

SMI-2023: 14th International Conference on Stopping and Manipulation of Ions and Related Topics



Contribution ID: 62

Type: **Invited talk**

RF gas catcher for the BigRIPS beams

Monday, 8 May 2023 14:40 (30 minutes)

A new cryogenic ion catcher filled with helium gas has been commissioned at the ZeroDegree spectrometer following BigRIPS at RIKEN/RIBF for the thermalization of high-energy RI beams from the BigRIPS beamline, as a part of the SLOWRI facility. The ion catcher is combined with a multi-reflection time-of-flight mass spectrograph and both are located downstream of the ZeroDegree spectrometer. This setup had its first on-line commissioning run in December 2020, where we measured more than 70 nuclear masses including 3 new masses [1, 2].

The ion catcher consists of a reentrant cryogenic catcher gas cell and an outer vacuum chamber. The catcher gas cell has a two-stage RF carpet configuration [3]. In off-line tests, the ion transport was first investigated using surface ionization ion sources, followed by Ar^+ and Kr^+ ions produced by α -particle emission in the helium gas. Recently, we have started ion transport tests using the fission products from a ^{248}Cm fission source. We are investigating the ion transport efficiency and charge state distributions for the fission products of various elements.

In this talk, I will give an overview of the development of the ion catcher, possible plans for future upgrades, and prospects.

[1] S. Imura *et al.*, Phys. Rev. Lett. **130**, 012501 (2023).

[2] M. Rosenbusch *et al.*, Nucl. Instrum. Meth. A **1047**, 167824 (2023).

[3] A. Takamine *et al.*, RIKEN Accel. Prog. Rep. **52**, 139 (2019).

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Session Classification: Plenary Session 1