Recent Nuclear Structure Studies at N=50 Through Masses of Isomeric States

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Nuclear binding energies arise from various effects that govern nuclear properties. Different nucleon configurations within nuclear isomers lead to modified binding energies, often resulting in mass differences of tens to hundreds of kilo-electronvolts. These isomeric excitation energies can be directly accessed by measuring the difference in atomic masses of ground and isomeric states. Here, we present such measurements through mult-reflection time-of-flight [1] and ion-cyclotron resonance mass spectrometry [2]. By evaluating the excitation energies of neutron-deficient indium isotopes down to the shell closure at N=50 against state-of-the-art shell model, DFT, and ab initio calculations, we contrast the performance of these theories applied to several nuclear properties [3,4]. We further evaluate possible shape-coexistences close to N=50 through independent excitation energy measurements of the (1/2)+ state in zinc-79 with JYFLTRAP at IGISOL and ISOLTRAP at ISOLDE, supported by accurate large-scale shell model calculations [5].

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