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Analog pygmy-dipole resonance and low-lying charge-exchange dipole state in neutron-rich nuclei

Response of atomic nuclei to external fields reveals the occurrence of a variety of modes of excitation, and the quest for unique modes of excitation in exotic nuclei has been a major subject in nuclear physics. The low-energy dipole mode or the pygmy dipole resonance (PDR) has been a central issue for its collectivity and the correlation with the neutron skin thickness.

The isovector (IV) dipole modes can be excited by the charge-exchange reactions as well. Then, the investigation of the IV modes not only in the Tz = 0 but Tz = 1 and -1 excitations could lead us to a deeper and universal understanding of the character and structure of the excitation modes, such as the isospin character of the PDR.

In this talk, I will discuss the possibility of the emergence of the low-lying charge-exchange dipole modes uniquely in neutron-rich nuclei based on nuclear density functional theory. Furthermore, I will discuss the deformation effects on the charge-exchange dipole resonances to try to generalize the deformation splitting mechanism seen in the Giant Dipole Resonance.

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