

# MuX meeting 29/11/2024

Marie Deseyn




# Geant4 update



# Geant4 simulations - status

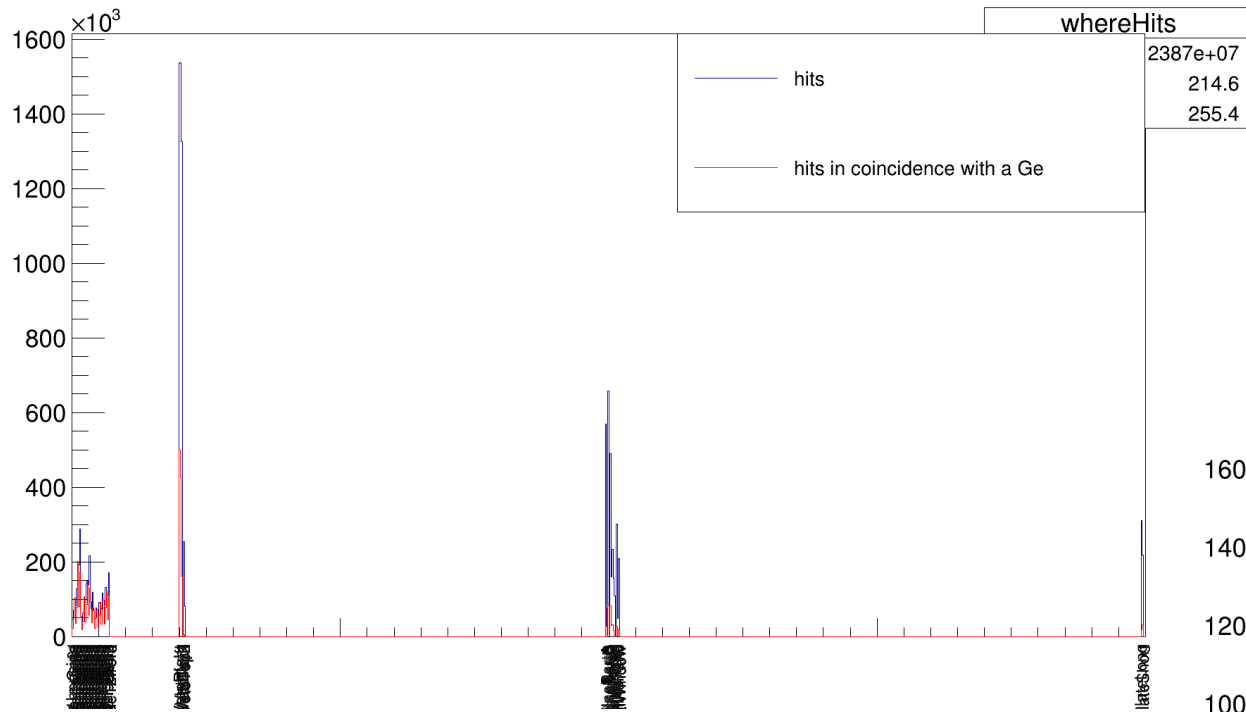
Update of my simulations (big clean-up)	Done, everything can now easily be done with json files for different types of detectors, for scintillators, for beamlinepieces, ... + energy deposition in all elements is possible now
Simulation of the array of last year	Not yet finished, all detectors are in but not miniball and the drawing-less detectors: Lege, Telescope, Leuven90 (waiting for the drawing from Reinaud), miniball (translate from my old simulation, should go rather quick as I don't want this to be very adaptable) + need to compare to the calibration spectra
Scintillator design	<ul style="list-style-type: none"><li>- Did very basic simulations (see later)</li><li>- Working on the bremsstrahlung tracking (not fully needed, but would be nice to see where brem is coming from)</li></ul>
Gradient descent for position optimization	Not much progress (to fix the 6e8 combinations in python and subsequent crashing)
New cluster	To make compatible with cluster, I now stopped using root in G4 simulations but I used G4 functions + fixed associated problems with multithreading (bremcode not yet updated)
Geant4 simulations for stepheight of hypermet	In progress

# Main conclusions from the beamtime preparation work

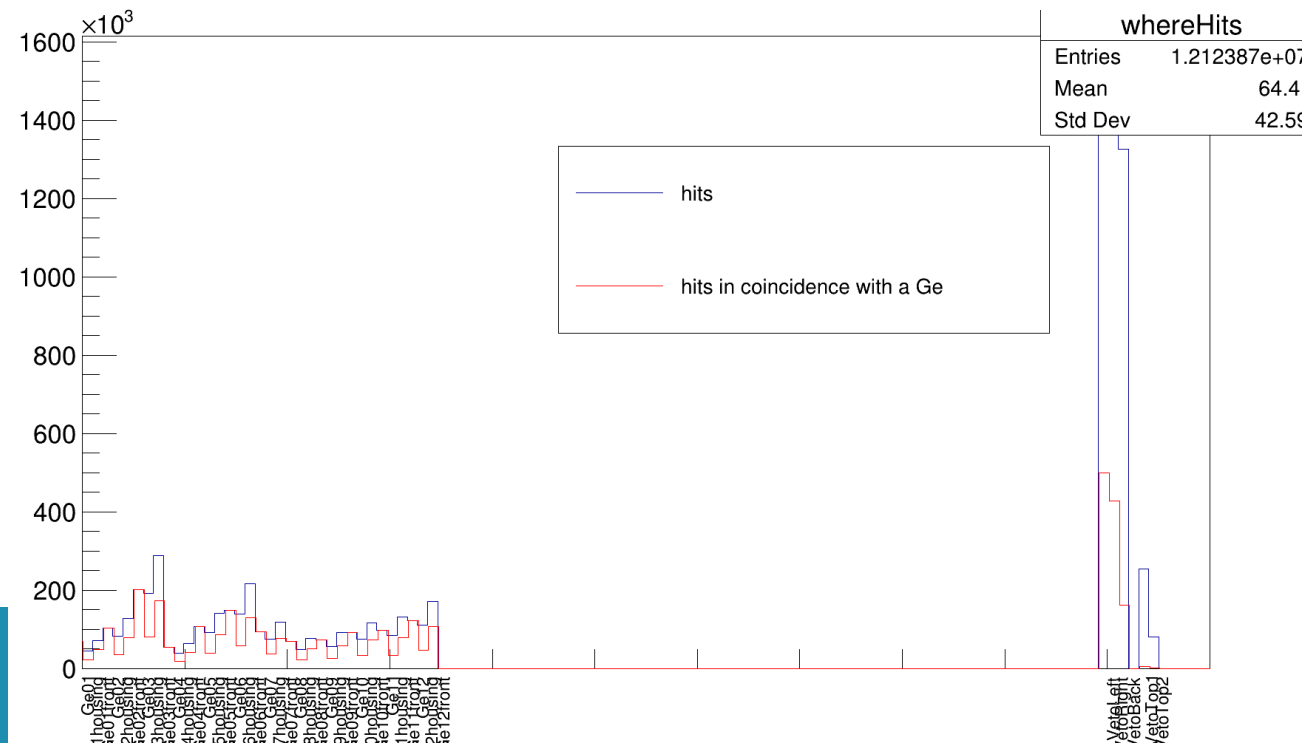
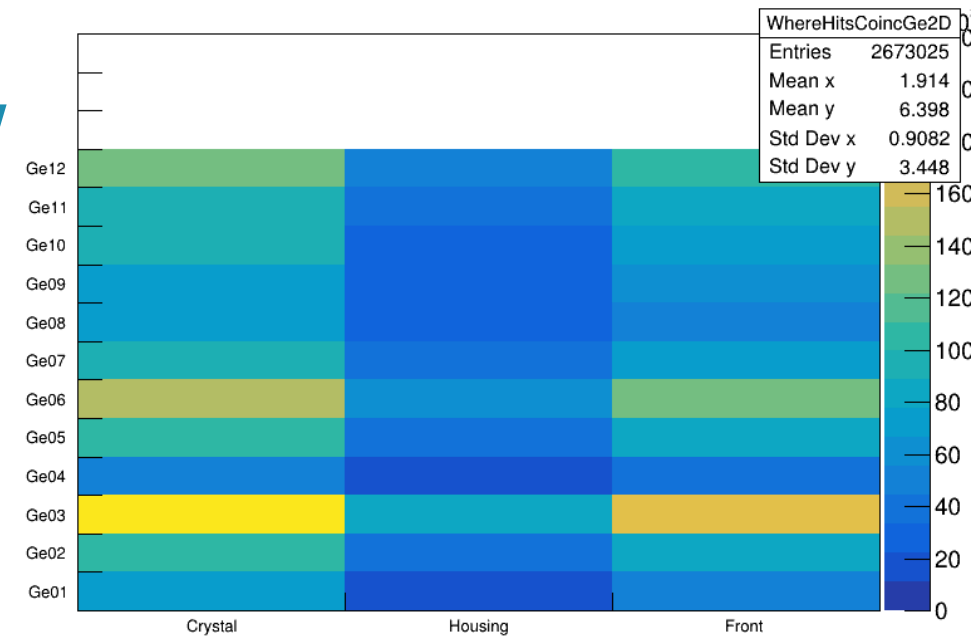
- Independent treatment of the detectors 
- General dependencies/constraints with Leuven 75 detector
  - Low energy detectors on northern hemisphere (Bremsstrahlung + blocking for Si)
  - $\theta_x$ : -20 to 20deg ok region
  - $\theta_y$ : 70 to 100deg ok region + definitely don't go to 0 deg

