
LONG LIVED ISOMERIC SPECIES AROUND $N = 152$ DEFORMED SHELL GAP.

M Sainath, K Vijay Sai, K Venkataramaniah, P C. Sood

Department of Physics, Sri Sathya Sai Institute of Higher Learning, Prasanthinilayam (AP) - 515134, INDIA.

In an early survey of long-lived ($t > 1$ sec) isomers in deformed nuclei, Sood and Sheline [1] found that such isomers are rarely seen in odd-mass actinides, whereas they are quite frequent in odd-odd heavy nuclei, with no isomeric transition (IT) observed in many cases. This latter feature makes the relative energy placement of isomer uncertain. This problem was addressed in a number of detailed structure studies [2-4]. These continuing investigations use the observed Nilsson single particle energies from odd-A neighbours [5] as input data into a realistic modeling of odd-odd spectra [2]. Our recent analysis of 250 Md level structures [6] revealed several interesting features and also provided pointers that led to the present study. An examination of the single particle level spacings in the region [5] shows large gaps at neutron numbers 150 and 152, and corresponding proton gaps at $Z = 92, 96$ and 100. With the observed neutron orbital spins $7/2$ and $9/2$ for $N = 149$ and $N = 151$ isomers respectively, and the corresponding proton spin being $5/2$ or above in most of the cases, we expect isomer pairs with change in angular momentum of 5 units or more, and hence no observable IT, in almost all the odd-odd transuranic nuclei. Presently only 5 such pairs are identified [7] albeit with no unambiguous configurations or relative placement. Using the procedure adopted in our recent 250 Md study [6] we report here the results of our investigations of the 24 expected isomeric species, mostly awaiting identification, in the odd-odd nuclei of this mostly unexplored frontier region.

1. P.C. Sood and R.K. Sheline, Nucl. Instr. Methods B24/25 (1987) 473
2. P.C. Sood and R.N. Singh, Nucl. Phys. A373 (1982) 519; Z. Phys. A314 (1983) 219.
3. P.C. Sood, Phys. Rev. C29 (1984) 1556; Phys. Scripta 29 (1984) 540; Rad. Eff. 95 (1986) 115
4. P.C. Sood, D.M. Headly, R.K. Sheline and R.W. Hoff, At. Data Nucl. Data Tables 58 (1994) 167
5. A.K. Jain, R.K. Sheline P.C. Sood and K. Jain, Rev. Mod. Phys. 62 (1990) 393
6. P.C. Sood, M. Sainath and K. Venkataramaniah, Int. J. Mod. Phys. E9 (2000) 309
7. J.K. Tuli, Nuclear Wallet Cards, 6th ed. (NNDC, Brookhaven, 2000)