



**The Abdus Salam  
International Centre for Theoretical Physics**



**1833-47**

## **Workshop on Understanding and Evaluating Radioanalytical Measurement Uncertainty**

*5 - 16 November 2007*

### **Uncertainty in Alpha Spectrometry**

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# Alpha Spectrometry: Sources of Uncertainty

**Paul Martin**  
**IAEA Laboratories Seibersdorf**

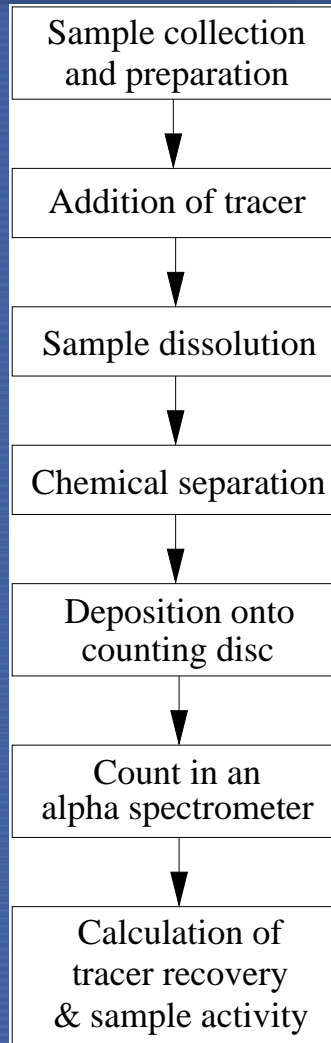


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# General procedure

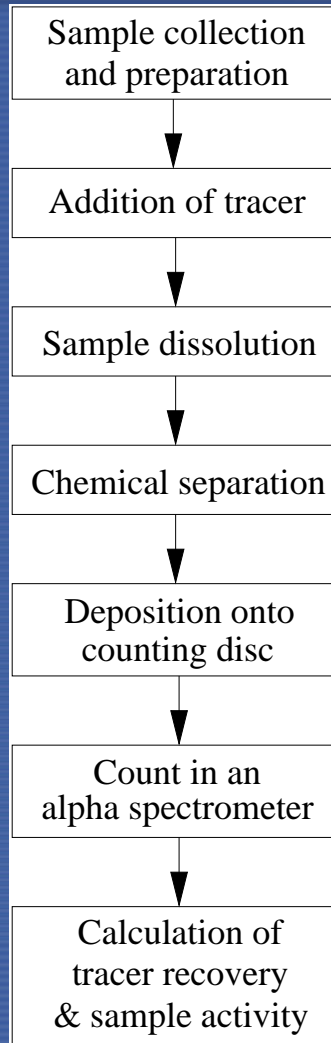


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# Sources of uncertainty



Appropriate preparation method

Tracer activity

Isotopic equilibration

Complete separation

Source quality

Counting statistics, tailing

Correct calculation, decay corrections

**Plus: background, blank**



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# Can all sources of uncertainty be estimated statistically?



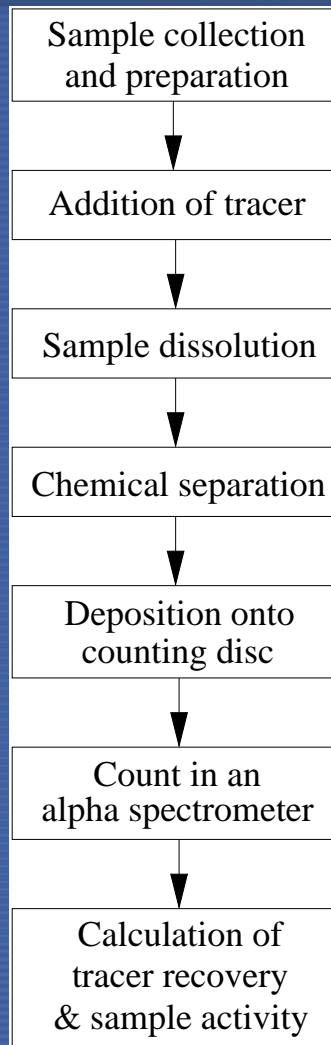
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# These can be estimated statistically



