Analysis for innovators round 2: brokerage

UK businesses can apply for a share of up to £4 million to address their productivity issues by working with the best scientists and research facilities.

**Competition opened:** Monday 5 March 2018:
**Competition closes:** Wednesday 4 April 2018 12:00pm

**Description**
Up to £4 million in consultancy and innovation projects will be invested by:

- the National Physical Laboratory (NPL)
- the National Measurement Laboratory at LGC (formerly known as the Laboratory of the Government Chemist)
- the National Engineering Laboratory (NEL) and
- the Science and Technology Facilities Council (STFC)

These projects will help UK companies solve analysis and measurement problems, to improve their productivity and competitiveness.

---

Innovations Club

---

Credit: skynesher (http://www.istockphoto.com)
The aim of this competition is to match the best UK scientists and cutting-edge facilities with companies that have analysis or measurement problems. Your application should describe the problem and estimate the value to your company of solving it.

Successful applicants will receive free consultancy. This will focus on how to approach solving their problem. They will also receive information about options for funding projects to work on solutions with the relevant funding partner organisations.

This is the first stage of a 2-stage competition. The second stage, which includes funding options from the 4 funding partners or Innovate UK, will be described in more detail at the roadshow and launch events.

**Competition information**

- **Eligibility**
- **Scope**
- **Dates**
- **How to apply**
- **Supporting information**

**Funding type:** Grant

**Project size:** Project costs could be up to £250,000. Consultancy sessions will start from May 2018 and follow-on projects will typically last up to 12 months.
Industrial Strategy Challenge Fund expression of interest

UK businesses can propose which of the main challenges faced by UK industry should be addressed by the Industrial Strategy Challenge Fund.

Competition opened: Wednesday 28 February 2018
Competition closes: Wednesday 18 April 2018 12:00pm

Description

UK Research and Innovation is inviting expressions of interest to identify the next wave of challenges to be supported under the Industrial Strategy Challenge Fund (ISCF). ISCF funding comes from UK Research and Innovation, business and the public sector working in partnership.

The aim of this open expression of interest (EoI) is to identify the main challenges faced by industry and society in the UK. We want to understand the level of demand for innovation funding in order to address them.

Your proposal must identify the challenge and explain what the impact would be if it were solved. Provide evidence of strong industry demand for funding and identify what market opportunities a solution would create. Explain what is preventing this challenge from being solved and why UK companies and research organisations are well-placed to tackle it.

This EoI is not a competition for funding in itself but a way for you to identify the main challenges for your industry. These challenges may then be addressed by ISCF.

Competition information

- Eligibility
- Scope
- Dates
- How to apply
- Supporting information

Funding type: Grant

Project size: Projects from the selected wave 3 challenges should start from April 2019 and last up to 3 years. If you think the projects from your challenge would be later than this, indicate this in question 1.
March 2018 sector competition: Open

UK businesses can apply for a share of £19 million for game-changing innovations with strong commercial potential that will significantly impact the UK economy.

Competition opened: Thursday 1 March 2018
Competition closes: Wednesday 9 May 2018 12:00pm

Description

Innovate UK will invest up to £19 million in highly innovative projects with the best game changing and/or disruptive ideas or concepts. This should be with a view to commercialisation and economic impact.

Projects should aim to lead to new products, processes or services (or novel use of existing ones) believed to be significantly ahead of anything similar available in the field. You can view Innovate UK videos and success stories to help in your application.

Your proposals can come from any technology (including arts, design, media or creative industries) and any part of the economy.

Projects must focus on commercialisation, growth or scale up as soon as possible following completion. Priority is given to proposals likely to lead to growth, gains in productivity and/or access to new overseas markets through export.

You may also be interested in Knowledge Transfer Partnerships (KTPs), a completely separate competition with a separate application process.

Competition information

• Eligibility
• Scope
• Dates
• How to apply
• Supporting information

Funding type: Grant

Project size: Your project’s total costs should be between £25,000 and £1 million depending on the type of research and development (R&D) to be undertaken. Project duration should be a minimum of 6 months, and a maximum of 3 years.
£4million to develop data handling techniques for industry

A £4million project will bring together experts from academia and industry to create new ways to extract useful information from large data sets.

A £4million project with STFC Hartree Centre will bring together experts from academia and industry to create new ways to extract useful information from large data sets.

Scientists from the University of Liverpool are leading the data science research project that aims to utilise emerging hardware such as graphics cards to significantly reduce the time it takes to analyse difficult data sets.

With ever more complex data sets being generated by science, society, government and industry, new approaches are needed so key information can be quickly and efficiently accessed from huge pools of data. Although there are algorithms which can do this already, they come at a huge computational cost – so researchers are hoping to find a way to harness the power of these algorithms but at a fraction of the computational cost.

