

University of Notre Dame
College of Science
Department of Physics

NUCLEAR SEMINAR

Predictions for Nucleon-Nucleus Reactions: Benchmarks for Modern Structure Models

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Monday, October 11, 2010 4:00 p.m. NSH 124
(Refreshments will be served prior to the seminar in 124 NSH)

Large-scale computational capabilities make microscopic predictions for nucleon-nucleus scattering now possible. We will present calculations which make use of state-of-the-art computational capabilities and modern structure models. In order to predict reaction cross sections, we explicitly coupled the elastic scattering channel to all particle-hole (p-h) excitation states of the target nucleus, as well as to all relevant pickup channels. These p-h states may be regarded as doorway states through which the flux flows to more complicated configurations, and to long-lived compound nucleus resonances. Such calculations for nucleon-induced reactions were performed using a QRPA description target excitations, coupling to all inelastic open channels, as well as to all transfer channels that correspond to the formation of a deuteron. For the first time, complete and consistent calculations of excitations, starting from basic interaction between nucleons within the nuclei and first principle structure models, account fully for the observed reaction cross-sections, at least for incident energies above 10 MeV. Our results are in very good agreement with predictions of a phenomenological optical potential and with experimental data. Our procedure serves as a method to evaluate the quality of structure models since our calculations yield predictions that can be directly compared with measurable quantities.

ALL INTERESTED PERSONS ARE CORDIALLY INVITED TO ATTEND

10/7/2010 10:46 AM