

# **Analysis status**

**muX meeting**

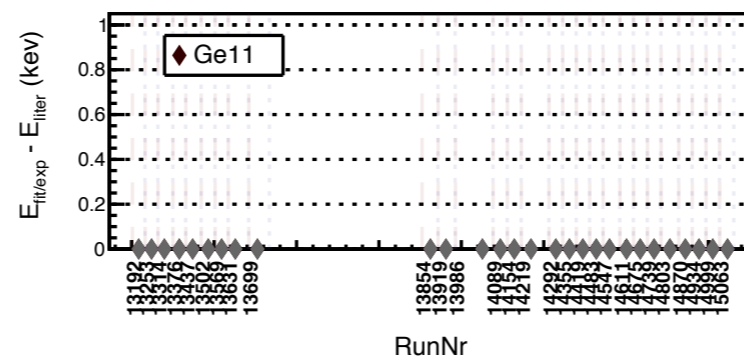
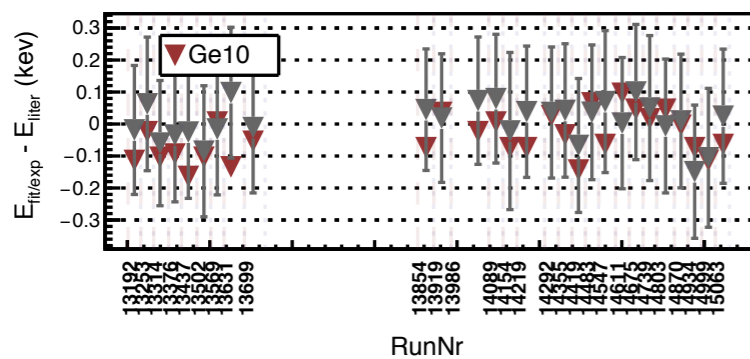
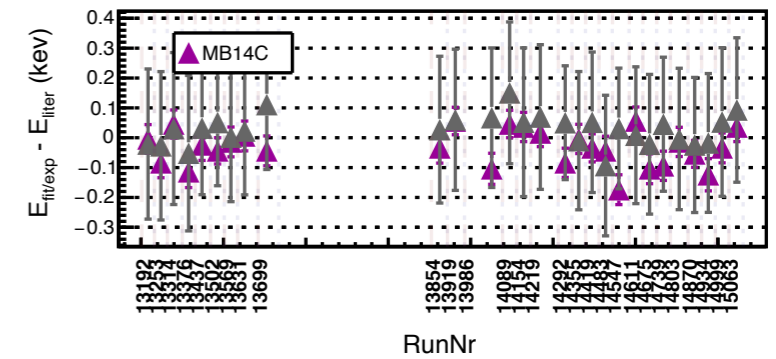
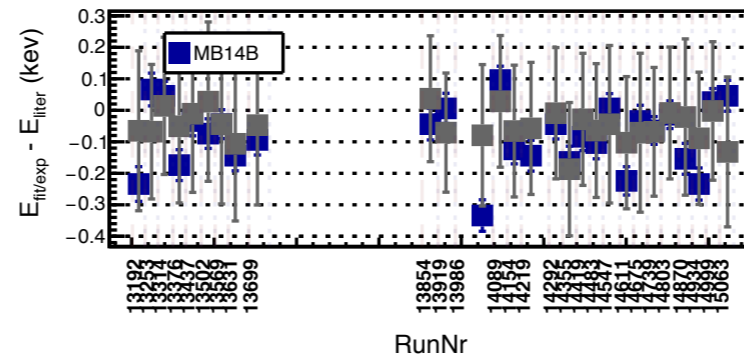
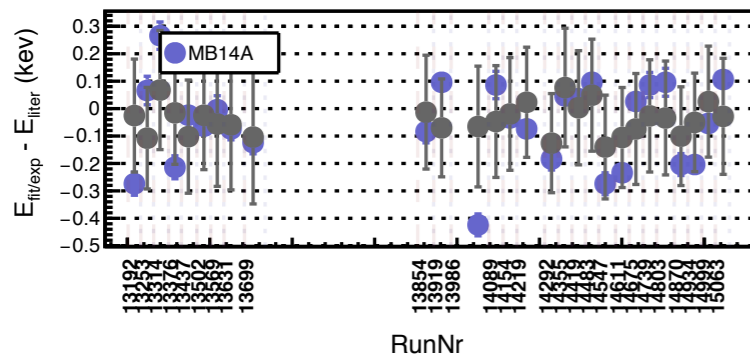
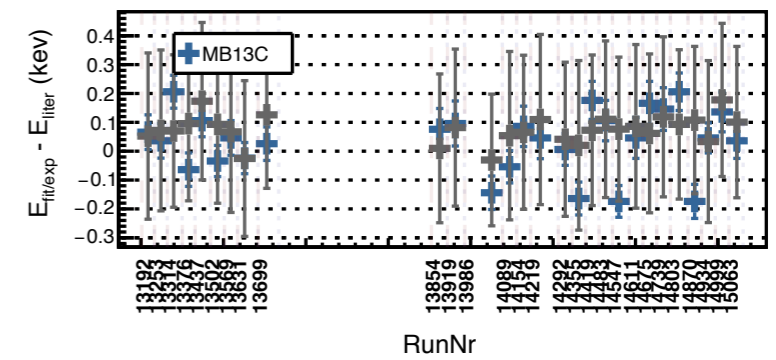
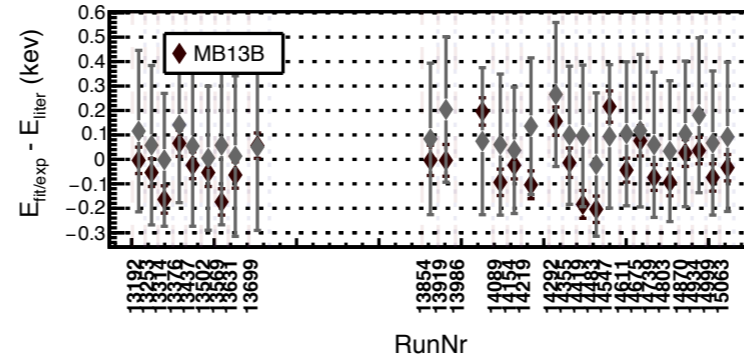
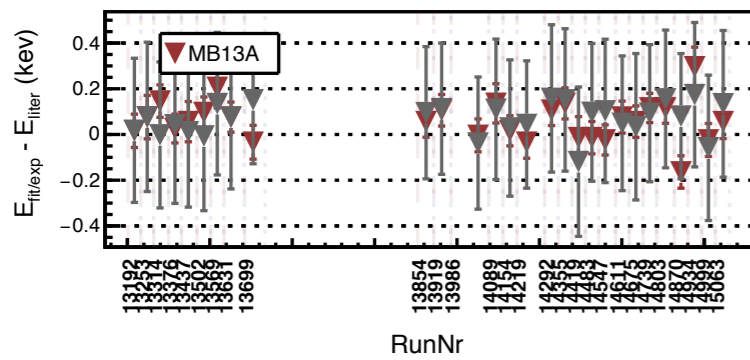
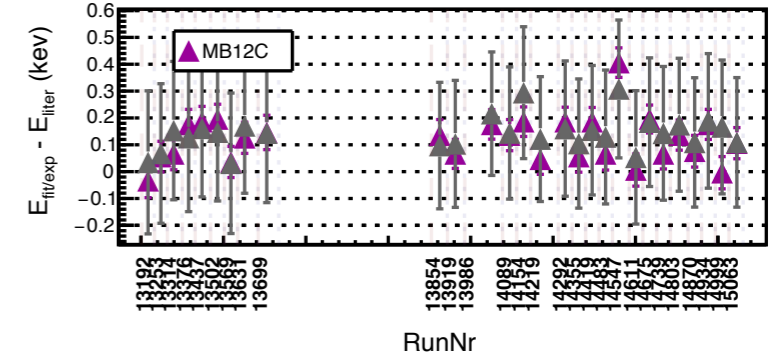
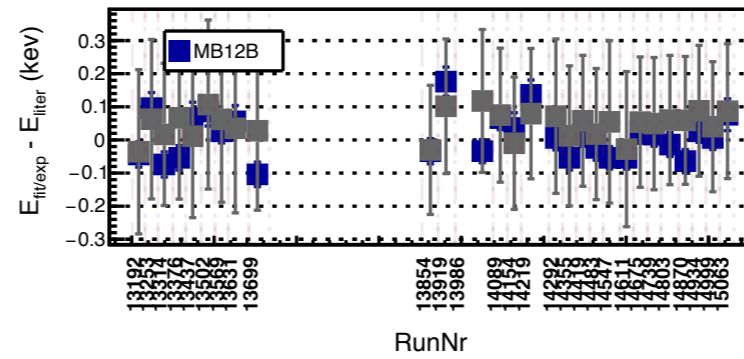
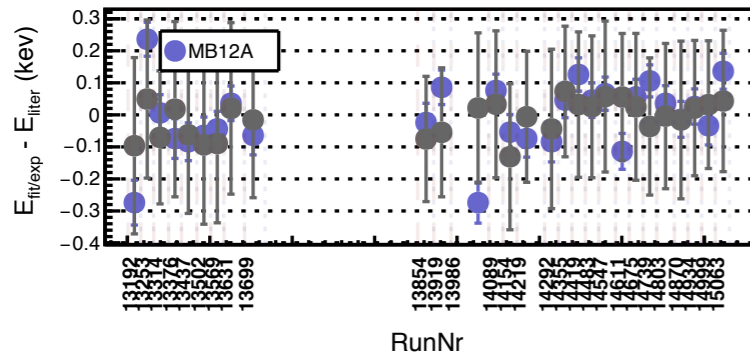
# Analysis plans

