Measurement of absolute $E2$ transition strengths in ^{176}W: Signatures for a rapid shape change*

Christoph Fransen[1], Alfred Dewald[1], Gunnar Friessner[1], Matthias Hackstein[1], Jan Jolie[1], Oliver Möller[2], Thomas Pissulla[1], Wolfram Rother[1]1, Karl-Oskar Zell[1]
[1] Institut für Kernphysik, Universität zu Köln, Zülpicher Strasse 77, 50937 Cologne, Germany
[2] Institut für Kernphysik, Technische Universität Darmstadt, Schlossgartenstrasse 9, 64289 Darmstadt, Germany

The X(5) symmetry describes nuclei at the critical point of the shape phase transition from axially deformed rotor nuclei to spherical vibrators [1]. ^{150}Nd, ^{152}Sm, and ^{154}Gd were the first nuclei where the predicted charateristics of the X(5) symmetry were observed (see, e.g., [2]). Later it was shown that also ^{176,178,180}Os can be successfully described with the X(5) symmetry [3].

In the close vicinity of shape phase transitions one expects strongly changing nuclear shapes. In the X(5) region around A=150 this was observed for nuclei with different neutron numbers, whereas in the X(5) region around A=180 this is to be expected for different proton numbers. The aim of the work presented here is the confirmation of a rapid shape change for nuclei close to ^{178}Os. Besides the knowledge on the level scheme of the nuclei of interest, especially absolute $E2$ transition strengths are crucial for the interpretation of nuclear structure. Prolate deformation is expected for ^{176}W. Thus we performed a recoil distance Doppler shift (RDDS) measurement on ^{176}W to measure $E2$ transition strengths from level lifetimes. The experiment was performed at the Cologne FN Tandem accelerator with the Cologne coincidence plunger with the reaction ^{169}Dy(^{16}O,4n)^{176}W and a beam energy of 80 MeV. We will present our experimental results and relate them to data on the neighboring nuclei ^{178}Os and ^{182}Pt. The results will be discussed in the framework of nuclear shape transitions in this mass region and compared to calculations with both the Interacting Boson Model (IBM) and the GCM.

* This work is supported by the Deutsche Forschungsgemeinschaft, grant No. De 1516/-1
[1] F. Iachello, Phys. Rev. Lett. **87**, 052502 (2001).
[2] E.A. McCutchan, N.V. Zamfir, R.F. Casten, Phys. Rev. C **71**, 034309 (2005).
[3] A. Dewald, *et al.*, J. Phys. (London) **G 31**, S1427 (2005).