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Systematics of the dipole polarizability

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The electric dipole polarizability is a key observable for the understanding of nuclear matter. Strong correlations between the neutron skin thickness, the dipole polarizability and the parameters of the symmetry energy term in the equation of state of neutron rich matter have been found within the framework of energy density functional theory [1].

The polarizability is experimentally accessible by a measurement of the full electric dipole strength distribution of atomic nuclei. A well suited technique for this purpose is inelastic proton scattering at relativistic velocities. At extreme forward angles Coulomb excitation dominates over the nuclear interaction. Such experimental conditions can be realized at the Research Center for Nuclear Physics in Osaka, Japan. There, the dipole response of various nuclei has been explored in the last decade. The scattered protons were measured with the Grand Raiden (GR) magnetic spectrometer, which can be placed at extreme forward angles up to 0° [3]. Measured spectra are deconvoluted into the contributions of different multiplicities by performing a multipole decomposition analysis based on DWBA calculations [2].

In this talk new results on the dipole polarizability of ^{58}Ni and ^{90}Zr will be presented. Also the now available systematics of the dipole polarizability will be discussed: from light and medium-mass to heavy nuclei [4,5,6,7,8,9].

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Primary authors: BRANDHERM, Isabelle (Technische Universität Darmstadt); Prof. VON NEUMANN-COSEL, Peter (Technische Universität Darmstadt); TAMII, Atsushi (Research Center for Nuclear Physics, Osaka University, Japan)

Co-authors: COLÒ, Gianluca (Dipartimento di Fisica, Università degli Studi di Milano, Italy); KLAUS, Tobias (Technische Universität Darmstadt); MATSUBARA, Hiroaki (Research Center for Nuclear Physics, Osaka University, Japan); Prof. PIETRALLA, Norbert (Technische Universität Darmstadt); REINHARD, Paul-Gerhard (Institut für Theoretische Physik, Universität Erlangen, Germany); ROCA-MAZA, Xavier (Dipartimento di Fisica, Università degli Studi di Milano, Italy)

Presenter: BRANDHERM, Isabelle (Technische Universität Darmstadt)

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