PhD Position - Portable Atomic Clocks

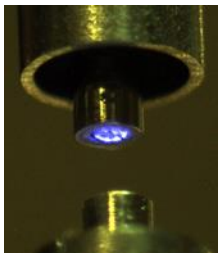
We offer a 3.5 year PhD position in the Ion Trap Cavity-QED and Molecular Physics Group in the Department of Physics & Astronomy at the University of Sussex.

The position comes with an annual stipend of £14,068 which can be supplemented by tutoring. The position includes an additional yearly travel allowance for attending conferences and workshops.

Applicants should have an undergraduate degree in physics or engineering.

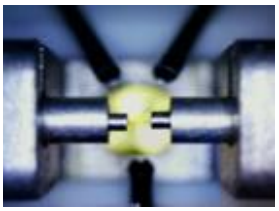
Project overview

The currently most precise atomic clocks are based on optical transitions within neutral atoms or trapped atomic ions. With frequency uncertainties on the order of 1 second in 30 billion years, these systems supersede current atomic clocks based on microwave transitions. Despite their superior performance, these optical clocks are still constrained to the research labs due to their high power consumption and the volume of the required infrastructure. The aim of the project is to develop and implement technologies to build a portable atomic clock based on trapped calcium ions. Utilising the advances in optical fibre technology and laser development, an all-fibre system will be set up and tested. Integrating optical fibres into the ion trap structure for fluorescence collection and light delivery as well as an all-fibre laser system ensures the stability and compact size of the optical clock.

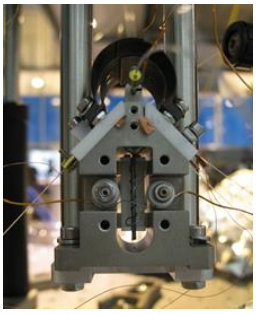


The project includes developing a compact laser system for generating, cooling, and interrogating the ions, integrating all optical components in to the ion trapping structure, building the required electronic control system as well as designing of the vacuum system. The heart of the clock is an ultra-stable laser (clock laser) which will be developed in collaboration with the National Physical Laboratory.

After successful testing the portable clock system, the project aims to explore novel schemes to eliminate systematic frequency shifts due to electric and magnetic fields. Finally, the clocks performance will be evaluated by comparing its stability with primary and secondary frequency standards at eh NPL.



The project is within the **Quantum Technology Hub for Sensors and Metrology** and in collaboration with the **National Physical Laboratory**.



As part of the National Quantum Technology Programme to commercialise quantum technologies, the project includes the investigation of potential commercialisation pathways for the atomic clock system and its components.

If you are interesting in being part of one of the forward thinking research groups please get in touch with Prof Matthias Keller (m.k.keller@sussex.ac.uk).

We offer you

- State of the art research facilities
- Research in a motivated supportive and experienced team
- Close contact with industry partners
- An annual stipend of £14,068 which can be supplemented by tutoring