The project will focus on the following areas which all generate and manipulate difficult data sets: pharma, nuclear security, defence, manufacturing, biology, chemistry, physics and psychology.

Deputy Director of STFC Hartree Centre, Michael Gleaves, said: "This project will strengthen the ability of the team, as a key pillar within the UK community, to take the lead in developing a next-generation solution to problems encountered across a vast range of industrial sectors."

Read the full press release
Harwell sets new strategy to place it at the centre of global innovation

A brand new strategy aimed at improving the productivity of the UK economy and the skills of its workforce has been launched by Harwell Campus.

The vision also sets out plans to stimulate high-tech business growth and support UK and international research and innovation. It was unveiled at the European Space Agency’s UK Headquarters which is located on the Harwell campus.

Harwell employs 6,000 people across 250 public, private and academic organisations and already contributes hugely to the government’s industrial strategy.

£264 million was invested in the campus by the government in 2017 alone, for a new Faraday Institution (£65 million), the Rosalind Franklin Institute (£100 million) and National Satellite Testing Facility (£99 million).

Future plans which form part of the ambitious strategy include over four million square feet of additional office, laboratory and high-tech manufacturing space across the 710 acres Campus to ensure growth continues to be supported.

Harwell Campus is a joint venture between Oxford Developments Ltd, the Science and Technology Facilities Council (STFC) and the UK Atomic Energy Authority.

More information about the new strategy can be found on the Harwell Campus website.
UK researchers take a very cool step towards a gamma-ray laser

UK scientists are poised to test a new technology that could bring the gamma-ray laser out of science fiction and into reality.

The gamma-ray laser was once described as one of the thirty most important problems in physics. Much discussed, it would herald a new generation of technology for research and industry, with enhanced applications that could range from spacecraft propulsion, to cancer treatment, ultra-precise imaging techniques, and the security sector.

A key stepping stone in making the gamma-ray laser possible is the ability to produce coherent gamma-ray emissions. A long standing challenge since lasers were first invented in 1960, coherent gamma-ray emissions have been considered an almost impossible task, until now.

In a research project funded by STFC, a UK team of researchers from University College London and the University of Surrey have combined their advanced atomic and nuclear physics expertise to conceive a proposal that will experimentally demonstrate that producing coherent gamma-ray emissions is a real possibility. The proposal, arguably the first of its kind, is testable in a realistic way that has never been considered before. It will seek to overcome a number of fundamental problems which have hindered the realisation of a gamma-ray laser. Until now, other proposals either have been testable only in principle, or would require technologies not yet available. The approach of the UCL and Surrey team is instead achievable with current technology. Full details of this fascinating research have been published in Physics Letters B.

The proposal involves caesium and an ultra-cold gas, called a Bose-Einstein condensate (BEC). The team’s idea is to make a BEC of caesium isomers (i.e. excited atomic nuclei), cooling them to 100 nano-kelvin, or one ten-millionth of a degree above absolute zero! At such extreme low temperatures, the atoms start to behave in remarkable ways - a gas of excited atoms can start to act like one single giant atom, and the nuclei inside those atoms can effectively communicate with one another. In this state, they can also decay in unison, emitting their energy simultaneously - producing a powerful burst of coherent gamma radiation. This is the first time that a BEC of a radioactive species is proposed, and in particular in their long-lived excited state, which will be produced by a particle accelerator.

Professor Phil Walker, Professor of Physics at the University of Surrey, said: “It is thanks to recent advances in our ability to make ultra-cold gases, and also in our understanding about the way that nuclei in specific gasses can behave so uniquely, that we have been able to even consider that such an exciting and potentially game-changing experiment could be possible. We could be on our way to being one step closer to solving one of the most challenging problems in physics.”

The dedicated beamline ready for UK experiments to produce the world’s first coherent gamma rays at the University of Jyväskylä in Finland. Credit: UCL
This research is no longer just theory. UCL’s Professor of Physics, Professor Ferruccio Renzoni, and his team are now busy setting up an experiment at the University of Jyväskylä Accelerator Laboratory in Finland. Key components, assembled at UCL, are already in place in Finland at the experimental facility. There, a cyclotron particle accelerator will produce the unstable caesium, and the UCL’s laser system will trap and cool it to 100 nano-kelvin, with a view to successfully producing the world’s first coherent gamma-ray emissions.

