

Investigations of shape conundra using Coulomb-excitation measurements at RIB facilities

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The highly-efficient and segmented TIGRESS gamma-ray spectrometer at TRIUMF has been used to perform a reorientation-effect Coulomb-excitation study of the first 2^+ state at 3.368 MeV in ^{10}Be . This is the first Coulomb-excitation measurement that enables one to obtain information on diagonal matrix elements for such a high-lying first excited state from gamma-ray data. With the availability of accurate lifetime data, a value of $-0.110(0.087)$ eb is determined for the diagonal matrix element, which assuming the rotor model, leads to a negative spectroscopic quadrupole moment. This negative value is in agreement with timely no-core shell-model calculations performed with the CD-Bonn 2000 two-nucleon potential and large shell-model spaces, and Green's function Monte Carlo predictions with two- plus three-nucleon potentials. This agreement outlines, however, a clear deficiency in our understanding of the spin-orbit interaction. Further reorientation-effect Coulomb-excitation measurements at iThemba LABS and the new RIB facility at CERN, HIE-ISOLDE, will also be discussed.

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