

Spectroscopy of the $^{67,68}\text{Fe}$ isotopes by direct reactions on a LH2 target

^{68}Ni and neighbor nuclei have been extensively studied since, in the nuclear shell-model, a sizeable effect was expected for the addition of the $\pi f_{7/2}$ proton shell closure $Z=28$ and the $\nu f_{5/2}$ neutron subshell closure $N=40$. While the energy of the first 2^+ state for Ni isotopes reaches a maximum for ^{68}Ni , the evolution of the two neutron separation energy S_{2n} is not significant of a major shell effect. Moreover, the 2^+ energy of the neighboring $^{64,66}\text{Fe}$ is quite small with indications of a prolate deformation while only two protons are removed from the spherical ^{68}Ni .

While the first SEASTAR campaign at RIBF was focused on the study of ^{78}Ni , data was also taken around ^{68}Fe , which gave the opportunity to study the spectroscopy of the neutron rich Mn, Fe and Co isotopes subject to pairing and neutron-proton interactions. $^{67,68}\text{Fe}$ in the vicinity of ^{68}Ni have been studied with the help of nucleon removal reactions, mainly $(p,2p)$ and (p,pn) in inverse kinematics with radioactive beams. In addition, the inelastic scattering channel (p,p') was also used to provide different selectivity of the final states. In-beam gamma measurement was performed with the DALI2 spectrometer surrounding the MINOS set-up, consisting in a 10 cm long LH2 target and a TPC for detection of charged particles and reconstruction of the reaction vertex in the target.

New transitions were observed with a tentative assignment of a new intruder band in ^{68}Fe . They will be compared to shell model and Hartree-Fock-Bogoliubov calculations, consistent with a sizeable quadrupolar deformation.

Summary

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