β^- - decay spectroscopy of indium isotopes across the N=82 shell closure at the ISOLDE Decay Station

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The β^- decays of neutron-rich indium isotopes from ^{124}In to ^{135}In were investigated at the ISOLDE Decay Station at CERN [1-5]. The aim of the study is to provide a detailed understanding of the nuclear structure of the tin daughter nuclei over a broad range of neutron numbers, encompassing both sides of the N=82 magic number. This region offers a unique opportunity to trace the evolution of shell structure, particularly the migration of single-particle levels and the development of Gamow-Teller (GT) transition strength as the neutron number increases.

Crossing the N=82 shell closure leads to a substantial increase in Q_β values, enabling the population of a wide range of excited states, including those above the neutron separation threshold (βn), and in some cases, even states accessible via β2n decay [2,6]. This allows for the simultaneous investigation of the nuclear structure of the daughter nuclei populated through different decay channels.

Excited states in the neutron-rich tin isotopes were investigated via the β^- decay of the corresponding indium precursors, $^{124-135}$In, at the ISOLDE Decay Station at CERN. The experiment employed isomer-selective ionization using the Resonance Ionization Laser Ion Source (RILIS), which enabled independent studies of the β decays of ^{133g}In ($I^\pi = 9/2^+$) and ^{133m}In ($I^\pi = 1/2^-$). This technique allowed for a clear separation of ground-state and isomeric decay branches, facilitating a more precise assignment of the observed excited states in the daughter nuclei to specific initial-state configurations in the parent indium isotopes.

The results provide essential empirical information on the systematics of single-particle level evolution and GT transition strength in the vicinity of the doubly magic ^{132}Sn, and serve as a stringent test for shell-model predictions in one of the most structurally informative regions of the nuclear chart.

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