School of Mathematical & Physical Sciences  
Department of Physics & Astronomy  
Research Fellow in Nanostructured Materials Based on Graphene and other 2D Crystals (fixed term for two years with possible extension to three years, full time)  
Salary range: starting at £32,004 and rising to £38,183 per annum  
Expected start date: Negotiable, but an immediate start is strongly preferred.

Applications are invited for a Research Fellow to undertake research in Raman spectroscopy, tip enhanced Raman spectroscopy and Scanning Probe Microscopy of graphene materials and systems. The successful candidate will also be able to contribute to other projects such as the characterisation of polymer composites based on 2-D crystal fillers and developing structure-optoelectronic property relationships.

The successful applicants will collaborate with other members of the Materials Physics Group at the University of Sussex which combines the expertise of physicists, chemists, materials scientists and biologists in a range of application areas. They will also collaborate with several groups internationally. The group’s research interests 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.

Eligibility criteria for the post  
Candidates would normally be educated to doctoral level, or other equivalent qualification, or have appropriate level of experience as appropriate to the discipline in Physics or a related discipline with a solid knowledge of Atomic Force Microscopy, Raman spectroscopy and possibly tip enhanced Raman spectroscopy. The candidate should also have expertise in working with nanomaterials such as carbon nanotubes, graphene and other 2D crystal materials.

How to apply for this post  
Please complete the application form from http://www.sussex.ac.uk/jobs, and ensure you include your CV and a letter of motivation with a maximum one-page statement explaining how your research interests, skills and experience are relevant to the position.

Closing date for applications: 10 March 2017  
For full details and how to apply see www.sussex.ac.uk/jobs  

The University of Sussex is committed to equality of opportunity

2. Senior leadership and management  
The Vice-Chancellor (Professor Adam Tickel) 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

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 and 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, 50 PhD students and 15 postdoctoral fellows.

Research groups

3.1. The Astronomy Centre

Current research interests are: physics of the early Universe; constraining cosmological models; numerical simulations of structure formation; extragalactic survey science; and galaxy formation and evolution. The first of these has strong overlaps with the Theoretical Particle Physics group.

The Centre consists of 12 permanent faculty members: Chris Byrnes (Royal Society URF), Peter Coles (also Head of School), Ilian Iliev, Antony Lewis, Jon Loveday, Seb Oliver
(Director of Research & KE for the School), Kathy Romer, Mark Sargent, David Seery, Robert Smith, Peter Thomas (Director of the Astronomy Centre), Stephen Wilkins; there are currently 8 postdoctoral researchers and 22 PhD students. The group’s main source of funding comes from a consolidated grant Science and Technology Facilities Council (STFC) and EU funding in the form of Starting, Consolidator and Cooperation grants.

The Centre’s activity is focused around three themes: Theoretical cosmology, with focus on inflationary cosmology, the cosmic microwave background, dark energy, and statistical methods; Simulations/modelling of reionization, large-scale structure, galaxy and cluster formation; Observations; surveys of galaxies and clusters from the infra-red through to X-ray.

We have major roles in extra-galactic surveys: Seb Oliver coordinates the Herschel Multi-tiered Extra-galactic Survey (HerMES); Kathy Romer leads the XMM Cluster Survey (XCS); Jon Loveday leads the Galaxy Mass Assembly (GAMA) spectra working group. We are partners in various supercomputing collaborations including COSMOS and VIRGO. We have key roles in Cosmology and Dark Energy studies including Planck and the Dark Energy Survey.

The Centre has access to substantial computing resources, including locally and various supercomputing consortia.

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

3.2. The Atomic, Molecular & Optical (AMO) Physics Group

Research in the AMO group at Sussex is devoted to the study of fundamental physics and quantum effects and technologies using the techniques of atomic and laser physics. The research covers both experimental and theoretical AMO physics.

