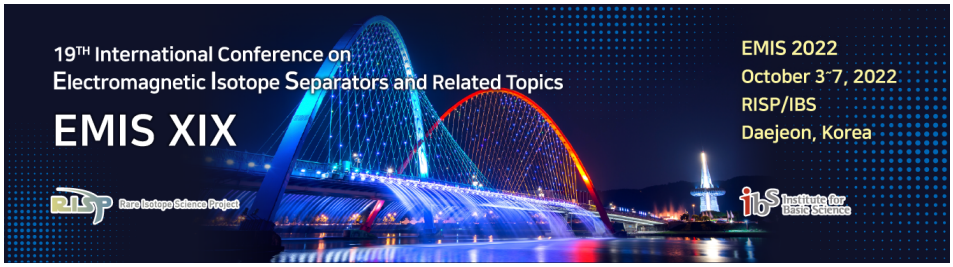

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Charge state fluctuations of heavy ion beams inside ionization chambers

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With the development of unstable nuclei beam generation and separation capabilities, the field of unstable nuclei research has expanded to include the measurement of various nuclei. At RIKEN, new isotopes have been discovered one after another, and the research has been expanded to the neutron-rich side or the region with large atomic number Z, such as 180Er with the largest Z, Z = 68. Currently, there are high expectations for the search for new isotopes in the upper right corner of the nucleus chart. However, previous studies have shown that the Z resolution for identifying nuclear Z deteriorates in regions with large Z, which poses a major challenge.
Ionization chambers with good energy resolution for low mass are often used to measure the energy loss ΔE for particle identification in heavy ion beams. However, it has been found that the energy resolution of ion chambers deteriorates as Z increases. This phenomenon was explained by a Monte Carlo simulation of the charge state fluctuation caused by charged particles passing through the ionization chamber inside the detector and reproducing the experimental values. The experiments were performed at the National Institute of Radiological Sciences (NIRS) using a secondary beam of Z = 22 ~ 55 generated by injecting a primary beam of 136Xe into a production target, Be. In this presentation, we will give an overview of the measurements and the results.

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