

^{223}Ra gamma spectrum

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^{223}Ra gamma spectrum

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 $\sim 5\text{kBq}$ is shown in Fig. 1. The measurement was performed using a NaI-detector gamma camera. The energies from Tab. 1 are overlaid for comparison. An equivalent measurement was performed with a second source of the same activity.

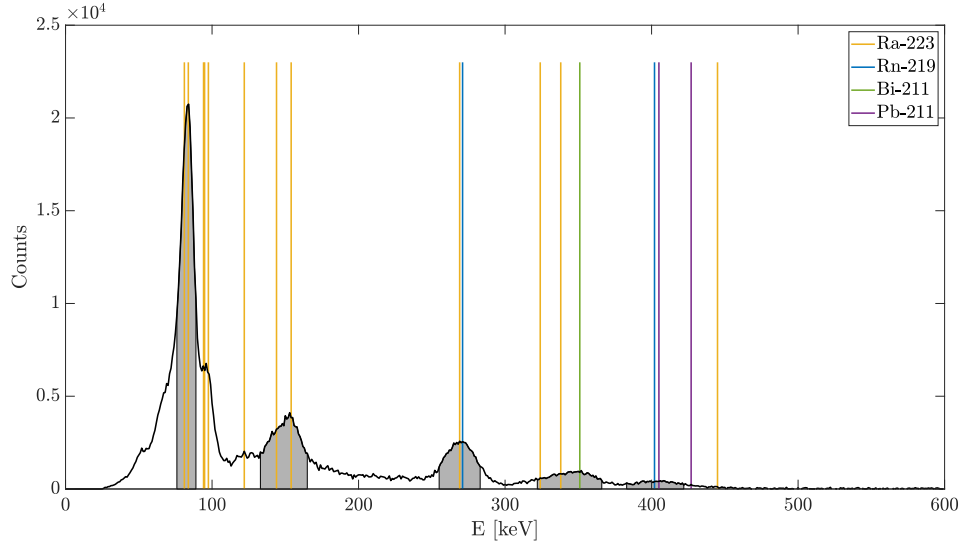


Figure 1: Spectrum measured from a ^{223}Ra source (black line). Energies from Tab. 1 are shown as lines. Suggested energy windows are shown as grey areas.

Energy windows

Tab. 2 shows a prioritised list of energy windows where the presence of ^{223}Ra can be detected. The windows are also shown in Fig. 1. Windows cover the FWHM of prominent peaks in the spectrum. The peaks at $\sim 95\text{keV}$ and $\sim 122\text{keV}$ were left out, since the FWHM was covered by other peaks in the spectrum.

Window [keV]
76 - 89
133 - 165
255 - 283
322 - 366
383 - 422

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