Alpha spectrometry measurements for low-background experiments
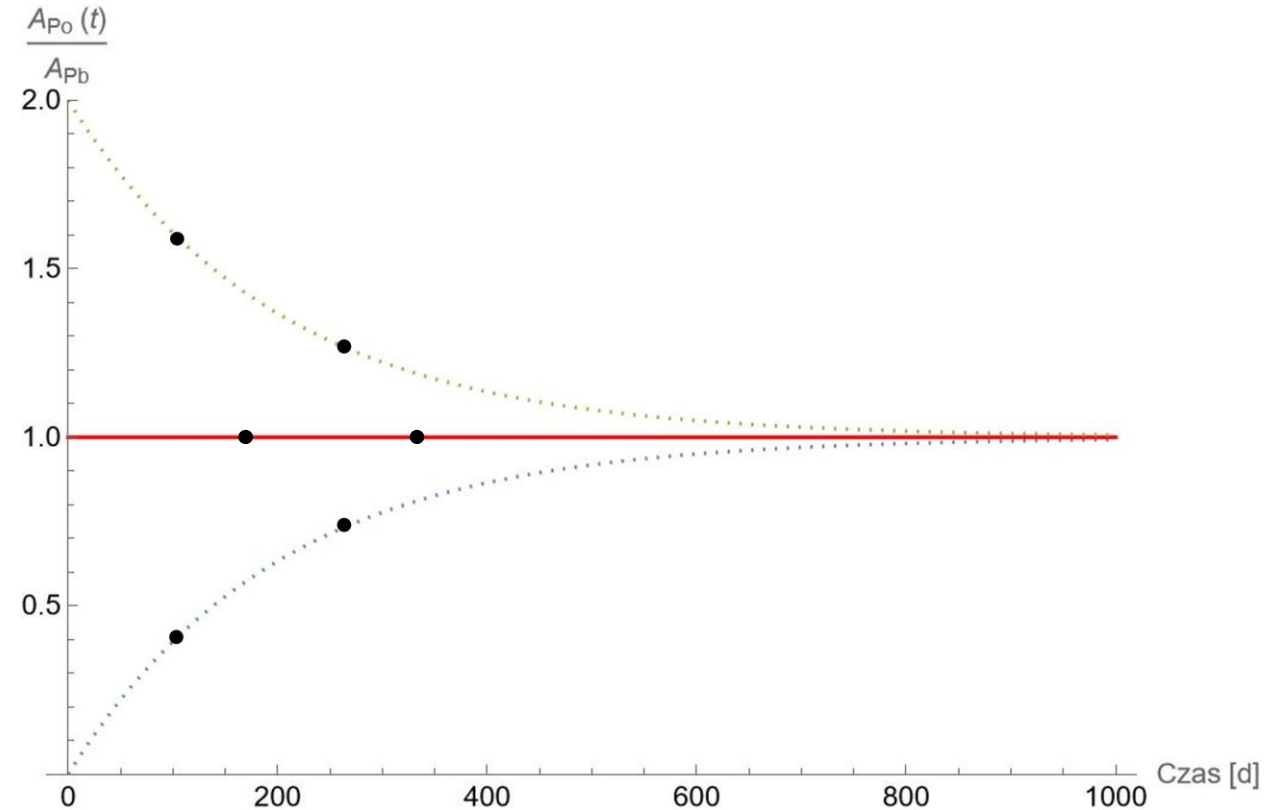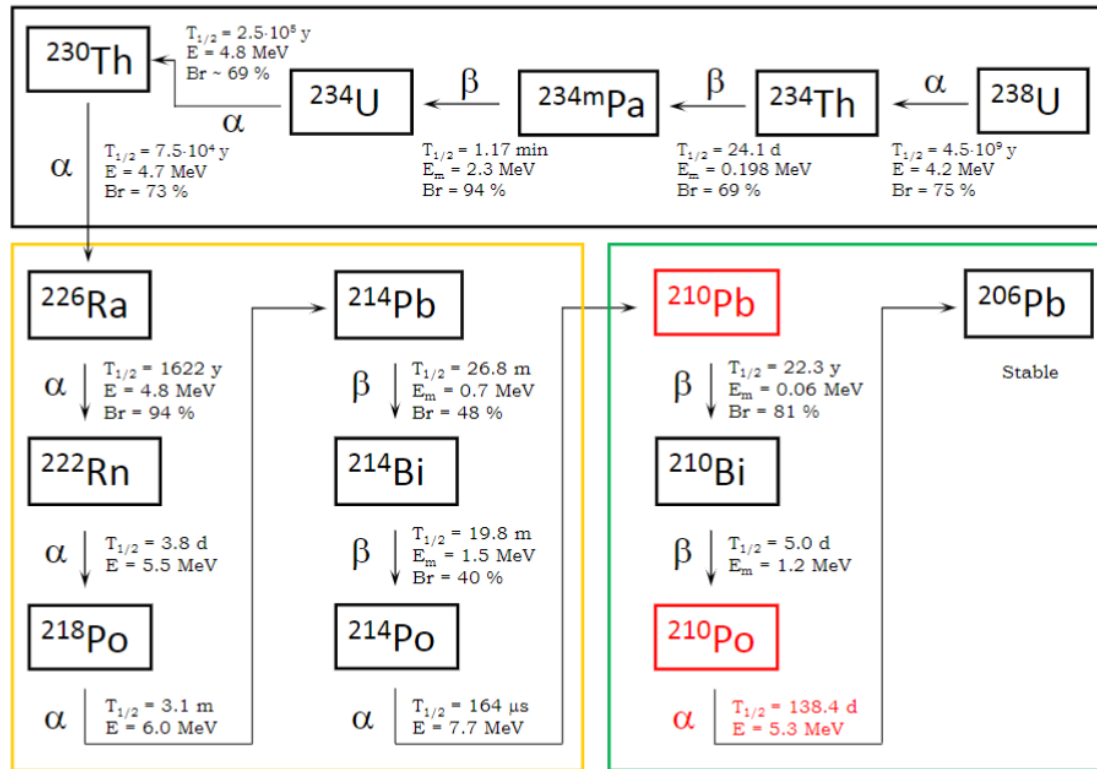
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NuPhys2023: Prospects of Neutrino Physics