There are five experimental faculty in the AMO group. Winfried Hensinger is developing new quantum technologies, looking at novel ways to trap and manipulate ions for large scale quantum computing. These experiments provide a basis for efficient quantum information processing in large scale quantum networks. Matthias Keller is investigating the interaction of single photons and ions assisted by optical cavities with the aim of generating large scale entangled states and developing quantum networks. His work also includes the physics of trapped molecular ions. Alessia Pasquazi is working on ultra-fast photonics and also on optical sources for quantum technologies. Marco Pecianti's research is focussed on Tera-Hertz Imaging and applications of Tera-Hertz radiation. Jose Verdu's team is developing a novel Penning trap technology based upon superconducting microwave transmission-lines. This work has applications to circuit-QED with trapped electrons, quantum metrology and mass spectrometry.

There are four theorists in the AMO group. Jacob Dunningham is investigating Bose-Einstein condensates and quantum technologies with a particular emphasis on quantum metrology, sensing, and imaging. Claudia Eberlein works on quantum field theory applied to atomic, optical, and nano-physics. Barry Garraway (AMO group leader) is developing new kinds of atom traps with applications to quantum information and quantum metrology and in addition works on cavity QED and non-Markovian dynamics. Diego Porras applies the techniques of quantum optics to condensed matter systems.

With the nine faculty there are currently five research fellows and 23 PhD students in the AMO group. Sources of funding include the European Union, EPSRC and European and national research networks on quantum information processing. The Atomic, Molecular & Optical Physics group web site is http://www.sussex.ac.uk/amo
3.3. The Experimental Particle Physics (EPP) Group

The Sussex EPP group counts ten permanent faculty members, plus one Emeritus Professor. 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, who is also the EPP Group Leader, together with Fabrizio Salvatore has established and leads a fast-growing team working on the ATLAS experiment at the CERN Large Hadron Collider (LHC). The other ATLAS faculty members are Lily Asquith, Alessandro Cerri 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.

Historically, the Sussex EPP 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 nEDM experiment at the PSI. Philip Harris leads this effort at Sussex together with Clark Griffith and Visiting Senior Lecturer Mike Hardiman.

Sussex EPP also boasts a vibrant and expanding programme of neutrino physics. Sussex is one of the leading UK institutes involved in the SNO+ experiment, which seeks to determine whether the neutrino is its own antiparticle by searching for neutrino-less double-beta decays. Simon Peeters leads the SNO+ effort at Sussex, together with Lisa Falk and Jeff Hartnell. Additionally, Jeff Hartnell was recently awarded substantial ERC funding to work on the Fermilab-based NOvA neutrino oscillation experiment and the future long-baseline programme (LBNE/LBNF). Peeters and Falk are also involved in LBNE/LBNF.

Sussex EPP currently has ten postdoctoral level researchers, eleven PhD students, three engineer/technician posts directly involved in EPP research, and a Linux system administrator. We have a number of well-equipped laboratories, and we enjoy good access to the University’s technical facilities, including shared technicians. Sussex EPP researchers have uncontended 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](http://www.sussex.ac.uk/epp)

3.4. The Materials Physics Group

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

A number of new appointments are underway.

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/physics/research/materials/](http://www.sussex.ac.uk/physics/research/materials/)

### 3.5. 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, Francesco Hautmann, Mark Hindmarsh, Stephan Huber, Sebastian Jaeger, Daniel Litim (group leader), Veronica Sanz, Emeritus Professors David Bailin and Norman Dombey, three Postdoctoral Research Fellows, and about 20 PhD and MSc students. The group maintains a research consortium with Royal Holloway (Nikolas Kauer, Stephen West). 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/](http://www.sussex.ac.uk/tpp/)

