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Studying the evolution of the nuclear structure along the zinc isotopic chain, close to ^{78}Ni, via multi-step Coulomb excitation

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Few nuclei have attracted as much attention as ^{78}Ni in the last decades, but unfortunately it remains out of reach of current generation ISOL facilities. For this reason, with only two protons above nickel, and the increasing occupation of neutrons in the $1g_{9/2}$ orbital, neutron-rich Zn isotopes are ideally suited to study the evolution of the proton shell gap, Z = 28, and the stability of the neutron shell gap, N = 50, near the doubly magic ^{78}Ni. During the last 10 years, several experiments were performed with the aim of studying the collectivity in the even-even Zn isotopes between N =40 and N = 50 [1-4], with different results. As a consequence, the interpretation of the neutron-rich Zn region is not fully understood.

For many years, several Coulomb excitation experiments have been successfully performed at REX-ISOLDE in combination with the powerful gamma spectrometer MINIBALL. These achievements have been produced due to the high intensity and the high purity of the exotic beams in this facility, being the energy of the beams the main limitation. Since middle of 2015, the post acceleration beam line at ISOLDE is being renewed, from 3.0 in 2012 to 10.0 MeV/u in 2018. Thanks to this new high beam energy, the multi-step Coulomb excitation process starts to play a relevant role, enabling us populate different low-lying and no-yrast states. Hence, this combination will allow going more in depth in the nuclear structure.

On this way, the first HIE-ISOLDE beam experiment in 2015 and one of the experiments performed this year were dedicated to the study of the evolution of the nuclear structure along the zinc isotopic chain, close to the doubly magic nucleus ^{78}Ni. The status of the analysis and some results will be presented.

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