- Final energy calibration of 2019 data is finished
  - ★  $^{248}\text{Cm}$ ,  $^{226}\text{Ra}$  (weak),  $^{226}\text{Ra}$  (strong) histograms and trees have been produced with the finalised energy calibration, baseline correction (by Alex) and ELET values (by Alex).
- Analysis of  $^{185,187}\text{Re}$  data towards the extraction of the nuclear charge radius
  - ★ Master thesis of Jeremy (till mid February)
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# Energy calibration results: calibration in run-packages

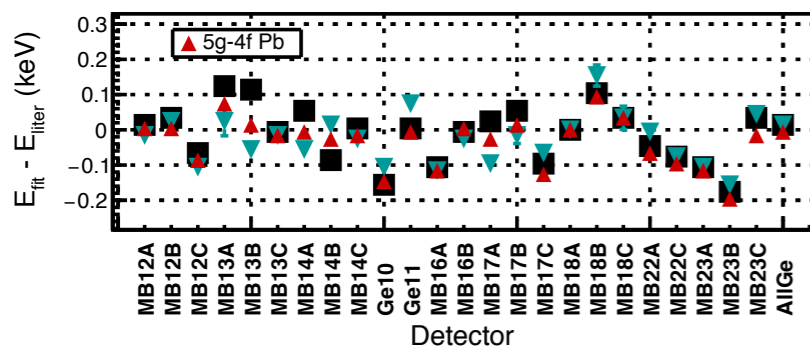
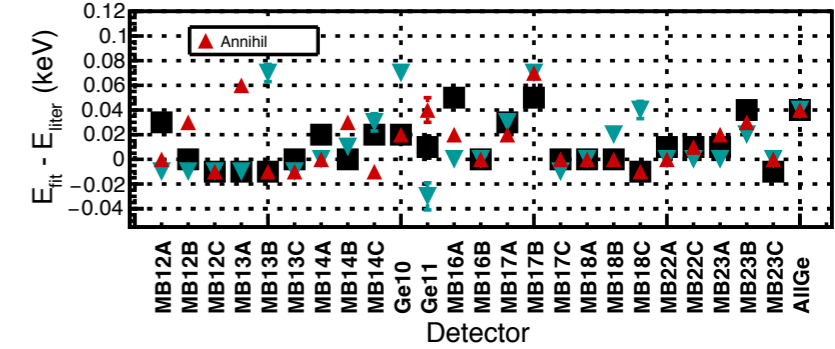
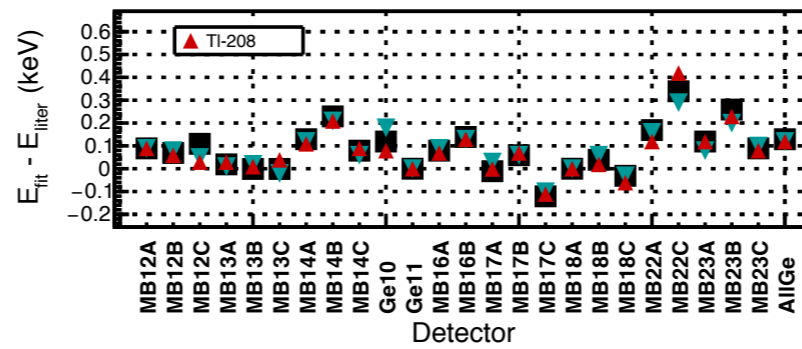
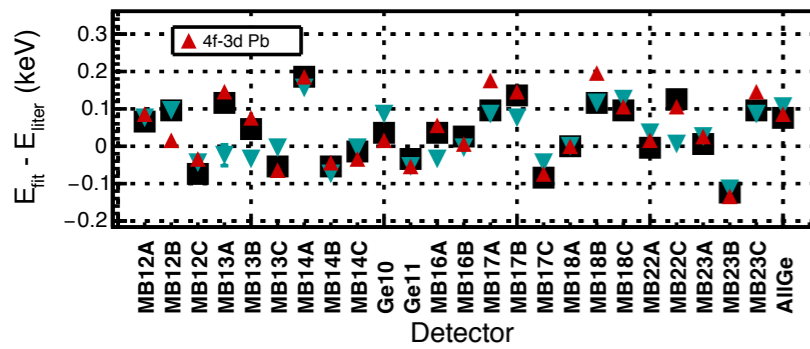
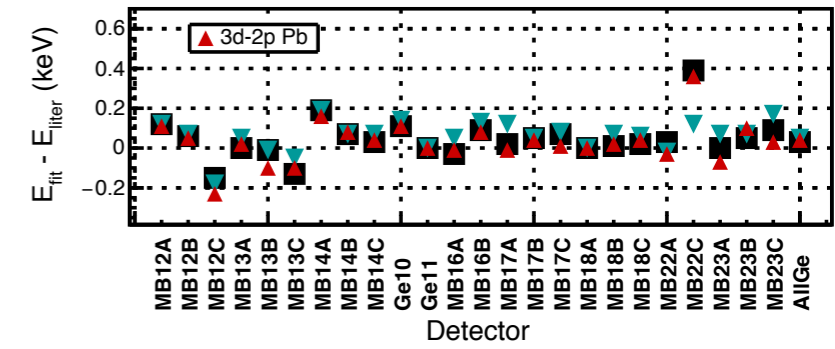
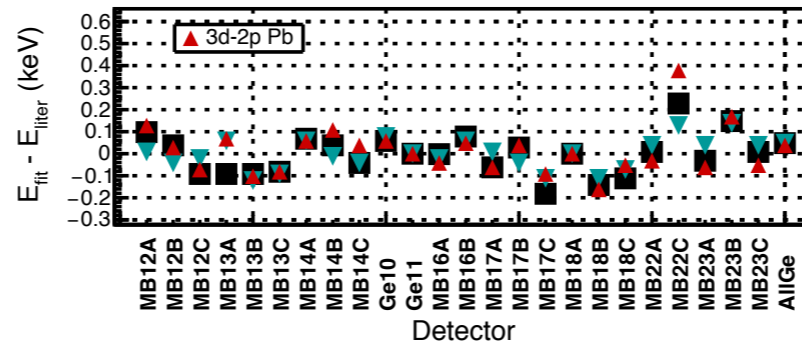
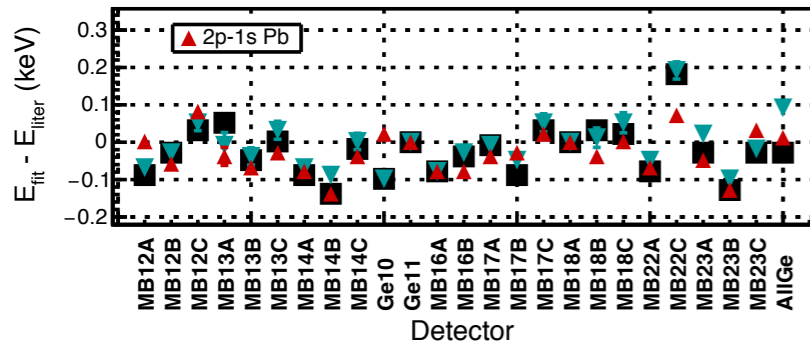
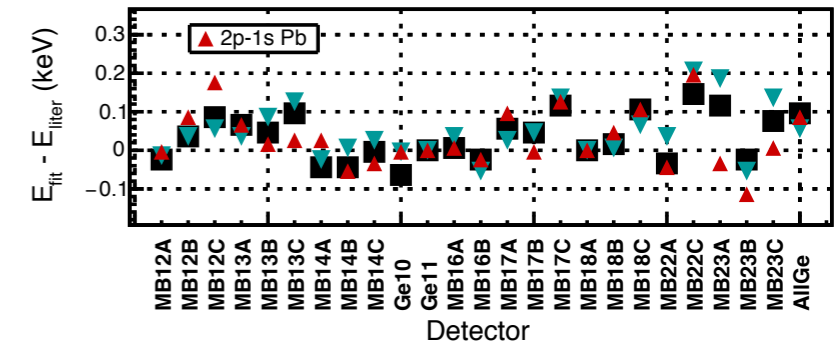
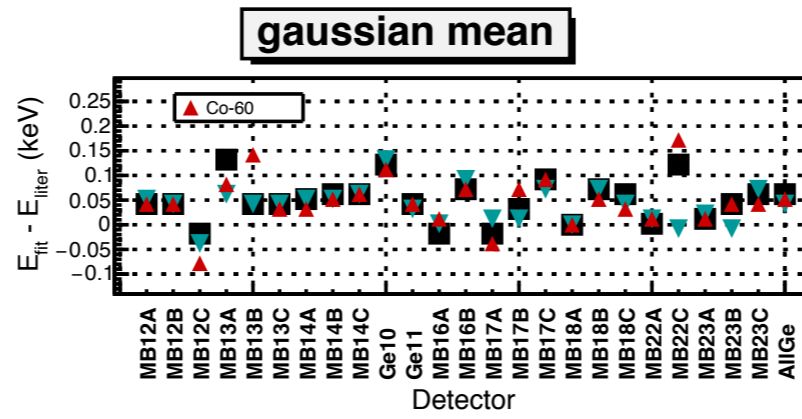
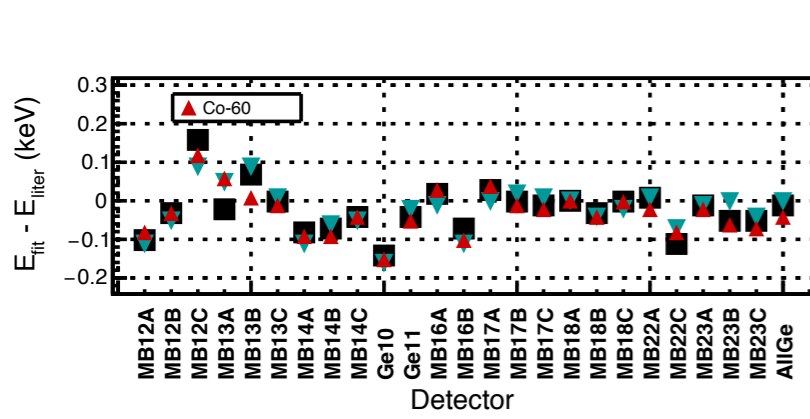
color: final energy calibration  
gray: "expected" energy calibration

