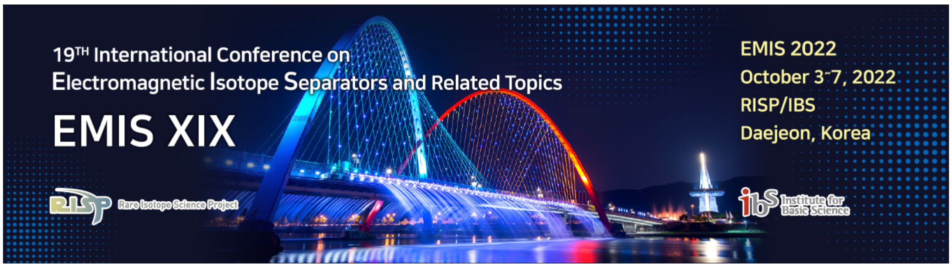

Contribution ID: **137** Type: **Poster Session**

Ion trapping properties of SCRIT: Time evolution of charge state distributions of ^{138}Ba ions

Monday, 3 October 2022 23:50 (8 minutes)

The SCRIT (Self-Confinement RI ion Target) technique [1] is an internal target formation technique that achieves electron scattering off unstable nuclei produced from the ERIS (Electron-beam-driven RI separator for SCRIT) [2].
The target ions incident from the outside of the SCRIT are trapped transversely by the periodic focusing force of the electron beam and longitudinally by the well-type electrostatic potential.
While the target ions are trapped in the SCRIT, the ion trapping properties (number of trapped ions N_{trap}, average charge state q_{ave}, etc.) continue to change.
To evaluate the ion trapping properties, the SCRIT system is equipped with an ion analyzer consisting of the total charge monitor that measures N_{trap}×q_{ave}, the ExB filter (wien filter) that separates the mass-to-charge ratio of the trapped ions, and a 43-channeltron array [3].
The luminosity is monitored with a Bremsstrahlung-gamma ray detector.
If the number of trapped ions in a highly charged state increases (trapping time > 50 ms), q_{ave} is required to evaluate N_{trap}. Therefore, in order to evaluate the correct SCRIT performance with trapping time of > 50 ms, we investigated the time evolution of the charge state distribution for trapping times of 30 - 500 ms using ^{138}Ba ions.

The results show that the trapping time to effectively utilize the trapped ^{138}Ba ions for the electron scattering was about 200 ms.
In the trapping time of 200 ms, the luminosity was achieved 1.6×10^{27} [$cm^{-2}s^{-1}$] at Ninj of 3.6×10^{8}, and the Ntrap was 7×10^{7} and the average charge state of ^{138}Ba ions was 4.0.
The ion trapping properties of SCRIT strongly depend on the emittance of the incident target ion beam and the electron beam conditions. Therefore, these evaluations are very important for optimizing the experimental conditions of the SCRIT.

[1] M. Wakasugi et al., Nucl. Instrum. Methods Phys. Res. B 317 (2013) 668.
[2] T. Ohnishi et al., Nulc. Instrum. Methods Phys, Res. B 317, 357 (2013).
[3] R. Ogawara et al., Nucl. Instrum. Methods Phys. Res. B 317 (2013) 674.

Primary authors: ENOKIZONO, Akitomo (Rikkyo University); OGAWARA, Ryo (Kyoto University); WAUKE, Hikari (RIKEN Nishina Center, ELPH Tohoku University); KURITA, Kazuyoshi (Rikkyo University); TSUKADA, Kyo (ICR Kyoto University); HARA, Masahiro (RIKEN Nishina Center); WATANABE, Masamitsu (RIKEN Nishina Center); WAKASUGI, Masanori (RIKEN Nishina Center, ICR Kyoto University); ICHIKAWA, Shinichi (RIKEN Nishina Center); OHNISHI, Tetsuya (RIKEN Nishina Center); SUDA, Toshimi (ELPH Tohoku University); HORI, Toshitada (RIKEN Nishina Center); ABE, Yasushi (RIKEN Nishina Center); MAEHARA, Yasushi (Kyoto University)

Presenter: OGAWARA, Ryo (Kyoto University)

Session Classification: Poster Session