Alastair A. Abbott

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Employment

Dec. 2020 – present:	**Research scientist (chargé de recherche)**, QINFO team, Inria centre at the University Grenoble Alpes, Grenoble, France
Sept. 2018 – Nov. 2020:	**Postdoctoral researcher** at the **University of Geneva**, Switzerland, in the group of Nicolas Brunner
Nov. 2015 – June 2018:	**Postdoctoral researcher** at the **Institut Néel (CNRS)**, Grenoble, France, in the group of Cyril Branciard

Education

2011 – 2015: **PhD in Computer Science and Physics**
Joint PhD: Department of Computer Science, University of Auckland, New Zealand; and Centre Cavaillès, École Normale Supérieure, Paris, France
Thesis: *Value Indefiniteness, Randomness and Unpredictability in Quantum Foundations*
Supervisors: Prof. Cristian S. Calude (UoA) and Prof. Giuseppe Longo (ÉNS)

2010: **MSc in Computer Science with First Class Honours**
University of Auckland, New Zealand
Thesis: *Quantum Random Numbers: Certification and Generation*
Supervisor: Prof. Cristian S. Calude

2009: **BSc(Hons) in Computer Science with First Class Honours**
University of Auckland, New Zealand
Dissertation: *De-quantisation in Quantum Computation*
Supervisor: Prof. Cristian S. Calude

2006 – 2008: **BSc in Computer Science and Physics**
University of Auckland, New Zealand

Current Research Interests

- **Quantum information**: quantum information processing with indefinite causal orders, certification of quantum resources, quantum cryptography, convex optimisation in quantum information theory
- **Quantum foundations**: quantum causal indefiniteness, entanglement, nonlocality, contextuality, quantum randomness
- **Quantum computing**: extended models of quantum computation (including coherent control), hybrid classical-quantum computation
- **Theoretical computer science**: algorithmic information theory and randomness
- **Philosophy of quantum mechanics**: quantum randomness, quantum causality

Prizes and Awards

- Department of Computer Science Poster Competition, 2nd place, 2011.
- Demonstrating Prize in Physics, 2009, for best physics lab tutor.
- Montgomery Memorial Prize in Logic, 2009, for the best Honours-year dissertation.
- New Zealand Computer Society Cup and Shield, 2009, for the top overall student in Computer Science.
- J. C. Butcher Prize in Theoretical Computer Science, 2008.
- Senior Prize in Computer Science, 2008.

Grants

- Scientific Coordinator for Inria Grenoble of ANR AAPG2022 PRC project TaQC (Taming Quantum Causality), 2023–2026; project coordinator: C. Branciard; 470k€.
- Scientific leader for Inria for EU Horizon Europe project QSNP (Quantum Secure Networks Partnership), 2022–2026; project coordinator: V. Pruneri (ICFO); 25M€.
- Coordinator of IRGA 2021 (Initiatives de Recherche à Grenoble Alpes) project CIQuP (Causally Indefinite Quantum Protocols: From Complexity to Applications), 2021–2022; 19k€.
- Collaborator in the EU Marie Curie Actions IRSES (International Research Staff Exchange Scheme) project RANPHYS (Randomness and Irreversibility in Physics), 2011–2015; project coordinator: K. Svozil (TUWien); $129k NZD.
- University of Auckland Doctoral Scholarship, 2011–2015.
- University of Auckland Masters Scholarship, 2010.
- Faculty of Science Summer Research Scholarship (×3), 2007, 2008, & 2009.
- Bonded Merit Scholarship, 2007–2009 (New Zealand Government Scholarship).

Expertise

Languages

Fluent in English and French, intermediate Russian.

