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Shape Evolution in Neutron-rich Kr Isotopes Beyond N=60: First Spectroscopy of 98,100Kr

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Across the nuclear chart, some of the most drastic known shape transitions appear in the A~100 region at N=60 for neutron-rich Zr and Sr isotopes [1,2]. Such a sudden rearrangement of a whole nucleus only adding a couple of nucleons is a peculiar feature of the nuclear system highlighting the subtle interplay between collective and microscopic degrees of freedom. Transitional regions where this phenomenon happens are thus preferential areas to be mapped experimentally. Neutron-rich Kr isotopes are especially interesting in this respect since this sudden increase of collectivity at N=60, like in the Zr and Sr chains, was not observed for 96Kr [3]. Instead, a smooth reduction of E(2+1) and rise of B(E2,0+-->2+) excitation strength suggest a gradual development of collectivity. Mass measurements of 96Kr, and 98,100Rb isotopes together with charge radii studies also emphasized that this abrupt shape transition at N=60 extends down to Z=37 and not to Z=36 in 96Kr but could not rule out that such a transition is not shifted to higher neutron numbers [4, 5].
To explore and delineate the boundaries of this nuclear shape transition region [4], we performed the first in-flight γ-ray spectroscopy of very neutron-rich 98,100Kr nuclei during the 2015 SEASTAR campaign using (p,2p) direct reactions from 99,101Rb isotopes at 266 and 257 MeV/u respectively. Thanks to the state-of-the-art combination of the RIBF facility, a 100-mm thick liquid hydrogen target and the MINOS+DALI2 setup, we identified their 2+ states but also additional low-lying states in 98Kr providing the first experimental evidence of the lowering in energy of an excited configuration coexisting with the ground-state one. These new experimental results will be discussed and compared to beyond mean-field calculations [6,7], which link them to the coexistence of oblate and prolate configurations at low energy. Interesting differences on how these configurations are predicted to order and mix around 98,100Kr will be described since they call for future experimental and theoretical benchmarks in the region.

References:

[1] S. A. E. Johansson, NP 64, 147 (1965).
[2] K. Heyde and J. L. Wood, RMP 83, 1467 (2011).
[3] M. Albers et al., PRL 108, 062701 (2012).
[4] S. Naimi et al., PRL 105, 032502 (2010).
[5] V. Manea et al., PRC 88, 054322 (2013).
[6] T. R. Rodriguez, PRC 90, 034306 (2014).
[7] J.-P. Delaroche, PRC 81, 014303 (2010).

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