

Microscopic Study of Nuclear Monopole Excitations

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A systematic study of the isoscalar giant monopole resonance (ISGMR) in spherical and deformed nuclei from various isotopic chains is performed within the microscopic self-consistent Skyrme HF+BCS method and coherent density fluctuation model. The calculations for the incompressibility in finite nuclei are based on the Brueckner and Skyrme energy density functionals for nuclear matter. The good agreement achieved between the calculated centroid energies of the ISGMR and their recent experimental values for various nuclei demonstrates the relevance of the proposed theoretical approach. The latter can be applied to analyses of neutron stars properties, such as incompressibility, symmetry energy, slope parameter, and other astrophysical quantities.