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Onset of the j-1 anomaly in ^{103}Ag

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Abstract

The $j-1$ anomaly stems from an atypical ordering of the $7/2^+$ and $9/2^+$ nuclear states, which arises from the $\pi g_{9/2}^{-3}$ multiplet. While the standard nuclear shell model dictates that $M1$ transitions between states of the same-j multiplet are strictly forbidden, these transitions are experimentally observed in odd-A silver (Ag) isotopes. Investigating $M1$ transition strengths is therefore of utmost interest. To date, experimental lifetime data within these isotopes are exclusively available for ^{101}Ag, a nucleus that lacks the anomalous trend characteristic of its heavier counterparts. Instead, the $j-1$ anomaly first manifests in ^{103}Ag, making it the lightest silver isotope to exhibit this behavior. Consequently, this study focuses on ^{103}Ag, presenting new lifetime measurements obtained via the recoil-distance Doppler-shift (RDDS) method. The resulting reduced electromagnetic transition probabilities are evaluated and compared with both empirical and large-scale shell-model calculations.