

Electron scattering for online-produced unstable nucleus at the RIKEN SCRIT facility

Wednesday, 11 September 2024 11:05 (15 minutes)

Electron scattering is the gold standard for probing nuclear structures, consistently playing an essential role in revealing the internal structures of atomic nuclei and in establishing modern pictures of their structures. To date, its application, however, has been strictly limited to stable nuclei (with some exceptions such as ^3H), leaving short-lived unstable nuclei unexplored*.

Following nearly two decades of development, we have successfully achieved a ground-breaking milestone: the first electron scattering experiment on an online-produced radioactive isotope at the SCRIT electron-scattering facility of RIKEN RI Beam Factory in Japan**.

The SCRIT facility, designed to explore the internal structures of short-lived exotic nuclei by electron scattering, employs a novel ion-trapping technique, SCRIT (Self-Confining Radioactive Isotope Ion Target)***. Using only $\sim 10^7$ ions of an exotic nucleus, the SCRIT technique enables us to achieve a luminosity of approximately 10^{27} / cm^2/s , which is the minimum required for realizing elastic electron scattering for medium-heavy nuclei.

I will present the recent achievements and the current status of the SCRIT facility, and outline many research possibilities awaiting exploration at the SCRIT facility as well.

If time allows, I will also provide an overview of the ongoing low-energy electron scattering project, ULQ2 (Ultra-Low Q2), in Sendai. This project aims to determine precise proton charge radius by low-energy electron scattering covering the lowest-ever momentum transfer, Q2.

- T. Suda and H. Simon, Prog. Part. Nucl. Phys. 96 (2017) 1-31. ** K. Tsukada et al, Phys. Rev. Lett. 131 (2023) 092502. Physics Today 76 (11), 14–16 (2023). *** M. Wakasugi, T. Suda and Y. Yano, Null. Instrum. Methods A532 (2004) 216.

Primary author: Prof. SUDA, Toshimi (Tohoku University)

Presenter: Prof. SUDA, Toshimi (Tohoku University)

Session Classification: Experimental Nuclear Physics for Astrophysics

Track Classification: Experimental Nuclear Physics for Astrophysics