Int. Workshop “Shapes and Dynamics of Atomic Nuclei: Contemporary Aspects”
ed. Nikolay Minkov, Heron Press, Sofia 2017

Quadrupole-deformation driven splitting of the $7/2^+ - 9/2^+$ doublet in silver nuclei

S. Lalkovski

Department of Nuclear Engineering, Faculty of Physics, University of Sofia ”St. Kl. Ohridski, Sofia 1164, Bulgaria

Abstract

The neutron-rich silver nuclei represent an interesting laboratory for testing of different nuclear models. Being three proton holes away from the magic thin nuclei, they present an excellent ground for testing of the Nuclear Shell model [1]. Indeed, in the past, the $j-1$ anomaly has been initially interpreted as a manifestation of the $\pi g_{9/2}^{-3}$ coupling scheme [2], which is a straight forward application of the spherical shell model. However, neither the experimental (j)-$(j-1)$ multiplet splitting nor the electromagnetic transition strengths have been effectively reproduced within this approach, which suggests that collective degrees of freedom may also play a role at the low energy part of the spectrum. Indeed, the neutron (50,82) mid shell silver nuclei have a relatively large number of valence particles, which is a prerequisite for development of quadrupole deformation. Isotopes of the neighbouring Cd and Pd elements with similar number of valence bosons, for example, are known to exhibit a more vibration-like or even transitional structure [3]. In search for collective effects in the low-energy part of the silver spectra, a number of model calculations have been performed in the past, with Axially symmetric Rotor-plus-Particle Model [4], Traixial-Rotor-plus-Particle Model, [5], Three-Valence-Particle-Cluster-plus-Vibrational Core model [6] being only few of them. In general, they give a better description of the low-lying positive-parity excited states, suggesting that to some extent quadrupole deformation is developed there. The present contribution will address this problem via a more extensive evaluation and interpretation of contemporary nuclear data.

References

[1] S.Lalkovski *et al.*, *Physical Review C* **87** (2013) 034308.
[2] L.S.Kisslinger, *Nuclear Physics* **78** (1966) 341.
[3] S.Lalkovski and P. van Isacker, *Physical Review C* **79** (2009) 044307.
[4] V.Popli, *et al. Physical Review C* **20** (1979) 1350.
[5] A.W.B.Kolshoven *et al.*, *Nuclear Physics A* **315** (1979) 334.
[6] V.Paar, *Nuclear Physics A* **211** (1973) 29.