

Lifetime measurement of low-lying yrast states of $^{170}\text{W}^*$

K.E. Ide¹, V. Werner¹, A. Goasduff^{2,3}, J. Wiederhold¹, P.R. John¹, D. Bazzacco³, M. Beckers⁴, J. Benito⁵, M. Berger¹, D. Brugnara^{2,3}, M.L. Cortés³, L.M. Fraile⁵, C. Fransen⁴, A. Gozzelino³, E.T. Gregor³, A. Illana³, J. Jolie⁴, L. Knafla⁴, R. Menegazzo³, D. Mengoni^{2,3}, C. Müller-Gatermann^{4,6}, O. Papst¹, G. Pasqualato⁷, C.M. Petrache⁸, N. Pietralla¹, F. Recchia^{2,3}, D. Testov^{2,7}, J.J. Valiente-Dobón³, and I. Zanon^{2,3,9}

¹*Technische Universität Darmstadt, Physics Department,
Institute for Nuclear Physics, Darmstadt, Germany*

²*Dipartimento di Fisica dell'Università di Padova, Padova, Italy*

³*INFN, Laboratori Nazionali di Legnaro, Legnaro (Padova), Italy*

⁴*Universität zu Köln, Institute for Nuclear Physics, Cologne, Germany*

⁵*Grupo de Física and IPARCOS, Universidad Complutense de Madrid, Madrid, Spain*

⁶*Physics Division, Argonne National Laboratory, Lemont, Illinois, USA*

⁷*INFN, Sezione di Padova, Padova, Italy*

⁸*CNRS/IN2P3, Université Paris-Saclay, Orsay, France and*

⁹*Dipartimento di Fisica, Università di Ferrara, Ferrara, Italy*

Recent experiments in the region of the hafnium and tungsten isotopic chains have shown a change in the mean lifetimes of the first 2^+ states in comparison to the previously measured values due to enhanced experimental techniques. The results show an increase of the $E2$ decay rate of the $2_1^+ \rightarrow 0_1^+$ transition in the tungsten isotopic chain between $N = 114$ and $N = 98$ and a significant drop in the transition probability at $N = 96$, hence, ^{170}W . Such a drop is not seen in the neighboring isotopic chains raising some doubts on the validity of the data. In addition, the mean lifetimes of the low-lying yrast states of ^{170}W have not been measured with similar modern techniques [1,2]. An experiment to measure the low-lying level lifetimes of ^{170}W ($N = 96$) with the recoil distance Doppler-shift (RDDS) method was therefore performed at Laboratori Nazionale di Legnaro (LNL). For the experiment the GALILEO array [3], consisting of 24 HPGe detectors placed at 5 different detector ring angles, and the GALILEO plunger device [4] were used. Mean lifetimes for the low-lying yrast states were obtained by using γ - γ coincidences and the differential decay curve method (DDCM). The resulting $E2$ transition probabilities are compared to calculations within the confined β -soft (CBS) rotor model [5]. The CBS calculation which reproduces the confirmed $B(E2; 2_1^+ \rightarrow 0_1^+)$ value might suggest a structure close to X(5) [6].

[1] C. Michel *et al.*, Z. Physik A **298** (1980) 213.

[2] F. K. McGowan *et al.*, Nucl. Phys. A **580** (1994) 335.

[3] A. Goasduff *et al.*, Nucl. Instrum. Meth. A **1015** (2021) 165753.

[4] C. Müller-Gatermann *et al.*, Nucl. Instrum. Meth. A **920** (2019) 95.

[5] N. Pietralla and O. M. Gorbachenko, Phys. Rev. C **70** (2004) 011304.

[6] F. Iachello, Phys. Rev. Lett. **87** (2001) 052502.