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Microscopic Mechanism of Large Fluctuation in Odd-Even Differences in Moments of Inertia for Actinide Nuclei

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Abstract: The experimental large fluctuation in odd-even differences in moments of inertia of deformed actinide nuclei is investigated using the particle-number conserving (PNC) method for treating the cranked shell model with monopole and quadrupole pairing interactions. PNC calculations show that the large odd-even difference in moments of inertia mainly comes from the interference contributions $j(\mu\nu)$ from particles in high j intruder orbitals μ and ν quite near the Fermi surface, which have no counterpart in the BCS formalism. The effective monopole and quadrupole pairing interaction strengths are determined to fit the experimental odd-even differences in binding energies and bandhead moments of inertia. The experimental results for the variation of moments of inertia with rotational frequency ω are reproduced well by the PNC calculation. The nearly identical experimental moments of inertia between ^{236}U(gsb) and ^{238}U(gsb) at low frequencies $\hbar\omega \leqslant 0.20$ MeV are also reproduced quite well.

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Key words: odd-even differences in moments of inertia, cranked shell model, particle-number conserving treatment

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