

The SCRIT electron scattering facility at RIKEN RI Beam Factory

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Electron scattering is a powerful tool for studying nuclear structure, because it allows model-independent studies of nuclear structure. For example, the charge density distribution of nuclei can be determined very accurately by electron elastic scattering. Therefore, electron scattering has been long awaited in the study of unstable nuclei, especially short-lived unstable nuclei.

To realize electron scattering with unstable nuclei, a new ion trapping method, Self-Confining Radioactive Isotope Ion Target (SCRIT) method, was developed.[1] After demonstrating the principle of the SCRIT method, the SCRIT electron scattering facility was constructed at RIKEN RI Beam Factory in 2009.[2] The SCRIT facility consists of an electron accelerator, an electron storage ring equipped with the SCRIT system, an online isotope separator, and an electron spectrometer besides the SCRIT system. Produced Radio Isotope (RI) beams are injected to the SCRIT system and RIs trapped inside the SCRIT system play as stationary targets. Electron beam stored in the ring are scattered from the RI targets and analyzed by the spectrometer.

After the success of the commissioning experiment using Xe [3] and the development of the RI production, the world's first electron scattering experiment using online-produced unstable nuclei was successfully conducted using Cs beam in 2022.[4] For the next stage, the upgrade of the SCRIT facility is underway for electron scattering off Sn, which is a iconic nuclei. In this contribution, we will report details of the first experiment, and the present status and perspective of the SCRIT facility.

[1] M. Wakasugi, T. Suda, and Y. Yano, Nucl. Instr. and Meth. A532, 216 (2004).

[2] M. Wakasugi et al., Nucl. Instr. and Meth. B317, 668 (2013).

[3] K. Tsukada et al., Phys. Rev. Lett. 118, 262501 (2017).

[4] K. Tsukada et al., Phys. Rev. Lett. 131, 092502 (2023).

Paper submission Plan

No

Best Presentation

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