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## Commissioning of the gas-catcher and Multi-Reflection Time-of-Flight Mass Spectrometer for the NEXT experiment

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The NEXT experiment intends to produce Neutron-rich EXotic heavy nuclei in multinucleon Transfer reactions. Measuring the mass of these nuclei to high precision provides information on their internal nuclear structure and useful input data for the modelling of nucleosynthesis processes.

The NEXT setup will be placed at the AGOR cyclotron at the Partrec facility in Groningen. The transfer products will be pre-separated in a solenoid separator before being slowed to thermal energies in a gas catcher and extracted via an RF carpet [1]. The extracted ions are bunched using a novel ion guide consisting of a stack of ring electrodes [2]. The bunched ions are then accelerated to a few keV and transferred to a Multi-Reflection Time-of-Flight Mass Spectrometer (MR-TOF MS) which separates the prepared ions from their isobaric contaminants and measures their masses. Simulation of the MR-TOF MS performance indicates that a mass resolving power of  $R \sim 10^5$  after only 300 ion revolutions is possible for  $^{85}\text{Rb}^+$  [3].

Currently the extraction performance of the gas catcher for heavy short-lived ions is being evaluated, while the MR-TOF has undergone commissioning and testing. The ion guide drivers are in development.

In this contribution an overview of the NEXT setup will be given, with focus on the gas catcher and MR-TOF MS, and the current project status will be discussed.

[1] J. Even, X. Chen, A. Soylu, P. Fischer, A. Karpov, V. Saiko, J. Saren, M. Schlaich, T. Schlathölder, L. Schweikhard, J. Uusitalo, and F. Wienholtz, "The NEXT project: Towards production and investigation of neutron-rich heavy nuclides," *Atoms*, vol. 10, no. 2, p. 59, 2022.

[2] X. Chen, J. Even, P. Fischer, M. Schlaich, T. Schlathölder, L. Schweikhard, and A. Soylu, "Stacked-Ring Ion Guide for Cooling and Bunching Rare Isotopes", *International Journal of Mass Spectrometry*, vol. 477, 116856, 2022.

[3] M. Schlaich, "Development and Characterization of a Multi-Reflection Time-of-Flight Mass Spectrometer for the Offline Ion Source of PUMA", Master's Thesis, Technische Universität Darmstadt, Darmstadt, Germany, 2021.

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