

# MuX meeting (13/12/2024)

Marie Deseyn

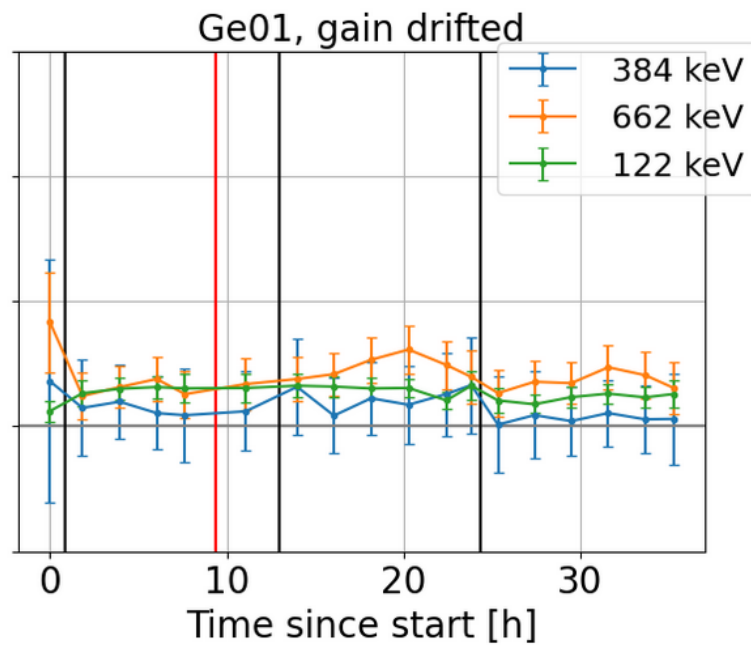
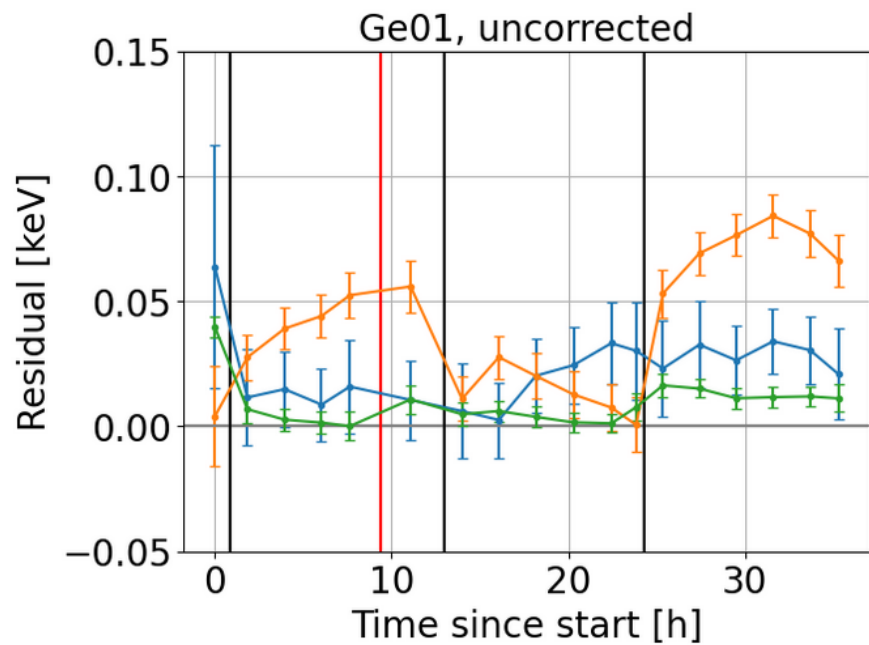
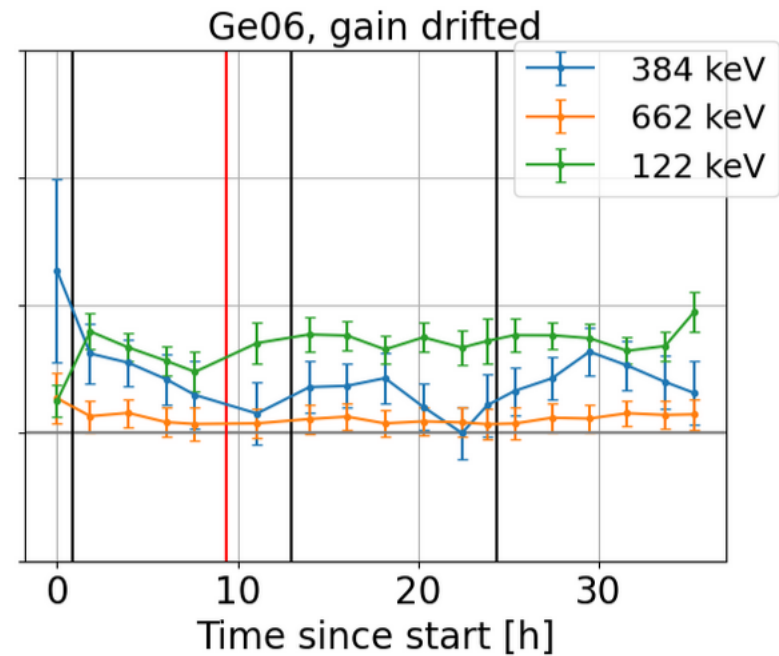
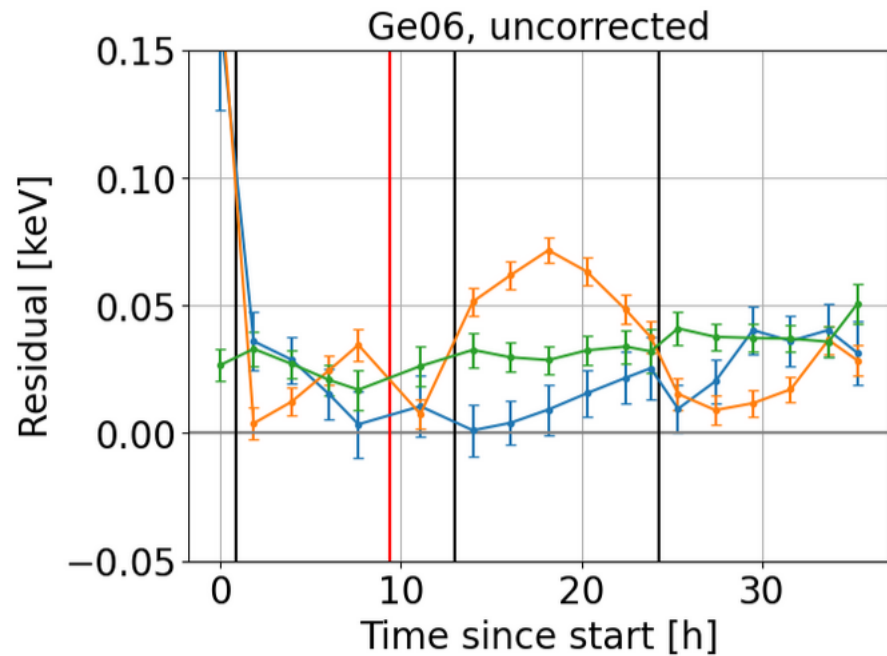
Si data update

