

1 Advertisement

Post title: Research Fellow in Experimental Particle Physics

School/department: School of Mathematical and Physical Sciences, Department of Physics & Astronomy

Hours: Full time. Requests for [flexible working](#) options will be considered (subject to business need).

Contract: Fixed Term until 30 September 2023.

Reference: 2331

Salary: starting at £33,797 to £40,322 per annum

Closing date: 21 October 2019. Applications must be received by midnight of the closing date.

Expected interview date: 19 November 2019

Expected start date: 01 December 2019, or as soon as possible thereafter.

Applications are invited from talented and creative scientists for a Postdoctoral Research Fellowship in Experimental Particle Physics on the DUNE neutrino experiment.

You will be a strong programmer with a passion for both the technical computing aspects of data acquisition and the physics of DUNE. With a focus on trigger development for DUNE you will work to enable the full physics exploitation of the huge detectors.

The UK government is contributing £65 million in construction funding for the DUNE project through to 2026, including more than £10 million for the DAQ which is jointly led in the UK by Sussex. This is a post that has the potential for seeing the DUNE project right through construction, into data taking and physics exploitation.

Experience with complex trigger systems from any experiment will be an advantage.

The Sussex group has a long history of neutrino research and a number of senior leadership roles internationally. Our current research focusses on the DUNE, NOvA, SBND and SNO+ experiments.

Informal enquiries may be addressed to Prof. Jeff Hartnell (j.j.hartnell@sussex.ac.uk) or Prof. Simon Peeters (s.j.m.peeters@sussex.ac.uk).

For full details and how to apply see our [vacancies page](#)

The University of Sussex values the diversity of its staff and students and we welcome applicants from all backgrounds.

2. The School / Division

The School of Mathematical and 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 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

The Astronomy Centre was established in 1966. Current research interests are: physics of

the early Universe; constraining cosmological models; the epoch of reionization; numerical simulations of structure formation; extragalactic survey science; and galaxy formation and evolution. The first of these topics has strong overlaps with the Theoretical Particle Physics group.

The Centre consists of 12 permanent faculty members plus postdoctoral researchers (between 5 and 10 at any given time) and PhD students (between 20 and 30 at any given time). The group's main source of funding comes from the Science and Technology Facilities Council (STFC), although additional sums come from the Royal Society, the European Council, and the Leverhulme Foundation.

We have leadership roles in international astronomical projects, including: the Herschel Multi-tiered Extra-galactic Survey (HerMES), the XMM Cluster Survey (XCS), the Galaxy Mass Assembly (GAMA) project, the Dark Energy Survey (DES), the Square Kilometre Array (SKA) and, the 4-MOST WAVES project. We also have active roles in the EUCLID, the Large Synoptic Survey Telescope, and James Webb Space Telescope projects. We are partners in various supercomputing collaborations including COSMOS and VIRGO, and have a strong track record of securing large awards of time on facilities such as PRACE and DIRAC. The Centre has access to substantial computing resources including a local super computing cluster.

The Astronomy Centre's web site is: <http://www.sussex.ac.uk/astronomy/>

The Experimental Particle Physics (EPP) Group

The Sussex EPP group counts eleven permanent faculty members, nine postdoctoral level researchers, nineteen PhD students, and four engineer/technician posts directly involved in EPP research. The group leader is Simon Peeters.

The group's main source of funding is the Science and Technology Facilities Council (STFC), with additional support from the European Research Council (ERC) and the Royal Society.

Antonella De Santo leads a substantial team working on the ATLAS experiment at the CERN Large Hadron Collider (LHC). The other ATLAS faculty members are Lily Asquith, Alessandro Cerri, Fabrizio Salvatore, Kate Shaw and Iacopo Vivarelli. The group has a long-standing leadership in the search for supersymmetry at ATLAS, and also leads in the areas of jet physics, Higgs physics, flavour physics, and top physics. Sussex also holds key responsibilities in the ATLAS High-Level Trigger (HLT) system, including in view of future LHC and ATLAS upgrades. It also has a major role in the proposed Level-1 tracking trigger project, for use by ATLAS at the High-Luminosity LHC.

Sussex EPP boasts a vibrant programme of neutrino physics with leading involvement in the DUNE, NOvA, SBND and SNO+ experiments. Faculty members are Simon Peeters (SNO+ group leader), Jeff Hartnell (long-baseline neutrino group leader), Lily Asquith, Lisa Falk and Clark Griffith. The group has major leadership roles towards the discovery of the remaining unknowns in neutrino physics, which include the neutrino mass ordering, octant of θ_{23} and leptonic CP violation as well as the nature of the neutrino and its absolute mass scale. For the next generation DUNE experiment we are co-leading the DAQ project in the UK.

The Sussex EPP group is world-renowned for its high-precision measurement of the neutron electric dipole moment (EDM). The EDM is uniquely sensitive to physics beyond the Standard Model, and the group is currently involved in the neutron EDM experiment at the PSI. Philip Harris leads this effort at Sussex together with Clark Griffith and Visiting Researcher Mike Hardiman.

Sussex EPP have access to a number of well-equipped laboratories and enjoy good access to the University's technical facilities, including shared technicians. Sussex EPP researchers have uncontented access to a dedicated Grid Tier-3 cluster, and Sussex is a member of the SouthGrid Tier-2 grouping of Grid-enabled research institutions in the South of England.

Sussex EPP has close links with colleagues in the Sussex Theoretical Particle Physics group and with other partners in the SEPnet consortium.