Appropriate preparation method

Tracer activity

Isotopic equilibration

Complete separation

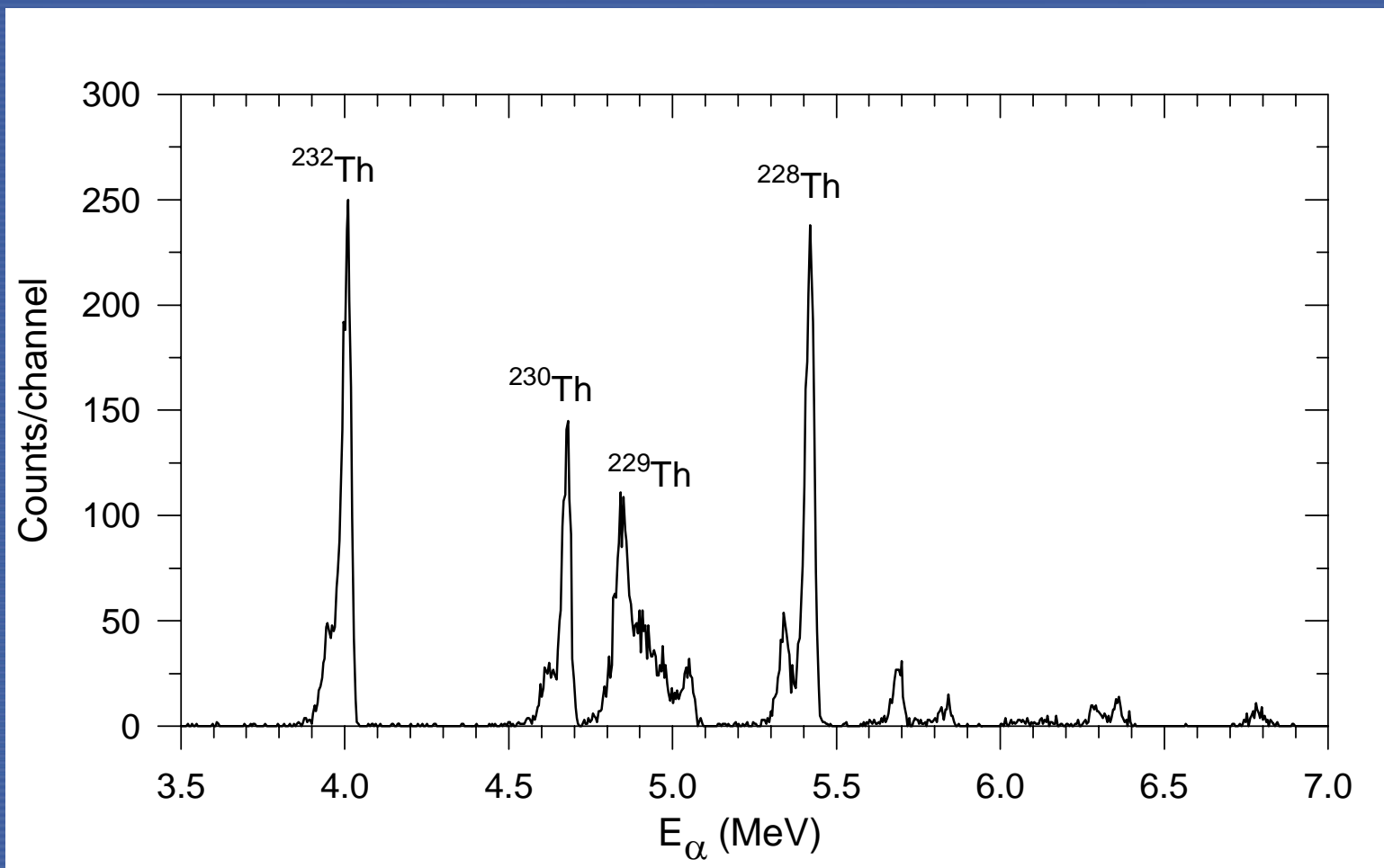
Source quality

Counting statistics, tailing

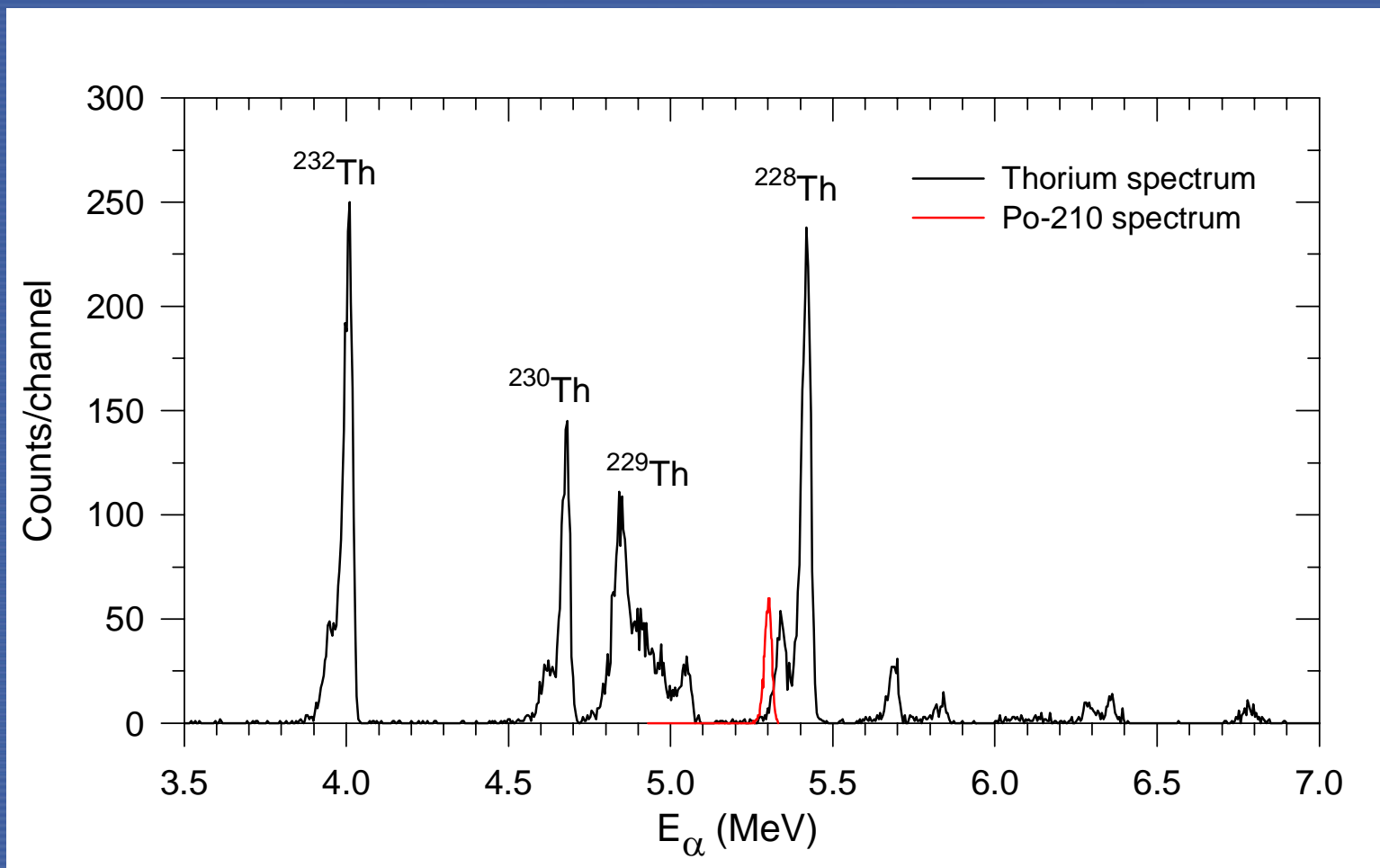
