DREB 2012 - Direct Reactions with Exotic Beams



Contribution ID: 67

Type: Talk

Ab initio calculations of light-ion reactions

Monday, 26 March 2012 11:00 (20 minutes)

We build a new ab initio many-body approach [1] capable of describing simultaneously both bound and scattering states in light nuclei, by combining the resonating-group method [2] with the ab initio no-core shell model [3]. In this way, we complement a microscopic-cluster technique with the use of realistic interactions, and a microscopic and consistent description of the nucleon clusters. We will present results for proton scattering on 7Be and for the S-factor of the 7Be(p, γ)8B capture reaction important for astrophysics, and for neutron scattering on 8He and 8Li. We will also highlight the first results of the d-3H and d-3He fusion calculations, of the 3He-4He scattering and the developments to include three-body cluster states within our ab initio approach.

*Prepared in part by LLNL under Contract DE-AC52-07NA27344.

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- 2. K. Wildermuth and Y. C. Tang, A unified theory of the nucleus, (Vieweg, Braunschweig, 1977).
- 3. P. Navratil, J. P. Vary, and B. R. Barrett, Phys. Rev. Lett. 84, 5728 (2000).

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Session Classification: Session 2