γ-vibrational States in ^{181}Ta ◇

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1. Motivation

Over the last years experiments searching for unknown levels in ^{181}Ta were performed [1,2,3]. γ-vibrational states in ^{181}Ta could not be found. Because large B(E2) values (normally several W.u.) are connecting the ground-state band with the vibrational bands, Coulomb-excitation of these bands is feasible.

2. Experimental Setup

^{181}Ta was bombarded with 225 MeV ^{58}Ni projectiles accelerated by the Tandem van de Graaff of the Niels Bohr Institute in Risø. Coincidences were recorded between 55 PIN diodes and NORDBALL's Compton-suppressed Germanium detectors. The high efficiency of this arrangement provided sufficient statistics to evaluate backscattered projectile-gamma-gamma triple coincidences.

3. Results

In fig. 1 a projectile-gamma coincidence-spectrum is shown. Transitions of a K=$3/2^+$ and a K=$11/2^+$ γ-vibrational band to the K=$7/2^+$ ground-state band are visible. Taking into account projectile-gamma-gamma spectra, intensity ratios and transition energies, the level scheme shown in fig. 2 was established. Obviously several multiple peaks are present in the spectrum. Transitions given with an energy accuracy of 1 keV are merging to multiple peaks. Such transitions are labeled by the average peak energy. Remarkable is the constant moment of inertia within a band. The computer code GOSIA [4] was used to extract B(E2) values. We get (6.4 ± 0.6) W.u. for the $3/2^+ \rightarrow 7/2^+$ and (3.2 ± 0.4) W.u. for the $11/2^+ \rightarrow 7/2^+$ bandhead transitions.

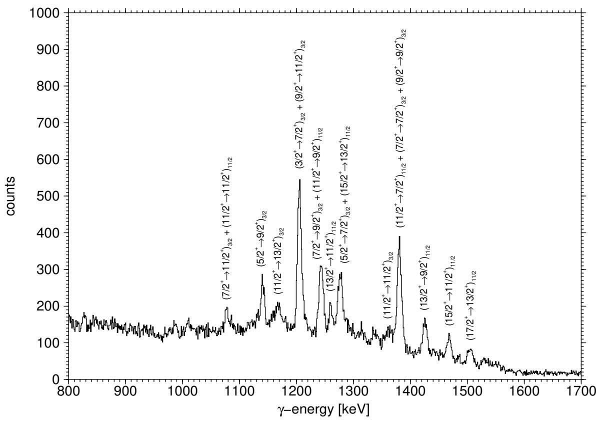

Fig. 1: Projectile-gamma coincidence spectrum

References

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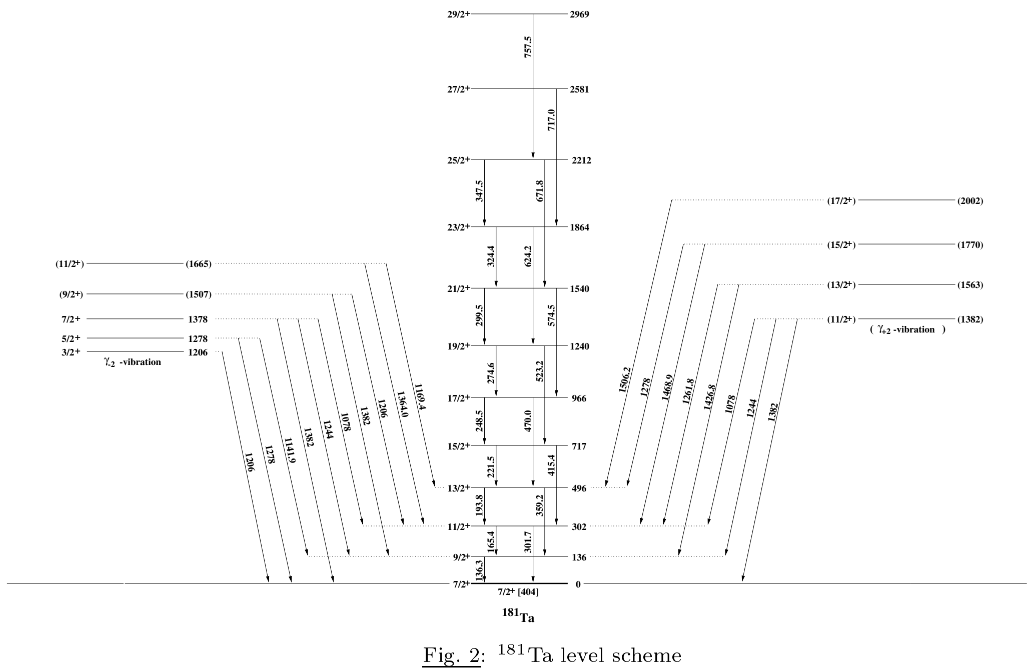

Fig. 2: ^{181}Ta level scheme

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