UNIVERSITY OF NOTRE DAME
DEPARTMENT OF PHYSICS

NUCLEAR SEMINAR

Monday, April 10

Inclusive deuteron-induced reactions

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Deuteron-induced reactions have long been used to probe single-particle aspects of nuclear spectra. Understanding the reaction mechanism is essential in order to disentangle direct reaction contributions (transfer and elastic breakup) from compound nucleus formation. Aside from providing valuable spectroscopic information about the nature of single-particle states in nuclei, the absorption of the neutron can be used at profit to study neutron-induced reactions in radio active isotopes with the surrogate reaction method in inverse kinematics. Within this context, we have recently developed a reaction formalism that integrates consistently the various reaction channels (elastic breakup, neutron transfer and neutron capture) present in deuteron-induced reactions. The reaction is described as a two-step process, namely the breakup of the deuteron followed by a propagation of the loose neutron in the target field. This field is modeled with an optical potential, and can account for the absorption of the neutron both in finite-width bound states and in the above neutron-emission threshold continuum states. The connection with structure models is essentially encoded in this neutron-target effective interaction, such as microscopic (coupled-clusters calculations) and dispersive, semi-microscopic (dispersive optical model) optical potentials. Within this context, a correct treatment of the non-locality of these interactions is important and under way. The ultimate goal is to provide a powerful tool (consistently integrating structure and reactions) to predict and analyze the single-nucleon structure (both above and below nucleon emission threshold) of the new isotopes expected to be available for experimentation in exotic beam facilities, as measured in nucleon transfer reactions.

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