1 Advertisement

Post Title: Postdoctoral Research Fellow in Theoretical Physics
School/department: School of Mathematical Sciences/Dept of Physics and Astronomy
Hours: full time or part time hours considered up to a maximum of 1.0 FTE
Requests for flexible working options will be considered (subject to business need).
Contract: Fixed term for 2 years.
Reference: 5256
Salary: starting at £33,797 to £40,322 per annum, pro rata if part time
Placed on: 5 January 2021.
Closing date: 31 January 2021. Applications must be received by midnight of the closing date.
Expected Interview dates: Week of 8 – 12 February 2021
Expected start date: As soon as possible, or by agreement up to September 2021

A postdoctoral research associate is sought to join the QUEST-DMC project, a new consortium composed of researchers at the University of Oxford, Royal Holloway University of London, Lancaster University and the University of Sussex. QUEST-DMC is developing theoretical and experimental techniques to study the superfluid helium-3 (3He) A/B transition as an analogue laboratory system which can be used to simulate phase transitions in the early universe.

The position, based at the University of Sussex, is devoted to theoretical research on the applications of superfluid 3He to cosmological phase transitions. We are particularly interested in applicants with research experience in numerical simulations of phase transitions or topological defects, either in quantum fluid condensates or cosmology.

The postholder will work with a team applying multidisciplinary skills to the modelling of the nucleation of B-phase droplets in the A phase, and the propagation of the phase boundary. The aim of the work is to solve the long-standing puzzle of the phase transition between the two superfluid phases of 3He (A and B), and develop theoretical and computational tools to model phase interface dynamics in quantum fluids. Both problems have direct connections to early universe phase transitions and the characterisation of gravitational waves for future space-based detectors such as LISA.

The postholder will benefit from the lively research environment of the Sussex Theoretical Particle Physics group, which is also a member of the related consortium QSNET funded under the same Quantum Technology for Fundamental Physics programme of the Science and Technology Facilities Council. They will also benefit from the consortium’s network international partners, including theorists at Northwestern University, Aalto University and the University of...
Helsinki. Supercomputing resources will be provided by the University of Sussex and CSC, the Finnish IT Centre for Science.

Potential candidates are strongly encouraged to make informal contact with Mark Hindmarsh (m.b.hindmarsh@sussex.ac.uk) or Stephan Huber (s.j.huber@sussex.ac.uk).

http://www.sussex.ac.uk/tp

The following materials should be sent by email to mpsrecruitment@sussex.ac.uk quoting the job reference number above.
- Official Sussex application form (available via the University website www.sussex.ac.uk/jobs)
- CV, list of publications, and statement of research interests in a single pdf document
- Three recommendation letters.

Late applications may be considered until the post has been filled.

The University is committed to equality and valuing diversity, and applications are particularly welcomed from women and black and minority ethnic candidates, who are under-represented in academic posts in Science, Technology, Engineering, Medicine and Mathematics (STEMM) at Sussex.

For full details and how to apply see our vacancies page

2. The School / Division

The School of Mathematical & Physical Sciences

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 Head of School is Professor Philip Harris. He is supported in his role by an Executive Committee consisting of the Heads of Department, the Director of Teaching and Learning, Director of Student Experience, Director of Recruitment and Admissions, Director of Research and Knowledge Exchange, Director of Doctoral Studies, School Administrator, Technical Services Manager, Director of Diversity and Equality, and a student representative.

The Department of Mathematics
The Department of Mathematics currently has 24 faculty divided into six research areas: Analysis and PDEs, Geometry and Topology, Mathematics Applied to Biology, Mathematical Physics, Numerical Analysis and Scientific Computing, and Probability and Statistics.

In the 2014 research excellence framework (REF), 81 per cent of the research outputs in Mathematics at Sussex were rated as world-leading (4*) or internationally excellent (3*). Mathematics at Sussex was ranked 21st in the UK in a recent league tables [Guardian 2017]. It also repeatedly scores well in the UK National Student Survey.

The Department has more than 370 undergraduate students, 99 MSc students, more than 50 PhD students and 2 research fellows.

**Research groups in Mathematics**

**Analysis and PDEs**

http://www.sussex.ac.uk/apde/

**Mathematics Applied to Biology**

http://www.sussex.ac.uk/mab/

**Mathematical Physics**

http://www.sussex.ac.uk/maths/research/ms

**Numerical Analysis and Scientific Computing**

http://www.sussex.ac.uk/nasc/

**Geometry and Topology**

http://www.sussex.ac.uk/maths/research/geotop

**Probability and Statistics**

http://www.sussex.ac.uk/maths/research/pas

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**The Department of Physics and Astronomy**

The Physics & Astronomy Department currently has 42 faculty divided into five research groups: Astronomy; Theoretical Particle Physics; Experimental Particle Physics; Materials Physics; and Atomic, Molecular & Optical Physics, carrying out internationally leading research in all these areas.

We are part of the South East Physics Network (SEPNet) – a consortium of the 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 was established with substantial government funding to support vital UK science research, teaching and development.
The Department is ranked 15th in the UK according to the Guardian University Guide (2018) including being ranked 1st for graduate prospects. We score very well on the National Student Survey including 100% for overall satisfaction in 2013.

The Department has approximately 350 undergraduate students, 30 MSc students, over 110 PhD students and 40 postdoctoral fellows.

Research groups in Physics & Astronomy

The Astronomy Centre
http://www.sussex.ac.uk/astronomy/

The Atomic, Molecular & Optical (AMO) Physics Group
http://www.sussex.ac.uk/amo

The Experimental Particle Physics (EPP) Group
http://www.sussex.ac.uk/epp

The Materials Physics Group
http://www.sussex.ac.uk/materials-physics/

Sussex Centre for Quantum Technologies
http://www.sussex.ac.uk/scqt/

The Theoretical Particle Physics (TPP) Group
http://www.sussex.ac.uk/tpp/

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**JOB DESCRIPTION**

**CORE JOB DESCRIPTION**

**Job Title:** Research Fellow in Theoretical Particle Physics

**Grade:** Research Fellow I, Grade 7

**School:** MPS

**Location:** Pevensey II

**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 To carry out original research in the area of theoretical physics, within a sub-area relating to the topics funded by the QUEST-DMC grant (superfluids and cosmology).

4.2 Participate in the host group’s regular meetings and seminars, assisting with their organisation if required.

4.3 Seek and exploit collaborations within the QUEST-DMC research consortium.

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

- A PhD or equivalent scholarly or relevant professional activity
- Pursuing a line of independent research within a research group.
- 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.
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. High level of knowledge and skill in theoretical physics.

2. Established publication record in the area of superfluids or cosmology.

3. Willingness and ability to travel to collaborative meetings and conferences as required.

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.

DESIRABLE ROLE-SPECIFIC CRITERIA

Experience in one or more of the specific: phase transitions, topological defects, numerical simulations.