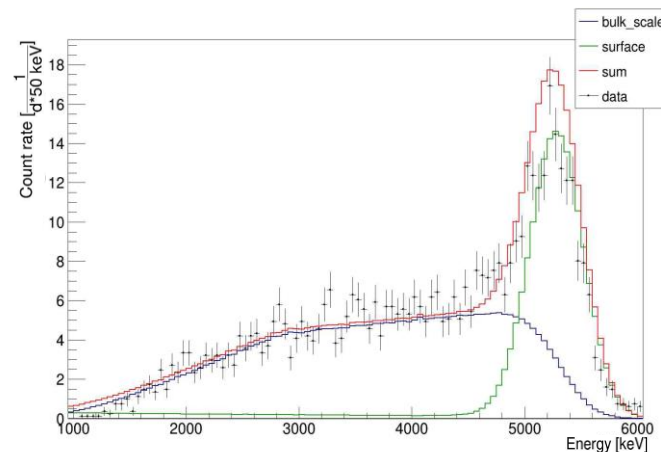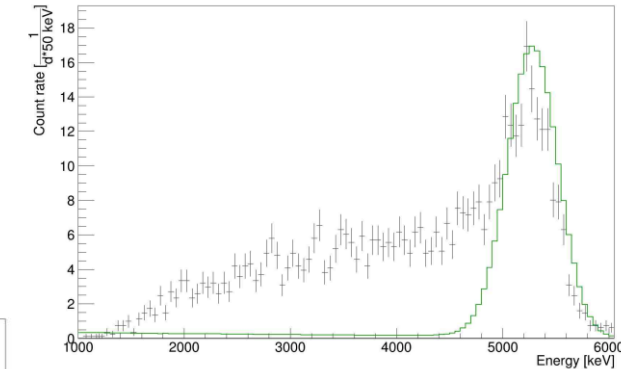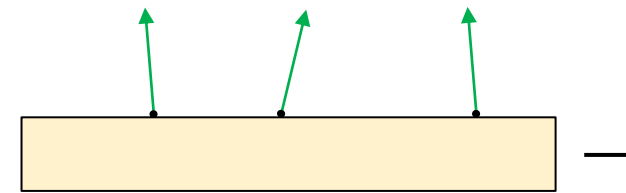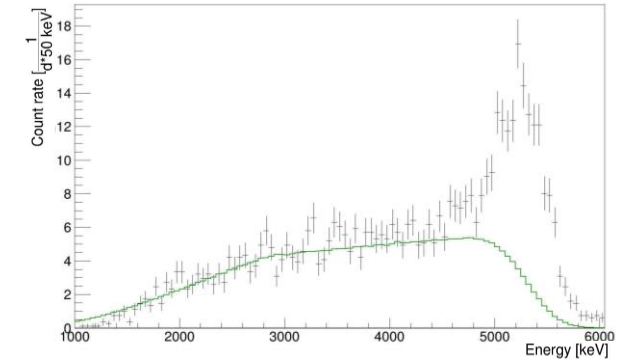18th December 2023

