MS 5: Precision Mass Spectrometry II

Time: Tuesday 15:15–16:00 Location: f128

Invited Talk MS 5.1 Tue 15:15 f128

Experiments with multiple-reflection time-of-flight mass spectrometers (MR-TOF-MS) at TRIUMF and GSI/FAIR — •Christine Hornung[1], the FRS Ion Catcher Collaboration[1,2], and the TITAN Collaboration[3] — [1]II. Physikalisches Institut, Justus-Liebig-Universität Gießen, Gießen, Germany — [2]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany — [3]TRIUMF, Vancouver, Canada

At the JLU Giessen, MR-TOF-MS have been developed for the TITAN experiment at TRIUMF and for the FRS/Super-FRS at GSI/FAIR. The systems incorporate several novel and unique concepts. The design enables world class performance, including a mass resolving power up to 1,000,000, mass accuracies down to $6 \cdot 10^{-8}$ and a background suppression of grater than 7 orders of magnitude. Mass measurements of neutron-deficient Yb and Tm isotopes have been performed across the $N = 82$ shell closure using TITAN's MR-TOF-MS. With the MR-TOF-MS of the FRS Ion Catcher at the FRS the masses of neutron-deficient ^{124}Xe projectile fragments in the vicinity of ^{100}Sn have been measured, including the ^{101}In ground state. Two new isomeric states have been discovered in ^{97}Ag and ^{101}In. A novel method for the measurement of half-lives and decay branching ratios with the FRS Ion Catcher has been developed and experimentally applied.

MS 5.2 Tue 15:45 f128

High-precision mass spectrometry of superheavy elements at SHIPTRAP: latest experiments, status and performances of the setup. — •Pierre Chauveau for the SHIPTRAP collaboration[1,2], Brankica Andelić[1,3], Olesya Bezrodnova[4,5], Klaus Blaum[6], Michael Block[1,2,7], Stanislav Chenmarev[5,7], Premaditya Chhetri[1,2], Christoph E. Düllmann[1,2,7], Martin Eibach[2,8], Julia Even[3], Sergey Eliseev[6], Pavel Filianin[6], Francesca Giacoppo[1,2], Stefan Götz[1,2,7], Manuel Gutiérrez[9], Frank Herfurth[2], Fritz-Peter Hessberger[1,2], Nasser Kalantar-Nayestanaki[3], Oliver Kaleja[2,6,7], Jadambaa Khuyagbaatar[1,2], Jacques J.W. van de Laar[1,7], Mustapha Laatiaoui[1], Steffen Lohse[1,7], Natalia Martynova[4,5], Enrique Minaya Ramirez[10], Andrew Mistry[1,2], Tobias Murböck[2], Yuri Novikov[4,5], Sebastian Raeder[2], Daniel Rodriguez[9], Fabian Schneider[1,7], Lutz Schweikhard[8], Peter Thirolf[11], and Alexander Yakushev[1,2] — [1]HI Mainz — [2]GSI Darmstadt — [3]Univ. Groningen — [4]SPbSU St. Petersburg — [5]PNPI KI Gatchina — [6]MPIK Heidelberg — [7]JGU Mainz — [8]Univ. Greifswald — [9]Univ. de Granada — [10]IPN Orsay — [11]LMU München

Mass measurements in the very heavy and superheavy regions of the nuclear chart are crucial to understand the increased stability of certain superheavy elements and can be used as anchor points for nuclear models attempting to pinpoint the position of the island of stability. In the latest experimental campaigns with the SHIPTRAP setup, ground states masses and excitation energies of low-lying isomers in nobelium ($Z = 102$), lawrencium ($Z = 103$) and rutherfordium ($Z = 104$) isotopes have been measured with very high accuracy. The Phase-Imaging Ion-Cyclotron-Resonance technique has been successfully applied for such challenging measurements characterized by the very low ion production rate and number of collected events. These results have been accomplished thanks to careful investigations and improvements of the efficiency of the SHIPTRAP setup, paving the way for the first direct high-precision mass spectrometry of even heavier and more exotic nuclides, including dubnium ($Z = 105$) isotopes. In this contribution, an overview on the efficiency of the setup as well as a summary of recent experimental campaigns will be given.