UNIVERSITY OF BIRMINGHAM

School of Electronic, Electrical and Computer Engineering

Closing date: 30 September 2013
Job reference: 52091

Defence Science and Technology Laboratory (Dstl)/RAEng Chair in Space Environment and Radio Frequency (RF) Engineering

The organisations

Defence Science and Technology Laboratory (Dstl)
The Defence Science and Technology Laboratory (Dstl) is the UK Ministry of Defence's (MOD) science and technology organisation. Dstl maximises the impact of science and technology for the defence and security of the UK, working with industry, academia, wider Government and international allies to meet defence priorities and national security challenges. A trading fund of the MOD, Dstl is accountable to Government, to the taxpayer and to the UK armed forces we support in the field every day. Through this Dstl-RAEng Chair at the University of Birmingham, Dstl will enable the research undertaken to remain relevant to current and future operational Defence requirements.

Royal Academy of Engineering
Founded in 1976, the Royal Academy of Engineering promotes the engineering and technological welfare of the country. Our Fellowship – comprising the UK's most eminent engineers – provides the leadership and expertise for our activities, which focus on the relationships between engineering, technology, and the quality of life. As a national academy, we provide independent and impartial advice to government; work to secure the next generation of engineers; and provide a voice for Britain's engineering community.

The University
The University of Birmingham is a thriving and progressive institution that combines over a century of heritage with one of the most compelling and ambitious agendas in higher education. Ranked amongst the world's top 100 institutions and a member of the prestigious Russell Group of leading research institutions, the University is well placed to succeed in the increasingly competitive global higher education sector. We have a clear vision for the future, ambitious leadership, world-leading academic strength, and a secure financial base.

Our five-year strategic plan 'Shaping Our Future: Birmingham 2015' was published in 2010 and the University is already demonstrating significant progress against this plan that will lift us into the international elite. In 2011/12, new research grant awards increased by over 56% to £145 million; we recruited an undergraduate cohort with the finest academic credentials in our history; opened a new representative office in Guangzhou, China; and developed a £175m investment plan for our other major asset, the University's green and leafy parkland campus in Edgbaston, Birmingham.

Inevitably, these are just a few of our achievements from the past 2 years, as the University community works together to enhance further our research achievements and educational provision. We are long established as leaders in the field of Medicine, with strengths in the research and treatment of cancer, heart, and liver disease as well as infections with a global significance including TB. In the Physical Sciences we boast outstanding academic and research credentials, including Chemical Engineering

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where we were recognised with a Queen's Anniversary Prize in the Jubilee year. In 2011 and 2012 we pioneered the Birmingham Fellows campaign, resulting in the appointment of an elite group of 66 early career international academic researchers to the institution.

As well as our focus on research excellence, we are committed to delivering a first-class experience for our students in every aspect of their university life. The University of Birmingham has recently been ranked 11th place in the Times Higher Education Student Experience Survey 2013 and 17th out of 124 UK universities in The Complete University Guide for 2014. These latest league table results further strengthen Birmingham's position as a top 20 university and reflect its recent performance in other highly regarded league tables, such as the Sunday Times University Guide 2013, which ranked the University in 13th place overall.

Areas particularly highlighted in the latest league tables include the excellent student experience and the quality of the courses available. In fact, of the 48 subjects on offer at Birmingham, the Complete University Guide ranked 17 in the top ten and two in first place. In addition, the University was ranked 10th place overall and first place for self-made millionaires in the 2013 Wealth-X Survey, which measures the financial success of alumni.

Birmingham has been challenging and developing great minds for more than a century. The University continues this tradition today and is delighted that its plans to establish a University School have recently been approved by the Department for Education. It will provide an excellent academic education for Birmingham's young people and serve as a centre of teacher education in the region as it will be one of the first 'University Training Schools' in the country.

