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Structure of Hamiltonian Matrix and the Shape of Eigenfunctions: Nuclear Octupole Deformation Model

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Abstract: The structure of a Hamiltonian matrix for a quantum chaotic system, the nuclear octupole deformation model, has been discussed in detail. The distribution of the eigenfunctions of this system expanded by the eigenstates of a quantum integrable system is studied with the help of generalized Brillouin-Wigner perturbation theory. The results show that a significant randomness in this distribution can be observed when its classical counterpart is under the strong chaotic condition. The averaged shape of the eigenfunctions fits with the Gaussian distribution only when the effects of the symmetry have been removed.

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