UNIVERSITY OF SUSSEX

1 Advertisement

Post Title: Research Fellow in Portable Atomic Clocks
School/department: School of Mathematical and Physical Sciences
Hours: Full time
Contract: Fixed term for 24 months
Reference: 1924
Salary: starting at £32,004 and rising to £38,183 per annum.

Closing date: 1st May 2017  Applications must be received by midnight of the closing date.
Expected Interview date: 8th May 2017
Expected start date: 01 June 2017 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
Phone: +44 (1273) 877673, email: M.K.Keller@sussex.ac.uk

Closing date for applications: 1 May 2017

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.

For full details and how to apply see our vacancies page

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2. Senior leadership and management

The Vice-Chancellor (Professor Adam Tickell) is the senior academic officer and, as Chief Executive, is responsible to the University Council for management of the University. He is supported by an executive group which includes the three Pro-Vice-Chancellors, the Registrar and Secretary, the Director of Finance and the Director of Human Resources. The Heads of the Schools of Studies at Sussex report to the Pro-Vice-Chancellors.

The Registrar and Secretary heads the Professional Services of the University. In addition, under the University Statutes, the Registrar and Secretary is Secretary to the University Council. The Director of Finance reports to the Vice-Chancellor. The Director of ITS reports to the Registrar and Secretary, and the Librarian reports to one of the Pro-Vice-Chancellors.

3. The School / Division

The School of Mathematical and Physical Sciences was created in 2009 as part of a University wide restructuring. It brings together two outstanding and progressive departments – Mathematics, and Physics & Astronomy. The School aims to capitalise on the synergy between these subjects to deliver new and challenging opportunities for faculty and students.

The School of Mathematical and Physical Sciences combines pioneering research and stimulating teaching in an interdisciplinary academic setting. The faculty work at the frontiers of their fields, as is reflected in the recent growth of both subjects. Each department has a number of thriving research groups and links with outside agencies.

The Department of Physics and Astronomy

The Physics & Astronomy Department currently has 39 faculty divided into four research groups: Astronomy; Theoretical Particle Physics; Experimental Particle Physics; and Atomic, Molecular & Optical Physics.

We are part of the South East Physics Network (SEPNet) - a consortium of nine physics departments of the University of Sussex, University of Kent, Queen Mary University of London, Royal Holloway University of London,
Southampton University, University of Surrey, University of Portsmouth, University of Hertfordshire, and the Open University. This has been awarded substantial government funding (from HEFCE) to support vital UK science research, teaching and development.

In the highly acclaimed Thomson Scientific 2006 ranking of the research impact of all departments in UK universities, the University of Sussex came top in Physics and in Space Science/Astronomy. It was ranked 8th in the UK in the Research Assessment Exercise of 2008. It was ranked 5th in Great Britain and 37th in the world according to the Times Higher Education World University Rankings (2010). Sussex is ranked 5th in UK for Physics in the Times Good University Guide (2013), and scored 100% for overall satisfaction in the 2013 National Student Survey.

The Department has approximately 350 undergraduate students, 30 MSc students, over 110 PhD students and 41 postdoctoral fellows.

4. Job Description

CORE JOB DESCRIPTION

Job Title: Research Fellow in Portable Atomic Clocks
Grade: Research Fellow I, Grade 7
School: School of Mathematical and Physical Sciences
Location: Pevensey 2
Responsible to: Principal Investigator through to Head of School
Direct reports: n/a
Key contacts: Members of research group, members of faculty within the School and University.

Role description: Research Fellow I is an early career-grade research position. Post-holders will be expected to contribute to the work of the research team, and also to develop their research skills with support from more experienced members of staff.

PRINCIPAL ACCOUNTABILITIES

1. To engage in individual and/or collaborative research activity resulting in high-quality publications; and to develop research funding and knowledge exchange income individually or in collaboration with others, as appropriate, depending on the size and scope of the bid.
2. To contribute to School teaching activities.

KEY RESPONSIBILITIES

1. Research, Scholarship & Enterprise
   1.1 Develop research objectives and proposals for own or joint research, at
       acceptable levels, with assistance if required.
   1.2 Conduct research projects individually and in collaboration with others.
   1.3 Analyse and interpret research findings and draw conclusions on the
       outcomes.
   1.4 Produce high-quality research outputs for publication in monographs or
       recognised high-quality journals, or performance/exhibition, as
       appropriate, and contribute to the School's REF submission at
       acceptable levels of volume and academic excellence.
   1.5 Contribute to the preparation of proposals and applications to external
       bodies, for example for funding purposes.
   1.6 Individually or with colleagues, explore opportunities for enterprise
       activity, knowledge exchange income and/or consultancy, where
       permissible.
   1.7 Build internal contacts and participate in internal networks and relevant
       external networks in order to form relationships and collaborations.
   1.8 Continually update knowledge and understanding in field or specialism,
       and engage in continuous professional development.

2. Teaching & Student Support
   2.1 Undertake teaching duties, if required.
   2.2 Assist in the assessment of student knowledge and supervision of
       student projects if required.
   2.3 Assist in the development of student research skills, for example as part
       of a postgraduate supervision team.

3. Contribution to School & University
   3.1 Attend and contribute to relevant School and project meetings.
   3.2 Undertake additional duties, as required by the Principal Investigator
       and/or Head of School.

4. Role-specific duties
   4.1 Planning, building and setting up a miniature ion trap with integrated fibre
       optics.
   4.2 Setting up of a compact laser system for generating, cooling and
       detecting trapped atomic ions.
   4.3 Testing and characterisation of the atomic clock system and its
       components.
   4.4 Investigating the use of quantum superpositions to enhance the clocks
       performance.
   4.5 Explore commercialisation paths for the clock system and its
       components.
   4.5 Dissemination of research findings through conference presentations
       and articles in journals.
This Job Description sets out current duties of the post that may vary from time to time without changing the general character of the post or level of responsibility entailed.

INDICATIVE PERFORMANCE CRITERIA

- Publishing research (either from a recently completed PhD or new original research).
- Other forms of externally recognised professional practice of creative output of a standing equivalent to regular publication of original research.
- Initiating, developing or participating in links between the University and external bodies such as business and industry, the professions, community organisations and policy-makers.
- Evidence of successful engagement in teaching or supervision.

5. Person Specification

ESSENTIAL CRITERIA

1. Normally educated to doctoral level, or other equivalent qualification, or appropriate level of experience, as appropriate to the discipline (see role-specific criteria below).
2. Evidence of engagement in high-quality research activity.
3. Excellent presentation skills, with the ability to communicate effectively, both orally and in writing, with students, colleagues and external audiences.
4. Ability to work individually on own initiative and without close supervision, and as part of a team.
5. Ability to exercise a degree of innovation and creative problem-solving.
6. Excellent organisational and administrative skills.
7. Ability to prioritise and meet deadlines.
8. Excellent IT skills.

ESSENTIAL ROLE-SPECIFIC CRITERIA

1. Ability to carry out original research in experimental quantum optics.
2. Skills working with optics and diode lasers.
3. Competence in using data acquisition software (LabView) and data analysis software.
4. Good communication skills, written and oral.
5. Experience in experiments in atomic or ion physics.

DESIRABLE CRITERIA

1. Emerging track record of high-quality publications in reputable journals and other appropriate media of similar standing.
2. Experience of generating research or knowledge exchange income.
3. Solid knowledge of quantum optics.
4. Experience in laser-manipulation of neutral atoms or ions.
5. Experience in high resolution spectroscopy and optical clocks.