Notre Dame Science
Department of Physics

NUCLEAR REACTIONS FOR ASTROPHYSICS AND OTHER APPLICATIONS*

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Cross sections for direct, resonance, and compound reactions play an important role in models of astrophysical environments and simulations of the nuclear fuel cycle. Often the reactions of interest have small cross sections in the relevant energy regime, or involve short-lived or highly radioactive target nuclei, which makes determining their cross sections difficult. To provide the required data, indirect methods, such as inverse-kinematics experiments with radioactive beams, combined with theoretical treatments, have to be developed.

This presentation will give a brief outline of indirect methods for obtaining cross sections. The primary focus will be the current status of the surrogate reactions method, an indirect approach for determining cross sections of compound-nuclear reactions. Past applications of the surrogate method have demonstrated that it can provide useful cross section estimates for neutron-induced fission of actinides. An outline of the surrogate approach will be given, examples of successful applications will be shown, and recent progress made in determining neutron-capture cross sections for astrophysics will be discussed. Reaction-theory developments that can improve the method, as well as provide insights into resonance reactions and nuclear-structure measurements, will be considered.

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Nuclear Seminar

All interested persons are cordially invited to attend.