

Experimental study of neutron-rich nuclei ^{89}Rb and ^{91}Rb *

T. Pawłat, R. Broda, B. Fornal, W. Królas, J. Wrzesiński, et al.,
Institute of Nuclear Physics PAN, Kraków, Poland

Neutron-rich nuclei with masses $A \sim 100$ exhibit shape transitions from spherical to strongly deformed with increasing neutron number. Sr and Zr isotopes with neutron numbers between $N = 50$ and 60 have been extensively studied in different experiments. Evidence of structural changes in these nuclei has been collected. Much less is known about medium and high-spin states in odd- Z nuclei in this region (Yb and Rb isotopes). Few studies have shown that these nuclei can be populated in multi-nucleon transfer and fusion-fission reactions.

The present contribution reports our studies of yrast states of $^{89,91}\text{Rb}$ isotopes which were obtained as fission products in three independent experiments ($^{48}\text{Ca} + ^{208}\text{Pb}$, $^{48}\text{Ca} + ^{238}\text{U}$ and $^{64}\text{Ni} + ^{238}\text{U}$) performed at Argonne National Laboratory with beams from ATLAS accelerator and with the GAMMASPHERE array. All of them were "thick target" experiments.

The ^{89}Rb nucleus was studied recently using multi-nucleon transfer reactions [1]. Few yrast transitions were placed in the level scheme above the $9/2^+$ state. The coincidence relationships between gamma rays from experiments listed above allowed us to extend this level scheme up to about 7 MeV excitation energy. In the ^{91}Rb nucleus only relatively low-spin states were [2]. In the present work we were able to establish several high-spin states above 17 ns isomer.

Multi-polarities for the transitions placed in the level schemes were proposed based on angular correlation analysis for the strongest lines identified in the spectra. Spin and parity assignments were clearly supported by systematics of Rb isotopes. Similarly, the current data are consistent with the structure evolution along the $N = 52$ and $N = 54$ lines. Excitation energies of first two yrast levels above the $g_{9/2+}$ isomer (namely $13/2^+$ and $17/2^+$) in both studied nuclei are very similar to the 2^+ and 4^+ levels in the neighbor even-even isotones ^{88}Kr , ^{90}Sr in case of ^{89}Rb and ^{90}Kr , ^{92}Sr in case of ^{91}Rb . The presented results might help to explore this area of neutron-rich nuclei within the shell model approach.

* Work supported by the Polish Ministry of Science, Grant No 1P03B05929.

[1] D. Bucurescu, et al., Phys. Rev. **C76**, 064301 (2007).

[2] C.M. Baglin, Nuclear Data Sheets **86**, 1 (1999).