

## AKBP 6: New Results from Accelerators for Hadron Physics

Time: Wednesday 11:00–12:30

Location: HSZ/0304

**Group Report** AKBP 6.1 Wed 11:00 HSZ/0304

**Laser spectroscopy of Mg<sup>+</sup> at CRYRING@ESR** — •KONSTANTIN MOHR<sup>1,2</sup>, ZORAN ANDELKOVIC<sup>3</sup>, VOLKER HANNEN<sup>4</sup>, FRANK HERFURTH<sup>3</sup>, MAX HORST<sup>1,2</sup>, PHILLIP IMGRAM<sup>1</sup>, KRISTIAN KÖNIG<sup>1,2</sup>, CLAUDE KRANTZ<sup>3</sup>, MICHAEL LESTINSKY<sup>3</sup>, YURI LITVINOV<sup>3</sup>, BERNHARD MAASS<sup>1,5</sup>, ESTHER MENZ<sup>6</sup>, PATRICK MÜLLER<sup>1</sup>, WILFRIED NÖRTERSCHÄUSER<sup>1,2</sup>, SIMON RAUSCH<sup>1,2</sup>, RODOLFO SÁNCHEZ<sup>3</sup>, RAGANDEEP SINGH SIDHU<sup>7</sup>, and KEN ÜBERHOLZ<sup>4</sup> — <sup>1</sup>Institut für Kernphysik, TU Darmstadt, Germany — <sup>2</sup>Helmholtzforschungsakademie Hessen für FAIR HFHF, Darmstadt, Germany — <sup>3</sup>GSI Helmholtzzentrum für Schwerionenforschung GmbH, Germany — <sup>4</sup>Institut für Kernphysik, WWU Münster, Germany — <sup>5</sup>ANL, Illinois, USA — <sup>6</sup>Helmholtzinstitut Jena, Germany — <sup>7</sup>University of Edinburgh, Scotland

The storage ring CRYRING@ESR at GSI/FAIR is dedicated to precision experiments with stored and cooled ions of energies down to few MeV. One of the first experiments at CRYRING@ESR was laser spectroscopy on the stable Mg isotopes, carried out to test a possible in-flight polarization buildup by optical pumping. Especially parity-non-conservation experiments would benefit from this technique. During the first attempts, we found an unexpectedly fast population transfer between the hyperfine ground states F=2,3 of <sup>25</sup>Mg<sup>+</sup>, which could be associated with the mixing of velocity classes caused by synchrotron oscillations in bunched-beam operation. We present the current status of the experiment and discuss the influence of dynamic effects. This work is supported by BMBF contract 05P21RDFA1.

**Group Report** AKBP 6.2 Wed 11:30 HSZ/0304

**Laser-Driven Acceleration of Gold Ions** — •LAURA DESIREE GEULIG, ERIN GRACE FITZPATRICK, MAXIMILIAN J. WEISER, VERONIKA KRATZER, VITUS MAGIN, MASOUD AFSHARI, JÖRG SCHREIBER, and PETER G. THIROLF — Ludwig-Maximilians-Universität München

The efficient acceleration of gold ions is a first step towards the 'fission-fusion' reaction mechanism, which aims at investigating the rapid neutron capture process in the vicinity of the N=126 waiting point[1]. In our recent measurement at the PHELIX laser with a pulse length of 500fs, for the first time, the laser-based acceleration of gold ions above 7 MeV/u was demonstrated. Additionally, individual gold charge states were resolved with unprecedented resolution[2]. This has allowed the investigation of the role of collisional ionization using a developmental branch of the particle-in-cell simulation code EPOCH[3], showing a much better agreement of the simulated charge state distributions with the experimentally measured ones than when only considering field ionization. This work is continued at the Centre for Advanced Laser Applications (CALA), using the ATLAS3000 laser (800nm central wavelength, 25 fs pulse length).

[1] D. Habs et al., Appl. Phys. B 103, 471-484 (2011)

[2] F.H. Lindner et al., Sci. Rep. 12, 4784 (2022)

[3] M. Afshari et al., Sci.Rep. 12, 18260 (2022)

**Group Report** AKBP 6.3 Wed 12:00 HSZ/0304

**Pure Copper and Stainless Steel Additive Manufacturing of an IH-Type Linac Structure** — •HENDRIK HÄHNEL, ADEM ATES, and ULRICH RATZINGER — Institut für Angewandte Physik, Goethe Universität, Frankfurt am Main

Additive manufacturing ("AM") has become a powerful tool for rapid prototyping and manufacturing of complex geometries. A 433 MHz IH-DTL cavity has been constructed to act as a proof of concept for direct additive manufacturing of linac components. In this case, the internal drift tube structure has been produced from 1.4404 stainless steel, as well as pure copper using AM. The Prototype cavity, as well as stainless steel AM parts have been copper plated. We present results from low level rf measurements of the cavity with and without copper plating, as well as the status of preparations for high power rf tests with a 30 kW pulsed power amplifier.