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Recent results from the FRS Ion Catcher

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The FRS Ion Catcher setup [1] is used for thermalization and high-resolution measurements of exotic nuclei produced at relativistic energies of up to 1 GeV/u at the fragment separator (FRS) at GSI. It consists of a cryogenic gas-filled stopping cell (CSC), an RFQ beamline and a multiple-reflection time-of-flight mass-spectrometer (MR-TOF-MS), which can be used for mass measurements with mass accuracies down to $6 \cdot 10^{-8}$ [2] and for the production of isobarically and isomerically clean beams.
Over the last years, several technical improvements and upgrades were implemented to the setup. New techniques for enhancing the selectivity of ion transport based on ion mobility and dissociation of molecular contaminants were developed. The RFQ beamline was expanded and upgraded with improved differential pumping, a mass filter and a laser ablation carbon cluster ion source. The areal density of the CSC was increased to 10 mg/cm^2. A novel method for half-lives and branching ratios measurements [3] using the CSC as an ion trap for controllable storing of ions was developed and demonstrated.
In addition, the progress on the technical design of the CSC for the Low-Energy Branch of the Super-FRS at FAIR will be reported.

References:
[1] W. R. Plass et al., Nucl. Instrum. Methods B, 317 (2013)
[2] S. Ayet et al., accepted to Phys. Rev. C, arXiv:1901.11278 (2019)
[3] I. Miskun et al., submitted to Eur. Phys. Journal A, arXiv:1902.11195 (2019)

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