2p-1s Pb @ 5963 keV  
Cm-248 target



# Energy calibration results: summed data in each detector

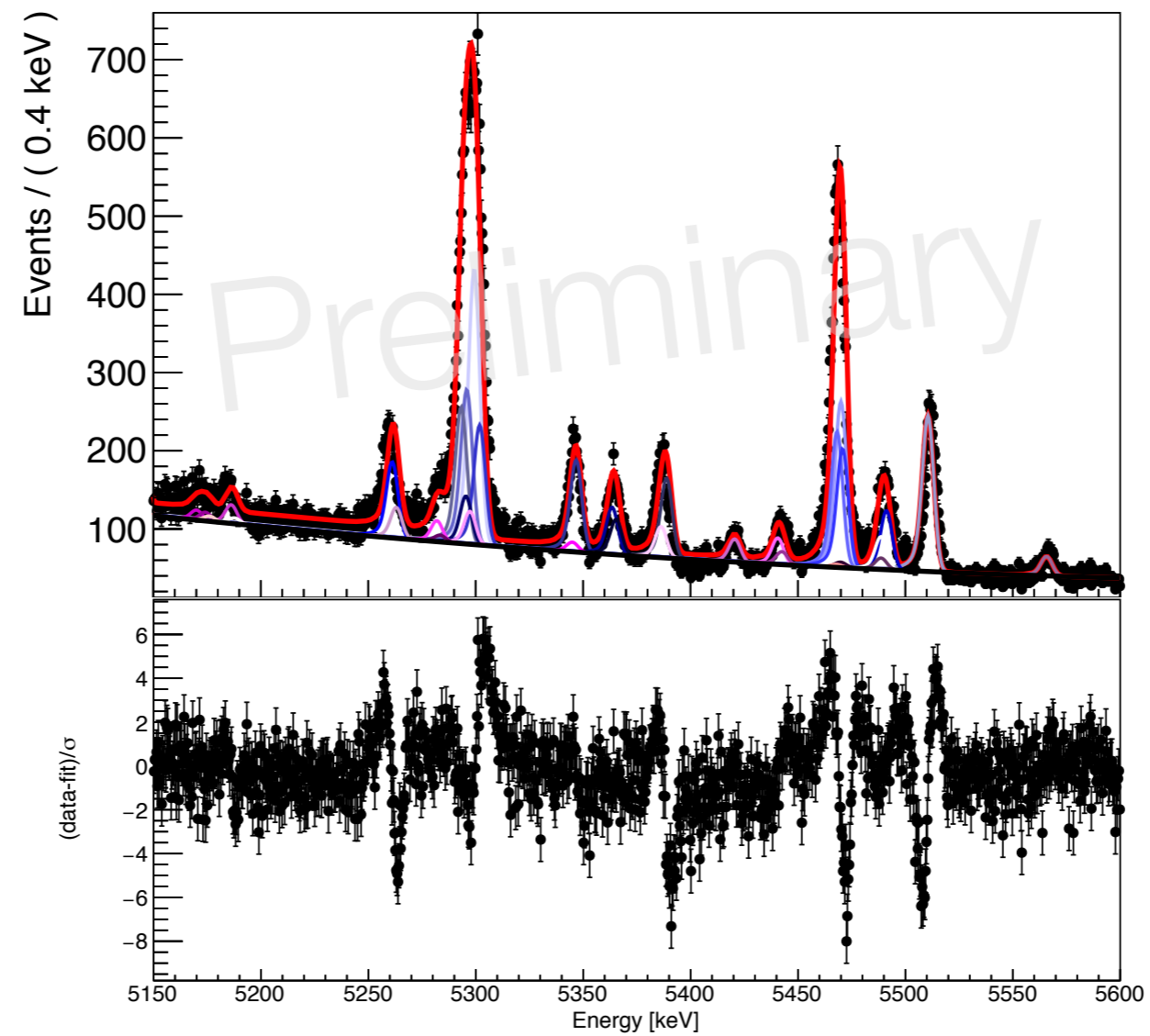
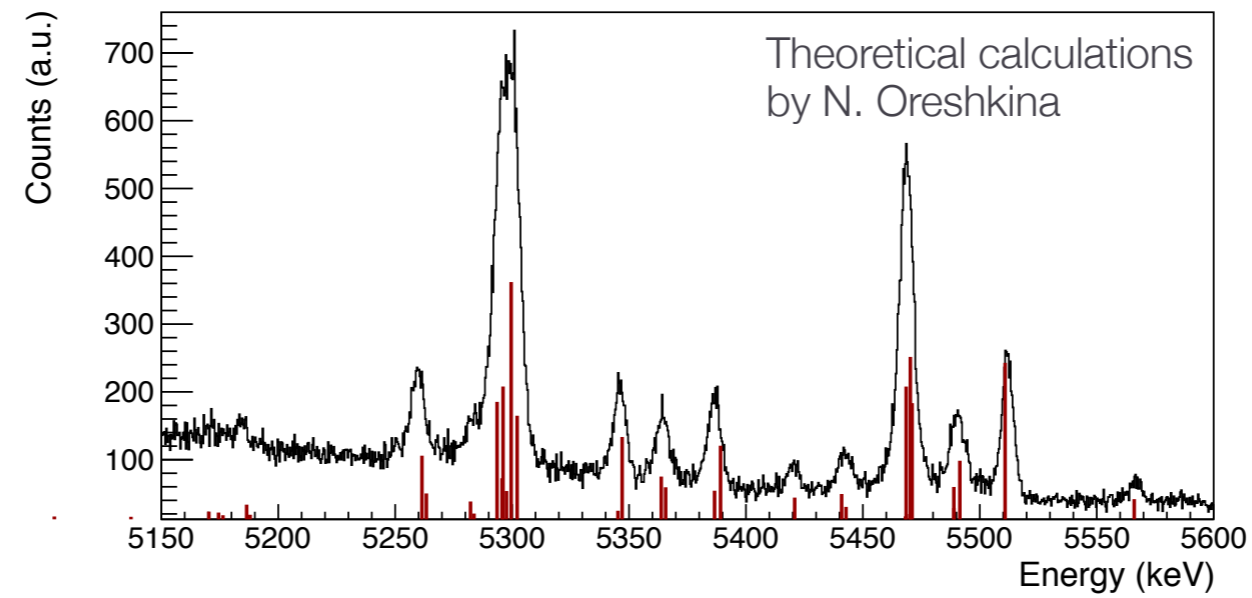
Cm-248: 13192-15122 (red)  
 Ra-226 (weak): 16816-18752 (black)  
 Ra-226 (strong): 15159-16784 (cyan)



