PHASECRAFT

QAFA

Quantum Algorithms from Foundations to Applications

UNLOCKING THE
POWER OF
QUANTUM COMPUTING
TO IMPROVE OUR WORLD

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Phasecraft: the quantum algorithms company

Our goal: Get the most out of near-term quantum computers – taking research to reality, faster

Our published work includes...

- The most efficient quantum algorithm + simulator for **producing low-energy states** of the Hubbard model [PRB '20, Editor's Suggestion, arXiv.org/1912.06007]
- The most efficient quantum algorithm by 5 orders of magnitude for **modelling the time-evolution** of the Hubbard model [Nature Comms '21, arXiv.org/2003.06886]
- The most efficient encoding of quantum materials / chemistry models into qubits [PRB '21, arXiv.org/2003.06939, arXiv.org/2003.07125]

The company:

- Founded by Toby Cubitt, Ashley Montanaro and John Morton
- Founders have >50 years combined experience in quantum computing
- Funded by venture investment (Episode 1, LocalGlobe, Parkwalk, UCL Tech Fund)
- Pre-seed funding 2019, seed round 2020
- Team of 16 based in Bristol and London

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QAFA: Quantum Algorithms from Foundations to Applications

Project goal: Address the most significant near-term and long-range theoretical challenges involved in applying quantum algorithms to practical problems, delivering e.g...

- Fast quantum optimisation algorithms
- Efficient quantum communication protocols
- Efficient algorithms for simulating quantum systems

Project organisation

- 2M euro budget over 5 years
- Hosted at Phasecraft and University of Bristol (~50% each)
- Phasecraft is responsible for the near-term, more applied aspects
- University of Bristol is responsible for the longer-term, blue-sky aspects
- Project has funds to support PI (Ashley Montanaro) and team of 2 at each host

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Value of hosting an ERC grant

- *Project funding* (particularly valuable for an early-stage startup company)
- *Prestige* – highly sought-after grants, rare to be hosted at a company
- *Talent Attractor* for world-class staff, visitors and collaborators
- Enables the *freedom and flexibility* to work on “bluer-sky” research

All of these are particularly valuable as the project is strongly aligned with Phasecraft’s R&D

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Phasecraft's R&D collaborations

Quantum hardware companies

rigetti

IBM

Google

Academic

UCL

The University of Edinburgh

Perimeter Institute

IQC Institute for Quantum Computing

University of Bristol

Industry (users)

Oxford Instruments

Standard Chartered

JM Johnson Matthey Inspiring science, enhancing life

quantum benchmark

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