MS 3: Poster

Time: Monday 16:30–18:30 Location: P

MS 3.1 Mon 16:30 P

Current status of the LIONTRAP experiment — •Sangeetha Sasidharan[1,2], Olesia Bezrodnova[1], Sascha Rau[1], Wolfgang Quint[2], Sven Sturm[1], and Klaus Blaum[1] — [1]MPIK, Heidelberg, Germany — [2]GSI Helmholtzzentrum, Darmstadt, Germany

Atomic masses with high precision are essential parameters for sensitive tests of fundamental physics. LIONTRAP (Light-Ion Trap) is a dedicated mass spectrometer aiming for various light ion mass measurements with a relative precision of a few 10^{-12} (ppt). Our latest results include the atomic masses of the proton [1], the deuteron and the HD^+ molecular ion [2]. These show an excellent agreement with values extracted from laser spectroscopy of HD^+ [3] and the comparison is limited by the precision of the relative mass of the electron, $A_r(e)$. This brings in a motivation to measure the atomic mass of ^4He which along with a *g*-factor measurement can improve the electron mass. Furthermore, the masses of ^3He and ^3T [4] can be used as an important cross-check for the determination of the electron antineutrino mass which is being investigated by the KATRIN experiment [5]. In this contribution I will discuss the efforts to measure the alluded systems at LIONTRAP.

[1] F. Heiße *et al.*, Phys. Rev. A **100**, 022518 (2019)
[2] S. Rau *et al.*, Nature **585**, p. 43-47 (2020)
[3] Alighanbari, S. *et al.*, Nature **581**, 152-158 (2020)
[4] E.G. Myers *et al.*, Phys. Rev. Lett. **114**, 013003 (2015)
[5] M. Aker *et al.*, Phys. Rev. Lett. **123**, 221802 (2019)

MS 3.2 Mon 16:30 P

MOCCA: a 4k-pixel molecule camera for the position and energy resolved detection of neutral molecule fragments at the Cryogenic Storage Ring CSR — •Ansgar Lowack[1], Dennis Schulz[1], Steffen Allgeier[1], Christian Enss[1], Andreas Fleischmann[1], Lisa Gamer[2], Loredana Gastaldo[1], Sebastian Kempf[1], Oldrich Novotný[2], and Andreas Wolf[2] — [1]Kirchhoff-Institute for Physics, Heidelberg University — [2]Max-Planck-Institute for Nuclear Physics, Heidelberg

MOCCA is a 64 x 64-pixel detector based on metallic magnetic calorimeters (MMCs), enabling a spatially- and energy-resolved detection of neutral massive particles with keV kinetic energies on a detector area of 4.5 cm x 4.5 cm with 99.5% filling factor. MOCCA was developed for the investigation of dissociative recombination, a fundamental process in interstellar chemistry, at the Cryogenic Storage Ring CSR at the Max-Planck Institute for Nuclear Physics in Heidelberg. For this purpose, a high detection efficiency for molecule fragments with kinetic energies between 1 and 300 keV, rates up to several hundred hits per second and multi-hit capability are required. We present the detector design and recent measurements showing the full functionality of the detector. Measurements with 6 keV X-ray photons yielded an energy resolution of 88 eV (FWHM). With this, MOCCA meets all the requirements for its use at the CSR. MOCCA is presently the largest and most complex MMC-based detector.