

Hlér Kristjánsson

QUANTUM INFORMATION PHD STUDENT

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Education

University of Oxford

Oxford, UK

DPHIL IN COMPUTER SCIENCE

Oct. 2018 – PRESENT

- PhD in quantum information theory, communication and foundations
- Provisional thesis title: *A second-quantised Shannon theory: communicating through quantum noise*
- Supervisors: Prof Giulio Chiribella and Prof Jonathan Barrett

Albert-Ludwigs-Universität Freiburg

Freiburg, Germany

ERASMUS YEAR ABROAD

Sep. 2016 – Aug. 2017

- Year abroad in 3rd year of MSci degree, completing lecture courses and Master's thesis
- Master's thesis title: *Efficient quantum transport in disordered networks with vibrations*
- Supervisor: Prof Dr Andreas Buchleitner

Imperial College London

London, UK

MSCI PHYSICS WITH A YEAR IN EUROPE

Oct. 2014 – Jun. 2018

- First-class honours, 80% average (UK grading scale), ranked in top 10% of cohort (*Dean's List*)
- 4-year Master's degree, incorporating Bachelor's level study
- Specialised courses: Foundations of Quantum Mechanics, Quantum Information, Quantum Optics, Quantum Field Theory, Unification, Advanced Particle Physics, General Relativity, Information Theory, Complexity and Networks

Honours & Awards

2021	Invited speaker , Invited to give a plenary talk at QPL 2021 (18th International Conference on Quantum Physics and Logic) in June 2021, whilst still a PhD student	Gdańsk, Poland
2020	First Prize Best Student Talk , awarded first prize in the <i>Best Student Talk Competition</i> at the Q-Turn International Conference	Online
2019	First Prize Poster Award , awarded first prize in the <i>Best Student Poster Award</i> at the 19th Asian Quantum Information Science Conference (AQIS'19)	Seoul, South Korea
2018	Dean's List , top 10% of MSci graduands in Physics at Imperial College London	London, UK
2016	BP Dean's Award , awarded to a student in the top 10% of Year 2 Physics for an outstanding contribution to university life at Imperial College London	London, UK
2014	Ash Music Scholarship , awarded annually to four incoming students at Imperial College London to attend music (violin) lessons at the Royal College of Music during their degree	London, UK

Invited Conference Presentations

18th International Conference on Quantum Physics and Logic (QPL)

Gdańsk, Poland (virtual)

INVITED TALK

June 2021

- Title: A second-quantised Shannon theory

5th London Symposium on Information Theory (LSIT)

London, UK

INVITED POSTER PRESENTATION

May 2019

- Title: Quantum Shannon theory with superpositions of trajectories

Experience

Ofcom

London, UK

RESEARCH CONSULTANT

Dec. 2020 - Jul. 2021

- Founded and led a 3-person team to write a 100-page report on the possibilities and limitations of quantum communications and its potential impact on the communication sector. Gave presentations to both technical and non-technical audiences at Ofcom on the findings of the report. Part-time work completed alongside my PhD.

The University of Hong Kong

Hong Kong

RESEARCH VISITOR

Mar. - May 2019, Aug. - Sep. 2019, Jan 2020

- Visited the Quantum Information and Computation Initiative research group of Prof Giulio Chiribella at the Department of Computer Science, The University of Hong Kong, to collaborate on research projects.

University of Oxford

Oxford, UK

CLASS TUTOR FOR QUANTUM COMPUTER SCIENCE

Oct. 2019 – Dec. 2019

- Tutor and marker for two classes of the *Quantum Computer Science* MSc lecture course
- Lecturer: Prof Bob Coecke, Department of Computer Science

University of Oxford

Oxford, UK

CLASS TUTOR FOR QUANTUM INFORMATION

Jan. 2019 – Mar. 2019

- Tutor and marker for two classes of the *Quantum Information* 3rd-year undergraduate lecture course
- Lecturers: Prof Giulio Chiribella and Prof Jonathan Barrett, Department of Computer Science

London Institute for Mathematical Sciences & Imperial College London

London, UK

SUMMER RESEARCH FELLOW IN QUANTUM INFORMATION THEORY

Jun. – Sep. 2016

- Worked on the theoretical foundations of a quantum generalisation of feedforward neural networks
- Supervisors: Prof Myungshik Kim & Dr Oscar Dahlsten

