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Detailed structure of ^{131}Sn populated in the β-decay of isomerically-purified ^{131}In states

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Nuclei with a large *N/Z* ratio are of great interest to test nuclear models and provide information about single particle states far off stability. During the last two decades there has been a substantial effort directed to gathering information about the region around the neutron-rich ^{132}Sn [1-3]. Lifetimes of excited states provide direct access to the reduced transition probabilities of γ transitions, which play an important role in the investigation of nuclear structure and the nucleon-nucleon effective interaction. The information available for the tin isotopes around ^{132}Sn is scarce.

The excited structure of ^{131}Sn was investigated in detail at the ISOLDE facility at CERN. We profited from the selective ionization by the ISOLDE Resonance Ionization Laser Ion Source (RILIS) [4] to enhance the production of each particular isomer in ^{131}In, and study its decay separately for the first time. This measurement took place at the new ISOLDE Decay Station (IDS), equipped with four highly efficient clover-type Ge detectors, along with a compact fast-timing setup consisting of two $LaBr_3$(Ce) detectors and a fast β-plastic detector [5-8].

In this contribution we will report on the first measurement of subnanosecond lifetimes in ^{131}Sn. A noticeable short half-life was derived for the the $\nu 3s^{-1}_{1/2}$ single-hole state, indicating an enhanced *l* -forbidden M1 behaviour for the $\nu 3s^{-1}_{1/2} \rightarrow \nu 3d^{-1}_{3/2}$ transition [9-11]. The measured half-lives of high-energy states, provided valuable information on transition rates, supporting the interpretation of these levels as core-excited states. In the other hand, the unambiguous separation of the decay provided an unique opportunity to disentangle the decay scheme of each ^{131}In isomer. The extended level-schemes, the position of the $\nu 1h^{-1}_{11/2}$ single-hole state [12], as well as the observed correlation between n/γ competition above the neutron-separation energy and the parent populating indium state will be discussed. Additionally, a revision of β-decay properties, such as log *ft* of the first-forbidden single-particle transitions, half-lives and P_n values for the three ^{131}In β-decaying states will be addressed.

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