Publications and Presentations

Papers in Refereed Journals

35. H. Dourdent, **A. A. Abbott**, I. Šupić and C. Branciard, *Network-Device-Independent Certification of Causal Nonseparability*, Quantum **8**, 1514 (2024).
34. **A. A. Abbott**, M. Mhalla and P. Pocreau, *Quantum query complexity of Boolean functions under indefinite causal order*, Physical Review Research **6**, L032020 (2024).
33. **A. A. Abbott**, M. Mhalla and P. Pocreau, *Improving social welfare in non-cooperative games with different types of quantum resources*, Quantum **8**, 1376 (2024). [Perspective on our paper by G. Scarpa: Quantum Views **8**, 82 (2024).]
32. R. Mothe, C. Branciard and **A. A. Abbott**, *Reassessing the advantage of indefinite causal orders for quantum metrology*, Physical Review A **109**, 062435 (2024),
31. A. Piveteau, **A. A. Abbott**, S. Muhammad, M. Bourennane and A. Tavakoli, *Weak entanglement improves quantum communication using only product measurements*, Physical Review Applied **21**, 034053 (2024).
30. M. Fellous-Asiani, R. Mothe, L. Bresque, H. Dourdent, P. A. Camati, **A. A. Abbott**, A. Auffèves and C. Branciard, *Comparing the quantum switch and its simulations with energetically constrained operations*, Physical Review Research **5**, 023111 (2023).
29. H. Dourdent, **A. A. Abbott**, N. Brunner, I. Šupić and C. Branciard, *Semi-Device-Independent Certification of Causal Nonseparability with Trusted Quantum Inputs*, Physical Review Letters **129**, 090402 (2022).
28. M. Ioannou, P. Sekatski, **A. A. Abbott**, D. Rosset, J.-D. Bancal and N. Brunner, *Receiver-device-independent quantum key distribution protocols*, New Journal of Physics **24**, 063006 (2022).
27. M. Ioannou, M. A. Pereira, D. Rusca, F. Grünenfelder, A. Boaron, M. Perrenoud, **A. A. Abbott**, P. Sekatski, J.-D. Bancal, N. Maring, H. Zbinden and N. Brunner, *Receiver-Device-Independent Quantum Key Distribution*, Quantum **6**, 718 (2022).
26. J. Wechs, H. Dourdent, **A. A. Abbott** and C. Branciard, *Quantum circuits with classical versus quantum control of causal order*, PRX Quantum **2**, 030335 (2021).
25. A. Tavakoli, E. Zambrini Cruzeiro, R. Uola and **A. A. Abbott**, *Bounding and simulating contextual correlations in quantum theory*, PRX Quantum **2**, 020334 (2021).
24. M. M. Taddei, J. Cariñe, D. Martínez, T. García, N. Guerrero, **A. A. Abbott**, M. Araújo, C. Branciard, E. S. Gómez, S. P. Walborn, L. Aolita and G. Lima, *Computational Advantage from the Quantum Superposition of Multiple Temporal Orders of Photonic Gates*, PRX Quantum **2**, 010320 (2021).

