

Building research leadership consortia for Quantum Technology Research Hubs

Call type: Expression of Interest

Closing date: 17:00, 07 August 2018

How to apply: Expression of Interest (EoI) for research leaders to attend the Quantum Technology Consortia Building meetings.

Assessment Process: A Panel will assess the EoIs submitted on the 20-21st August 2018 and select the research leaders who will attend the consortia building meetings.

Key Dates:

Activity	Date
Deadline for EoI	7 August 2018
Interview Panel	20 th -21 st August 2018
Decision	23 rd -24 th August 2018
Consortia Building meetings	September-October 2018

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Related themes: Quantum technologies, ICT, Physical sciences, Digital economy, Engineering, Healthcare technologies, Mathematical sciences.

Summary

A call for research leaders who will be part of the quantum technology consortia will open on the 16th July 2018. The Expression of Interest (EoI) will be for academic research leaders to join the consortia who will develop the second phase Quantum Technology Research Hub proposals. UKRI EPSRC plan to hold the initial consortia briefing meetings in the first two weeks of September 2018. Applicants will be asked to apply against research areas listed in the EoI documentation. The selected consortia members will develop the second phase Quantum Technology Research Hub proposals with the current Quantum Technologies Hub research leaders who have already been selected by a panel held on the 2nd July 2018. There will be opportunity to add further academic expertise to the consortia at the outline proposal writing stage.

Background

EPSRC as part of the National Quantum Technology Programme (NQTP) are running a process to develop Quantum Technology Research Hubs for a further period of 5 years.

Funding a second phase of the National Quantum Technology Programme (NQTP) has not yet been confirmed but this process is to ensure that the momentum and capabilities developed by the existing Quantum Technology Hubs is not lost and the work of the current Quantum Technology Hubs will be built on in a further 5 years.

The purpose of this stage is to identify the academic research leadership that will lead the development of second phase Hub proposals, and in all likelihood deliver it subject to review of the final proposal. It is envisaged that these four consortia of research leaders will be relatively small groups. There will be opportunity to add further academic expertise to the consortia at the outline proposal writing stage.

The Consortium building stages will take place in September and October 2018. The outline Hub proposals will be submitted in November 2018 and assessed by a Panel. The successful outline proposals will obtain feedback from that Panel and will submit full proposals in January 2019. These applications will be subject

to international peer review and assessment by an interview Panel in March 2019.

Eligibility

For information on the eligibility of individuals to receive EPSRC funding, see the EPSRC Funding Guide:

<https://www.epsrc.ac.uk/funding/howtoapply/fundingguide/>

As this call is a targeted funding opportunity provided by EPSRC, eligible individuals from higher education institutions, and some research council institutes and independent research organisations are eligible to apply. A list of eligible organisations to apply to EPSRC is provided at:

<http://www.rcuk.ac.uk/funding/eligibilityforrcs/>

How to apply

Submitting an application

Submissions must be made electronically by 17:00, 7 August 2018 using the Expression of Interest Smart Survey form on the Quantum Technology Hub Consortia call page on the EPSRC website. Please read this document carefully before submitting your EoI.

Guidance on making a submission

This call for EoI's is for individuals to demonstrate why they should be included in the research leadership consortium for the development of a proposal for a Quantum Technology Research Hub in the second phase of the National Quantum Technologies Programme.

The evidence required includes your international research standing, what you will bring to the development of a proposal for a hub and also why you should be invited to the first consortia meeting as a research leader.

The research areas open for EoI applications are listed below the relevant Hub scope. Applicants may wish to discuss their application with EPSRC and the current Quantum Technology Hub leadership teams

<http://uknqt.epsrc.ac.uk/about/uknqt-hubs/>

Please note that if you wish to apply to more than one Quantum Technology Hub Scope you will need to submit a separate EoI for each Quantum Technology Hub Scope.

Assessment

Assessment process

The panel will meet on the 20th -21st August and assess the EoIs received against the assessment criteria. This selection is for the academic research leaders to be involved in the initial consortia building meetings. Applicant not selected due to the limited places available may still be included in the Hub proposals at a later stage.

The successful applicants from this EoI process will join with the current Quantum Technologies Hub research leaders from the current QT Hub who were selected by a panel held on the 2nd July 2018. The selected consortia of research leaders will meet to develop the outline proposals for the second phase Quantum Technology Hubs in September and October 2018.

Assessment criteria

Hub scope

This process is to select research leaders in the open research areas listed for each quantum technology Hub scope. The scopes and the open research areas for each of the phase 2 Quantum Technology Hubs are listed in the following 4 pages.

1. Quantum Communication Hub Scope

The Quantum Communications Hub in a second phase of the National QT Programme will need to cover the priority areas listed below.

- Satellite and free space communications capability into UK and National Programme
- Entanglement based networking
- Development of detectors for quantum communications
- Continuous Variable as well as Discrete Variable QKD for coherent systems
- New protocols beyond QKD
- Long wavelength free space QKD e.g. for mobile phones
- Quantum Repeaters
- Chip scale QKD

Open research areas for EoI in Quantum Communications

Applications are welcomed against the following open research areas listed in bullet points below.

