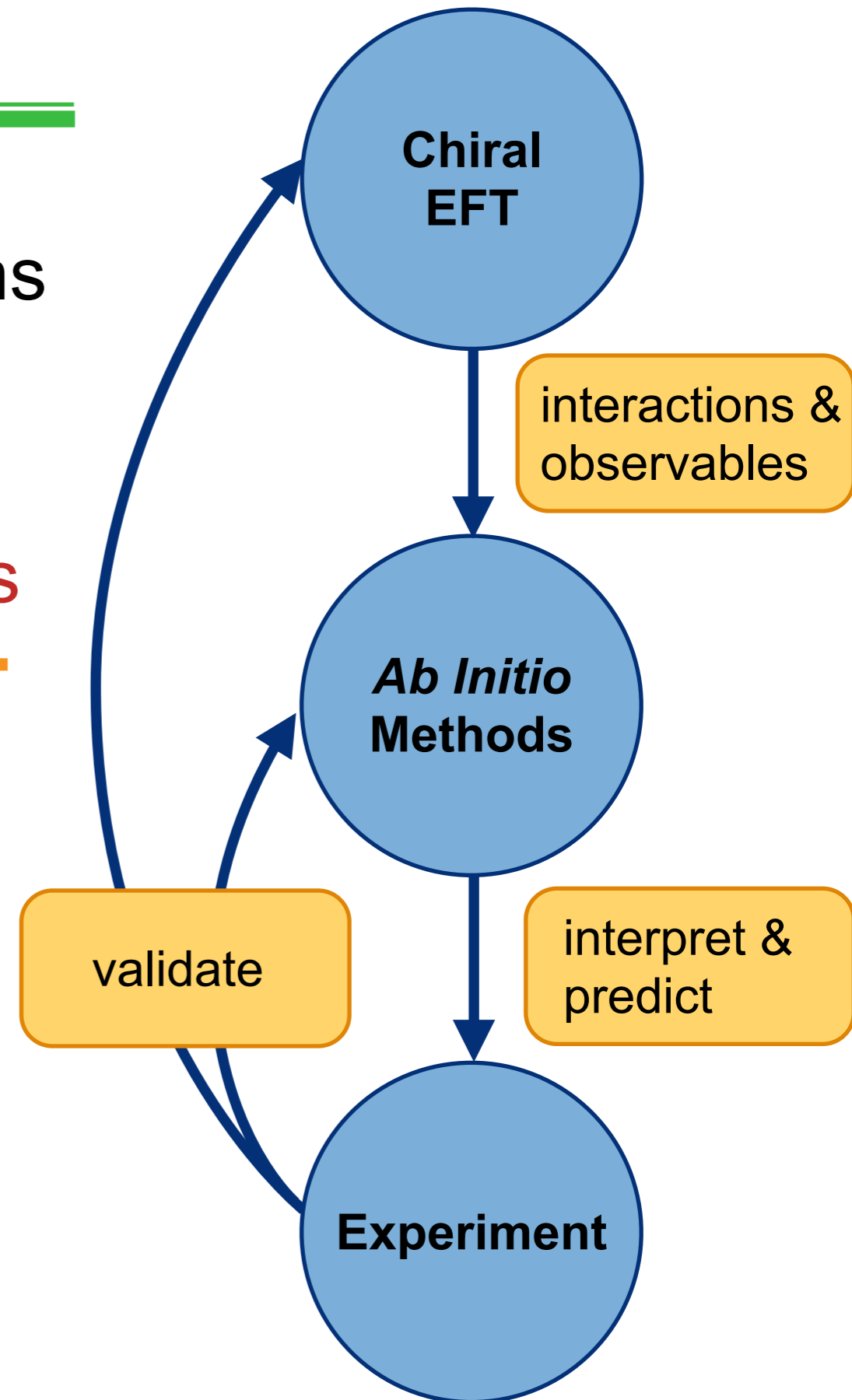


# Physics Objectives

- low-energy QCD via chiral EFT:  
**consistent** framework for interactions & observables
- *ab initio* many-body methods
- ▶ **controlled uncertainties at all stages**

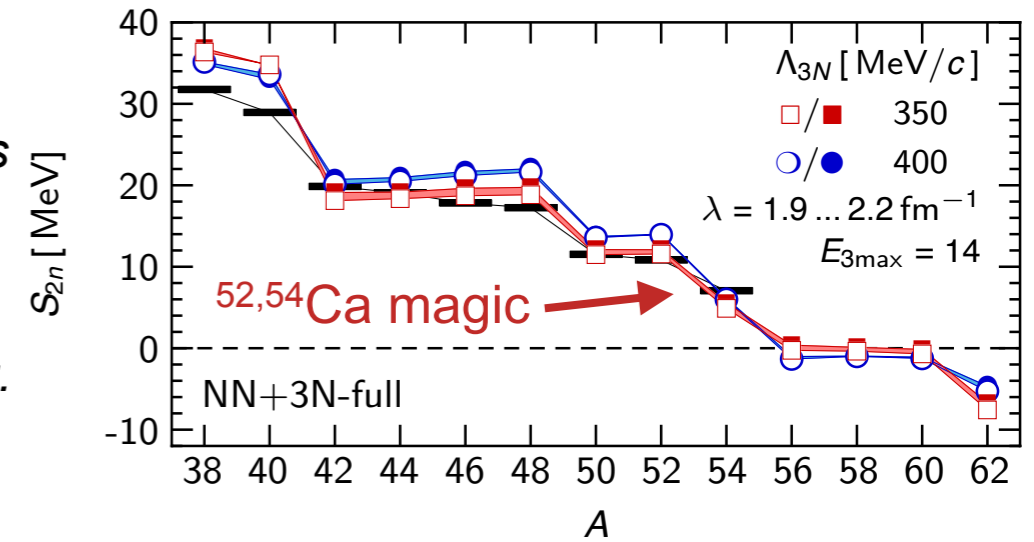
- **interpretation & prediction** of experiments
- nuclear structure inputs with **quantified uncertainties** for
  - nuclear reaction theory
  - nuclear astrophysics
  - fundamental symmetries
  - neutrino physics