Correct calculation, decay corrections

Plus: background, blank

# Looking at spectra: Thorium

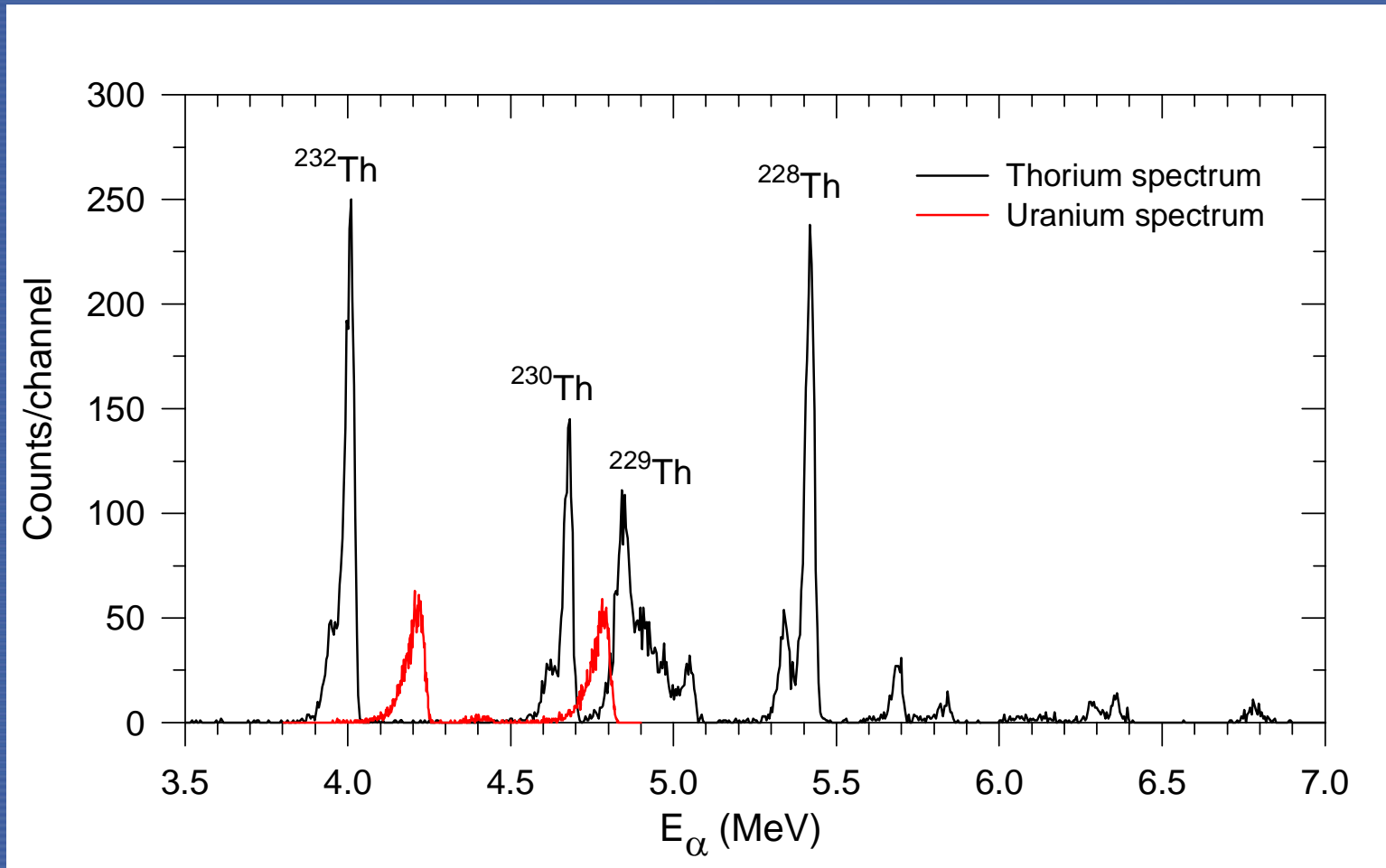


# Looking at spectra: Thorium + Po-210





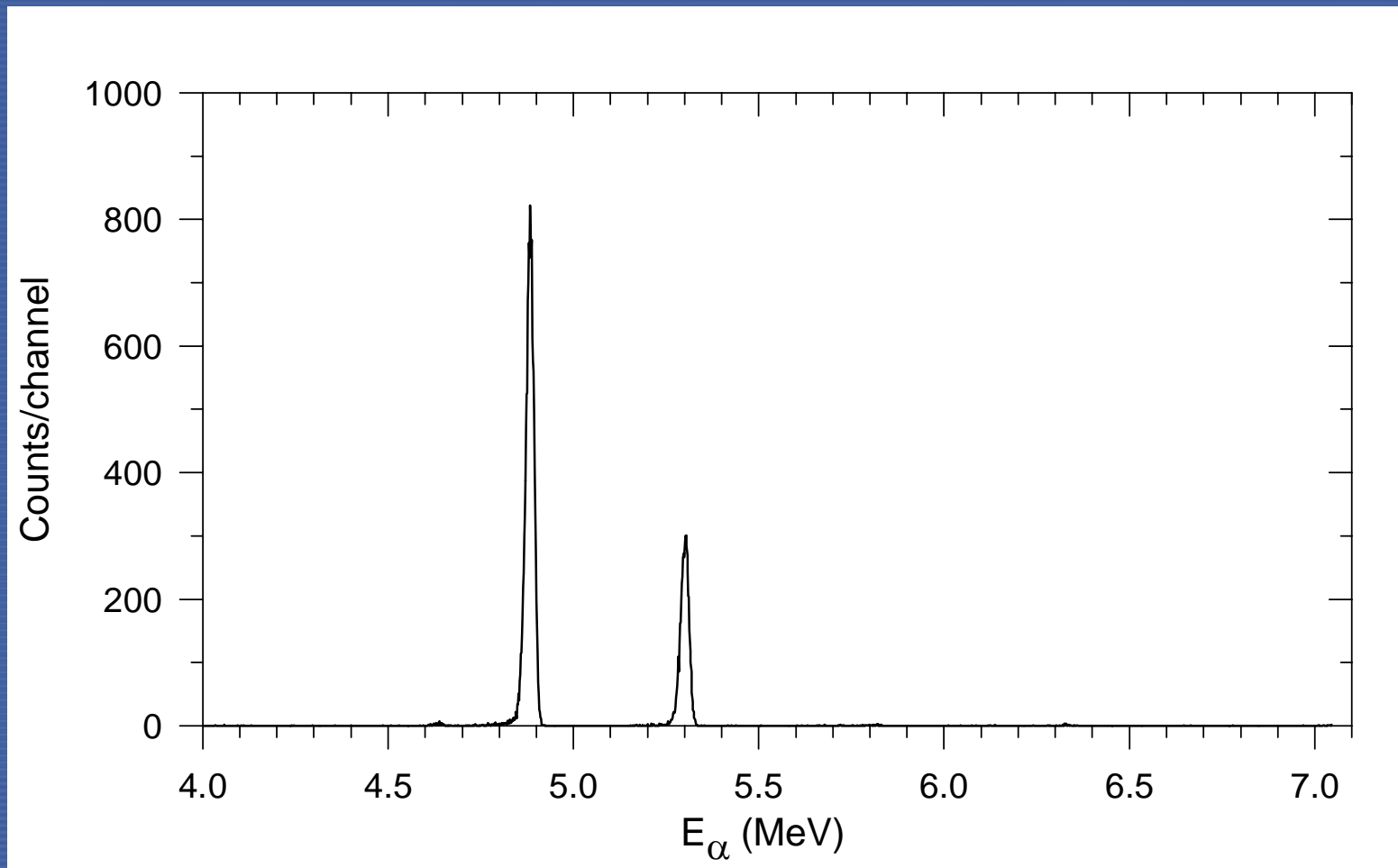