23. G. Rubino, L. A. Rozema, D. Ebler, H. Kristjánsson, S. Salek, P. A. Guérin, **A. A. Abbott**, C. Branciard, Č. Brukner, G. Chiribella and P. Walther, *Experimental quantum communication enhancement by superposing trajectories*, Physical Review Research **3**, 013093 (2021).
22. **A. A. Abbott**, J. Wechs, D. Horsman, M. Mhalla and C. Branciard, *Communication through coherent control of quantum channels*, Quantum **4**, 333 (2020).
21. R. Uola, T. Kraft and **A. A. Abbott**, *Quantification of quantum dynamics with input-output games*, Physical Review A **101**, 052306 (2020).
20. **A. A. Abbott**, R. Silva, J. Wechs, N. Brunner and C. Branciard, *Anomalous weak values without post-selection*, Quantum **3**, 194 (2019). [Perspective on our paper by E. Cohen: Quantum Views **3**, 27 (2019).]
19. **A. A. Abbott**, C. S. Calude, M. J. Dinneen and R. Hua, *A hybrid quantum-classical paradigm to mitigate embedding costs in quantum annealing*, International Journal of Quantum Information **17**, 1950042 (2019).
18. B. Demirel, S. Sponar, **A. A. Abbott**, C. Branciard and Y. Hasegawa, *Experimental test of an entropic measurement uncertainty relation for arbitrary qubit observables*, New Journal of Physics **21**, 013038 (2019).
17. J. Wechs, **A. A. Abbott** and C. Branciard, *On the definition and characterisation of multipartite causal (non)separability*, New Journal of Physics **21**, 013027 (2019).
16. **A. A. Abbott**, C. S. Calude, M. J. Dinneen and N. Huang, *Experimentally probing the incomputability of quantum randomness*, Physica Scripta **94**, 045103 (2019).
15. A. Tavakoli, **A. A. Abbott**, M.-O. Renou, N. Gisin and N. Brunner, *Semi-device-independent characterization of multipartite entanglement of states and measurements*, Physical Review A **98**, 052333 (2018).
14. **A. A. Abbott**, J. Wechs, F. Costa and C. Branciard, *Genuinely multipartite noncausality*, Quantum **1**, 39 (2017).
13. N. Miklin, **A. A. Abbott**, C. Branciard, R. Chaves and C. Budroni, *The entropic approach to causal correlations*, New Journal of Physics **19**, 113041 (2017).
12. **A. A. Abbott** and C. Branciard, *Noise and disturbance of qubit measurements: An information-theoretic characterization*, Physical Review A **94**, 062110 (2016).
11. **A. A. Abbott**, C. Giarmatzi, F. Costa and C. Branciard, *Multipartite causal correlations: Polytopes and inequalities*, Physical Review A **94**, 032131 (2016).
10. **A. A. Abbott**, P.-L. Alzieu, M. J. W. Hall and C. Branciard, *Tight state-independent uncertainty relations for qubits*, Mathematics **4**, 8 (2016).
9. **A. A. Abbott**, C. S. Calude and K. Svozil, *A non-probabilistic model of relativised predictability in physics*, Information **6**, 773 (2015).
8. **A. A. Abbott**, C. S. Calude and K. Svozil, *A variant of the Kochen-Specker theorem localising value indefiniteness*, Journal of Mathematical Physics **56**, 102201 (2015).
7. **A. A. Abbott**, C. S. Calude and K. Svozil, *Value-indefiniteness observables are almost everywhere*, Physical Review A **89**, 032109 (2014).
6. **A. A. Abbott**, C. S. Calude and K. Svozil, *A quantum random number generator certified by value indefiniteness*, Mathematical Structures in Computer Science **24**, e240303 (2014).
5. **A. A. Abbott**, C. S. Calude, J. Conder and K. Svozil, *Strong Kochen-Specker theorem and incomputability of quantum randomness*, Physical Review A **86**, 062109 (2012).
4. **A. A. Abbott**, M. Bechmann, C. S. Calude and A. Sebald, *A nuclear magnetic resonance implementation of a classical Deutsch-Jozsa algorithm*, International Journal of Unconventional Computing **8**, 161 (2012).
3. **A. A. Abbott** and C. S. Calude, *Von Neumann normalisation of a quantum random number generator*, Computability **1**, 59 (2012).
2. **A. A. Abbott**, *De-quantisation of the quantum Fourier transform*, Applied Mathematics and Computation **219**, 3 (2012).
1. **A. A. Abbott**, *The Deutsch-Jozsa problem: De-quantisation and entanglement*, Natural Computing **11**, 3 (2012).

Papers in Refereed Conference Proceedings

5. **A. A. Abbott**, M. Mhalla and P. Pocreau, *Classical and quantum query complexity of Boolean functions under indefinite causal order*, Proceedings of the 22nd International Conference on Quantum Physics and Logic (Varna, Bulgaria, July 14–18 2025); EPTCS, *to appear* (2025).
4. **A. A. Abbott**, C. S. Calude, M. J. Dinneen and R. Hua, *A hybrid quantum-classical paradigm to mitigate embedding costs in quantum annealing – Abridged Version*, In M. Cuffaro and P. Papayannopoulos (eds), Proceedings of the 9th International Workshop on Physics and Computation (Fontainebleau, France, June 26 2018); ETPCS **273**, 1 (2018).
3. **A. A. Abbott** and I. Watson, *Ontology-aided product classification: A nearest neighbour approach*, In A.