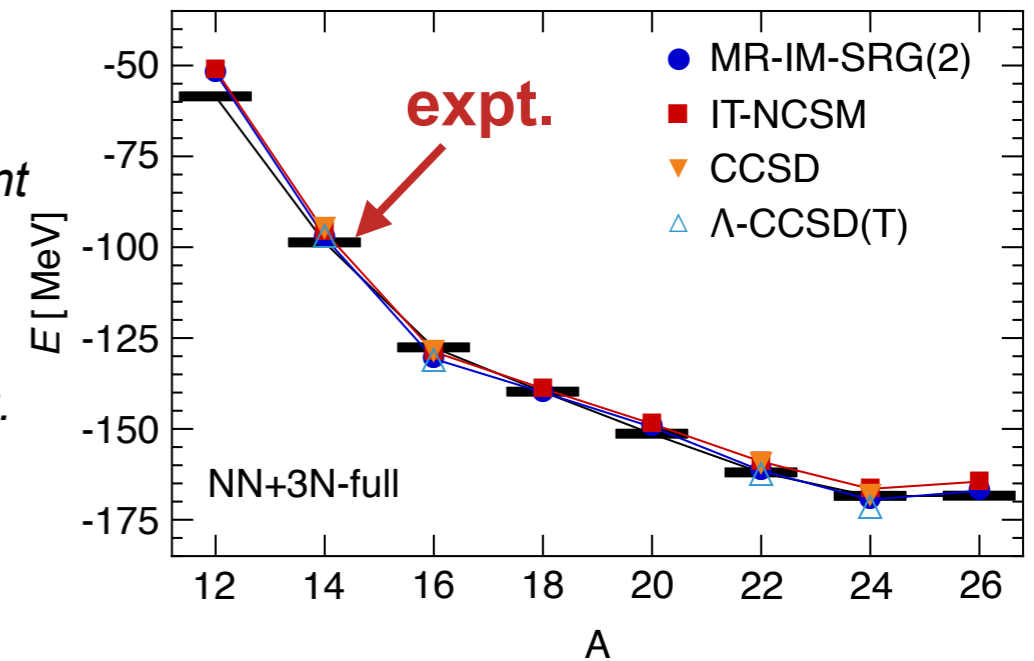
# Status

- (MR-)IM-SRG ground-state calculations reach **tin isotopes** with chiral NN+3N interactions
- mild computational scaling allows **exploration of uncertainties** due to
  - many-body basis & truncations
  - chiral expansion
- **spectroscopy** with **non-empirical** Shell Model interactions from IM-SRG

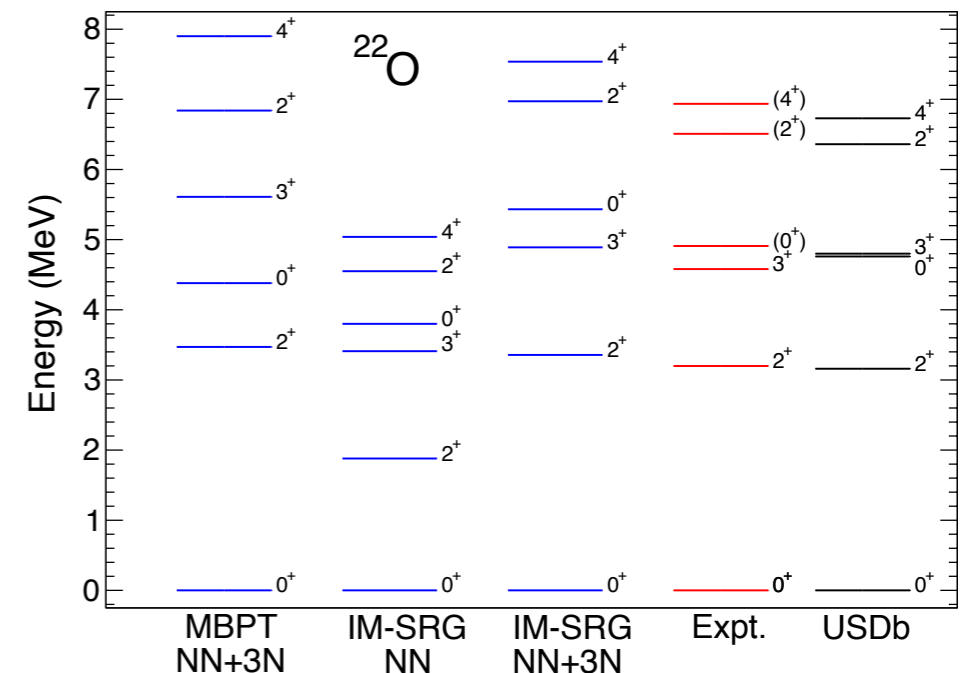
**Figure: Calcium two-neutron separation energies for chiral NN+3N interactions with different cutoffs. Black bars are expt. values**



**Figure: Oxygen ground-state energies for different ab initio methods, using the same NN+3N interactions. Black bars are expt. values.**



**Figure: <sup>22</sup>O spectra from IM-SRG generated Shell Model interactions, compared to experiment and the phenomenological USD<sub>b</sub> interaction.**



# Outlook & Needs

