# Precision experiments in strong-field and attosecond science

In strong-field and attosecond science, the interpretation of experiments relies on highly complex theoretical simulations. Often theory and experiment do not agree, throwing these interpretations into doubt. I will describe efforts to achieve highly accurate measurements in strong-field ionisation and high-harmonic generation at the Australian Attosecond Science Facility (AASF). Using atomic hydrogen, we have achieved few-percent accuracy in measuring photoionisation yields, photoelectron energies, and laser peak intensities. Our measurements on H2 strongly challenge theory: the data are known to be accurate at the 3% level, but disagree with state-of-the-art simulations at the tens of percent level. From the H2 data, we have derived an intensity calibration standard that is readily accessible to other laboratories. In another set of experiments, we have demonstrated a new kind of HHG interferometer, based on Gouy phase evolution of the drive laser. With only passive stabilisation, this technique provides zeptosecond timing stability in measuring time delays between HHG pulse pairs. We are preparing experiments to investigate nuclear effects on HHG using the microradian phase precision of this interferometer.

The Potsdam Photonics and Quantum Optics Student Chapter cordially invites to the talk

**"Precision experiments in strong-field and attosecond science"**

given by David Kielpinski

**Where**
Room 0.108
Building 28 (bright gold)
University of Potsdam
Institute for Physics and Astronomy
Karl-Liebknecht-Str. 24
14476 Potsdam-Golm

**When**
Friday, 27th of June
Beginning: 10:00

**How to get there**
Take the bus 605 or 606 from Potsdam main station and exit at Golm/University or use the RB21 train from Potsdam main station to Wustermark and exit at Golm.

Prof. David Kielpinski performed his PhD research in experimental trapped-ion quantum computing at the University of Colorado under the supervision of Dr David Wineland (Nobel 2012). He went on to a postdoctoral fellowship at the Massachusetts Institute of Technology (MIT) with Prof Wolfgang Ketterle (Nobel 2001) performing experiments on Bose-Einstein condensation and was awarded an MIT Pappalardo Fellowship in 2003. This enabled him to start independent work on laser cooling in the lab of Prof Franz Kaertner. He moved to a permanent appointment at Griffith University in 2006 and was appointed Professor in 2012. His research interests focus on the interaction of light and single atoms from the ultracold to the strong-field domains.

**Potsdam Photonics and Quantum Optics Student Chapter**

Universität Potsdam

OSA The Optical Society