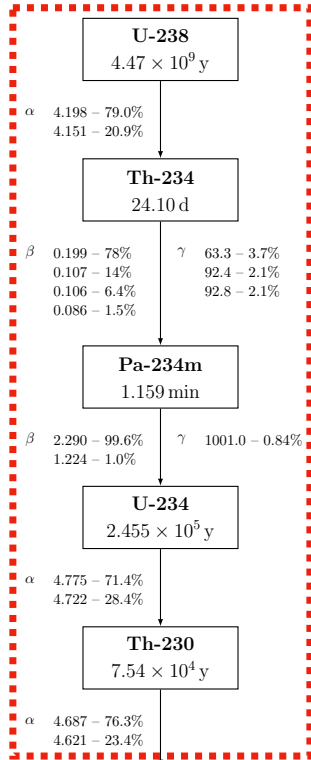


Internal background status

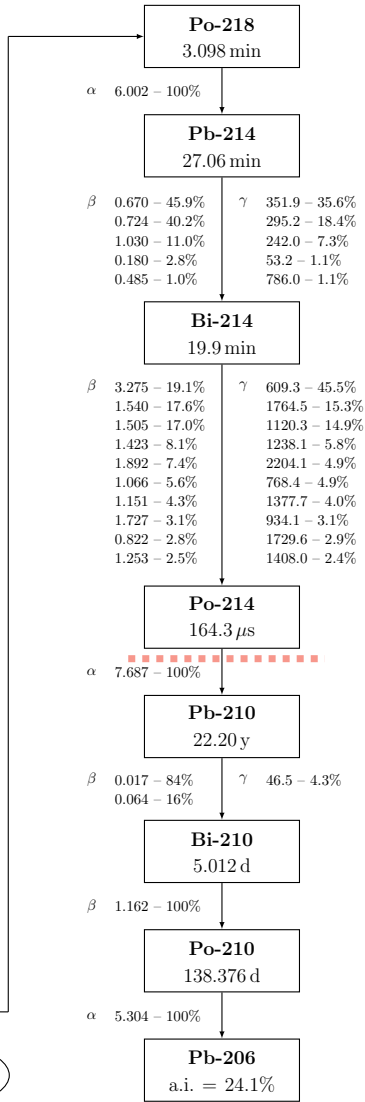
Simulation meeting

Melba D'Astolfo, 7/10/2024



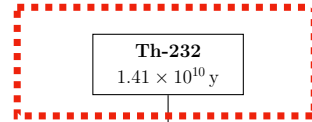
α 4.198 – 79.0%
 4.151 – 20.9%
 β 0.199 – 78%
 0.107 – 14%
 0.106 – 6.4%
 0.086 – 1.5%
 γ 63.3 – 3.7%
 92.4 – 2.1%
 92.8 – 2.1%
 β 2.290 – 99.6%
 1.224 – 1.0%
 γ 1001.0 – 0.84%
 α 4.775 – 71.4%
 4.722 – 28.4%
 α 4.687 – 76.3%
 4.621 – 23.4%

α - β energy in MeV
 γ energy in keV



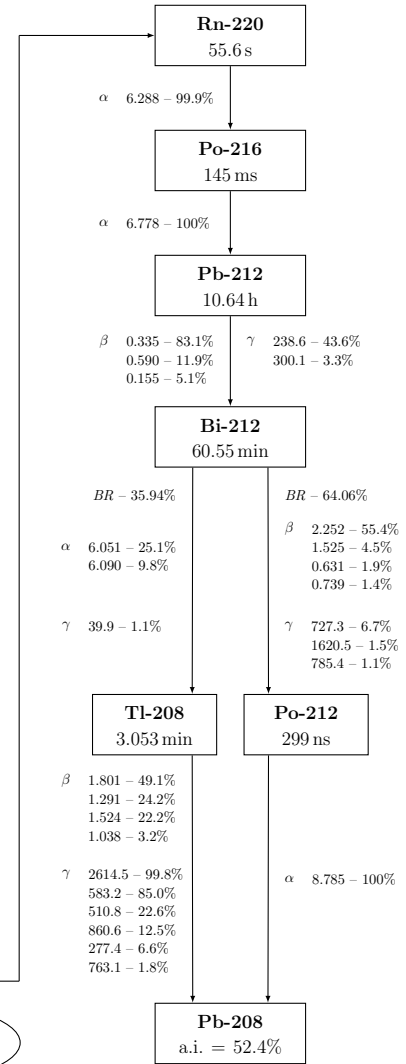
α 6.002 – 100%
 β 0.670 – 45.9%
 0.724 – 40.2%
 1.030 – 11.0%
 0.180 – 2.8%
 0.485 – 1.0%
 γ 351.9 – 35.6%
 295.2 – 18.4%
 242.0 – 7.3%
 53.2 – 1.1%
 786.0 – 1.1%
 β 3.275 – 19.1%
 1.540 – 17.6%
 1.505 – 17.0%
 1.423 – 8.1%
 1.892 – 7.4%
 1.066 – 5.6%
 1.151 – 4.3%
 1.727 – 3.1%
 0.822 – 2.8%
 1.253 – 2.5%
 γ 609.3 – 45.5%
 1764.5 – 15.3%
 1120.3 – 14.9%
 1238.1 – 5.8%
 2204.1 – 4.9%
 768.4 – 4.9%
 1377.7 – 4.0%
 934.1 – 3.1%
 1729.6 – 2.9%
 1408.0 – 2.4%
 α 7.687 – 100%
 β 0.017 – 84%
 0.064 – 16%
 γ 46.5 – 4.3%
 β 1.162 – 100%
 α 5.304 – 100%

