

UNIVERSITY OF NOTRE DAME
DEPARTMENT OF PHYSICS

NUCLEAR SEMINAR

Monday, March 14

Inferring neutron capture rates of short-lived isotopes

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Nuclear reactions where an exotic nucleus captures a neutron are critical for a wide variety of applications, from energy production and national security, to astrophysical processes and nucleosynthesis. Neutron capture rates are well constrained near stable isotopes where experimental data are available; however, moving far from the valley of stability, uncertainties grow by orders of magnitude. This is due to the complete lack of experimental constraints, as the direct measurement of a neutron-capture reaction on a short-lived nucleus is extremely challenging. Indirect techniques have been developed to address this experimental shortcoming. The most recent indirect technique, the so called b-Oslo method, takes advantage of the beta decay of a short-lived radioactive nucleus to populate high energy states in the daughter. The subsequent gamma-ray cascade is detected using a total absorption spectrometer. Using an iterative technique to extract the first gamma-ray emitted in each cascade along with appropriate experimental normalizations, the nuclear level density and gamma-ray strength function are extracted. The two quantities are inserted in a Hauser-Feshbach model to constrain the neutron capture rate. An outline of the technique along with a recently obtained validation and extension to neutron-rich nuclei relating to the weak r-process will be presented.

4 pm – 5 pm
Nuclear Science
Laboratory
124 Nieuwland
Science Hall

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All interested  
persons are  
cordially invited  
to attend

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Refreshments will be
served prior to the
seminar in room 124