Professor Ferruccio Renzoni said: “If the project goes as planned, our experiment in Finland will show that it is possible to produce coherent gamma radiation in this way, and will lead on to further tests that will confirm the best conditions for scaling up to make a practical device, the gamma-ray laser, over the coming years. In the meantime, several milestones in atomic physics and new insights in nuclear behaviour will be available for us to study.”

Professor John Simpson, Head of STFC’s Nuclear Physics Group, said: “Here in the UK we are making exciting progress in the world’s quest to develop the technology that will make a gamma-ray laser possible. The social and economic benefits of such technology will be dramatic. I look forward to the results that the UK research team will achieve with their international collaborators at Jyväskylä in Finland.”
UK joins World Leading X-Ray Laser Facility

On 19 March 2018 the UK became the latest member state of the European XFEL, the international research facility that is home to the world’s largest X-ray laser.

Sited in Germany the European XFEL is capable of generating extremely intense X-ray laser flashes that offer new research opportunities for scientists across the world. Its range of capabilities include enabling researchers to take three-dimensional “photos” of the nanoworld, “film” chemical reactions as they happen and study processes such as those that occur deep inside planets.

In a ceremony at the British Embassy in Berlin, representatives of the UK government and the other contract parties, including the German federal government, signed the documents to join the European XFEL Convention. The UK is European XFEL’s twelfth member state. The UK’s contribution will amount to 26 million Euro, or about 2% of the total construction budget of 1.22 billion Euro (both in 2005 prices) and an annual contribution of about 2% to the operation budget. The UK will be represented in European XFEL by the Science and Technology Facilities Council (STFC) as shareholder.
UK joins World Leading X-Ray Laser Facility

UK Science Minister Sam Gyimah said: “The incredible XFEL laser will help us better understand life threatening diseases by using one of the world’s most powerful X-ray machines. Working with our international partners, the super-strength laser will help develop new medical treatments and therapies, potentially saving thousands of lives across the world. Through our modern Industrial Strategy we are investing an extra £4.7 billion into research and development. I am determined that we continue to secure our position as being a world-leader in science, research and innovation and I can’t wait to see the results that come from our participation in this extraordinary project.”

Although not an official shareholder until today the UK has been involved with XFEL since 2008 through both collaboration on technology and the two XFEL User Consortia. The first advanced detector to be installed at the European XFEL, the Large Pixel Detector (LPD), a cutting-edge X-ray ‘camera’ capable of capturing images in billonths of a second, was developed and built by STFC. The LPD was installed mid-2017 and is now operational at the instrument for Femtosecond X-ray Experiments (FXE) at European XFEL.

In addition the STFC Central Laser Facility, based at Rutherford Appleton Laboratory near Oxford in the UK is currently building a nanosecond high energy laser for the High Energy Density (HED) instrument at European XFEL. This new ‘Dipole’ laser will be used to recreate the conditions found within stars.

Dr Brian Bowsher, Chief Executive of STFC, said: “As the UK becomes a full member of XFEL it opens up areas of research for British scientists at the atomic, molecular and nanoscale level that are currently inaccessible. This signing today reinforces our continued strategy to ensure UK science remains at the very forefront of global research by collaborating with the best scientists in the world and using the best facilities. The capabilities offered by XFEL are already opening up entirely new scientific opportunities and this is a very important day for both UK science and STFC. Building on the contributions already made to XFEL by both STFC research and engineering staff and other UK researchers, I look forward with immense interest to see what my fellow UK research colleagues and the XFEL team will discover in the coming years.”

The UK has also developed a training facility at the Diamond Light Source on the Harwell campus in Oxfordshire for British scientists. The UK XFEL life sciences hub will enable users to fully prepare for their experiments with XFELs.

Chair of the European XFEL Council Professor Martin Meedom Nielsen who was present at the signing said: “All member states are very happy that the United Kingdom now officially joins the European XFEL. The UK science community has been very active in the project since the very beginning, and their contribution of ideas and know-how has always been highly appreciated. Together, we will maintain and develop the European XFEL as a world leading facility for X-ray science.”

The XFEL image and media database can be accessed at: XFEL Media and Video Database
Upgrade to UK environmental science super computer will make it twice as capable

A major upgrade is being made to double the storage available in the UK’s leading environmental science supercomputer. The upgraded system will support the global analysis of the next generation of climate models and provide a venue for UK academia and industry to exploit Earth observation data.

Called JASMIN, this supercomputer provides the UK and European climate and earth-system science communities with the ability to access very large sets of environmental data, which are typically too big for them to download to their own computers, and process it rapidly, reducing the time it takes to test new ideas and get results; from months or weeks to days or hours.

