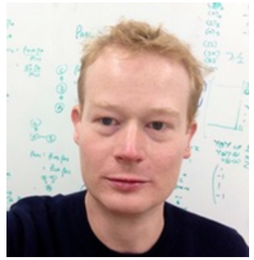
UNIVERSITY OF OXFORD

DEPARTMENT OF COMPUTER SCIENCE

Quantum

WHO

4 Faculty



Jon Barrett

Aleks Kissinger

Matty Hoban

Sergii Strelchuk

- + 1 URF Fellow
  Sathya Subramanian
- 5 postdocs
- 11 PhD

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WHAT

Jonathan Barrett	• Quantum information theory • Foundations of quantum theory • Causality and quantum causal structures	Aleks Kissinger	• Quantum compilation • Fault-tolerant quantum computing • Classical simulation and verification of QC • (Quantum) causal inference
Matty Hoban	• Quantum information and foundations • Quantum non-locality • Quantum verification and device-independence	Sergii Strelchuk	• Quantum algorithms and applications (esp. bioinformatics) • Classical simulation for QC • Quantum complexity theory, and quantum learning theory.

- ERC/UKRI DeQS project + EPSRC RoarQ
- Wellcome Leap Q4Bio challenge
- Quantum Software Alliance
- Quantum Informatics CDT
- participation in MQTech masters & Oxford Quantum Institute
- open-source quantum compiler development
- Industrial collaborations with Quantinuum, IBM, Cleveland, Foxconn, IONQ, …
- …

RoaRQ

leap

Quantum Informatics CDT

erc

European Research Council

Established by the European Commission

IBM

Cleveland Clinic

FOXCONN

IONQ

QUANTINUUM

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Quantum

WHERE ...Research challenges

Foundational

Quantum foundations & quantum causal structures

Q: What can quantum computing tell us about fundamental physics?

Quantum complexity theory & q. advantage

Q: What kinds of tasks are easy, hard, or impossible with classical or quantum computers?

Practical

Fault-tolerant quantum computing

Q: How do we scale up quantum computers and make them robust to noise?

Quantum algorithms for chemistry & genomics

Q: What are the most important applications for quantum computing in the future?

AI for Quantum

Q: Can AI help us overcome difficult problems in design of quantum hardware and software?