

ABSTRACT

Experimental Level Densities for Neutron Capture from White Neutron Beams

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The neutron capture rates important for nucleosynthesis problems typically involve neutron rich nuclei. The main uncertainty for these reaction rates comes from estimates of statistical properties that enter the Hauser-Feshbach model, namely the level density of the excited compound nucleus and the strength function describing the evaporation of gamma-rays. While many of the nuclei important for some of these processes are close to the valley of stability, modern statistical model calculations of the relevant neutron-capture rates still carry significant uncertainties that are identified in recent sensitivity studies.

We have recently applied the evaporation technique for the extraction of experimental level densities to the case of (n,x) reactions on zinc isotopes. We plan to expand the technique to heavier nuclei that may be relevant to the nucleosynthesis of elements observed in Carbon-Enhanced Metal-Poor stars or generally in stellar environments with neutron densities between the s- and the r- process. In this talk, I will present the experimental technique we are using and its theoretical foundation, discuss assets and limitations from the point of view of experimental and theoretical capabilities, as well as the applicability to specific astrophysics scenarios.

This material is based upon work supported by the U.S. Department of Energy, Office of Science, Nuclear Physics program under Award Number DE-SC-0022538.