Contribution ID: **332** Type: **Oral**

Properties of nuclei beyond 132Sn: importance for nuclear physics and astrophysics

Thursday, 30 November 2023 11:55 (15 minutes)

Neutron-rich nuclei close to the r-process path and waiting point nuclei give extremely essential information about intrinsic nuclear properties vital both for nuclear physics and for astrophysics. They reveal how structure effects are of importance for theoretical modeling and can be crucial to understand deviations of microscopic-macroscopic self-consistent models treating both neutron and gamma emission [1,2] from data.

Such studies can be performed on long-lived excited and ground states, predominantly disintegrating by beta decay being on the neutron-excess side of the stability line. Some of the nuclei in the neighborhood of 132Sn, although exotic and neutron-rich, have rather simple structures dominated by shell effects and the evolution of low-lying proton-neutron orbitals [3,4]. Furthermore, these effects are possible to study in beta-decay coincidences with gamma-ray detection. Recently, we performed several investigations reporting on structure [3-6] and also FF/GT rates and Pn, P2n ratios by spectroscopy [4,6]. Confronted with purely neutron-emission detection methods and T1/2 measurements [8,9], they provide complementary and rather complete data sets to better describe astrophysical scenarios away from the stability line. Examples will be presented in this work together with, whenever available from the structural point of view, a theoretical picture.

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Attendance Type

In-person

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Session Classification: Session 6

Track Classification: Neutron Physics