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# Anomalous B4/2 ratio in the yrast band of 167Os

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Spectroscopic properties of exotic nuclei are powerful tools to obtain a better insight on the evolution of nuclear structure far from the stability. Mid-shell nuclei are expected to exhibit collective behaviour which is typically reflected in the observation of low excitation energies of the first excited states and high transition probabilities. Moreover, the collectivity is expected to increase with the spin, causing both the $R_{4/2} = E_X(4^+)/E_X(2^+)$ to be higher than 2 and the $B_{4/2} = B(E2; 4^+ \rightarrow 2^+)/B(E2; 2^+ \rightarrow 0^+)$ to be higher than the unit.

However, an increasing number of mid-shell nuclei had been found to present a $B_{4/2} < 1$. This has already been observed in two neutron-deficient regions, one located close to the $Z = 50$ shell closure and one in the rare-earth region.

In particular, the osmium isotopic chain presents cases both in even-even nuclei, such as $^{168,170}$Os, and one in an even-odd nucleus, $^{169}$Os, where the $B_{4/2}$ ratio has been redefined as $B(E2; 21/2^+ \rightarrow 17/2^+)/B(E2; 17/2^+ \rightarrow 13/2^+)$. According to theory, this anomaly could only be explained by a change from collective to seniority-like regimes or by phenomena such as shape coexistence. However, this change in structure has not been predicted by theory in the osmium isotopic chain, which remains an open question.

In this context, lifetime measurements of the excited states of these nuclei can provide a meaningful insight on the structure of the low-lying bands.

An experiment aimed at performing lifetime measurements in $^{167}$Os was performed at the Accelerator Laboratory of Jyv\"askyl\"a (Finland), where the nucleus of interest was populated in a fusion- evaporation reaction. The selection of the channel was performed using the alpha-recoil tagging technique and the gamma rays emitted by the recoil were detected using the Jurogam3 array. The lifetimes were extracted using the Recoil Distance Doppler Shift method.

From the measured lifetimes, it was possible to extract the reduced transition probabilities of the low-lying states and the $B_{4/2}$ ratio. The experimental results were then compared to potential energy surface calculations in order to shed light on the role of the unpaired neutron. In this contribution, a summary of the performed experiment, the new results and the comparison with theory are presented.

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