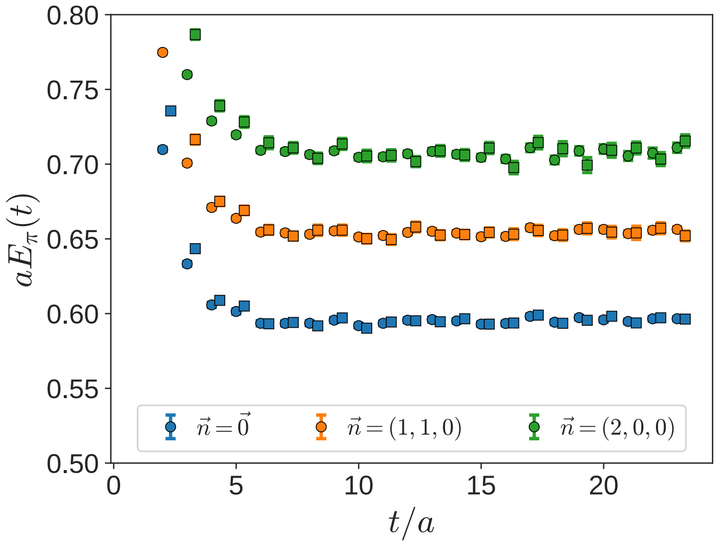
Sparsified correlator construction

Objectives

- Develop novel lattice QCD (LQCD) calculation approach to speed up many-body contractions and enable efficient studies of light nuclei in LQCD
- Reduce computational cost for LQCD measurements by exploiting spatial correlations in quark propagators.

Impact

- Computationally expensive LQCD measurements can be sped up by a large factor without losing fidelity of low-energy physics
- Enables calculations of larger nuclear systems than previously possible and



- Sparse (■) and full (●) effective energies for the pion at various different momenta

Accomplishments

- Developed software infrastructure for sparsifying quark propagators
- Investigated effects of sparsification in low energy sector of single hadrons (pions, protons, rho-mesons and Delta-baryons) and nuclei up to atomic number A=4, finding no loss of precision in extraction of ground states energies
- Developed All-Mode-Averaging symmetry based correction procedure to cheaply re-introduce degrees of freedom missing in sparsified calculations