# Gain drift

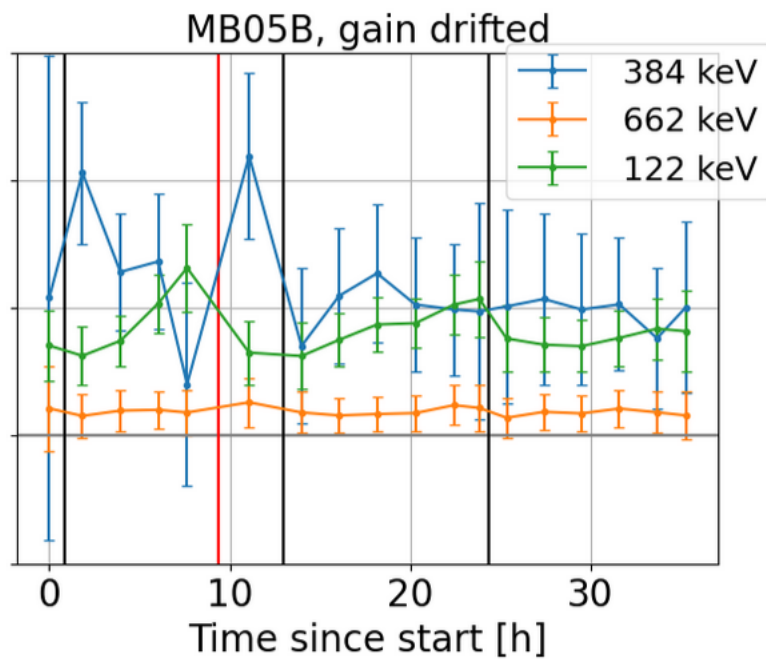
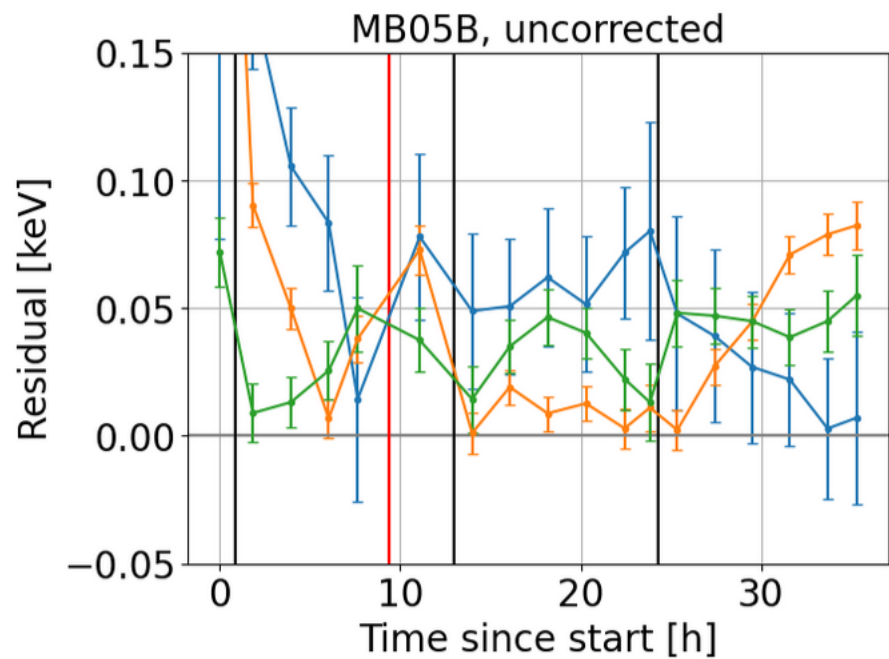
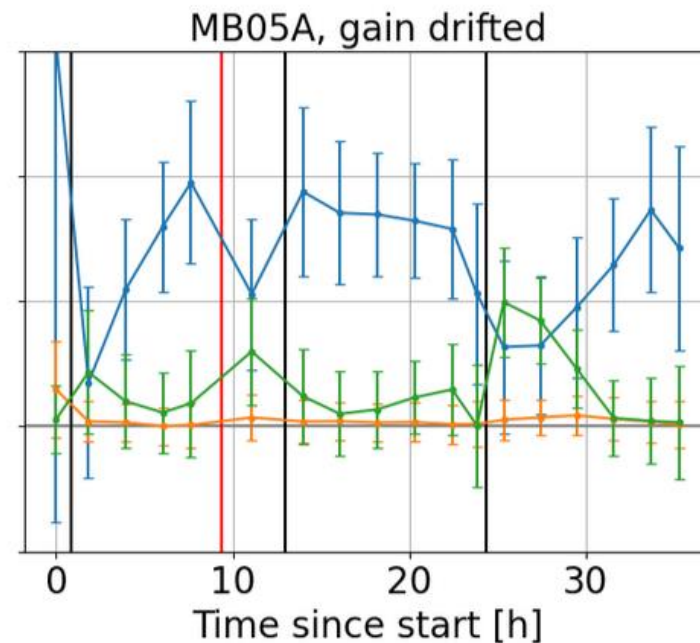
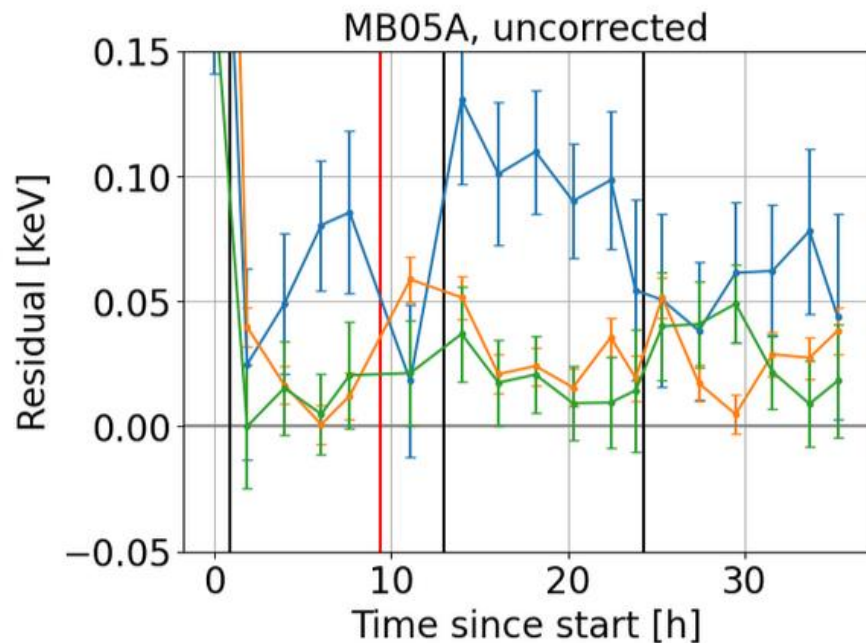
- I did initial better calibration, with same lines as gain drift
- Less lines taken into account

Energy [keV]	Origin
302.8508	Ba133
383.8485	Ba133
661.657	Cs137
344.2785	Eu152
778.9045	Eu152
121.7817	Eu152
867.380	Eu152

