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Onset of deformation in the neutron-rich krypton isotopes via transfer reactions with the ISOLDE Solenoidal Spectrometer

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In the A = 100 region, the dramatic shape change observed for Zr [1-3] and Sr [4-7] (Z = 40 and 38, respectively) is not present in Kr (Z = 36) isotopes [8-10]. The 2_1^+ energies and the B(E2;$2_1^+ \rightarrow 0_1^+$) values vary smoothly across the Kr isotopes. This is in contrast to the Sr and Zr isotopes which display a large jump at N = 60, indicating a significant increase in the ground state deformation of these isotopes. The $\nu g_{7/2}$ orbital is filled in the ground states of krypton isotopes around N = 59 and is thought to lower the energy of the $\pi g_{9/2}$ orbital and help to drive deformation in this region.

Previous studies in this region have shown a smooth onset of deformation in Kr isotopes at N = 60 [9,10], and evidence of a new oblate structure coexisting with the prolate ground state [11]. Accurately predicting ground-state spins and parities of odd-mass isotopes in this region is challenging due to the large valence space, and lack of ESPE data and accurate shell-model interactions. The single-particle energy differences and spectroscopic factors extracted from neutron adding reactions will provide a more complete experimental picture of the underlying single-particle configurations allowing for comparison to modern shell-model calculations [12] that try to describe the onset of deformation around A = 100.

The transfer reactions ^{92,94}Kr*(d,p)* were carried out in inverse kinematics at an energy of 7.35 MeV/u using the ISOLDE Solenoidal Spectrometer at ISOLDE, CERN. However, due to the low yield obtained for the ^{94}Kr beam, only the ^{92}Kr*(d,p)* reaction has been performed so far. Spectroscopic factors of the low-lying states of ^{93}Kr have been determined. Preliminary results obtained in the October 2022 experiment will be presented.

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