# Examples of what I can do now

whereHits

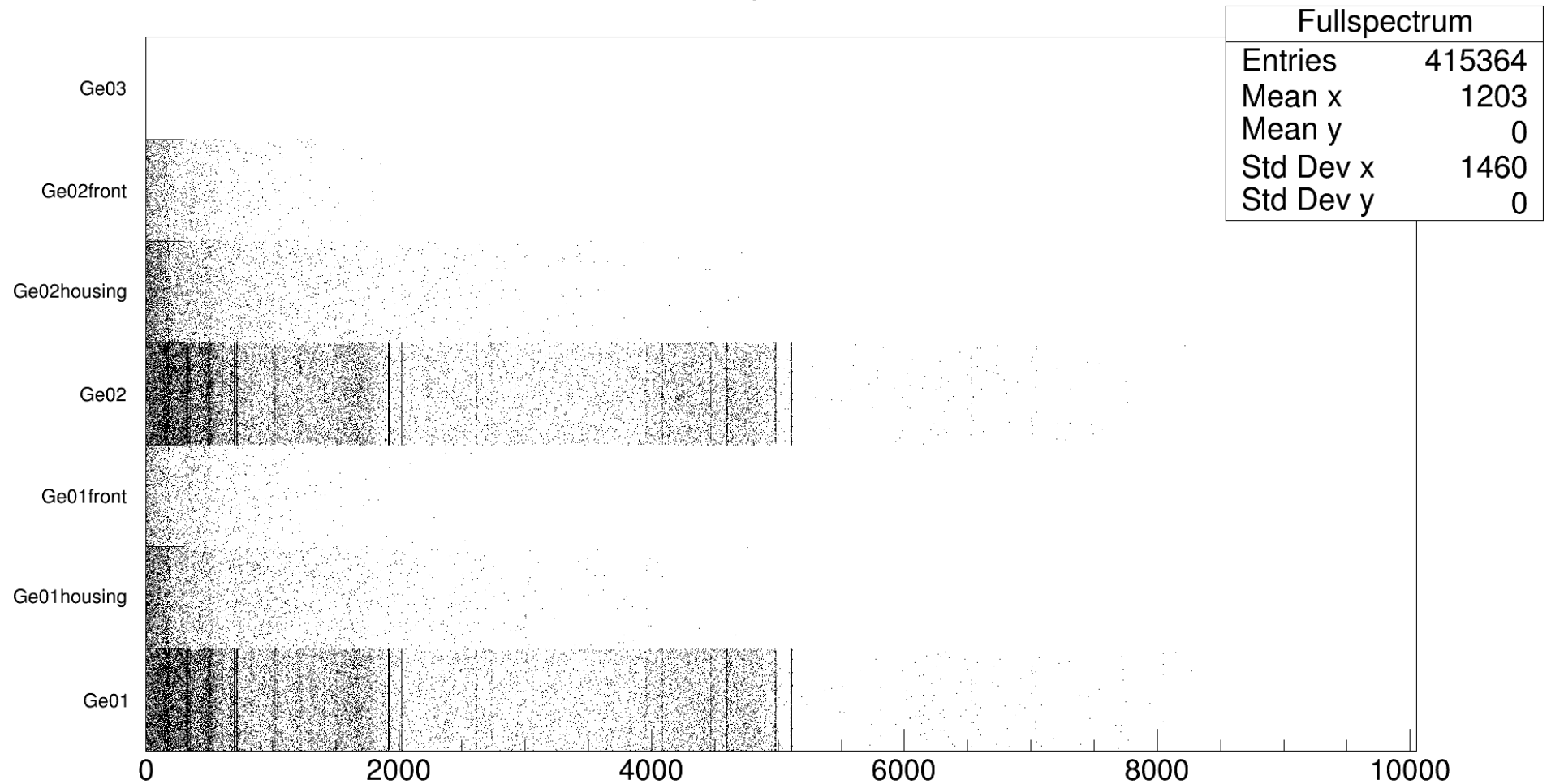


WhereHitsCoincGe2D

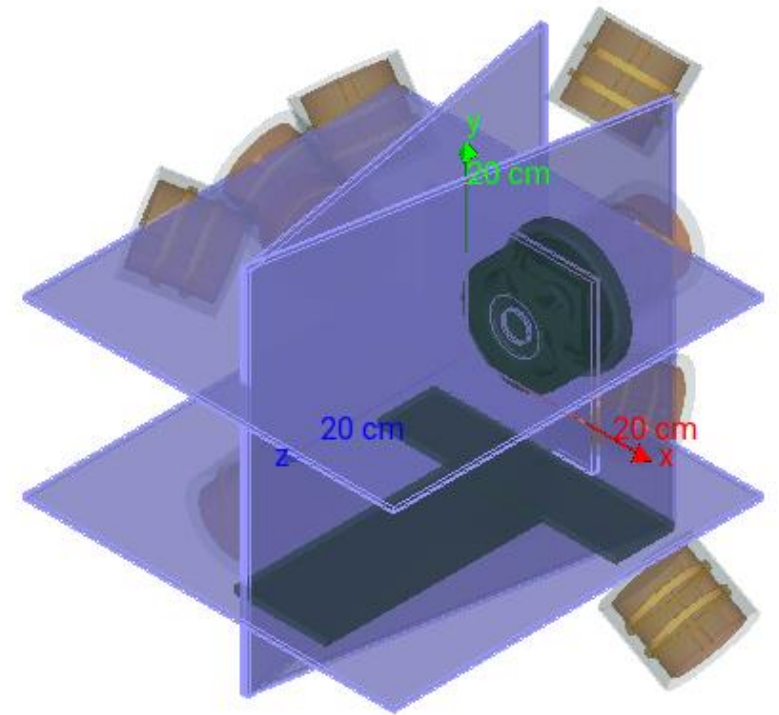
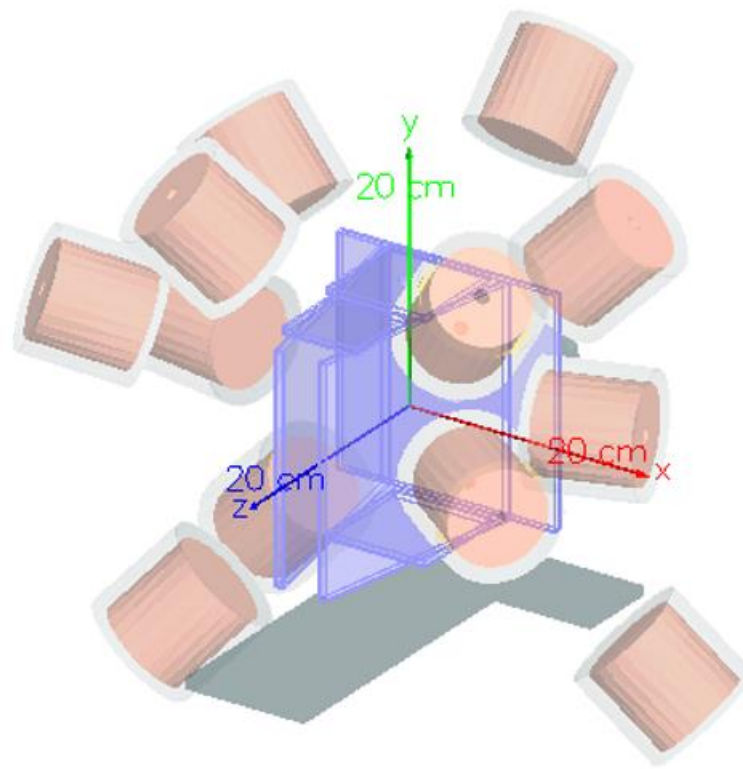
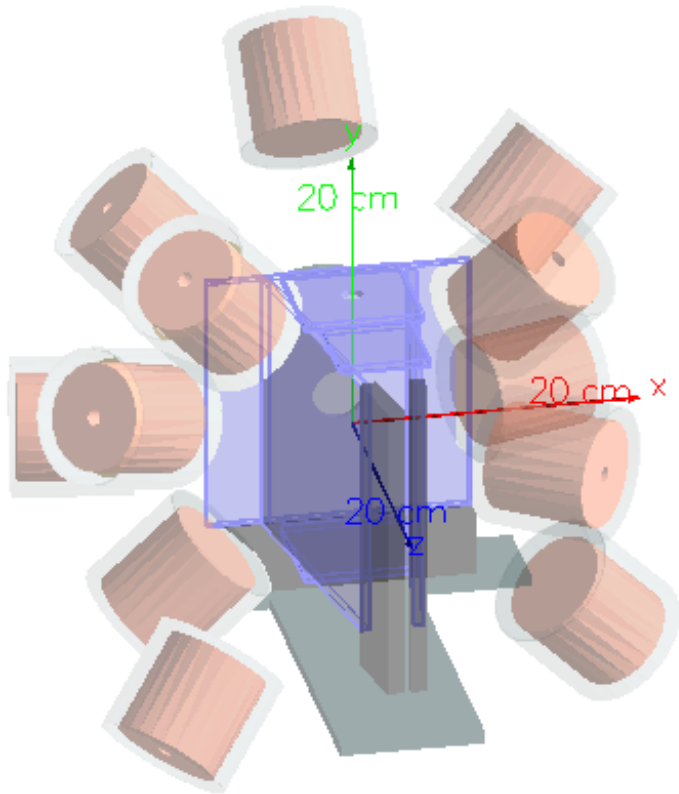


# Examples of what I can do now

Fullspectrum



# Scintillators

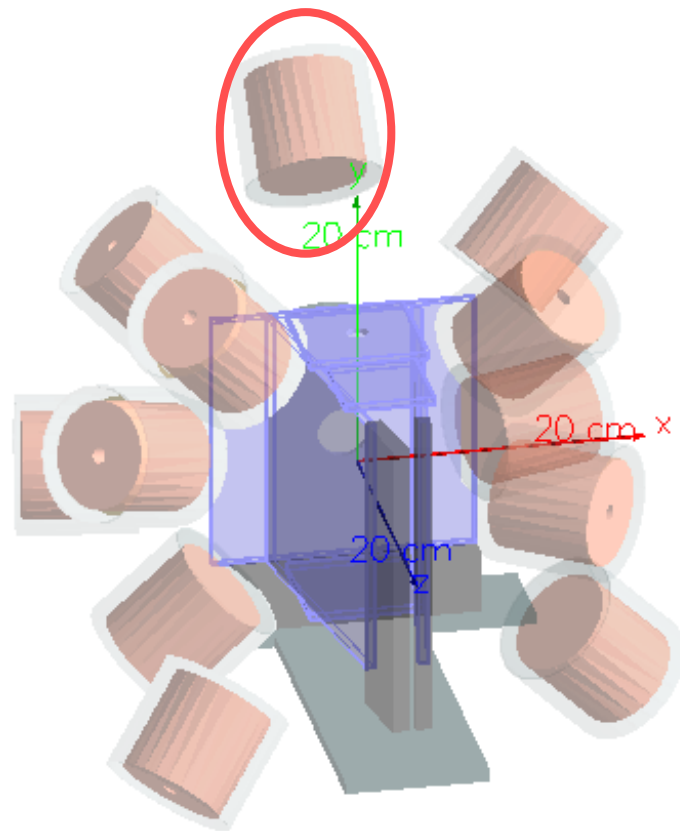


# Scintillators

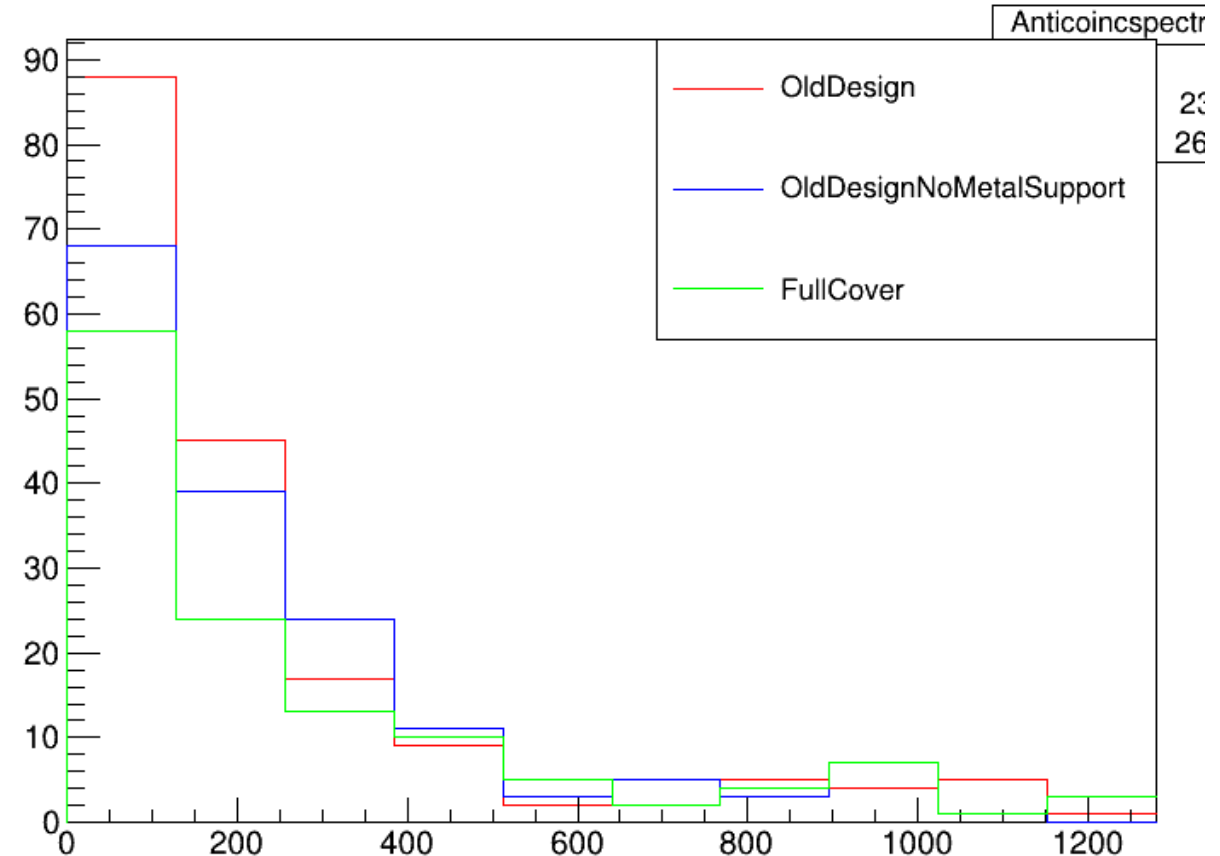
Integral ([0,4000]) of OldDesign spectrum: 203