The upgrade will double the available storage to more than 44 Petabytes, equivalent to over 10 billion photos. It will also add around 40% to the processing capability, with 11,500 cores on 600 nodes, similar to adding the power of several thousand high-end laptops. This means that the 1700 registered users of JASMIN can process and analyse big datasets simultaneously and in very little time.

JASMIN is a globally unique data intensive supercomputer for environmental science and currently supports over 160 science projects. JASMIN users research topics ranging from earthquake detection and oceanography to air pollution and climate science.

When JASMIN was brought online 6 years ago with just 4.5 Petabytes of storage it revolutionised access to data for the environmental science community in the UK. This latest upgrade offers a huge leap in the capability of the system for users.

RAL Space’s Centre for Environmental Data Analysis (CEDA), part of the Science and Technology Facilities Council (STFC), jointly manages JASMIN.

Dr Victoria Bennett, Head of CEDA, said “We are excited to be expanding JASMIN to manage the increasingly large datasets, from satellites, climate models and other sources. For example the current Sentinel Earth observation satellites alone are producing 10 Terabytes of data every day and this will grow as more are launched as part of the European Commission’s Copernicus programme. This upgrade will allow us to build on the successes we’ve already seen in enabling our users in the science community to efficiently process and analyse these massive datasets.”

Funded with a multi-million pound investment from the Natural Environment Research Council (NERC), the upgraded system will also continue to provide the ‘UK environmental data commons’ - an online collaborative space bringing together data, services and expertise - underpinning much of academic environmental science.

Sentinel 2 data stored on JASMIN and processed by CEDA showing Bristol Credit: ESA/FEU Copernicus data processed by STFC RAL Space
Upgrade to UK environmental science super computer will make it twice as capable

NERC Associate Director for National Capability and Capital, Dr Liz Fellman, said, “The JASMIN supercomputer is central to delivering NERC science across its portfolio and provides a globally unique and increasingly powerful capability for the UK’s environmental science community, enabling significant improvement of predictive environmental science to benefit the UK and beyond. NERC welcomes this major upgrade to a world-class facility.”

Professor Pier Luigi Vidale from the University of Reading has been using JASMIN since 2012 to store and analyse high-resolution global climate model data and said of the upgrade “The project we’re currently leading involves 21 institutions across Europe and will output more than 4 Petabytes of data. The JASMIN upgrade will allow us to store all data and to do most of the analysis online, thus dramatically speeding up the extraction of science, at unprecedented resolution and enabling scientific publication at a far higher rate. We would not have embarked on the project without the enhanced JASMIN.”

As a ‘customised’ data intensive supercomputer, the JASMIN upgrade involves the integration of computing equipment from many suppliers, a specialised new network, the development and deployment of new software, and the migration of Petabytes of archived data from old hardware, in need of retirement, to new. The entire process will take many months, from the integration of the first new equipment in March until the last of the old storage is retired. Completion is expected by the end of 2018. The system integration is being led by STFC Scientific Computing Department (SCD), and the software and data management by CEDA.

Jonathan Churchill, JASMIN Systems Architect and Manager for SCD, is part of the team that has designed and are now installing the upgrade that will be exploited by the ever expanding JASMIN science communities. He said “Not only have we dramatically scaled out JASMIN storage, compute and networking, but the new storage and networking technologies will improve the user experience and provide capabilities that we have never been able to make available to users before. The compute upgrade will provide not only much needed extra batch computing cores but also provide the deep, on-demand cloud computing capacity and flexibility that releases new analysis environments to our science communities.”
UK team delivers Earth Observation instrument that will improve our understanding of the Earth’s climate

A Broadband Radiometer instrument, designed and built in the UK with the aim of improving our understanding of the Earth’s climate, has been delivered to the EarthCARE mission team in Germany.

The broadband radiometer (BBR) is a scientific instrument for the Earth Cloud Aerosol and Radiation Explorer (EarthCARE) satellite. It is a cutting edge piece of engineering that will use three telescopes looking in three directions at once to study the radiance at the top of the atmosphere for better weather prediction. It will look at the relationship between clouds, aerosols and radiation and their combined effects on the Earth’s climate system.

This is the latest step towards completing the European Space Agency’s most complex Earth observation satellite.

Dr Chris Mutlow, Director of RAL Space said, “The BBR is an innovative and complex piece of engineering which, thanks to our heritage in this area, many RAL Space staff have been involved over the course of its development, build and test. I’m delighted that it’s now ready to be integrated with the EarthCARE spacecraft and look forward to the impact its observations will have on our ability to model and understand the processes involved in climate change.”

Led by Thales Alenia Space in the United Kingdom, it was delivered from the Science and Technology Facilities Council’s RAL Space in Oxfordshire, UK, to satellite prime contractor Airbus’s integration centre in Friedrichshafen, Germany.

