

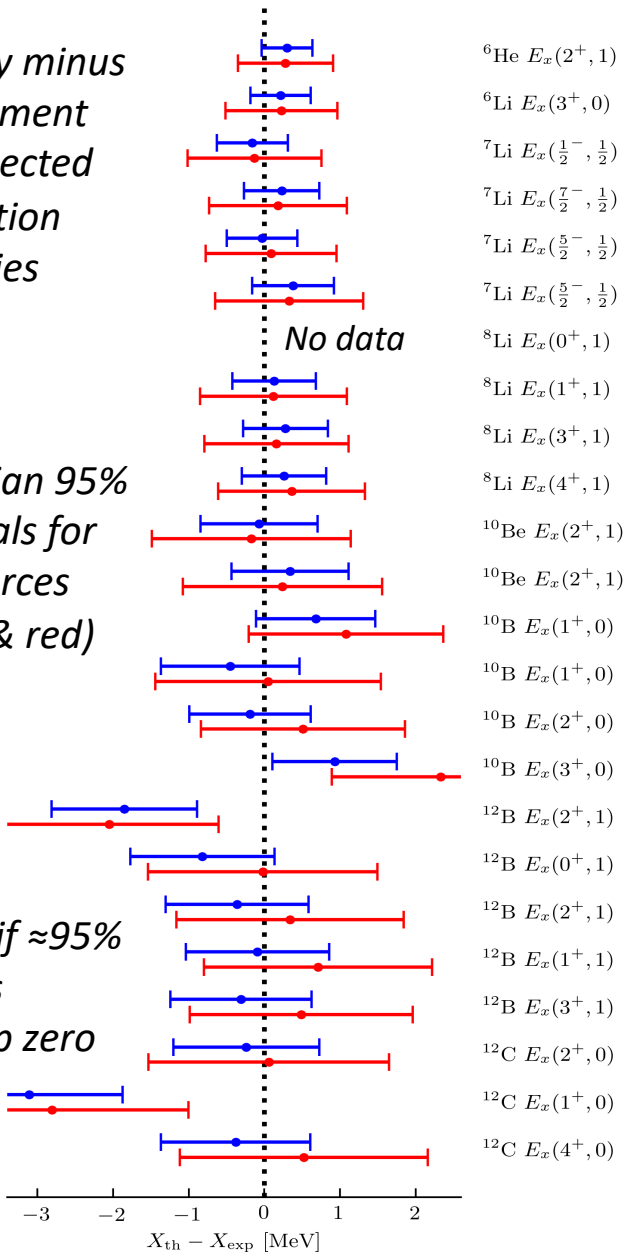


# Excitation energies from effective field theory with quantified uncertainties

Theory minus  
experiment  
for selected  
excitation  
energies

Bayesian 95%  
intervals for  
two forces  
(blue & red)

Check if  $\approx 95\%$   
of bars  
overlap zero



## Objectives

- Predict properties of ground and excited states of light nuclei with robust theoretical error estimates.
- Test consistent [LENPIC](#) chiral effective field theory (EFT) interactions with 2- and 3-nucleon forces.
- Extend and test a Bayesian statistical model that learns from the order-by-order EFT convergence pattern to account for correlated excitations.

## Impact

- First test of novel chiral nucleon-nucleon potentials with consistent three-nucleon forces.
- Demonstrates understanding of theoretical uncertainties due to chiral EFT expansion.
- Accounting for correlations produces agreement with experimental excitation energies (see figure).
- Exceptions in  $^{12}\text{C}$  and  $^{12}\text{B}$  indicate different theoretical correlations in the nuclear structure.

## Accomplishments

P. Maris et al, arXiv: 2012.12396 [nucl-th]