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Mixed Proton-Neutron Symmetry in the Valence Shell of Heavy Nuclei¹

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Three generic aspects determine the physics of atomic nuclei as specific examples of mesoscopic two-fluid quantum systems: collectivity (many-body aspect), shell structure (quantum aspect), and the isospin degree of freedom (two-fluid character). Their interplay and competition can be sensitively studied on phenomena that reflect these three aspects equally strongly such as collective isovector excitations of the valence shell of heavy nuclei. Such structures have been predicted previously, for instance, in the interacting boson model (IBM-2) in terms of mixed-symmetry states. New experimental approaches have been developed over the last few years for studying these off-yrast low-spin nuclear structures with mixed proton-neutron symmetry. The data will be reviewed and an outlook to the future development of the field will be attempted.

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