The University of Birmingham School and Sixth Form will be a comprehensive co-educational 11–16 school plus a sixth form, taking 150 per year into Year 7 and up to 200 per year into the Sixth Form. It will be located near the University of Birmingham's Edgbaston campus. It will have strong links with the University and reflect its values, including a commitment to academic excellence and to raising aspirations and widening participation in higher education. As such, the emphasis will be on preparing pupils for entrance to selective universities. Our goal is to accept the first intakes into Years 7 and 12 (sixth form) for September 2015.

The University's cultural profile has been enhanced with the opening of the beautiful Bramall Music Building, which houses the Elgar Concert Hall, named after our first Professor of Music, Sir Edward Elgar. The outstanding venue reflects the quality of our Music department, ranked second in the UK, and the importance of music as a part of the social and cultural life of the institution.

The Bramall Music Building is one amongst a number of cultural assets that include the Shakespeare Institute located in the heart of Shakespeare's Stratford-upon-Avon, the Ironbridge Institute at the centre of this world heritage location in Shropshire, and the Barber Institute of Fine Arts, a small art gallery with a European reputation, located on campus. Our Edgbaston campus also includes Winterbourne House and Garden, a unique Edwardian heritage attraction that is home to over 6,000 plant species from around the world.

Sport is also integral to life at Birmingham and we are ranked second in the UK for the quality of student sport. We have capital plans for a major new sports development, which will include the city of Birmingham's first 50m swimming pool that will not only provide facilities for our performance sportsmen and women but also offer a new resource to the local community. It was perhaps this combination of performance in, and commitment to, sport that attracted the fastest man in the world, Usain Bolt and the 2012 Jamaican track and field team to our campus for their pre-Olympic training camp. After winning his second gold medal at the Games, Usain Bolt and his colleague Yohan Blake saluted, to a worldwide television audience, the facilities, support and warm welcome that he and his team mates had received from the University.

This recognition supports the University's long-term plans to extend its international profile. In addition to the China office, which opened in 2011; the University also operates offices in India and Brussels. Through these offices, we are developing research partnerships with institutions around the world. In Brazil, the Universities of Birmingham and Nottingham are working together in a unique collaboration

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to develop a network of strategic partnerships with Brazilian universities, as well as the oil and gas industry. These initiatives have been central to the UK Government's outreach into Brazil, and this year will bring in the region of 20 doctoral researchers to the University as part of a prestigious scholarship programme.

We receive over 75,000 applications each year from students wishing to study here and welcome 24,000 successful students to the campus from 150 countries. A £5m investment in employability services has seen the numbers of graduates who find work within the first six months of graduation increase significantly for the second year in a row, and in a time of recession. A long-term project improving the academic support available to students and plans for the development of a state-of-the-art student services hub have led to satisfaction rankings in the National Student Survey rising faster than the national average, with overall satisfaction now standing at 88% (which is 3% higher than the sector average).

Not only does Birmingham have serious ambition but we also have financial resources to realise those ambitions, and our plans for the future are underpinned by long established financial probity. We are a large scale business, worth over £1 billion to our region and are currently forecasting a turnover of £479 million for the financial year 2012/13. Our cash surpluses are re-invested into the academic and capital fabric of the institution, enabling us to plan with confidence for the future and to continue to invest in the facilities and services that are required for high-quality research, and an outstanding student learning experience.

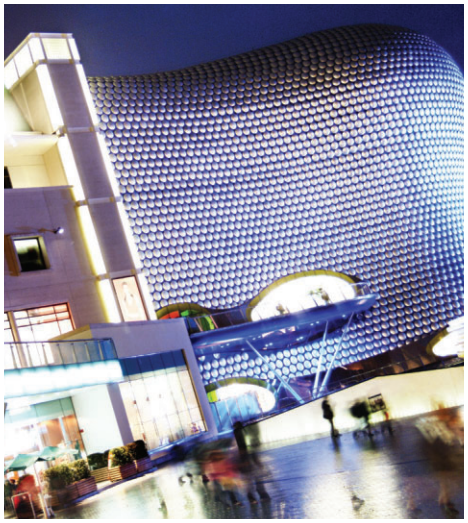
Led by Vice-Chancellor Professor David Eastwood, the University is structured for swift decision making, enabling us to capitalise on our academic range, financial strength and opportunities that emerge in the fast changing global HE environment.

