B(E2) measurements of heavy N = Z nuclei at FRIB

Michael Bentley[1]
[1]University of York, UK

Results will be presented on the measurement, at the new FRIB facility in the USA, of the B(E2) for the decay of the first excited state in N = Z ^{88}Ru [1] . This is the heaviest N = Z system for which such a measurement has been made.

Crucial questions remain unanswered in the heaviest accessible region of N = Z nuclei, where both the neutron and proton Fermi levels are located well inside the g9/2 shell. The details of how collectivity varies for N = Z nuclei between ^{56}Ni and ^{100}Sn, and the location, and extent, of the maximum collectivity presents a demanding test of our best nuclear-structure models – see e.g. [2].

The experiment was performed in at FRIB, using fragment beams of ^{89}Ru and ^{88}Tc, separated using the new ARIS spectrometer at FRIB. Gamma rays were recorded using GRETINA and the TRIPLEX plunger device was utilised in order to determine the lifetimes, and hence B(E2).

The results indicate a dramatic collapse of collectivity along the N=Z line. Two new shell-model approaches have been recently developed [3] and have been successfully applied in this case: a full large-scale shell model calculation using a new interaction (ZBM3) as well as the new DNO-shell-model approach, capable of dealing with very large valence spaces.

[1] M A Bentley et. al., submitted to Phys. Rev Lett.. 2025
[2] K. Kaneko, Y. Sun and T. Mizusaki, Phys. Rev. C 97 (2021) 054326
[3] J. Ha et al, Nature Communications 16, 10631 (2025)