# The 566th Nuclear Science Seminar

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# The Electric Dipole Response of $^{132}$Sn

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Room 309, Faculty of Science Build 1,
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The Isovector Giant Dipole Resonance (IVGDR) is a well-known collective excitation in which all protons oscillate against all neutrons of a nucleus. In neutron-rich nuclei an additional low-lying dipole excitation occurs, often denoted as Pygmy Dipole Resonance (PDR). The strength function of the PDR is related to the thickness of the neutron skin. Experimental information provide important constraints on the theoretical description of nuclear matter, especially pure neutron matter. However, experimental data for exotic neutron-rich nuclei are scarce.

To study the electric dipole response of neutron-rich tin isotopes an experiment was successfully performed with the R3B-LAND setup at GSI Helmholtzzentrum fuer Schwerionenforschung GmbH (Darmstadt, Germany). Relativistic Coulomb excitation in inverse kinematics was utilized for these studies. The experimental setup is designed to perform kinematically complete measurements of the projectiles and their decay products which allows an event-by-event reconstruction of the excitation energy via the invariant- mass method.

The measured spectra for excitation energies, neutron kinetic energies and γ-ray energies are intrinsically convoluted with the detector responses. These instrumental responses are reproduced via simulations of statistical decays of tin isotopes and the reconstruction of the simulated hits in the neutron and γ-ray detectors. A deconvoluted excitation-energy distribution for $^{132}$Sn is obtained using a complex fitting algorithm in which a trial input is folded with the corresponding detector responses. The convoluted spectra are compared to the experimentally observed ones and the trial input is adjusted iteratively until a desirable agreement is reached.

The dipole strength function and the electric dipole polarizability of $^{132}$Sn are de- termined from the fit result. The former reveals the GDR as well as the PDR and their positions, widths and strengths are in good agreement with values from literature. The latter is determined for the first time and within the relativistic DD-ME framework this result is in very good agreement with published results for 68Ni and 208Pb. The neutron- skin thickness of $^{132}$Sn is determined from the polarizability and the model-dependency is discussed.

*Nuclear Science Seminar (NSS)*
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