

DNP19-2019-020018

Abstract for an Invited Paper
for the DNP19 Meeting of
the American Physical Society

Pairing Interactions in Mg-40

H.L. CRAWFORD, Lawrence Berkeley National Laboratory

The study of nuclei far from stability is one of the most active and challenging areas of nuclear structure physics. One of the most exotic neutron-rich nuclei currently accessible to experiment is ^{40}Mg , which lies at the intersection of the nucleon magic number $N=28$ and the dripline and is expected to have a large prolate deformation similar to that observed in the neighboring lighter isotopes $^{32-38}\text{Mg}$. In addition, the occupation of the weakly bound low- l $p_{3/2}$ state may lead to the appearance of an extended neutron halo. ^{40}Mg offers an exciting possibility and a rare opportunity to investigate the coupling of weakly bound valence particles to a deformed core, and the influence of near threshold effects on collective rotational motion.

We will discuss the results of an experiment carried out at RIBF RIKEN to study low-lying excited states in ^{40}Mg produced by a 1-proton removal reaction from a 240 MeV/u ^{41}Al secondary beam. Two gamma rays were observed, and the excitation spectrum shows unexpected properties compared to both neighboring Mg isotopes, and theoretical model predictions. Potential explanations for the observed structure will be speculated on, which may have interesting implications for weakly-bound nuclei across the Segre chart.

For the NP0906-RIBF03R2 Collaboration