Ram and N. Wiratunga (eds), Proceedings of the 19th International Conference on Case-Based Reasoning (London, UK, September 12–15 2011); LNAI **6880**, 348 (2011).

2. **A. A. Abbott** and C. S. Calude, *Von Neumann normalisation and symptoms of randomness: An application to sequences of quantum random bits*, In C. S. Calude, J. Kari and I. Petre (eds), Proceedings of the 10th International Conference on Unconventional Computation (Turku, Finland, June 6–10 2011); LNCS **6714**, 40 (2011).
1. **A. A. Abbott** and C. S. Calude, *Understanding the quantum computational speed-up via de-quantisation*, In S. B. Cooper, E. Kashefi, P. Panangaden (eds), Proceedings of the 6th Workshop on Developments in Computational Models: Causality, Computation, and Physics (Edinburgh, UK, July 9–10 2010); EPTCS **26**, 1 (2010).

Book Chapters

2. **A. A. Abbott**, C. S. Calude and K. Svozil, *On the unpredictability of individual quantum measurement outcomes*, In L. D. Beklemishev *et al.* (eds), Fields of Logic and Computation II: Essays Dedicated to Yuri Gurevich on the Occasion of His 75th Birthday; LNCS **9300**, 69 (Springer, Cham, 2015).
1. **A. A. Abbott**, C. S. Calude and K. Svozil, *A quantum random oracle*, In S. B. Cooper and J. van Leeuwen (eds), *Alan Turing: His Work and Impact*, pp. 206–210, (Elsevier Science, 2013).

Preprints and Research Reports

2. **A. A. Abbott**, L. Bienvenu and G. Senno, *Non-uniformity in the Quantis random number generator*, *CDMTCS Research Report 472* (2014).
1. **A. A. Abbott** and M. J. Dinneen, *An investigation of algorithms to aesthetically draw Cayley graphs*, *CDMTCS Research Report 318* (2008).

Edited Proceedings

1. **A. A. Abbott** and D. C. Horsman, *Proceedings of the 7th International Workshop on Physics and Computation, Manchester, U.K., 14 July 2016*, Electronic Proceedings of Computer Science (EPTCS) 214 (2016).

Journal Guest Editor

1. C. Câmpeanu, L. Staiger, **A. A. Abbott** and M. Ziman, *Frontiers of Computability, Randomness, and Complexity (dedicated to the 70th birthday of Professor Cristian Calude)*, Theoretical Computer Science C (2023).

Vulgarisation and Communication

9. Quantum Dates: Quantique, Cybersecurité et Data. Invited introductory talk: *Quantum Key Distribution: From principles to security.* November 2024.
8. Explorations Quantiques 2050, les récits. Technological analysis of scenarios and their basis in the scientific literature. March 2024.
7. Interview for the podcast series *Decode quantum*, organised and animated by Olivier Ezratty and Fanny Bouton (27 October 2022).
6. Annual conference of the Informatics Society of France (SIF), Grenoble 6–7 April 2023. *L'informatique quantique : une révolution pour l'informatique du futur ?*.
5. IM2AG Round Table on Quantum Information (UGA), Grenoble, 19 May 2022. *Recherche et formation à Grenoble.*
4. Vers une révolution quantique (ADIRA Event), Grenoble, 5 May 2022. *QuantAlps – Faire de Grenoble l'épicentre du quantique en région AURA.*
3. Lecture in celebration of 20 years of the "Informatique" programme at Polytech Grenoble, 30 September 2022. *L'informatique quantique : une révolution pour l'informatique ?*
2. Invited blog post (with Prof. Cristian S. Calude) on the website Quantum for Quants about the prospects of near-term quantum computing and hybrid approaches: *The limits of quantum computing* (19 June 2016).
1. Article for a broad audience in the *Asia Pacific Mathematics Newsletter*: **A. A. Abbott**, C. S. Calude and K. Svozil. *On Demons and Oracles*, Asia Pacific Mathematics Newsletter **2**(1), 25 (2012).

