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Oscillations of the inertia moment of a finite Fermi system in the cranking model framework

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Abstract

In the framework of the cranking model with the potential of an anisotropic harmonic oscillator, we rigorously calculate how the moment of inertia of a finite Fermi system depends on the chemical potential at finite temperatures in the adiabatic limit analytically. We show that this dependence involves smooth and oscillating components. We find analytic expressions for these components at arbitrary temperatures and axial deformation frequencies. We show that oscillations of the moment of inertia increase as the spherical limit is approached and decrease exponentially as the temperature increases. © 2013 Pleiades Publishing, Ltd.

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Keywords

anisotropic quantum harmonic oscillator, finite Fermi system, forced rotation model, Mellin transformation, moment of inertia of the nucleus