

Jonte R Hance

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Google Scholar: [Jonte R Hance](https://scholar.google.com/citations?user=jonte)

EDUCATION

PhD Electrical and Electronic Engineering Oct 2019–Mar 2023

University of Bristol, Bristol, UK

Thesis: *The interplay between quantum foundations and quantum technologies*

UK Quantum Communications Hub/ University of York DTP Scholarship & Stipend

MSci (Hons) Physics and Philosophy Oct 2014–Jun 2019

University of Bristol, Bristol, UK

Classification: First Class Honours

A-Levels — A* A B 2012–2014

John Hampden Grammar School, High Wycombe, UK

Maths, Physics, RS: Philosophy & Ethics

AS-Levels — A B 2012–2013

John Hampden Grammar School, High Wycombe, UK

Further Maths, Politics

GCSEs — 8 A*s, 4As 2010–2012

John Hampden Grammar School, High Wycombe, UK

EXPERIENCE

Teaching Assistant ([Graduate Teacher Level 1 and 2](#)) Sep 2020–May 2022

University of Bristol, Bristol, UK

- **Quantum Mechanics I (part of [PHYS20028](#))**: Teaching assistant (2021–22)
- **Quantum Mechanics II (part of [PHYS20029](#))**: Teaching assistant (2021–22)
- **[EENG25000](#): Lines and Waves**: Teaching assistant (2021–22)
- **[EMAT10100](#): Engineering Mathematics 1**: Senior drop-ins tutor (2020–22)
- **[EMAT20200](#): Engineering Mathematics 2**: Senior drop-ins tutor (2020–22)
- **[PHYS11400](#): Essential Maths for Physics**: Seminar tutor (2020–21)
- **[PHYS10006](#): Core Physics I: Mechanics and Matter**: Workshop marker (2020–21)
- **[PHYS10005](#): Core Physics II: Oscillations, Waves and Fields**: Workshop marker (2020–21)

Postgraduate Researcher Oct 2019–Present

Quantum Engineering Technology Laboratories, University of Bristol, Bristol, UK

Researching theoretical quantum communication at the University of Bristol's Quantum Engineering Technology Laboratories, on a full PhD scholarship and stipend funded by the UK's Quantum Communications Hub/the University of York's Doctoral Training Partnership (DTP). Currently focusing on quantum counterfactual communication, as well as quantum foundations, and the philosophy of quantum physics. Supervised by Prof John Rarity and Prof James Ladyman. More information available [here](#).

Research and Development Consultant

Sep 2018–Dec 2020

dotQuantum, Bristol, UK

Developing resources for quantum communication, focused on quantum key distribution, single-photon sources, and quantum networks.

Research Intern

Jun–Sep 2018

Quantum Engineering Technology Laboratories, University of Bristol, Bristol, UK

Investigated counterfactual communication, both experimentally, testing weak value measurements in bulk optics, then theoretically. Offered a fully-funded PhD scholarship to pursue further.

PUBLICATIONS

Supermeasured: Violating Bell-Statistical Independence without violating physical statistical independence Jul 2022

Found. Phys. **52**(4), 81 (2022). *First & corresponding author.*

The wave function as a true ensemble Jun 2022

Proc. R. Soc. A **478**(2262), 20210705 (2022). *First & corresponding author.*

The laws of physics do not prohibit counterfactual communication May 2022

npj Quantum Inf. **8**(1), 60 (2022).

Could wavefunctions simultaneously represent knowledge and reality? Apr 2022

Quantum Stud.: Math. Found. **9**(3), 333-341 (2022). *First & corresponding author.*

Comment on “Scheme of the arrangement for attack on the protocol BB84” Oct 2021

Optik **243** 167451 (2021). *First & corresponding author.*

Counterfactual Ghost Imaging Jun 2021

npj Quantum Inf. **7**(1), 88 (2021). *First & corresponding author.*

Backscatter and spontaneous four-wave mixing in micro-ring resonators Apr 2021

J. Phys. Photonics **3**(2), 025003 (2021). *First & corresponding author.*

How Quantum is Quantum Counterfactual Communication? Feb 2021

Found. Phys. **51**(1), 12 (2021). *First & corresponding author.*

Exchange-free computation on an unknown qubit at a distance Jan 2021

New J. Phys. **23**(1), 013004 (2021).PREPRINTS

Interaction-Free Polarimetry Jul 2022

arXiv Preprint–2207.13539. *First & corresponding author.*

What does it take to solve the measurement problem? Jun 2022

arXiv Preprint–2206.10445. *First & corresponding author.*

Comment on “Experimentally adjudicating between different causal accounts of Bell-inequality violations via statistical model selection” Jun 2022

