

Complete electric and magnetic dipole response of nuclei from zero degree inelastic proton scattering

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At RCNP Osaka, Japan, and iThemba LABS, South Africa, new facilities allowing for inelastic proton scattering at energies of a few hundred MeV per nucleon under extreme forward angles including zero degree have been developed. Some highlights of the physics addressed with these systems are presented. For example, they facilitate the measurement of the complete E1 strength from low excitation energies across the GDR and thus the dipole polarizability, which in turn provides information on the neutron skin thickness and parameters of the symmetry energy of neutron matter. Also, the complete spin-M1 resonance in heavy nuclei can be extracted for the first time. Finally, the high energy resolution of the data permits the determination of characteristic scales of the GDR fine structure related to the dominant decay mechanisms, and of level densities in the energy region of the GDR.

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