Integral ([0,4000]) of OldDesignNoMetalSupport spectrum: 179

Integral ([0,4000]) of FullCover spectrum: 164



## Anticoincspectrum



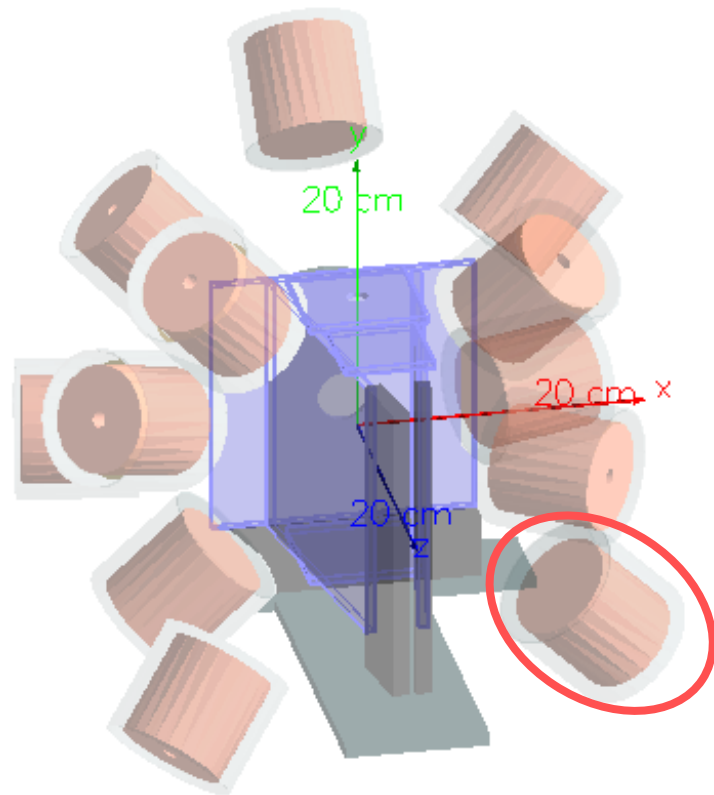


# Scintillators

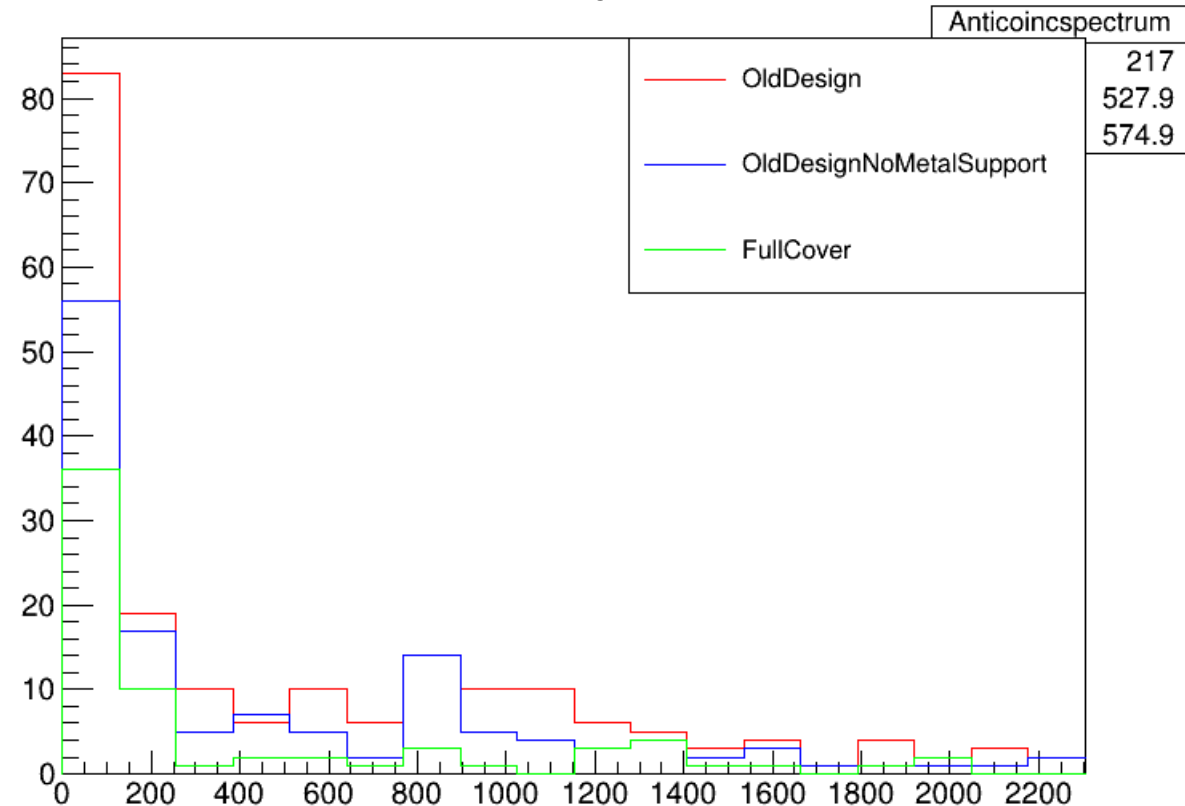
Integral ([0,4000]) of OldDesign spectrum: 212

Integral ([0,4000]) of OldDesignNoMetalSupport spectrum: 143

Integral ([0,4000]) of FullCover spectrum: 72



### Anticoincspectrum



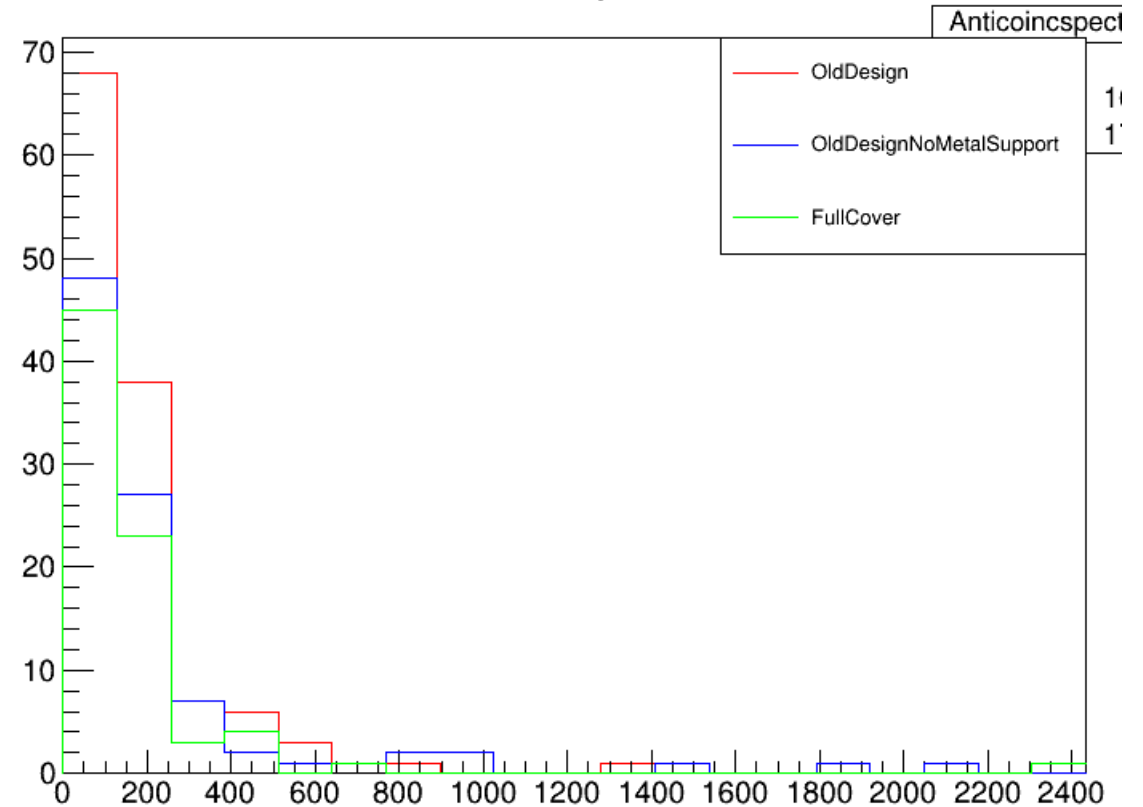
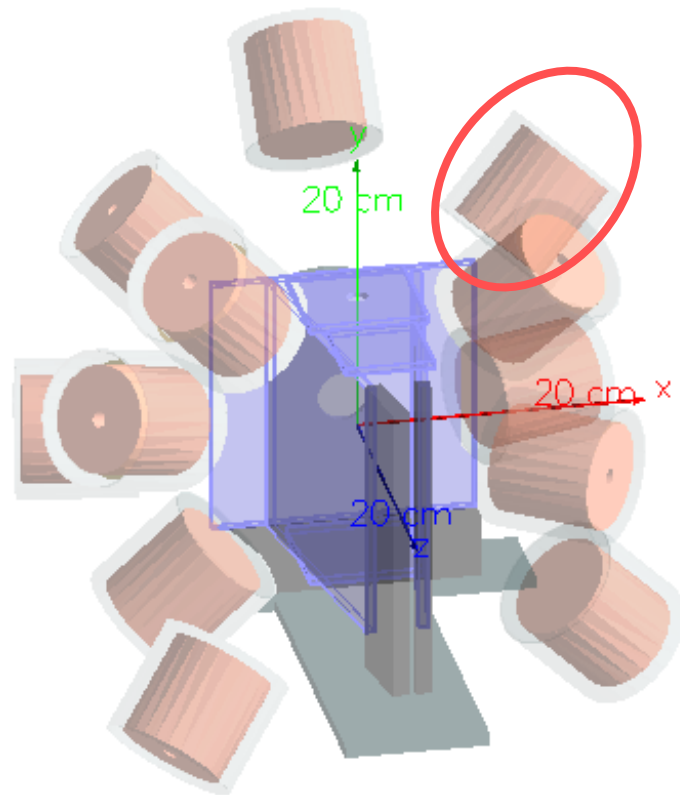
# Scintillators

Integral ([0,4000]) of OldDesign spectrum: 127

Integral ([0,4000]) of OldDesignNoMetalSupport spectrum: 99

Integral ([0,4000]) of FullCover spectrum: 78

### Anticoincspectrum



# Idea with Razvan and Christian

- Before each germanium detector: put a scintillator detector with 3D printed endcap to fit on all snouts
- Redesigning the scintillators around the target
- Guided by Geant4 simulations



