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Bat 703, p 45, CEA Saclay, Orme des Merisiers

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From the Chiral Nuclear Interaction to Ab Initio Description of Light-ion Fusion Reactions

Chiral forces offer an alternative venue for accurate calculations bridging the gap with the underlying theory of QCD. Their predictive power has to be tested in ab initio calculations. The ab initio No- Core Shell Model with Continuum (NCSMC) [1] is capable of addressing both structural and reaction properties [2, 3] of light-nuclei. This method can accurately describe reaction systems of more than five nucleons extending the range of ab initio reaction applications. We have developed the NCSMC formalism for the description of nucleon- and deuteron-nucleus scattering including three-nucleon forces. We will present results for the N-4He and d-4He scattering processes when accounting for the chiral two- plus three-nucleon interaction versus the chiral two-nucleon interaction, our progress to describe the α ; + n + n three-cluster dynamics and initial calculations of the d(t, α ;)n fusion including the three-nucleon forces within NCSMC. This work paves the way for modeling of light-ion fusion reactions with realistic nuclear forces, that are important for understanding nuclear astrophysics processes.

References

- [1] S. Baroni, P. Navratil and S. Quaglioni Phys. Rev. Lett. 110, 022505 (2013); Phys. Rev. C 87, 034326 (2013).
- [2] S. Quaglioni and P. Navratil, Phys. Rev. Lett. 101, 092501 (2008); Phys. Rev. C 79, 044606 (2009).
- [3] G. Hupin, J. Langhammer, P. Navratil, S. Quaglioni, A. Calci and R. Roth, Phys. Rev. C 88, 054622 (2013).

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