$j-1$ anomalous states in silver nuclei*

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The $j-1$ anomaly observed in some silver nuclei has attracted significant experimental and theoretical interest [1-5] in the last 60 years. The anomaly is expressed by the unusual ordering of the j and $j-1$ states arising from the spherical shell model j^{-3} multiplet, split under unusually strong $Q.Q$ residual interaction [5]. In the mass regions placed away from doubly magic nuclei, the $j-1$ levels appear in energy below the respective j states. The effect is most prominent in the silver isotopic chain where the $(7/2^+, 9/2^+)$ doublet arises from $\pi g_{9/2}^{-3}$ configuration, but it is not unique for silver nuclei. It is also observed in other systems with pure three-holes configurations. In these nuclei, the splitting $\Delta E = E_{j-1} - E_j$ and the E_{2^+} core energies of the neighbouring even-even nuclei are correlated [6]. Indeed, such a correlation is well pronounced in the (28,50) neutron and proton shells, and to a lesser extent in the lower and higher (20,28) and (50, 82) shells.

In order to further study [7,8] the nature of the anomaly and the evolution of the lowest energy states of the $\pi g_{9/2}^{-3}$ multiplet we have further examined ^{115}Ag data from a ^{252}Cf source spontaneous fission experiment. This isotope is one of the silver nuclei with best pronounced anomalous $(j, j-1)$ ordering. In addition, we have performed lifetime measurements on ^{103}Ag which is the 'turning point' of the $j-1$ anomaly in the silver isotopic chain. The new results will be discussed in the framework of empirical single-j Shell Model, Rigid-Triaxial Rotor plus Particle Model and Interacting Boson-Fermion Model calculations.

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