Experimental study of neutron rich nuclei in the N=50 shell closure *

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Neutron-rich nuclei close to the neutron drip-line, have been predicted to show a strongly reduced spin-orbit interaction. One expects a more diffuse nuclear surface, thus a smaller value of the spin-orbit term of the nucleon-nucleon interaction. Evolution of the shell structure far from stability can be related to a different mechanism based on the monopole tensor part of the effective nucleon-nucleon interaction [1]. It is expected an attraction for orbitals with antiparallel spin configuration and a repulsion for orbitals with parallel spin configuration [2]. Therefore, neutron-rich nuclei close to shell gaps are particularly interesting since, when compared with the shell-model prediction, they allow to search for anomalies into the shell structure. These nuclei are difficult to reach, particularly in high-spin states, since they can not be produced via fusion-evaporation reactions. However, we have investigated the high-spin states of the nuclei close to N=50 shell closure using deep inelastic collisions and multi-nucleon transfer reactions. N=50 isotones have been populated through the reaction ^{82}Se + ^{238}U. The ^{82}Se ions were accelerated at an energy of 515 MeV by he combination of the Tandem-XTU and superconductive LINAC ALPI accelerators at the LNL. The target, isotopically enriched, was of a thickness of 1000 μg/cm^2. Projectile-like nuclei, produced following multi-nucleon transfer, were detected by the PRISMA spectrometer [3,4,5], positioned at an angle of 64°, covering a large angular region roughly centered on the grazing angle of the reaction. The γ-rays following the de-excitation of the reaction products were detected by the CLARA array [6] consisting of 23 clover detectors, placed in the hemisphere opposite to the entrance of the spectrometer. After selection on mass and charge for each nucleus we have identified several new excited states of the nuclei ^{81}Ga,^{82}Ge and ^{83}As at N=50 shell closure.

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