^{223}Ra gamma spectrum

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11th February 2021

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Tab. 1 lists the photon energies of a selection of the transitions observed in the decay products of ^{223}Ra. The first column shows the parent nucleus. The second column shows the observed transition energies of the daughter nucleus after the α decay (or β^- decay for ^{211}Pb) of the parent. The third column shows the intensity of the given transition as a relative frequency for each parent nucleus. Only transitions with an energy between 50keV and 600keV and an intensity of at least 1% were included.

Parent nucleus	Energy [keV]	Intensity %
^{223}Ra	81.1	15
	83.8	24
	94.2	3
	94.9	6
	97.5	2
	122	1
	144	3
	154	6
	269	14
	324	4
	338	3
	445	1
^{219}Rn	271	11
	402	7
^{211}Pb	405	4
	427	2
^{211}Bi	351	13

Table 1: Spectrum of photon energies emitted by ^{223}Ra and its decay products.
Source: https://www.nndc.bnl.gov/nudat2/

Comparison with measurement on NaI-detector

A measurement of a ^{223}Ra source with an activity of $\sim$ 5kBq is shown in Fig. 1. The measurement was performed using a NaI-detector gamma camera. The energies from Tab. 1 are overlaid for comparison.

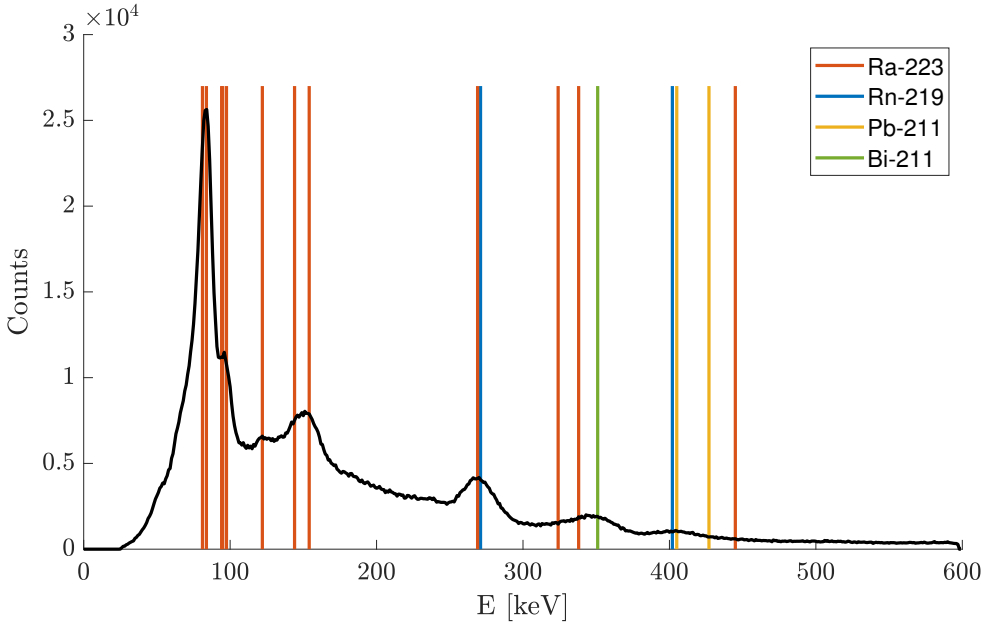

Figure 1: Spectrum measured from a ^{223}Ra source (black line). Energies from Tab. 1 are shown as lines.

Energy windows

Tab. 2 shows a prioritised list of energy windows where the presence of ^{223}Ra can be detected. The windows are all 20% windows, however due to the density of the spectrum, multiple transitions are included in some of the windows. The windows are prioritised based on the minimal detectable activity (MDA), which is estimated from a background measurement performed in connection with the measurement of the ^{223}Ra source.
Note that two of the windows overlap.

Window [keV]	MDA [Bq]
73 - 108	18
130 - 169	56
242 - 298	60
316 - 386	90
360 - 440	133

Table 2: Prioritised list of energy windows in which the presence of ^{223}Ra can be detected.