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Direct Mass-Measurements of the 99In Isomeric State Provide new Experimental Input to Nuclear Theory

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Much attention has been drawn in recent years to the heaviest known self-conjugate nucleus, 100Sn, and its implications on nuclear structure models. Various decay experiments have been conducted to study the nucleus' expected doubly-magic character of the closed proton and neutron shells. Direct measurements by means of mass-spectrometry or laser-spectroscopy are challenging due to its short half-life and difficult production and have yet to be performed. One proton removed from tin, however, neutron-deficient indium isotopes play a crucial role to understand nuclear structure in the vicinity of 100Sn. Mass-measurements of 99In and 100In in combination with ab inito many-body calculations now test our understanding of nuclear forces close to the shell closure. Going one step further, the excitation energy of the (1/2)- isomeric state in 99In has been measured by means of Time-of-Flight Mass-Spectrometry at ISOLDE/CERN. In this contribution, experimental results of this experimental campaign, including the mass-spectrometry of eleven ground states and seven isomers of neutron deficient indium isotopes, are presented and compared with nuclear shell-model calculations.

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