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ON THE STRENGTH DISTRIBUTION OF ISOSCALAR GIANT MONOPOLE RESONANCE IN MEDIUM-HEAVY SPHERICAL NUCLEI

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Being associated with breathing modes of high-energy nuclear excitations,the Isoscalar Giant Monopole Resonance (ISGMR) is the object of permanent experimental and theoretical studies [1, 2]. In studies of Ref. [2], the detailed theoretical description of ISGMR (together with L=1,2,3) isoscalar GRs) in medium-heavy closed-shell nuclei have been proposed within the semi-microscopic Particle-Hole Dispersive Optical Model (PHDOM). Although this model is not fully self-consistent, it demonstrates unique abilities in describing main characteristics (strength distribution, transition densities, probabilities of direct one-nucleon decay) of various GRs in the above-mentioned nuclei (Refs. [2, 3] and references therein). These abilities appear due to specific features of PHDOM, in which the main relaxation modes of collective (p-h)-type states associated with GRs (Landau damping, coupling these states to single-particle continuum and to many-quasiparticle configurations (the spreading effect)) are together taken into account. In particular, these modes are the main contributors to formation of the GR total width.

In this report, we present a comparison of the strength functions of ISGMR in 48Ca, 90Zr, and 208Pb evaluated within PHDOM [2] and cRPA (continuum-random-phase approximation) with the strength distributions deduced from an analysis of the respective (α,α')-reaction cross sections [4, 5, 6]. In neglecting contribution of pair correlations to formation of the ISGMR strength function (this effect is expected to be weak), a similar comparison is done for open-shell nuclei 58Ni and 120Sn (experimental data are taken from Refs. [5, 6]). As a result, one can conclude that due to the above-mentioned features of PHDOM it is possible within this model to describe reasonably the strength distribution of ISGMR in medium-heavy spherical nuclei. Respective results of other theoretical approaches are also discussed.

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Section

Nuclear structure: theory and experiment

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