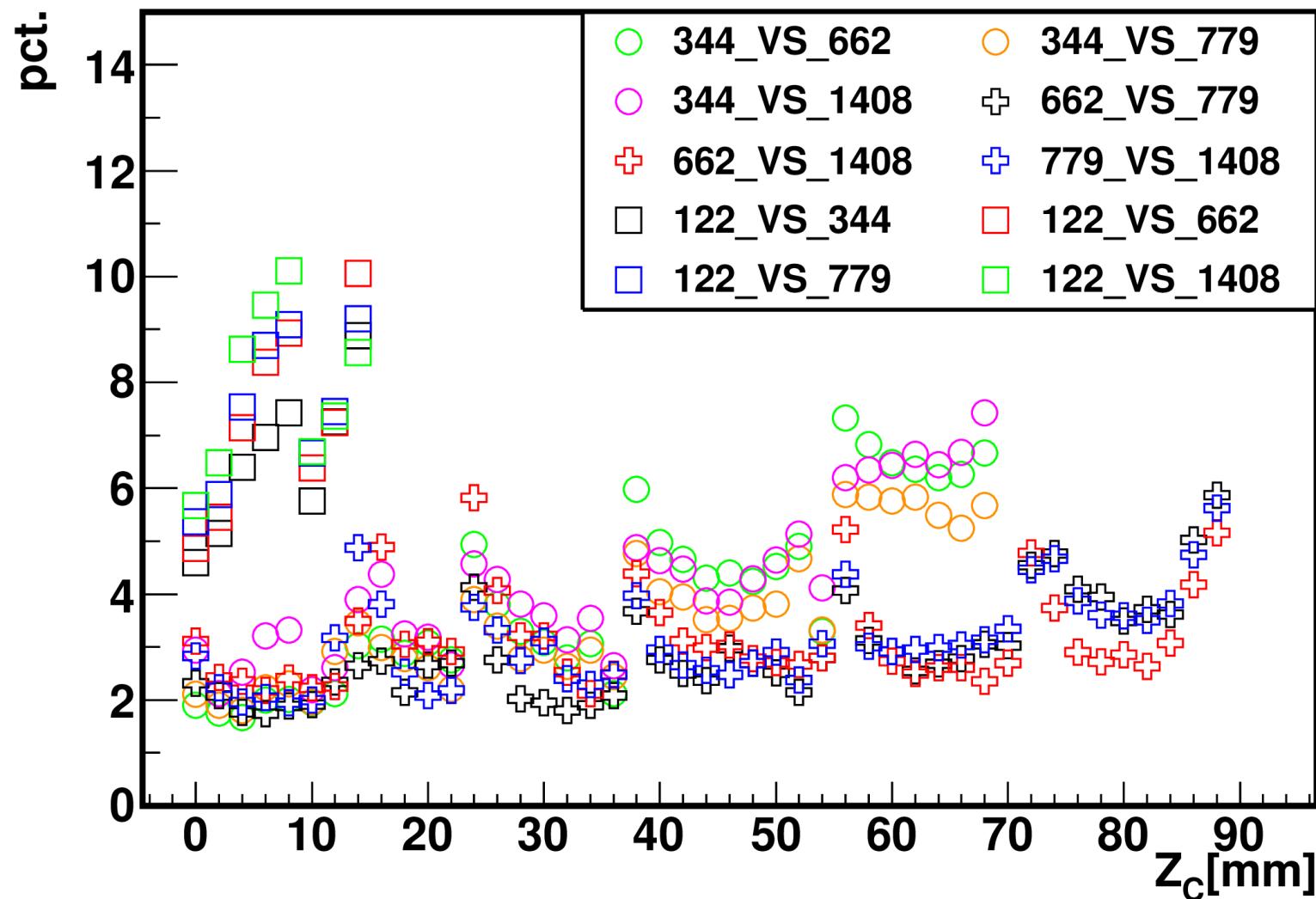
Average database-slice residuals

TOT. RES. 662keV vs 779keV



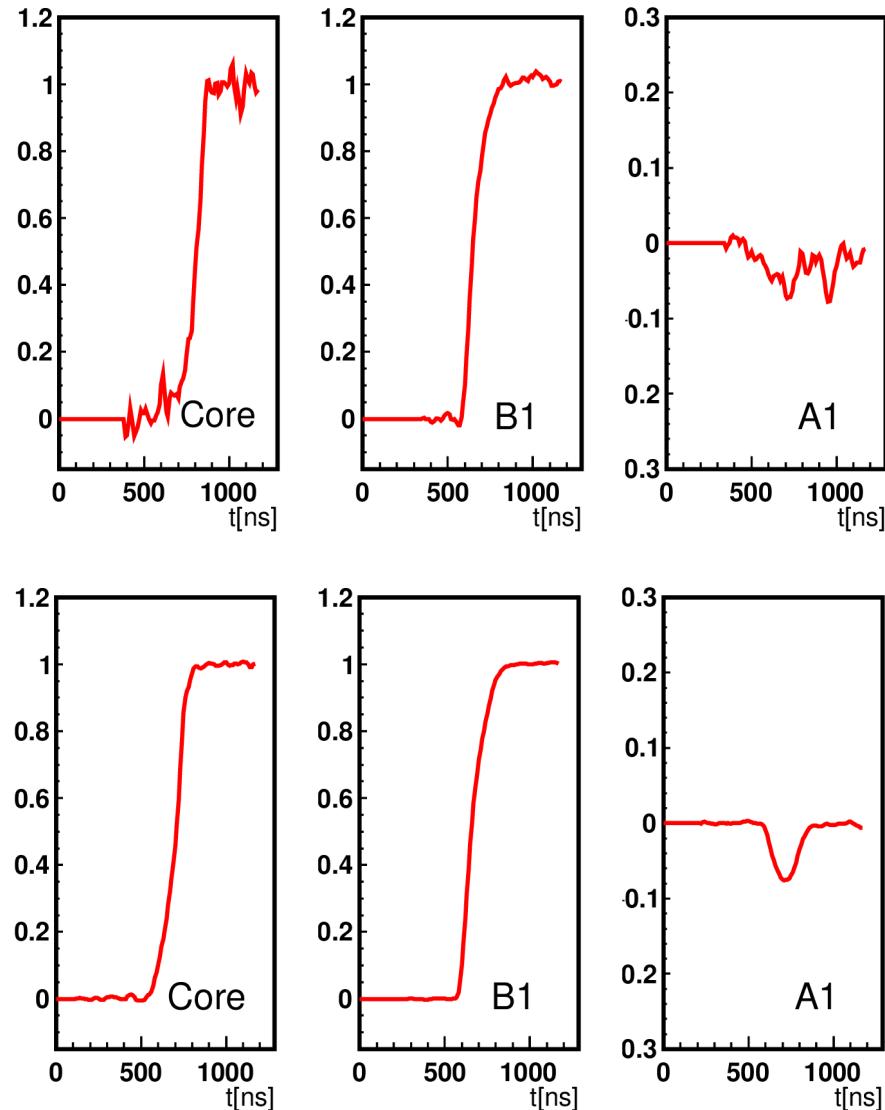
Average database-slice residuals

TOTAL RESIDUALS



Hypotheses

- Too much noise on low E signals?
- Time alignment method?
- Low statistics?
- Background having meaningful impact?

