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Advances in *ab initio* theories for nuclear reactions

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Driven by high-performance computing and new ideas, in recent years *ab initio* theory has made great strides in achieving a unified description of nuclear structure, clustering and reactions from the constituent nucleons and their strong and electroweak interactions. This is giving access to forefront tools and new fertile grounds to further our understanding of the nuclear force and electroweak currents in nuclei in terms of effective degrees of freedom. A fundamental understanding of nuclear reaction mechanisms and a new capability to accurately compute their properties is also relevant for nuclear astrophysics, terrestrial applications of nuclear fusion, and for using nuclei as probes of fundamental physics through, for example, neutrino-nucleus scattering. In this talk, I will present recent highlights and reflect on future perspectives for this area of nuclear theory. Prepared by LLNL under Contract No. DE-AC52-07NA27344.