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Laser spectroscopy on Zn isotopes and isomers

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Laser spectroscopy measurements were performed on bunched beams of Zn ($Z = 30$) isotopes at ISOLDE-CERN using the ion cooler-buncher ISCOOL and the high-resolution collinear laser spectroscopy setup COL-LAPS. The experimental measurements allowed to deduce the nuclear spins, magnetic moments and quadrupole moments of odd-Zn isotopes and isomers up to ^{79}Zn , as well as the mean square charge radii of $^{62-80}\text{Zn}$. These new results provide nuclear structure information on the Zn isotopic chain across the $N = 40$ sub-shell and up to the $N = 50$ shell closure.

As the nuclear moments are a sensitive probe of the configuration of the wave function, the experimental results are compared to large scale shell model calculations using jj44b/JUN45 (^{56}Ni core and pfg shell) [1,2] effective interactions and state-of-the-art shell-model calculations in a large model space (pf for proton and sdg for neutron) [3]. Shell evolution of $^{69-79}\text{Zn}$ isotopes with increasing neutron occupation of the $\nu g_{9/2}$ orbit will be discussed based on the experimental measurements and the shell model calculations.

The measured changes in mean-square charge radii along the Zn chain cover the $N = 40$ sub-shell and reached the $N = 50$ shell. This result will be presented to discuss the proposed sub-shell/shell closure at $N = 40/N = 50$ in the Ni region together with earlier measurements of Cu and Ga [4,5].

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