Abstract Submitted
for the SES21 Meeting of
The American Physical Society

Global Sensitivity Analysis of Collective Observables for Light Nuclei[1] KEVIN BECKER, KRISTINA LAUNEY, Louisiana State University, TOMAS DYTRYCH, Academy of Sciences of the Czech Republic — Collective motion plays an important role in the dynamics of atomic nuclei across the Segre chart, and ab initio studies show that these features arise from an emergent symmetry in nuclear Hamiltonians [1]. With the goal to constrain uncertainties on collective observables computed with chiral effective field theory interactions, we couple the framework of the symmetry-adapted no-core shell model with the method of global sensitivity analysis [2]. In this talk, we discuss a sensitivity analysis that determines the low-energy constants in the interaction that have the largest impact on collective observables. We generate a sufficiently large sample of unique sets of the low-energy constants, and diagonalize the associated Hamiltonians to obtain the low-lying wavefunctions for selected light nuclei. Specifically, we compute the quadrupole moments for 6Li and 12C. This opens the door for constructing nuclear potentials for precise calculations of collective nuclear observables. [1] T. Dytrych, K. D. Launey, J. P. Draayer, et al., Phys. Rev. Lett. 124, 042501 (2020) [2] A. Ekström and G. Hagen, Phys. Rev. Lett. 123, 252501 (2019)

[1]Supported by the U.S. NSF (PHY-1913728) and SURA. This work benefitted from computing resources provided by LSU (www.hpc.lsu.edu), the National Energy Research Scientific Computing Center (NERSC) and Frontera computing project at TACC.

Kevin Becker
Louisiana State University

Date submitted: 30 Sep 2021 Electronic form version 1.4