

Research Fellow in Quantum Technology for Fundamental Physics

Department of Physics and Astronomy

School of Mathematical and Physical Sciences, University of Sussex

Positions available: 2

Fixed term: 24 months, with the possibility of an extension

Hours: Full time

Salary range: starting at £33,797 and rising to £39,152 per annum

We invite applications for two full-time postdoctoral positions in Quantum Technology for Fundamental Physics within the ITCM Group at the University of Sussex, led by Prof Matthias Keller.

The research project is part of the UK 'Network of clocks for measuring the stability of fundamental constants' consortium. The consortium aims to build a network of dissimilar clocks to search for spatio-temporal changes in fundamental constants. Our partners in the network are the National Physical Laboratory, Imperial College London, the University of Birmingham and the University of Sussex.

The goal of the project at Sussex is to measure the frequency of a vibrational transition in molecular nitrogen ions with unparalleled precision and compare it with an electronic transition in calcium ions. The nitrogen ion's vibrational transition and the calcium ion's electronic transition exhibit different sensitivities to the proton-to-electron mass ratio, and therefore any relative changes in the frequencies of these transitions can be used to establish the degree to which the proton-to-electron mass ratio is constant.

In order to measure the vibrational frequency, a single nitrogen ion will be trapped alongside a single calcium ion. The calcium ion will serve as the read-out of the state of the molecule using a quantum logic spectroscopy scheme. A second ion trap system, which will hold a single calcium ion, will be used as a reference for the frequency comparison. The project will employ existing systems in the ITCM Group at Sussex and expand it in order to facilitate the frequency comparison. With the two ion traps and the molecular beam line in place, the focus of the project will be to expand the laser system for the vibrational frequency measurement, implement the quantum logic spectroscopy scheme and measure of the frequency ratio of the transitions within nitrogen and calcium.

The ITCM Group, which operates several ion-trap systems for research in quantum information and precision spectroscopy. The group currently consists of two research fellows, six PhD students, two MSc and three undergraduate project students lead by Prof Keller. You can read more about us here: <http://itcm-sussex.com>

Informal enquiries are highly encouraged. Please contact Prof Matthias Keller for more information:

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Email: M.K.Keller@sussex.ac.uk

The successful applicants will have obtained a PhD in experimental quantum optics, molecular or atomic physics and be able to demonstrate working knowledge in this field.

Please include with your completed application form a CV, two or more references and a list of relevant publications. The School of Mathematical and Physical Sciences is committed to equity, diversity and inclusion and we particularly welcome applications from women and black and minority ethnic candidates, who are underrepresented in academic posts in Science, Technology, Engineering, Medicine and Mathematics (STEMM) at Sussex.

The University of Sussex is committed to equality of opportunity.