Abstract

This thesis presents the systematic study of the Pygmy Dipole Resonance (PDR) in the atomic nuclei ^{94}Mo, ^{124}Sn, and ^{138}Ba using the new method of $(\alpha, \alpha'\gamma)$ coincidence experiments at 34 MeV/nucleon bombarding energy. These experiments provide a deeper insight into the underlying structure of this resonance, since hadronic interaction is dominant at the chosen kinematic conditions. The measurements have been performed at the Kernfysisch Versneller Instituut (KVI) in Groningen, The Netherlands. The comparison of the obtained results to the dipole strength distribution measured in real photon scattering experiments on the same nuclei reveals a splitting of the PDR into two energetically separated parts with different underlying structure. This phenomenon seems to be a general feature of this resonance, since it is so far observed in all studied nuclei.

The details and results of the experiments are presented in this thesis and a comparison to the results of theoretical microscopic calculations is given that allow an interpretation of the experimentally observed splitting of the PDR. It turns out that the energetically lower-lying group of states seemingly belongs to an isoscalar neutron-skin oscillation, while the higher-lying group of dipole transitions seems to belong to a transitional region on the tail of the isovector Giant Dipole Resonance (IVGDR).