Abstract ID : **42**

Exploring nuclear structure near 100Sn with neutron knockout reactions

Content

The region of the nuclear chart near the doubly-magic ^{100}Sn is of crucial importance for understanding the atomic nucleus and an excellent testing ground for state-of-the-art nuclear models. ^{100}Sn is the heaviest doubly-magic N = Z nucleus, and additionally represents the end of the astrophysical rp-process. Experimental constraints of the single-particle orbits outside 100Sn are crucial to understand the region.
In recent years there has been much discussion regarding the lowest-lying excited state of 100Sn, which lies at 172 keV. The spin and parity ordering of the two lowest-lying states (J = 5/2+, 7/2+) is still unknown, and this ordering directly relates to the $\nu d_{5/2}$, $g_{7/2}$ single particle orbitals which inform the structure of the whole region [1, 2]. Thus, an experimental determination of the spin and parity of these low-lying states is imperative. The lightest Sn isotope for which the ordering has been experimentally measured is ^{107}Sn [3].
Results from single neutron knockout reactions on beams of ^{104,1002}Cd and ^{104}Sn will be presented. Neutron knockout is an excellent probe of single-particle structure, effectively utilizing weak beams, and providing a measure of the angular momentum transfer and wavefunction purity. The experiment was conducted at the Facility for Rare Isotope Beams, using the GRETINA array and the S800 spectrograph. The high-statistics ^{104,1002}Cd data provides insight into the neutron knockout reaction mechanism, with direct population of high-spin states showing down-shifted momentum distributions.

---

[1] D. Seweryniak et al., Phys. Rev. Lett. 99, 022504 (2007)
[2] I. Darby et al., Phys. Rev. Lett. 105 162502 (2010)
[3] G. Cerizza et al. Phys. Rev. C 93, 0221601 (R) (2016)

Primary authors: BASSON, M. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); BECK, T. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); CAMPBELL, C. M. (Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley, California, 94720, USA); CERIZZA, G. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); CHUNG, J. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); COX, I. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA); FARRIS, P. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); GADE, A. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); GHIMIRE, R. (Lawrence Livermore National Laboratory, Livermore, California 94550, USA); GILLESPIE, S. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); Prof. GRAY, T. J. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA & Physics Division, Oak Ridge National Laboratory, Oak Ridge Tennessee 37831, USA); GRINDER, M. (Department of Physics and Astronomy, Rutgers University, New Brunswick, New Jersey 08903); GRZYWACZ, R. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA); HILL, A. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); JONES, K. L. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA); PAIN, S. D. (Physics Division, Oak

Ridge National Laboratory, Oak Ridge Tennessee 37831, USA); PALMISANO, A. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA); PETER, A. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA); RYKACZEWSKI, K. (Physics Division, Oak Ridge National Laboratory, Oak Ridge Tennessee 37831, USA); WEISSHAAR, D. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA); WILLIAMS, M. (Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan, 48824, USA)

Presenter: Prof. GRAY, T. J. (Department of Physics and Astronomy, University of Tennessee Knoxville, Tennessee 37966, USA & Physics Division, Oak Ridge National Laboratory, Oak Ridge Tennessee 37831, USA)

Status: SUBMITTED

Submitted by **DE GREGORIO, Giovanni** on **Friday, 14 March 2025**