

# SparQ Access: Achievements to Date and Outlook

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# Academic Channel: High-level Metrics

- Access enabled to 16 quantum computing hardware systems, across 9 providers
- 114 academic allocations awarded
- 147 users onboarded
- 29 participating institutions

University of  
**Kent**

Edinburgh Napier  
UNIVERSITY

Imperial College  
London

**KING'S**  
*College*  
**LONDON**

Kingston  
University  
London

LONDON  
metropolitan  
university

**UCL**

**Newcastle**  
University

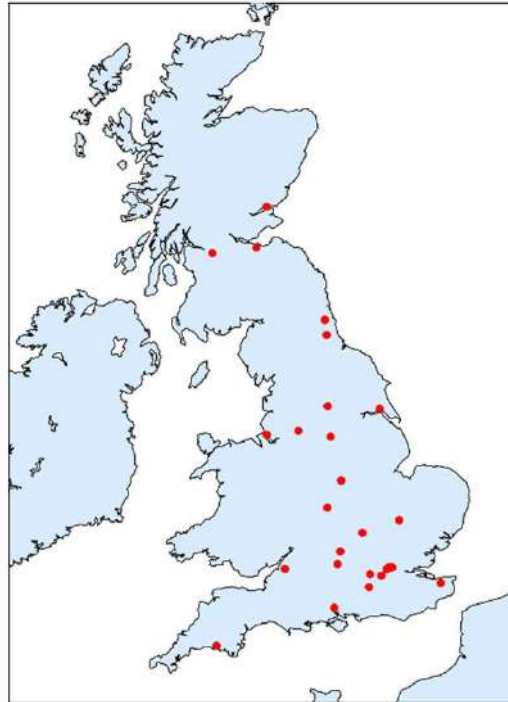
Queen Mary  
University of London

UNIVERSITY OF  
CAMBRIDGE

**Durham**  
University

UNIVERSITY OF  
**LIVERPOOL**

UNIVERSITY OF LEEDS



The Open  
University

**Abertay**  
University

THE UNIVERSITY  
OF EDINBURGH

**CITY**  
ST GEORGE'S

UNIVERSITY OF  
**PLYMOUTH**

Loughborough  
University

University of  
**Southampton**

UNIVERSITY  
of **HULL**

University of  
**Strathclyde**  
Glasgow

**MANCHESTER**  
1824

University of  
**Sheffield**

**UKRI**  
National Quantum  
Computing Centre

UNIVERSITY  
OF **WARWICK**

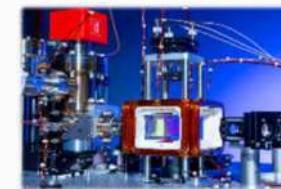
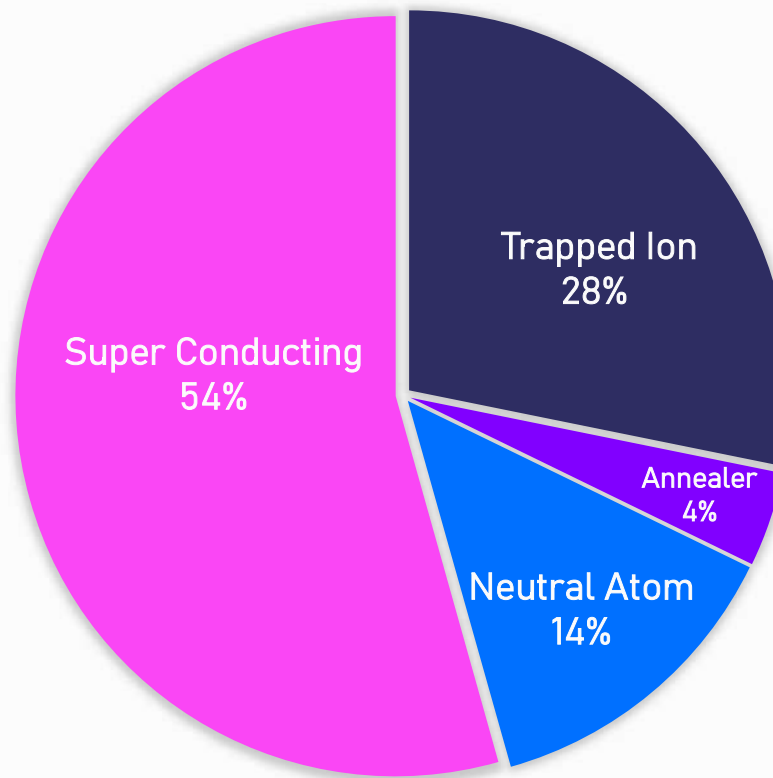
ROYAL  
HOLLOWAY  
UNIVERSITY  
OF LONDON

