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Evolution of the Dipole Response in the Stable Sn Isotope Chain: Polarizability, Pygmy Dipole Resonance and Gamma Strength Function

Inelastic proton scattering at very forward angles and energies of a few hundred MeV has been established as a new tool to study the complete E1 response in nuclei in the excitation energy region between about 5 and 25 MeV [1,2]. Such data are crucial to determine the dipole polarizability of nuclei, which in turn provides important constraints on the neutron skin thickness and on the Equation of State of neutron-rich matter [3-5]. They also shed new light on the much-discussed nature of the Pygmy Dipole Resonance (PDR) observed in nuclei with neutron excess [6,7]. Since the data also provide information on the spin-M1 strength [8,9], one can extract the full Gamma Strength Function (GSF) [10]. The high-resolution experiments furthermore allow an extraction of the level density (LD) [11], and the combined GSF and LD results permit a novel test of the Brink-Axel hypothesis for GSFs in the energy region of the PDR [11].

The chain of Sn isotopes represents a particularly interesting case to investigate the impact of neutron excess on the E1 response of nuclei in a systematic manner because their g.s. structure changes little. We report results from a systematic study of the stable even-mass nuclei 112,114,116,118,120,122,124Sn on all of the above problems.

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- [1] A. Tamii et al., Nucl. Instrum. Methods A 605, 326 (2009).
- [2] R. Neveling et al., Nucl. Instrum. Methods A 654, 29 (2011).
- [3] A. Tamii et al., Phys. Rev. Lett. 107, 062502 (2011).
- [4] T. Hashimoto et al., Phys. Rev. C 92, 031305(R) (2015).
- [5] J. Birkhan et al., Phys. Rev. Lett. 118, 252501 (2017).
- [6] I. Poltoratska et al., Phys. Rev. C 85, 041304(R) (2012).
- [7] A.M. Krumbholz et al., Phys. Lett. B 744, 7 (2015).
- [8] J. Birkhan et al., Phys. Rev. C 93, 041302(R) (2016).
- [9] M. Mathy et al., Phys. Rev. C 95, 054316 (2017).
- [10] I. Poltoratska et al., Phys. Rev. C 89, 054322 (2014).
- [11] D. Martin et al., Phys. Rev. Lett. 119, 182503 (2017).

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