

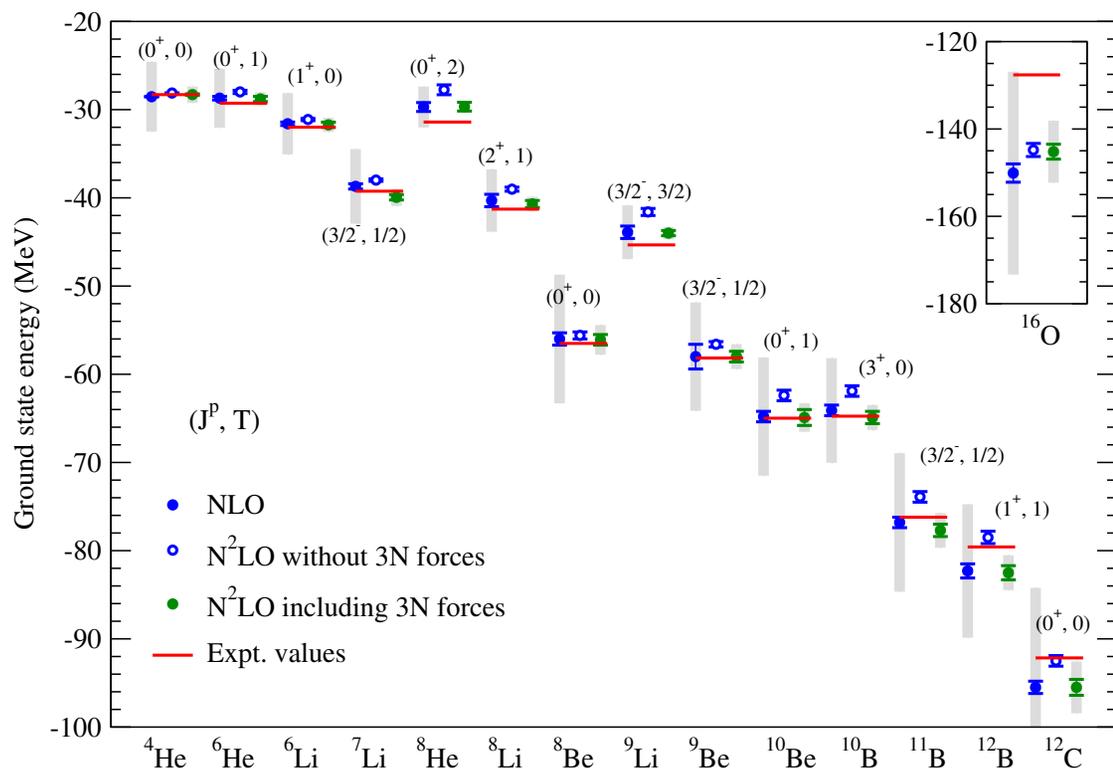
# Chiral Effective Field Theory for Nuclei Structure

## Scientific Achievement

- First nuclear structure solutions with Chiral Effective Field theory consistent through Next-to-Next-to-Leading Order (N<sup>2</sup>LO)
- Established the predictive power of *ab initio* nuclear theory and quantified the uncertainties

## Significance and Impact

- Guides experimental programs at FRIB, DOE's rare isotope facility
- Shows three-nucleon (3N) forces make significant contributions



Ground states of light nuclei at Next-to-Leading Order (NLO and solid blue symbols) and Next-to-NLO (N<sup>2</sup>LO). The progression from open to solid green symbols demonstrates the important role of chiral 3-nucleon forces.

## Research Details

- Solves the No Core Shell Model on DOE's supercomputers (Argonne and NERSC)
- Predicts properties of ground and excited states
- Achieves understanding of theoretical uncertainties due to (1) truncating the chiral expansion at N<sup>2</sup>LO (grey bands); (2) numerical extrapolation (blue and green bars)



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<https://journals.aps.org/prc/abstract/10.1103/PhysRevC.99.024313>  
Contacts: [ivary@iastate.edu](mailto:ivary@iastate.edu); [pmaris@iastate.edu](mailto:pmaris@iastate.edu)