

Effects of the shape on the formation and decay properties of the ^{229m}Th isomer (remote)

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It will be shown within a relatively simple nuclear structure model framework [1] that the formation of the 8 eV “clock” isomer ^{229m}Th may be the effect of single-neutron levels quasi-degeneracy stemming from a specific quadrupole octupole shape of the nucleus. The very fine interaction between collective and single-particle modes within narrow limits in the deformation space rather unambiguously determines the isomer formation conditions with the attendant B(M1), B(E2) decay rates and magnetic dipole moment in the isomeric state. Estimates based on a comprehensive model analysis of these isomer characteristics will be discussed. It will be shown that the approach used provides a clear protocol for the search, prediction and identification of low-energy excitations in other nuclei opening a way to study similar effects and phenomena on the border between nuclear and atomic physics.

References

[1] N. Minkov and A. Palffy, Phys. Rev. Lett. **118**, 212501 (2017); Phys. Rev. Lett. **122**, 162502 (2019); Phys. Rev. C **103**, 014313 (2021).

Presenter: MINKOV, Nikolay (INRNE, Sofia, Bulgaria)

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