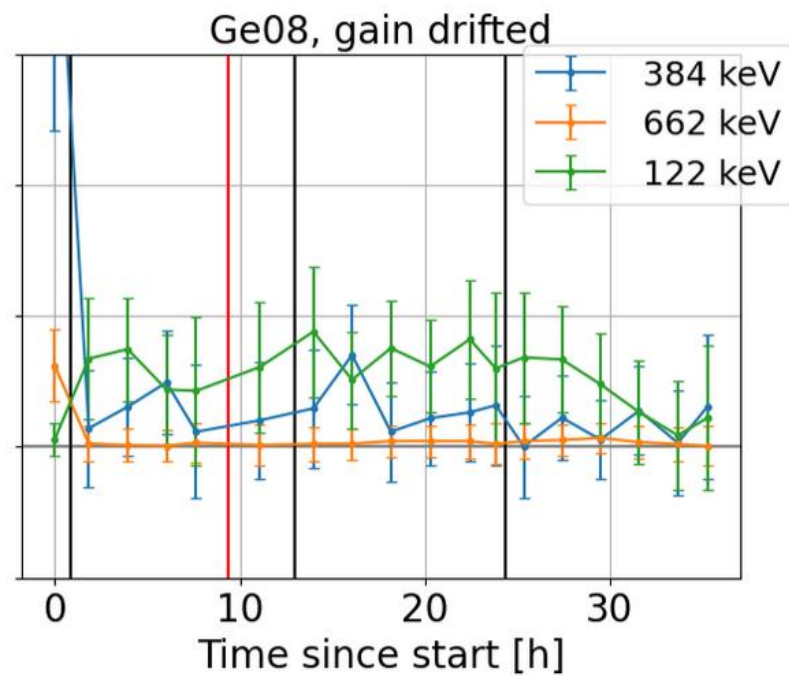
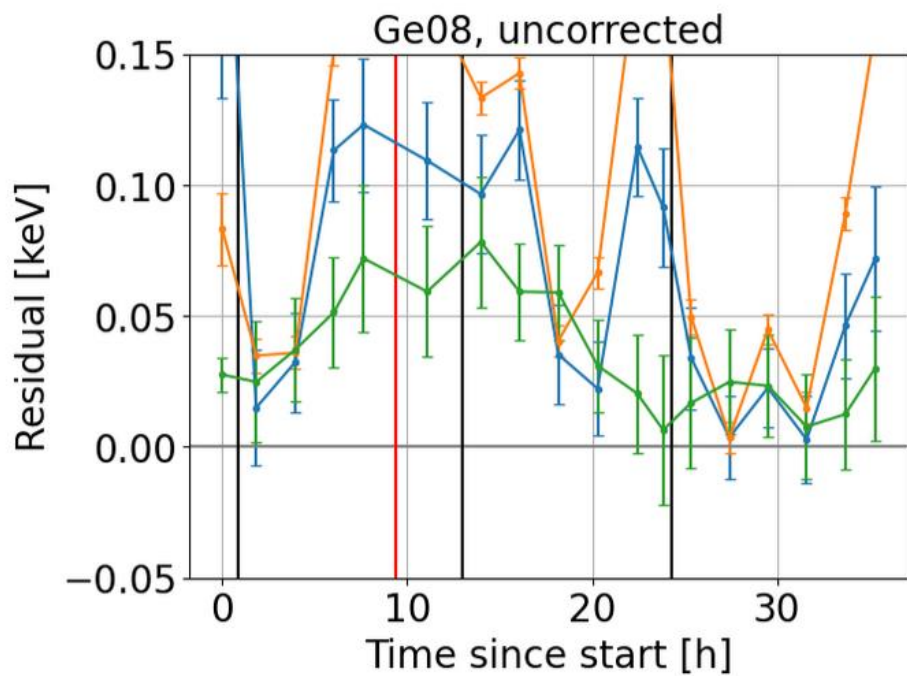
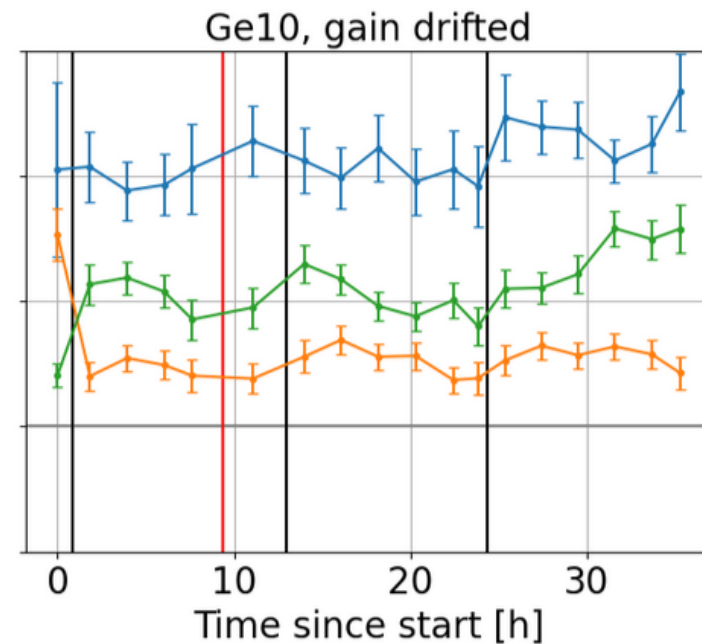
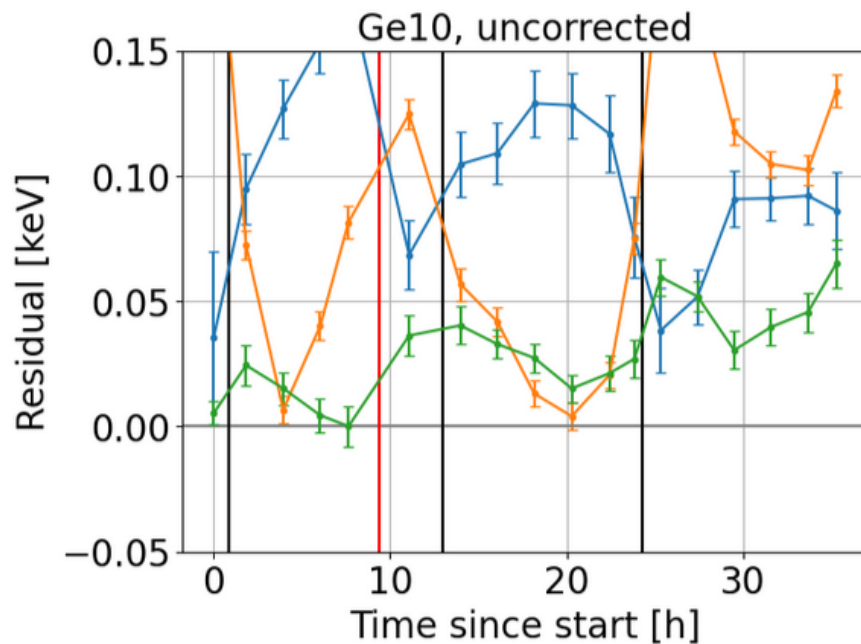
# Gain drift



