FIRST DIRECT OBSERVATION OF ENHANCED OCTUPOLE COLLECTIVITY IN 144,146BA

Dr Brian Bucher[1], Dr Shaofei Zhu[2],
[1] Lawrence Livermore National Laboratory,
[2]Argonne National Laboratory,

The neutron-rich Ba isotopes near N=90 have long been predicted to exhibit enhanced octupole correlations. Until now, only indirect experimental evidence was available in the form of low-lying interleaved positive- and negative-parity levels with enhanced *E1* linking transitions. However, recent Coulomb excitation measurements performed at ATLAS using post-accelerated ^{144,146}Ba beams from ^{252}Cf fission (CARIBU source) provide the first direct confirmation of enhanced octupole collectivity in this mass region. Compared to a number of theoretical calculations using mean-field, beyond-mean-field, algebraic, and cluster model approaches, the new experimental octupole strengths are larger than any of those predicted with a measured $B(E3;\ 3^- \rightarrow 0^+)$ transition probability in ^{144}Ba of 48 W.u. [B. Bucher *et al.*, Phys. Rev. Lett. 116, 112503 (2016)]. Moreover, the new measurements do not indicate a reduction in octupole strength from ^{144}Ba to ^{146}Ba, despite a drop in *E1* strength by nearly 2 orders of magnitude between the two isotopes, which is in agreement with the interpretation that the dipole moments in this region can be mainly attributed to shell-induced displacements of the center-of-charges and center-of-masses between protons and neutrons [P. A. Butler and W. Nazarewicz, Nucl. Phys. A533, 249(1991)]. The experiment, which utilized the advanced capabilities of the new GRETINA -ray tracking array and CHICO2 heavy-ion counter, will be presented in detail along with a discussion of the new results.