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Gamma-ray spectroscopy of the neutron-rich ^{55,57,59}Sc isotopes

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Abstract

Experimental data have shown that far from the valley of stability the nuclear shell structure evolves. New magic numbers can emerge and the traditional ones can disappear. In particular, two new magic numbers at N=32 and N=34 have been suggested in the vicinity of Z=20 based on γ-ray spectroscopy and mass measurements in Ar, Ca and Ti isotopes [1–5]. In order to assess the impact of a single valence proton outside of the Z=20 shell on the shell-evolution mechanism in this region, it is necessary to study the neutron-rich Sc isotopes around [6], and even beyond, neutron number N=34. Investigation of exotic nuclei in this region was the goal of the third SEASTAR campaign at RIKEN-RIBF. Neutron-rich isotopes in the vicinity of ^{53}K were produced by fragmentation of a primary ^{70}Zn beam on a ^{9}Be target. Known and new γ-ray transitions of the isotope ^{55}Sc were observed and γ-rays from ^{57,59}Sc were identified for the first time. Observed γ spectra from ^{55,57,59}Sc will be presented together with preliminary level schemes. They will be discussed in the framework of the tensor-driven shell evolution.

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References

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