**CORE JOB DESCRIPTION**

<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>Research Fellow in Nanostructured Materials</th>
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<tbody>
<tr>
<td><strong>Grade:</strong></td>
<td>Research Fellow I, Grade 7</td>
</tr>
<tr>
<td><strong>School:</strong></td>
<td>School of Mathematical and Physical Sciences</td>
</tr>
<tr>
<td><strong>Location:</strong></td>
<td>Falmer</td>
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<tr>
<td><strong>Responsible to:</strong></td>
<td>Principal Investigator through to Head of School</td>
</tr>
<tr>
<td><strong>Direct reports:</strong></td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Key contacts:</strong></td>
<td>Members of research group, members of faculty within the School and University.</td>
</tr>
<tr>
<td><strong>Role description:</strong></td>
<td>Research Fellow I is an early career-grade research position. Post-holders will be expected to contribute to</td>
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</table>
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 Undertake research in Raman, tip enhanced Raman and Scanning Probe Microscopy of nanostructures such as graphene, 2D crystals and carbon nanotubes.
4.2 Autonomously undertake the development and implementation of novel metrics for chemical analysis of carbon nanostructures using Raman spectroscopy.
4.3 Undertake research in the characterisation of polymer based composites based on 2-D crystal fillers and developing structure-optoelectronic property relationships.
4.4 Publish and present research in high-quality international journals and conferences.
4.5 Pro-actively organise and manage own time and research-related activities.
4.6 Report orally and prepare papers reporting progress and delivery of project outcomes, and be able to communicate at both technical and high-level for example with collaborators from industry and other universities.
4.7 Perform any other duties associated with the project, as deemed appropriate to the grade by the supervisor.
4.8 Promote the research and activities of Materials Physics in national and international forums.

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


2. Expertise in graphene, 2D atomic crystals, carbon nanotubes, polymer composites and related materials processing.

3. Meet on a weekly basis on campus with Materials Physics staff and collaborators.

4. Attend project meetings and present results at other sites as required.

5. Give oral and written reports on project progress and outcomes. Be able to report at both a technical low-level and conceptual high-level to a range of audiences including the public and industry.

6. Continually update knowledge and develop skills.

7. Carry out routine administrative tasks associated with a specified research project, for example risk assessment of research tasks, organisation of project meetings and documentation. This will entail planning own day-to-day research activity within the framework of the agreed programme, dealing with problems that may affect the achievement of research objectives and deadlines and implementing procedures required to ensure accurate and timely delivery.

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.
## SKILLS / ABILITIES

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<tr>
<th>Essential</th>
<th>Desirable</th>
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<tbody>
<tr>
<td>Competence in the use of Raman spectroscopy and Atomic Force Microscopy</td>
<td>X</td>
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<tr>
<td>Competence in Nanoparticle Processing</td>
<td>X</td>
</tr>
<tr>
<td>Competence in the use of tip enhanced Raman spectroscopy</td>
<td>X</td>
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<tr>
<td>Competence in scientific writing</td>
<td>X</td>
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## KNOWLEDGE

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
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<tbody>
<tr>
<td>Up-to-date knowledge of research literature relating to applications of graphene and other 2-D materials</td>
<td>X</td>
</tr>
<tr>
<td>Up-to-date knowledge of research literature relating to applications of Raman spectroscopy for imaging graphene and related materials</td>
<td>X</td>
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## EXPERIENCE

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
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<tbody>
<tr>
<td>Grant/proposal writing</td>
<td>X</td>
</tr>
<tr>
<td>Previous involvement with supervision of PhD and Masters students</td>
<td>X</td>
</tr>
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## QUALIFICATIONS

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
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</thead>
<tbody>
<tr>
<td>PhD in Physics, Materials Science or Related Subject</td>
<td>X</td>
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</table>

## PERSONAL ATTRIBUTES AND CIRCUMSTANCES

<table>
<thead>
<tr>
<th>Essential</th>
<th>Desirable</th>
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<tbody>
<tr>
<td>Able to work flexible and unsocial hours including weekends as and when required</td>
<td>X</td>
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<tr>
<td>Able to work independently</td>
<td>X</td>
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Date …24/01/2017