Development of collectivity beyond N=50 in the Ge and Se isotopes

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Recent experimental evidence has shown that in the doubly magic nucleus 78Ni, both spherical and deformed structures can be present at similar energies. This contradicts naive assumptions of the absence of deformation-driving intruder configurations. Understanding how these coexisting structures provide insights to traditional and cutting-edge nuclear theories. Elucidation of the origin of the deformed structures present in 78Ni may be achieved by understanding analogous structures in its north-east valence space. To this end, an experiment was conducted at the Radioactive Isotope Beam Factory of the RIKEN Nishina Center focusing on Ge and Se isotopes beyond N=50. In these isotopes, deformed structures correspond to their ground states. The excitation probability from ground-to-excited states reflects the magnitude of deformation present, with comparison to nuclear theories providing insights to the deformation-driving orbitals which are active.

The presentation will detail the experimental setup which was focussed on the inelastic scattering of Ge and Se isotopes on a heavy target at ~150 MeV/nucleon to induce Coulomb excitations. A high-resolution gamma-ray detector array was used to record de-excitations to infer reaction cross sections and also perform lineshape analysis which provides access to lifetimes of excited states. Preliminary results of the extracted reduced transition probabilities to low-lying states will be presented along with theoretical predictions and discussed in terms of how collective structures arise beyond the N=50 shell closure and potential co-existing shapes.