 ICP-MS




α 4.012 – 78.2%
 3.947 – 21.7%
 β 0.039 – 40%
 0.013 – 30%
 0.027 – 20%
 0.040 – 10%
 γ 13.5 – 1.6%
 β 1.165 – 29.9%
 1.738 – 11.7%
 0.603 – 7.6%
 2.076 – 7.0%
 1.011 – 5.9%
 0.981 – 5.8%
 0.488 – 4.2%
 0.966 – 3.1%
 1.111 – 3.1%
 0.491 – 3.0%
 γ 911.2 – 25.8%
 969.0 – 15.8%
 338.3 – 11.3%
 964.8 – 5.0%
 463.0 – 4.4%
 794.9 – 4.3%
 209.3 – 3.9%
 270.2 – 3.5%
 1588.2 – 3.2%

α - β energy in MeV
 γ energy in keV



α 6.288 – 99.9%
 α 6.778 – 100%
 β 0.335 – 83.1%
 0.590 – 11.9%
 0.155 – 5.1%
 γ 238.6 – 43.6%
 300.1 – 3.3%
 BR – 35.94%
 BR – 64.06%
 α 6.051 – 25.1%
 6.090 – 9.8%
 γ 39.9 – 1.1%
 β 1.801 – 49.1%
 1.291 – 24.2%
 1.524 – 22.2%
 1.038 – 3.2%
 γ 2614.5 – 99.8%
 583.2 – 85.0%
 510.8 – 22.6%
 860.6 – 12.5%
 277.4 – 6.6%
 763.1 – 1.8%
 α 8.785 – 100%

 Assumption:
 secular
 equilibrium
 from Ra-226 on

Sample list

- Cu piece CSN CARL SCHREIBER

Sample "Cu L"	Weight [g]	Sample treatment	Cu dissolved [g]	Note
Starting	14.10			
After Etching n 1	11.05	6 mL H ₂ O + 10 mL HNO ₃	3.05	Waste
After Etching n 2	8.13	6 mL H ₂ O + 10 mL HNO ₃	2.92	Measured
After Etching n 3	5.20	6 mL H ₂ O + 10 mL HNO ₃	2.93	Measured
After Etching n 4	2.13	6 mL H ₂ O + 10 mL HNO ₃	3.07	Spiked 100 ppt

Tab.1 Sample etching with HNO₃

Rinse and description

Cu sample was rinsed with 5% of acid soap "Decon" in ultra-sonic bath, nitric acid and citric acid, this procedure was performed by Roberto Cerroni together with samples cleaning for gamma-ray spectroscopy.

Results

The measurements were performed after matrix separation and pre-concentration by mean chromatographic resins (TRU by Triskem).

	Etching 2	Etching 3
	[pg * g ⁻¹]	[pg * g ⁻¹]
Th	9 ± 3	7 ± 2
U	5 ± 2	2 ± 1

Tab.2 Contamination and activity in copper sample, the concentration values refer to solid sample; the uncertainty is about 30% of given values, recovery uncertainty is about 10%

ISOTOPE	ACTIVITY (Bq/kg)
$^{238}\text{U}_{top}$	2.45E-05
$^{232}\text{Th}_{top}$	2.85E-05
^{235}U	2.78E-08

