

Spectroscopic study of $^{76,77,78,79,80}\text{Kr}$

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Introduction

Light krypton isotopes were among the first medium mass nuclei to indicate very large prolate deformation ($\beta=0.35$) stabilized by shell structure. Large shell gaps at $Z, N=34,36$ for oblate shapes and at $Z, N=38,40$ for prolate shapes result in very deformed ground-state configurations and prolate-oblate shape coexistence [1]. In this article we report preliminary results of $^{76,77,78,79,80}\text{Kr}$.

Experimental setup and data analysis

The fusion-evaporation reaction was initiated following the interaction of ^{28}Si ions at 145-160 MeV with a Fe self-supporting target. The combined 15 UD pelletron and LINAC accelerators at the Inter University Accelerator Center (IUAC), New Delhi, were used to deliver the beams on target. Prompt γ rays from residues were detected with the 12 Compton suppressed HPGe clover detectors of the Indian National Gamma Array (INGA) [2]. Data were recorded in an event-by-event mode with a trigger condition of two or more Ge detector signals observed in prompt coincidence; 733 million γ - γ coincidence events were collected.

The offline analysis of the data was performed using the **NiasMARS** and the **RADWARE** software packages. The γ - γ coincidences calibrated data were sorted into γ - γ matrix. The total projected spectrum from γ - γ matrix is as shown in Figure 1.

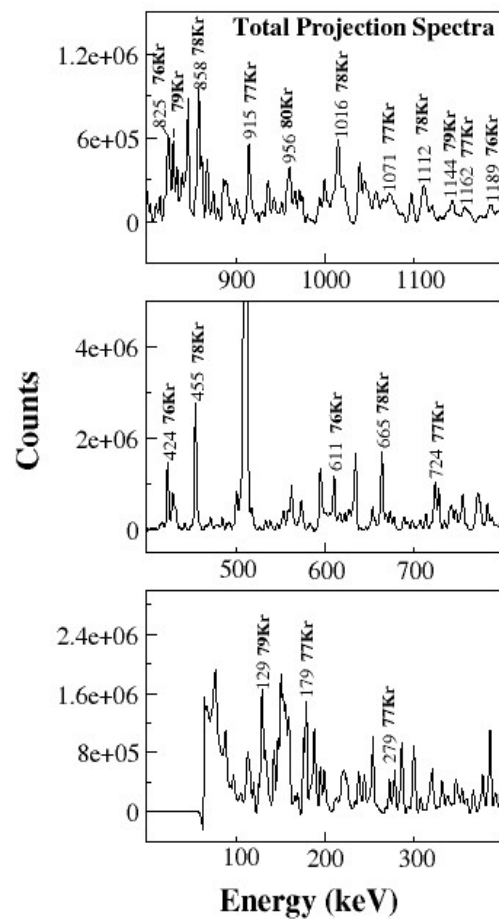


Fig. 1 Strong photo-peaks of Kr are labeled with γ -ray energy.

Examples of gated γ -ray spectra labeled with their associated gammas are shown in Figure 2.

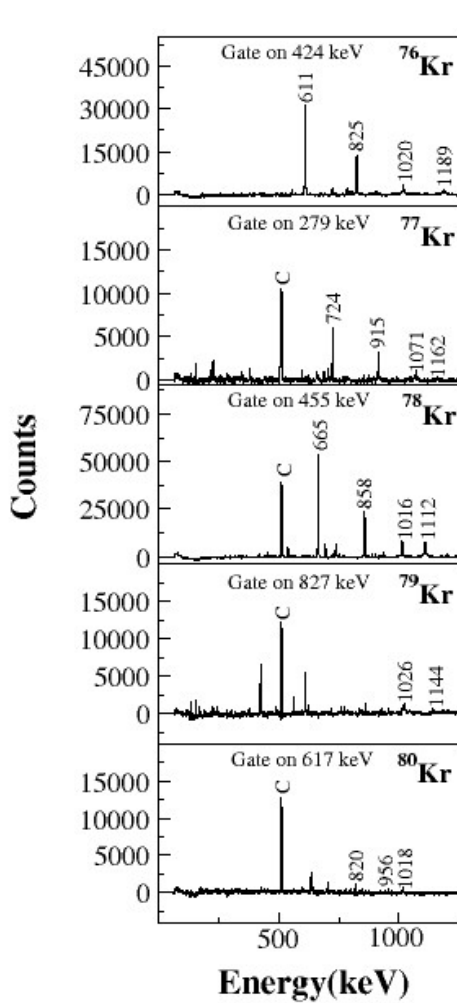


Fig. 2 The gated spectra of γ -ray transitions belonging to $^{76,77,78,79,80}\text{Kr}$. The label C indicated the 511 keV photo-peak.

Results and Level Scheme

The partial level schemes of Kr isotopes based on the present work are shown in Figure 3.

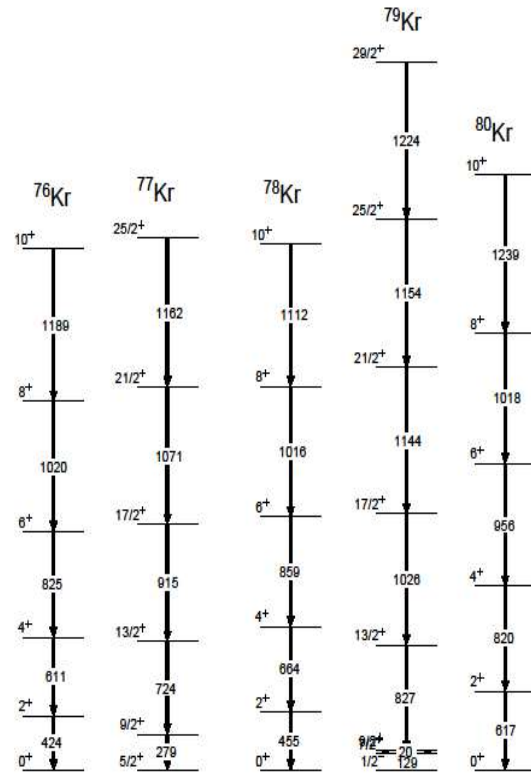


Fig. 3 Partial level scheme of $^{76,77,78,79,80}\text{Kr}$. The energy values have the uncertainties of ± 0.5 keV.

References

- [1] W. Nazarewicz *et al.*, Nucl. Phys. A 435, 397 (1985).
- [2] S. Muralithar *et al.*, Nucl. Inst. Meth. Phys. Res. A 622, 281 (2010).