

Ab initio approach to the structure and reactions of light nuclei

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Over the last decade we have seen significant progress in several areas that has been key for the achievement of successful ab initio descriptions of nuclear structure for light nuclei. This exciting trend in modern nuclear theory is now continuing with the evolution of methods to treat bound, scattering, and resonance states within a single unified formalism. The development of such a capability is crucial for obtaining a fundamental understanding of the structure of exotic nuclear systems; currently being investigated at radioactive beam facilities. Such methods would also form the foundation for a microscopic treatment of low-energy nuclear reactions on light nuclei.

An overview of this very active field of research will be presented with focus in particular on our understanding of low-energy, effective nuclear interactions based on chiral perturbation theory, and challenges in the development of a unified description of nuclear structure and reactions. In particular, the importance of many-body degrees of freedom together with a consistent treatment of couplings to open channels.