

ADVERT

Vacancy details

- Department: School of Physics & Astronomy
- Job Title: Postdoctoral Research Associate: Crystallography of simple systems under extreme conditions
- Job Function: Academic
- Job Type: Full Time
- Live Date:
- Expiry Date: 28/2/2009
- Salary Scale: £29,704 - £35,469
- Internal job: No. Anybody can apply for this position.
- Further Information: [Further Information](#)
- Conditions Of Employment: [View Conditions of Employment](#)

Postdoctoral Research Associate - Crystallography of simple systems under extreme conditions

A position is available for a crystallographer to work in the Extreme Conditions Physics Group of the School of Physics and Astronomy (part of the Scottish Universities Physics Alliance, SUPA) in the Centre for Science at Extreme Conditions. This follows the £3.5M renewal of the group's EPSRC Programme Grant.

We are a world leader in x-ray powder and single-crystal diffraction studies of exotic phases of matter at extreme pressures. You will participate in this exciting and challenging programme of x-ray structural studies of elements and simple materials at very high pressures and at high and low temperatures. You will also be involved in the further development of techniques and procedures to extend the limits for diffraction studies to pressures and temperatures beyond those currently achievable, perhaps using new 4th generation x-ray sources.

The group has established programmes in experimental structural studies using both x-ray and neutron diffraction, and also in extreme conditions spectroscopic and transport properties and in electronic structure calculations.

FURTHER INFORMATION

The University of Edinburgh

The University of Edinburgh is over 400 years old and is one of the largest in the UK. It is Scotland's premier research University and graded among the top British Universities in the recent national Research Assessment Exercise. It has over 2000 academic staff, a student population of some 20,000 and an annual research income of around £110m. The University comprises twenty one Schools organised into three Colleges - Science and Engineering; Medicine and Veterinary Medicine; and Humanities and Social Science.

College of Science and Engineering

The College of Science and Engineering is one of the largest groupings of its kind in the United Kingdom with approximately 5000 undergraduate students and 1000 postgraduate students, and 1,400 FTE staff of whom about 930 are teaching and research staff. It comprises Schools of Biological Sciences; Chemistry; Engineering and Electronics; GeoSciences; Informatics; Mathematics; and Physics & Astronomy. In the 2001 RAE, 94% of its academic and research staff were in units of assessment rated 5 or 5*. Most of the College is located at the King's Buildings (Mayfield Road) Campus in Edinburgh, approximately three miles south of the city centre.

School of Physics & Astronomy

The School of Physics & Astronomy is in the College of Science & Engineering and comprises the Institute for Physics; the Institute for Astronomy; EPCC (national high performance computing centre) and the Institute for e-Science. The School was ranked 6th in the UK in the 2008 Research Assessment Exercise, with 65% of our research classed as 4* and 3*. It has undergraduate programmes in Mathematical Physics, Physics, Computational Physics, Astrophysics and (jointly with the School of Chemistry) Chemical Physics. We also run MSc programmes in High Performance Computing, Distributed Computing for Science and in Acoustics and Music Technology. The School accepts between 120 and 180 new undergraduates into its programmes each year and has a total of 126 postgraduate students. The School is based in the James Clerk Maxwell Building (JCMB) on the King's Buildings campus, and is the major stakeholder in the Centre for Science at Extreme Conditions (CSEC) which occupies a recently constructed wing of the JCMB.

Scottish Universities Physics Alliance: SUPA

The University of Edinburgh is a member of the Scottish Universities Physics Alliance (SUPA, <http://www.supa.ac.uk>). SUPA is an alliance of six Universities (Edinburgh, Glasgow, St Andrews, Heriot Watt, Strathclyde, Paisley) aimed at developing Physics in Scotland into a world-leading force. The Chief Executive of SUPA is Professor Ian Halliday. The formation of SUPA was boosted by a £14M research investment programme funded by the Scottish Higher Education Funding Council, the UK Office of Science and Technology, and the constituent Universities. SUPA identifies five major research themes, of which Particle Physics is one. SUPA hosts a Scotland-wide Graduate School. We are currently seeking funding for a second phase of SUPA.

