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TRIGA-SPEC - a development platform for MATS and LASPEC

The TRIGA-SPEC experiment [1] at the research reactor TRIGA Mainz consists of a Penning trap experiment (TRIGA-TRAP) for mass measurement and a collinear laser spectroscopy setup (TRIGA-LASER). These setups are the prototypes for the MATS- and the LASPEC-Experiments at FAIR [2]. It is used for technical developments to improve the sensitivity and accuracy of the techniques. Additionally the reactor will provide also short-lived isotopes produced by neutron-induced fission of ^{235}U , ^{239}Pu or ^{249}Cf in a target chamber that is located close to the reactor core. The fission products are transported to the on-line surface ionization source, where they are ionized.

The ions are accelerated to 30 keV and mass separated in a dipole magnet. To increase the detection efficiency of both experimental branches, radiofrequency-quadrupole (RFQ) is included in the common beamline to cool and bunch the ions. The energy spread and temporal width of the bunches has been characterized and optimized by time resolved collinear laser spectroscopy in the optical detection chamber of the TRIGA-LASER setup. That became possible due to the development of a new time-resolved data acquisition system and has been used to improve the RFQ settings, leading to a better adaption of the bunch properties to the respective experiment. This is very important for the injection into the Penning trap system (TRIGA-TRAP) for precision mass spectrometry as well as for collinear laser spectroscopy (TRIGA-LASER).

The setup as well as the latest developments and results at TRIGA-SPEC are presented.

[1] J. Ketelaer et al., Nucl. Instr. Meth. A 594, 162 (2008)

[2] D. Rodriguez et al., Eur. Phys. J. Special Topics 183, 1-123 (2010)

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Primary author: Mr KAUFMANN, Simon (Institut für Kernchemie Uni-Mainz)

Co-authors: Mr GORGES, Christian (Institut für Kernphysik TU Darmstadt); DÜLLMANN, Christoph Emanuel (GSI, Darmstadt; Helmholtz Institut Mainz, Universität Mainz; Institut für Kernchemie, Universität Mainz; PRISMA cluster of excellence); GEPPERT, Christopher (Institut für Kernchemie, Universität Mainz); RENISCH, Dennis (Institut für Kernchemie, Universität Mainz); MARTIN, Eibach (MPI-K Heidelberg); Mr SCHNEIDER, Fabian (Institut für Kernchemie, Universität Mainz; Institut für Physik, Universität Mainz); GRUND, Jessica (Institut für Kernchemie, Universität Mainz; PRISMA cluster of excellence); Prof. BLAUM, Klaus (Max-Planck-Institut für Kernphysik); EBERHARDT, Klaus (Institut für Kernchemie, Universität Mainz); Prof. WENDT, Klaus (University of Mainz); HAMMEN, Michael (Helmholtz Institut Mainz, Universität Mainz; Institut für Kernchemie, Universität Mainz); FRÖMMGEN, Nadja (Institut für Kernchemie, Universität Mainz); SANCHEZ ALARCON, Rodolfo Marcelo (GSI, Darmstadt); Mr AHMER, Samer (MPI-K Heidelberg); NAGY, Szilard (Johannes Gutenberg-Universität Mainz(UMz-IPH)); Mr BEYER, Thomas (MPI-K Heidelberg); NÖRTERSHÄUSER, Wilfried (Institut für

Kernchemie, Universität Mainz; Institut für Kernphysik, TU Darmstadt)

Presenter: Mr KAUFMANN, Simon (Institut für Kernchemie Uni-Mainz)