# Gain drift

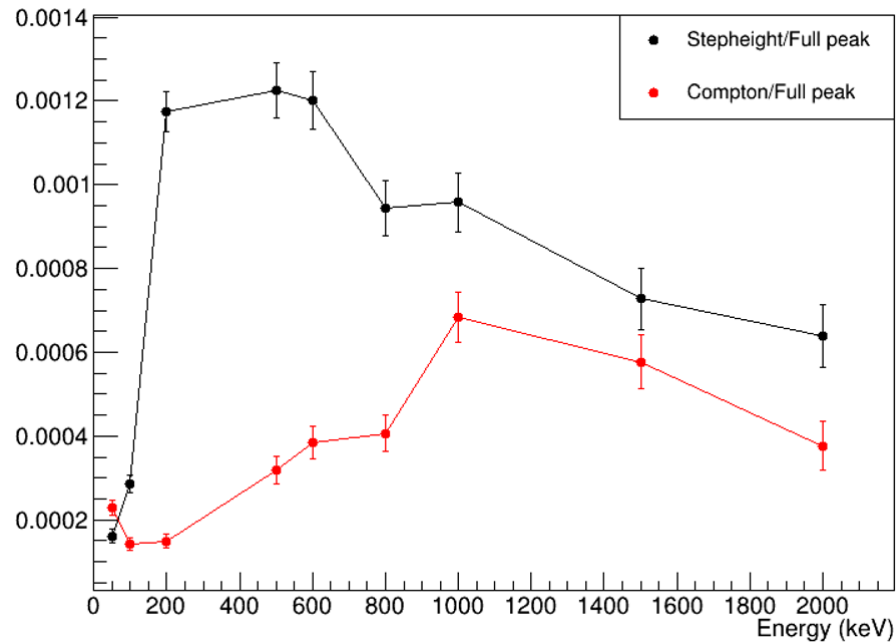


# Gain drift

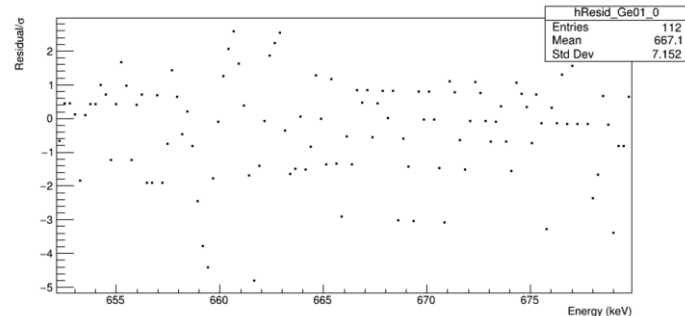
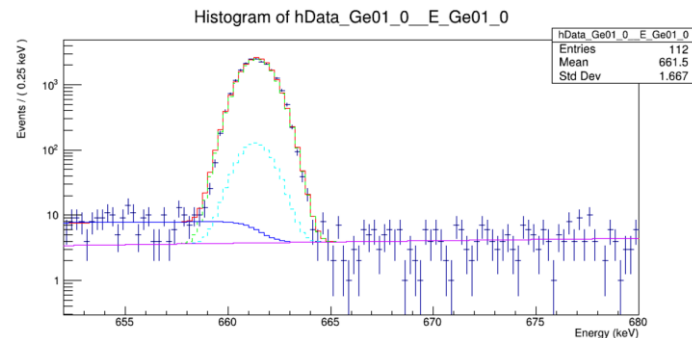


# Step height

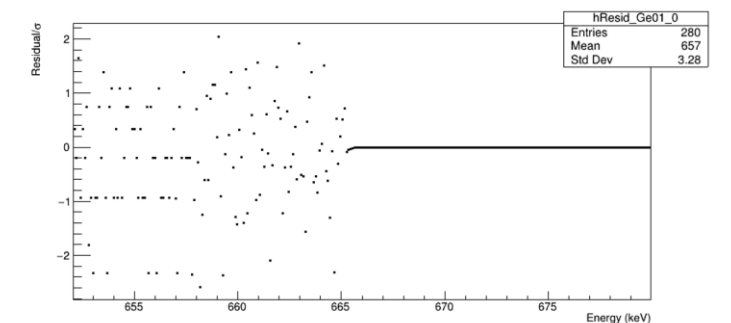
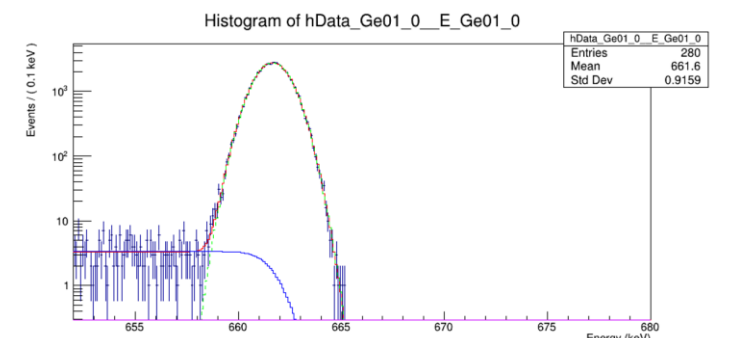
- Investigating the origin of the step height and predictive power of Geant4
- Very much work in progress still

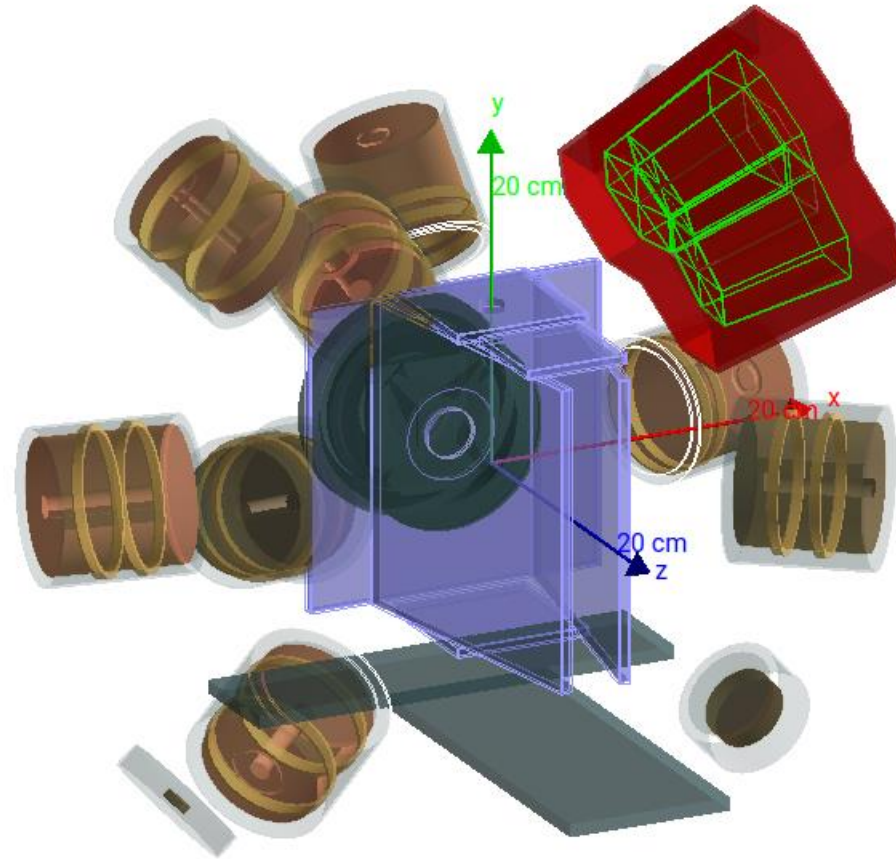


Experimental spectrum:



Simulated spectrum:





Geant4 simulations of the array  
of this year



# Based on the measurements we took during the switch between Au-Pb-H<sub>2</sub>O target and Al/Si

Detector	Name	Thetay	Thetax	R [cm]	Extra notes
Ge01	Bege 3820b MIXE - Ge01 of 2023 b	180	45	10	MIXE position
Ge02	Bege 3830	-108	45	15	MIXE position
Ge03	Bege3820a MIXE	-108	0	9.1	MIXE position
Ge04	Telescope	-108	-45	21.7	MIXE position
Ge05	Miniball	-53	45	13.9	Not at 32.5, because we wanted to make sure we had enough space for it, since it is a big crystal
Ge06	Leuven75	-53	0	11	MIXE position
Ge07	Leuven90	55	45	15.3	
Ge08	Leuven70	55	12.5	19.1	32.5 deg difference
Ge09		55	-20	18	32.5 deg difference
Ge10	Rege7023MIXE	100	45	15.4	MIXE position
Ge11	Rege90TUM	100	0	14.8	MIXE position
Ge12	Lege	100	-45	12.4	

