



Contribution ID: 91

Type: Oral

## Microscopic aspects of $\gamma$ -softness in atomic nuclei

Thursday, 20 July 2023 17:00 (15 minutes)

How the collective features emerge from the microscopic degrees of freedom is one of the main research themes in quantum many-body systems. Using the microscopic approach of the triaxial projected shell model (TPSM), the authors demonstrate that admixing few quasiparticle excitations into the vacuum configuration with a fixed triaxiality parameter  $\gamma$  provides a quantitative description of the shape fluctuations of the  $\gamma$ -soft nuclei.

This is demonstrated by a detailed study of  $^{104}\text{Ru}$ , which reproduces a large set of experimental energies and  $BE2$  matrix elements measured by COULEX [1].

The collective features are elucidated using the quadrupole shape invariant analysis, and also the staggering phase classification of the  $\gamma$ -band. A systematic study of twenty-two nuclei has been carried out by means of the TPSM. The experimental energies of the yrast bands and  $\gamma$  bands as well as the pertaining experimental  $B(E2)$  values for intra and inter band transitions are very well reproduced. The signatures of triaxiality softness, as the position of the  $2_2^+$  state relative to the  $4_1^+$  state, the energy staggering of the  $\gamma$  band, the position of the  $0_2^+$  state and its  $E2$  decay are discussed.

[1] N. Nazir et al. Phys. Rev. C 107, L021303 (2023)

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**Session Classification:** Session 13A

**Track Classification:** Theoretical Nuclear Structure