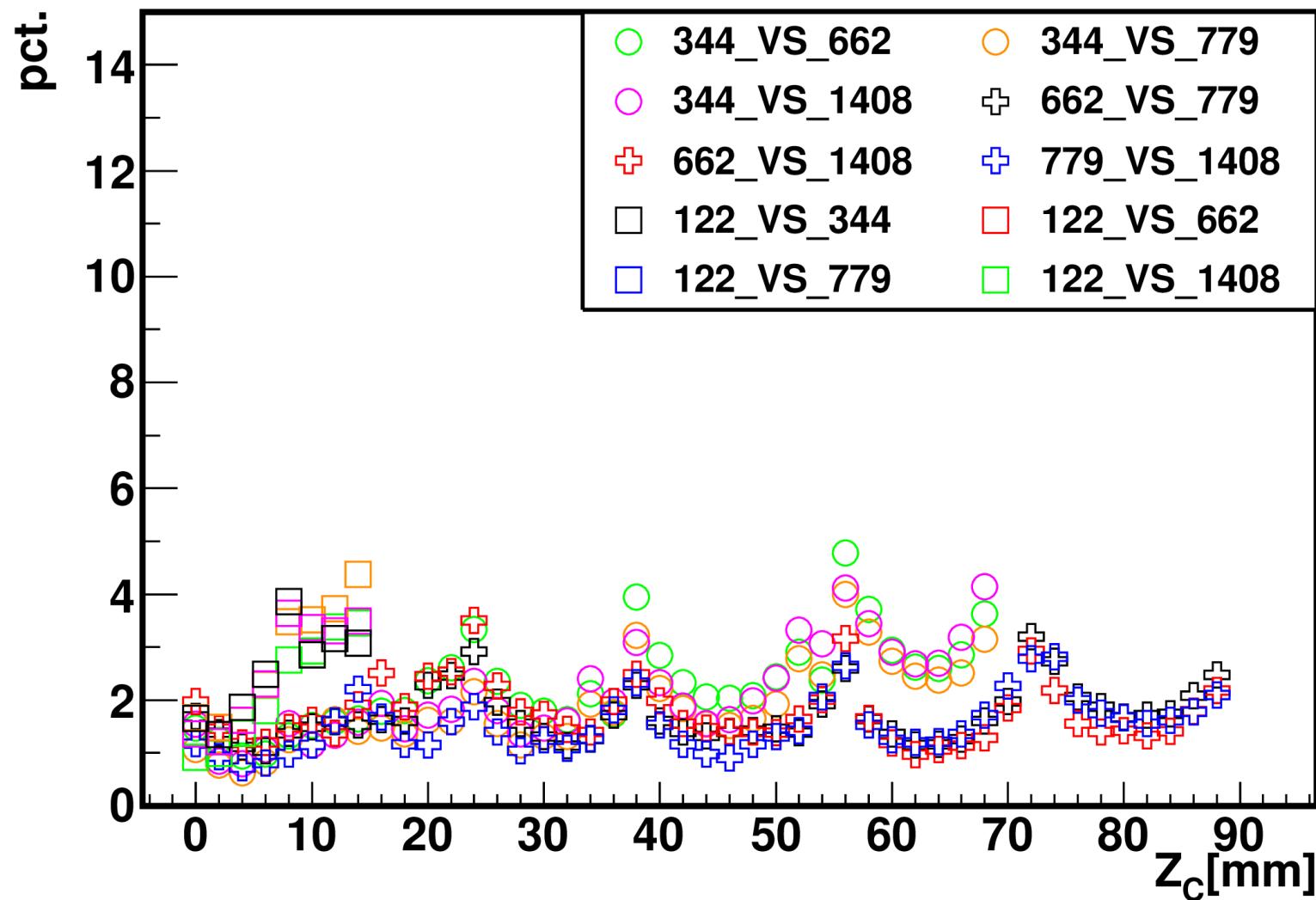


Conclusions

- Discrepancies at low energies due to PSCS
- Tests to be made:
 - Time alignment
 - Add noise filtering
 - χ^{α} test
 - Add weights to transient signals
 - Implement different scanning configurations