Invited Conference Presentations

6. Improving social welfare in non-cooperative games with different types of quantum resources. *Japanese-French Quantum Information Workshop (JFQI)*, Tokyo, Japan, December 2023.
5. The Causal Structure of Quantum Information. *Spring School in Theoretical Computer Science (EPIT)*, CIRM, Marseille, France, May 2021.
4. Coherent Control of Quantum Channels. *The Quantum Information Structure of Spacetime*, Hong Kong, January 2020.
3. Causal Nonseparability in Multipartite Scenarios. *Quantum Maiwar*, Brisbane, Australia, November 2018.
2. Localising Value Indefiniteness with the (Strong) Kochen-Specker Theorem. *Solstice of Foundations: Contextuality Workshop*, Zürich, Switzerland, June 2017.
1. From Preparation to Measurement Through the Eyes of Entropic Uncertainty Relations. *2nd International Conference on Quantum Foundations*, Patna, India, October 2016.

Regular Conference Presentations

24. Self-testing quantum supermaps, with an application to the quantum switch. *Central European Quantum Information Processing Workshop (CEQIP)*, Smolenice, Slovakia, June–July 2025.
23. Self-testing quantum supermaps, with an application to the quantum switch. *Causalworlds*, Perimeter Institute, Waterloo, Canada, September 2024.
22. Self-testing quantum supermaps, with an application to the quantum switch (poster). *Seefeld Workshop on Quantum Information*, Seefeld in Tirol, Austria, June 2024.
21. Improving social welfare in non-cooperative games with different types of quantum resources. *Central European Quantum Information Processing Workshop (CEQIP)*, Smolenice, Slovakia, September 2023.
20. Quantum Query Complexity of Boolean Functions under Indefinite Causal Order. *Quantum Physics and Logic (QPL)*, Paris, France, July 2023.
19. Device-Independent Quantification of Quantum Resources (poster). *Quantum Communication, Measurement and Computing (QCMC)*, Lisbon, Portugal, July 2022.
18. Optimizing quantum social welfare in non-collaborative games (poster). *Quantum Physics and Logic (QPL)*, Oxford, England, June 2022.
17. Device-Independent Quantification of Quantum Resources (poster). *Vienna Quantum Foundations Conference (VQF-CON)*, Vienna (hybrid), Austria, September 2021.
16. Bounding and simulating contextual correlations in quantum theory. *Quantum Physics and Logic (QPL)*, Gdansk (virtual), Poland, June 2021.
15. Computational Advantage from Quantum Superposition of Multiple Temporal Orders of Gates. *GDR IQFA (Quantum Engineering, Fundamental Aspects to Applications)*, Grenoble (virtual), France, December 2020.
14. Communication through coherent control of quantum channels (poster). *GDR IQFA (Quantum Engineering, Fundamental Aspects to Applications)*, Paris, France, November 2019.
13. Communication through coherent control of quantum channels. *Asian Quantum Information Science Conference (AQIS)*, Seoul, South Korea, August 2019.
12. Indefinite causal relations in multipartite scenarios (poster). *GDR IQFA (Quantum Engineering, Fundamental Aspects to Applications)*, Nice, France, November 2017.
11. Genuinely multipartite noncausality. *Quantum Networks*, Oxford, England, August 2017.
10. Multipartite causal correlations, polytopes and inequalities. *Quantum Networks*, Natal, Brazil, November 2016.
9. Noise and disturbance of qubit measurements: An information-theoretic characterisation. *Quantum Physics and Logic (QPL)*, Glasgow, Scotland, June 2016.
8. A variant of the Kochen-Specker theorem locating value indefiniteness. *Quantum theory: From foundations to technology*, Växjö, Sweden, June 2015.
7. Quantum information inside and outside the quantum. *Weaving the understanding of information*, Vienna, June 2015.
6. Locating value indefiniteness with a variant of the Kochen-Specker theorem. *Randomness in Quantum Physics and Beyond*, Barcelona, Spain, May 2015.
5. Von Neumann normalisation and symptoms of randomness: An application to sequences of quantum random bits. *Unconventional Computation*, Turku, Finland, June 2011.
4. Ontology-aided product classification: A nearest neighbour approach. *New Zealand Computer Science Research Student Conference*, Palmerston North, New Zealand, April 2011.
3. De-quantisation of the quantum Fourier transform. *Workshop on Physics and Computation*, the Nile,

Luxor–Aswan, Egypt, September 2010.