The city of Birmingham

Birmingham is a major European centre and the second city of the United Kingdom. It is a city of business and ballet, canals and world-class concerts, jewellery and jazz, historical interest and cosmopolitan atmosphere. Birmingham is also the ideal base for exploring one of Britain's most fascinating regions for tourism, being within an hour's drive of Stratford-upon-Avon, Warwick, the Potteries, and the Cotswolds.

The new heart of Birmingham is symbolised by Symphony Hall, considered one of the greatest concert venues in the world and a fitting home for the globally respected City of Birmingham Symphony Orchestra (CBSO). Symphony Hall forms part of the impressive International Convention Centre, which overlooks attractive canals at the hub of the UK's canal network. At the magnificent Hippodrome Theatre is the internationally renowned Birmingham Royal Ballet, adding further cultural depth to the city. Apart from London's West End, Birmingham boasts the highest concentration of live theatre in the UK, including regular tours by major opera companies.

The City Museum and Art Gallery houses the world's finest collection of Pre-Raphaelite paintings, alongside a major collection of Old Masters, Modern and Contemporary pictures. The Barber Institute of Fine Arts (based on our own campus) houses one of the best UK university collections of Impressionist and Renaissance art. The restored Gas Hall Gallery has international touring exhibitions, while the Halcyon and Ikon galleries feature innovative contemporary works. National landmark sites abound, including the National Indoor Arena, the National Exhibition Centre, National Motorcycle Museum, National Car Heritage Museum, and the National Sealife Centre.



The iconic Bullring is one of the largest dedicated shopping facilities in Europe. Sports and recreation are also well served; the city offers international Test cricket, top-flight football, International Championship golf and top-class rugby. The International Convention Centre and National Indoor Arena have spawned a whole new development at the centre of the city. The National Exhibition Centre, on the outskirts of the city, remains one of the largest exhibition facilities in Europe.

Birmingham is at the crossroads of the UK's motorways. From Birmingham International Airport, more than a dozen different airlines operate scheduled services to 60 destinations worldwide. The University is the only mainland UK university to have its own railway station, while 50 million passengers a year use Birmingham New Street Station, which will be at the centre of the proposed high speed rail network.

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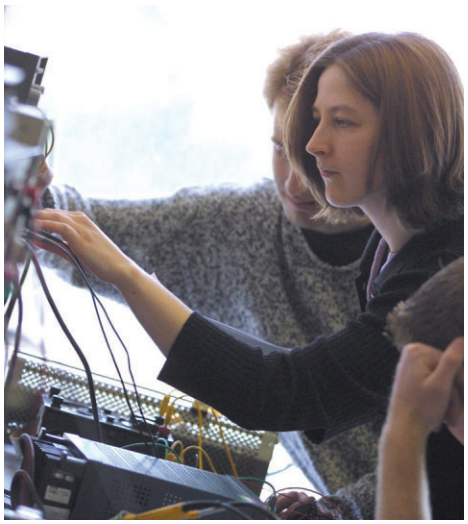
London is 90 minutes away by shuttle service, with trains every 20 minutes until the evening. There is a high standard of all types of private accommodation, with high-quality affordable family housing in several attractive residential suburbs. Public parks and large domestic gardens are an integral part of this green city. Quality public and private schools are widely available, with several consistently rated in the top 10 on examination performance in annual league tables for England and Wales.

College of Engineering and Physical Sciences



The College of Engineering and Physical Sciences is the second largest of five Colleges making up the University of Birmingham. The University was founded in 1900 and is renowned for its contributions across disciplines in medical and life sciences, social sciences, engineering, fundamental sciences and business. Eight Nobel prize winners have worked at the University and it was recently the recipient of the Queen's Award for Research in the area of Chemical Engineering.