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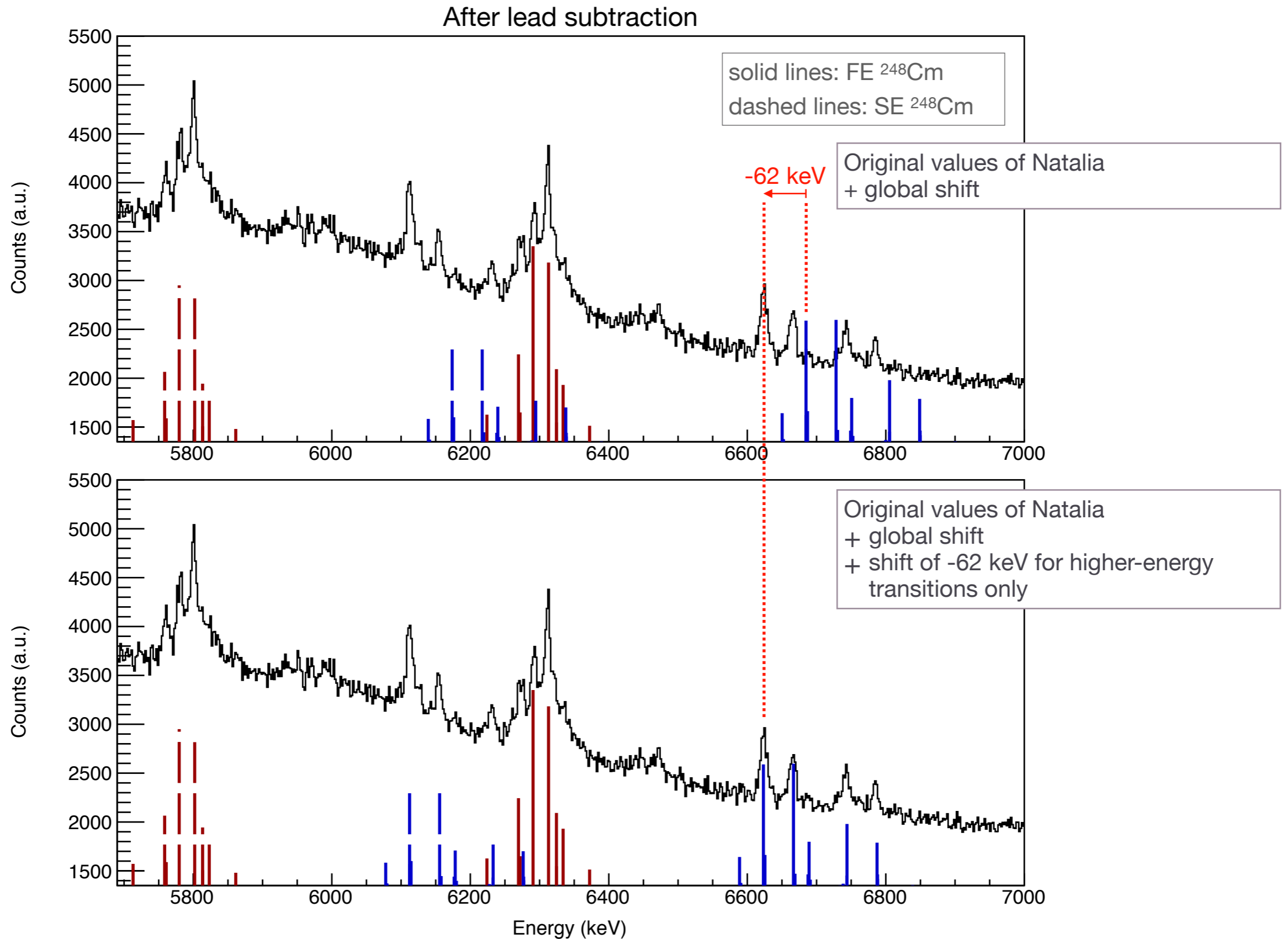
# Reminder of $^{185}\text{Re}$ 2p-1s fit in $^{185}\text{Re}$



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# Do