2. De-quantisation in quantum computing: An overview and an application to the quantum Fourier transform. *New Zealand Computer Science Research Student Conference*, Wellington, New Zealand, April 2010.
1. The Deutsch-Jozsa problem: De-quantisation and entanglement, *Workshop on Physics and Computation*, Ponta Delgada, Portugal, September, 2009.

Invited Research Seminars

24. University of Tokyo (Japan), 6 March 2025. *Classical and quantum query complexity of Boolean functions under indefinite causal order.*
23. QuantAlps Quantum Computing Workshop, Grenoble, 15 November 2023. *Causally Indefinite Quantum Computation.*
22. Journée Scientifique du pôle PEM (UGA), Grenoble, 19 October 2023. *Taming Quantum Causality.*
21. Inria challenge "EQIP" yearly meeting, Strasbourg, 30 November 2022. *Improving social welfare in non-cooperative games with different types of quantum resources.*
20. Laboratoire Kastler Brossel (LKB), "Ateliers du LKB" seminar series, Paris (France), 13 October, 2022. *Causal indefiniteness from quantum control of processes.*
19. Laboratoire d'Informatique de Grenoble (LIG) Research Days, Autrans (France), 22 June 2022. *Quantum control structures in quantum information processing.*
18. QuantAlps kickoff meeting, Grenoble, 25 March 2022. *Certifying Quantum Resources with Minimal Assumptions.*
17. Inria challenge "EQIP" kickoff meeting, Paris, 19 November 2021. *Certification of Dynamical Quantum Resources.*
16. Swiss QSIT (Quantum Science and Technology) General Meeting, Arosa (Switzerland), 5 February 2020. *Quantum Information Processing with Indefinite Causal Orders.*
15. Laboratoire d'Informatique de Grenoble (LIG), 30 January 2020. *Communication through coherently controlled quantum channels.*
14. University of Tokyo (Japan), 26 August 2019. *Quantum circuits with classical and quantum control of causal orders.*
13. Quantum Information Theory Seminar, ETH Zürich, Zürich (Switzerland), 28 May 2019. *Quantum circuits with classical and quantum control of causal orders.*
12. Faculty of Informatics, Università della Svizzera italiana, Lugano (Switzerland), 15 May 2019. *Quantum circuits with classical and quantum control of causal orders.*
11. Institute for Quantum Optics and Quantum Information, University of Vienna (Austria), 9 April 2019. *Quantum circuits with classical and quantum control of causal orders.*
10. Laboratoire de Physique et Modélisation des Milieux Condensés (France), 16 January 2019. *Quantum information beyond the circuit model.*
9. Invited talk in the seminar series "Fondements et implications sociétales de la mécanique quantique", Institut Néel (France), 29 March 2017. *Randomness, indeterminism and unpredictability in quantum mechanics.*
8. Invited talk in the seminar series "Logique, Informatique, Mathématiques, Raisonnement", Université Lyon 3 (France), 15 March 2017. *Randomness and unpredictability at the heart of quantum mechanics.*
7. Invited talk in the seminar series "Séminaires de philosophie et Mathématiques: Temps et Hasard", École Normale Supérieure de Paris (France), 6 February 2017. *Randomness and unpredictability at the heart of the foundations of quantum mechanics.*
6. Talk in seminar the series "Journal Club Foundations", Institut Néel (France), 8 October 2015. *An introduction to quantum contextuality.*
5. Technical University of Vienna (Austria), 30 May 2015. *A variant of the Kochen-Specker theorem locating value indefiniteness.*
4. École Normale Supérieure (France), 28 November 2014. *Randomness and unpredictability: Their meaning in quantum mechanics.*
3. Technical University of Vienna (Austria), 11 September 2013. *From value indefiniteness to quantum randomness.*
2. University of Bologna (Italy), 11 June 2013. *Strong incomputability of quantum randomness.*
1. Université de Paris 7 Diderot (France), 28 November 2012. *Quantum randomness: In search of an algorithmic description.*

