In-beam Spectroscopy of ^{231}Pa ◇

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The level structure of ^{231}Pa, investigated in different experiments in Munich, Bonn and at the Niels Bohr Institute Tandem Accelerator Laboratory (NBITAL), Denmark, was compared with model calculations [1–3]. Two low-lying opposite-parity bands based on the $K^\pi = 1/2^\pm$ states were observed and followed up to spins $31/2^-$ and $21/2^+$, respectively. From the E1/E2 branching ratios the intrinsic electric dipole moment was determined to be $|D_0| \approx 0.04\ e{\cdot}\mathrm{fm}$. Weak Coulomb excitation of other bands was established, but experimental uncertainties are large for weak transitions. Calculations were performed in the framework of the quasiparticle + phonon model [4]. To verify proposed assignments to bands, a $\gamma\gamma$ matrix with good statistics is needed.

The Coulomb-excitation experiments were performed at NBITAL with a 255,260MeV ^{58}Ni beam (30-120nA) using a 105μg/cm^2 ^{231}Pa-oxide target on a 12μg/cm^2 carbon backing. To suppress reaction gammas from the backing and background from the radioactive target a particle coincidence on the backscattered projectiles with good time resolution is required. A new PIN-diode particle detector inside the NORDBALL target chamber was installed for this purpose [5,6].

In the online γ-γ-particle spectra accumulated during a week of beamtime in December 1995 states up to the 31/2- state can be identified, fig. 1.

The background due to random coincidences with gammas from the decay of ^{231}Pa was reduced compared to earlier experiments. A detailed evaluation of the particle-γ-γ coincidences is in progress.

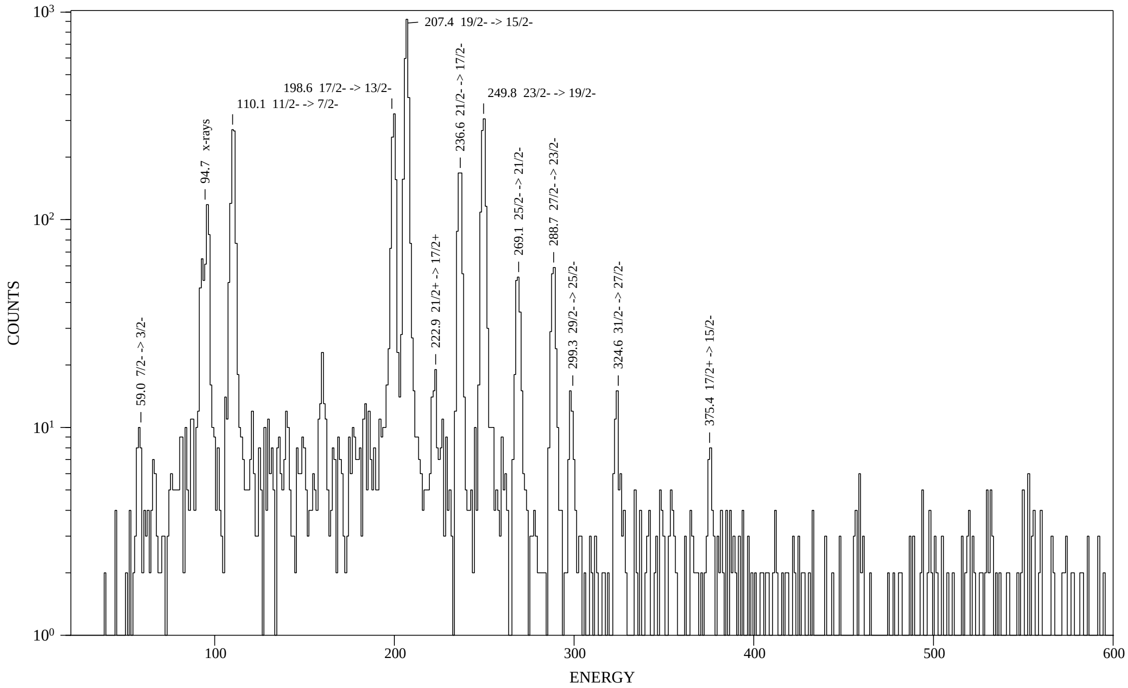

Fig. 1: Doppler corrected spectrum ^{231}Pa + (260MeV) ^{58}Ni Coulex gated on 158.3 or 160.0 keV

References

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