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Intermediate-energy Coulomb excitation of $N = 52$ isotones towards ^{100}Sn

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The Sn isotopes, containing the longest chain of isotopes between two doubly-magic nuclei, offer a fundamental testing ground for nuclear theories. Between the $N = 50$ and $N = 82$ shell closures, the 2^+_1 energies of all Sn isotopes are well established and show an almost constant value, as expected in the generalized seniority scheme. Within the same framework, the $B(E2)$ values should resemble an inverted parabola peaking at mid-shell. However, measurements in the most proton-rich Sn isotopes have shown a clear deviation from the expected behavior, with an enhancement of the transition probabilities towards ^{100}Sn. Although different calculations tend to agree on the neutron-rich side of the chain, significant differences are observed in the proton-rich side. This is particularly true for ^{102}Sn, where the difference between the predictions amounts to almost a factor of 3, making this isotope a good candidate for the investigation of the effects driving the nuclear structure in the vicinity of ^{100}Sn.

An experiment to measure for the first time the $B(E2)$ values in the $N = 52$ isotones towards ^{100}Sn, including ^{102}Sn, was performed at the Radioactive Isotope Beam Factory in Japan. A 345 MeV/nucleon beam of ^{124}Xe was fragmented on a 5-mm-thick Be target at the entrance of the BigRIPS separator. The $N = 52$ isotones of interest were identified on an event-by-event basis using the $B\rho - \Delta E - B\rho$ technique. A 0.5-mm Au target placed at the F8 focal plane was used to induce Coulomb excitation. Outgoing fragments were identified using the ZeroDegree spectrometer. The Au target was surrounded by the high-efficiency DALI2$^+$ γ-detector array, composed of 226 NaI(Tl) detectors. Preliminary results on the Coulomb excitation cross sections and transition probabilities for ^{98}Pd, ^{100}Cd and ^{102}Sn will be presented, and their comparison with shell model and ab-initio calculations will be discussed.

Collaboration

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