On the moment of inertia of a quantum harmonic oscillator

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Abstract

An original method for calculating the moment of inertia of the collective rotation of a nucleus on the basis of the cranking model with the harmonic-oscillator Hamiltonian at arbitrary frequencies of rotation and finite temperature is proposed. In the adiabatic limit, an oscillating chemical-potential dependence of the moment of inertia is obtained by means of analytic calculations. The oscillations of the moment of inertia become more pronounced as deformations approach the spherical limit and decrease exponentially with increasing temperature. © 2013 Pleiades Publishing, Ltd.