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Abstract for an Invited Paper for the SES08 Meeting of the American Physical Society

⁷⁸Ni, Nuclear Structure and LeRIBSS: New results from the HRIBF JEFF WINGER, Mississippi State University

The nuclide ⁷⁸Ni is the most neutron-rich doubly magic nuclide $(N/Z \approx 1.79)$ which can be reached using the available experimental techniques for the foreseeable future. Or at least we have long considered this nuclide to be doubly magic. Recent theoretical studies have shown the importance of the tensor component of the neutron-proton interaction [1] and coupling to continuum states [3] in causing a shift in the single particle energies for this neutron-rich region. The net effect is that we may no longer live in a happy little world of robust shell closures at Z=28 and N=50 once we move away from stability. Hence, we have a region of great interest for experimental studies. At the Holifield Radioactive Ion Beam Facility (HRIBF) of ORNL, the UNIRIB Consortium has begun a systematic study of nuclei in the ⁷⁸Ni region. This began two years ago with a successful campaign using re-accelerated radioactive beams of ⁷⁶⁻⁷⁹Cu and ⁸³⁻⁸⁵Ga. This year, we made our first measurements using the Low-energy Radioactive Ion Beam Spectroscopy Station (LeRIBSS). I will give an overview of the results of the earlier experiment, present some preliminary results from the LeRIBSS runs, and discuss our future plans. Funded by DOE grant DE-FG02-96ER41006.

[1] T. Otsuka et al., Phys. Rev. Lett. 97, 162501 (2006)

[2] J. Dobaczewski et al., Prog. Part. Nucl. Phys. 59, 432 (2007)