

Single-particle and collective structure of neutron-rich N=40 nuclei

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The increase in collectivity in neutron-rich isotopes around N=40 has been attributed to the enhanced occupation of neutron intruder orbitals from above N=40 [1]. At the center of this island of inversion lies ^{64}Cr . We propose to measure neutron and proton knockout from ^{64}Cr to quantify the neutron g $_{9/2}$ and d $_{5/2}$ intruder orbital occupations. The proton knockout will yield the relative location of the f and p proton states which drive the evolution of collectivity in this region. Spectroscopic factors will be compared to state-of-the-art shell model calculations.

In parallel, lifetimes of excited states will be measured using the line-shape method. The same experimental technique has been applied already to ^{66}Fe at NSCL employing GRETINA [2]. The extracted transition strength will shed light on the evolution of collectivity at N=40.

The expected level density in ^{63}Cr and ^{63}V is high requiring the use of a high resolution gamma-ray spectrometer for the in-beam spectroscopy. Few states are known in ^{63}Cr from beta decay [3], no excited state is established in ^{63}V . A recent decay experiment at RIBF found no isomeric states in either nuclei [4] thus isomer tagging is not required for the experiment.

[1] S. M. Lenzi et al., Phys. Rev. C 82 (2010) 054301

[2] K. Wimmer et al., to be published.

[3] S. Suchyta et al., Phys. Rev. C 89 (2014) 034317.

[4] K. Wimmer et al., Phys. Lett. B 792 (2019) 16.

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