The vision and strategy of the University is to:

- Enhance our Research Power
- Provide our Students with a distinctive, high quality experience
- Sustain our financial strength and use it purposefully
- Enhance our performance and status as an engaged university
- Be the destination of choice amongst our peers

This informs the College strategy in education, research and business engagement.
Our focus includes:

- Continuous enhancement of our high quality student educational experience through curriculum enhancement, facilities, internships and employability opportunities
- Development of distinctive and leading research groups in and between our science and engineering schools
- Growing partnership with employers, research funders and beneficiary organisations in the region and internationally
- Global collaborations in education and research from our city-city bridges in Guangzhou, Chicago and Sao Paulo
- Translation of knowledge both within the academic community and externally with active celebration of our impact on society
- Building the future pipeline of high quality science and engineering graduates through activities with Schools and employers through our national Science, Technology, Engineering and Mathematics (STEM) Centre

Our research focus is especially focused on our leading academics who contribute to three overarching research themes:

- Science Frontiers: Fundamental breakthroughs in our understanding of the way nature works
- Advanced Manufacturing: Driving industry forward by delivering the edge in the global competition through innovation
- Resilience, Energy and Sustainability: Tackling the challenges of future generations now

Partnerships

The College has many partnership relationships with external bodies with contacts running to over 1500 organisations each year. Some strategic partnerships include:

- **Manufacturing Technology Centre** – a translational centre for taking new methodologies and modelling methods related to manufacturing into large scale trial in partnership with over forty industrial partners.
- **Rolls Royce** – a long standing partnership as part of the Rolls University Technology Centre structure relating to aerospace materials research and doctoral training. A major new form of partnership now includes a High Temperature Research Centre that focuses on casting technologies.

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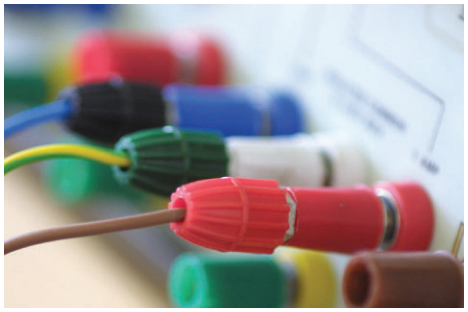
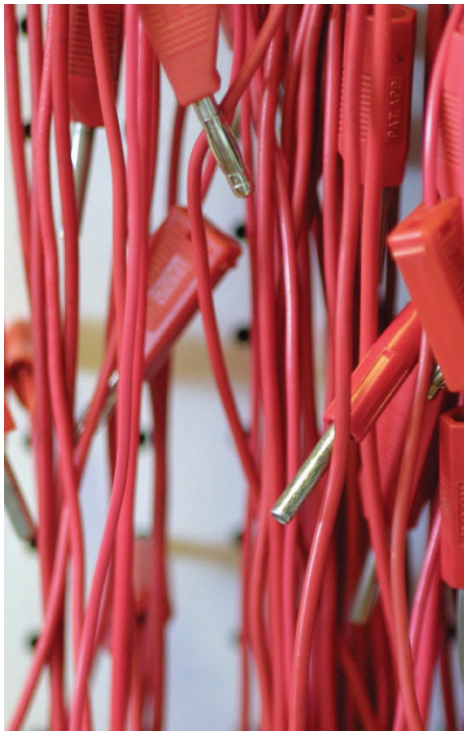
College of Engineering and Physical Sciences continued…

- **QinetiQ** – a relationship that enables internship of leading visiting research staff from an industrial external body into the College. This relationship currently has a focus on vehicle autonomy , robotics, communications and space.
- **Jaguar Land Rover Ltd** – a strategic relationship including undergraduate scholarships and research in vehicle technology focusing on power train engineering, communications and other emerging technologies.

