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Nuclear structure studies of neutron-rich Rb isotopes using Coulomb excitation

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The neutron-rich A=100 mass region has recently risen up a high interest of the nuclear structure community. When going from N=58 to N=60, a rapid shape transition occurs from spherical to well deformed ground state shape, similar to what is observed in the rare earths region. This region firstly accessible by fission [1] has been later studied by mass and laser spectroscopy (e.g. [2]), which highlighted the presence of deformation at N˜60. According to recent mass [3] and Coulomb excitation [4] measurements, the Kr isotopic chain presents a more gradual evolution of deformation. Since the Rb isotopic chain is placed at the low-Z border of deformation region, it constitutes a good candidate to identify and characterize the mechanisms involved in the development of deformation.

Excited states in ^{93,95,97,99}Rb were populated via low-energy Coulomb excitation. The nuclei of interest were produced at ISOLDE (CERN) using a UCx target. The beam is post-accelerated up to 2.83 MeV/u using REX-ISOLDE and then impinges on a secondary target of ^{60}Ni positioned in the centre of the MiniBall array used for particle and gamma-ray detection.

Excited states in ^{97,99}Rb were observed for the first time in this study. Level schemes have been constructed by analysing gamma-gamma matrices, which show a clear rotational character in contrast to what is observed for the spherical-like ^{93,95}Rb isotopes. It validates the scenario of a rapid shape transition at N=60, which is also confirmed by the transition probabilities extracted from this dataset using the GOSIA code (see abstract of M. Zielinska *et al.*).

The particle-rotor model constitutes an appropriated tool to interpret the level scheme as rotational bands. By comparing experimental and theoretical values from a quasi-particle model of the B(M1)/B(E2) ratios and g-factor, a firmed assignment of the $3/2^+[431]$ Nilsson orbital as the ground state configuration of the ^{97}Rb has been determined.

[1] S.A.E Johansson *et al.*, Nuclear Physics 64, p. 147-160 (1965)

[2] C. Thibault *et al.*, Phys. Rev. C 23, 2720 (1981).

[3] S. Naimi *et al.*, Phys. Rev. Lett. 105, 032502, (2010).

[4] M. Albers *et al.*, Phys. Rev. Lett. 108, 062701 (2012).

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