theoretical predictions overlap with the peaks in the experimental spectrum?



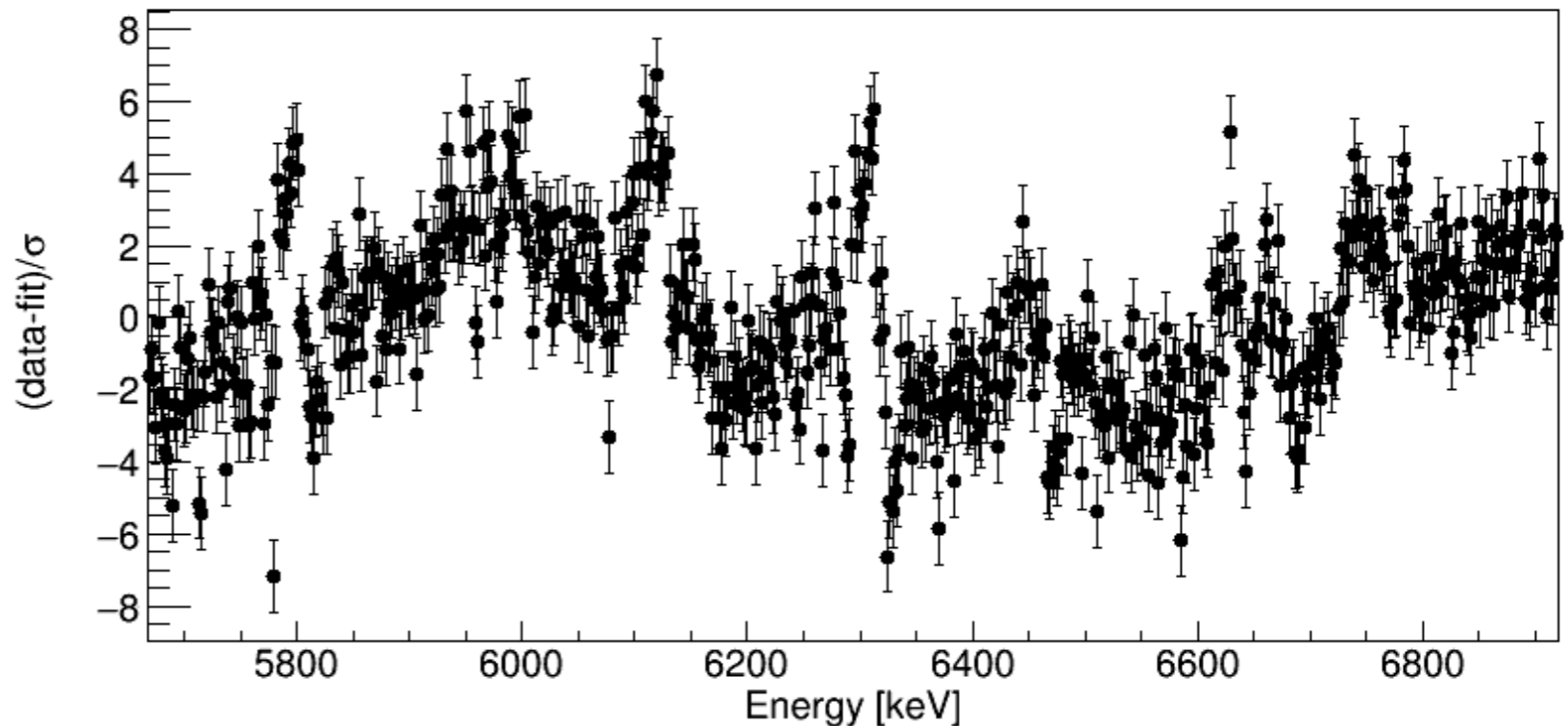
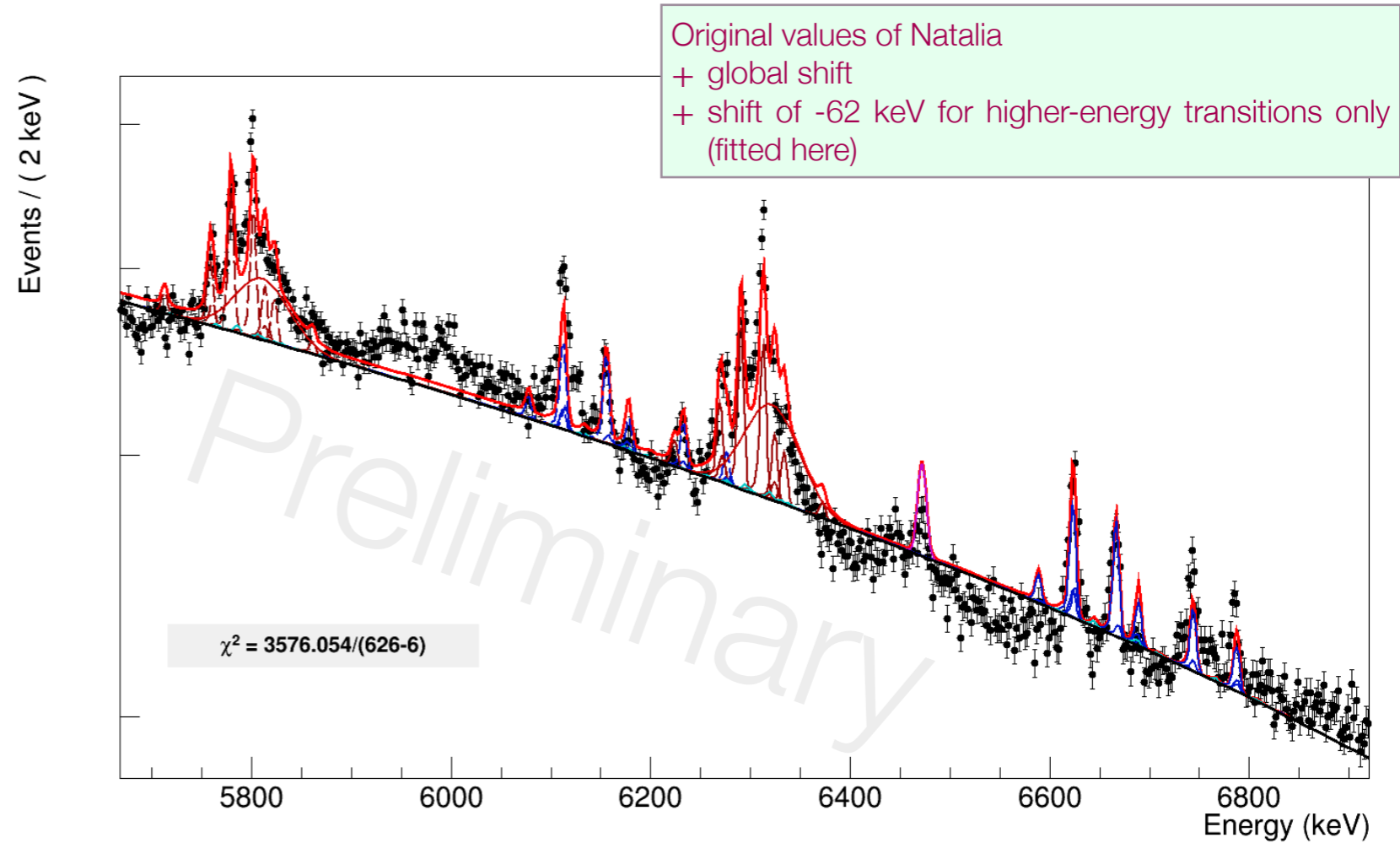


