Nuclear Seminar

Toward Realistic Description of Low-energy Fusion of Light Ions for Astrophysics

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The description of nuclear reaction observables from first principles, which provides many insights into the nuclear Hamiltonian, has been a long-standing goal in nuclear physics. The *ab initio* no-core shell model combined with the resonating-group method (NCSM/RGM) [1, 2] is capable of addressing both structural and reaction properties of light-nuclei. While promising results have already been achieved starting from a two-body Hamiltonian, a truly realistic prediction of nuclear observables requires the treatment the three-nucleon interactions. Using similarity-renormalization-group evolved two- and three-nucleon interactions [3, 4], I will present N-^{4}He and d-^{4}He scattering processes when accounting for the chiral two- plus three-nucleon interaction versus the chiral two-nucleon interaction. This work paves the way to modeling of light-ion fusion reactions with realistic nuclear forces, that are important for understanding nuclear astrophysics processes.[a]

References

[1] S. Quaglioni and P. Navr_atil, Phys. Rev. Lett. **101**, 092501 (2008); Phys. Rev. C **79**, 044606 (2009).

[2] P. Navr_atil and S. Quaglioni, Phys. Rev. C **83**, 044609 (2011).

[3] E. Jurgenson, P. Navr_atil, and R. J. Furnstahl, Phys. Rev. C **83**, 034301 (2011).

[4] R. Roth, J. Langhammer, A. Calci, S. Binder, and P. Navr_atil, Phys. Rev. Lett. **107**, 072501 (2011).

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