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On the microscopic pygmy- and giant resonances theory accounting for complex 1p1h⊗phonon configurations

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An extension of the self-consistent theory of finite Fermi systems [1,2] to the energy region of pygmy- and giant resonances in magic nuclei is performed with the aim to consider particle-hole (ph) and complex 1p1h⊗phonon configurations and to consistently account for the phonon coupling (PC) .
A new equation for the effective field, which determines nuclear polarizability,
has been derived. Quite new PC contributions to the effective field, which are of interest in the energy regions of PDR and GMR, have been obtained. These contributions are the following. 1) The tadpole effect in the standard ph-propagator. In order to calculate dynamic tadpole contributions, it is necessary to solve the equation for the two-phonons creation amplitude or, maybe, to use the known estimations for the tadpole. 2) Two new interactions induced due to phonon exchange in the second ph-channel (in addition to the old phonon-exchange interaction in the first ph-channel) and the phonon-exchange interactions in the pp- and hh-channels, 3) The effects of the first and second variations of the effective interaction in the phonon field. Such an extension allows us to describe on the equal footing both the ground states and the whole region of nuclear excitations up to giant resonances energies (30-35 MeV). The qualitative analysis and discussion of the new terms are performed.

1. A. B.Migdal, Theory of Finite Fermi Systems and Applications to Atomic Nuclei (Nauka, Moscow, 1965; Intersci., New York, 1967).
2. V. A. Khodel and E. E. Saperstein, Phys. Rep. **92**,183 (1982).

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