

De Pace, A.; Molinari, A.; Weidenmüller, H. A.

Doorway states in the random-phase approximation. (English) Zbl 1360.81047
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Summary: By coupling a doorway state to a sea of random background states, we develop the theory of doorway states in the framework of the random-phase approximation (RPA). Because of the symmetry of the RPA equations, that theory is radically different from the standard description of doorway states in the shell model. We derive the Pastur equation in the limit of large matrix dimension and show that the results agree with those of matrix diagonalization in large spaces. The complexity of the Pastur equation does not allow for an analytical approach that would approximately describe the doorway state. Our numerical results display unexpected features: The coupling of the doorway state with states of opposite energy leads to strong mutual attraction.

MSC:

81P16 Quantum state spaces, operational and probabilistic concepts
15B52 Random matrices (algebraic aspects)

Keywords:

doorway state; spreading width; random matrices; random phase approximation

Full Text: [DOI](#)

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