# Looking at spectra: Th + U



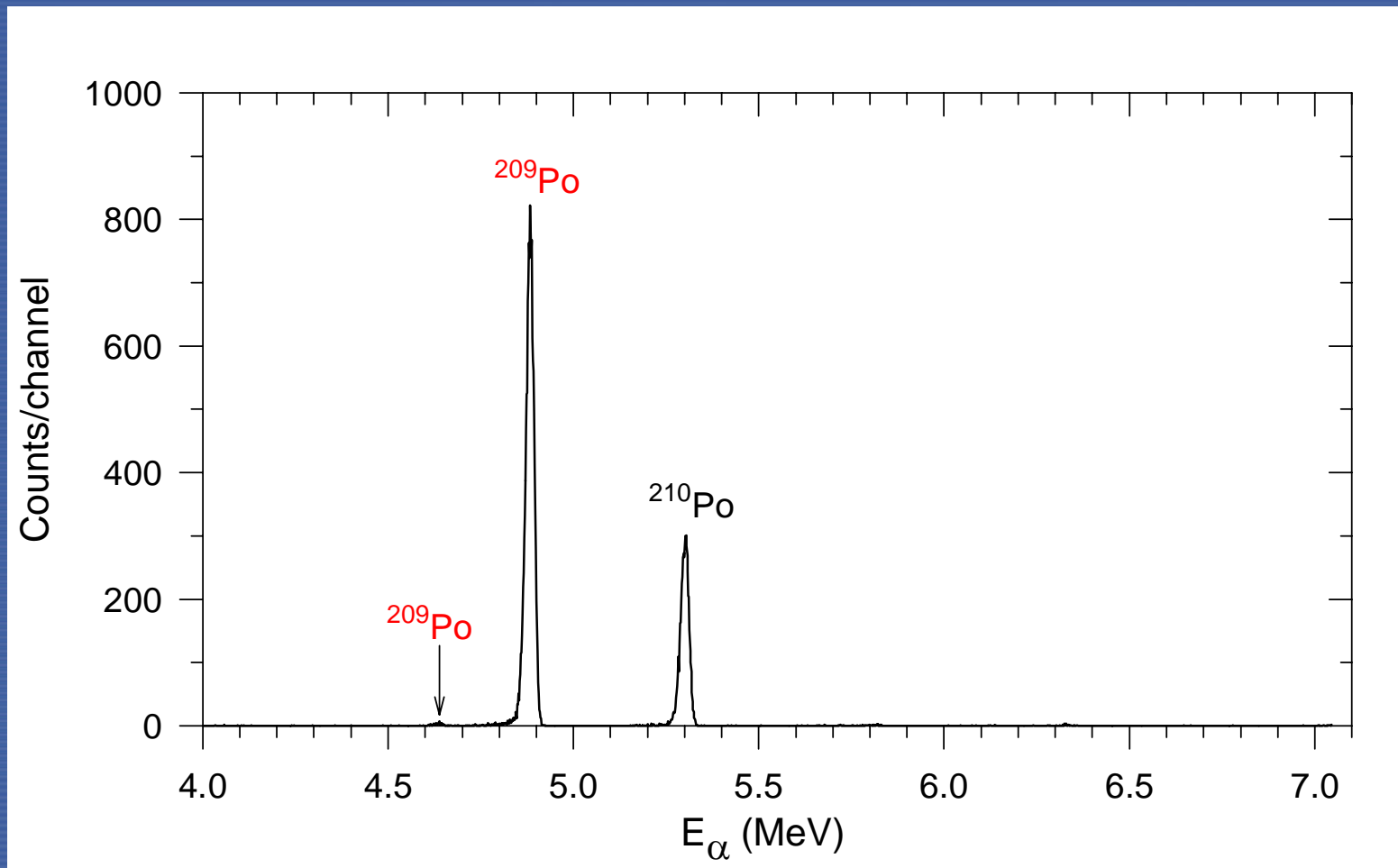
# Exercise 1

Identify as many peaks as you can in the spectra provided

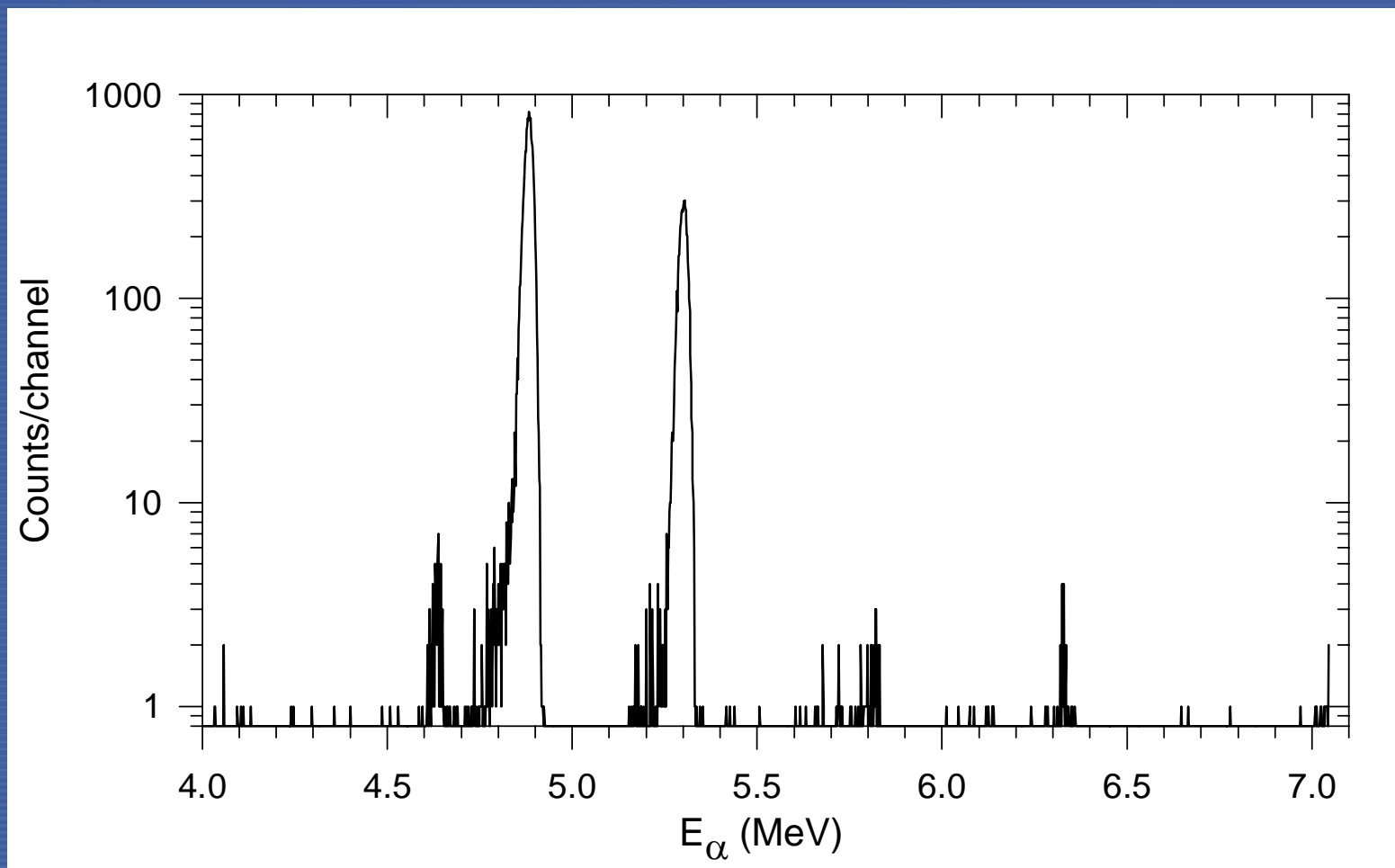
# Polonium



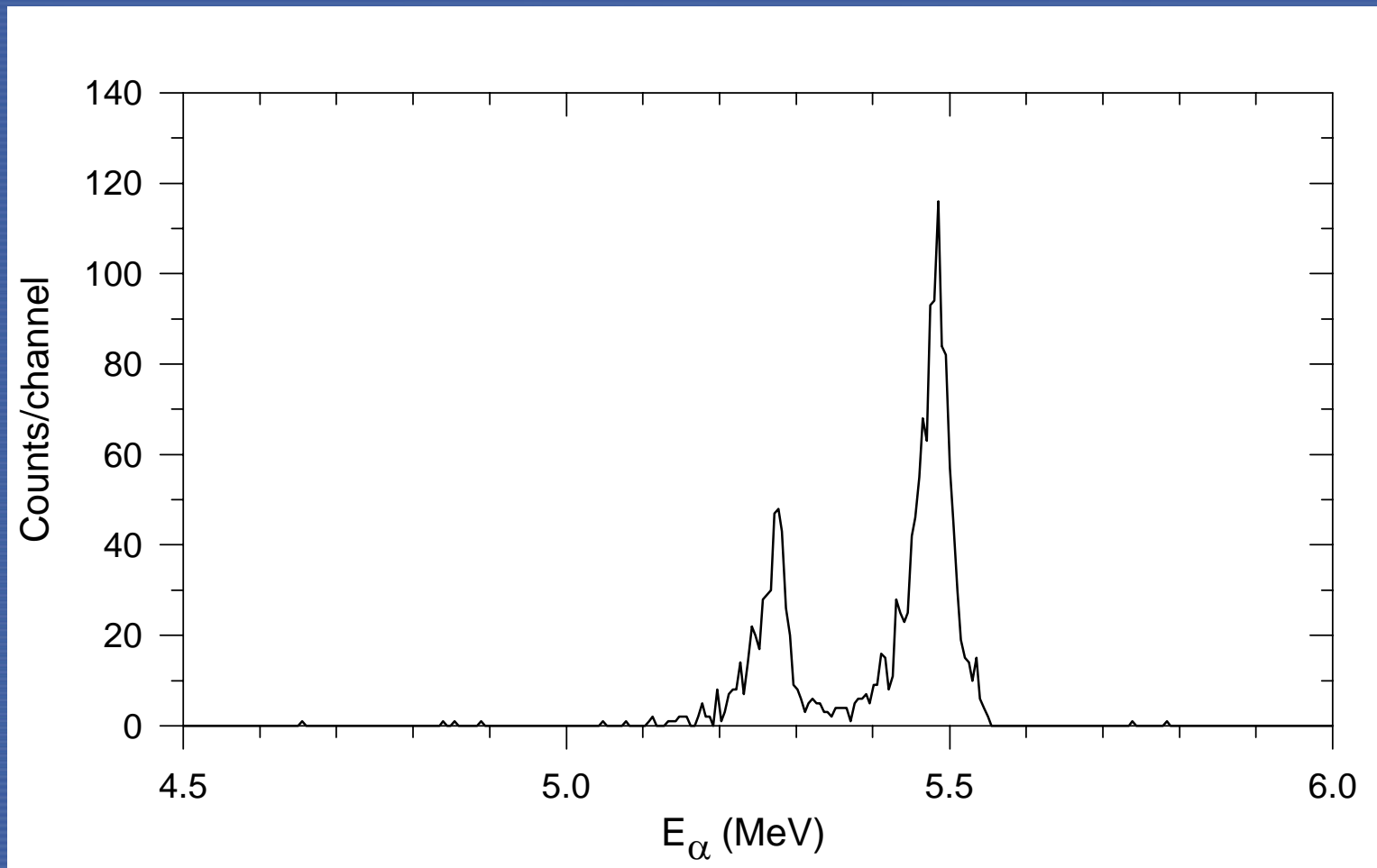
