

## **Wave Photonics leads £470k Innovate UK feasibility study project to create a Quantum Photonics PDK.**

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Cambridge-based startup, Wave Photonics, is leading a £470k Innovate UK project to explore the use of computational design to develop an optimised library of component designs for integrated quantum photonics. It will be working alongside Cardiff University, Compound Semiconductor Applications Catapult and KETS Quantum Security.

Integrated quantum photonics is a scalable technology used in quantum computing, sensing, random number generation and communication. Currently designers have to spend a lot of time and effort developing their own custom, high-performance components. This feasibility study will investigate using a computational approach to design a library of components in a way that can be moved to different fabrication processes, aiming to enable the development and scale-up of quantum technologies.

The application was supported by PsiQuantum, a quantum computing company, who noted in a letter of support that “Although optimized components such as these would be of use to companies developing integrated quantum photonics technologies, they are not yet a standard offering from photonics foundries.”

Wave Photonics will develop the software and component designs for the PDK. Wave Photonics CEO, James Lee said “This project will enable us to make the most of the team’s background in quantum photonics and computational optimisation to not only develop a quantum photonic PDK at the target foundry, but to also develop the core tools to expand to other fabrication processes in an efficient way.”

Project partner, Cardiff University, will be developing a testing setup and performing measurements to allow Wave Photonics’ software to adapt the designs for maximum robustness and efficiency. Professor Anthony Bennett said, “we are excited to be part of this project, collaborating to deliver a new technology for quantum photonics”.

The Compound Semiconductor Applications Catapult will be supporting the project by developing a testing rig for entangled photon sources and performing characterisation of the designed sources throughout this project. Joe Gannicliffe, Head of Photonics and RF said “Quantum Photonics Technologies enable applications such as Quantum-secure comms, and Quantum computing however further industrialisation is needed to bring them to market. CSA Catapult is pleased to support this programme in developing and establishing PDKs for Quantum components such as single photon sources through access to our advanced industrial test facilities”.

Consortium member KETS Quantum Security, a quantum photonics company developing on-chip quantum-secure communications systems will be providing input into the project as a potential end user of a quantum photonics PDK. Jake Kennard, Chief Applications Officer at KETS said “Integrated quantum photonic chips are the beating heart of KETS products -

but developing new ones often requires bespoke designs that can be complicated, time consuming, and expensive to produce. To that end, we're delighted to be joining Wave Photonics and partners on the 'Quantum Photonics PDK' project that will directly tackle this issue. As a consumer of integrated optical photonic chips we look forward to engaging with the project and to the successful development of an optimised PDK that can dramatically simplify KETS' design process through standard building blocks designed from the ground up for quantum applications.”

#### About Innovate UK

Innovate UK drives productivity and economic growth by supporting businesses to develop and realise the potential of new ideas.

We connect businesses to the partners, customers and investors that can help them turn ideas into commercially successful products and services and business growth.

We fund business and research collaborations to accelerate innovation and drive business investment into R&D. Our support is available to businesses across all economic sectors, value chains and UK regions.

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#### About Wave Photonics:

Wave Photonics is Cambridge-based start-up that is using computational techniques to accelerate integrated photonics design. Integrated photonics is a scalable technology that is currently largely used in datacomms, has the potential to be used as a platform for upcoming technologies such as quantum computing and communication, healthcare and biosensing, lidar and sensing. However, the lack of readily-available libraries of photonics components and the difficult of accounting for process imperfections means that entrants to these markets face high barriers to product development. Wave Photonics is developing tools to automatically account for process imperfections and develop high-quality, robust libraries of components to enable photonic chip designers to rapidly develop and scale their products. For more information, visit <https://www.wavephotonics.com>.

#### About Cardiff University:

Cardiff University is recognised in independent government assessments as one of Britain's leading teaching and research universities and is a member of the Russell Group of the UK's most research intensive universities. The 2014 Research Excellence Framework ranked the University 5th in the UK for research excellence. Among its academic staff are two Nobel Laureates, including the winner of the 2007 Nobel Prize for Medicine, Professor Sir Martin Evans. Founded by Royal Charter in 1883, today the University combines impressive modern facilities and a dynamic approach to teaching

and research. The University's breadth of expertise encompasses: the College of Arts, Humanities and Social Sciences; the College of Biomedical and Life Sciences; and the College of Physical Sciences and Engineering, along with a longstanding commitment to lifelong learning.

This work will partly be carried out in the ERDF-funded Institute for Compound semiconductors (ICS) cleanroom at Cardiff University.

#### About CSA Catapult:

Compound Semiconductor Applications (CSA) Catapult is focused on bringing compound semiconductor applications to life in three key areas: the road to Net Zero, future telecoms and intelligent sensing.

CSA Catapult is a Not for Profit organisation headquartered in South Wales. It is focused on three technology areas: Power Electronics, RF & Microwave and Photonics. As well as the three technology areas, CSA Catapult is also working in Advanced Packaging for these high-power innovations.

The next wave of emerging applications will have an enormous impact on our lives. Compound semiconductors will enable a host of new and exciting applications in the electrification of transport, clean energy, defence and security and digital communications markets.

CSA Catapult exists to help the UK compound semiconductor industry grow and collaborates across the UK and internationally.

#### About KETS Quantum Security:

KETS is a UK-based technology firm specialising in chip-scale quantum-safe communications with applications in telecommunications, data centres and defence & space. It is a multi-award-winning start-up from the [Quantum Engineering Technology Labs \(QETLabs\)](#) at the University of Bristol and industrial partner in the Quantum Communications Hub, part of the National UK Quantum Technologies Programme. For more information about KETS Quantum Security, please visit [www.kets-quantum.com](http://www.kets-quantum.com).