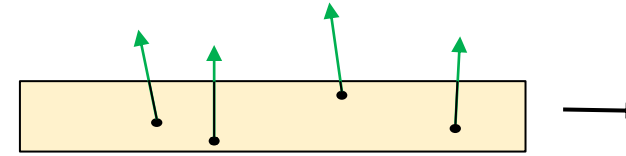# Detection of ^{210}Pb via ^{210}Po

- ICP – MS
- γ-spectrometry
- α-spectrometry

$$A_{Po}(t) = A_{Pb} \cdot \left(1 - e^{-\lambda_{Po}t}\right)$$

Alpha spectrometer: XIA UltraLo-1800

- Large-surface, low-background α-spectrometer XIA UltraLo-1800
- Ionization counter filled with gasous argon (3.5 l/min)
- Sample's surface (i. e. foil): 0.43×0.43 m^2
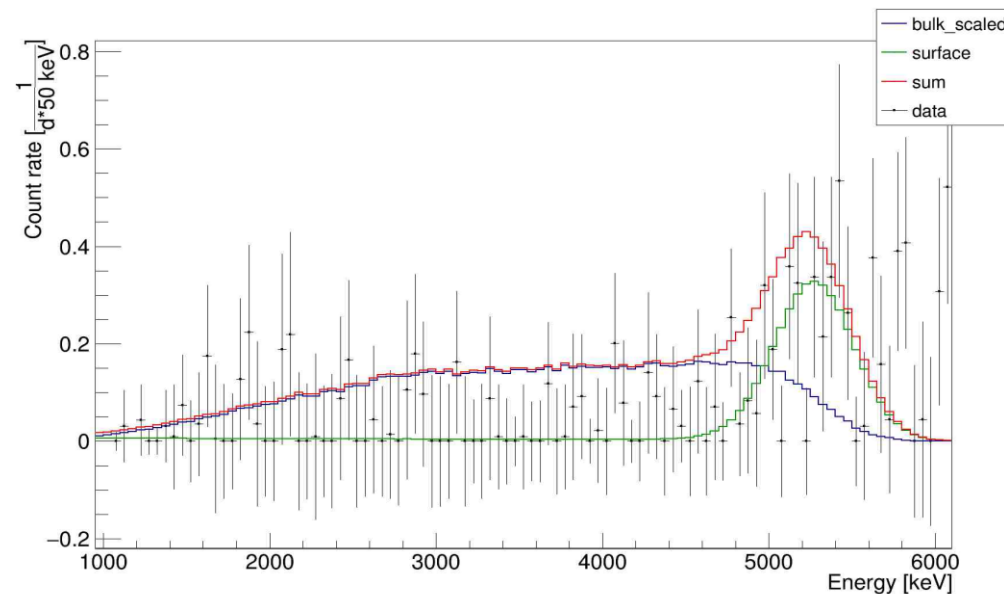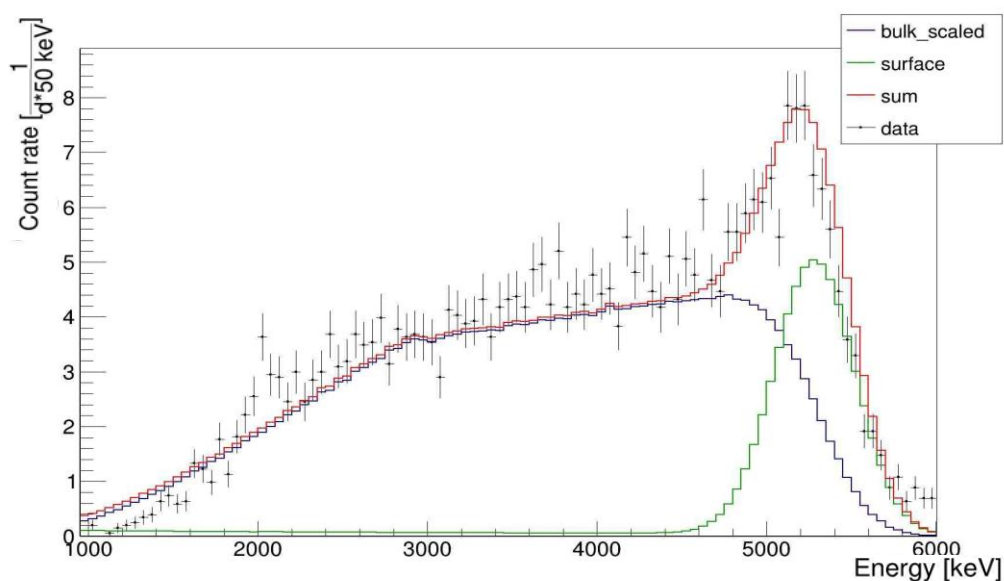- Construction with low-radioactivity materials
- Energy range: $1.0 - 10$ MeV

Sensitivity of the detector (minimal measured activity):

$C_{sf}: \leq 0.5 \dfrac{mBq}{m^2}$

$C_{bl}: \leq 50 \dfrac{mBq}{kg}$

Selected results

High purity titanium and copper spectra. Blue curves represent the spectra from bulk activity, green – surface activity, while the red ones are the sum of bulk and surface activity.

	Bulk activity $\left[\frac{\mathbf{mBq}}{\mathbf{kg}}\right]$	Surface activity $\left[\frac{\mathbf{mBq}}{\mathbf{m^2}}\right]$
High purity titanium	1260 ± 100	8.5 ± 0.9
Copper	≤ 49	0.56 ± 0.37

Thank you.