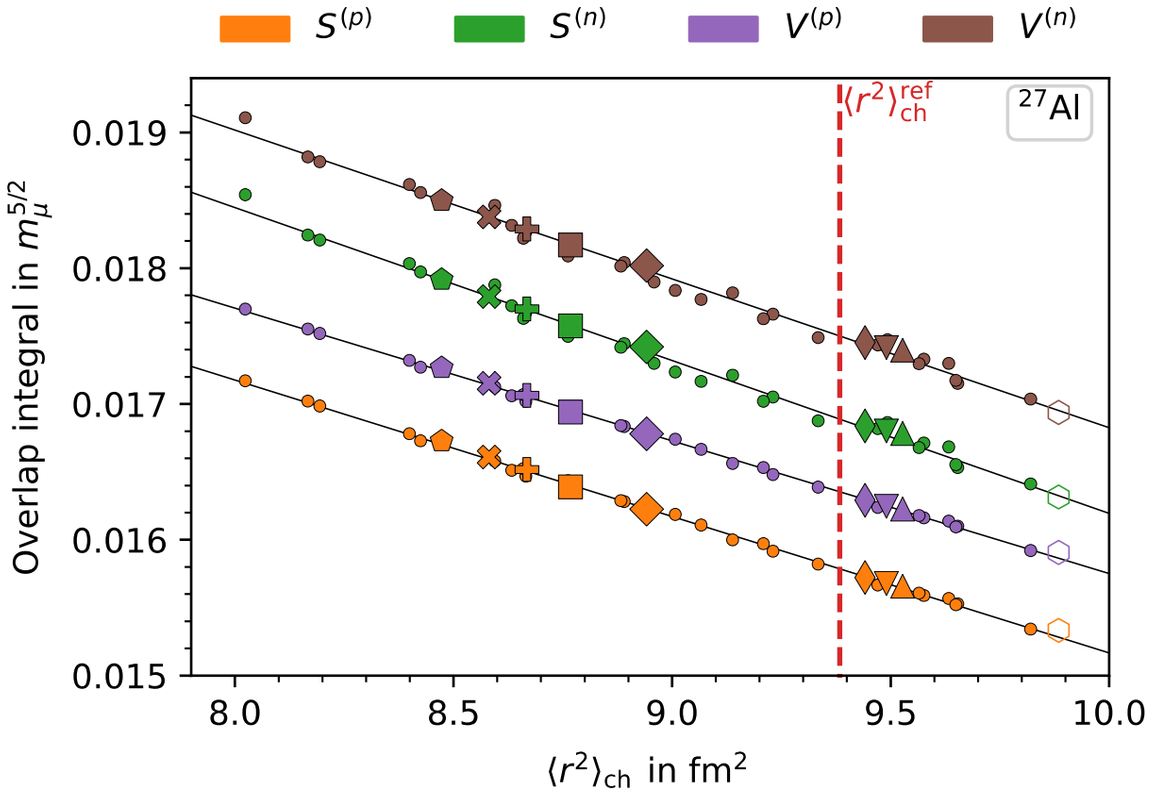
Ab initio calculations of overlap integrals for μ→e conversion in nuclei

U.S. DEPARTMENT OF ENERGY | Office of Science

NUCLEI Nuclear Computational Low-Energy Initiative

Objectives

- Predict nuclear responses to possible lepton-flavor violating interactions in candidate systems for ongoing experimental searches of μ→e conversion
- Quantify uncertainties in these responses, including correlations, to facilitate efforts to infer constraints on different models of lepton flavor violation from current and future bounds



The established correlations between the nuclear responses to lepton-flavor violating interactions and the charge radius of ^{27}Al together with the measured charge radius allow for precise predictions of these quantities, necessary to draw conclusions about lepton flavor violation in nature from ongoing and planned experiments.

Impact (as of now)

- Comprehensive treatment of uncertainties in calculations to establish tight correlation between the charge radius and nuclear responses
- Measured value of charge radius together with correlation provide precise prediction of nuclear contribution to μ→e conversion
- Improved on past approaches that used uncontrolled phenomenological methods, with large uncertainties for the neutron responses in particular
- Full uncertainties including covariances between nuclear responses provided to aid efforts to combine various experimental bounds on μ→e conversion to constrain models of lepton flavor violation

Accomplishments (as of now)

- Preprint: Heinz, Hoferichter, Miyagi, Noël, Schwenk, arXiv:2412.04545