NUCLEAR SPINS, MOMENTS AND CHARGE RADII OF NEUTRON-RICH ZINC ISOTOPES AND ISOMERS

Xiaofei Yang, KU Leuven, Leuven, Belgium

X.F. Yang[1], C. Wraith[2], L. Xie[3], C. Babcock[2,4], J. Billowes[3], M.L. Bissell[3,1], K. Blaum[5], B. Cheal[2], K.T. Flanagan[3], R.F. Garcia Ruiz[1], W. Gins[1], C. Gorges[6], L.K. Grob[7,6], H. Heylen[1], S. Kaufmann[6,8], M. Kowalska[7], J. Kraemer[6], S. Malbrunot-Ettenauer[7], R. Neugart[5,8], G. Neyens[1], W. Nortershauser[6], J. Papuga[1], R. Sanchez[9], and D.T. Yordanov.

1. KU Leuven, Inst. voor Kern- en Stralingsfysica, Celestijnenlaan 200D, 3001 Leuven, Belgium
2. Oliver Lodge Laboratory, Oxford Street, University of Liverpool, Liverpool L69 7ZE, UK
3. School of Physics and Astronomy, The University of Manchester, Manchester M13 9PL, UK
4. EN Department, CERN, CH-1211 Geneva 23, Switzerland
5. Max-Plank-Institut für Kernphysik, D-69117 Heidelberg, Germany
6. Institut fur Kernphysik, TU Darmstadt, D-64289 Darmstadt, Germany
7. Experimental Physics Department, CERN, CH-1211 Geneva 23, Switzerland
8. Institut f¨ur Kernchemie, Universit¨at Mainz, D-55128 Mainz, Germany
9. GSI Helmholtzzentrum f¨ur Schwerionenforschung, D-64291 Darmstadt, Germany
10. nstitut de Physique Nucl´eaire, CNRS-IN2P3, Universit´e Paris-Sud,Universit´e Paris-Saclay, 91406 Orsay, France

A variety of nuclear structure information has been revealed recently on the isotopes in the vicinity of ^{78}Ni both experimentally and theoretically [1,2]. However, whether or not ^{78}Ni can be considered to be a double magic nucleus still remains as a question and attracts much attention. In order to further understand the various properties of nuclei in this region, we have studied the neutron-rich Zn (Z = 30) isotopes, from N = 39 up to N = 50, via collinear laser spectroscopy at ISOLDE.

The experiment provides us with information on the ground- and isomeric state spins, magnetic and quadrupole moments, as well as the nuclear charge radii of Zn isotopes. The experimental magnetic moment can been well accounted for by large scale shell model calculations using jj44b/JUN45 effective interactions (^{56}Ni core and pfg shell) [4,5]. The calculated wave functions confirm the inversion of $p_{3/2}$, $f_{5/2}$ proton orbits, as observed in the Cu and Ga isotopic chain. However, in order to explain the measured quadrupole moments of more neutron-rich isotopes and the spin and magnetic moment of a newly discovered intruder isomer, the interactions [2,6] with an extended model space including orbits beyond N = 50 are necessary.

The extracted charge radii of Zn isotopes across N = 40 and up to N = 50 will give us information on the subshell /shell closures. An enhanced isomer shift in ^{79}Zn reveals an unexpected signature of shape coexistence near ^{78}Ni [7], which has been observed nearly simultaneously by another different experiment in ^{80}Ge [8], as well as in a recent theoretical study [2].

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