School of Mathematical and Physical Sciences
Research Computing Support Technician (Full time, permanent)
Salary range: starting at £32,004 and rising to £38,183 per annum
Start date: April 2017, or as soon as possible thereafter

Applications are invited for a Research Computing Support Technician position in the Mathematical and Physical Sciences (MPS) School at the University of Sussex. The post, which is permanent and full time, is mainly to support the various research groups in the Physics & Astronomy department, and the Mathematics department.

The Sussex HPC cluster currently has 140 nodes (62 Omni-Path and 78 Infiniband) and 3700 cores, 600TB of Lustre parallel file storage and over 300TB of NFS storage. It is managed by Bright Cluster Manager and uses the Univa Grid Engine batch scheduler. This resource is jointly managed by MPS system administrators and IT Services.

In Mathematics, Physics, and Astronomy, many of the research groups employ important research-oriented software, mostly Linux/Unix-based, in the development and application of computational models, techniques, and data analysis, often in connection with end users in industry.

The new research computing support technician will be responsible for the successful operation of existing research computing facilities, as well as for the purchasing, installation, integration, and maintenance of new resources that may be acquired over time for research use.

The successful candidate will research and identify optimal solutions for the relevant computing systems by liaising with user research groups in MPS, with other technical personnel within the School and the Sussex IT Services (ITS), as well as with computing and Grid experts from collaborating institutes.

The role holder will also support the day-to-day running of the core computing services of the research groups including both hardware and software support and contribute actively to the long-term development of the computing strategy of MPS.

The school is committed to equality and diversity, and currently holds an Athena SWAN Bronze Award. Applications are particularly welcomed from women and black and minority ethnic candidates, who are under-represented in posts in science and engineering at Sussex. Career breaks will be fully taken into account.

Informal enquiries about this post may be addressed to Doctor Cassandra Churchwell (C.Churchwell@sussex.ac.uk).

Closing date for applications: 3 April 2017
Interviews are currently planned to be held in April 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 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 / 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.

Acting Head of School is Professor Philip Harris.

The Department of Mathematics

The Department of Mathematics currently has 23 faculty divided into six research areas: Analysis and PDEs including Financial Mathematics, Mathematics Applied to Biology, Numerical Analysis and Scientific Computing, Geometry and Topology, 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 22nd in the UK in a recent league table (Guardian 2016). It also repeatedly scores well in the UK National Student Survey.

The Department has more than 350 undergraduate students, 64 MSc students, more than 60 PhD students and 2 research fellows.

Research Areas

Research in Mathematics at Sussex is currently supported by international and national grants. The Department coordinates an Innovative Training Network (Makridakis, EU H2020) and is partner of another Innovative Training Network (Madzvamuse, EU H2020). The Leverhulme Trusts funds two research projects (Duering and Madzvamuse). EPSRC funds several PhD positions and a first grant (Koch). The Icelandic Research Fund contributes to the research activities of Giesl and Scalas. Faculty at Sussex recently organised specialised meetings and conferences hosting distinguished researcher with support from the London Mathematical Society.
Analysis and PDEs

Research in this group spans a broad spectrum underpinned by the rigorous treatment and analysis of linear and nonlinear partial differential equations (PDEs). This ranges from PDEs arising in geometry, physics and mechanics to those in control theory, finance and material sciences. A core of our activities is on calculus of variations and geometric and harmonic analysis and there are subgroups with major interests in geometric measure theory, spectral theory, function spaces, dynamical systems, fluid mechanics, nonlinear elasticity and homogenisation. Current members are: Dr Filippo Cagnetti, Dr Miroslav Chlebik, Dr Masoumeh Dashti, Dr Peter Giesl, Dr Gabriel Koch, Prof Michael Melgaard, Dr Mariapia Palombaro, Dr Qi Tang, and Dr Ali Taheri (coordinator).

