Finite volume pionless effective field theory for nuclear systems

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Finite-volume pionless effective field theory is an efficient framework with which to perform the extrapolation of finite-volume lattice QCD calculations of multi-nucleon spectra and matrix elements to infinite volume and to nuclei with larger atomic number. In this contribution, a new implementation of this framework based on correlated Gaussian wavefunctions optimized using differentiable programming and using a solution of a generalised eigenvalue problem is discussed. This approach is found to be more efficient than previous stochastic implementations of the variational method, as it yields comparable representations of the wavefunctions of nuclei with atomic number $A \leq 6$ with an order of magnitude fewer terms. Future applications to infinite-volume extrapolations of p-shell nuclei and nuclear matrix elements will also be discussed.