**UWE**  
**BRISTOL**  
University of the  
West of England

UNIVERSITY OF  
**OXFORD**

UNIVERSITY OF  
**SURREY**

# Projects by Quantum Compute Modality



National Quantum  
Computing Centre

Superconducting: IBM, Rigetti, IQM    Ion Trap: IonQ, AQT, Quantinuum  
Neutral Atom: QuEra, Pasqal    Annealer: D-Wave

# Technical Classification of Projects

- Quantum Hardware & Error Correction
- Quantum Algorithms & Software
- Quantum Simulation for Physics
- Quantum Chemistry & Materials
- Quantum Machine Learning & AI
- Quantum Applications & Optimisation
- Quantum Foundations, Verification & Education

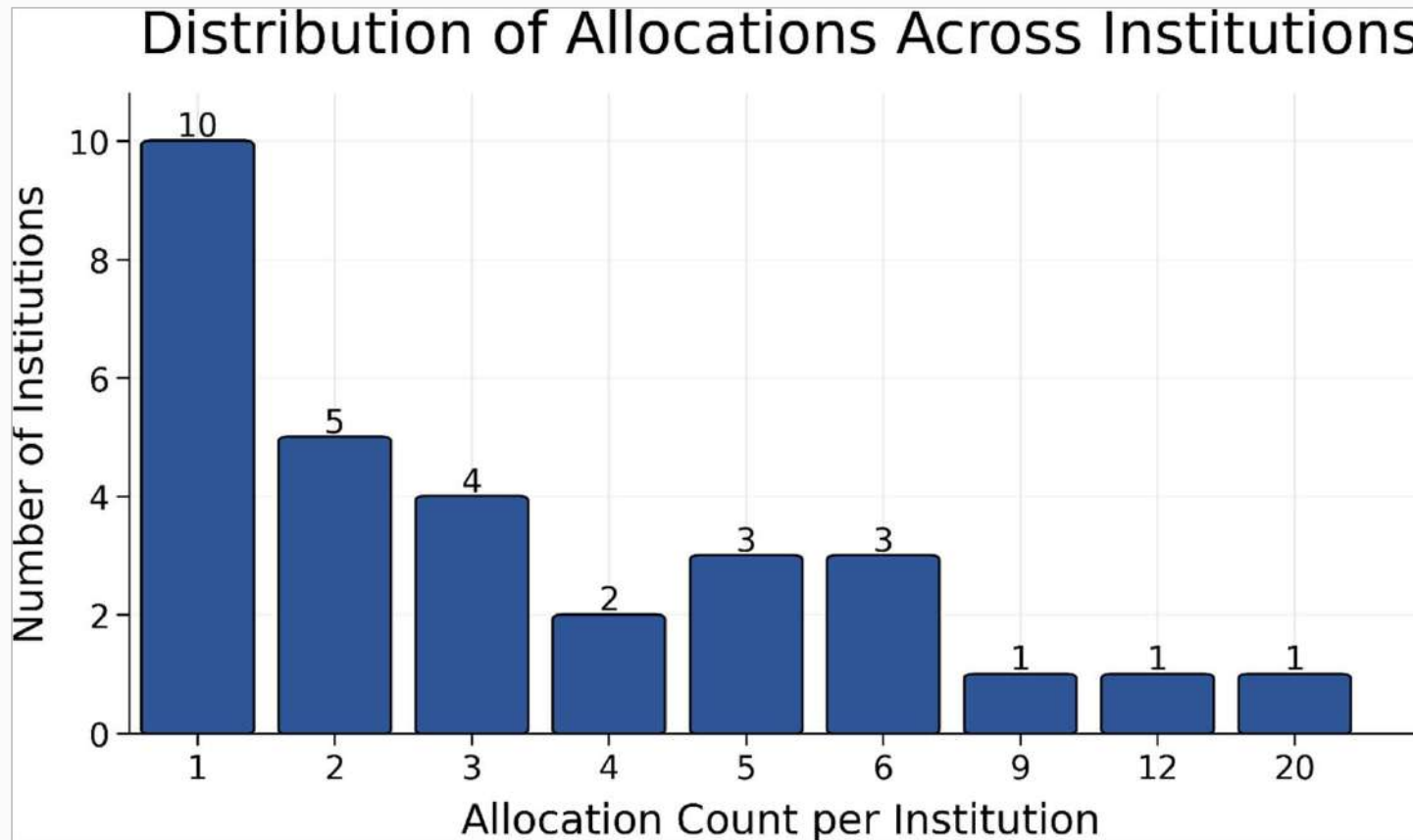


# Application Areas

| Application Area                                   | % of Projects | Topics Include                                                                                                                |
|----------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
| Fundamental Physics & Scientific Discovery         | 36%           | Neutrino oscillations and CP violation, Quantum field theory, Lattice gauge theory, Particle scattering, Nuclear physics, etc |
| Quantum Computing Systems, Software & Benchmarking | 21%           | Error correction, Benchmarking, Verification, Processor performance, Control systems, software tools, etc                     |
| Chemistry, Materials & Biotechnology               | 12%           | Molecular ground states, Enzyme structure, Drug discovery and biochemistry, Correlated fermionic systems, etc                 |
| AI & Data Science                                  | 10%           | Quantum neural networks, Generative AI, Healthcare analytics, Financial forecasting, Scientific data analysis, etc            |
| Optimisation & Industrial Operations               | 9%            | Transport and routing, Energy systems, Resource allocation, Graph optimisation, Engineering design, etc                       |
| Engineering, Energy & Infrastructure               | 7%            | Fluid dynamics, Heat transfer, Communications systems, Energy infrastructure, Industrial process optimisation etc             |
| Quantum Communications & Security                  | 4%            | Quantum key distribution, Quantum teleportation, Distributed quantum systems, Quantum networking protocols, etc               |



# Breadth of Engagement - Depth of Engagement



# SparQ Access Publications

Acknowledgement includes the identifier:  
["UK National Quantum Computing Centre \[NQCC200921\]"](#)

