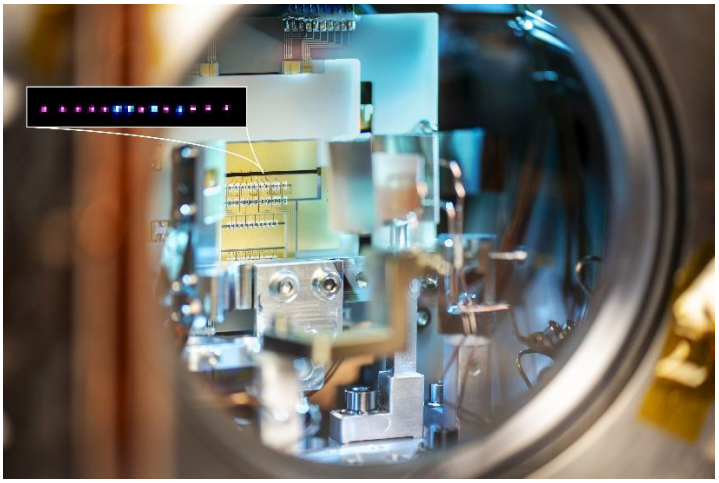
The Institute of Quantum Optics of Leibniz University Hannover, in cooperation with the Physikalisch-Technische Bundesanstalt (PTB) - the national metrology institute of the Federal Republic of Germany - in Braunschweig, invites applications for the position of a

Postdoctoral researcher (m/f/d) at PTB on multi-ion clocks



Background:

Scalable quantum systems based on trapped ions have wide applications in quantum computing, optical clocks, and tests of fundamental physics. Our approach to scale the number of trapped ions for clock spectroscopy has been very successful in the past years and is implemented in our clock experiments based on In^+ and Yb^+ ions. The multi-ion optical clock recently achieved a world-record stability and accuracy of 2.5×10^{-18} [Hausser *et al.*, PRL **134**,0023201 (2025)] and has since been scaled to operation with a 20-ion chain. Our group is part of the Cluster of Excellence "Quantum Frontiers" and the SFB *DQ-mat* and a Joint Research Lab with Osaka and Tokyo labs (Japan).

Task description:

You will be part of a diverse team, embedded in national and international collaborations and close exchange with theory groups at LUH. Our future work will concentrate on the following key aspects of multi-ion clocks, and you will participate in some of the following tasks:

- Utilizing precision spectroscopy for tests of Special Relativity with precisely controlled quantum systems
- Multi-ion clock operation with ion chains near the motional ground state
- Further development of multi-ion clock protocols and reduced uncertainties

In detail, the tasks include:

- Precision clock spectroscopy on trapped ions
- Controlling and observing collective motion in ion chains
- Quantum optical simulations of coherent laser-atom interaction
- Participating in international clock comparisons
- Work with ultra-stable lasers and laser optics
- Presenting research findings at national and international conferences

Employment conditions

- A PhD in physics with relevant publications in the field
- Hands-on experience in at least one of the following fields:
  - Work with laser-optics and vacuum setups
  - Programming opto-electronic control systems
  - Laser-cooling and spectroscopy of trapped ions or atoms
  - Quantum optics
- Fluent English skills
- We search for candidates who enjoy active participation in scientific discussions
- Strong analytical thinking abilities
- Good communication and teamwork skills
- Curiosity and high motivation to develop quantum optics experiments

In return for your contributions, we offer:

- Competitive Tarif TVL compensation up to E14
- The opportunity to work in an international and highly motivated team in a state-of-the-art equipped research lab and embedded in a world-class infrastructure

The university aims to promote equality between women and men. For this purpose, the university strives to reduce under-representation in areas where a certain gender is under-represented. Women are under-represented in the salary scale of the advertised position. Therefore, qualified Women are encouraged to apply. Moreover, we welcome applications from qualified Men. Preference will be given to equally qualified applicants with disabilities.

For more information, visit

https://quantummetrology.de/quaccs

or contact

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