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Shape Coexistence in Neutron-rich Odd-mass S Isotopes

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Collective motions in atomic nuclei such as rotation and vibration have been characterized by the ground-state shape as a single basis. This picture can be altered in exotic nuclei with unusual proton-to-neutron ratios if the nuclear shape changes drastically at low excitation energies. The phenomena of shape coexistence occur when two or more states with distinct shapes exist in a nucleus within a narrow energy range.
Recently there has been an increasing interest for shape coexistence phenomena in neutron-rich S isotopes. Previous studies suggested that the N=28 shell gap is weakened in the neutron-rich region inducing strong competition among different configurations as well as fairly large collectivity in 40,42,44S isotopes. Therefore it is important to address the question as to how shape coexistence manifests itself and persists in neutron-rich odd-mass S isotopes in the vicinity of N = 28.
Model-independent lifetime measurements of the 43,45S excited states were performed by applying the Recoil Distance Method with the TRIPLEX Plunger in conjunction with GRETINA to fast rare isotope beams at the NSCL. We will discuss the search for isomeric or long-lived states in 45S and attempt to fully characterize the band structure of the low-lying states in 43S, which provide key information to establish a comprehensive picture of the shape coexistence in this region.

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