Spectroscopy of ^{127}Te Using the Polarized Deuteron Beam

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The Te nuclei with two protons beyond the closed shell Z=50 span a wide transitional region of N=50–82 allowing to investigate the evolution of the main nuclear structures when the number of valence neutrons is gradually changed. A long chain of available odd-A tellurium isotopes provides a good test for the IBFM description in the wide transitional region from SU(5) limit (anharmonic vibrator) to O(6) (gamma unstable oscillator). Continuing our systematic studies [1–3] of odd-A Te nuclei we performed measurements of the ^{126}Te($\vec{\mathrm{d}}$,p)^{127}Te reaction at E_d = 20 MeV. A polarized deuteron beam (200 nA on target) of the Munich tandem accelerator was used. The target consisted of 140 μg/cm^2 enriched ^{126}Te (97.8%) evaporated on 4.6 μg/cm^2 carbon backing. The reaction products were analyzed with the Q3D magnetic spectrograph and detected in the 1.8 m long focal plane detector which covered an excitation range up to 3.7 MeV.

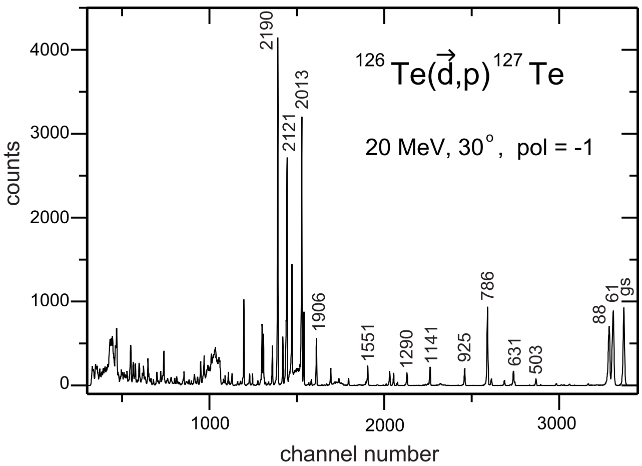

Fig. 1: An example of the ^{126}Te($\vec{\mathrm{d}}$,p)^{127}Te spectra measured at the Q3D spectrograph. The prominent peaks are marked by their energy in keV.

Spectra (fig.1) at two polarizations have been measured at angles between 12.5° and 45° which will enable us to assign spin and parity unambiguously (see fig.2). The observed energy levels have a better resolution (about 5 keV) then in previous studies [4]. The investigations will be complemented with the measurements of thermal-neutron capture gammas at Řež near Prague.

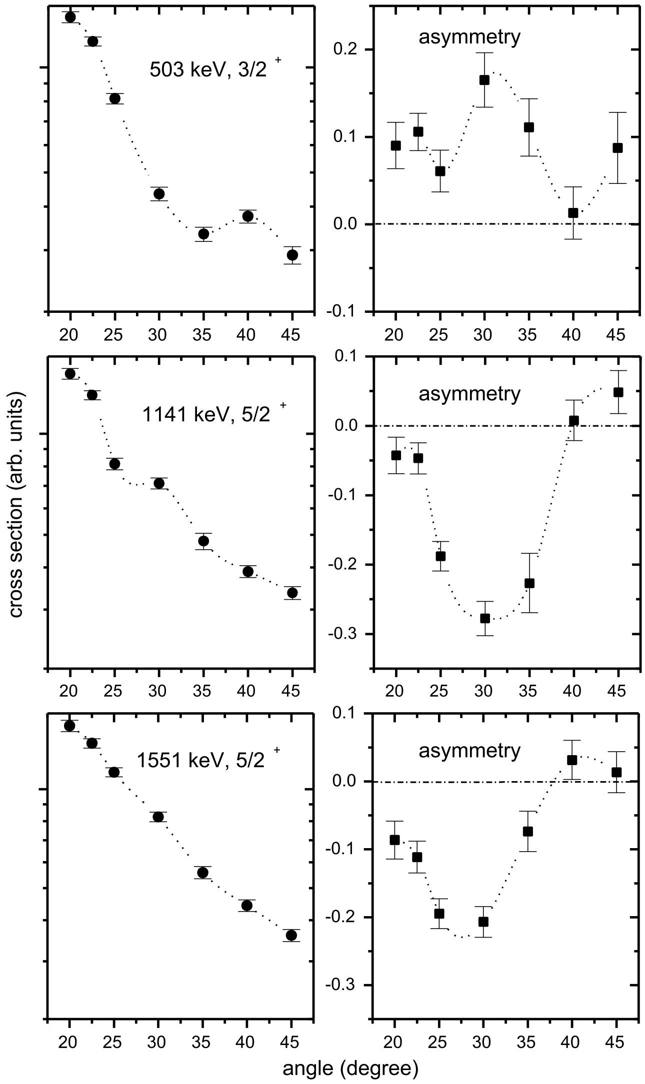

Fig. 2: Examples of angular distributions. (Note: The curves only join the experimental points.)

References

[1] V. Bondarenko *et al.*, Jahresbericht 1996, p. 24

[2] D. Bucurescu *et al.*, this report p.17

[3] H.-F. Wirth *et al.*, this report p.19

[4] A. Graue *et al.*, Nucl. Phys. **A120** (1968) 493