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Coulomb Excitation Study on 50-54Ca - Progress Report

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We report on the progress of a systematic study of $E2$ transition strengths in neutron-rich Ca isotopes, namely $^{50-54}$Ca, using the intermediate-energy Coulomb excitation method. This study aims to provide key insights into the shell structure along the Ca isotopic chain on the neutron-rich side and to supply critical experimental information regarding the magicity of ^{60}Ca. Furthermore, the neutron sub-shell gaps of ^{52}Ca [1] and ^{54}Ca [2] have been reported, yet the large charge radii of ^{50,52}Ca suggest the possibility of core-breaking proton excitations in the isotopic chain [3], thereby questioning the magicity of ^{52}Ca. Through this study, the transition strength to the 2^+ state is expected to be systematically probed, with the goal of providing decisive information about the shell structure and benchmarking theoretical calculations.

The experiment was carried out at RIBF using the BigRIPS separator, the ZeroDegree spectrometer, and the DALI2+ array. The neutron-rich Ca beams were produced via the fragmentation of a ^{70}Zn primary beam impinging on a 7-mm-thick Be target at 345 MeV/nucleon. Two BigRIPS settings were tuned to study ^{50,51}Ca and $^{52-54}$Ca separately. The neutron-rich Ca beams were transported to a 1-mm Au target to induce the Coulomb excitation. The contributions of the nuclear excitation were measured on a 6-mm Be target. In this report, we present the preliminary result of the recently conducted experiment including PID results and gamma-ray spectrum.

Bibliography

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Author: GAO, Ting (University of York)

Co-authors: PETRI, Marina (University of York); RIBF-249 COLLABORATION; CHEN, Sidong (University of York)

Presenter: GAO, Ting (University of York)