- Experimental expertise in:
 - vulnerability testing
 - freespace and satellite communications
 - entanglement based networking
 - detectors and sources for both single photon and entanglement based quantum communications
- Continuous variable QKD expertise for quantum communications systems and networks
- Expertise in modern/post quantum cryptography to support the development of quantum communications

2. Quantum Computing and Simulation Hub Scope

The Quantum Computing and Simulation Hub in a second phase of the National QT Programme will need to cover the priority areas listed below.

- Must include both quantum computing and simulation
- Hardware and software activities included in an integrated fashion, including research on the architecture and operating system for quantum computing and simulation
- The Hub should maintain the UK's leading position in networked architectures for quantum computing and simulation based on photonics and ion traps, with particular focus on addressing challenges to scalability, fidelity and reliability in the drive to a universal quantum computer
- A Hub should include work on both hardware and software which helps the UK remain flexible to other approaches to quantum computing through developing the expertise and links needed to remain abreast of international activities and developments
- The Hub should identify potential applications and problems where the full potential of quantum computing and simulation is needed
- Work into hybrid approaches should be included.

Open research areas for EoI in Quantum Computing and Simulation

Applications are welcomed against the following open research areas listed in bullet points below.

- Memories and storage for quantum computing and simulation
- Algorithms for quantum computers and simulation
- Hybrid computing involving quantum
- Emulation of quantum computers and simulators
- Computing systems comprising both hardware and software to deliver quantum computing
- Photonics for quantum computing and simulation

3. Quantum Imaging Hub Scope

The Quantum Imaging Hub in a second phase of the National QT Programme will need to cover the priority areas listed below.

- Imaging through complex media / obscurants and Imaging through difficult media
- Imaging and ranging using entanglement and correlation
- Non-linear imaging and shifting wavelength of detection

Open research areas for EoI in Quantum Imaging

Applications are welcomed against the following open research areas listed in bullet points below.

- Computational techniques for quantum imaging:
 - to overcome scattering;
 - to exploit the power of multiple imaging systems particularly for safety critical situations;
 - for data processing and interpretation (including data fusion and machine learning).
- New nonlinear materials for entanglement based imaging, especially where materials open up new wavelength windows.
- Increasing wavelength while retaining photon numbers or the quantum state
- Quantum radar
- Quantum entanglement based techniques for quantum imaging technologies

4. Quantum Sensing and Timing Hub Scope

The Quantum Sensing and Timing Hub in a second phase of the National QT Programme will need to cover the priority areas listed below.

- Research to further develop the full range of existing quantum sensing and timing approaches
- New concepts for quantum sensing and timing
- New application domains for sensing and timing
- Working with researchers in application domains to understand how to achieve the full potential of quantum sensing and timing
- The Hub will be expected to work closely with NPL on timing

Open research areas for EoI in Quantum Sensing and Timing.

Applications are welcomed against the following open research areas listed in bullet points below.

- Microfabrication for quantum sensing and timing
- Magnetic sensing using quantum technologies
- New sensor modalities for quantum sensing and timing (modalities not included in the research activities in the phase one Hub)
- Optimal control and fast signal processing for quantum sensing and timing
- AI and machine learning to enable end user interpretation of data for optimisation of quantum sensor operations
- Application areas for quantum sensing and timing, in particular (but not restricted to):
 - oil and gas
 - corrosion
 - navigation
 - geophysics
- Value chain analysis to enable research and innovation in quantum sensing and timing.

Assessment Criteria

Research Quality: The second phase Hubs must bring together a consortia of international standing academics. The academic research leaders selected to attend the consortia building workshops by this Panel should be research leaders in the research area they are applying against.

Contribution to the development of a Hub proposal: The research leaders selected should have the skills and expertise which will enable the Hub research leaders selected to attend the consortia building meetings to contribute effectively to the priorities stated in the Hub scopes being addressed.

Contribution to the delivery of a second phase quantum technology hub: The hub consortia should present a strong, multidisciplinary partnership of researchers with the necessary skills and expertise to deliver the second phase Hub proposal.

Equality, Diversity and Inclusion

The long term strength of the UK research base depends on harnessing all of the available talent. The Research Councils have together developed the ambitious RCUK Equality, Diversity and Inclusion Action Plan
<http://www.rcuk.ac.uk/funding/diversity/>.

EPSRC will pay additional caring costs incurred by attendees at the consortia meeting.
<https://epsrc.ukri.org/funding/applicationprocess/basics/caringresponsibilities/>

EPSRC will pay reasonable travel costs for attending the September and October consortia meetings in line with our rules and regulations
<https://epsrc.ukri.org/about/standards/travel/>

Feedback

Feedback will not be provided at the EoI stage.

Moving forward

Entries submitted to this call will **not** count towards the Repeatedly Unsuccessful Applicants Policy. Further information about the policy can be found at:
<https://www.epsrc.ac.uk/funding/howtoapply/basics/resubpol/rua/>.

Key dates

Activities	Dates
Deadline for Expressions of Interest	7 August 2018
Decisions Announced	By 27 August 2018
Consortia building workshops	During first 2 weeks in September 2018
Outline proposals submitted by consortia	Mid November 2018
Full proposals submitted by consortia	Mid January 2019 (subject to full proposals being invited)
Decisions	April 2019 (subject to funding being available)

Contacts

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Change log

Name	Date	Version	Change
Helen Hunt	11/07/18	1	Finalise call details