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Detailed Spectroscopy of Neutron-rich Sn Isotopes with GRIFFIN

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The region of neutron-rich tin isotopes near A = 130 is of great interest to nuclear structure. In particular, 132Sn with 50 protons and 82 neutrons represents a doubly magic nucleus and provides an essential benchmark for the shell model far from stability. Understanding the structure of this nucleus provides a foundation to comprehend the single-particle nature of excited states in neighboring isotopes. With no excited states below 4 MeV, 132Sn can be considered to be the most magic among heavy nuclei. Among known excited states, several particle-hole multiplets have been identified, as well as a collective 3- level characteristic of doubly magic nuclei [1,2]. In addition to nuclear structure considerations, the region around 132Sn is also useful in astrophysics, as studying the properties of these nuclei is key to understanding the r-process path and its role in creating the A = 130 abundance peak.

The nucleus 132Sn has recently been studied as part of a campaign to investigate the structure of neutron-rich tin isotopes at the TRIUMF-ISAC facility. Excited states in 132Sn were produced from the beta-decay of 132In. A low-energy beam of 132In was delivered to the GRIFFIN experimental station [3], where the 16 high-purity germanium clovers were used to detect gamma-rays. In addition, SCEPTAR [4], an array of 20 plastic scintillators, was used to detect beta-particles to create beta-gamma-gamma coincident spectra. This experiment represents the most sensitive study of 132Sn to date, allowing for the identification of new weakly fed levels as well as confirmation of spin and parity assignments of several excited states via angular correlation measurements. In this talk, I will present new results on the levels in this nucleus as well as prospects for other Sn isotopes.

References:

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