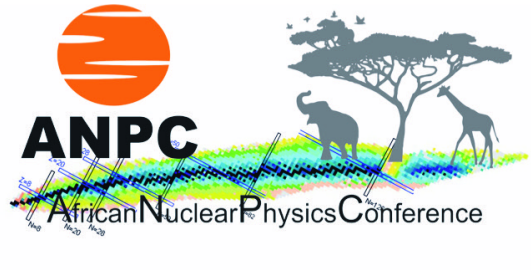

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Structure of 40Mg

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 40Mg [1, 2], 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⊠38Mg [3]. In addition, the occupation of the weakly bound low-‘ p3=2 state may lead to the appearance of an extended neutron halo. 40Mg 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 40Mg produced by a 1-proton removal reaction from a 240 MeV/u 41Al secondary beam. 40Mg and other final products were separated and identified using the Zero Degree Spectrometer, and prompt gamma rays were detected using the DALI2 array. Two gamma rays were observed, and the excitation spectrum shows unexpected properties compared to both neighboring Mg isotopes, and theoretical model predictions.
[1] T. Baumann et al., Nature 449, 1022 (2007).
[2] H. L. Crawford et al., Phys. Rev. C 89, 041303 (2014).
[3] P. Doornenbal et al., Phys. Rev. Lett. 111, 212502 (2013).
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