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## Electron-RI scattering at SCRIT and ARIEL

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Electron scattering is a powerful tool for probing nuclear structure, because it enables model-independent studies. For instance, elastic electron scattering accurately provides the charge density distribution of nuclei, directly reflecting their nuclear shape. Furthermore, inelastic electron scattering and other electron-induced reactions significantly aid our understanding of nuclear spectroscopy. As a result, electron scattering has been performed on various stable nuclei, yielding numerous achievements. Despite these successes, its application to unstable nuclei has been limited to only very long-lived examples. Consequently, the broader application of electron scattering to unstable nuclei has long been awaited.

The main difficulty in achieving electron scattering with unstable nuclei is the preparation of a target with a sufficient number of atoms to reach a required luminosity (over  $10^{27}$  cm<sup>-2</sup>s<sup>-1</sup>), especially considering their extremely low production rates. To overcome this situation, a novel ion trapping method, Self-Confining Radioactive Isotope Ion Target (SCRIT) method, was developed.[1] After demonstrating its principle, the SCRIT electron scattering facility was constructed at RIKEN RI Beam Factory in 2009.[2] Recently, we achieved a major milestone: the world's first electron scattering experiment using online-produced unstable nuclei was successfully conducted with a Cs beam in 2022.[3] This success opens up a new and exciting research field for the study of unstable nuclei.

ARIEL is a new research facility dedicated to nuclear physics of unstable nuclei, and it produces high-intensity and more-exotic radioisotope (RI) beams using high-power electron or proton beams. This presents an extremely important opportunity for conducting electron-RI scattering experiments, similar to those pioneered at the SCRIT facility. The utilization of ARIEL's electron beam for these experiments and its capability to produce high-intensity and exotic RI beams will significantly expand the research scope and enable the achievement of even higher luminosity for electron-RI scattering.

In this contribution, we will report on the present status and perspectives of the SCRIT facility, and also discuss the possibility of electron-RI scattering at ARIEL.

[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. 131, 092502 (2023).

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