

Plenary Talk PV IV Wed 8:45 HS1+HS2
Ab Initio Nuclear Structure Theory with Chiral Two- plus Three-Nucleon Interactions — ●ROBERT ROTH — Institut für Kernphysik, Technische Universität Darmstadt, Germany

Low-energy nuclear theory has entered an era of ab initio nuclear structure and reaction calculations based on input from QCD. One of the most promising paths from QCD to nuclear observables employs Hamiltonians constructed within chiral effective field theory as consistent starting point for precise ab initio nuclear structure and reaction studies. However, the full inclusion of chiral two- plus three-nucleon (NN+3N) interactions in exact and approximate many-body

calculations still poses a formidable challenge. We discuss recent developments towards this goal, ranging from consistent Similarity Renormalization Group evolutions of NN+3N Hamiltonians to large-scale ab initio calculations for ground states and spectra in the Importance-Truncated No-Core Shell Model with full 3N interactions. We highlight recent achievements and discuss open issues and future perspectives for nuclear structure theory with QCD-based interactions. Moreover, we discuss successful steps towards merging ab initio structure and reaction theory and show applications to low-energy reactions in the p-shell relevant for astrophysics.

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