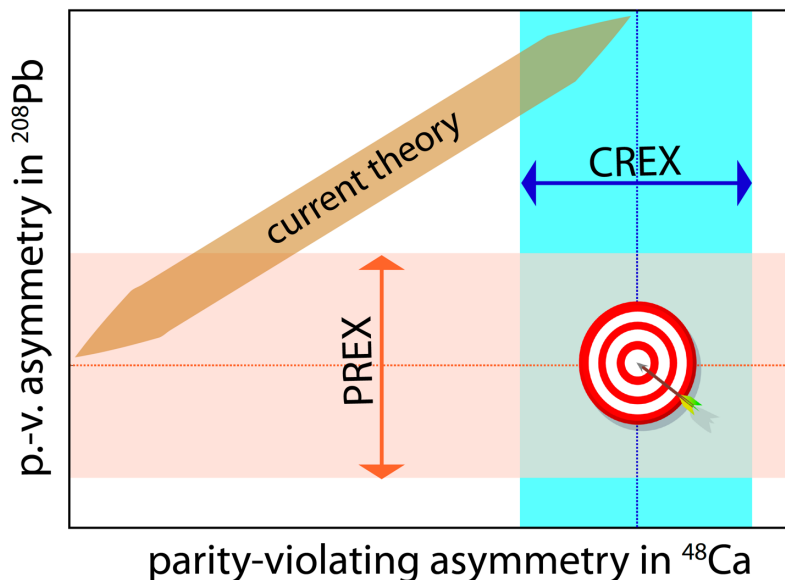


PREX, CREX, and nuclear models: the plot thickens

Objectives

- The recent electron scattering measurements of the parity-violating asymmetry A_{PV} in lead-208 (PREX experiment) and calcium-48 (CREX experiment) provided two highly anticipated observables that can inform models of nuclei.
- To understand the impact of these measurements, we carried out a critical analysis of PREX and CREX results using nuclear density functional theory and the tools of statistical uncertainty quantification.



Impact

- We conclude that the simultaneous accurate description of A_{PV} in calcium-48 and lead-208 cannot be achieved by the current global models that have been used successfully to describe nuclear properties along the whole nuclear chart. This result calls for a critical search of limitations of nuclear models and/or possible sources of uncertainty in experiment.
- Until the tension between theory and experiment is resolved, one should exercise extreme caution when interpreting the CREX and PREX measurements in the context of neutron skins or neutron star physics.

Accomplishments

- Publication: [Phys. Rev. Lett. 129, 232501 \(2022\)](#)
- Featured by: [DOE Science](#), [Phys.org](#).

Figure: The tension between the CREX and PREX values of A_{PV} and model predictions.