The EarthCARE mission, scheduled to launch in 2020, will improve our understanding of the relationship between clouds, aerosols and radiation and their combined effects on the Earth’s climate system. This high-priority mission will enhance our understanding of the science behind climatology and weather prediction.
The BBR will measure both solar flux and thermal flux, taking measurements across the spectrum from ultraviolet to the far infrared. It comprises three independent fixed telescopes, sophisticated calibration systems and specifically developed detectors to cover the entire spectrum. A significant design and engineering challenge, the BBR will set a new standard in satellite radiometry.

The telescope assembly was designed and built by RAL Space, building on over 20 years of experience working on innovative instruments for weather forecasting and climate science. The sophisticated design used RAL Space’s extensive expertise leading the Geostationary Earth Radiation Budget (GERB) series of instruments, which monitored the reflected sunlight and thermal emissions from Earth between 2002 and 2013.

Thales Alenia Space’s engineers in the UK led the design, construction and testing of the BBR. Other British companies and universities made significant contributions to this instrument, including RAL Space. Alongside the optical, mechanical and electrical design for the telescope assembly, RAL Space also provided the thermal design for the whole instrument. The majority of environmental testing, functional testing and instrument calibration was also performed at RAL Space facilities. ESR provided the mechanism assembly and SciSys the onboard software.

“By designing, building and testing the sophisticated BBR instrument, Thales Alenia Space is proud to serve the largest and most complex Earth Explorer mission to date,” said Ben Olivier, CEO of Thales Alenia Space in the UK. “It represents ten years of collaborative and constructive work between teams from industry and academia, who have had to overcome tremendous technical challenges.”
Global Physics Photowalk 2018

Major science laboratories from around the world today announced a Global Physics Photowalk competition, open to amateur and professional photographers. Physics facilities in Asia, Australia, Europe and North America will open their doors for a rare opportunity to see behind the scenes of some of the world’s most exciting and ground-breaking science.

The photowalk will involve local and national competitions, with the winning national photos submitted to a global judging panel. Organised by the Interactions Collaboration, and supported by the Royal Photographic Society (RPS), the global shortlist will be announced in August, followed by a public vote.

Confirmed locations include CERN – the home of the Large Hadron Collider – as well as underground laboratories in the US, Australia and the UK; and labs and facilities in Italy, the UK, the US, Canada, and – for the first time – China.

Mark Richardson, Chair of the RPS Science Committee, said: “This is a fantastic celebration of the stunning beauty of science on an international scale. The world’s best scientific research is based on international collaboration, a worldwide melting pot of expertise and technologies, each working for the benefit of our global society and economy. The photowalk is a rare opportunity to capture work behind the scenes at the world’s best international laboratories and capture it, frame by frame.”

Dr Andrew Taylor, Executive Director of the National Laboratories for the UK’s Science and Technology Facilities Council, said: “We are incredibly excited to be hosting a photowalk at our national laboratories. It’s a unique opportunity for photographers to see some of the incredible science that happens here in the UK, and to share it with the public in a new and exciting way.”

Further details for the STFC Photowalk can be found online.
External Innovations and Innovations Club

The External Innovations team manages the activities that aim to realise the impacts and benefits that flow from STFC’s investments in science and technology towards commercialisation through one to one brokering, events and a range of funding schemes.

If you wish to contact the teams for more information please see the following contacts and email addresses.

Innovations club: innovationsclub@stfc.ac.uk

External Innovations – Global Challenges

Jason Green  Head of External Innovations  
Tel: + 44 (0)1793 442 014  Email: Jason.green@stfc.ac.uk

Ling Xu  Knowledge Exchange Manager  
Tel: + 44 (0)1793 442 104  Email: ling.xu@stfc.ac.uk

Katharine Hollinshead  21st Century Challenges Programme Manager  
Tel: + 44 (0)1793 442 068  Email: katharine.hollinshead@stfc.ac.uk

Stephen Loader  21st Century Challenges Programme Manager  
Tel: +44 (0)1793 442 111  Email: stephen.loader@stfc.ac.uk

Administration

Andi Kidd  Office Manager  
Tel: +44 (0)1793 442 059  Email: andi.kidd@stfc.ac.uk

Pauline Thompson  Programme Support  
Tel: +44(0)1793 442 650  Email: pauline.thompson@stfc.ac.uk

Richard Traini  Grants Manager  
Tel: +44(0)1793 442 162  Email: richard.traini@stfc.ac.uk

The Innovations Club newsletter contains a selection of articles drawn from our partner organisations that we think you will find interesting. We welcome your comments innovationsclub@stfc.ac.uk