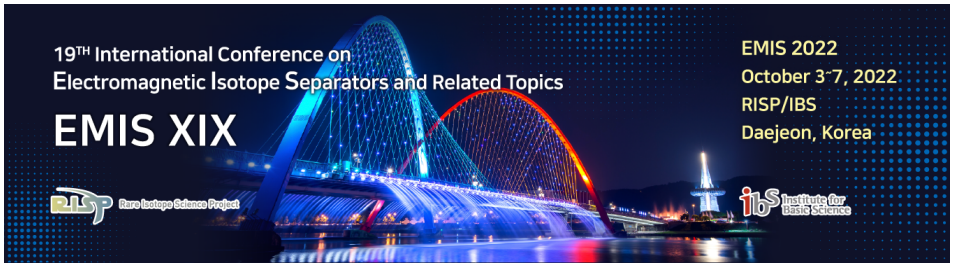

Contribution ID: **111** Type: **Invited**

The SCRIT electron scattering facility at the RIKEN RI Beam Factory

Monday, 3 October 2022 09:00 (30 minutes)

Electron scattering is a powerful tool for studying nuclear structure, and it has been long-awaited for unstable nuclei, because it allows model-independent studies of nuclear structure, including fundamental parameters, such as size and shape. After many years of development, the world's first experiment on electron scattering off unstable nuclei is, recently, finally ready at the SCRIT (Self-Confining Radioactive isotope Ion Target) electron scattering facility [1] at the RIKEN RI Beam factory using a novel target forming technique, SCRIT. [2]

The SCRIT facility consist of a compact racetrack microtron, an electron storage ring equipped with the SCRIT system, an online isotope separator (ERIS), and a dc-to-pulse beam converter. RI beams produced at ERIS are converted to pulsed beams and injected to the SCRIT system. RIs trapped inside the SCRIT system play as stationary targets and electron beam stored in the ring are scattered from the RI targets. An electron spectrometer besides the SCRIT system analyzes the momentum and the trajectories of scattered electrons. The luminosity is measured continuously by a luminosity monitoring system placed at the downstream exit of the straight section of the electron storage ring. The usefulness of the SCRIT was demonstrated in the commissioning experiment. [3]

At ERIS, the RI production using the photofission of uranium is performed with the self-made UCx target. For instance, the rate of ^{132}Sn and ^{137}Cs are reached as 2.6×10^{5} ions/sec and 1.2×10^{7} ions/sec, respectively, with the 15-W electron beam irradiation on the UCx target including 28-g uranium. For ^{137}Cs case, the luminosity is expected to reach about 2×10^{26} cm^{-2}s^{-1}, even at such a low production rate. In addition, there are plans to upgrade the electron beam power to 2 kW for electron elastic scattering from ^{132}Sn.

In this contribution, we will introduce the SCRIT electron scattering facility and report the present status, the upgrade plan, and the progress of the experiment with unstable nuclei.

[1] M. Wakasugi et al., Nucl. Instr. Meth. B317 (2013) 668.
[2] M. Wakasugi et al., Nucl. Instr. Meth. A532 (2004) 216.
[3] K. Tsukada et al., Phys. Rev. Lett. 118 (2017) 262501

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Session Classification: Session 1