

Announcing the opening of the Quantum Software Lab at the University of Edinburgh, in partnership with the National Quantum Computing Centre



19 April 2023, Edinburgh, UK – The National Quantum Computing Centre (NQCC) and the University of Edinburgh today signed a memorandum of understanding to mark the opening of the new Quantum Software Lab at Edinburgh.

The Quantum Software Lab at Edinburgh, in partnership with the NQCC, is based in the School of Informatics and aims to overcome key challenges to accelerate the development of quantum computing and investigate new ways in which quantum computers can provide benefits, beyond the reach of traditional computers.

Under the leadership of the NQCC Chief Scientist, Professor Elham Kashefi, the Lab will conduct key research into the development of new quantum software, based on a core programme of research called the Quantum Advantage Pathfinder. Researchers from the Lab will work closely with industry partners to understand how quantum computers might help address their problems. The Lab will be able to offer expertise and education, in addition to undertaking pioneering research.

The Lab represents a core research capability in quantum software that can attract talent, help to train the next-generation workforce, provide scientific expertise, and build the capability to solve the key scientific challenges facing quantum computing.

Advancements in science may enable new applications, and new applications may inspire new research directions, the team says.

The Lab's theoretical research pillars will develop the necessary tools for identifying and demonstrating any quantum advantage that one might obtain in a provable and reproducible way for specific practical applications.

The work of the Lab will be delivered in support of the NQCC's vision of exploring the potential of quantum computing to address some of the most complex computational challenges, enabling the UK to realise its full benefits, as the technology is further developed.

Establishing the Lab aligns with the ambitions of the NQCC's user engagement programme, SparQ, which seeks to grow the UK's developer and user communities, by supporting potential users of quantum computing on their journey from awareness to advocacy.

About the Quantum Advantage Pathfinder (QAP) research programme

The QAP is the core research programme for the Quantum Software Lab. The programme is a multi-disciplinary initiative involving physicists, mathematicians, engineers and computer scientists. The NQCC Chief Scientist, together with the QAP research team, will create a framework for investigating practical ways of using quantum computing to solve problems beyond the reach of classical computing. The lab will collaborate with the government, industry, and other academics working on quantum to ensure solutions meet the needs of our economy and society. It also aims to help establish a trusted independent quantum software community as part of NQCC to empower all stakeholders in the adoption of quantum computing.

The QAP's vision is to turn industry pain-points into relevant research problems. As academics carry out pioneering research expanding the pillars of research, including the mathematical foundations of quantum information, quantum algorithms and architectural design, they will use the wealth of new knowledge generated to help tackle real-world problems in the industry by carrying out feasibility studies. QAP will serve as the foundation for follow-up phases of the NQCC programme in quantum software and applications in the years to come. It will aid development of the first fully functional quantum computing cloud platforms in the UK.

NQCC Director, Dr Michael Cuthbert said, “I am delighted that the NQCC is partnering with the University to establish the new Quantum Software Lab at Edinburgh. This joint endeavour will create a core research capability to address some of the key challenges in developing quantum software, paving the way towards practical applications of quantum computing that can have a real impact on the industry”.

Professor Sir Peter Mathieson, Principal and Vice-Chancellor of the University of Edinburgh, said: “In the year the University of Edinburgh marks six decades at the forefront of computer science and artificial intelligence research, we are delighted to partner with the National Quantum Computing Centre (NQCC). That the NQCC’s first software lab has been established here at the University is hugely significant, and is indicative of the calibre of quantum researchers in our School of Informatics. Together, I hope we can play a significant role in the development and delivery of emerging quantum technologies.”

Notes to editors:

About National Quantum Computing Centre (NQCC)

The NQCC is the UK’s national centre for quantum computing, dedicated to accelerating its development by addressing the challenges of scaling up the technology. Our vision is to enable the UK to solve some of the most complex and challenging problems facing society by harnessing the potential of quantum computing. The centre is working with businesses, the government and the research community to deliver quantum computing capabilities for the UK and support the growth of the emerging industry.

The NQCC’s programme represents a £93m investment and is being delivered jointly by the research councils, EPSRC and STFC, as part of UK Research and Innovation. The centre will be headquartered in a purpose-built facility, which is due for completion in 2023, within STFC’s Rutherford Appleton Laboratory site at the Harwell Campus in Oxfordshire.

The NQCC is part of the National Quantum Technologies Programme, which involves substantial public and private sector investment to develop and deliver quantum technologies across the areas of sensing, timing, imaging, communications and computing.

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About the School of Informatics, UoE

With over 500 academic and research staff and over 2000 taught and research students, the School of Informatics at the University of Edinburgh is one of the largest institutes of its kind in the UK and Europe.

The research in the School of Informatics focuses on understanding how natural and artificial systems process, store and communicate information.

The School is among the top Computer Science and Informatics research institutions in the UK, according to 2021 Research Excellence Framework results. Our research was recognised as world-leading for research impact and environment. Times Higher Education (THE) named us the top Computer Science and Informatics department in terms of the quality and breadth of our research, known as research power.

The School is consistently ranked in the top 30 in the world for computer science (currently 15th in QS ranking for Data Science, 20th in QS ranking for Computer science and 24th in THES ranking for computer science)