Other Research Experience

- 2009–2010: *UNSPSC Product Classifier with Case Based Reasoning.* Working on a paid research grant to develop a system to classify consumer products into a class-hierarchy ontology using a Case Based Reasoner with conversational elements.
- 2008–2009: *Diode Laser Modulation to excite Raman transitions between hyperfine-states in Rubidium atoms.* Experimental work with Dr. M. D. Hoogerland in the UoA Quantum Information Laboratory on quantum gates implemented with super-cooled Rubidium atoms.

Teaching and Thesis Supervision

- PhD supervision:
  - Raphaël Le Bihan, *"Compositionality and Applications of Quantum Supermaps"*; UGA 2024–.
  - Maarten Grothus, *"Exploiting causal indefiniteness in quantum computational models"*, co-supervised with Cyril Branciard; UGA 2023–.
  - Pierre Pocreau, *"Implications of causal indefiniteness for quantum communication"*, co-supervised with Mehdi Mhalla; UGA 2022–.
  - Raphaël Mothe, *"Causal indefiniteness and dynamicality in quantum mechanics"*, co-supervised with Cyril Branciard; UGA 2021–2024, defended 18/10/2024.
- Master's student supervision:
  - Matthieu Bruant, *"Genuinely multipartite noncausality and causal nonseparability"*; École Polytechnique 3rd year internship, 2025.
  - Raphaël Le Bihan, *"Compositionality of causally indefinite quantum supermaps"*; ENS Paris Saclay pre-thesis internship, 2024.
  - Pierre Pocreau, *"Query complexity for higher order quantum computation"*; Ensimag M2 Internship, 2022.
  - Elliot Renel, *"Computational advantages with causally indefinite quantum circuits"*; MoSIG M1 Internship, 2022.
  - Raphaël Mothe; ENS Lyon pre-thesis internship, 2021.
  - Pierre Pocreau, *"Improving quantum social welfare by relaxing pseudo-telepathic constraints in non-collaborative games"*; Ensimag M1 Lab project, 2021.
  - Océane Koska, *"Simulation of the superposition of multiple temporal gates orders in quantum circuits"*; Ensimag M1 Lab project, 2021.
  - Eleftherios Tselentis, *"Anomalous Weak Values and Indefinite Causal Order"* (thesis defended October 2019; external Master's thesis from ETH, Zürich).

- Lecturer (preparing and giving lectures, writing and marking exams) for the following courses (stars indicate organisation of course):

University of Grenoble Alpes:

2021, 2022–2025*:	Fundamental Computer Science	(graduate, 4th year)

University of Auckland:

2012, 2013:	Principles of Programming	(undergraduate, 1st year)

- General interest lectures to students:

Grenoble INP:

2023:	Introduction aux calcul et algorithmes quantiques	(Ensimag)
2024:	Introduction aux calcul et algorithmes quantiques	(Grenoble INP, Kaleidoscope 2)

- Teaching assistant (tutorials, marking assignments and exams) for the following courses:

University of Geneva:

2020:	Quantum Information	(graduate, 4th year)
2018–2020:	Mathematical Methods for Physicists	(undergraduate, 1st year)

University of Auckland:

2012, 2013:	Mathematical Foundations of Computer Science	(undergraduate, 3rd year)
2009–2012:	Advanced Physics Laboratory	(undergraduate, 2nd, 3rd year)
2011:	Algorithm Design and Analysis	(undergraduate, 3rd year)
2008–2010:	UNIX, Operating Systems and Data Communication	(undergraduate, 2nd year)
2008, 2009:	Principles of Programming	(undergraduate, 1st year)
2008:	Planets, Stars and Galaxies	(undergraduate, 1st year)
2008:	First Year Physics Laboratory	(undergraduate, 1st year)

Service and Administration

Organising Committees

- QuantAlpsDays 2025, Grenoble, France, October 2025.
- *Séminaire Dautreppe (doctoral training school) – Quantum Sciences & Technologies*, Grenoble, France, October 2025.
- *QuantAlps Days 2024*, Grenoble, France, September–October 2024.
- *QuantAlps Days 2023*, Grenoble, France, October 2023.
- *Workshop on Physics and Computation 2016*, Manchester, UK, July 2016.
- *Workshop on Physics and Computation 2015*, Auckland, New Zealand, August/September 2015.

