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# First electron scattering on RI beam at the SCRIT electron scattering facility

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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.
There are only a few measurements of electron scattering on unstable nuclei which are long life isotopes. This is because it is difficult to prepare a large number of targets for more production-hard, short-lived unstable nuclei to achieve the required luminosity for electron scattering. To overcome such a situation, 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 $^{132}$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 $^{137}$Cs beam in 2022.[4] For the next stage, the upgrade of the SCRIT facility is underway for electron scattering off $^{132}$Sn, which is a iconic nuclei. In addition, various interesting physics programs have been proposed; photo absorption, isotope dependence of charge density distribution, forth-order moment of nuclear charge density to access neutron distribution radius, and more. In this contribution, we will report details of the first experiment, and the present status and perspective of the SCRIT project.
[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).

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## Classification

Instrumentation for radioactive ion beam experiments

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