arXiv Preprint–2206.10619. *First & corresponding author.*

Is the dynamical quantum Cheshire cat detectable? Apr 2022

arXiv Preprint–2204.03374. *First & corresponding author.*

Comment on “Why interference phenomena do not capture the essence of quantum theory” by Catani et al <i>arXiv Preprint–2204.01768 . First & corresponding author.</i>	Apr 2022
Reply to arXiv:2111.13357 (“The Quantum Eraser Non-Paradox”) <i>arXiv Preprint–2112.00436. Corresponding author.</i>	Dec 2021
The quantum eraser paradox <i>arXiv Preprint–2111.09347. Corresponding author.</i>	Nov 2021
Do weak values show the past of a quantum particle? <i>arXiv Preprint–2109.14060. First & corresponding author.</i>	Sep 2021
Properties of Invariant Set Theory <i>arXiv Preprint–2108.08144. First author.</i>	Aug 2021
Experimental Tests of Invariant Set Theory <i>arXiv Preprint–2102.0779. First & corresponding author.</i>	Feb 2021
Deterministic Teleportation and Universal Computation Without Particle Exchange <i>arXiv Preprint–2009.05564</i>	Sep 2020
Counterfactuality, Definiteness and Bell’s Theorem <i>arXiv Preprint–1909.06608. First & corresponding author.</i>	Sep 2019

PATENTS

Improved Cryptographic Method and System gb 1821135.9
Created while working for dotQuantum. Filed 21 December 2018. Patent pending.

TALKS

Interaction-Free Polarimetry

- Optica Advanced Photonics Congress (APC) 2022 (NpW2G.5)
- Optica Optical Sensors and Sensing Congress (OSSC) 2022 (STu4G.4)

Supermeasured: Violating Bell-Statistical Independence without violating physical statistical independence

- Trieste School on Quantum Foundations (Dedicated to GianCarlo Ghirardi) 2022 (Invited)
- Åskloster Seminar 2022 (Invited)
- Bonn Superdeterminism and Retrocausality Workshop 2022 (Invited)

Does weak values show the past of a quantum particle?

- Photon 2022 (Session 10D, Speaker 4)
- Bristol Quantum Information and Technology Workshop 2022 (BQIT:22) (Upgraded Poster Talk)
- Deutschen Physikalischen Gessellschaft Conference Heidelberg 2022 (AGPhil 9.4)
- International Conference on Quantum Information and Foundations (ICQIF) 2022 (SN29)

Backscatter and spontaneous four-wave mixing in micro-ring resonators

- IOP Silicon Quantum Information Processing Workshop 2021 (2-minute pitch presentation)

Counterfactual Ghost Imaging

- Frontiers in Optics + Laser Science (FiO+LS) 2021 ([FM5C.2](#))
- OSA Optical Sensors and Sensing Congress (OSSC) 2021 ([SW5F.5](#))
- CLEO/Europe-EQEC 2021 ([EB-7.3](#))
- University of Bristol SCEEM PGR Conference 2021

Counterfactuality: From Foundational Issues to Practical Applications

- IPAQS Heriot-Watt Weekly Theory Talk 13/1/2022 (Invited)
- QETLabs/Photonics Bristol Weekly Talk 1/4/2021 (Invited)

How quantum is quantum counterfactual communication?

- OSA IONS Exeter Conference 2019

POSTERS

Interaction-Free Polarimetry

- CLEO Pacific Rim 2022 (P-CTh6-13)
- Quantum 2.0 Conference and Exhibition 2022 ([QW2A.18](#))

Do weak values show the past of a quantum particle?

