Resolving $B(E2)$ Discrepancies in the Ni, Sn, and Te Isotopes by Coulomb Excitation in Inverse Kinematics

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Recent DSAM measurements of the stable Ni and Sn isotopes [1, 2] have shown significant deviations in the extracted $B(E2)$ values from the adopted literature [3]. In order to clarify these discrepancies, a HPGe and CsI array (CLARION+HyBall) was used to study the Coulomb excitation of ^{58,60,62,64}Ni($Z = 28$), ^{112,114,116,118,120,122,124}Sn($Z = 50$), and ^{130,134}Te($Z = 52$) in inverse kinematics with natural-carbon targets; this method has the benefit of employing pure beam and target combinations. Scattered target nuclei are measured at forward angles relative to the beam direction (corresponding to backward angles in the center-of-mass frame) to provide a clean trigger for selecting the γ-ray transitions from the Coulomb-excited beam and to normalize the integrated beam current through Rutherford scattering. Furthermore, a Bragg-curve detector was used at zero degrees to measure the energy losses through the target directly. The beams were kept at "safe" energies (i.e., surface separation > 5.1 fm) and the "safe" condition was checked directly by running at multiple beam energies (i.e., above and below "safe") for a few select nuclei. High-precision $B(E2; 0_1^+ \to 2_1^+)$ e^2b^2 values are obtained for these critical shell-model nuclei and are found to be in disagreement with the recent DSAM studies [1, 2].

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References

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