Contribution ID: **59** Type: **Instruments**

Development of a Radio Frequency Dipole Mass Filter for the Francium Permanent Electric Dipole Moment Search

Wednesday, 9 August 2023 15:25 (5 minutes)

The permanent electric dipole moment (EDM) of elementary particles is a physical quantity that reflects CP symmetry breaking, and is being explored. In particular, it is theoretically suggested that electron EDMs are amplified as atomic EDMs in heavy elements. In this project, we aim to achieve high-precision EDM measurement using francium (Fr) atoms trapped by laser cooling technique. Toward this end, a radio frequency dipole mass filter (RFDMF) was developed for the generation of high-purity Fr ion beams to enhance the number of trapped Fr atoms. The RFDMF is a device that oscillates the beam using an oscillating electric field, and is designed to remove impurity ions lighter than Fr in a short beam transport system with a total length of several tens of cm. The parameters of the oscillating voltage required for the RFDMF to remove impurities were searched for by simulation, and an AC circuit that can apply an oscillating voltage in the range of the parameters obtained from the simulation was created. The performance of the mass filter was evaluated by off-line experiments using stable atom rubidium and Fr generation experiments using the RIKEN AVF cyclotron.

Presentation type

Oral presentation

Primary author: FUKASE, Mirai (Center for Nuclear Study, The University of Tokyo)

Co-authors: NAGAHAMA, Hiroki (The University of Tokyo); NAKAMURA, Keisuke (CNS, The University of Tokyo); OZAWA, Naoya (Department of Physics, Kyoto University); SATO, Motoki (University of Tokyo); Mr NAKASHITA, Teruhito (The University of Tokyo); NAGASE, Shintaro; UEHARA, Daisuke

Presenter: FUKASE, Mirai (Center for Nuclear Study, The University of Tokyo)

Session Classification: Short presentation for poster contributions