| Year   | Title of Publication                                                                                                                      | Publication medium                    | Authors                                                                                                                                                                                                                                        |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dec-25 | Composably Secure Delegated Quantum Computation with Weak Coherent Pulses                                                                 | arXiv                                 | Garnier, Maxime; Leichtle, Dominik; Music, Luka; Ollivier, Harold                                                                                                                                                                              |
| Nov-25 | How "Quantum" is your Quantum Computer? Macrorealism-based Benchmarking via Mid-Circuit Parity Measurements                               | arXiv                                 | Zindorf, Ben; Braccini, Lorenzo; Das, Debarshi; Bose, Sougato                                                                                                                                                                                  |
| Dec-25 | Investigating methods to solve large windfarm optimization problems with a minimum number of qubits using circuit-based quantum computers | arXiv                                 | Hancock, James; Craven, Matthew; McNeile, Craig                                                                                                                                                                                                |
| May-25 | Real-Time Scattering on Quantum Computers via Hamiltonian Truncation                                                                      | arXiv                                 | Ingoldby, James; Spannowsky, Michael; Sypchenko, Timur; Williams, Simon; Wingate, Matthew                                                                                                                                                      |
| May-25 | Real-Time Scattering on Quantum Computers via Hamiltonian Truncation                                                                      | arXiv                                 | James Ingoldby; Michael Spannowsky; Timur Sypchenko; Simon Williams; Matthew Wingate                                                                                                                                                           |
| Oct-25 | Scalable quantum computation of Quantum Electrodynamics beyond one spatial dimension                                                      | arXiv                                 | Mou, Z-G; Chakraborty, B.                                                                                                                                                                                                                      |
| Apr-26 | Harmonic Control of Dynamical Freezing in Programmable Rydberg Atom Arrays                                                                | arXiv                                 | Sarkar, Madhumita; Zindorf, Ben; Mukherjee, Bhaskar; Bose, Sougato; Ghosh, Roopayan                                                                                                                                                            |
| Feb-26 | High-order splitting of non-unitary operators on quantum computers                                                                        | arXiv                                 | Brearley, P; Pfeffer, P.                                                                                                                                                                                                                       |
| Sep-26 | Impact of Data Loss in Postprocessing on Training and Inference of Quantum Neural Networks                                                | arXiv                                 | Soraya V. Panambalom, Edoardo Altamura, Nick Chancellor, Jonte R. Hance                                                                                                                                                                        |
| Jun-26 | Quantum Generative Diffusion Model for Real-World Time Series                                                                             | arXiv                                 | Jack Waller;Filippo Caruso;Dimitrios Makris;Rajagopal Nilvalan;Xing Liang                                                                                                                                                                      |
| Jun-26 | Quantum Nonlocal Games on Graph Ensembles                                                                                                 | arXiv                                 | Joshua Tucker; Chris Weeks; Peter Drmota; Ellis M. Ainley; Ayush Agrawal; Adam R. Martinez; Erin Malinowski; Jacob A. Blackmore; David P. Nadlinger; Gabriel Araneda; David M. Lucas; Carlos A. Perez-Delgado; Paul Strange; Jorge Quintanilla |
| May-26 | Qubit-efficient variational algorithm for nuclear structure                                                                               | arXiv                                 | Sarma, Chandan; Stevenson, Paul                                                                                                                                                                                                                |
| Apr-26 | Randomised measurements of a disorder-induced entanglement transition in a neutral atom quantum processor                                 | arXiv                                 | Matsoukas-Roubeas, Apollonas S.; Scholin, Oscar; Sá, Lucas; De, Arinjoy; Hamdan, Majd; Bylinskii, Alexei; Daley, Andrew J.; Gangloff, Dorian A.                                                                                                |
| Mar-26 | Simulating Supersymmetric Quantum Mechanics Using Variational Quantum Algorithms                                                          | arXiv                                 | Kerfoot, John; Schaich, David; Mendicelli, Emanuele                                                                                                                                                                                            |
| Jun-26 | Solving Einstein Field Equations on a Digital Quantum Computer                                                                            | arXiv                                 | Altomonte, Clelia; Fairbairn, Malcolm                                                                                                                                                                                                          |
| Jul-26 | Spin Chain Quantum Communication on a Trapped-Ion Processor                                                                               | arXiv                                 | Sarkar, Madhumita; Pinton, Trinity; Bose, Sougato                                                                                                                                                                                              |
| Feb-26 | A low-circuit-depth quantum computing approach to the nuclear shell model                                                                 | Springer Discover Quantum Science     | Sarma, C; Stevenson, P.                                                                                                                                                                                                                        |
| May-26 | Quantum-assisted domination games on cycle graphs                                                                                         | IOP Publishing New Journal of Physics | C Weeks; Paul Strange; Peter Drmota; Jorge Quintanilla                                                                                                                                                                                         |
| Nov-25 | Spectral quantum algorithm for passive scalar transport in shear flows                                                                    | Springer Nature Scientific Reports    | Pfeffer, Philipp; Brearley, Peter; Laizet, Sylvain; Schumacher, Jörg                                                                                                                                                                           |

# Further initiatives in-plan or under consideration

- New additions to AWS, Azure, IBM Quantum and D-Wave
- Extended allocations under a research theme or target application
- NQCC hosted testbeds
- Software tools and services
- Willow-like collaborative opportunities
- Support for further community hosted events

# Thank you



SparQ Access: Quantum Computing as a Service Feedback form



National Quantum  
Computing Centre