Web site: [http://www.sussex.ac.uk/apde/](http://www.sussex.ac.uk/apde/)

Mathematics Applied to Biology

The Mathematics Applied to Biology research group develops new theoretical, mathematical and computational frameworks, as well as cutting-edge techniques and software algorithms for problems arising in a wide range of disciplines, such as cell motility and cell morphology, cell biology, developmental biology, biomedicine, epidemiology, immunology, neural systems, genetics networks and engineering.

The group’s mathematical expertise is at the interface of dynamical systems, geometric PDEs, bulk-surface reaction diffusion systems, stochastic processes, graph/network theory and time-delayed systems. Current members are: Dr Konstantin Blyuss, Dr Istvan Kiss (coordinator) Dr Yuliya Kyrychko and Dr Anotida Madzvamuse.

Web site: [http://www.sussex.ac.uk/mab/](http://www.sussex.ac.uk/mab/)

Numerical analysis and scientific computing

Research concentrates on the modelling and analysis of problems coming from the physical and life sciences, engineering and finance, leading to partial differential equations. The interests of the group spans from the mathematical analysis of mathematical (mainly differential) models to their computer implementations (scientific computing), passing through the development and analysis of novel numerical methods. Current members are: Dr Bertram Duering, Dr Max Jensen, Dr Omar Lakkis, Prof Charalambos Makridakis (coordinator) and Dr Vanessa Styles.

Web site: [http://www.sussex.ac.uk/nasc/](http://www.sussex.ac.uk/nasc/)

Geometry and Topology

Research interests are in the theory of knots, braid groups, topology, combinatorics of finite projective spaces, coding theory and its connections between finite geometry and algebraic geometry, combinatorial structures, algebraic geometry over finite fields, classical algebraic and projective geometry. The group comprises Research Faculty: Prof James Hirschfeld, Dr Roger
Fenn, and Research students: Awss Al-Ogaidi, Salam Alabdullah, Zainab Hamed, Mohammad Hazzazi, Fatma Karaoglu.

**Probability and Statistics**

Research interests are in probability theory, discrete-time and continuous-time stochastic processes, rigorous statistical physics, optimal strategies in diverse games and gambles, the mathematics of spread betting and the development of statistical methodologies for problems arising in engineering and medicine.

The group comprises Research Faculty: Dr Andrew Duncan, Dr Nicos Georgiou, Prof Enrico Scalas (coordinator), Dr Dimitrios Tsagkarogiannis, Emeritus Faculty: Prof Charles Goldie, Dr John Haigh, Dr Derek Robinson, and Research Students: Stephen Ashton, Panagiota Birmpa, and Mailan Trinh.

**The Department of Physics and Astronomy**

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

**Research groups**

4.1. 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 11 permanent faculty members 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 focussed 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) and EU funded Herschel Extra-galactic Legacy Project (HELP); Kathy Romer leads the XMM Cluster Survey (XCS); Jon Loveday leads the Galaxy Mass Assembly (GAMA) spectra working group. We are the main UK contributor to 4-MOST on the VISTA telescope and have a leading role in the WAVES spectroscopic galaxy 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 (DES).

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/

4.2. 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 six experimental faculty in the AMO group. Winfried Hensinger is developing new quantum technologies using trapped ions. His group is developing a quantum simulation engine and they are in the process of constructing a large-scale trapped-ion quantum computer. Another research area is the development of portable quantum sensors. Peter Kruger, is starting a major activity in Quantum Systems and Technologies. This will involve a range of experiments and device development at the interface of cold atomic and condensed matter physics. 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 Peccianti'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 (AMO group leader) 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 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.

Along with the faculty there are currently 14 research fellows and 40 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
4.3. 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)

4.4. 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.

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/materials-physics/

4.5. 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), Prof Barry Garraway (Trapped Ultracold Atoms &Theoretical Quantum Optics) and Dr Diego Porras (Quantum optics and condensed matter systems).

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/

4.6. 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 Professors David Bailin and 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/](http://www.sussex.ac.uk/tpp/)
UNIVERSITY OF SUSSEX

Job Description for the post of Research Computing Support Technician

Department Physics and Astronomy and Mathematics

School MPS

Grade 7

Responsible to Technical and Administrative Supervisor

Principal Accountabilities / Main tasks

1. Help with the installation and the maintenance of experiment-specific core software in use by research group members. Provide general guidance on best programming practices.

