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Ab initio calculations of nuclear scattering and transfer reactions

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The description of nuclei starting from the constituent nucleons and the realistic 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, we have made a significant progress in developing ab initio many-body approaches capable of describing both bound and scattering states in light nuclei simultaneously employing two- and three-nucleon forces from chiral effective field theory. We will present calculations of resonances of exotic nuclei 7,9He, 11N, scattering of 10C and 8He on protons, structure of the neutron rich 17C. Further, we will discuss our efforts to describe (d,p) and (d,n) transfer reactions within our ab initio framework.

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