Programme Committees

- *Quantum Physics and Logic (QPL) 2025*, Varna, Bulgaria, July 2025.
- *Causalworlds 2024*, Waterloo, Ontario, Canada, September 2024.
- *Conference for Young Quantum Information Scientists 2019*, Sopot, Poland 2019.
- *Workshop on Physics and Computation 2017*, Fayetteville AR, USA, June 2017.
- *Workshop on Physics and Computation 2016*, Manchester, UK, July 2016.
- *Workshop on Physics and Computation 2015*, Auckland, New Zealand, August/September 2015.
- *Workshop on Physics and Computation 2011*, Turku, Finland, June 2011.

Direction and Steering Committees

- Member of the direction of the Maison de Quantique Alpes (2025–)
- Governing board of TIQuA (2022–)
- Governing board of QuantAlps (2022–)
- Steering committee of QuantAlps (for research axis "Quantum Information and Software" and joint-lead of the "Quantum Communication" federative project; 2022–)

Evaluation Committees

- Selection committee for Inria CRCN and ISFP recrutement competitions, Inria Saclay Centre, 2025.
- Selection committee for Inria CRCN and ISFP recrutement competitions, Inria Saclay Centre, 2024.
- Selection committee for Assistant Professor (MCF) in Quantum Computing, CentraleSupélec, 2024.
- Selection committee for LANEF and La Fondation Nanosciences PhD scholarships, UGA, 2021.

PhD Defence Committees

- Don Jean-Baptiste Anoman, *"Contributions relatives à la génération quantique d'aléa"*, Université de Limoges, 2 December 2021.

PhD Individual Monitoring Committees (CSI)

- Julien Lamiroy, Université Paris Saclay, 2024–2027.
- Julien Bertrand, *"Generation of photon triplets"*, Université Grenoble Alpes, 2022–2025.

External evaluator for research funding

- DIM QuanTIP (Quantum Technologies in Paris Region), PhD and Postdoc Fellowships, 2023–2024.
- FNRS ANS Mandate PhD Research Fellowships, 2024.

Referee for Journals and Conferences

- Referee for the Communications: *Nature Communications*, *APS Journals (PRL, PRX, PRA)*, *New Journal of Physics*, *Quantum*, *npj Quantum Information*, *Proceedings of the Royal Society A*, *Scientific Reports*, *Journal of Mathematical Physics*, *Journal of Physics Communications*, *Quantum Information Processing*, *Optica*, *Photonics Research*, *Canadian Journal of Physics*, *Fundamenta Informaticae*, *Mathematical Structures in Computer Science*, *Natural Computing*, *Theoretical Computer Science*, *Classical and Quantum Gravity*, *Algorithms*.
- Referee for the conferences: *LICS*, *SIGGRAPH*, *BIID*, *QIP*, *QPL*, *TAMC*, *TQC*, *Causalworlds*, *AQIS*.
- IOP Trusted Reviewer.

Networking and General Service Presentations

2. Panorama des technologies quantiques (day organised by Minalogic), Grenoble, 4 October, 2022. *Les défis de l'informatique quantique dans un monde bruité*.
1. Presentation of CEA-List @Grenoble, Grenoble, 20 October 2021. *Les enjeux du quantique*.

Miscellaneous

- 2022: Member of the jury for the Quantum Hackathon by QuantX, 1–2 October 2022.
- 2022–: Organisation of the QuantAlps research seminars on Quantum Information and Computing.
- 2020–2021: Organisation of the regular series of lectures on Quantum Computing as part of the QuEnG (Quantum Engineering Grenoble) network.
- 2013–2015: Proofreading and editing for the New Zealand Mathematical Society Newsletter.