Centre for Science at Extreme Conditions (CSEC)

CSEC is a multi-disciplinary Centre at The University of Edinburgh designed to promote the study of materials at extremes of pressure and temperature, and in electromagnetic fields, using both in-house and synchrotron and neutron techniques. Research interests range from fundamental physics, chemistry and biology, through geoplanetary and materials science, to engineering, instrumentation and technology. The members of the Centre represent the Schools of Physics & Astronomy, Chemistry, GeoSciences, Engineering and Electronics, and Biological Sciences.

CSEC provides a UK centre of excellence in fundamental, applied and strategic research across a wide range of extreme conditions physics, with the capacity for continuing long-term development, and the ability to respond to strategic needs. It provides access to state-of-the-art techniques and expertise for non-expert researchers, and aims to assist actively in making these techniques routinely available in UK research.

See www.csec.ed.ac.uk for further information.

The Extreme Conditions Physics Group

The group has established world-leading programmes in experimental structural studies using both x-ray and neutron diffraction, in extreme conditions spectroscopic and transport properties measurements, and in electronic structure calculations. Our interests include the extreme P-T behaviour of hydrogen and other elemental and simple molecular systems, transitions and properties of metallic elements and their alloys - including liquid phases - and of ices, water and other hydrogen-bonded molecular systems, including systems of relevance to planetary modelling.

The group's full-time academic staff currently comprise: Prof Richard Nelmes (x-ray synchrotron and neutron diffraction, metals, ices and molecular systems); Prof Malcolm McMahon (x-ray diffraction and scattering, metallic elements and binary systems); Dr John Loveday (neutron scattering, ices, simple molecular systems); Dr Eugene Gregoryanz (ultra high P-T optical spectroscopy and x-ray scattering, hydrogen and other fundamental systems); and Prof Graeme Ackland (electronic structure calculation and computational modelling). The group's experimental programme is strongly supported by Dr Konstantin Kamenev of the School of Engineering and Electronics (extreme conditions instrumentation, diamond anvil engineering). Alongside these academic staff, the group will host six or seven other postdocs on this programme and, currently, three PhD students.

The group makes extensive use of central synchrotron and neutron beam facilities, Diamond Light Source and ISIS at Rutherford Appleton Laboratory, and the ESRF and ILL in Grenoble. The group has strong international links with collaborators in Paris, Grenoble, Trieste, Washington DC, Ottawa, and Florence.

Job Description

You will carry out experimental work - principally x-ray powder and single-crystal diffraction - aimed at understanding the structures and properties of metals and simple molecular systems under extreme conditions, in particular at very high pressures and temperatures. You will be based in CSEC, which is adjacent to the School of Physics & Astronomy, and have access to the in-house optical and x-ray facilities as well as to Diamond and ISIS at Rutherford Appleton Laboratory and ESRF and ILL in Grenoble.

The structures of metallic elements, which are generally simple at ambient pressure, often become much more complex at high pressure. A

range of archetypal simple metals like potassium, rubidium, sodium and barium have been shown to exhibit a variety of complicated structural phenomena including incommensuration, guest-host structures and complex large unit cells when compressed. The challenge is now to understand what in the properties of these simple metals drives this complexity, what consequences does it have for the dynamics and conduction behaviour, how complex structures are reflected in the molten state, and how widespread is this complexity.

Working principally with Prof Malcolm McMahon, you will participate in an experimental programme to address these challenges. You will carry out x-ray diffraction studies of structures and transitions in both the solid and liquid state using diamond anvil cells using both in-house x-ray equipment and synchrotron facilities at Diamond at Rutherford Appleton Laboratory, and ESRF in Grenoble. You will also carry out inelastic x-ray scattering measurements using facilities at ESRF, and may participate in transport property and optical spectroscopy studies.