Si data



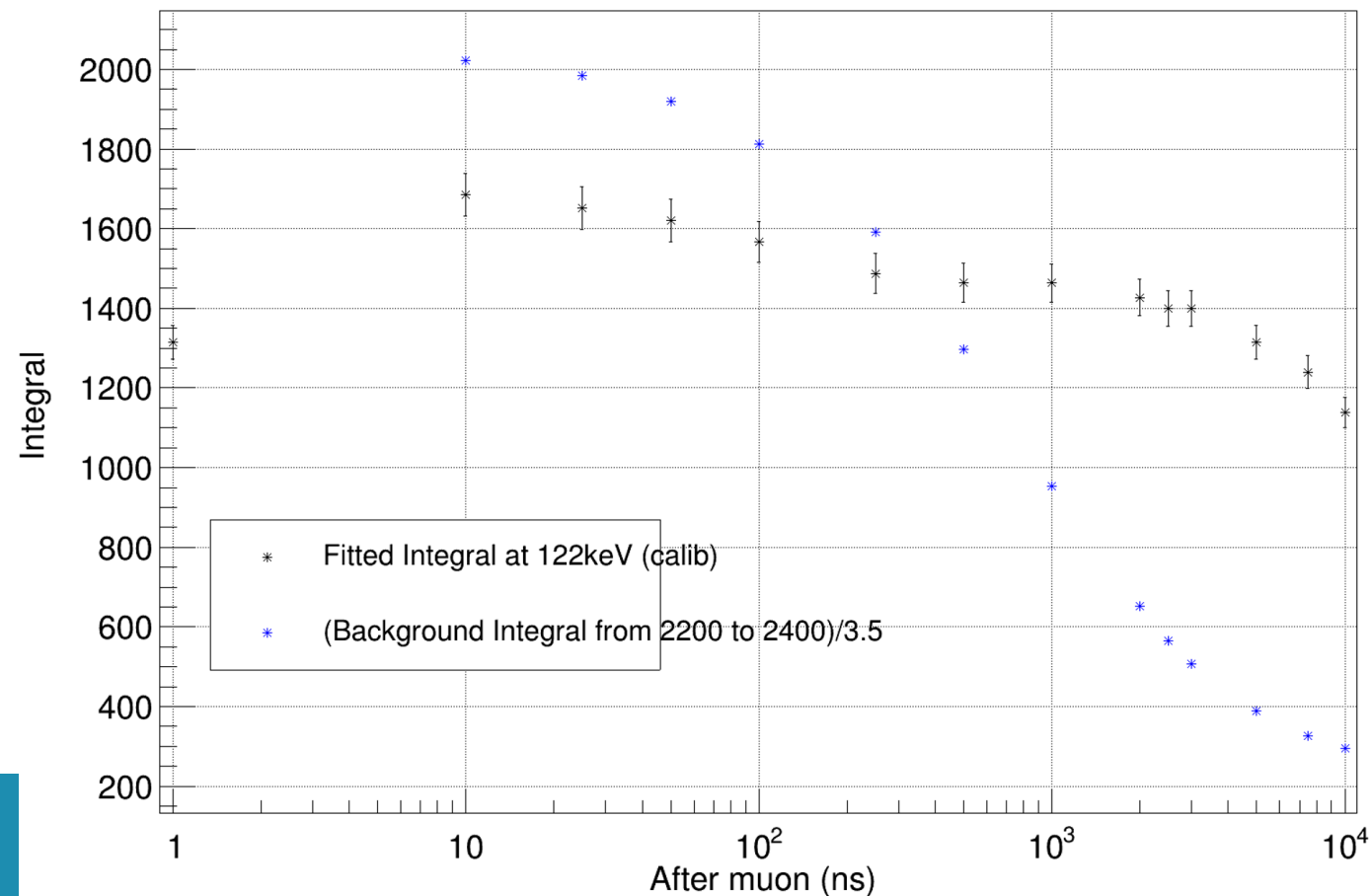
# ELET

- ELET overview table:  
(USING RUN 71290 - 71295)

Detector	Ex	Th	F	Sigma (ns)
Ge01	0	25	1.5	39
Ge02	0	20	2.5	23
Ge03	0	20	2	37
Ge04	1	30	2	14.8
MB05A	0.3	40	7	13.9
MB05B	0	50	6	13.1
MB05C				
Ge06	0.6	30	7	14.3
Ge07	1.1	40	5.5	18.6
Ge08	2.2	60	7	16
Ge09	1.2	40	3.5	17.3
Ge10	1.3	40	3.5	16.1
Ge11	1.4	40	6	14.3
Ge12	0	50	2	

# Anticoincidence windows

- For negative time → Decided to look at background content vs. calibration line content



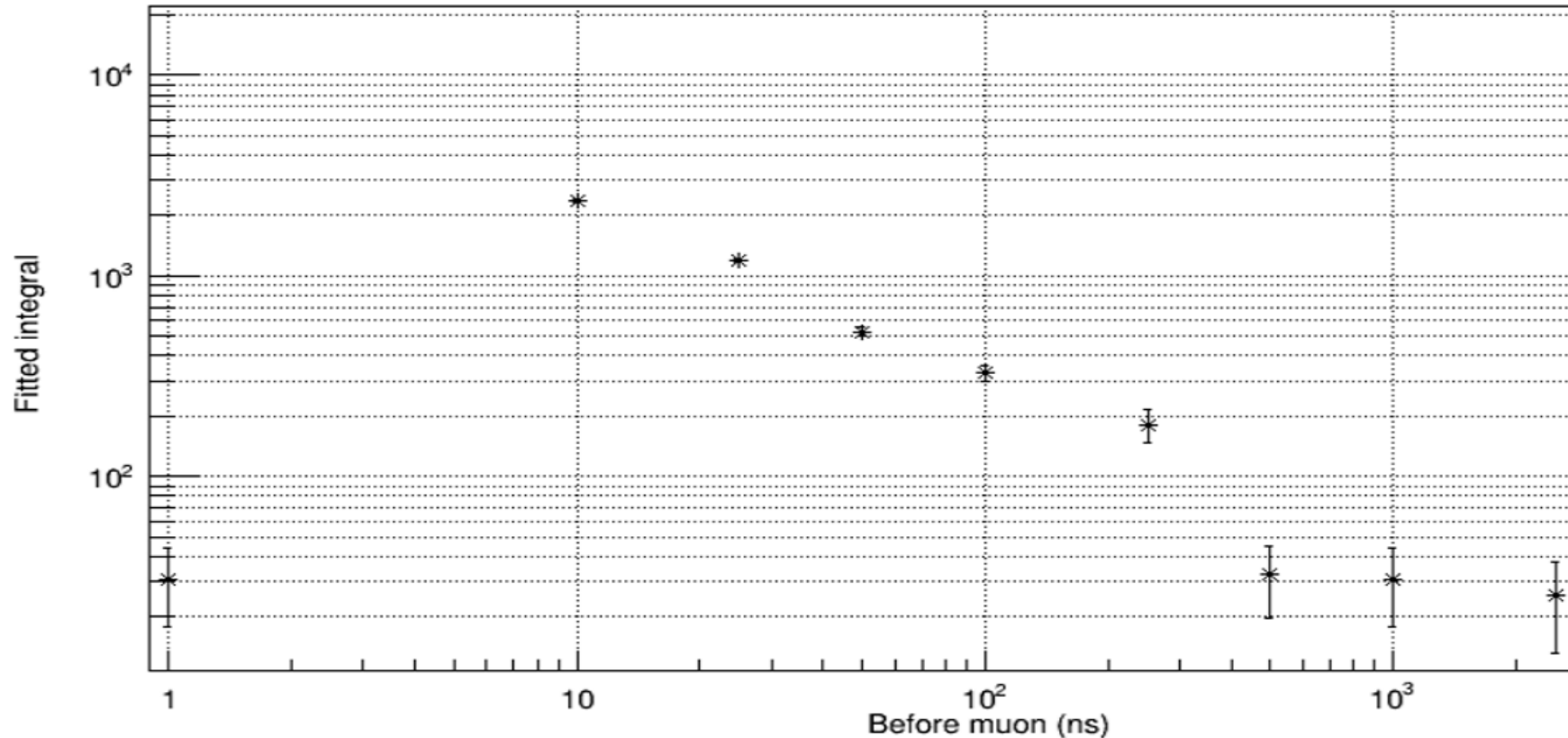
Decided on **-3000ns**

# Anticoincidence windows

- Muonic x ray at 400keV

**1000ns** to be conservative (Because there is miniball who has this periodic noise that might trigger before the real muonic x ray is emitted)

Check 400 keV



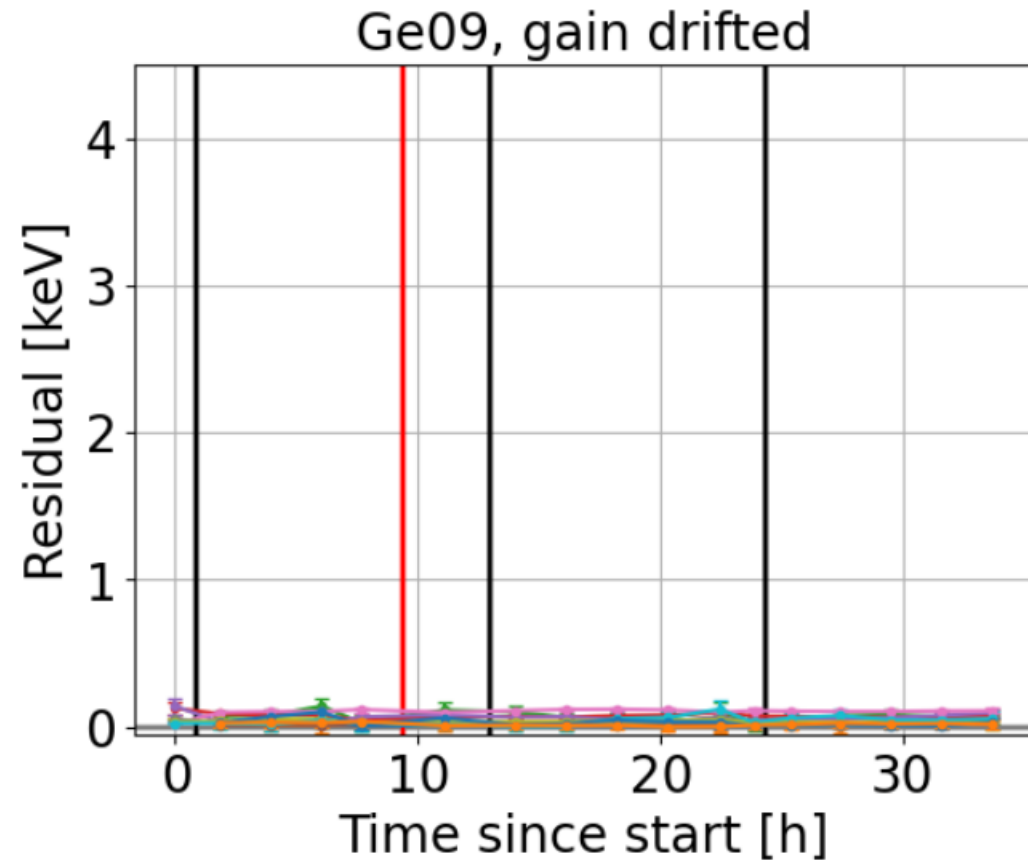
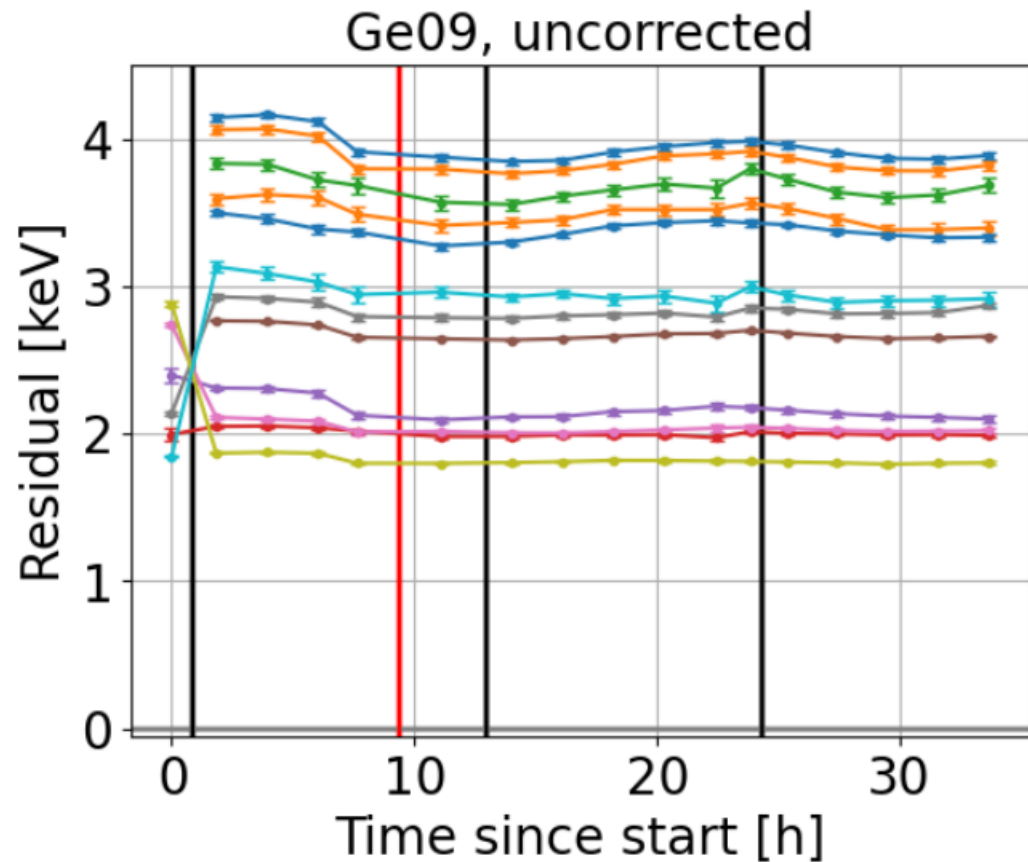
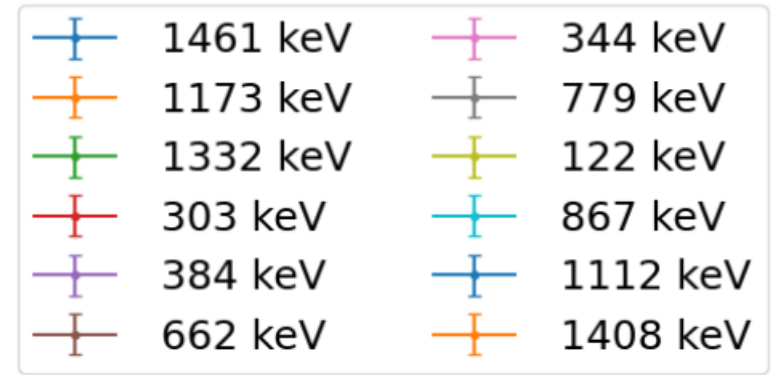