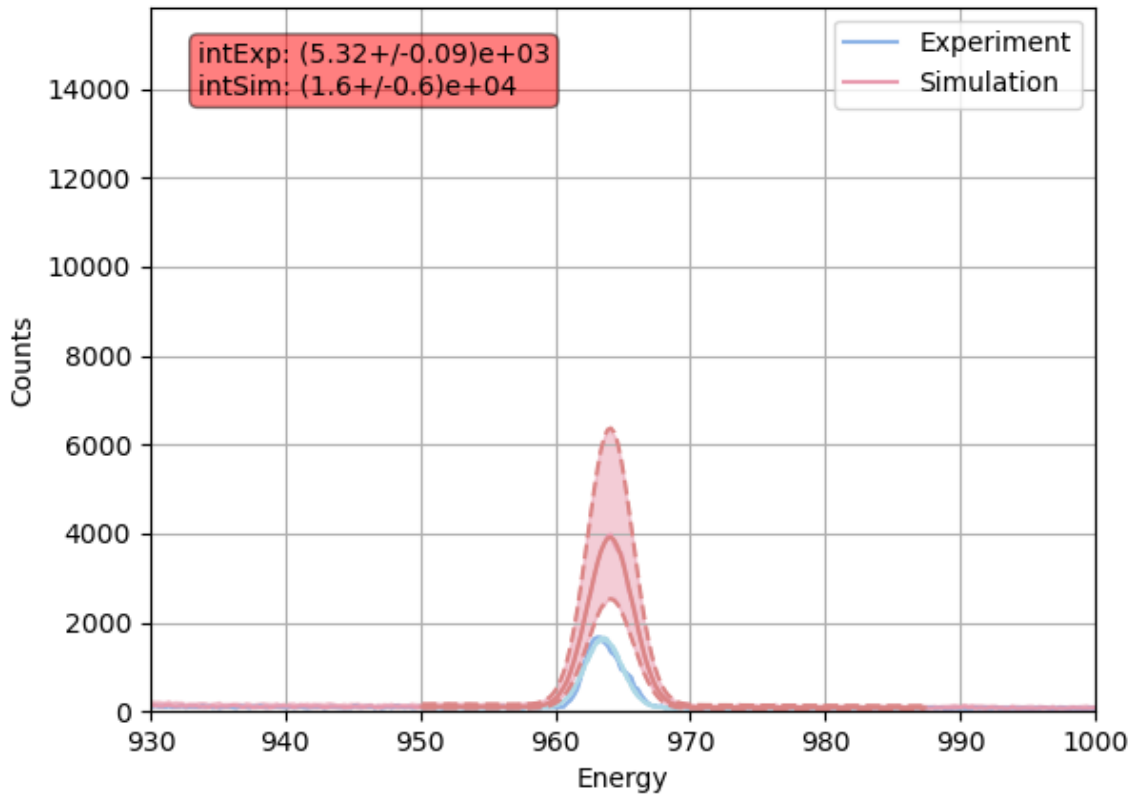
- Uncertainty on R : +/- 30  
→ Geant4 simulations for:
  - All detectors on measured R
  - All detectors on measured R + 30mm
  - All detectors on measured R - 30mm

# Comparison

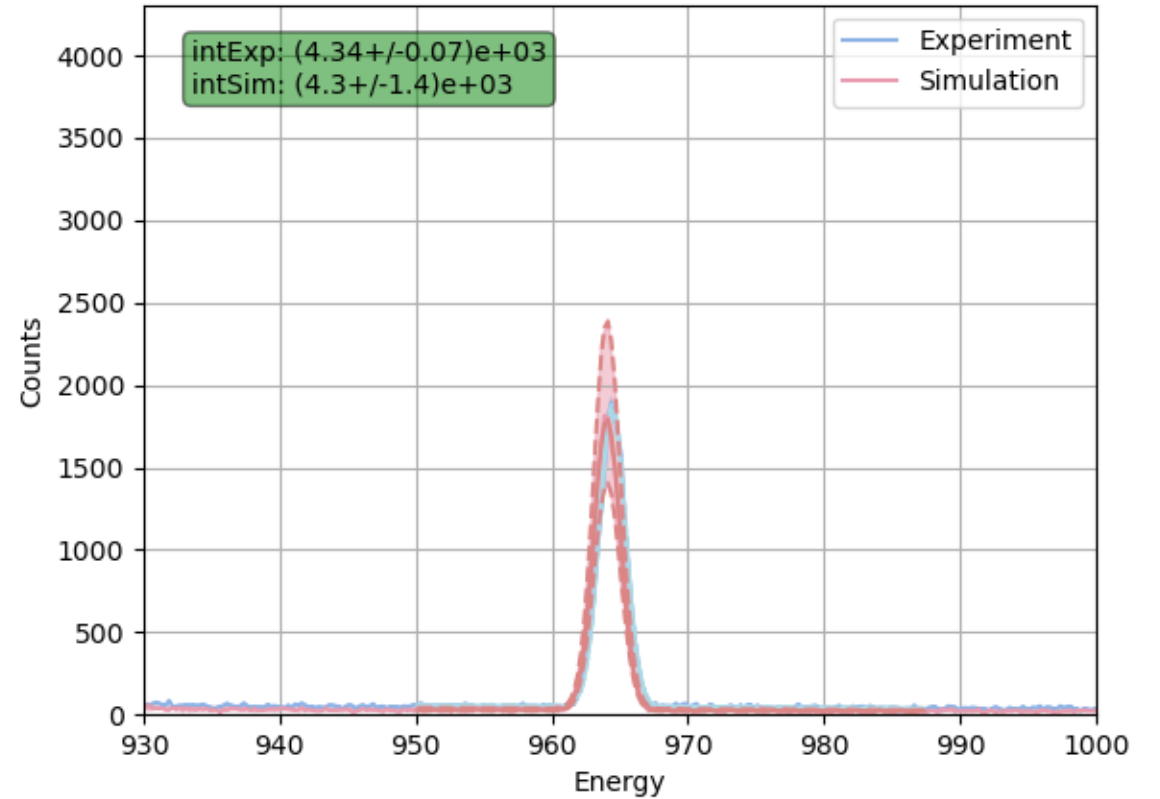
- Scale experimental spectrum with:  $N_{\text{sim}}/(A \cdot t_{\text{exp}})$
- Fit experimental and simulated spectrum → Get integral value
- Uncertainty on simulation: from the  $\pm 3\text{cm}$  simulations
- Uncertainty on the experiment: from the uncertainty on the activity

# Comparison – $^{152}\text{Eu}$ – 962keV line

Ge03 - BEGE3820a



Ge08 - leuven70



# Comparison

152Eu - 962 keV

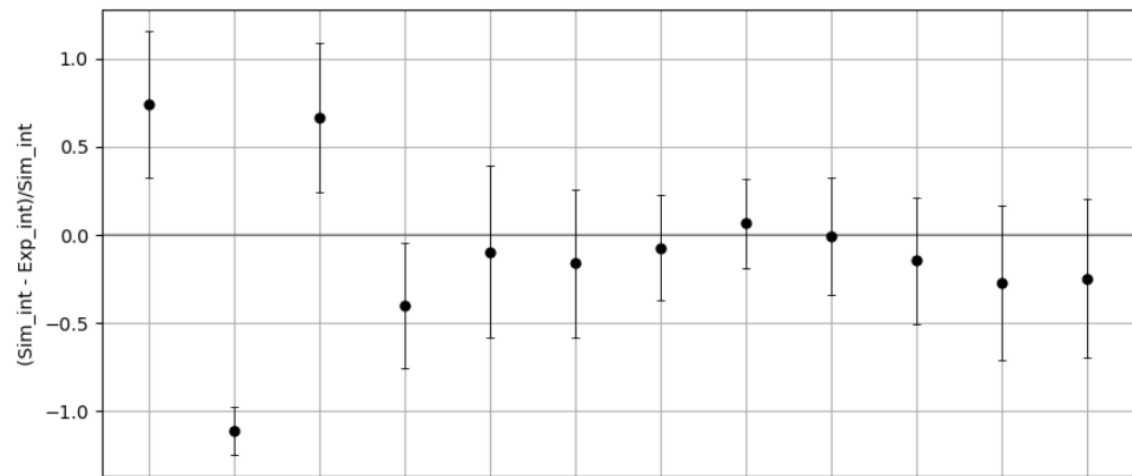
Detector	Name	Agreement within which sigma	Notes
Ge01	Bege 3820b MIXE	> 4	Awkward position --> Likely not at all facing the source + not very reliable distance measurement
Ge02	Bege 3830	>4	???
Ge03	Bege3820a MIXE	2	
Ge04	Telescope	2	
MB05A	Miniball A	1	
MB05B	Miniball B	1	
Ge06	Leuven75	1	
Ge07	Leuven90	1	
Ge08	Leuven70	1	
Ge09	Rege7023MuX	1	
Ge10	Rege7023MIXE	1	
Ge11	Rege90TUM	1	
Ge12	Lege		Does not see this line