The position will be primarily to work with Prof McMahon, but will also involve strong liaisons both with other experimentalists of the extreme conditions group (Prof Richard Nelmes, Dr Eugene Gregoryanz, Dr John Loveday and Dr Konstantin Kamenev) and with computational modellers in Edinburgh (Prof Ackland) and with overseas collaborators.

The post is planned to start on the 1st April 2009 or as soon as possible thereafter. The grant funding from EPSRC provides for a fixed-term contract of up to 30 months, depending on when the post is taken up. As the Grant is cash-limited, the contract period may also depend on the salary on appointment.

Prerequisites and Selection Criteria

While appropriate direct knowledge and experience of relevant physics and techniques is required, imagination, drive, scientific flair and a willingness and ability to work closely with other members of the group are also important. Please include in your application a statement of your future scientific goals as well as information about your relevant skills, particularly those concerned with diffraction and crystallography.

Required:

PhD in physics, chemistry, materials or geo sciences or equivalent training in research methods, practices and technology relevant to the job description above.

- Experience and skills in crystallography, particularly in ab initio structure solution and refinement of single-crystal and powder data
- Experience of conducting research at this level without day-to-day supervision.
- Ability and willingness to participate in, and sometimes lead, experiments at central facilities for synchrotron research, in the UK and abroad.

- Ability and willingness to discuss project goals with academic staff, and to formulate, implement and develop research plans for achieving these goals.
- Ability and willingness to write scientific reports and papers as lead drafting author, and to give presentations within the group and at national and international conferences.

The ability to work without close supervision towards project goals, that are defined only in relatively broad terms, is essential, as is the ability to work to a more closely specified remit and timetable when scientific priorities demand this. This is particularly important for a programme of this kind that involves intensive periods of experimental work at Central Facilities, where - after due training and experience - postdoctoral staff will sometimes be expected to run complex experiments themselves without direct, on-the-spot supervision.

Desirable:

- Experience and skills in diamond anvil cell high-pressure techniques
- Experience of working at synchrotrons
- Experience of working in a multi-disciplinary team, or demonstrable interest in multi-disciplinary work.
- Excellent general communication skills.
- Ability and willingness to contribute to the group's activities in knowledge transfer, and/or in public awareness of science.

Salary

The prerequisites listed above are commensurate with appointment at Grade UE07 of the recently agreed National JNCHES pay structure. The annual salary for this Grade is on a seven-point scale from £29,704 - £35,469, incremented annually. (On reaching the top of the scale, a further three discretionary increments might then be awarded, on the basis of exceptional individual contribution, up to a maximum salary of £38,757.)

Further Enquiries

Informal enquiries concerning the posts may be addressed by email to Prof Malcolm McMahon (mim@ph.ed.ac.uk).

Application Procedure:

We encourage all applicants to apply online at www.jobs.ed.ac.uk The application process is quick and easy to follow, and you will receive email confirmation of safe receipt of your application. The online system allows you to submit a c.v.

Otherwise to complete the application process you need to complete the (i) Application Form, including a statement addressing how your application meets the Person Specification (ii) Additional Personal Information Form, (iii) Equality & Diversity Monitoring Form, and (iv) Rehabilitation of Offenders Form. Please also include a brief

CV. Please return the Application form and all enclosures (except the equal opportunities form) to Mrs Doreen Hamilton, School of Physics & Astronomy, University of Edinburgh, JCMB King's Buildings, Mayfield Road, Edinburgh EH9 3JZ by the **closing date of 28th February**. Return the equal opportunities form in the separate prepaid envelope. We cannot guarantee to consider late applications.

Please then arrange for two letters of recommendation to be sent directly to Doreen Hamilton at d.hamilton@ed.ac.uk or at the mailing address given above. Please ask your referees to quote the job reference number in these letters of recommendation and all related correspondence.

The University reserves the right to vary the candidate information or make no appointment at all. Neither in part, nor in whole does this information form part of any contract between the University and any individual.