# Used lines

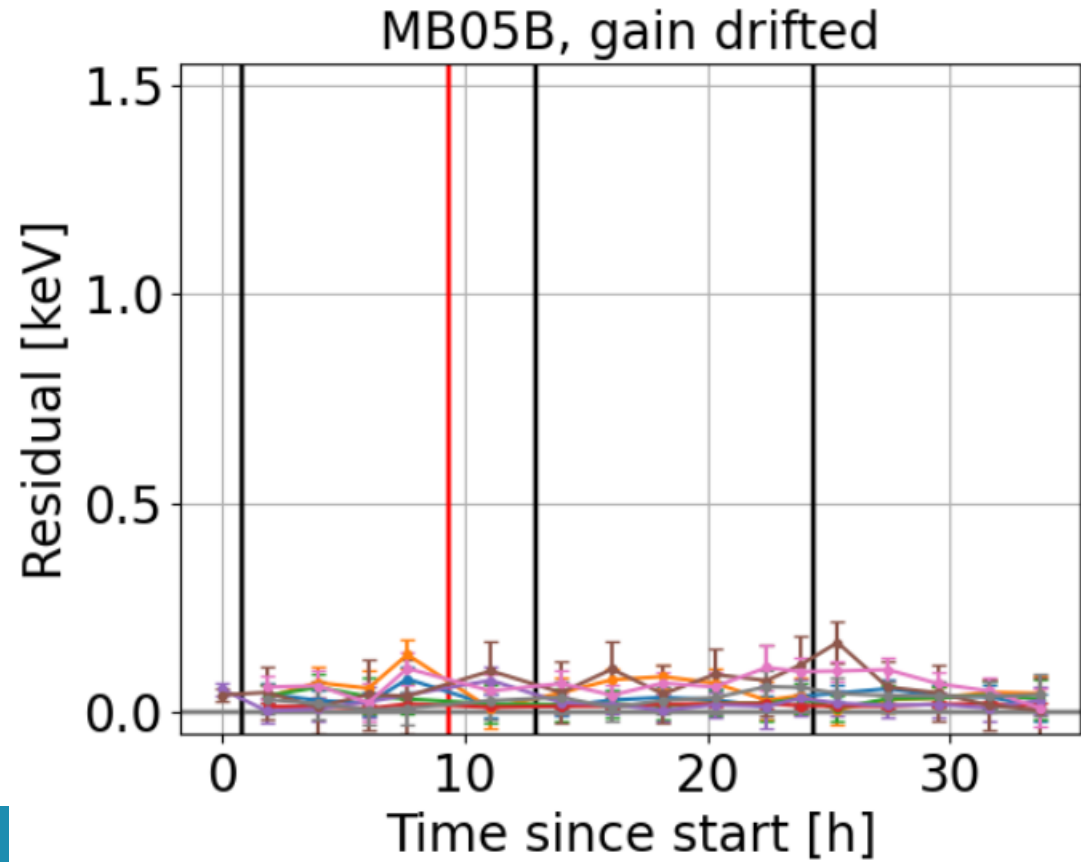
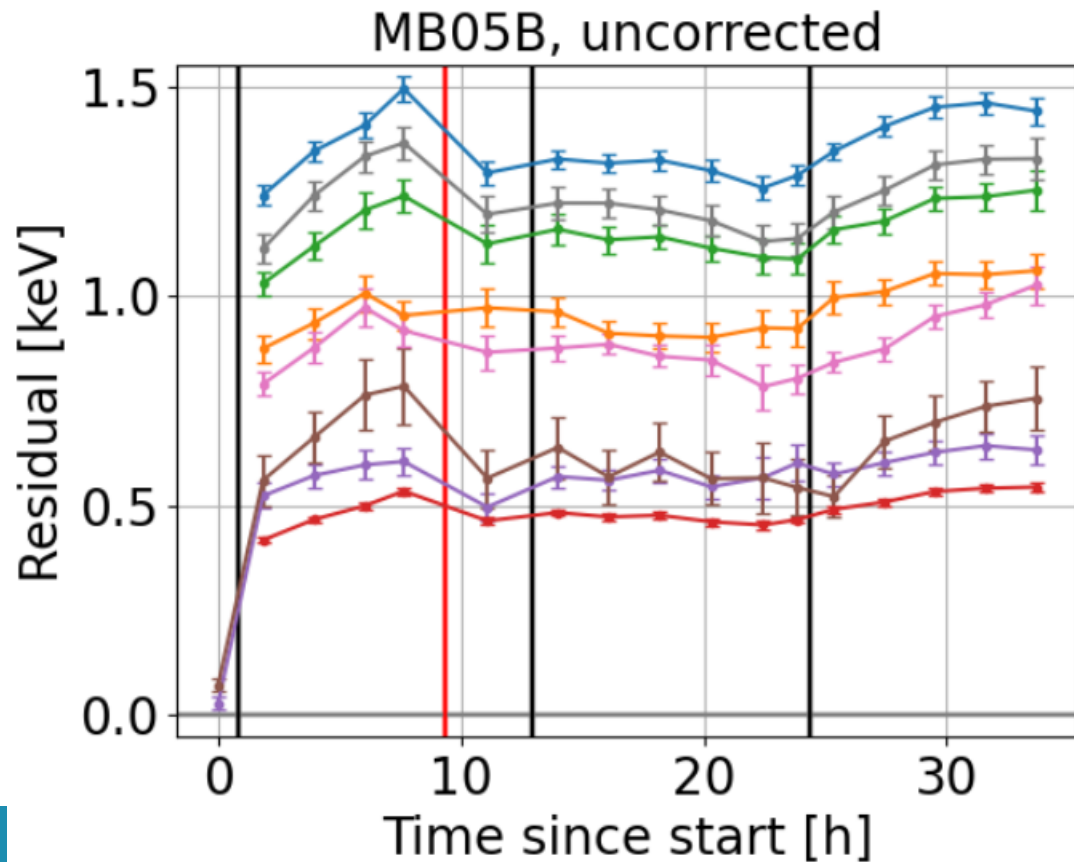
Energy [keV]	Origin
1173.228	Co60
1332.492	Co60
302.8508	Ba133
383.8485	Ba133
1460.820	K40
661.657	Cs137
344.2785	Eu152
778.9045	Eu152
121.7817	Eu152
867.380	Eu152
1112.076	Eu152
1408.013	Eu152