Our latest partnership is with Dstl and the Royal Academy of Engineering to create this new Dstl-RAEng Chair in Space Environment and Radio Frequency (RF) Engineering.





School of Electronic, Electrical and Computer Engineering

There has been a School of Electrical Engineering at the University of Birmingham since 1905, with the first Chair being Gisbert Kapp (after whom the newly refurbished building is named). The School houses many research laboratories, ranging from laser ablation and photonics labs to a class 10,000 clean room with thin film deposition and processing facilities and anechoic chambers, as well as numerous computer laboratories dedicated to research activity.

The School of Electronic, Electrical and Computer Engineering has 36 permanent academic staff, 42 research staff, 95 postgraduate research students. At the last Research Assessment Exercise, EECE had 85% of its research to be judged of international standing, with 60% rated as 'international leading' and the School regularly attracts research income in excess of £3 million per year (through a balanced portfolio of grants from Engineering and Physical Sciences Research Council (EPSRC), the European Union, Defence and Industry).

The School has some 350 Undergraduate students and gained the maximum 24/24 in the most recent QAA review. The School obtained 92% in the most recent National Student Survey.

While some 1/3 of the research activity in the School involves communications and radar related activity, additional research activities cover electrical power and control systems, railway systems engineering and digital signal processing.

As part of the College of Engineering and Physical Sciences, EECE is responsible for delivering against research strategies in the areas of Intelligent Interactive Sensors and Networks (which is primarily concerned with RF (microwave and teraHertz communications), Energy (particularly in terms of managing distribution), Railways (in the areas of condition monitoring, knowledge management and optimisation) and Human-Computer Interaction (in multimodal activity recognition and 'serious games' applications). The School is organised in Areas of Activity which are responsible for delivering research and recruiting Postgraduate students. The annual PhD intake in the School is around 25 and a further 40 students are registered for MSc courses. Current MSc courses include Embedded Systems, Electronic and Computer Engineering, Communications Engineering, Interactive Digital Media.

The School has both central and specialised mechanical and electronic workshops and the Campus Network enables fast access from individual offices and laboratories to JANET and to other computing facilities.

Job outline

The appointee will be expected to develop a programme of internationally recognised research in the field of Space Environment and RF Engineering. He/she will be expected to develop a UK capability to bridge the gap between academia and the defence industry. Consequently, the appointee will be expected to secure a balanced portfolio of funding from research councils, government departments, space agencies and industry. The appointee may be able to benefit by aligning the portfolio with the developing NERC Space Weather Research Strategy and the UK Space Agency's substantial participation in the Space Weather element of ESA's Space Situational Awareness programme.

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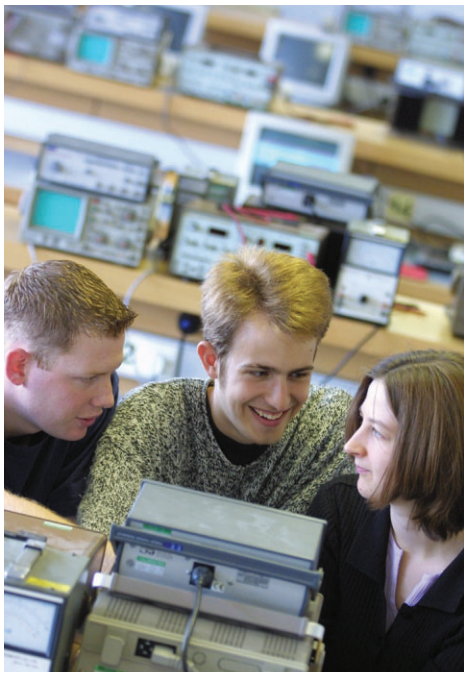
- Full time
- Duration of post – Open (5-year sponsored post leading to conventional professorial appointment)
- Post is open to internal and external candidates
- Grade – Professorial Grade 10
- Salary – Competitive package for an outstanding candidate.
- Informal Enquiries – please contact Professor Christopher Baber on 0121 414 3965, c.baber@bham.ac.uk and Professor Paul Cannon on 0121 414 4323, p.cannon@poynting.bham.ac.uk



