

Major project on assurance of Quantum Random Number Generators awarded Industrial Strategy Challenge Fund (ISCF) funding

- Consortium led by National Physical Laboratory (NPL) awarded £2.8 million funding in recent Innovate UK competition
- Industrial partners Cambridge Quantum Computing, Crypta Labs, KETS Quantum Security, Nu Quantum, Quantum Dice, Toshiba Europe Limited, ID Quantique
 - Academic partners University of York and University of Kent
- ISCF project will address the need for assurance to accelerate the commercial and industrial exploitation of QRNGs

LONDON – 15th JUNE 2020 - A major inter-disciplinary project has been successful in the “*Commercialising quantum technology: technology projects round one*” funding competition run by Innovate UK, the UK’s Innovation Agency, as part of the Industrial Strategy Challenge Fund (ISCF).

The successful consortium is led by the National Physical Laboratory (NPL), the UK’s National Metrology Institute. Key partners are the UK’s leading developers of optical quantum random number generators (QRNGs) – Cambridge Quantum Computing, Crypta Labs, KETS Quantum Security, Nu Quantum, Quantum Dice, Toshiba Europe Limited – and Swiss market-leader ID Quantique. Academic expertise is provided by University of York and University of Kent. The Quantum Communications Hub, through its partnership resource, previously helped to fund a feasibility study on QRNG assurance, which served as the model underpinning this new programme of work.

Data is one of the world’s most valuable commodities, it affects every person, company and government, everywhere. Most of the world’s cybersecurity infrastructure is based on the exchange and use of digital cryptographic keys; random number generators (RNGs) are essential to this infrastructure and newer technologies such as quantum key distribution.

Current tests for random number generators can give information about the statistical properties of their output but cannot assure that the output is unknown to others. There is currently no process that can assure that the numbers generated are unique and hence unpredictable, which potentially compromises security.

Quantum random number generators (QRNGs) utilise the inherent randomness of natural physical processes to create their output, assured unique to each device if the process is quantum. They are thus superior to RNGs as they produce truly random numbers, with no risk of the same random sequence being produced by identically manufactured and prepared QRNGs.

A method for providing authoritative certification of the unique randomness produced by QRNGs does not currently exist. Modelling and experimentally testing the physical process used to create a QRNG’s output can be used to evidence its quantum nature, and hence its randomness and uniqueness. This ISCF project will address this lack of certification, supported by an additional £1.6m of co-funding from the industrial partners and complementary research in the EPSRC Quantum Communication Hub.



Significantly, and with National Cyber Security Centre (NCSC) as an associate partner, the project will also help address concerns raised by this UK Government agency about these devices, paving the way for certifying this technology through a UK-established assessment process.

Dr Rhys Lewis, Head of NPL's Quantum Metrology Institute stated: "We are very pleased that this project has been chosen for funding within the ISCF quantum programme. The aim of this project is to bring together NPL measurement expertise with industrial and academic partners to develop an authoritative assessment process for improved random number generators based on quantum effects. This is critical for creating a certification process which can provide confidence in the application of these new devices. This project is a great example of the test and evaluation capability which NPL is developing for a range of quantum technologies."

Dr Pete Thompson FEng, NPL's CEO said: "The UK is ideally placed to emerge as a global leader in quantum technologies and at NPL our metrology is crucial in realising the benefits that quantum can offer. I am delighted that the expertise and knowledge of our quantum physicists will be contributing to all three ISCF calls (feasibility, collaborative R&D and technology), and across all five technical themes of computing (hardware and software), communications, sensors and timing, imaging and components."

Notes to editors:

The Industrial Strategy Challenge Fund brings together the UK's world leading research with business to meet the major industrial and societal challenges of our time. The fund was created to provide funding and support to UK businesses and researchers, part of the government's £4.7 billion increase in research and development over the next 4 years. It was designed to ensure that research and innovation takes centre stage in the Government's Industrial Strategy and is run by Innovate UK, the UK's innovation agency, and the Research Councils on behalf of UK Research and Innovation.

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About NPL

[NPL](#) is the UK's National Metrology Institute, providing the measurement capability that underpins the UK's prosperity and quality of life.

From new antibiotics to tackle resistance and more effective cancer treatments, to secure quantum communications and superfast 5G, technological advances must be built on a foundation of reliable measurement to succeed. Building on over a century's worth of expertise, our science, engineering and technology provides this foundation. We save lives, protect the environment and enable citizens to feel safe and secure, as well as support international trade and commercial innovation. As a national laboratory, our advice is always impartial and independent, meaning consumers, investors, policymakers and entrepreneurs can always rely on the work we do.

Based in Teddington, south-west London, NPL employs over 600 scientists. NPL also has regional bases across the UK, including at the University of Surrey, the University of Strathclyde, the University of Cambridge and the University of Huddersfield's 3M Buckley Innovation Centre.

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