- Separate for Batch1 (AI and empty run); Leuven90 and Lege

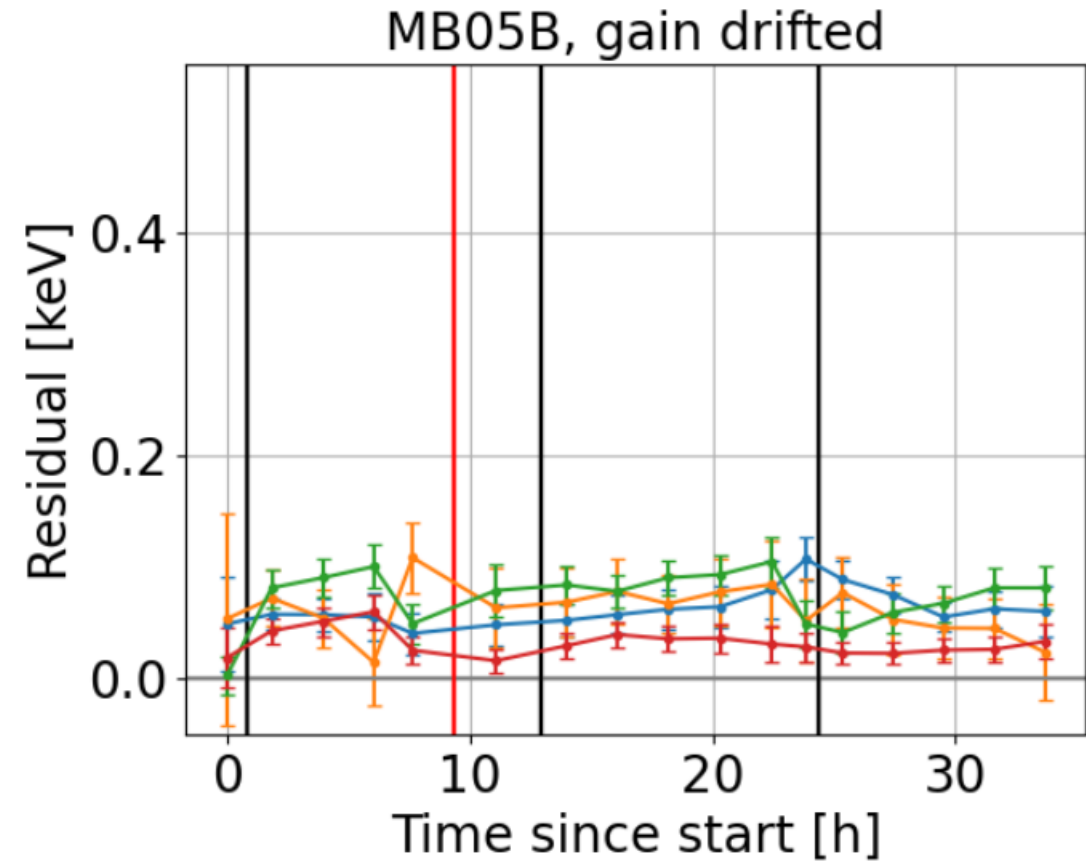
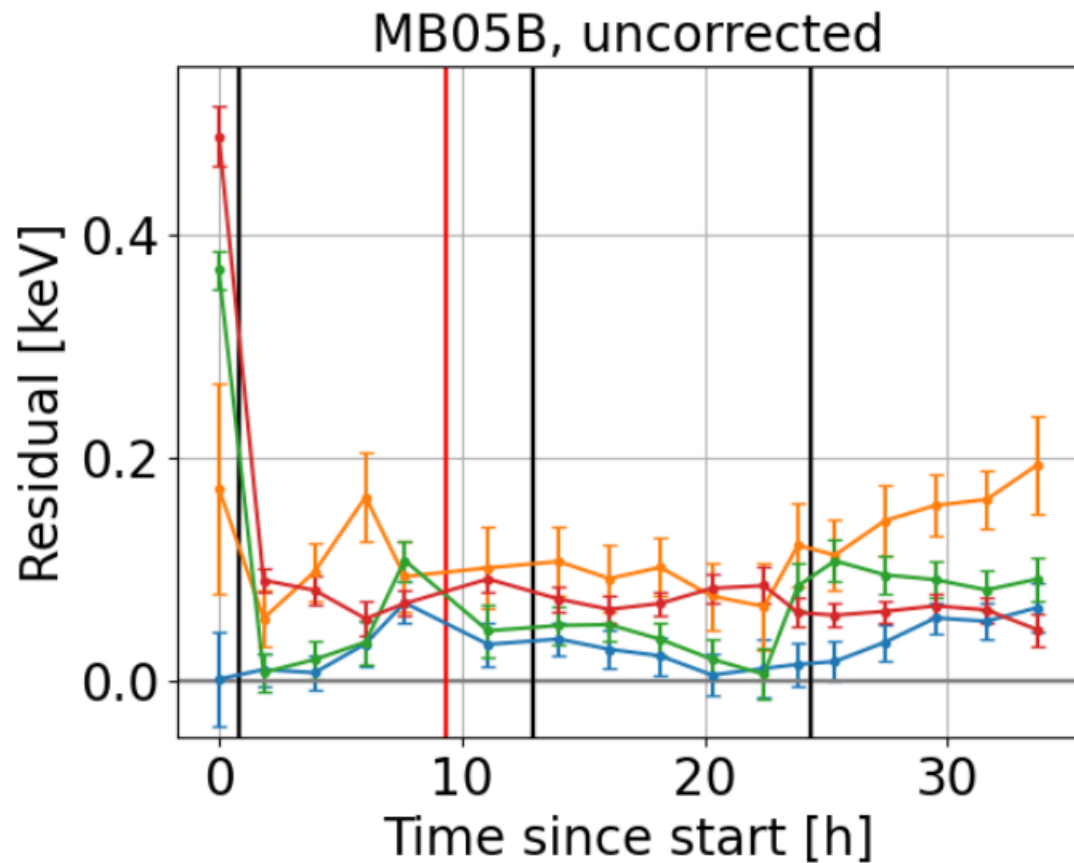
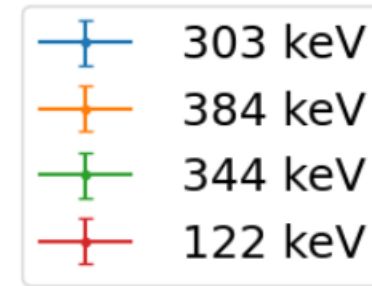
# Evaluation of the gain drift



