Physics Colloquium

Ab initio calculations of nuclear reactions important for astrophysics

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WEDNESDAY

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4:00 P.M.

RM 118 NSH

The description of nuclei starting from the constituent nucleons and the fundamental interactions among them has been a long-standing goal in nuclear physics. In addition to the complex nature of nuclear forces with two-nucleon, three-nucleon and possibly even four-nucleon components, one faces the quantum-mechanical many-nucleon problem governed by an interplay between bound and continuum states. In recent years, significant progress has been made in ab initio nuclear structure and reaction calculations based on input from QCD employing Hamiltonians constructed within chiral effective field theory. Among the newly developed methods is the No-Core Shell Model with continuum (NCSMC) capable to describe simultaneously bound and unbound states of light nuclei. I will present NCSMC results for reactions important for astrophysics that are difficult to measure, such as 7Be(p,γ)8B, 3He(α,γ)7Be and 3H(α,γ)7Li radiative capture, and the 3H(d,n)4He and 3He(d,p)4He fusion. I will also highlight our recent studies of the exotic 11Be and 11N nuclei and address prospects of calculations of 11C(p,γ)12N, 2H(α,γ)6Li and 4He(nn,γ)6He capture reactions.

Refreshments
in Rm 202 NSH
@ 3:30 pm

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