GAMMA-RAY SPECTROSCOPY OF $^{120-130}$Te NUCLEI

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Structure of the even $^{120-130}$Te nuclei have been investigated with prompt gamma-ray spectroscopy following the $^{122-126,nat}$Te(n,n'γ) reactions and the (α,2nγ)^{120,124,126}Te reactions. Gamma-ray excitation functions, angular distributions, $\gamma\gamma$-coincidences, and Doppler shifts have been measured. Level schemes have been constructed to approximately 3.3 MeV excitation energy, and spectroscopic information including level spins and parities, branching and multipole-mixing ratios, and lifetimes have been extracted.

Three different types of structure are thought to play an important role in these low-lying excitations. These are: collective, two-particle, and 4p-2h intruder excitations. Because there are seven stable even-even Te nuclei, the evolution of these excitation modes over this wide range in neutron number is investigated.

Level sequences and transition rates obtained from these measurements are compared to IBM-2 model calculations both with and without intruder-state mixing by Rikovska et al. (1), and to particle-vibrational coupling model calculations by Lopac (2). The IBM-2 model calculations with intruder mixing well reproduce the level energies in the low-mass Te; however, examination of the electromagnetic transition rates reveals that there is no clear improvement in the description of these nuclei by adding the intruder configurations. Additionally, no evidence of the 2^+ mixed-symmetry strength is observed in the 2_3^+ and 2_4^+ levels in these nuclei. The particle-vibration model calculations appear to do a good job describing both the level scheme and the transition rates in the heavier nuclei investigated.

References:
(1) J.Rikovska,N.J.Stone,P.M.Walker,W.B.Walters, Nucl. Phys. A505 (1989) 145.
(2) V.Lopac, Nucl. Phys. A155 (1970) 513.

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