A 24: Poster: Atomic systems in external fields

Time: Tuesday 16:30–18:30 Location: Spree-Palais

A 24.1 Tue 16:30 Spree-Palais

A Penning Trap Experiment at High-Intensity Lasers — •Manuel Vogel[1,2], Wolfgang Quint[2,3], Gerhard Paulus[4,5], and Thomas Stöhlker[2,4,5] — [1]Technische Universität Darmstadt — [2]GSI Helmholtzzentrum für Schwerionenforschung Darmstadt — [3]Ruprecht Karls-Universität Heidelberg — [4]Friedrich-Schiller-Universität Jena — [5]Helmholtz-Institut Jena

We present the HILITE Penning trap experiment dedicated to studies with atomic and molecular ions in extreme laser fields (High-Intensity Laser Ion-Trap Experiment). It is designed to allow the preparation of clean ion targets with well-defined composition, localization, density and shape for irradiation with high-intensity and/or high-energy lasers. Non-destructive detection of reaction products with up to single-ion sensitivity supports advanced studies by maintaining the products for further studies at confinement times of minutes and above. Of particular interest for intial studies are nonlinear processes such as multiphoton ionization of atoms, singly-, and particularly highly charged ions.

A 24.2 Tue 16:30 Spree-Palais

Numerical investigations of tunneling times — •Nicolas Teeny, Heiko Bauke, and Christoph H. Keitel — Max-Planck-Institut für Kernphysik Saupfercheckweg 1, 69117 Heidelberg

Tunnel ionization belongs to the fundamental processes of atomic physics and has been investigated in-depth experimentally as well as theoretically. The question, however, how long it takes for an electron to escape from an attractive potential could not yet be answered conclusively. In our contribution, we utilize numerical solutions of the time-dependent Schrödinger and Dirac equations to identify tunneling times [1]. The numerical results are compared with predictions based on theoretical calculations [2].

[1] Proc. of SPIE, **8780**, 87801Q (2013)

[2] Phys. Rev. Lett., **110**, 153004 (2013); E. Yakaboylu et al., arXiv:1309.0610 (to be published in Phys. Rev. A)

A 24.3 Tue 16:30 Spree-Palais

Imaging of Relaxation Times and Microwave Field Strength in Vapor Cells — •Guan-Xiang Du[1], Andrew Horsley[1], Matthieu Pellaton[2], Thejesh Bandi[2], Christoph Affolderbach[2], Gaetano Mileti[2], and Philipp Treutlein[1] — [1]Departement Physik, Universität Basel, Switzerland — [2]Laboratoire Temps-Fréquence, Institut de Physique, Université de Neuchâtel, Switzerland

We present a new characterisation technique for atomic vapor cells [1], combining time-domain measurements with absorption imaging to obtain spatially resolved information on decay times, atomic diffusion and coherent dynamics. The technique has been used to characterise both a microfabricated Rb vapor cell placed inside a microwave cavity, and a larger, high-performance vapor cell atomic clock. Time-domain Franzen and Ramsey measurements are used to produce high-resolution images of the population (T_1) and coherence (T_2) lifetimes in the cell, while Rabi measurements yield images of the σ_-, π and σ_+ components of the applied microwave magnetic field. Images of the microwave magnetic field reveal regions of optimal field homogeneity, and thus coherence. Our technique is useful for vapor cell characterisation in atomic clocks, atomic sensors, and quantum information experiments.

[1] A. Horsley et al., *Imaging of Relaxation Times and Microwave Field Strength in a Microfabricated Vapor Cell*, accepted to PRA. Arxiv: 1306.1387