Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Single-particle structure of neutron-rich N=40 isotopes: A new Island of Inversion[1] KATHRIN WIMMER, Central Michigan University, E12012 COLLABORATION — The region around neutron-rich N=40 nuclei has recently attracted a lot of interest. The high-lying 2+ state in 68Ni and its small transition probability to the ground state are a result of the N=40 harmonic oscillator shell gap between the fp shell and the 1g9/2 orbital. This shell gap is reduced for the more neutron-rich Fe and Cr isotopes. In the shell model the increase in B(E2) values and the decrease in 2+ excitation energy can only be reproduced if the neutron 1g9/2 and 2d5/2 intruder orbitals are included in the model space. Spectroscopic studies of neutron-rich nuclei around N=40 have been performed at the NSCL utilizing the S800 spectrometer and the GRETINA gamma detector array. The study focused on the one-neutron removal reactions from 64,66Fe. This experiment employed a new technique of combined prompt and delayed gamma-spectroscopy allowing to quantify the occupancy of the intruder neutron 1g9/2 and 2d5/2 orbitals in 64,66Fe. Comparison of the measured spectroscopic factors with large-scale shell model calculations show a significant occupation of the intruder orbitals across the N=40 sub-shell gap. Therefore the existence of a new "Island of Inversion" at N=40 as been experimentally verified for the first time.

[1]This work was supported by the National Science Foundation under Grant No. PHY-1306297.

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Date submitted: 29 Jun 2014 Electronic form version 1.4