SES21-2021-000053

Abstract for an Invited Paper
for the SES21 Meeting of
the American Physical Society

DMRG description of the island of inversion isotopes 28-33F[1]

KEVIN FOSSEZ, Florida State University

Neutron-rich nuclei near the limits of nuclear stability will be one of the main areas of study at the Facility for Rare Isotope Beams (FRIB) coming online in 2021. These systems exhibit features common to all open quantum systems due to their weakly bound or unbound character, and also reveal interesting information about the nuclear interaction due to their extreme neutron-to-proton ratios and emergent behaviors. This is particularly visible in the so-called island of inversion (IOI), a region of the nuclear chart around $Z = 10$ and $N = 20$ where nuclear structure deviates from the standard shell model predictions due to deformation and continuum effects. Recently, two experiments on the neutron-rich isotopes ^{28,29}F have revealed an unexpectedly large influence of continuum effects which effectively extends the IOI to these nuclei. In this work, I will show the mechanisms leading to these observations using state-of-the-art large-scale shell model calculations including continuum states and based on a core of ^{24}O and an effective two-body interaction with only three adjustable parameters. I will also present new predictions in the isotopes $^{25-33}$F to motivate future experiments at FRIB.

[1]DOE: DE-SC0013617 (Office of Nuclear Physics, FRIB Theory Alliance)