

Chirality in the mass 80 region:⁷⁹Kr

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The high spin states of ⁷⁹Kr were studied via the ⁷⁰Zn(¹³C, 4n) reaction to search for chiral doublet bands based on the three-quasi-particle configuration, $\pi g_{9/2}^2 \otimes \nu g_{9/2}^{-1}$. The ¹³C beam of 65 MeV was provided by the 930 AVF Cyclotron at Cyclotron Radio Isotope Center facility at Tohoku University and was bombarded onto the stacked 70%-enriched self-supporting ⁷⁰Zn targets. The γ rays were detected by the newly constructed Ge detectors array, Hyperball2. This array was designed to be shared between normal nuclear and hypernuclear γ -ray spectroscopy experiments. In the current work, the array was used in the optimized mode to the normal nuclear spectroscopy. The array consists of 14 co-axial detectors of $\sim 65\%$ relative efficiency and 6 Colver-type detectors placed at 90° relative to the beam axis. The absolute total photo peak efficiency of the array is $\sim 4\%$ for 1-MeV γ ray and the tripe coincidence data were taken. The side band structure to the $\pi g_{9/2}^2 \otimes \nu g_{9/2}^{-1}$ yrast band has been identified in ⁷⁹Kr. A tentative spin and parity assignments are made based on the DCO ratio and linear polarization analysis.

This single particle configuration is similar to those with $\pi h_{11/2}^2 \otimes \nu h_{11/2}^{-1}$ in the $A \sim 130$ region where the angular momenta of unpaired valence protons align along the short axis and that of a valence neutron along the long axis of a triaxial core. The doublet bands observed in ¹³⁵Nd have shown characteristic features consistent with spontaneous formation of chirality. If the nuclear chirality is geometrical in origin and not limited to a particular mass region, observation of doublet bands in the $A \sim 80$ region is expected and important to investigate, in addition to already relatively well studied mass regions of $A \sim 100$ and 130. A possibility of chirality for new band structure is discussed.