# Polonium



# Polonium – log scale

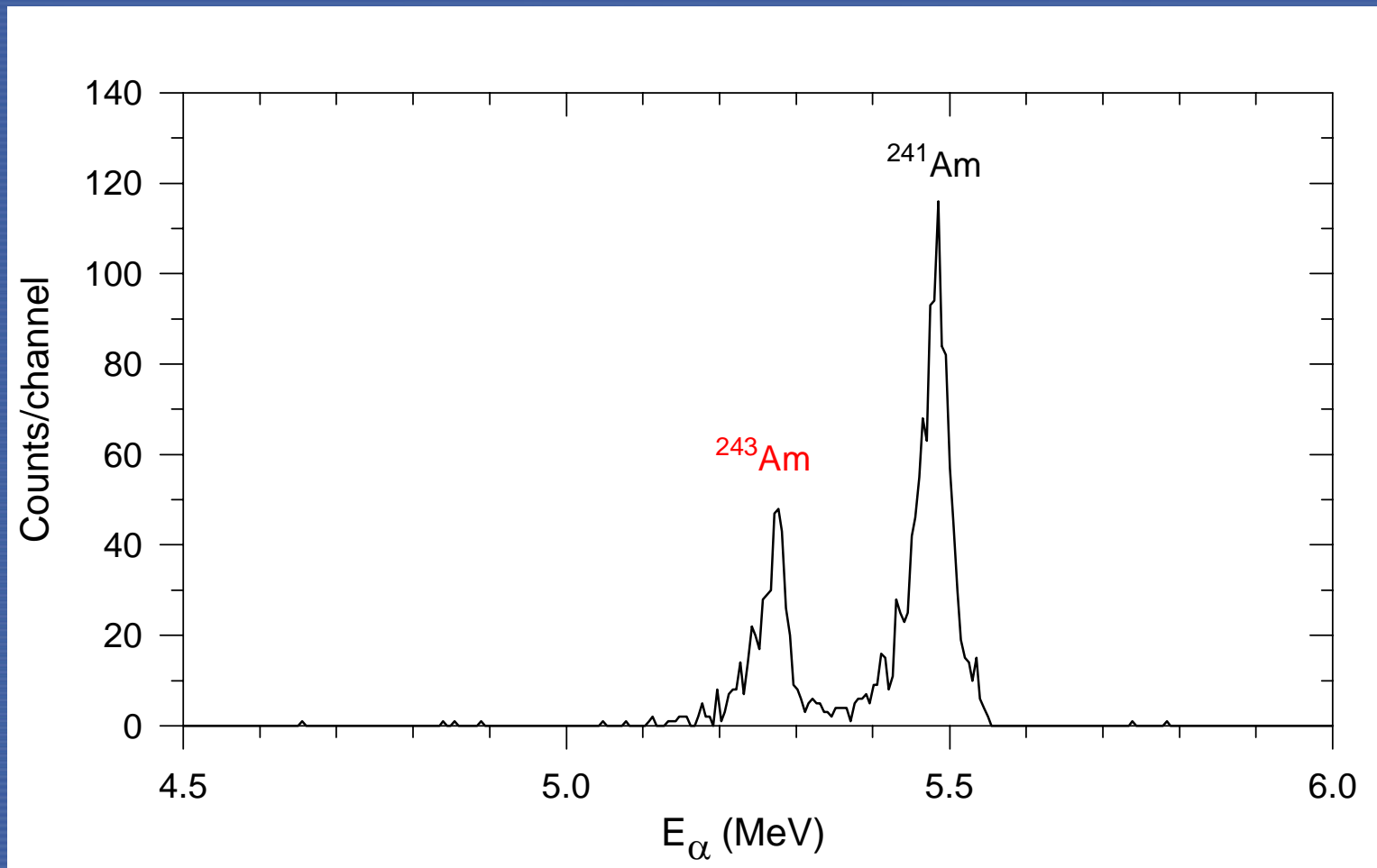


# Americium

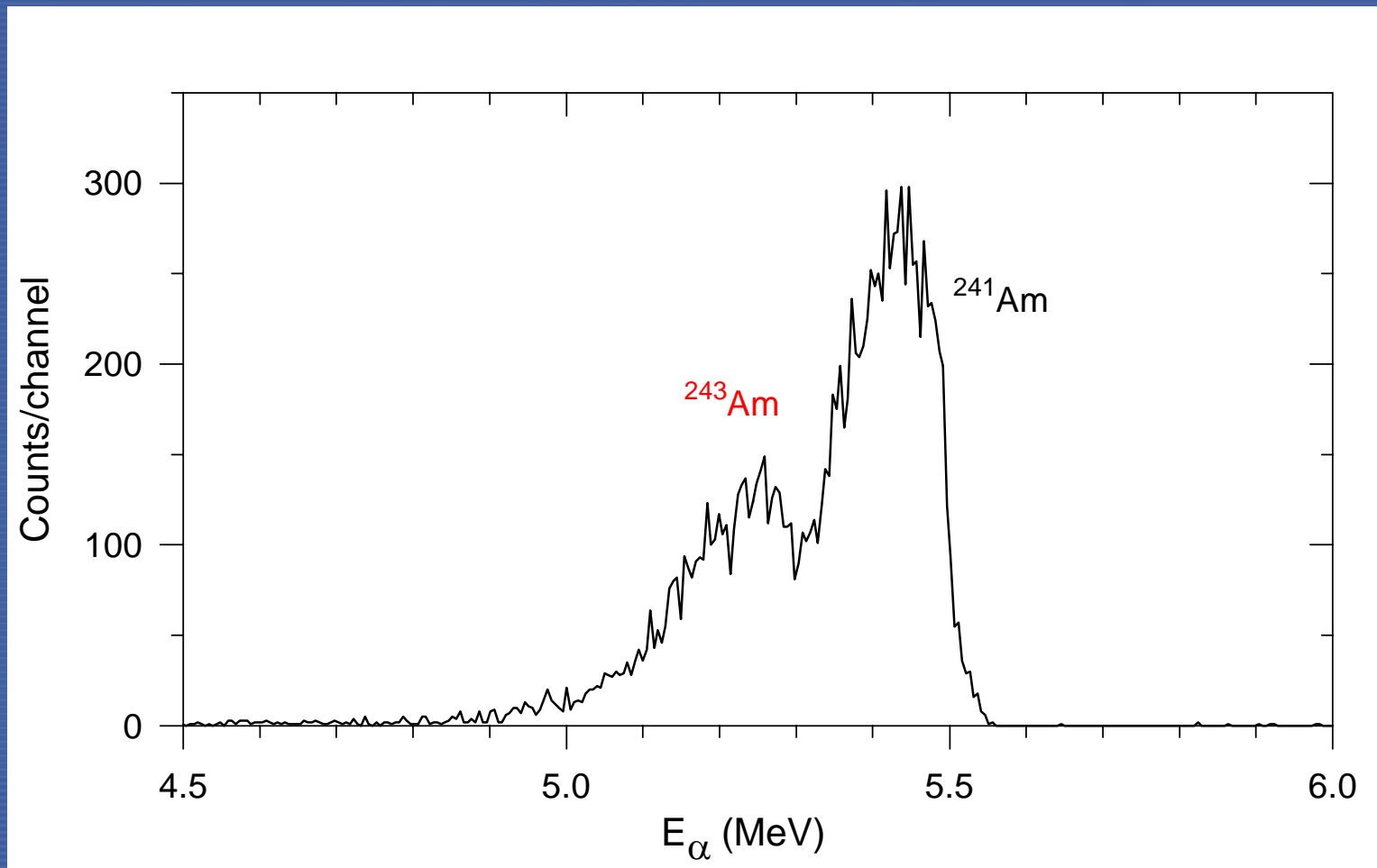




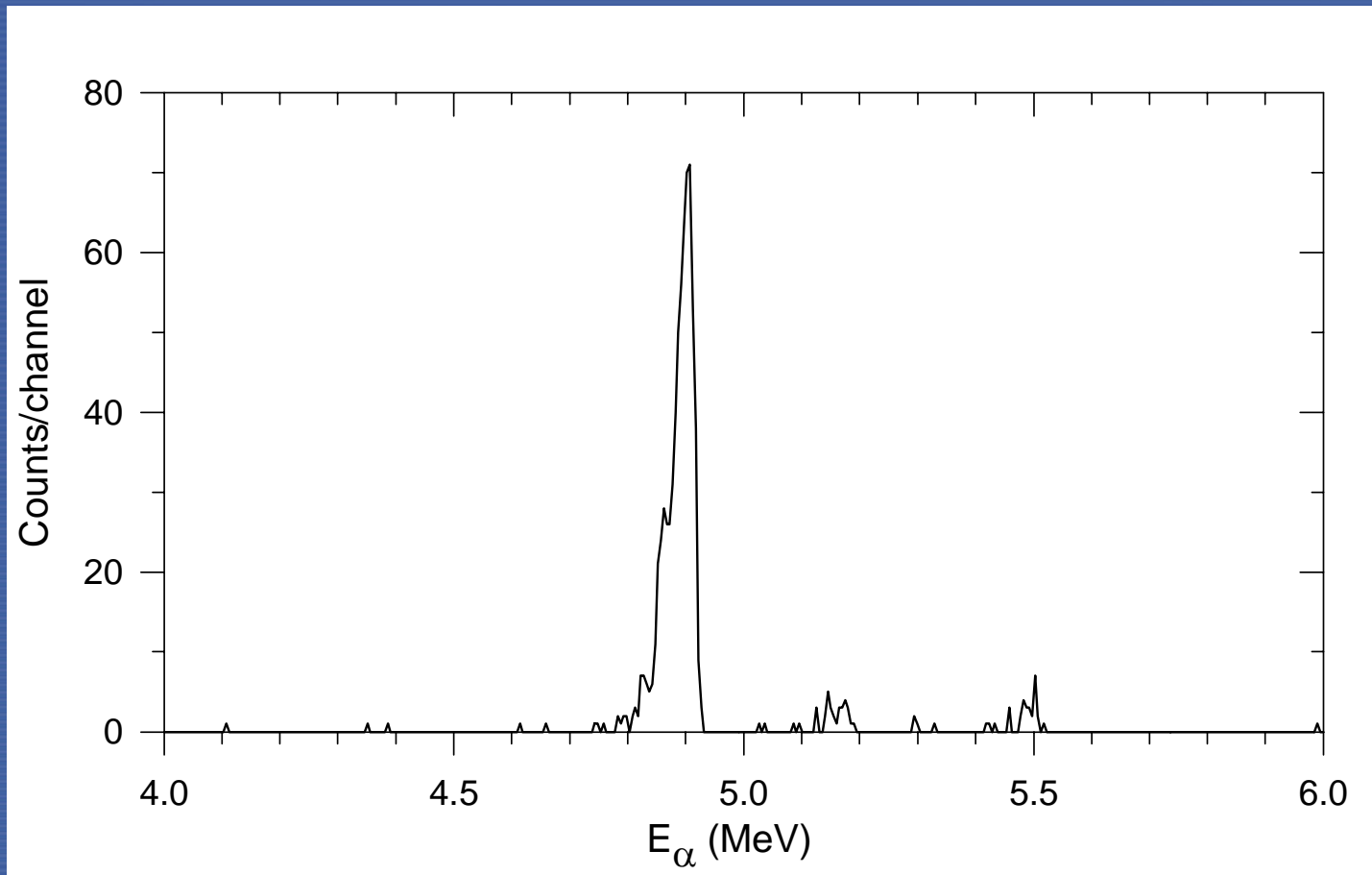
# Americium



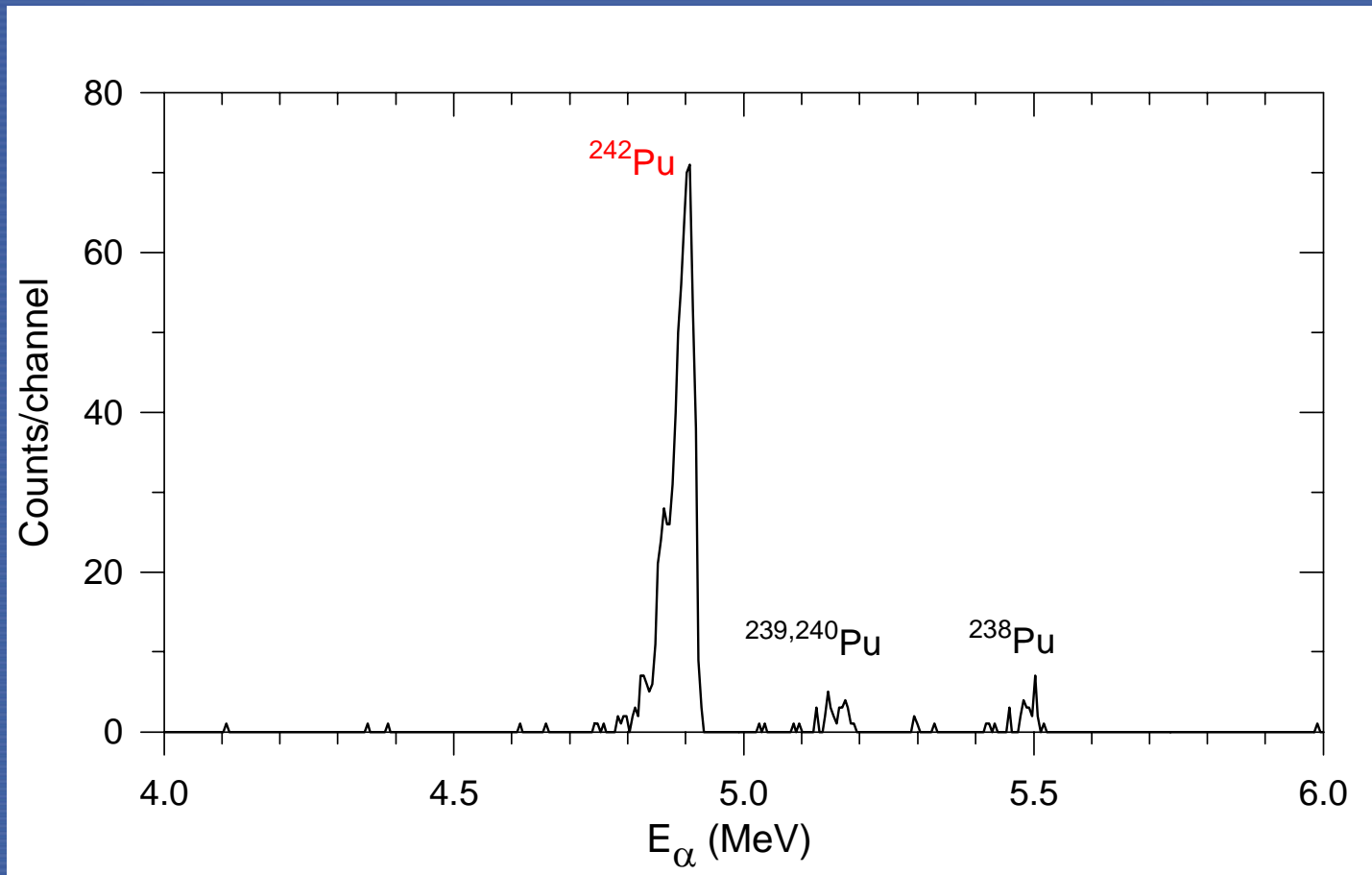