# Fit results after putting everything together

- lead subtracted data
- fix line-shape from  $^{208}\text{Pb}$  peaks
- fit FE & SE peaks of  $^{248}\text{Cm}$
- fix the 6.3 MeV capture line
- fix the unknown line at  $\sim 6.45$  MeV
- fit FE & SE peaks of  $^{246}\text{Cm}$  ( $m_{\text{Cm-246}} \sim 5\% \times m_{\text{Cm-248}}$ )

## Results

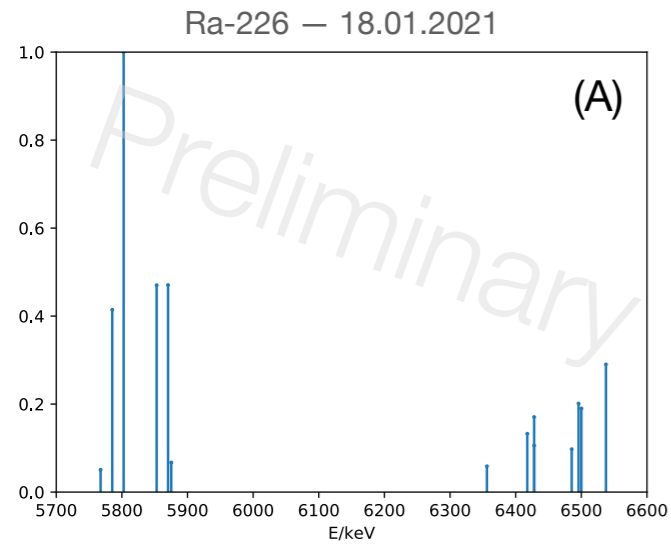
Floating Parameter	InitialValue	FinalValue	+/-	Error	GblCorr.
A	1.0000e-03	6.3398e-04	+/-	8.20e-05	<none>
Bpar1	-3.6000e-01	-3.3897e-01	+/-	1.79e-03	<none>
Counts	2.0000e+02	4.5108e+03	+/-	1.56e+02	<none>
NPshift	-6.0000e+01	-6.1492e+01	+/-	1.69e-01	<none>
Nbkg	9.2982e+05	1.7778e+06	+/-	2.25e+03	<none>
x0	6.3025e+03	6.2905e+03	+/-	1.14e-01	<none>