137Cs

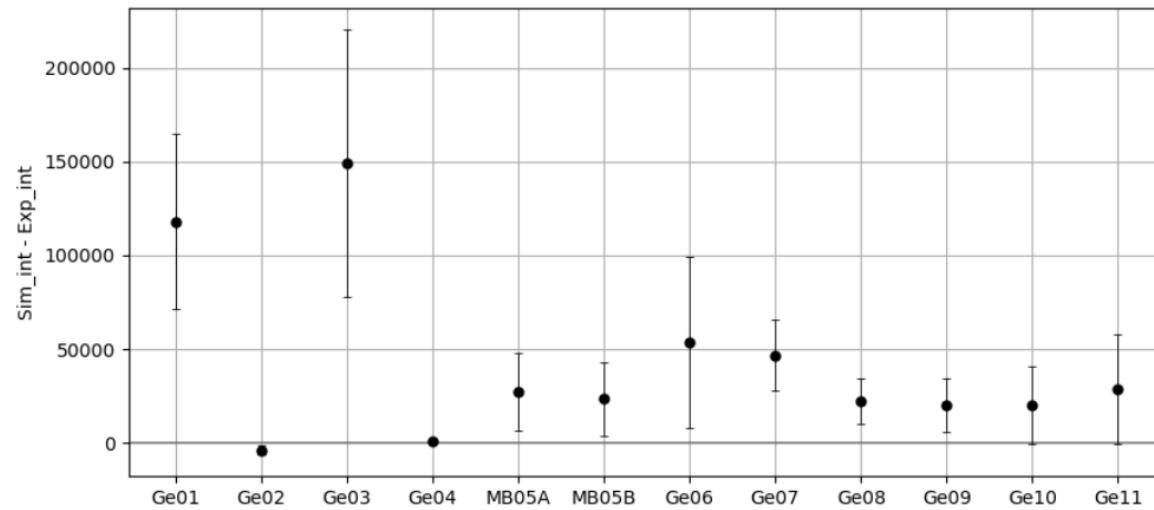
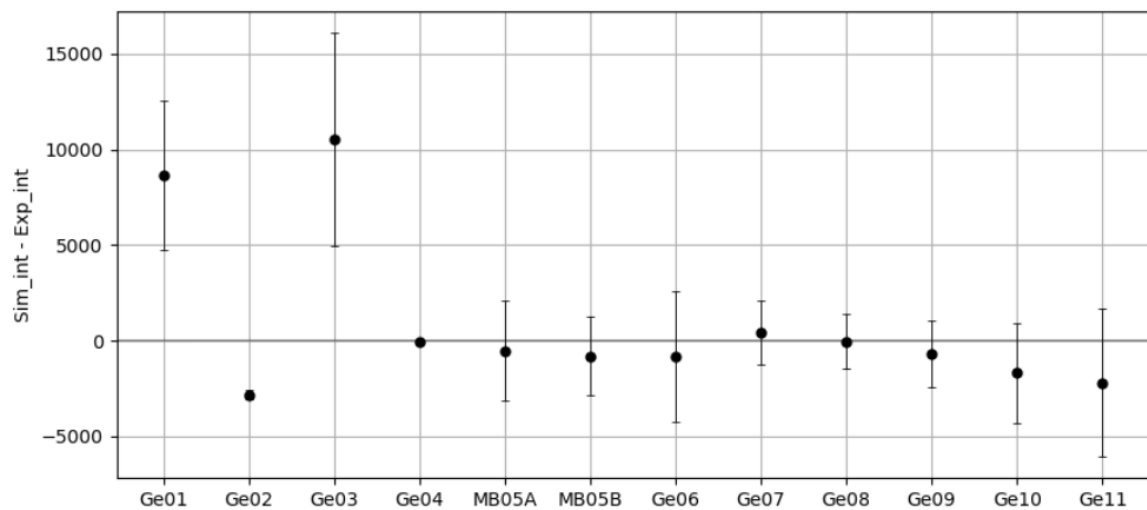
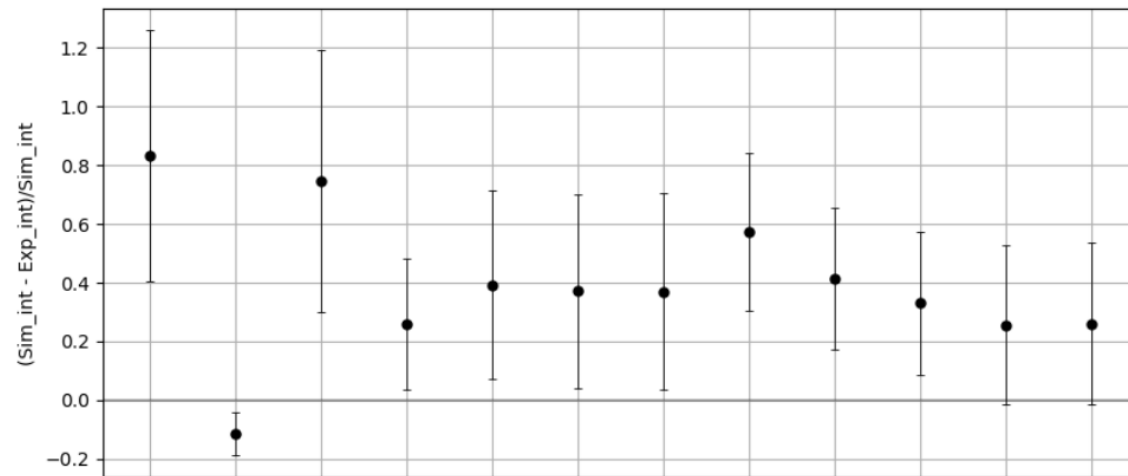
Detector	Name	Agreement within which sigma	Notes
Ge01	Bege 3820b MIXE	3	Awkward position --> Likely not at all facing the source + not very reliable distance measurement
Ge02	Bege 3830	2	
Ge03	Bege3820a MIXE	3	???
Ge04	Telescope	2	
MB05A	Miniball A	2	
MB05B	Miniball B	2	
Ge06	Leuven75	2	
Ge07	Leuven90	3	In general things were wrong with this detector
Ge08	Leuven70	2	
Ge09	Rege7023MuX	2	
Ge10	Rege7023MIXE	1	
Ge11	Rege90TUM	1	
Ge12	Lege	>4	Only barely sees this peak

