

Research Fellow in Portable Atomic Clocks

Department of Physics and Astronomy

University of Sussex - School of Mathematical and Physical Sciences

Fixed Term for 24 months with the possibility of an extension, full time

Salary range: starting at £30,424 and rising to £33,230 per annum

Expected start date: 01 April 2018 or as soon as possible thereafter

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. Utilizing the advances in fibre optics and laser technology, 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 into 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 the possibility to eliminate systematic frequency shifts due to electric and magnetic fields through quantum superpositions. Finally, the clocks performance will be evaluated by comparing its stability with primary and secondary frequency standards at the 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 commercialize quantum technologies, the project includes the investigation of potential commercialization pathways for the atomic clock system and its components. For further information please contact Dr Matthias Keller

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Closing date: 1 March 2018

Please include with your completed application form a CV, at least two references and a list of relevant publications.

The University of Sussex is committed to equality of opportunity.