MS 7: MS Poster Session

Time: Wednesday 16:30–18:15 Location: P

MS 7.1 Wed 16:30 P

Direct high-precision measurement of the Q-value of the electron capture in ^{163}Ho — •K. Kromer[1], M. Brass[2], V. Debierre[2], M. Door[1], H. Dorrer[3], Ch.E. Düllmann[3,4,5], S. Eliseev[1], C. Enss[6], P. Filianin[1], L. Gastaldo[5], Z. Harman[1], M.W. Haverkort[2], J. Herkenhoff[1], P. Indelicato[7], C.H. Keitel[1], D. Lange[1], Yu.N. Novikov[8], D. Renisch[4,5], A. Rischka[1], Ch. Schweiger[1], and K. Blaum[1] — [1]Max-Planck-Institut für Kernphysik, 69117 Heidelberg, Germany — [2]Institute for Theoretical Physics, Heidelberg University, 69120 Heidelberg, Germany — [3]Institut für Kernchemie, Johannes-Gutenberg-Universität Mainz, 55128 Mainz, Germany — [4]Helmholtz-Institut Mainz, 55128 Mainz, Germany — [5]GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany — [6]Kirchhoff-Institute for Physics, Heidelberg University, 69120 Heidelberg, Germany — [7]Laboratoire Kastler Brossel, Sorbonne Université, CNRS, ENS-PSL Research University, Collège de France, 75005 Paris, France — [8]NRC "Kurchatov Institute"-Petersburg Nuclear Physics Institute, Gatchina 188300, Russia

Pentatrap [1] is a high-precision Penning-trap mass spectrometer featuring a stack of five Penning traps and determining mass-ratios with a relative uncertainty of below 10^{-11}. Mass-ratio determinations of stable and long-lived highly charged ions at this level have numerous applications, among others, in neutrino physics. The ECHo collaboration [2] plans to set an upper limit on the mass of the electron neutrino by measuring the sprectrum of the electron capture decay of ^{163}Ho with metallic magnetic calorimeters. In order to exclude systematic errors and have an independent value of the endpoint of the electron capture spectrum, Pentatrap measured the Q-value by means of Penning-trap mass spectometry, comparing the mass of highly charged ions of the mother and daughter nuclides ^{163}Ho and ^{163}Dy. The uncertainty of the final Q-value including binging energy calculations of the missing electrons is as low as 1.1 eV.

[1] Repp, J. et al., Appl. Phys. B 107, 983, (2012)
[2] Gastaldo, L. et al., Eur. Phys. J. ST 226, 1623 (2017)

MS 7.2 Wed 16:30 P

Schottky detectors for high resolution and fast Schottky spectroscopy of short-lived fragments in heavy ion storage rings — •Shahab Sanjari[1,2], Dmytro Dmytriiev[1,3], George Hudson-Chang[4,5], Yuri A. Litvinov[1,3], and Mariia Selina[2] — [1]GSI Helmholtz Center, D-64291 Darmstadt, Germany — [2]Aachen University of Applied Sciences, D-52005 Aachen, Germany — [3]Heidelberg University, D-69117 Heidelberg, Germany — [4]University of Surrey, GU2 7XH, Surrey, UK — [5]RIKEN Nishina Center, 351-0198, Wako, Saitama, Japan

Using non-destructive Schottky detectors, precise determination of masses and lifetimes of exotic nuclear species and their isomeric states can be performed in heavy ion storage rings. Single ion sensitivity has regularly been achieved in the past using resonant cavity pick-ups. New designs are targeting an increase in measurement accuracy by additionally measuring particle position in the dispersive section of the storage ring. In this work, we report on the latest progress on the development of new position sensitive cavity pickup detectors.

MS 7.3 Wed 16:30 P

Implementation of a software defined radio (SDR) based beam current monitor for Schottky detectors in heavy ion storage rings — •Mariia Selina[1], Shahab Sanjari[1,2], Dmytro Dmytriiev[2,3], and Yuri A. Litvinov[2,3] — [1]Aachen University of Applied Sciences, D-52005 Aachen, Germany — [2]GSI Helmholtz Center, D-64291 Darmstadt, Germany — [3]Heidelberg University, D-69117 Heidelberg, Germany

With the increasing sensitivity and precision of resonant Schottky detectors, this technology becomes more valuable in the determination of masses and lifetimes of the yet unstudied nuclei inside heavy ion storage rings but also in general storage ring physics. At present, information from these detectors is gained by high-end units with software and hardware interface that are not versatile and / or not suitable for applications where scalability is indispensable. Here, software-defined radio (SDR) based data acquisition systems come in handy, mainly due to their low cost and relatively simple hardware but also due to the fact that their functionality is almost entirely software-defined/programmable. If calibrated, Schottky detectors can facilitate beam current measurements that are orders of magnitude more sensitive compared to existing DC current transformers (DDCT). In this work, we report on the implementation of an SDR-based online beam current monitor for use with Schottky detectors in heavy ion storage rings such as ESR in GSI/FAIR.

MS 7.4 Wed 16:30 P

LISEL@DREAMS progress report — •Oliver Forstner[1,2,3], Thomas Weber[1], Vadim Gadelshin[4], and Klaus Wendt[4] — [1]Friedrich-Schiller-Universität Jena, Jena — [2]Helmholtz-Institut Jena, Jena — [3]GSI Holmholtzzentrum, Darmstadt — [4]Johannes Gutenberg-Universität Mainz, Mainz

The LISEL setup (Low-energy Isobar SEparation by Lasers) is currently being built at the University of Jena in the framework of a BMBF funded project. It comprises a gas-filled radio frequency quadrupole cooler where negative ions will be slowed down to thermal energies and overlapped with a laser beam. This allows an elemental selective suppression of isobars by laser photodetachment by careful selection of the photon energy. The tunable laser system is currently being developed at the University of Mainz. After commissioning the LISEL setup will be transferred to the DREAMS (DREsden AMS) facility at the Helmholtz Center Dresden Rossendorf (HZDR).

In this presentation I will give a status report of the construction of the LISEL cooler and present an outlook of the future activities.