The Experimental Particle Physics group web site is: <http://www.sussex.ac.uk/epp>

The Materials Physics Group

This is a new research group set up by Professor Alan Dalton who joined the Department from Surrey University in February 2016.

The group will focus on understanding the fundamental structure-property relationships in materials containing one- and two-dimensional structures such as carbon nanotubes, graphene and other layered nanomaterials. Prof Dalton is particularly interested in developing viable applications for nano-structured organic composites (mechanical, electrical and thermal). He is also interested in the directed-assembly and self-assembly of nanostructures into functional macrostructures and more recently interfacing biological materials with synthetic inorganic and organic materials and associated applications.

The Materials Physics group webpage is: <http://www.sussex.ac.uk/materials-physics/>

Sussex Centre for Quantum Technologies

The Sussex Centre for Quantum Technologies is focused on the exploitation and development of disruptive quantum technologies. The Centre hosts ten research groups covering the broad spectrum of quantum technologies as well as hosting a number of associate member groups that share significant overlap with our mission.

Our research groups are involved in the UK Quantum Technology Hub on Networked Quantum Information Technologies and the UK Quantum Technology Hub for Sensors and Metrology as well as DSTL initiatives, Centres for Doctoral Training and numerous national and international collaborations. The centre is integrated within the UK National Quantum Technology Programme. The centre leadership consists of Prof. Winfried Hensinger (director) and Prof. Jacob Dunningham (deputy director).

The Centre's five experimental research groups are led by Prof Winfried Hensinger (Ion Quantum Technology), Dr Matthias Keller (Ion Trap Cavity-QEG and Molecular Physics), Prof Peter Krueger (Quantum Systems and Technologies), Dr Alessia Pasquazi (Ultrafast Photonics), Dr Marco Peccianti (Tera-Hertz Imaging), and Dr Jose Verdu (Electrons in Quantum Circuits). The centre also hosts ground breaking theory groups led by Prof Claudia

Eberlein (Quantum Field Theory in AMO), Prof. Jacob Dunningham (Quantum metrology, Bose-Einstein condensates and Entanglement), and Prof Barry Garraway (Trapped Ultracold Atoms & Theoretical Quantum Optics).

The Sussex Centre for Quantum Technologies features numerous state-of-the-art quantum technology laboratories along with key infrastructure. In addition to the high quality research environment, training plays an integral role and the centre hosts the pioneering MSc in Frontiers of Quantum Technology as well as carrying out specialized quantum technology training for doctoral and postdoctoral researchers.

The Sussex Centre for Quantum Technologies web page is: <http://www.sussex.ac.uk/scqt/>

The Theoretical Particle Physics (TPP) Group

The current research activities in the group are: particle astrophysics and cosmology, including cosmological phase transitions, baryogenesis, topological defects, inflation, dark matter, and dark energy; collider and low-energy phenomenology, including Higgs and BSM physics, flavour, QCD, supersymmetry and extra dimensions; and quantum field theory, including quantum gravity, tests the asymptotic safety conjecture, the renormalisation group, effective theory and strong coupling phenomena.

The group consists of Andrea Banfi, Xavier Calmet, Mark Hindmarsh, Stephan Huber (group leader), Sebastian Jaeger, Daniel Litim, Veronica Sanz, Emeritus Professor Norman Dombey, two Postdoctoral Research Fellows, and about 20 PhD and MSc students. The group maintains a research consortium with Royal Holloway (Nikolas Kauer) and University College London (Frank Deppisch). The group's research funding comes mainly from the UK Science and Technology Facilities Council (STFC) and is also supported by the European Science Foundation and the Higher Education Funding Council for England.

The group has close links with both the Experimental Particle Physics and Astronomy research groups, and is a member of the NExT Institute, a regional collaboration for particle physics phenomenology. It benefits from excellent computing resources including a Linux-based system of workstations and servers and access to the University's High Performance Computing cluster.

The Theoretical Particle Physics group web page is <http://www.sussex.ac.uk/tpp/>

3. Job Description

Job Description for the post of: Research Fellow in Experimental Particle Physics

Department: Physics and Astronomy

Section/Unit/School: School of Mathematical and Physical Sciences

Location: Physics and Astronomy, Falmer Campus, Brighton

Grade: Research Fellow I, Grade 7

Responsible to: Jeffrey Hartnell, Professor of Physics

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 DUNE experiment.
- 4.2 Develop the DUNE DAQ design.
- 4.3 Develop trigger strategies and determine their expected physics performance.
- 4.4 Present/discuss the group's activities at phone conferences and 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 or 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.

4. 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. Expertise with complex computing systems for particle physics experiments or similar.
2. Ability to efficiently process and analyse large-scale experimental data.
3. Experience in the analysis of data from a particle physics experiment or similar.
4. Excellent C++/other language programming and IT skills
5. Commitment to learning new software skills when required, possibly by attending appropriate training.
6. High level of numerical and analytical skills.
7. Demonstrated initiative and creativity in developing an existing experimental programme.
8. Willing and able to travel to and spend time in the USA and to other locations in the UK and abroad, including for extended periods of time, as required.
9. Flexibility to work outside normal hours if required.
10. Willing to live within 20 miles of the university.
11. Willing and able to carry out work underground and in radiation protected zones if necessary.

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. Evidence of successful engagement in teaching and/or the supervision of students.
4. Experience with DAQ and/or trigger systems from a particle physics experiment or similar.
5. Detailed knowledge of liquid argon time projection chambers.
6. Detailed knowledge of neutrino physics.

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.