# Americium : effect of tailing



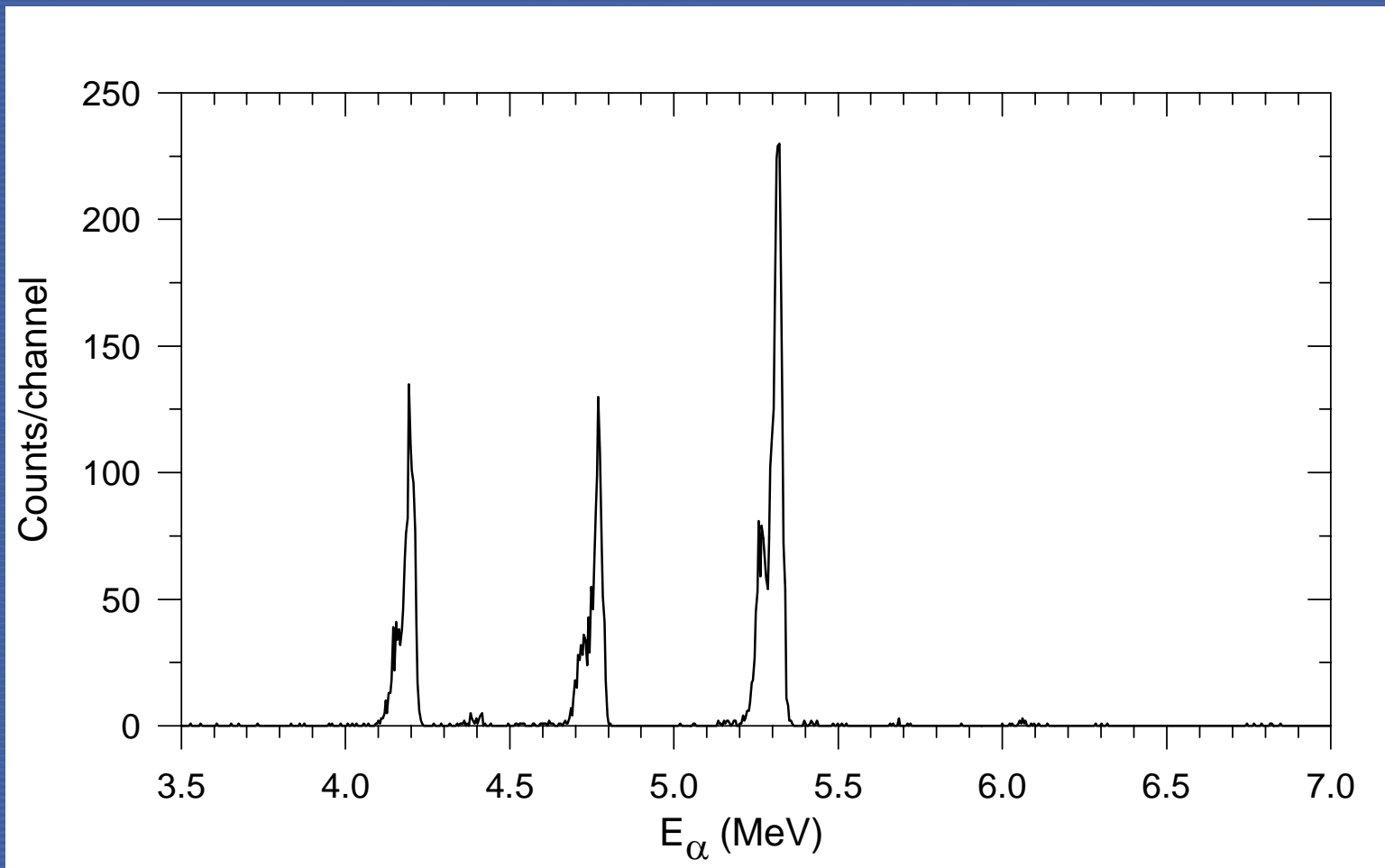
# Plutonium



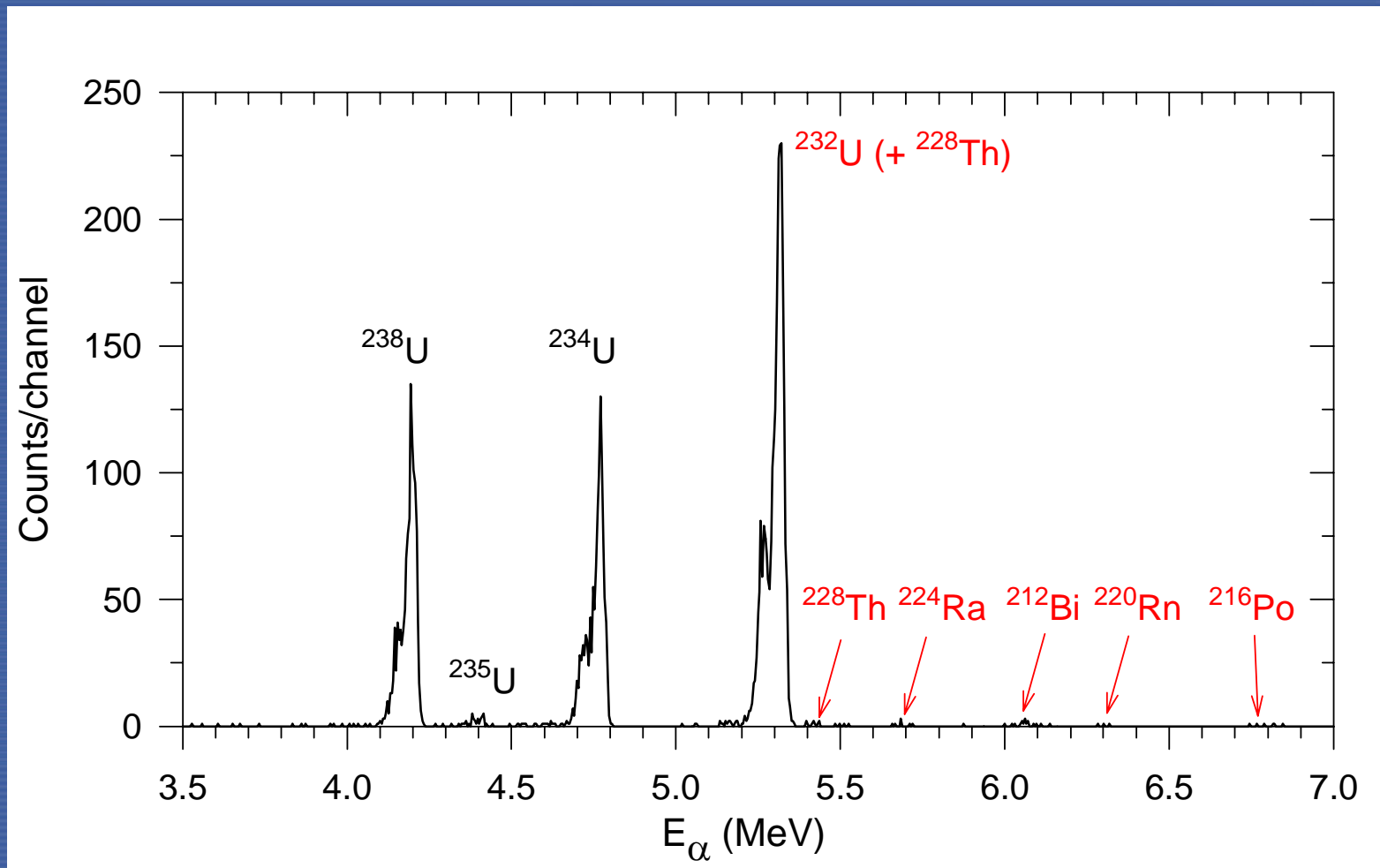
# Plutonium



# Uranium



# Uranium



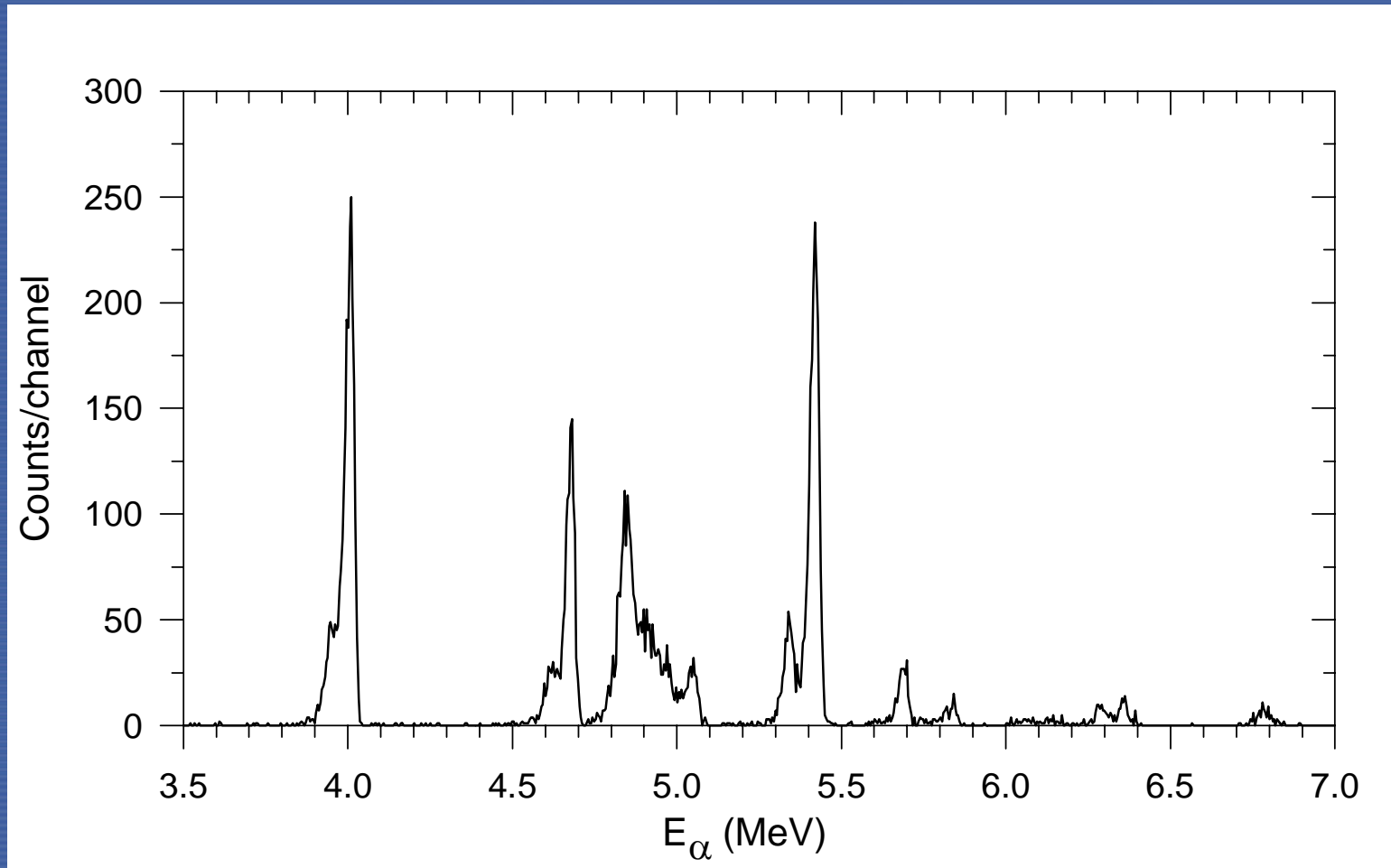