# Analysis plans

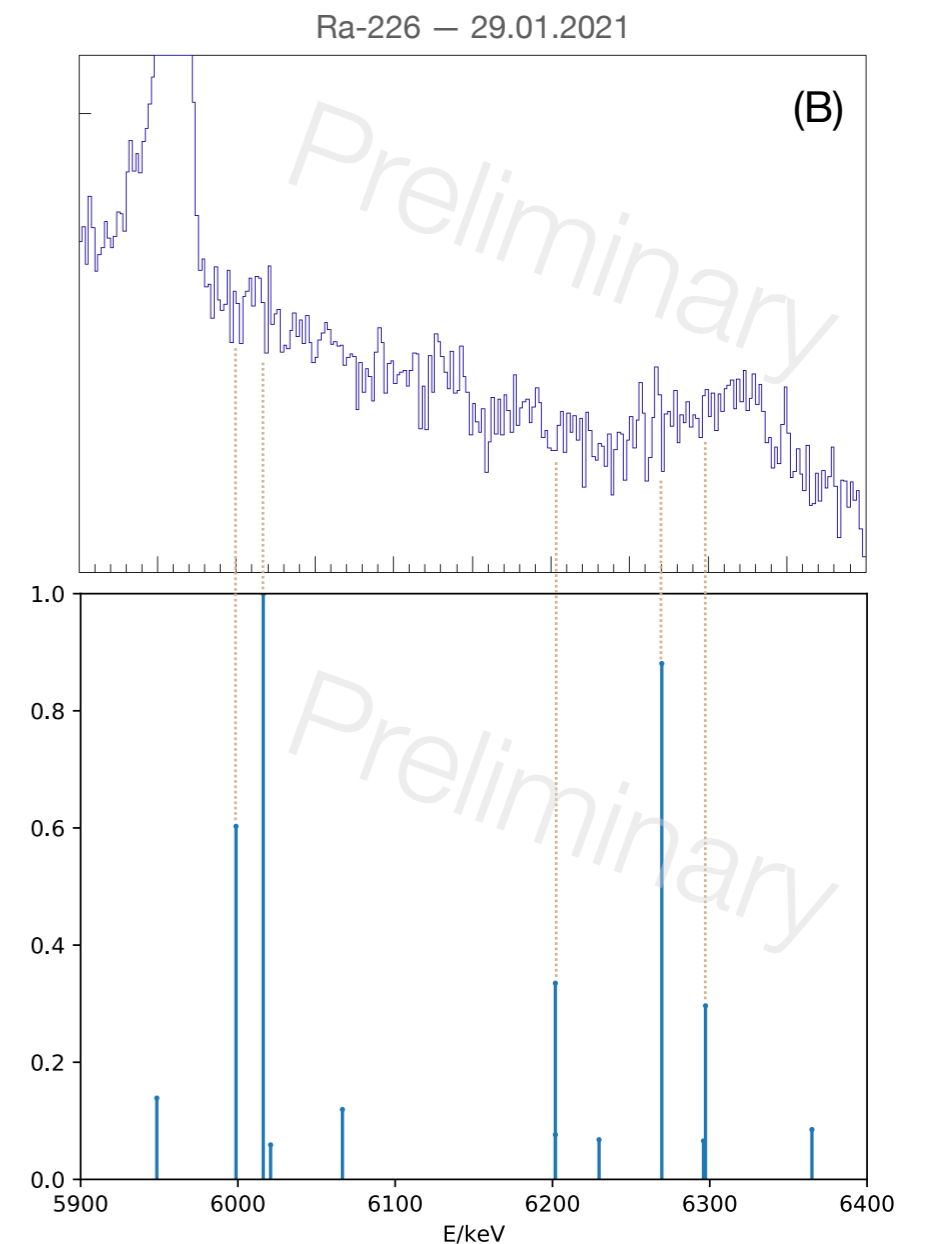
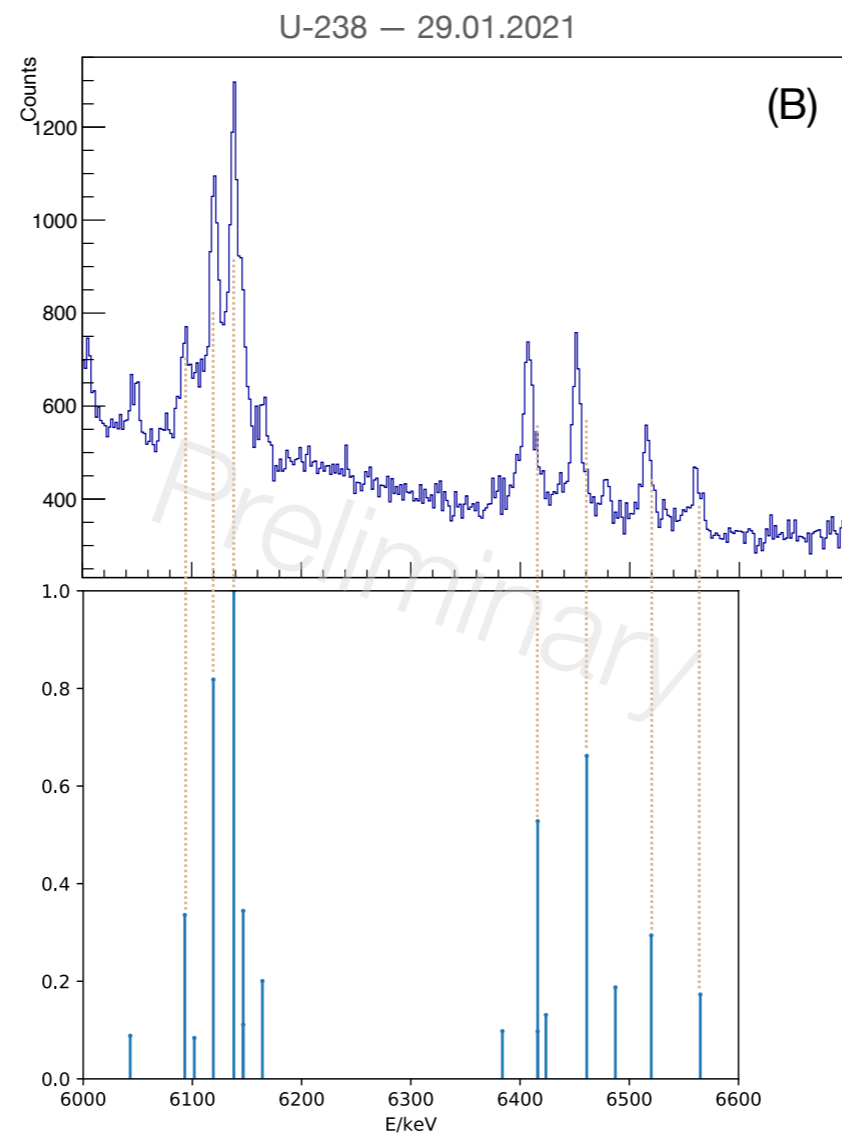
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# Radium theoretical calculations



