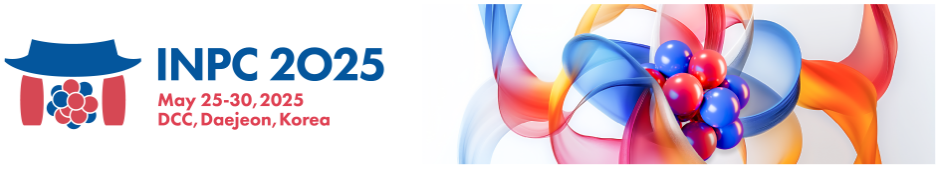


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# ToF-Brho mass measurements of neutron-rich nuclei near N=70

The astrophysical origin for the chemical elements between the first and second $r$-process peaks is a matter of intense debate, with a number of nucleosynthesis processes at explosive stellar environments possibly contributing to their production. Reliable data on the trends of neutron separation energies of neutron-rich isotopes are required to model neutron-capture processes that would produce these elements. Masses of $^{104}$Y, $^{106}$Zr, $^{112}$Mo, and $^{115}$Tc have been measured with the time-of-flight-magnetic-rigidity (ToF-B$\rho$) technique at the National Superconducting Cyclotron Laboratory at Michigan State University. The experiment is the first application of the ToF-B$rho$ technique at the S800 spectrograph that reached the mass region relevant to heavy-element nucleosynthesis. The two-neutron separation energy deduced from the measured masses exhibits a smooth trend consistent with the theoretical predictions within the range of experimental uncertainty, indicating that there is no sudden shape transition in these isotopes as hinted at by previous data.

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