The appointment

By the end of the five year period the research portfolio should demonstrate advances in the UK's capability for understanding and addressing space environment impacts on RF systems (which may be ground, air or space-based). The research portfolio should include scientific and engineering research, and could also include relevant satellite design studies, which may progress to payload construction. The vision for this element may be to have one satellite in orbit and another in development. The appointee will be encouraged to contribute to the development of scientific payloads in the School of Physics and Astronomy, thereby building on the long heritage of designing and building scientific satellite payloads at the University.

In addition, at the end of the first five years in post the appointee will be expected to have developed the capability to contribute to undergraduate and postgraduate teaching in the School.

Space Environment Mitigation and Exploitation
Space environment mitigation includes specification and forecasting which can be considered a 'grand challenge' embodying the underlying physics, the radio propagation impact, instrumentation (including system resilience), assimilative mathematics and computing. The applications are as diverse as HF radar and corrections in low frequency astronomy exploring the origins of the universe and dark energy.

Mitigation also includes engineering designs to overcome and even benefit from the ionosphere. Past examples include the dual frequency and differential approaches in GPS and Galileo navigation systems. Looking forward the challenges include designs for space based low frequency synthetic aperture radars and other novel space surveillance techniques.

Exploitation of the ionosphere includes artificial ionospheric modification (AIM) by RF, chemical and other approaches. This vibrant area of research is beginning to transition from science to engineering and offers a number of exciting lines of inquiry.

Satellite payloads
Satellite platforms can carry communications, navigation and surveillance sensors and can also carry environmental measurement instrumentation. The appointee may wish to design, build and fly novel satellite payloads to explore novel engineering concepts which 'engineer out' the environment, or may wish to fly environmental measurement instrumentation to measure the sun, magnetosphere or ionosphere.

More generally the successful applicant will be expected to:
- Publish high quality research in international journals of high repute
- Lead delivery of research that contributes to the progress of the discipline
- Provide research leadership, through leading bids for external research grants which develop and sustain research support
- Supervise and examine research students
- Provide academic leadership across the School and College as agreed and appropriate in accordance with the Collegiate approach to management and administration promoted at the University
- Take an active part in the life of the School, including participation in departmental seminars and attending of meetings as required
- Promote the work of the School in the subject area both nationally and internationally

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Person specification

- Will have an international academic or industrial reputation in space environment and RF engineering.
- Will be an expert on radio frequency (RF) navigation, surveillance or communications systems and have an appreciation of the impacts of the environment on such systems.
- Ideally, the appointee will have skills and interests in space weather and its mitigation.
- Will need to demonstrate a clear vision and demonstrate the leadership qualities required to build and sustain an internationally competitive research programme.
- Will have a track record of obtaining research funding from national or international agencies, and should be able to demonstrate delivery of successful project outcomes which have met requirements for innovation, quality and professionalism.
- Should be able to demonstrate how he/she might interact and forge collaborations that will develop space engineering at Birmingham.
- In the UK, funding for space engineering derives from a range of sources (eg, ESA, TSB, UK Space Agency). Thus the candidate should ideally be able to demonstrate that he/she can develop effective relationships with these bodies, and show adequate awareness of benefits to be gained from capitalising on alignment with eg, the UK Space Weather Strategy (draft), the NERC space weather research strategy (draft) and the UK Space Agency's participation in the Space Weather element of ESA's Space Situational Awareness programme.
- The successful candidate must already have or be in a position to obtain UK clearance to SECRET.
- Will be expected to supervise post-graduate students.

How to apply

Applicants are invited to submit their application online to us, via www.hr.bham.ac.uk/jobs