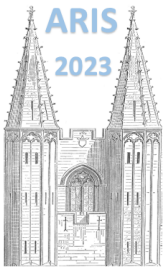

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β-decay studies of neutron-rich isotopes in the region around double-magic ^{132}Sn

vendredi 9 juin 2023 08:45 (25 minutes)

In a simple picture, nuclei in the vicinity of double magic isotopes are of great interest from both experimental and theoretical points of view. Such nuclei have a spherical shape and the excitations-energy spectrum is dominated by single-particle excitation. This simple approach may need to be revised for nuclei that are significantly off the stability path on the neutron-rich side. The study of the evolution of single-particle states, interaction energies and β-decay properties (half-lives, β-decay strength, and β-delayed neutron emission probability) are important for understanding the structure of such exotic nuclei, as well as for its relevance in understanding the astrophysical r-process.

In this particular, understanding the nuclear structure near the doubly-magic ^{132}Sn is important for validating theoretical models that predict properties of more exotic nuclei, which are not experimentally accessible. In the specificity, the single-particle energy of the neutron state $i_{13/2}$ is still not firmly established [1,2] and it was suggested that nuclear structure affects the neutron versus γ-ray competition in the decay of neutron-unbound states [3]. The n-γ competition in the de-excitation of excited states of these nuclei is relevant in the framework of the astrophysical r-process, since ^{135}In is a so-called waiting point [4]. β-decay studies of neutron-rich indium isotopes provide excellent conditions to investigate such effects since their decays are characterized by large energy windows for the population of neutron-unbound states ($Q_{\beta n} > 10$ MeV).

Excited states in $^{132-135}$Sn were investigated via β decay of the respective precursors, $^{133-135}$In, at ISOLDE Decay Station [5,6]. Isomer-selective ionization using the Resonance Ionization Laser Ion Source enabled the β decays of ^{133g}In ($I^{\pi}=9/2^{+}$) and ^{133m}In ($I^{\pi}=1/2^{-}$) to be studied independently for the first time [5]. Owing to the large spin difference of those two β-decaying states, it is possible to investigate separately the lower- and higher-spin states in the daughter ^{133}Sn and therefore to probe independently different single-particle transitions relevant in the ^{132}Sn region. The single-particle $i_{13/2}$ neutron state was tentatively identified in the decay of ^{134}In and ^{135}In.
A review of the most recent results will be given and discussed in the framework of state-of-the-art shell model computations.

[1] P. Hoff *et al.*, Phys. Rev. Lett. **77**, (1996) 1020.
[2] A. Korgul *et al.*, Phys. Rev. C **91**, (2015) 027303.
[3] V. Vaquero *et al.*, Phys. Rev. Lett. **118**, (2017) 202502.
[4] I. Dillmann *et al.*, Eur. Phys. J. A **13**, (2002) 281.
[5] M. Piersa, A. Korgul *et al.*, Phys. Rev. C **99**, (2019) 024304.
[6] M. Piersa, A. Korgul *et al.*, Phys. Rev. C **104**, (2021) 044328.

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