2. Install, manage and maintain information systems and services, such as WEB/wiki, Git, SVN, My SQL, etc, for use by the research groups.

3. Provide documentation to users of the HPC system, as well as design and run training events for new and existing users, in collaboration with colleagues from ITS.

4. Perform core system administrator tasks, ensuring appropriate use and optimal distribution of resources amongst relevant research teams and individuals in MPS and more generally across the University.

5. Ensure smooth day-to-day running of the systems, including routine maintenance and security updates and occasional major software updates.

6. Install and manage batch system queues on the MPS HPC.

7. Working as part of a team in collaboration with colleagues from ITS, develop, support and maintain the MPS HPC infrastructure, including (but not limited to) the Sussex Grid resources (Tier-2 and Tier-3). This includes: optimisation and development of the analysis software used by the MPS research groups; optimization of technical specs for hardware to be purchased; procurement of the required hardware; its integration within the existing University Linux system; and its broader integration within the HPC.
structure at Sussex.

8. Install and manage use of disk space on the system, including regular backups of vital subsets of stored data.

10. Assist with the production of strategic plans and proposals for long-term growth of the computing infrastructure within the MPS school.

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 the level of responsibility entailed.

Candidates invited to interview will be asked to explain how they think they fit the job requirements and how they see themselves contributing to the MPS research computing strategy in the long term. Further details about arrangements for the interview will be provided to short-listed candidates.
**UNIVERSITY OF SUSSEX**

**Person Specification for the post of: Research Computing Support Technician**

### SKILLS / ABILITIES

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<th>Essential</th>
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<tr>
<td>Demonstrated extensive knowledge and hands-on experience of the Linux operating system.</td>
<td>x</td>
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<td>Demonstrated expertise and ability to work with researchers developing scientific and numerical software.</td>
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<tr>
<td>Demonstrated high level of skill in the installation, testing, and maintenance of large-scale computing applications.</td>
<td>x</td>
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<tr>
<td>Demonstrated high level of skill in the development and implementation of large-scale computing applications.</td>
<td>x</td>
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<tr>
<td>Knowledge of analysis software commonly used in particle physics, astronomy and Maths research groups (e.g. ROOT, Geant4, R, etc)</td>
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<td>Commitment to learning new software skills as and when necessary, possibly by attending appropriate training</td>
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<td>Proven high level of ability in working efficiently and effectively in a team</td>
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<td>Ability/willingness to provide prompt, result-oriented solutions to the fast-evolving computing requirements of a research team</td>
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<td>Ability to interact effectively with members of the departmental technical team as well as with colleagues in Sussex ITS.</td>
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<td>Excellent communication skills, both spoken and written</td>
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<tr>
<td>Work experience as Linux system administrator, technical analyst, or programming support in a research environment, preferably in a Maths or Physics context.</td>
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## KNOWLEDGE

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<tr>
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<th>Essential</th>
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<tr>
<td>Linux operating system</td>
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<td>x</td>
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<td>Mac and Windows operating systems</td>
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<td>x</td>
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<td>Grid experience</td>
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<tr>
<td>Knowledge/experience of High Performance/High Throughput computing, including batch queue systems in a Linux environment</td>
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<td>C++</td>
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<td>Python</td>
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<td>Scripting languages (zsh, bash, etc.)</td>
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<td>x</td>
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<td>Parallel programming</td>
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## QUALIFICATIONS

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<tr>
<td>Undergraduate degree in a scientific subject</td>
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<tr>
<td>PhD degree in a scientific subject</td>
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## PERSONAL ATTRIBUTES AND CIRCUMSTANCES

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<tr>
<td>Willing and able to undertake occasional travel within the UK and abroad (e.g. CERN), as and when required.</td>
<td>x</td>
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<td>Willing to work outside normal working hours occasionally for maintenance work to avoid excessive downtime for the users.</td>
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