# Comparison

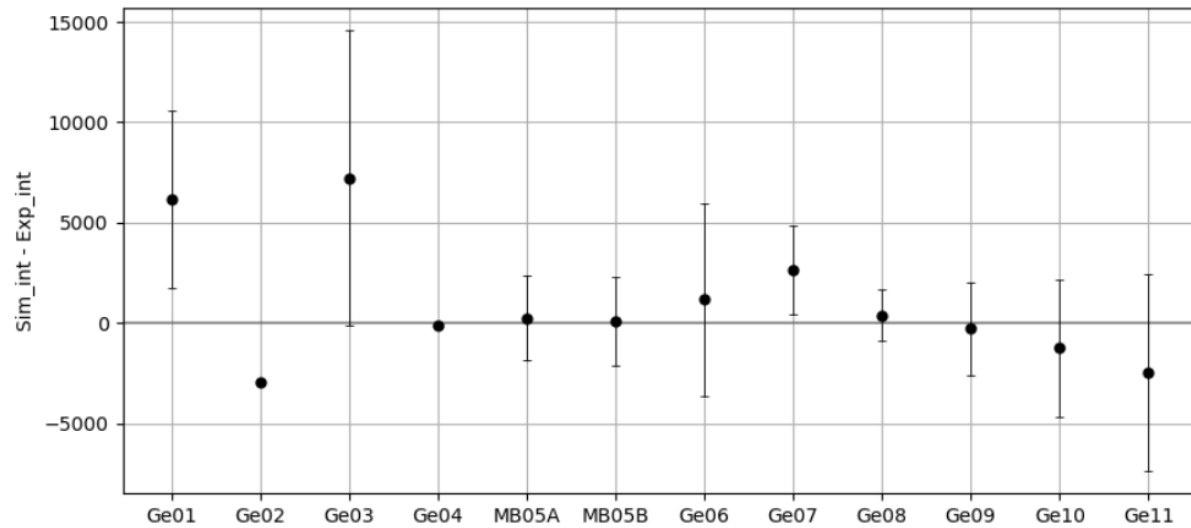
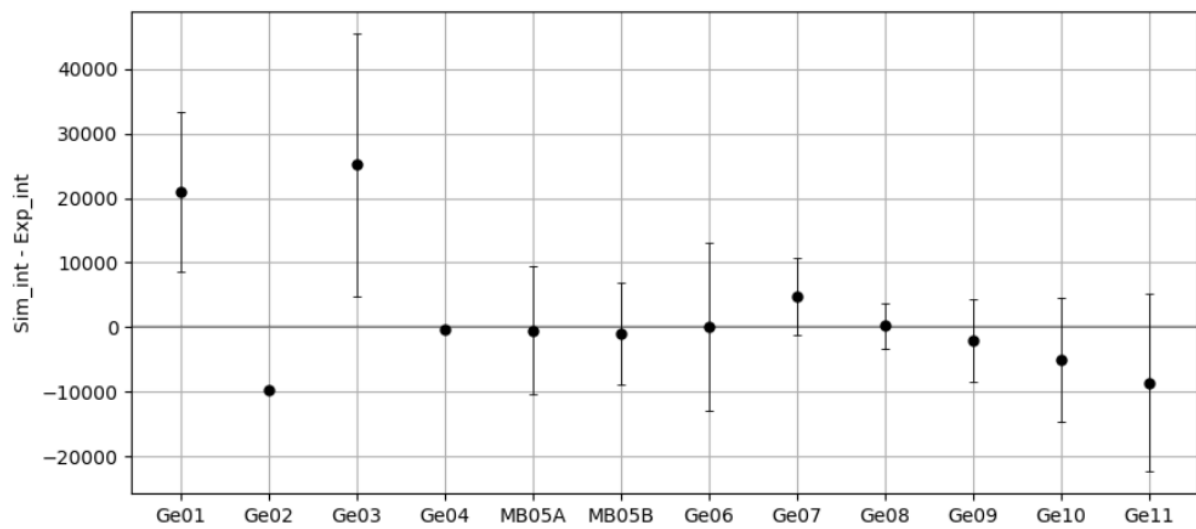
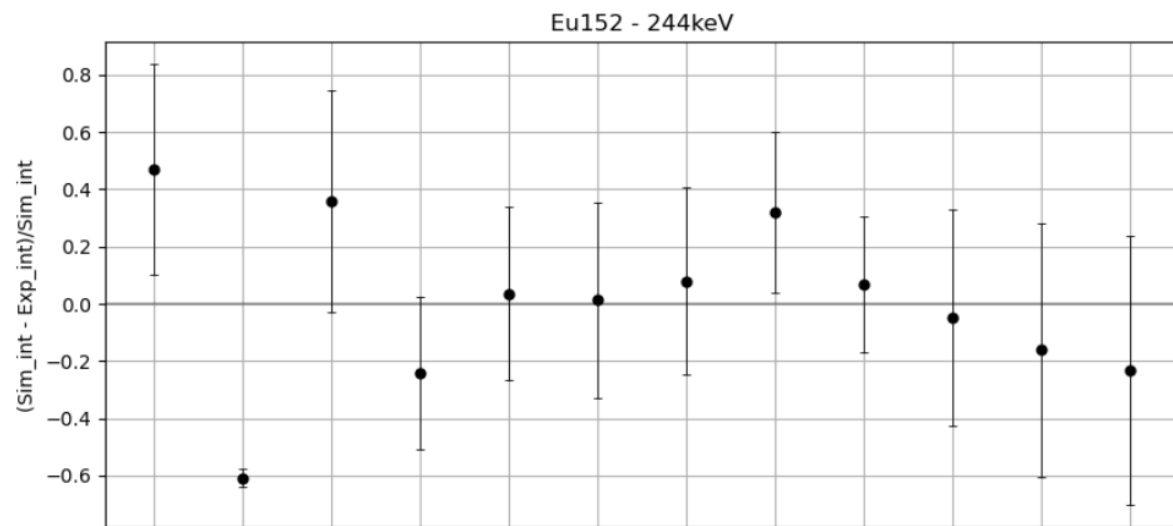
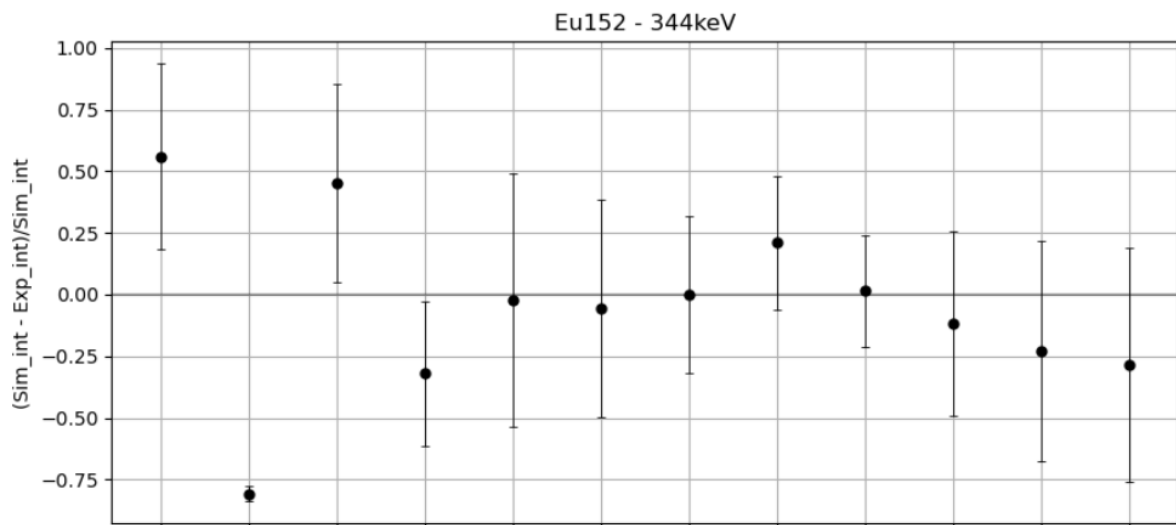
Eu152 - 962keV