Skills

Programming Python, Matlab, Mathematica, LaTeX

Languages English, Icelandic, Mandarin Chinese, German

Publications

- **Hlér Kristjánsson**, Wenxu Mao and Giulio Chiribella, ‘Witnessing latent time correlations with a single quantum particle’, *arXiv preprint arXiv:2004.06090*, 2021.
- Augustin Vanrietvelde, **Hlér Kristjánsson**, Jonathan Barrett, ‘Routed quantum circuits’, Accepted for publication in *Quantum*, *arXiv preprint arXiv:2011.08120*, 2020.
- Giulia Rubino, Lee Rozema, Daniel Ebler, **Hlér Kristjánsson**, Sina Salek, Philippe Allard Guérin, ... and Philip Walther, ‘Experimental quantum communication enhancement by superposing trajectories’, *Physical Review Research*, vol. 3, no. 1, 013093, 2021.
- **Hlér Kristjánsson**, Giulio Chiribella, Sina Salek, Daniel Ebler and Matthew Wilson, ‘Resource theories of communication’, *New Journal of Physics*, vol. 22, p. 073014, 2020
- Giulio Chiribella and **Hlér Kristjánsson**, ‘Quantum Shannon theory with superpositions of trajectories’, *Proceedings of the Royal Society A*, vol. 475, no. 2225, p. 20180903, 2019
- Kwok Ho Wan, Oscar Dahlsten, **Hlér Kristjánsson**, Robert Gardner, and M.S. Kim, ‘Quantum generalisation of feedforward neural networks’, *npj Quantum Information*, vol. 3, no. 1, p. 36, 2017

Conference Presentations

20th Asian Quantum Information Science Conference (AQIS'20)

Sydney, Australia (virtual)

CONTRIBUTED TALK

Dec. 2020

- Title 1: Single-particle communication through correlated noise
- Title 2: Resource theories of communication

Q-Turn

Chennai, India (virtual)

CONTRIBUTED TALK (AWARDED FIRST PRIZE)

Nov. 2020

- Title: Resource theories of communication

17th International Conference on Quantum Physics and Logic (QPL)

Paris, France (virtual)

CONTRIBUTED TALK

June 2020

- Title: Resource theories of communication

Quantum Information Structure of Spacetime (QISS) HKU Workshop

Hong Kong

CONTRIBUTED TALK

Jan. 2020

- Title: Quantum interference of latent time-correlations

23rd Annual Conference on Quantum Information Processing (QIP)

Shenzhen, China

POSTERS (X2)

Jan. 2020

- Title 1: Quantum Shannon theory with superpositions of trajectories
- Title 2: Resource theories of communication with quantum superpositions of processes

19th Asian Quantum Information Science Conference (AQIS'19)

Seoul, South Korea

POSTER (AWARDED FIRST PRIZE)

Aug. 2019

- Title: Quantum Shannon theory with superpositions of trajectories

Quantum Causal Structures Workshop

Oxford, UK

CONTRIBUTED TALK

July 2019

- Title: Quantum Shannon theory with superpositions of trajectories

German Physical Society (DPG) Spring Meeting

Mainz, Germany

CONTRIBUTED TALK

Mar. 2017

- Title: Quantum transport model of the FMO photosynthetic complex

Extracurricular Activity

Imperial College London

London, UK

STUDENT REPRESENTATIVE

Oct. 2015 – Sep. 2016 & Oct. 2017 – Jun. 2018

- Year representative in undergraduate years 2 & 4 and course representative for *MSci Physics with a Year in Europe* in year 4
- Worked to increase mental health awareness and support in the Physics Department

Album Release

Cambridge, UK

COMPOSER, VIOLINIST

Oct. 2012 - Aug. 2013

- Co-composed, recorded, managed and released an original album, *The Deacon of Myrká*, on *Bandcamp*
- Nominated as among the top 10 online Icelandic album releases in 2013 by the leading Icelandic newspaper *Morgunblaðið*

National Youth Orchestra of Iceland

Reykjavík, Iceland

CONCERTMASTER

Jun. 2011 – Nov. 2011

- Appointed leader of the National Youth Orchestra of Iceland in the 2011–12 academic year