Hauptvortrag PV XIII Mi 10:00 RW 1

New modes of low-energy excitations — •Nadia Tsoneva[1,2] and Horst Lenske[1] — [1]Institut für Theoretische Physik, Universität Gießen — [2]INRNE, BAS, Sofia, Bulgaria

Studies of electromagnetic response functions along isotopic and isotonic chains led to the surprising observation of new low-energy modes of nuclear excitations. They are carrying features which are very distinct from the surface vibrations and the giant resonances known from stable nuclei close to the N=Z line. Meanwhile, there are clear indications that these new modes are specific signals of nuclear skin oscillations which become visible in transition densities and currents. A theoretical method based on density functional theory and multiphonon approach is presented for investigations of nuclear excitations with different multipolarities and energies in stable and exotic nuclei. The relation of low-energy modes to neutron or proton skins is systematically investigated for isotonic and isotopic chains. Our studies of dipole and quadrupole response functions and the corresponding transition densities indicate new pygmy dipole and quadrupole modes. Also, the presence of skins is found to affect M1 strength distributions in nuclei. The results are compared to experimental data. The information on pygmy resonances reveals new aspects on the isospin dynamics of the nucleus with important astrophysical consequences. In this connection, cross sections in ^{86}Kr(γ, n) reaction are studied in order to probe the s-process branching at ^{85}Kr. The investigations contribute to the understanding of neutron-capture processes and the synthesis of heavy neutron-rich elements. Supported by BMBF project 06GI9109.