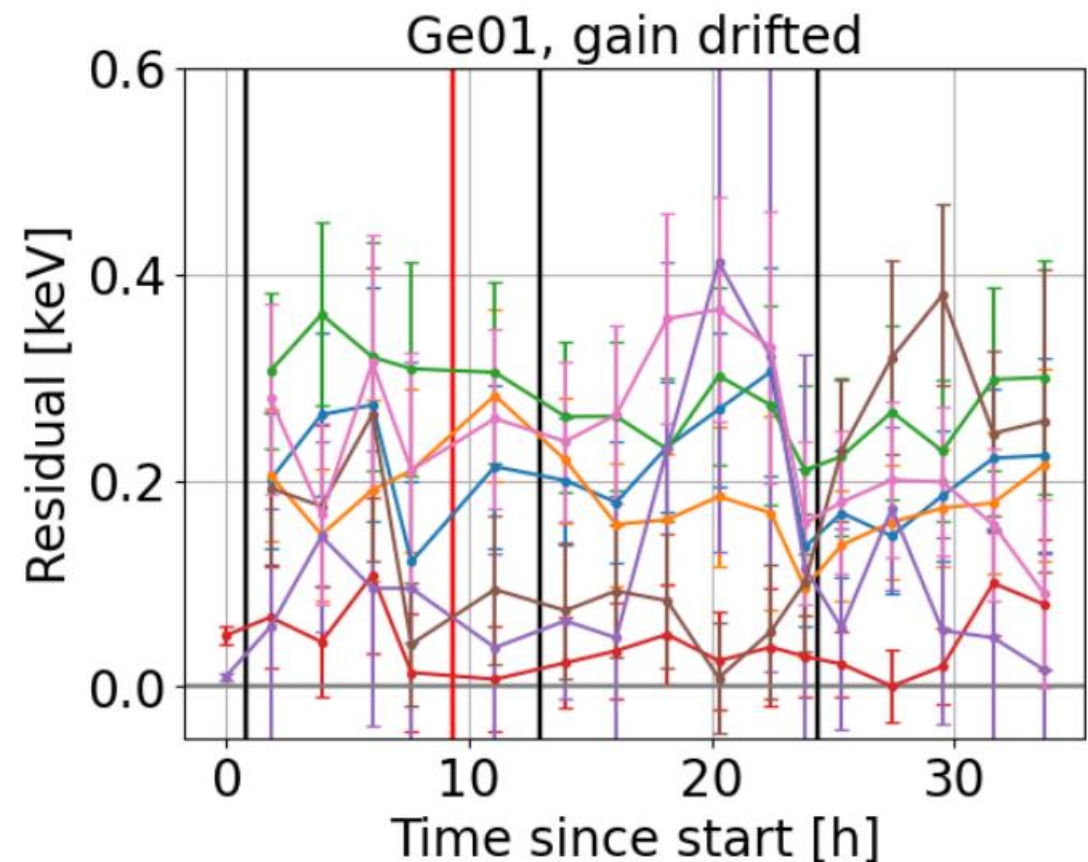
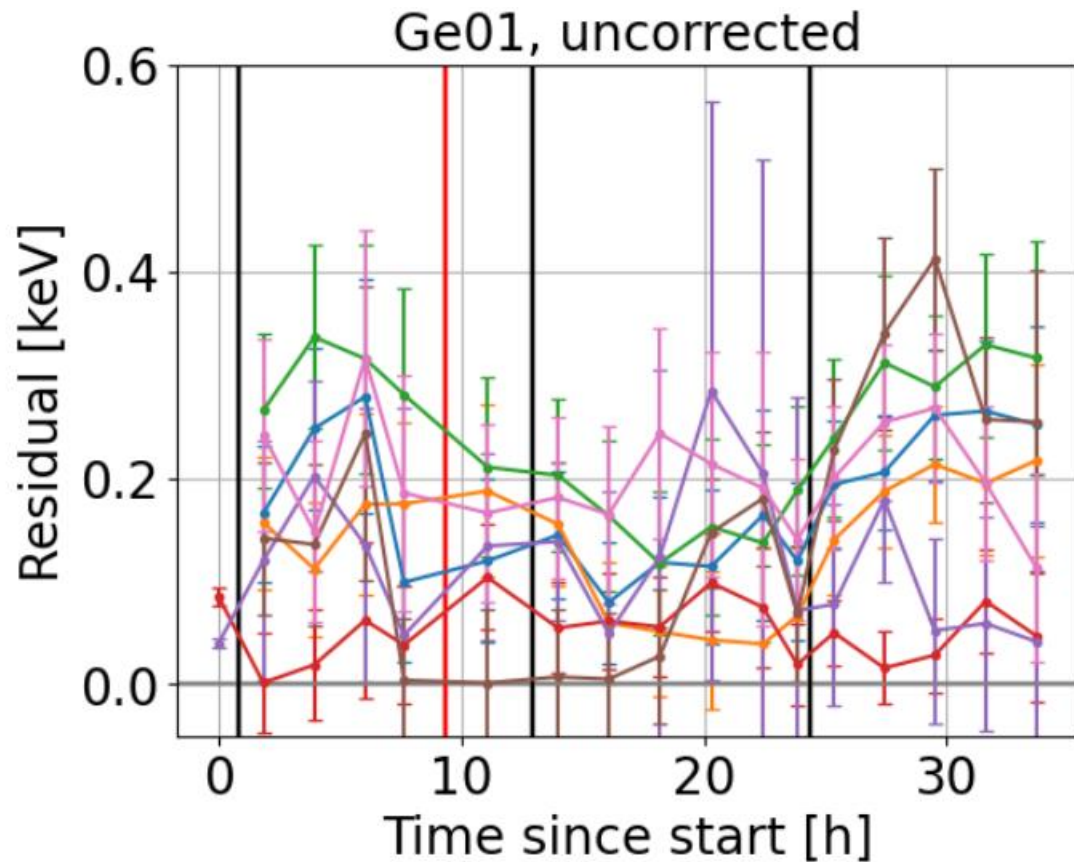
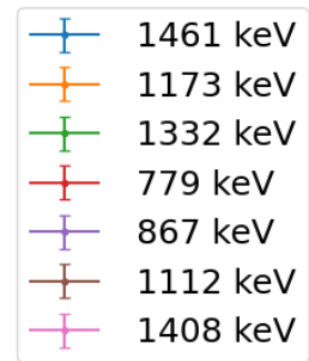
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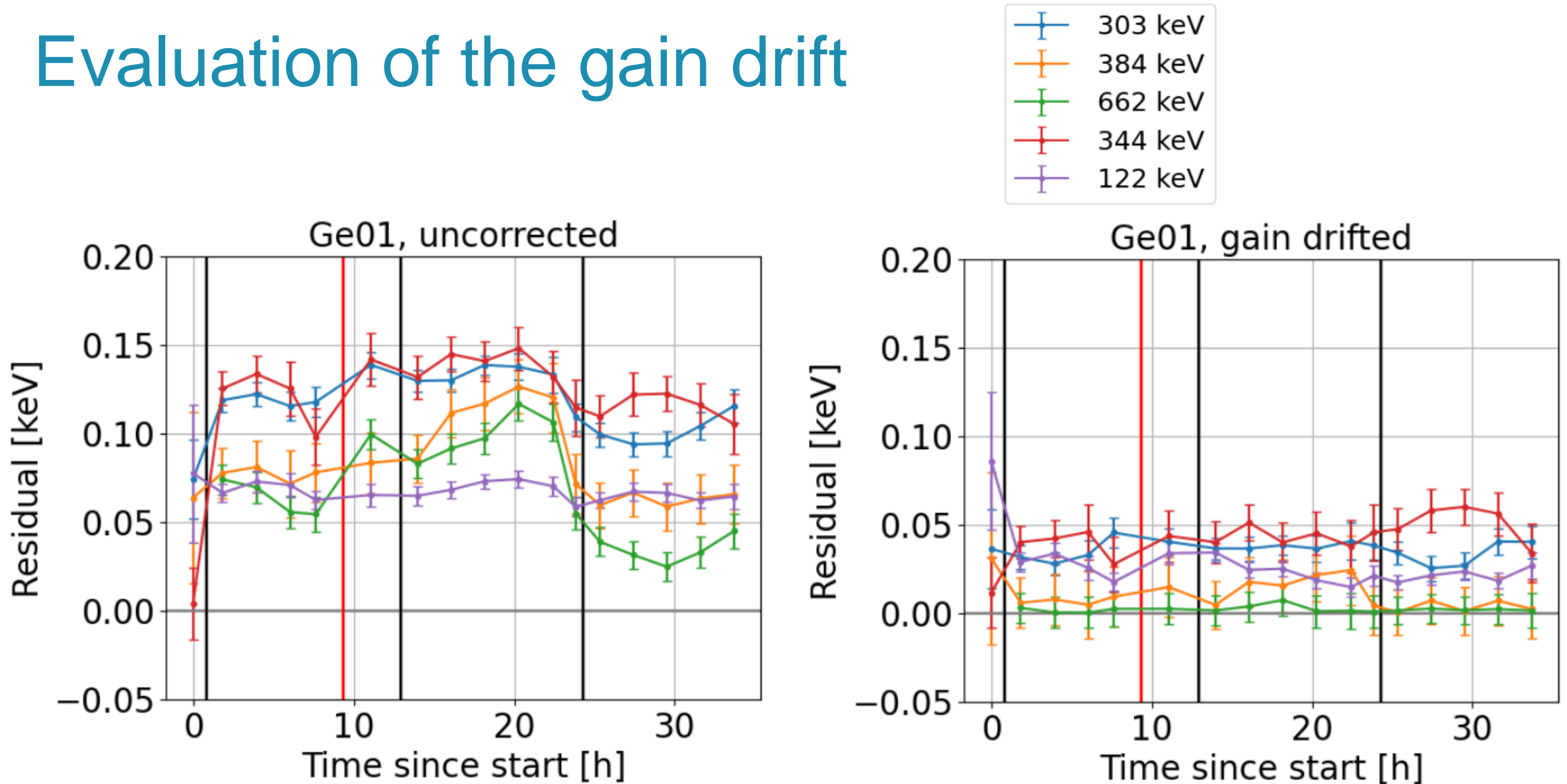
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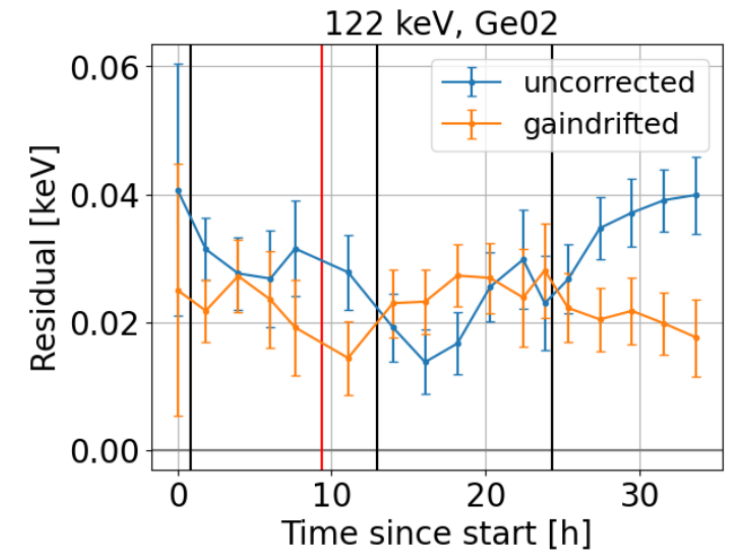
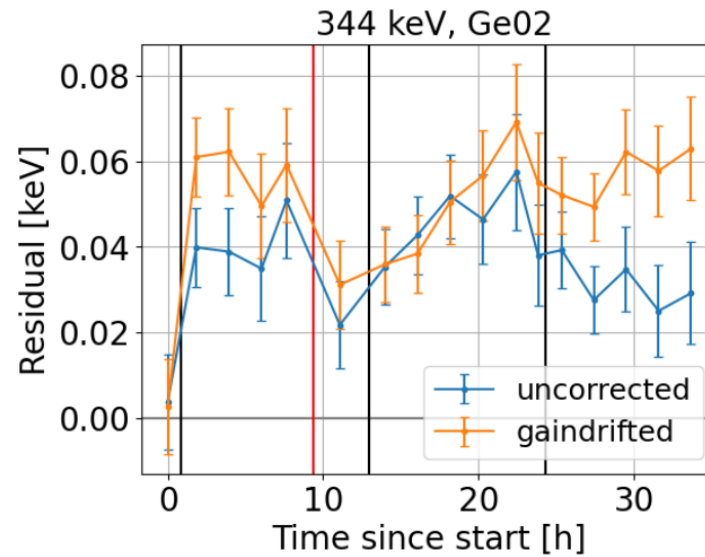
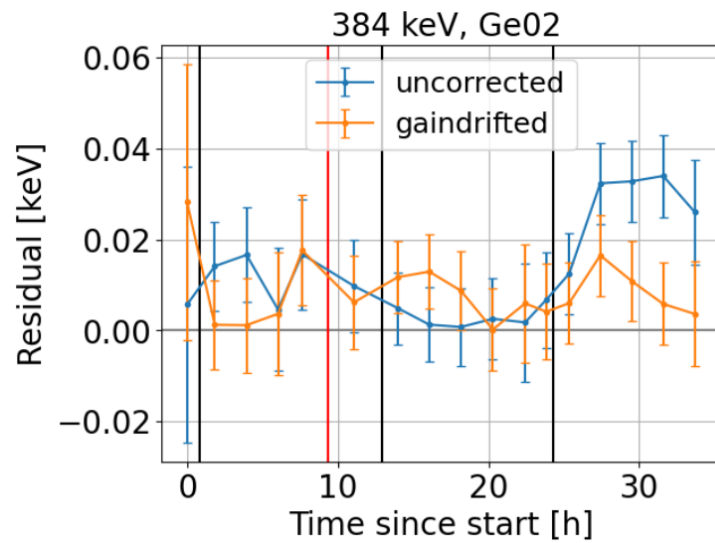
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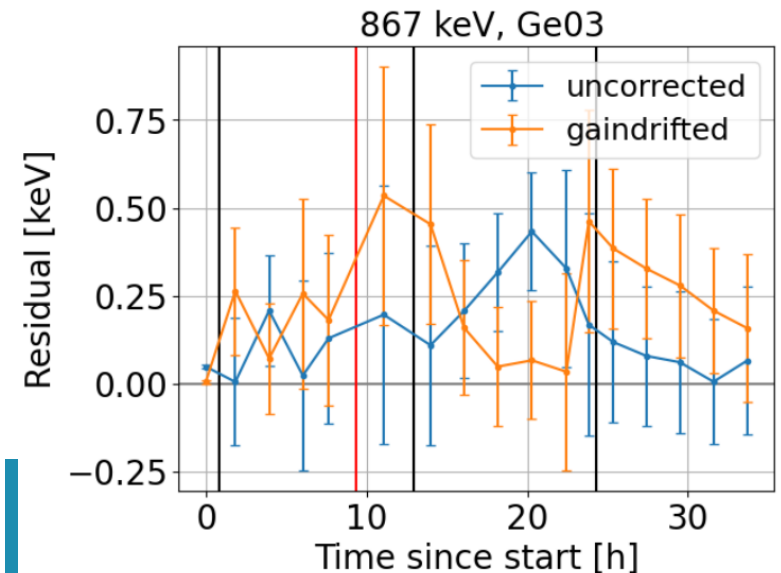
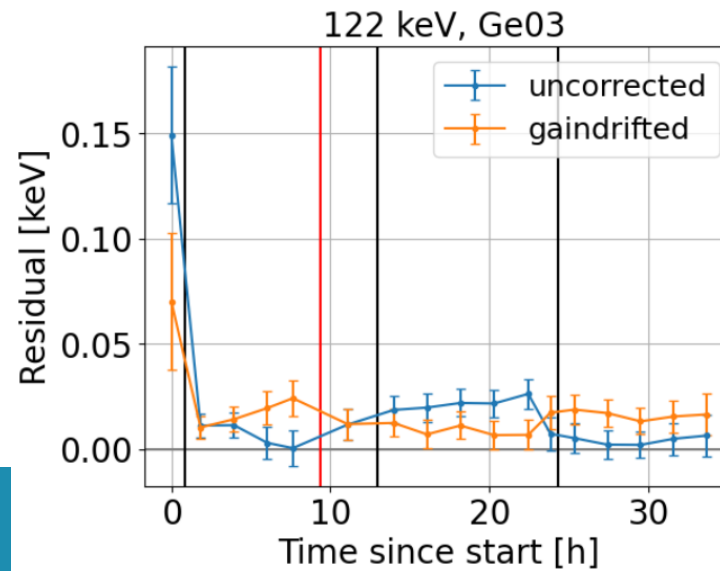
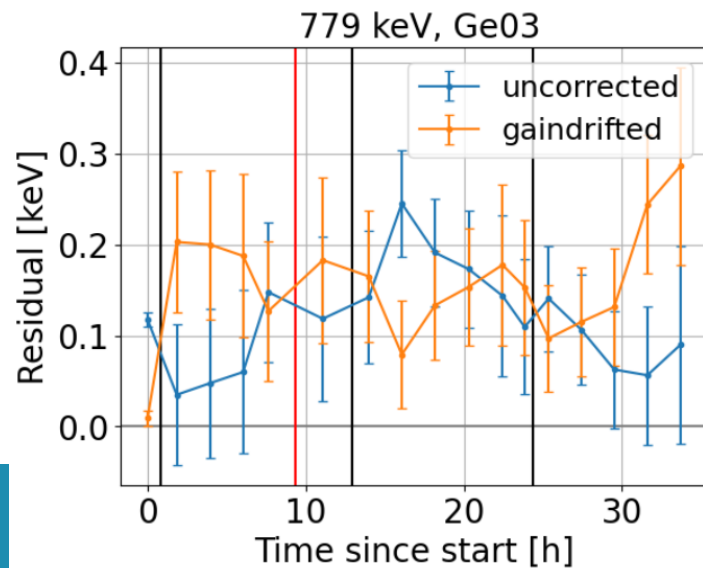
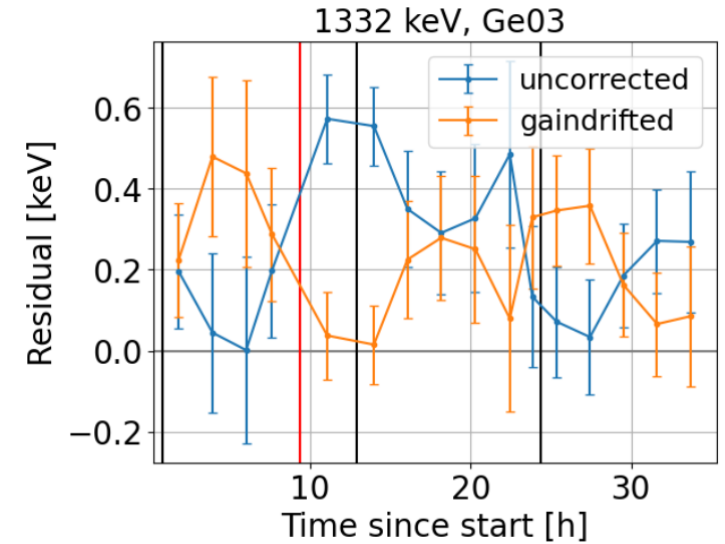
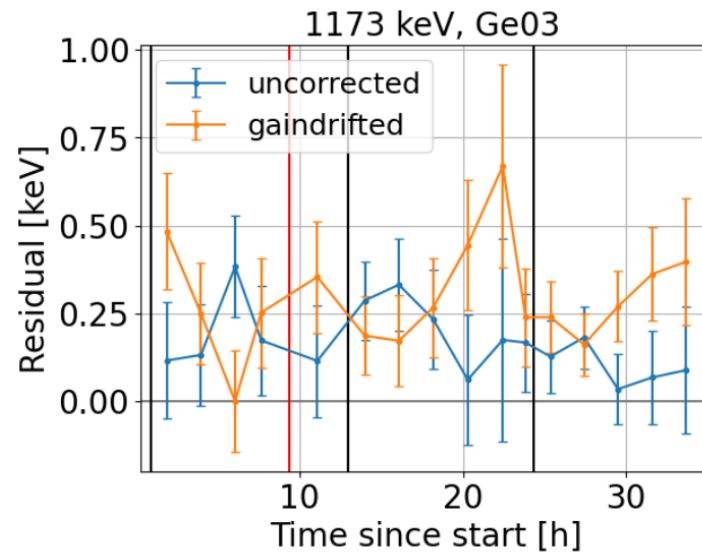
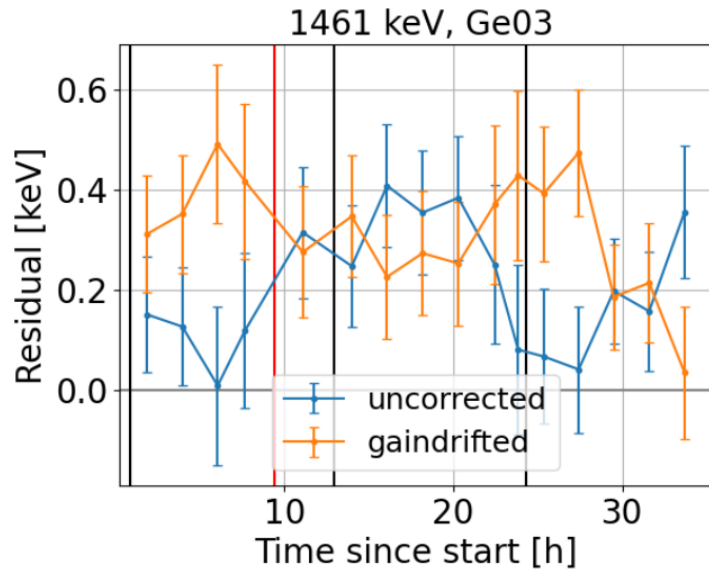


