Contribution ID : **351** Type : **Oral talk**

# Constraints on neutron skin thickness and symmetry energy

*Thursday, 24 October 2024 11:15 (15)*

The structure of exotic neutron-rich nuclei is one of the main science drivers in contemporary nuclear physics research [1]. The new measurements of pygmy dipole (PDR) and giant dipole (GDR) resonances in neutron-rich nuclei have sparked advancements in nuclear models. The quasiparticle random phase approximation, utilizing the self-consistent mean-field derived from Skyrme effective interactions, is a widely used tool for describing the PDR and GDR. This approach made it possible to a successful description of the properties of low-lying states and the characteristics of giant multipole resonances in spherical nuclei [2,3]. Due to the anharmonicity of vibrations there is a coupling between simple particle-hole configurations and more complex states [4,5]. As an illustration, we study the properties of the low-lying dipole states in the neutron-rich Ca and Ni isotopes [6,7]. This reveals a number of characteristic features of the low-energy E1 modes. The effect of the low-energy E1 strength on the electric dipole polarizability is discussed [5]. The correlations between the electric dipole polarizability, the symmetry energy, and neutron skin thickness are studied [8]. The research was supported within the framework of the scientific program of the National Center for Physics and Mathematics, topic no. 6 “Nuclear and Radiation Physics” (stage 2023-2025).

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**Session Classification :** Nuclear

**Track Classification :** Nuclear physics