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New evidence on the $B_{4/2}$ anomaly in Te isotopes through precise lifetime measurements in the ps range

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Abstract

In standard collective models, the $B_{4/2}$ = B(*E2;* $4^+ \rightarrow 2^+$) / B(*E2;* $2^+ \rightarrow 0^+$) reduced transition probability ratio typically fluctuates between the vibrational (2.0) and rotational (1.43) limits, consistently maintaining values above unity. Experimentally, however, a handful of ”anomalous” cases where $B_{4/2} \leqslant 1$ have been observed scattered across the nuclear chart [1]. A prominent example is ^{114}Te [2]: despite its energy levels indicating a clear vibrational character, its $B_{4/2} \leqslant 1$ ratio challenges current theoretical explanations [2, 3].

To systematically investigate the presence of this anomaly within the Te isotopic chain, lifetime measurements were recently performed for $^{113-116}$Te [4,5]. These experiments were carried out at the 9 MV Bucharest Tandem accelerator using the Recoil Distance Doppler Shift (RDDS) technique combined with the high-resolution γ-ray spectroscopy capabilities offered by the ROSPHERE array [6]. This setup enabled the extraction of lifetimes for the 2^+ and 4^+ states in the even-even Te isotopes, as well as their $15/2^-$ and $19/2^-$ counterparts in

neighboring odd-A nuclei. The results are discussed in terms of nuclear triaxiality and placed in a broader context across the nuclear chart.

References

[1] R.B. Cakirli, R.F. Casten, J. Jolie, N. Warr, *Phys. Rev. C* **70** (2004) 047302.

[2] O. Möller, N. Warr, J. Jolie, A. Dewald, A. Fitzler, A. Linnemann, K.O. Zell, P.E. Garrett, S.W. Yates, *Phys. Rev. C*, **71** (2005) 064324

[3] E.A. Cederlöf, et al., *Phys. Rev. C* **113** (2026) 054312.

[4] S. Pascu, et al., *Phys. Rev. C* **112** (2025) 024312.

[5] S. Pascu, et al., *Phys. Rev. C* **113** (2026) 034314.

[6] D. Bucurescu, et al., *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* **837** (2016) 1.