

MICROSCOPIC DESCRIPTION OF ISOSCALAR GIANT MONOPOLE RESONANCE IN $^{118-132}\text{Sn}$

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The study of nuclear giant resonances has long been a subject of extensive theoretical and experimental research. The multipole response of nuclei far from the β -stability line and the possible occurrence of exotic modes of excitation present a growing field of research. In particular, the study of the isoscalar giant monopole resonances (ISGMR) in neutron-rich nuclei is presently an important problem not only from the nuclear structure point of view [1] but also because of the special role they play in many astrophysical processes such as prompt supernova explosions [2] and the interiors of neutron stars [3]. One of the successful tools for describing the ISGMR is the quasiparticle random phase approximation (QRPA) with the self-consistent mean-field derived from Skyrme energy density functionals (EDF) [4]. Such an approach can describe the properties of the low-lying states reasonably well by using existing Skyrme interactions. Due to the anharmonicity of the vibrations there is a coupling between one-phonon and more complex states [5]. The main difficulty is that the complexity of calculations beyond standard QRPA increases rapidly with the size of the configuration space, and one has to work within limited spaces. Using a finite rank separable approximation for the residual particle-hole interaction derived from the Skyrme forces one can overcome this numerical problem [6-8]. In the present report, we analyze the effects of phonon-phonon coupling (PPC) on the E0 strength distributions of neutron-rich tin isotopes. Using the same set of the EDF parameters we describe available experimental data for $^{118,120,122,124}\text{Sn}$ [9] and give prediction for $^{130,132}\text{Sn}$ [10]. The effects of the PPC leads to a redistribution of the main monopole strength to lower energy states and also to higher energy tail.

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