



国立研究開発法人理化学研究所 仁科加速器科学研究センター
第305回 RIBF核物理セミナー
RIKEN Nishina Center for Accelerator Based Science
The 305th RIBF Nuclear Physics Seminar

Direct mass measurement of superheavy nuclides
via MRTOF mass spectrograph equipped with an α -TOF detector

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The ground state atomic mass is one of the most fundamental physical quantities and has a unique value for each nucleus. Mass is an important tool not only for discussing nucleon-nucleon interaction but also for uniquely determining the mass number and atomic number of unknown superheavy elements, by providing a fingerprint for the identification of elements.

We have carried out precision mass measurements of several heavy nuclei in the SHE-Mass facility using a multi-reflection time-of-flight mass spectrograph (MRTOF-MS), and the gas-filled recoil ion separator GARIS-II. Due to the extremely low fusion cross section, the amount of ions to work with is small in superheavy element experiments. Therefore, accurate mass measurements are required that can discriminate against background events such as cosmic rays, environmental noise, dark counts, etc.

In this study, we have developed a new detector, which we call “ α -TOF”, for the direct mass measurement of a superheavy nuclide. The α -TOF detector comprises a Si semiconductor detector embedded in a commercial time-of-flight detector, to allow correlations between the acquisition of time-of-flight signals and subsequent alpha decay events. The α -TOF detector enables accurate and precise mass measurement by using correlated alpha decay events as footprints, even for extremely low-yield cases with less than a few events per day.

In this presentation, I will give the details of the α -TOF detector and its results of application to decay spectroscopy. In addition, I will introduce the results of the first direct mass measurement of superheavy nuclides Db.

Feb. 22th(Tue), 2022 13:30 ~
via Zoom Meeting System



* The talk will be given in English language.

Contact: Nuclear Physics Seminar Organizing Committee

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