1 Advertisement

Post Title: Research Fellow in Experimental Particle Physics  
School: School of Mathematical and Physical Sciences  
Department: Physics & Astronomy  
Contract: Full time, Fixed term; until 30 September 2022 (with the possibility to extension, subject to funding) Requests for flexible working options will be considered (subject to business need).  
Ref: 3232  
Salary range: starting at £33,797 and rising to £40,322 per annum  
Expected start date: 24 April 2020, or as soon as possible thereafter

Applications are invited from talented and creative scientists for a Postdoctoral Research Fellowship in Experimental Particle Physics on supernova neutrino detection with the SNO+ and DUNE experiments. You are an efficient and capable programmer able to process and analyse large-scale experimental data, and have an affinity for experimental work.

The SNO+ experiment will probe a wide range of neutrino physics. The detector will be loaded with natural tellurium, enabling a world-leading search for neutrinoless double beta-decay. The programme also includes antineutrinos from reactors and geothermal activity, solar neutrinos and watching for a supernova in our galaxy. The DUNE detector is currently being developed and, whilst it will focus is on measuring neutrino oscillations, it will also have a unique sensitivity to neutrinos from a potential supernova.

The Sussex SNO+ group's activities are currently centred around the overall calibration of the experiment, as well as neutrinoless double-beta decay analysis, supernova neutrinos and reactor antineutrinos. The successful candidate will be responsible for maintaining the Sussex calibration systems, be actively involved in the calibration campaigns, and further develop and maintain the SNO+ supernova trigger. They will also take a leading role in the supernova analysis group. In addition, we expect the successful candidate to contribute to the development of a future upgrade of the SNO+ detector.

In DUNE, the Sussex group plays a leading role in the DAQ development. A particular challenge is the ability to trigger on supernova neutrinos, where there is overlap with SNO+ physics. The successful candidate will assist the group in developing the algorithms for the supernova trigger, and assess the potential physics performance.

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 and engineering at Sussex.
Informal enquiries may be addressed to: Prof Simon Peeters, 
\texttt{s.j.m.peeters@sussex.ac.uk}

For full details and how to apply, see \url{www.sussex.ac.uk/jobs}.

\textit{The University of Sussex is committed to equality of opportunity}
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.

3. 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 was rated as world-leading (4*) or internationally excellent (3*). Mathematics at Sussex was ranked 21st in the UK in 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

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/
4. **Job Description**

**Job Title:** Research Fellow, Experimental Particle Physics  
**Grade:** Research Fellow I, Grade 7  
**School:** MPS  
**Location:** Physics & Astronomy  
**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.

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**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 Carry out research relating to the SNO+ experiment.

4.2 Maintain the Sussex calibration systems and be actively involved in SNO+ calibration campaigns at SNOLAB, as well as contributing to the operation of the detector. Contribute to the detailed understanding of the detector performance by analysing calibration data.

4.3 Analyse SNO+ data to extract physics parameters from neutrinos from a potential supernova.

4.4 Contribute to the development of the next-generation liquid scintillator neutrinoless double-beta detector design. Suggested alternative: Contribute to the R&D for the next-generation liquid scintillator detector for neutrinoless double beta decay.

4.5 Contribute to the development of the supernova trigger of the DUNE DAQ and assess its physics performance.
4.6 Present and discuss the results of the group’s activities at telephone conferences and (in person) at international collaboration meetings.

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 policymakers.
▪ 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 efficiently process and analyse large-scale experimental data.
2. Commitment to learning new software skills when required, possibly by attending appropriate training.
3. High level of numerical and analytical skills.
4. Excellent C++ programming and IT skills.
5. Experience in the analysis of data from a particle physics experiment.
6. Demonstrated initiative and creativity in developing an existing experimental programme.
7. Willing and able to travel to and spend time in the Canada and to other locations in the UK and abroad, including for extended periods of time, as required.
8. Flexibility to work outside normal hours if required.
9. Willing and able to carry out work underground and in radiation protected zones if necessary.
10. An affinity for experimental work.

**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. Experience with detector calibration.
4. Detailed knowledge of neutrino physics.

**Terms and Conditions of the Post**

*State here which terms and conditions are relevant for this post.*
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