

## A Proposal for Invariant Mass Measurement of $^{39}\text{Mg}$ at SAMURAI

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We would like to propose an invariant mass measurement of the neutron unbound  $N=27$  nucleus  $^{39}\text{Mg}$ , lying one neutron hole outside of the quenched  $N=28$  shell gap. This region of the nuclear chart is an area of significant recent interest, with the quenching of the  $N=28$  shell gap below  $^{48}\text{Ca}$  resulting in well-developed ground-state deformation, rapid shape evolution and shape coexistence along the  $N=28$  isotones, and evidence for an extended region of deformation in the Mg isotopes extending from  $N=20$  to  $N=28$ . First structural information in the neutron-unbound nucleus  $^{39}\text{Mg}$  will provide insight into the evolution of structure both in the neighbouring  $N=28$  isotones, and the  $Z=12$  isotopes. This unbound nucleus will be produced following a one proton removal reaction from a secondary radioactive beam of  $^{40}\text{Al}$  on the thick liquid hydrogen target of MINOS. Charged particle decay products will be analyzed through the SAMURAI magnet while neutrons will be detected by the combination of NEBULA and NeuLAND. Details of the proposed experiment and preliminary simulation results will be presented.

**Primary author:** Dr CRAWFORD, Heather (Lawrence Berkeley National Laboratory)

**Presenter:** Dr CRAWFORD, Heather (Lawrence Berkeley National Laboratory)

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