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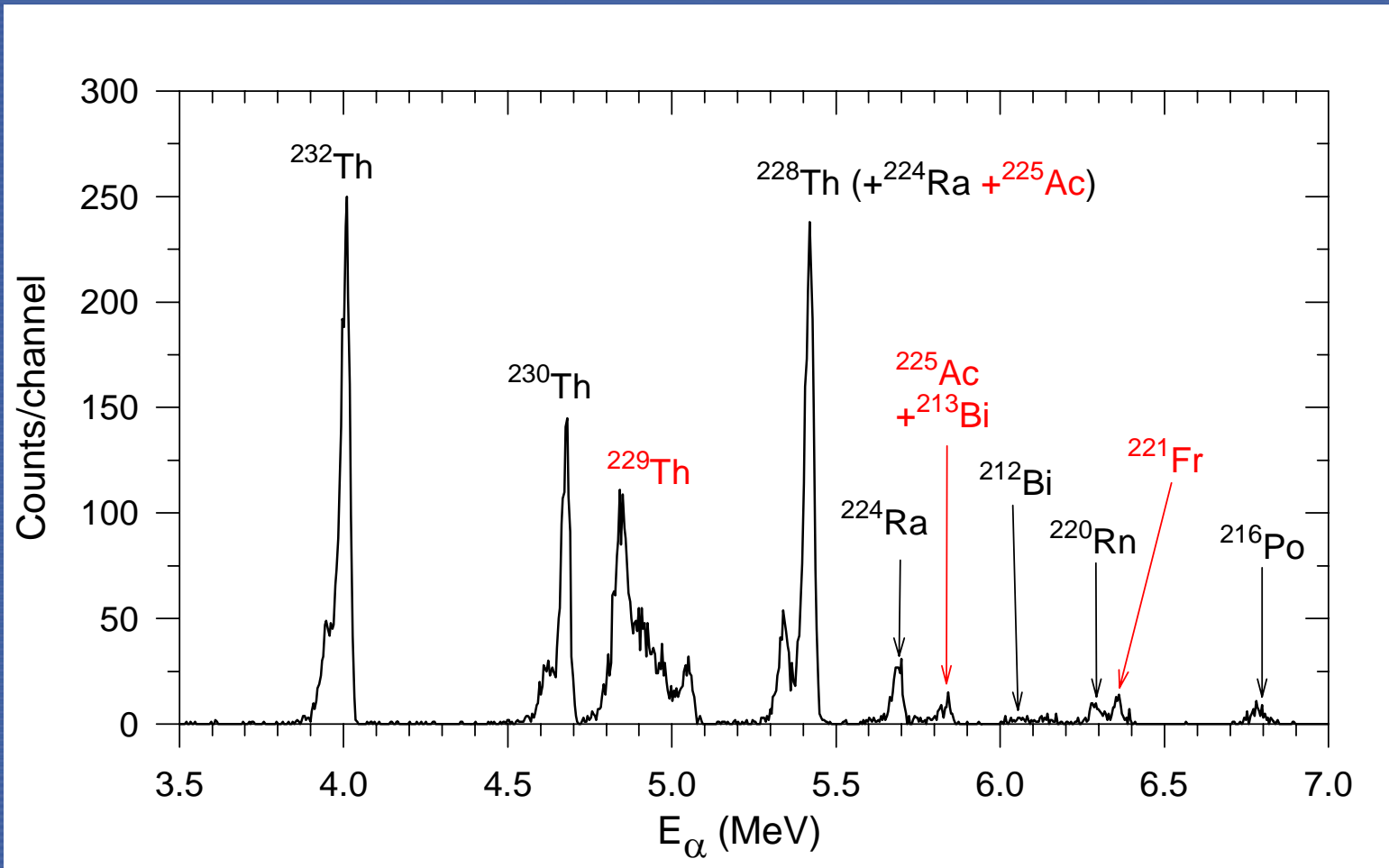
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# Thorium



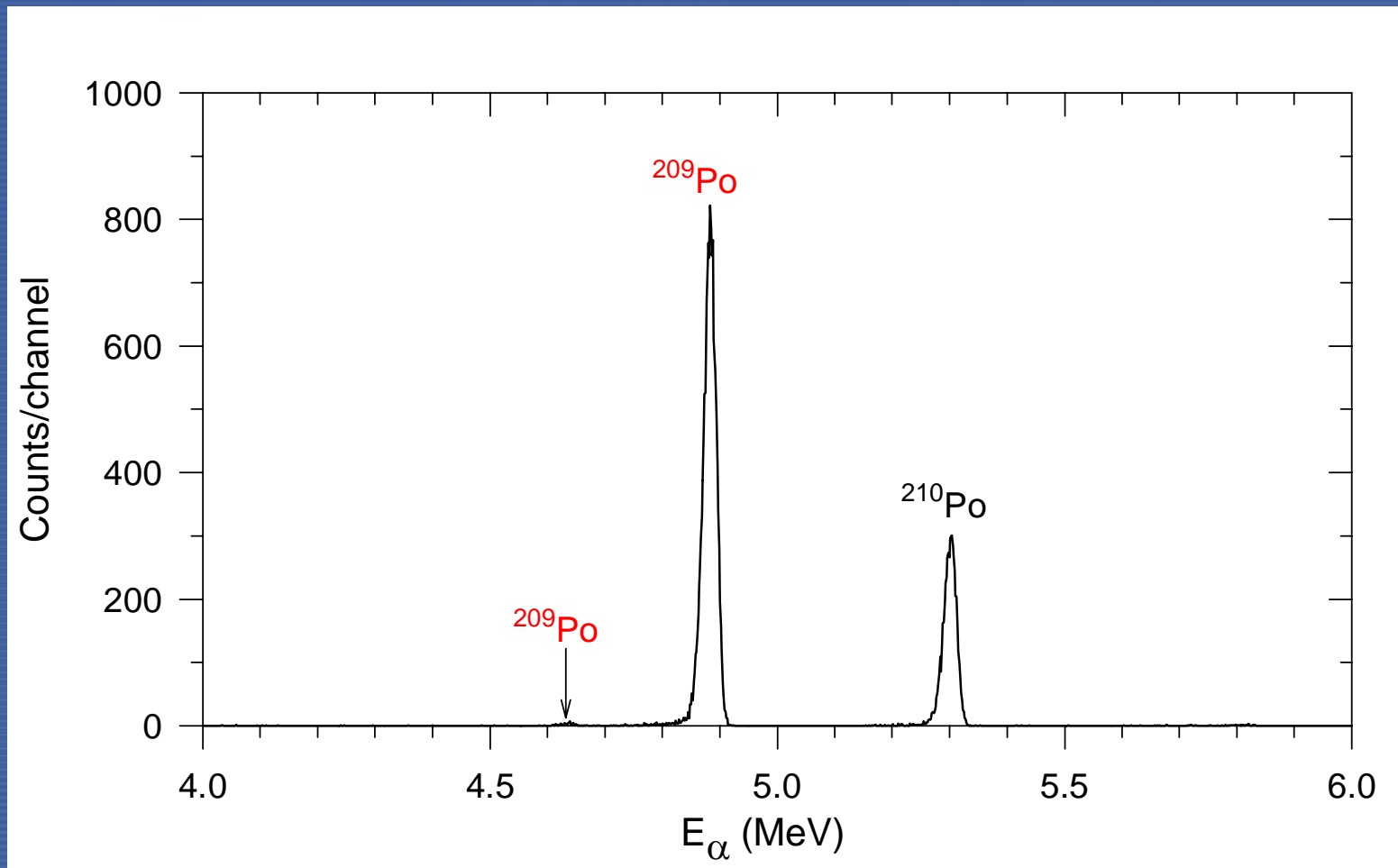
# Thorium



## Exercise 2

Calculate the activity concentration of  $^{210}\text{Po}$  in a sample for the date of chemical separation, including the uncertainty.

# Polonium



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