Extra

RESIDUALS NEIGHBOUR

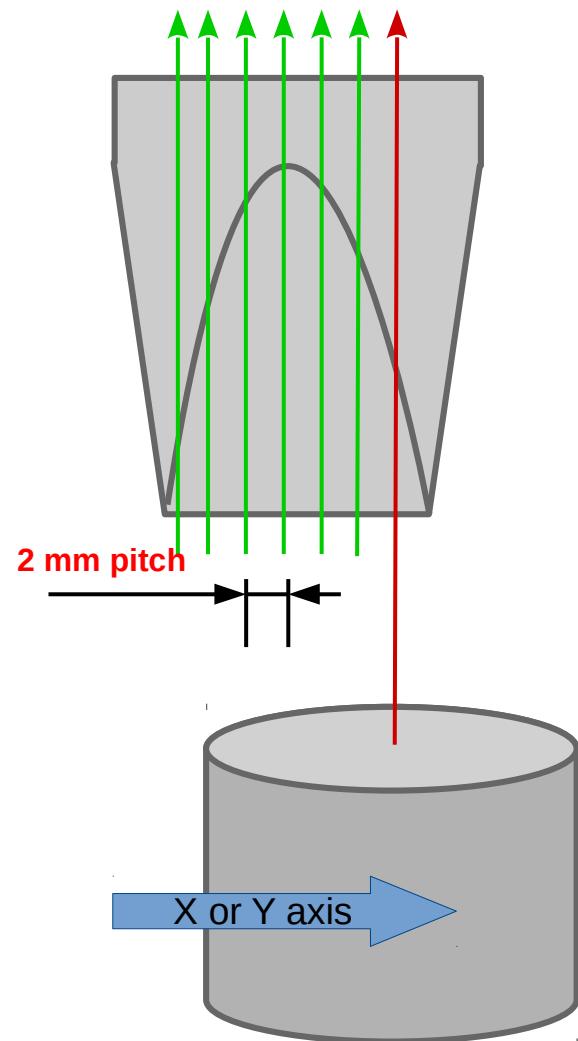


Extra

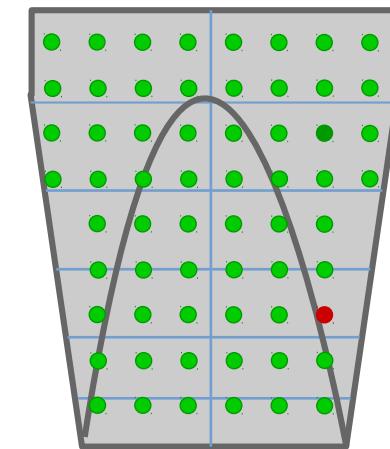
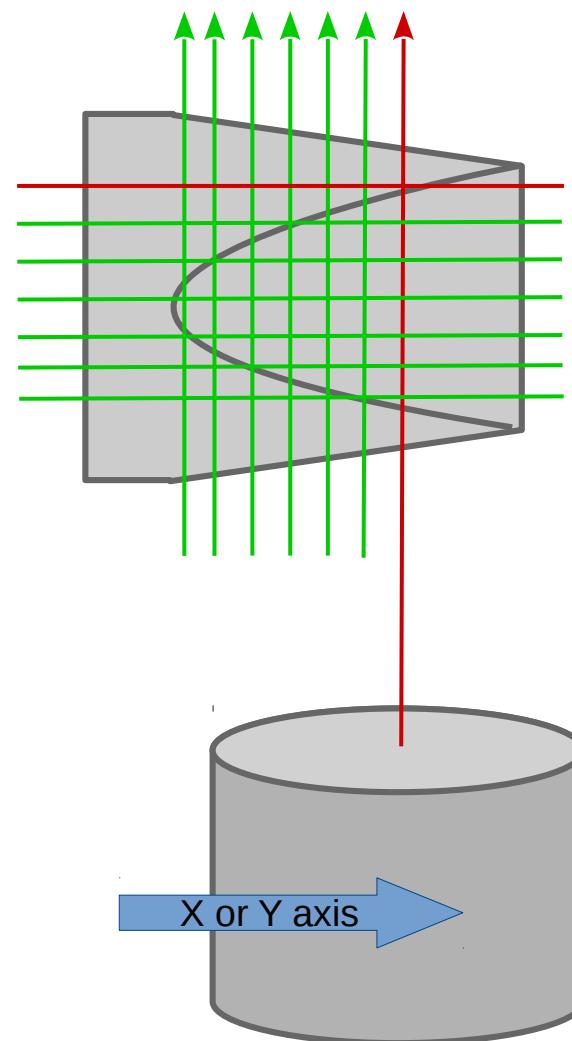
Pulse Shape Comparison Scan (PSCS)

F. Crespi et al. "A novel technique for the characterization of a HPGe detector response based on pulse shape comparison" - *Nuclear Instruments and Methods A* - 593(3):440-447-2008

VERTICAL CONF.



HORIZONTAL CONF.



Comparison of two crossing datasets