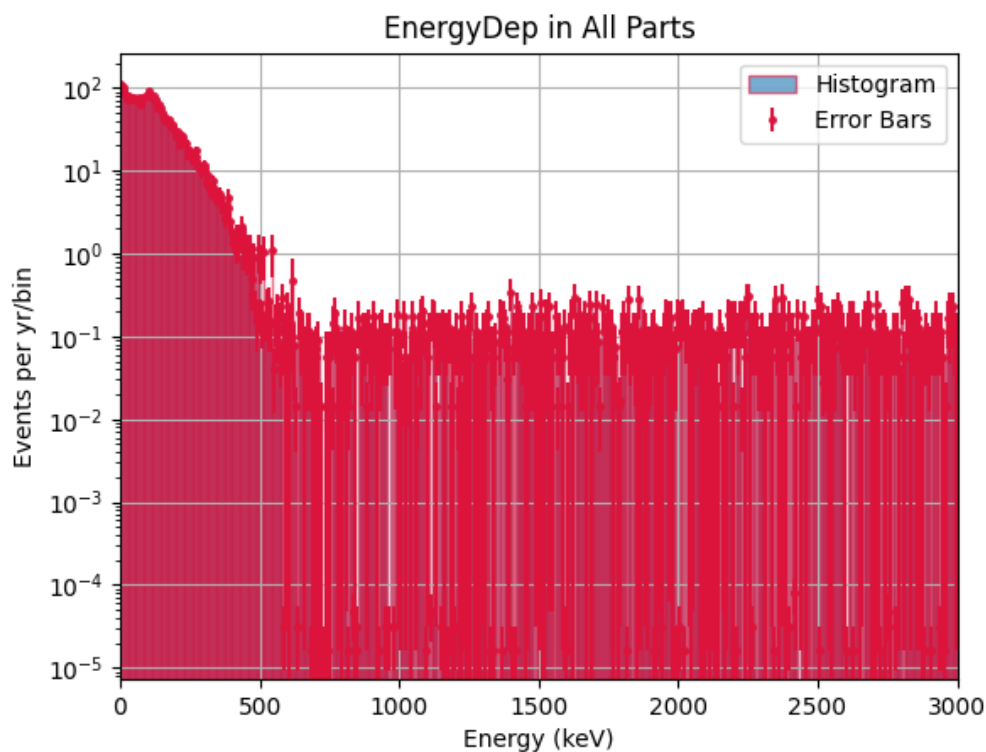
CATHODE - SCHRIEBER reference



9.10604 kg



X = 2.5 mm Y = 620 mm Z = 880 mm



ISOTOPE	ACTIVITY
$^{238}\text{U}_{top}$	2.45E-05
$^{238}\text{U}_{bottom}$	1.00E-04
^{235}U	2.78E-08
$^{232}\text{Th}_{bottom}$	1.70E-04
^{40}K	6.80E-04
^{137}Cs	1.10E-04
^{60}Co	3.10E-05

Total Rate for events within the energy interval [1, 20] keV from all detectors: 1980 ± 44 events per year

Total Rate for NR events within the energy interval [1, 20] keV from all detectors: 5 ± 1 events per year

CATHODE - SCHRIEBER reference



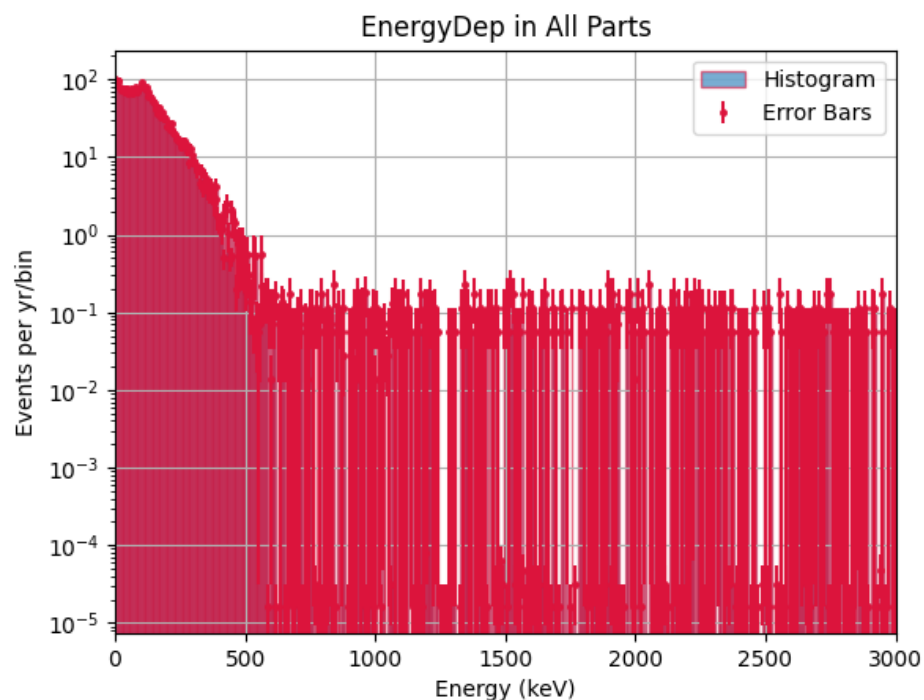
9.10604 kg



X = 2.5 mm Y = 620 mm Z = 880 mm



2 cm from each side



ISOTOPE	ACTIVITY
$^{238}\text{U}_{top}$	2.45E-05
$^{238}\text{U}_{bottom}$	1.00E-04
^{235}U	2.78E-08
$^{232}\text{Th}_{bottom}$	1.70E-04
^{40}K	6.80E-04
^{137}Cs	1.10E-04
^{60}Co	3.10E-05

Total Rate for events within the energy interval [1, 20] keV from all detectors: 1892 ± 43 events per year