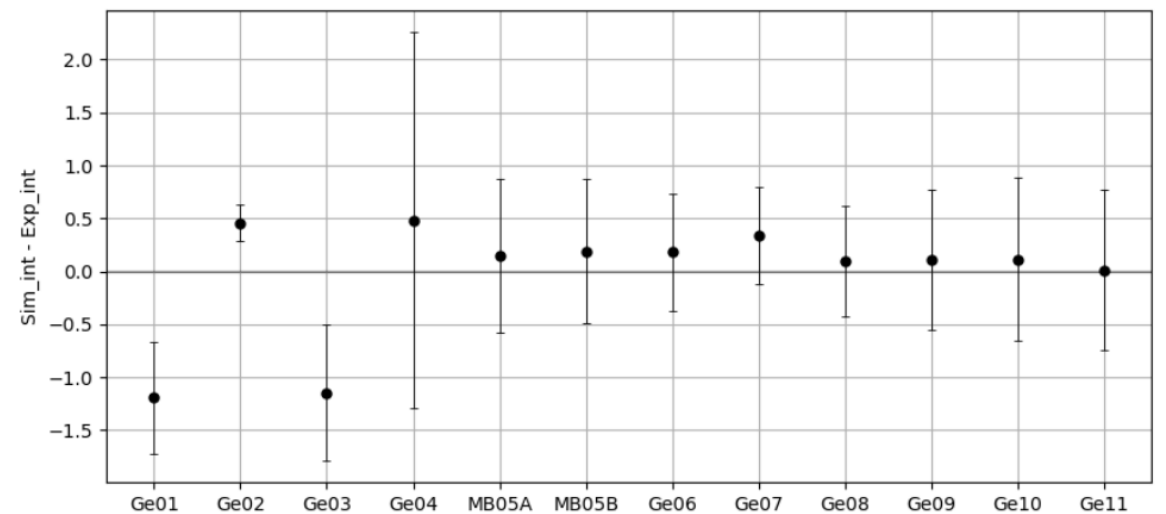
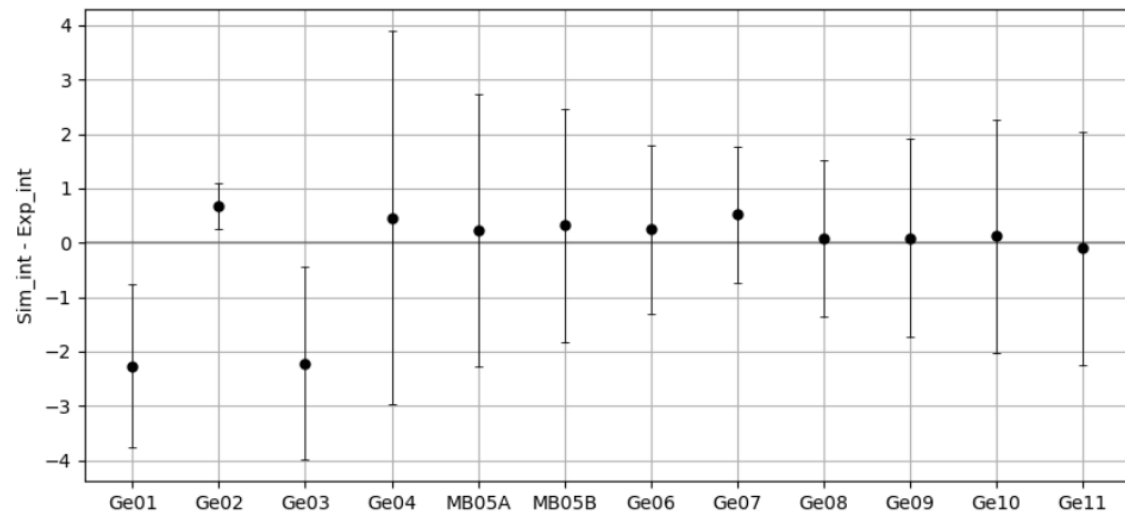
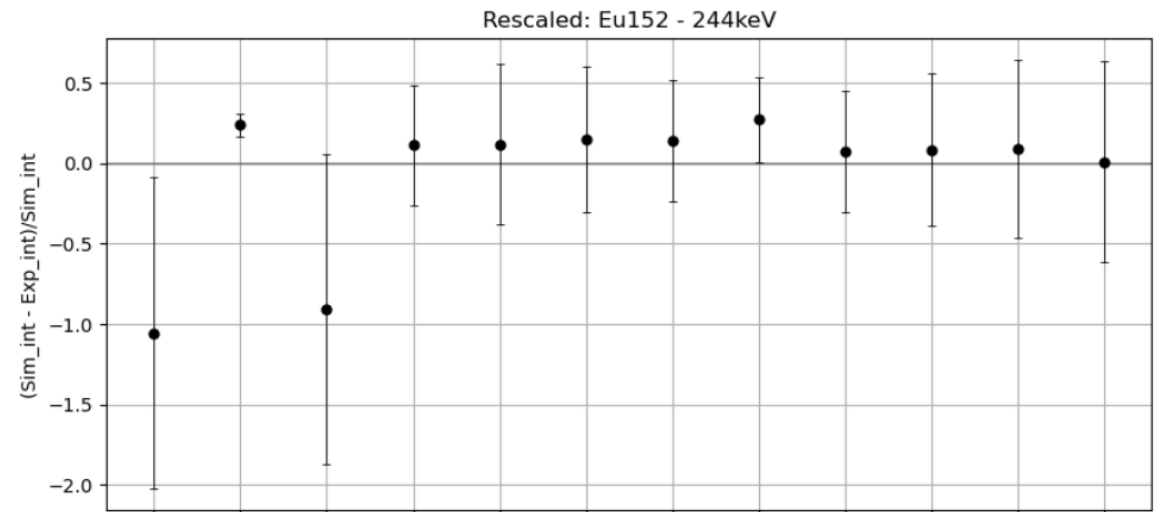
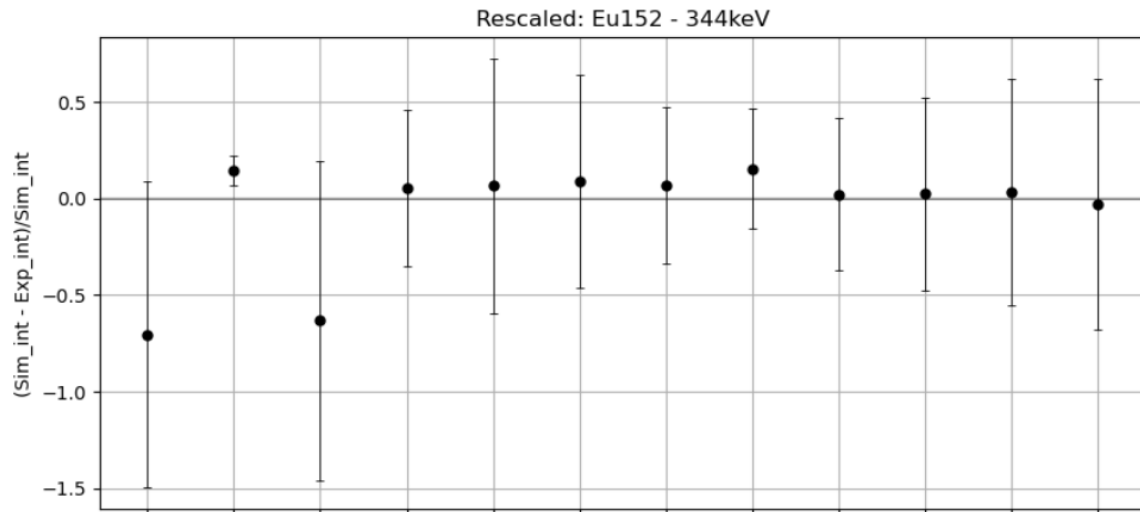
Cs137



# Comparison

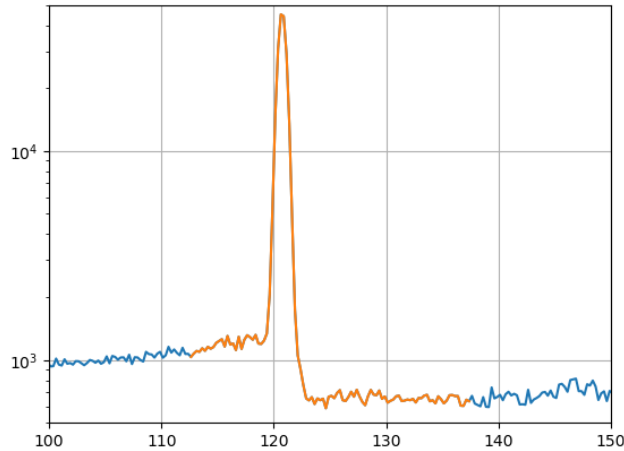


# Compare – rescaled with 962keV line



# Comparison

- Not very good, but quite a big step:



→ Gaussian fit might not be the best

