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TOGAXSI telescope: dawn of generalized nuclear clustering

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The development of subsystems in matter is a phenomenon that appears in a wide field of physics.
Subsystems in nuclei are called “clusters”, and they have been established for light nuclei and in α-decay nuclei. However, very little is known about the situation in medium and heavy nuclei [1]. The ONOKORO project aims to conduct a systematic study of the cluster formation over a wide mass range by using the cluster knockout reaction at intermediate energy, utilizing the facilities in Japan: RCNP, HIMAC, and RIBF.

The construction of the TOGAXSI telescope is one of the important missions of this project to realize the measurements in inverse kinematics and is ongoing at RIBF.
Efforts to strengthen international collaborations have resulted in offers from IBS (Korea) and Peking University (China) to produce an additional 10 GAGG(Ce) crystals each.
This will significantly improve the efficiency, especially for deuterons and tritons, and thus maximize the outcome.

Meanwhile, the first comprehensive cluster knockout measurements for the stable nuclei ^{40,42,44,48}Ca have been performed at the RCNP. Separation energy spectra for the deuteron, triton, ^{3}He and α clusters have been obtained successfully. Complementary measurements using the TOGAXSI telescope for unstable nuclei $^{50\text{-}52}$Ca are planned for 2025 at RIBF.

Preliminary results will be presented and discussed together with the construction status of the TOGAXSI telescope and the preparation status for the upcoming measurements.

[1] T. Uesaka and N. Itagaki, Phil. Trans. R. Soc. A **382**, 20230123 (2024).

Consent

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