- Quantum Computing Theory in Practice (QCTiP) 2022
- Quantum Information Processing (QIP) 2022

Counterfactual Ghost Imaging

- Conference on Lasers and Electro-Optics (CLEO) 2021 ([JTU3A.14](#))
- Bristol Quantum Information and Technology Workshop 2021 (BQIT:21)

Wavefunctions can Simultaneously Represent Knowledge and Reality

- Vienna Quantum Foundations 2021
- IOP QUAMP 2021

How quantum is quantum counterfactual communication?

- Bristol Quantum Information and Technology Workshop 2020 (BQIT:20)

Modal, Truly Counterfactual Communication with On-Chip Demonstration Proposal

- QMATH Masterclass on Continuous Variable Quantum Communication and Computation 2019
- OSA Quantum Information and Measurement (QIM) V 2019
- Bristol Quantum Information and Technology Workshop 2019 (BQIT:19)
- OSA IONS KOALA 2018

SERVICE

- **Bonn Superdeterminism and Retrocausality Workshop 2022:** [Session Chair \(Invited\)](#)
- **Bristol Quantum Information and Technology Workshop 2022 (BQIT:22):** Programme Committee Lead; Board Member, Session Chair
- **Peer Reviewer:** *Physica Scripta* (2); *British Journal for the Philosophy of Science* (1); *Scientific Reports* (2)

AWARDS

- **University of Bristol SCEEM PGR Conference 2021:** 3rd Best Presentation Prize
- **IONS KOALA Conference 2018:** Best Poster Presentation Prize; Travel Grant
- **John Hampden Grammar School Full Colours (Honours):** Awarded 2014 for representing the school in debating and public speaking.
- **John Hampden Grammar School Half Colours (Honours):** Awarded 2013 for representing the school in debating and public speaking.
- **Bar National Mock Trial Competition 2012/13:** Regional Heat Winner, National Final Participant (role: defence barrister)
- **John Hampden Grammar School Junior Colours (Honours):** Awarded 2012 for representing the school in debating and public speaking.
- **National Public Speaking Competition for Schools 2011–12:** Runner Up (First Round—3rd Heat); Best Chairperson (Branch Final)
- **Duke of Edinburgh’s Award:** Bronze (2011)
- **Rotary International Youth Speaks Competition 2011:** District 1090 Heat Senior Section Winner

COURSES

- [IOP Trusted Reviewer](#)
- OSA Reviewer Certification Course
- [PGCert Academic Practice Unit AFACM0019: Engaging Higher Education Students in their Learning \(University of Bristol, 30 credits\)](#)
- [First Aid at Work QA Level 3 Award \(Acorn Health and Safety FAO2\)](#)
- Bristol Futures Open Course in Innovation and Enterprise
- [2019 Masterclass on Continuous Variables for Quantum Communication and Computation \(QMATH, University of Copenhagen/European Quantum Technology Flagship\)](#)
- [Phot1x: Silicon Photonics Design, Fabrication and Data Analysis \(edX\)](#)
- [009x: Stochastic Processes: Data Analysis and Computer Simulation \(edX\)](#)

MEMBERSHIPS

- **Institute of Physics:** Member (MInstP)
- **Advance HE:** Associate Fellow (AFHEA)
- **Samy Maroun Center for Space, Time and the Quantum:** Member
- **Philosophy of Physics Society:** Member
- **British Society for the Philosophy of Science:** Member
- **Optica (formerly OSA):** Member

SKILLS

- **Programming:** Wolfram Mathematica, L^AT_EX, Python, MatLab
- **Languages:** English (Fluent), French (Basic), Italian (Basic), Japanese (Basic)
- **Other:** MS Office, Lumerical, KLayout, Inkscape

EXTRA-CURRICULAR

- **University Fire Warden, First Aider:** 2020–Now, University of Bristol
- **Freeman:** 2018–Now, City of London Corporation
- **Sound Designer/Engineer:** 2018–20, University of Bristol Stage Technicians' Association
- **Freeman:** 2018–Now, Worshipful Company of Clockmakers
- **Company Director:** 2017–22, Kings Court (Bristol) Management Co. Ltd
- **Society Treasurer:** 2017–19; 2021–22, University of Bristol Pantomime Society
- **Society President:** 2017–18, Paradox (University of Bristol Physics and Philosophy Society)
- **Deputy Head Boy:** 2013–14, John Hampden Grammar School
- **Beaver Scout Leader:** 2010–14, 1st Bourne End Scout Group