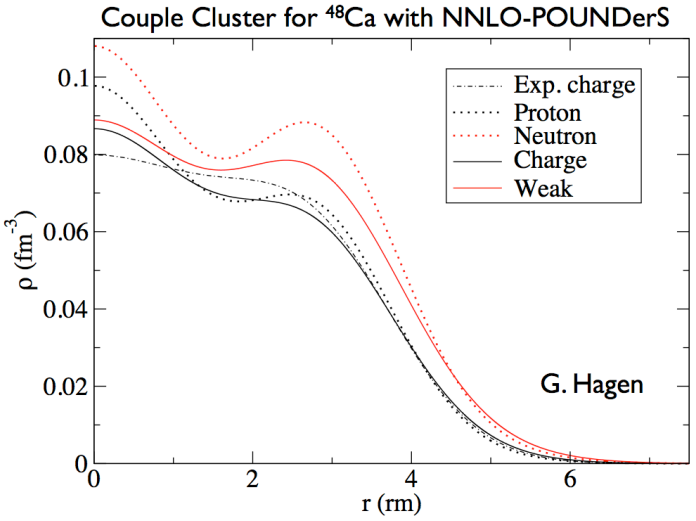
NUCLEI Calculations Support JLAB Experiment

Objectives

- Explore how parity violating measurements of neutron densities at Jefferson Laboratory can constrain density functional and ab initio theories of nuclear structure.
- Optimize nuclear structure impact of possible parity violation experiments.

Impact

- JLAB measurement of neutron radius of ^{48}Ca will test both ab initio and density functional theories of nuclear structure by providing important, model independent, constraints on isovector interactions.



Left: Proton (dotted black) and neutron (dotted red) densities for ^{48}Ca as predicted by coupled cluster calculations using a new chiral effective field theory interaction. The weak charge density (solid red) is largely the neutron density folded with a nucleon form factor. This density will be measured by the JLAB parity violating experiment CREX. Right: Workshop at JLAB discussing NUCLEI predictions for CREX.

Accomplishments

1. New coupled cluster calculations relate neutron density of ^{48}Ca to chiral two and three nucleon forces.
2. Extensive density functional calculations show correlations of neutron radii for ^{48}Ca and ^{208}Pb with many other physical quantities.

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NUCLEI Nuclear Computational Low-Energy Initiative

Reference:

Contact: C. J. Horowitz, horowit@indiana.edu
W. Nazarewicz, witek@utk.edu