

Single neutron transfer experiments close to the r-process line

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Supernovae are violent thermonuclear explosions which synthesize half of the elements heavier than iron. The rapid neutron capture process (r-process) is thought to be the main production mechanism for these elements. Critical input for r-process models includes structure information on neutron-rich nuclei far from stability.

At the HRIBF at Oak Ridge National Laboratory we have made the first neutron-transfer measurement to study a predicted r-process nucleus, ⁸³Ge. Prior to this measurement, only the half-life of ⁸³Ge was known. We have used the (d,p) reaction with beams of radioactive ⁸²Ge and ⁸⁴Se to extract spectroscopic information about both the ground state and low-lying excited states of nuclei one neutron past the shell closure at N=50.

We are extending our techniques to study nuclei around the doubly-magic ¹³²Sn nucleus. We have made a proof of principle study of (d,p) reactions in inverse kinematics in the A~132 region using a stable beam of ¹²⁴Sn.

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