

NG-Trap: Trap System for Measuring Neutron Capture Cross Section of Short-lived Neutron Rich Isotopes

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Neutron-capture cross-sections of radioactive neutron-rich isotopes have a wide impact on nuclear astrophysics, nuclear reactions and nuclear structure studies. Measurement of these cross-sections is currently considered impossible due to the instability of the targets and projectile. We propose a method to overcome this limitation. We plan to stop and thermalise fission fragments in a cryogenic stopping cell. These fragments will then form a cooled low-energy beam transported into an RF trap system (coined ‘NG-Trap’ [1]). An intense neutron beam will then irradiate this trapped ‘cloud target’. The reacted ions will be mass-selected, identified and counted using a multiple-reflection time-of-flight mass-spectrometer (MR-TOFMS), thus extracting (n,γ) cross-sections.

This talk will present preliminary results towards the goal of generating the required ‘cloud target’. A demonstrator system based on a triple-RFQ system[2] with an ion capacity of more than 10^{10} ions will be presented. This system is a major milestone of the plan to install a high-capacity trap at the Soreq Applied Research Accelerator Facility (SARAF), currently under construction in Yavne, Israel.

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 - [2] E. Haettner *et al.*, Nucl. Instr. Meth. A **880**, 138 (2018).
 - [3] I. Mardor *et al.*, Eur. Phys. Jour. A **54**, 91 (2018).