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Exploring triaxiality in neutron-rich 112,114Mo isotopes using beta-delayed gamma-ray spectroscopy at RIKEN RIBF

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The gamma band of even-even deformed nuclei has traditionally been interpreted as a vibrational band related to the triaxial vibration of an axially symmetric deformed shape. However, recent theoretical studies suggest that typical gamma bands can be interpreted as a triaxial rotor with a weakly triaxial shape [1]. Neutron-rich Mo isotopes provide an excellent opportunity to explore triaxiality, as their low-lying second 2^+ states are comparable in energy to the first 4^+ state and can be interpreted using various models, including the rigid-triaxial rotor, gamma-unstable nuclei, and gamma vibration [2]. In this case, not only the band head of the gamma band but also the energies of the band members are important to distinguish between several pictures.
In the present study, we investigated the deformation evolution of neutron-rich Mo isotopes with mass numbers 112 and 114 using β-delayed γ-ray spectroscopy at RIKEN RIBF using the Ge cluster EURICA and fast timing array FATIMA. The level scheme of ^{112}Mo was constructed from the gamma-gamma coincidences and energy matching information. The lifetime of the first 2^+ state in ^{112}Mo was measured. Our results reveal a gradual decrease in quadrupole deformation as a function of mass number. The gamma band with $K^\pi = 2^+$ and the $K^\pi = 4^+$ state were observed in ^{112}Mo. A very small odd-even energy staggering observed in the gamma band indicates an axially symmetric rotation of the band head, which is not reproduced by the five-dimensional collective Hamiltonian calculation using the SLy5+T interaction.
In this conference, we will present the experimental and theoretical results, including a discussion on our attempts to reproduce the gamma band by changing the effective interaction. We will also discuss an indication for the modification of the pairing strength in neutron-rich Mo isotopes.

[1] T. Otsuka, Y. Tsunoda, Y. Utsuno, et al., arXiv preprint arXiv:2303.11299 (2023).
[2] J. Ha, T. Sumikama, F. Browne, et al., Phys. Rev. C 101, 044311 (2020).

Primary authors: Prof. BRUCE, Alison (University of Brighton); Dr BROWNE, Frank (University of Manchester); Dr HA, Jeongsu (CENS, IBS); Dr HINOHARA, Nobuo (University of Tsukuba); Prof. WALKER, Phil (University of Surrey); Prof. CHOI, Seonho (Seoul National University); Dr SUMIKAMA, Toshiyuki (RIKEN Nishina Center)

Co-author: FOR THE RIBF26 COLLABORATION

Presenter: Dr SUMIKAMA, Toshiyuki (RIKEN Nishina Center)

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