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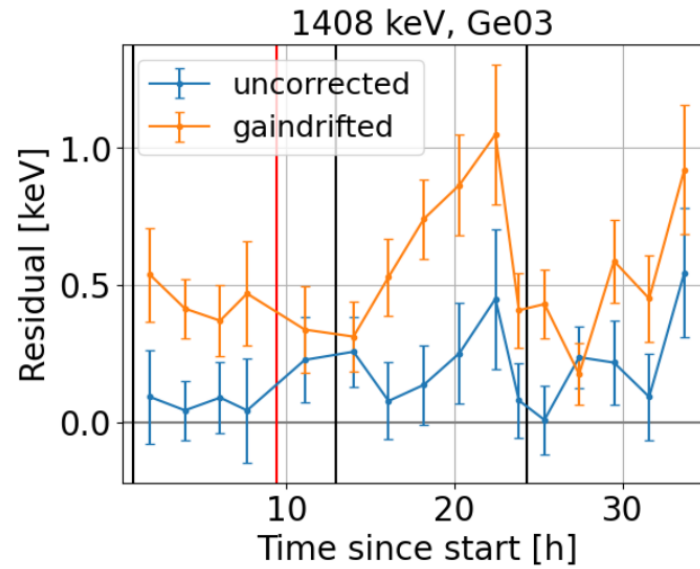
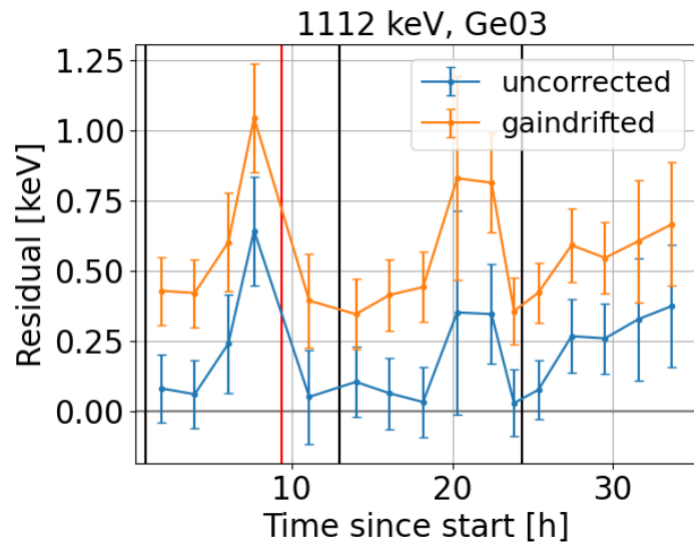


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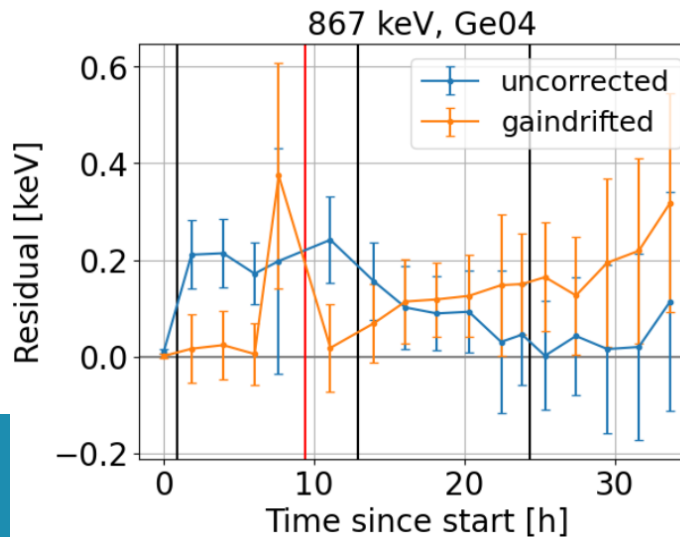
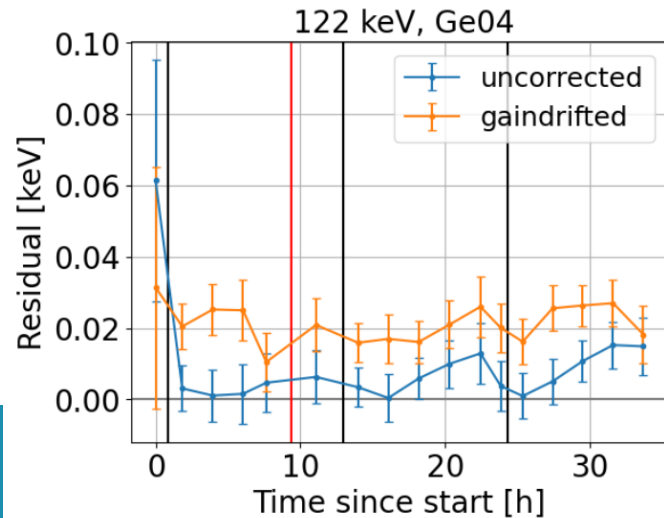
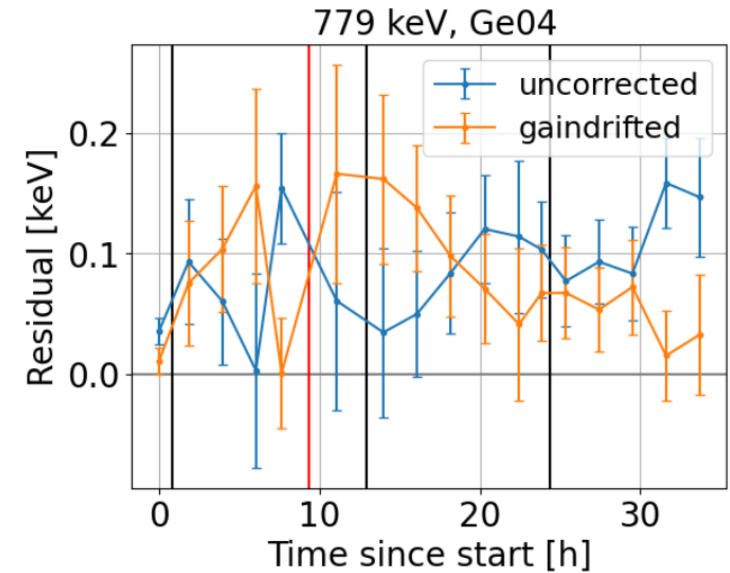
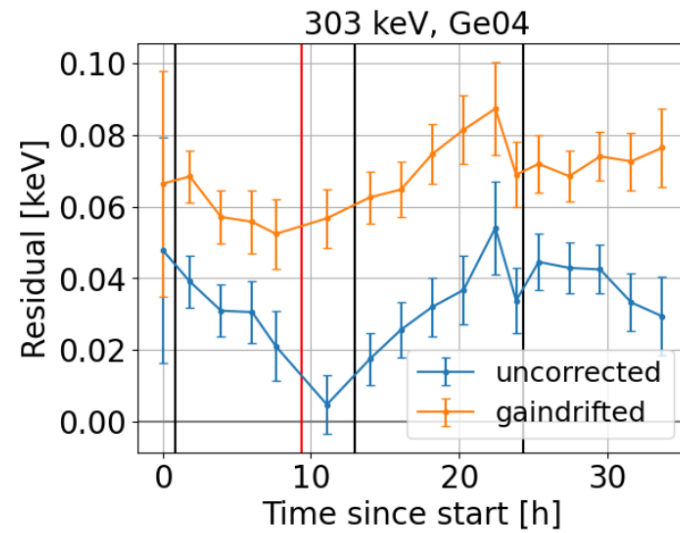
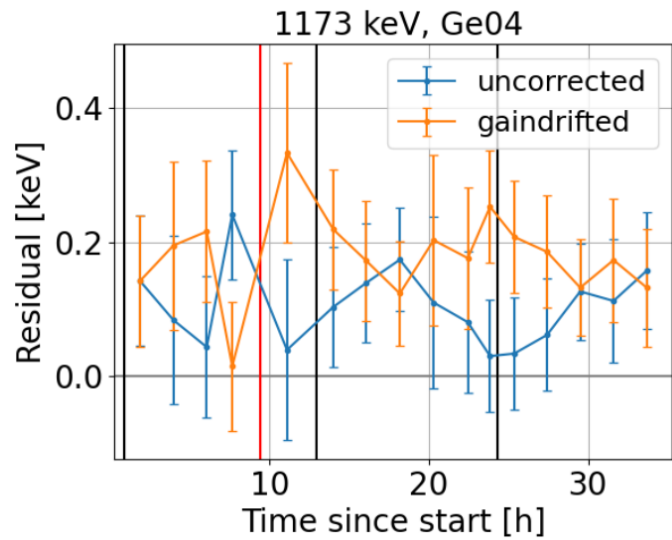




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