Researchers observe transverse wobbling bands in neodymium-136

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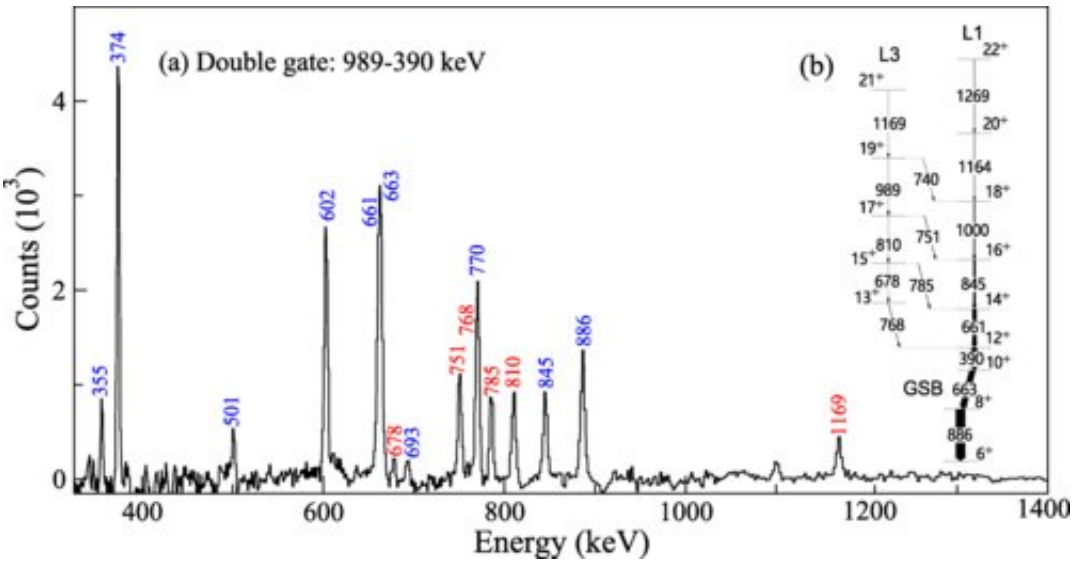

Figure 1. (a) Double-gated spectrum on the 989- and 390-keV transitions showing the transitions in bands L1 and L3. The transitions of the ground state band and of band L1 are indicated in blue, while the transitions of band L3 are in red. The transitions in green are from other bands of ^{136}Nd/ [39] (355 keV between bands L1 and N1, 501 keV in band N1, and 693 keV between bands N1 and GSB). (b) Partial level scheme of ^{136}Nd relevant for the present work. Credit: *Physical Review C* (2022). DOI: 10.1103/PhysRevC.105.034302

Researchers from the Institute of the Modern Physics (IMP) of the Chinese Academy of Sciences (CAS) and their collaborators from France, Finland, Romania and other countries have recently observed the transverse wobbling bands at the medium spin region of

neodymium-136. The results have been published in *Physical Review C*.

The wobbling motion is a clear fingerprint of stable triaxial shapes of nuclei. Since the transverse wobbling motion was first proposed by theoretical physicists in 2014, numerous studies have been performed. However, barium-130 is the only reported transverse wobbler in even-even nuclei until now. Very little is known about this phenomenon.

In this study, researchers proposed to search for the other transverse wobbler in even-even nuclei of the A~130 mass region. The experiment was carried out using the JUROGAM II + RITU + GREAT array at the University of Jyvaskyla, Finland. Equipped with 24 Clover detectors and 15 tapered detectors, the JUROGAM II spectrometer can collect very high statistics, which ensures the precision measurement of linear polarization.

Researchers found that the measured experimental information on two medium spin bands of neodymium-136 clearly indicates their transverse wobbling character. To further investigate the nature of these bands, a Romanian theory scientist developed a new particle-rotor model, with which he obtained results that are in very good agreement with experimental results, thus confirming the transverse wobbling character of the bands.

The study provides the second case of a transverse wobbler in even-even nuclei, which furthers our understanding of the existence of stable triaxiality at medium spin in nuclei.

More information: B. F. Lv et al, Experimental evidence for transverse wobbling bands in ^{136}Nd, *Physical Review C* (2022). DOI: 10.1103/PhysRevC.105.034302

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