GIANT RESONANCES IN THE SKYRME-HARTREE-FOCK THEORY

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Self-consistent nuclear models, originally designed for the description of nuclear ground state properties, have found widespread application also for dynamical processes as surface vibrations, fission, heavy-ion collisions or giant resonances. The present talk concentrates on the non-relativistic Skyrme-Hartree-Fock (SHF) model and focuses on its ability to describe nuclear giant resonances. All presently used self-consistent models are based on effective energy-density functionals whose structure is given by theoretical considerations while its parameters are adjusted empirically, usually with respect to a large pool of ground state properties. SHF is based on the Skyrme energy-density functional which has been developed and refined over several decades in order to accommodate more and more aspects of nuclear structure and dynamics. The talk gives an overview of the descriptive power of SHF for giant resonances. It discusses how to estimate uncertainties in the predictions and correlations between peak-frequencies of giant-resonance and ground-state properties. Of particular interest is here the Isovector channel covering the giant dipole resonance excitation and the static properties as dipole polarizability and neutron radius. Finally, the presentation will address a couple of yet unsolved open ends in the SHF description of giant resonances which remain as homework problem for future development.