The 7th international conference on particle physics and astrophysics



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).

A. Zilges, D.L. Balabanski, J. Isaak, and N. Pietralla, Prog. Part. Nucl. Phys. 122, 103903 (2022).
N. Paar, D. Vretenar, E. Khan, and G. Colò, Rep. Progr. Phys. 70, 691 (2007).
E.G. Lanza, L. Pellegri, A. Vitturi, and M.V. Andrés, Prog. Part. Nucl. Phys. 129, 104006 (2023).
V.G. Soloviev, Theory of Atomic Nuclei: Quasiparticles and Phonons. Bristol/Philadelphia 1992.
A.P. Severyukhin, N.N. Arsenyev, and N. Pietralla, Phys. Rev. C. 104, 024310 (2021).
N.N. Arsenyev, A.P. Severyukhin, V.V. Voronov, and N.V. Giai, Phys. Rev. C. 95, 054312 (2017).
N.N. Arsenyev, A.P. Severyukhin, V.V. Voronov, and N.V. Giai, Phys. Part. Nucl. 50, 528 (2019).
N.N. Arsenyev, and A.P. Severyukhin, Moscow Univ. Phys. Bull. 79, 200 (2024).

Primary author(s) : ARSENYEV, Nikolay (Bogoliubov Laboratory of Theoretical Physic, Joint Institute for Nuclear Research); SEVERYUKHIN, Alexey (Joint Institute for Nuclear Research)

Presenter(s) : ARSENYEV, Nikolay (Bogoliubov Laboratory of Theoretical Physic, Joint Institute for Nuclear Research)

Session Classification : Nuclear

Track Classification : Nuclear physics