

Fredrik Johannes Olsen Hasselgren

[Oxford Mathematical Institute](#) | [LinkedIn](#) | [Google Scholar](#)

Research interests

My research interests lie in the transition from high-powered computing to quantum advantage, including topics from both ends like tensor networks and quantum algorithms, simulation, and dynamics.

Education

Oct. 2025 - 2029 **DPhil Quantum Information, Computation and Cryptography Group, Mathematical Institute, Keble College, University of Oxford**
Funding: Fully-funded by Mathematical Institute with Jane Street Graduate Scholarship

Oct. 2024 - 2025 **MSc Mathematical and Theoretical Physics, St Hilda's College, University of Oxford**
Distinction. Quantum algorithms & Tensor Networks: Extended dissertation on *Quantum-Inspired Classical Simulation Through Randomized Time Evolution* supervised by Prof. Balint Koczor [Preprint arXiv](#).

Graduate courses include: Quantum Information Theory, Quantum Field Theory (and Advanced-QFT, Topological-QFT), Groups and Representations, ZX-Calculus, Machine- & Deep- Learning.

Sep. 2020 – 2024 **BSc Honours Physics and Philosophy, University of St Andrews**
First-Class. Exciton-Polariton Modelling: First class dissertation on modelling the strong coupling of excitons to cavity photons, supervised by Dr. Hamid Ohadi.
Class medal: Highest grade average in third year physics.

Publications

2026:

- *Quantum-Inspired Classical Simulation Through Randomized Time Evolution* **F. Hasselgren** and B. Koczor. [Preprint arXiv](#)
- Forthcoming: *A virtually connected probabilistic computer as a solver for higher order, densely connected, or reconfigurable combinatorial optimization problems*, A. Searle, H. Youel., **F. Hasselgren**, and M. von der Leyen

2025: *Probabilistic computing optimization of complex spin-glass topologies*, **F. Hasselgren**, M. O. Al-Hasso, A. Searle, J. Tindall, and M. von der Leyen, [Preprint arXiv](#)

Scholarships and Awards

2025 - 2029 **Mathematical Institute Scholarship with Jane Street Graduate Scholarship**
(£150,000) Awarded competitively by the University of Oxford mathematics department; covers full course fees and an annual stipend.

2025 **2nd place - Quantum Dice Michaelmas Challenge**
(£2,000) October - December challenge focusing on out-competing classical methods in solving the Unit Commitment Problem with probabilistic computing.

2023 **Medal (Physics Third level) - University of St Andrews**
Awarded for performance in physics, where I attained the highest grade average among third year physics students.

2023 **1st place - Computational Physics challenge - University of St Andrews**

2021, 2022, 2023, 2024 **Dean's list award for academic excellence - University of St Andrews**
Awarded for having a credit-weighted mean grade above a First-Class standard.

Work experience

Summer 2025

Research summer intern at Quantum Dice, Oxford, UK

- Probabilistic computing: Worked on photonic probabilistic computing architecture implementing Virtually Connected Boltzmann Machines (PC-VCBM). Two pre-prints to be submitted.
- Spin-glass and QUBO optimization: Developed PC-VCBM architecture to solve for low energy states of the spin-glass model and solve quadratic unconstrained binary optimization problems faster than classical solvers and quantum annealers.
- Real-world optimization: Tailored PC-VCBM development towards solving real-world optimization problems for clients.

Summer 2023

Full-Stack developer summer intern at DN Bank, Bergen, Norway

- Front-end: Developed a visualisation tool for the Bank's mainframe jobs using TypeScript and React in Customer and Core Services division.
- Back-end: Used Python to parse, validate, and analyse a dataset of 30 000 daily mainframe jobs.
- Data-analysis: Used graph theory to create interactive web of nodes and edges, with functionality to navigate and filter via search as well as generate and download reports on the data.
- Result: The finished product was immediately put to use by the full-time developers in our division, and is being prepared for online deployment for the company at large.

Teaching

Fall 2025

- Class tutor for *Quantum Processes and Computation* (Computer Science)
- Teaching-assistant for *B7.4 Special Relativity* and *B7.3 Further Quantum Theory* (Mathematical Institute)

Skills

Research skills: Tensor network methods (Quimb, ITensor, custom implementations). Quantum software and quantum algorithm design (ZX-Calculus, Qiskit, pyQuEST).

Programming languages & software development: Python, React, Java/TypeScript (professional experience), Julia, Mathematica, JavaFX, C++, and Swift (limited experience).

Technical and Computational Tools LaTeX; Git; Jupyter; MQLib; Cytoscape; Linux batch processing and computing clusters.

Languages: Fully fluent in Norwegian and English.

Leadership and volunteering and experience

2024 - 2025 *Co-Organizer, University of Oxford Junior MathPhys Journal Club*

2021 - 2024 *Captain, Vice-Captain, Health and Safety Officer, University of St Andrews Judo Club*

2021-2022 *Representative, Campaign for Affordable Student Housing (C.A.S.H), St Andrews*

2019-2020 *Leader, Student Council at Bergen Cathedral School, Norway*

2017-2019 *Deputy Mayor, Representative, Youth City Council of Bergen, Norway*