Magnetic Moments in Odd-A Isotopes and Coupling of Particles with the Zero-Point Motion

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The coupling of the last nucleon in odd-A nuclei with configurations in the ground state of the even-even core is known to augment the single quasiparticle fragmentation pattern [1]. In a recent experimental study by Yordanov *et al*. [2] the values of the magnetic dipole and electric quadrupole moments of the $11/2^-$ state in a long chain of Cd isotopes were found to follow a simple trend which we attempt to explain by means of incorporating higher order correlations in the ground state. A particular attention is given to the impact of the long-range ground state correlations on the magnetic moments in Cd isotopes. In order to evaluate if the additional correlations have bearing on the magnetic moments we employ an extension to the quasiparticle-phonon model (QPM) which takes into account quasiparticle$\otimes$phonon configurations in the ground state of the even-even core to the structure of the odd-A nucleus wave function. Its effects on the spin core polarization and on the probabilities of the magnetic transition between complex configurations are debated. It is shown that the estimates for the magnetic moments which this extension yields deviate further from the Schmidt values and bring the results closer to the measured values.

References

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[2] D. T. Yordanov et al., Phys. Rev. Lett. 110, 192501 (2013)