

Electromagnetic Properties of the ^{229m}Th Isomer

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We study the magnetic and electric radiative decay properties of the 7.8 eV ^{229m}Th isomer within a model of nuclear collective quadrupole-octupole and single particle (s.p.) motions with Coriolis interaction [1]. We examine a number of possible values for the magnetic dipole moment (MDP) in the $K = 5/2^+$ ground and the $K = 3/2^+$ isomeric states based on the s.p. wave functions obtained for the unpaired neutron in both states under various model conditions. While the MDP values obtained for the ground state corroborate the experimental data the values obtained for the isomer state show certain deviation from the corresponding experimental estimations. We discuss the possible ways to minimize the discrepancies in order to describe the electromagnetic characteristics of the ^{229m}Th isomer with a high enough accuracy. This is of special importance regarding the current efforts for establishing of a new frequency standard referred to as a “nuclear clock”.

References

- [1] N. Minkov and A. Pálffy, Phys. Rev. Lett. **118**, 212501 (2017); arXiv:1704.07919 [nucl-th] (2017).