

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



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## First results from the JYFL-MR-ToF

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Multi-Reflection Time-of-Flight Mass-Spectrometers (MR-ToF-MS) [1] have gained ground in radioactive beam facilities in the past 10 years, due to their comparatively fast operation cycles ( $\sim 10$  ms) and high mass resolving powers ( $R = m/\Delta m \sim 2 \cdot 10^5$ ). This enables the separation and subsequent mass measurement of particularly short-lived and exotic radioactive nuclei. The operation of an MR-ToF-MS is based on trapping a temporally short bunches of ions ( $\sim 50$  ns FWHM in temporal width), which have been accelerated to an approximately the same energy. Ions with different mass-to-charge ratios are separated by their time-of-flight, as they are trapped and moving along closed paths in the device. At the Ion-Guide Isotope-Separator On-Line (IGISOL) facility [2] at the University of Jyväskylä an MR-ToF-MS has been recently commissioned and used for mass separation and measurements of exotic isobaric radioactive nuclei. The MR-ToF-MS can also be used for selecting ions for other experiments, such as decay spectroscopy. In this contribution, an overview and the recent mass measurements utilizing the IGISOL MR-ToF-MS are presented, with preliminary mass spectra of fission fragments around  $A=90$ , relevant for the astrophysical rapid neutron capture process ( $r$  process), as well as mass spectra of multi-nucleon transfer reaction products produced with xenon beam on bismuth target.

### References

- [1] W. R. Plan, T. Dickel, and C. Scheidenberger, "Multiple-reflection time-of-flight mass spectrometry", *International Journal of Mass Spectrometry*, vol. 349-350, pp. 134–144, 2013. doi: 10.1016/j.ijms.2013.06.005.
- [2] I. Moore et al., "Towards commissioning the new IGISOL-4 facility", *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, vol. 317, pp. 208–213, 2013. doi: 10.1016/j.nimb.2013.06.036.

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