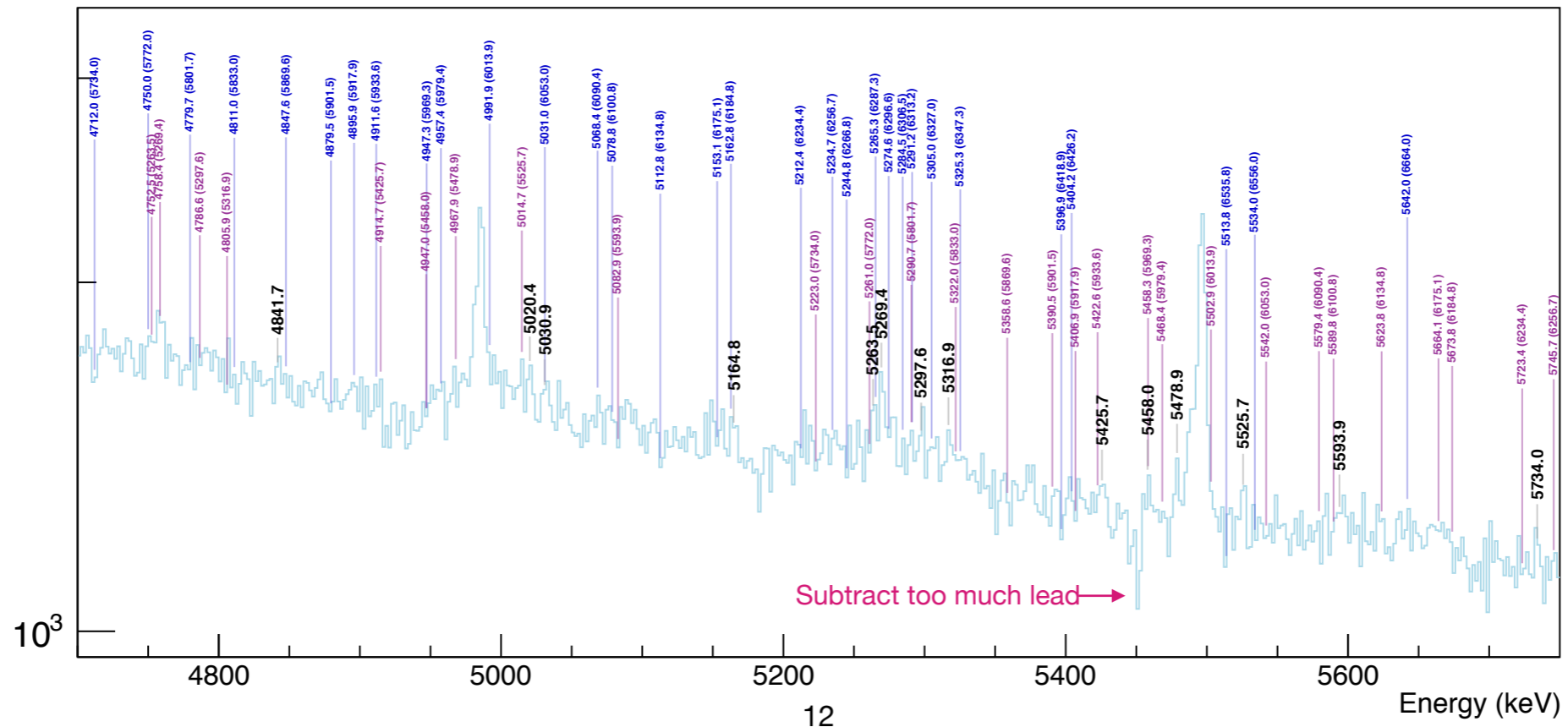
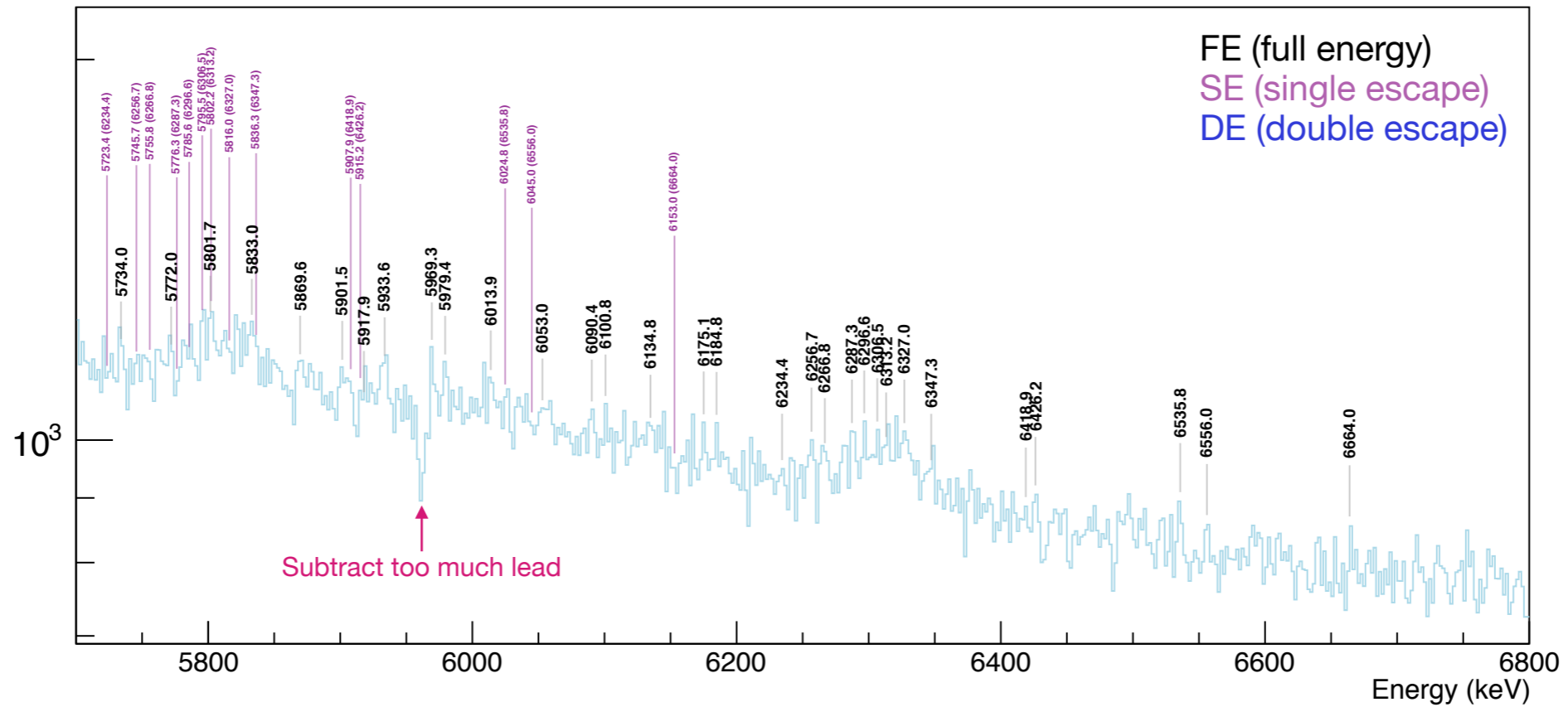
Timeline of Natalia's calculations:

- A. First Ra-226 calculations — fine splitting at the order of 700 keV — too big compared to Cm-248 and U-238 spectra (expected: ~300 keV)
- B. Found bug in code — corrected U-238 and Ra-226 calculations — U-238 predictions now are ~matching with data



# Radium experimental spectrum

~all working detectors — **no finalised energy calibration** — **no baseline correction** — tDiff -50 to 250 ns —  
lead subtraction — electron veto and muon entrance cuts



# **BACKUP SLIDES**

# Check overlap between 2p-1s Cm-248 and Pb-208 peaks

