
Employment

- 2023-present **Postdoctoral fellow**, *University College London*
2019-2023 **Postdoctoral fellow**, *University of Ottawa*

Education

- 2015-2019 **PhD**, *University of Edinburgh*, Supervisors: Chris Heunen and Tom Leinster
2014-2015 **PhD studies**, *Aalto University*
2013-2014 **Master of Science in Mathematics and the Foundations of Computer Science**, *University of Oxford*
Graduated with distinction.
2010-2012 **Bachelor of Science**, *University of Helsinki*
Major: Mathematics. Minor: Economics.
2009-2012 **Bachelor of Arts**, *University of Helsinki*
Major: Theoretical Philosophy. Minor: Philosophy of Values and World Views.

Grants, scholarships and awards

- 2020-2025 **Research grant: Cryptography in a Quantum World**, *Air Force Office of Scientific Research*, Wrote the section concerning my joint project with the PI, representing approximately 25% of the application text, and 50% of the proposed research, Principal Investigator: Anne Broadbent
2016-2018 **Postgraduate scholarship**, *The Osk.Huttunen foundation*
2015 **Postgraduate scholarship**, *Vilho, Yrjö and Kalle Väisälä Foundation*
2013 **Outstanding mathematics student award**, *The Mathematics and Science Fund, University of Helsinki*
2012 **Outstanding philosophy student award**, *The Ilkka Niiniluoto Fund, University of Helsinki*

Teaching experience

- Winter 2021 **Introduction to Mathematical Logic**
University of Ottawa, Department of Mathematics and Statistics
Winter 2020 **Introduction to Linear Algebra**
University of Ottawa, Department of Mathematics and Statistics
Spring 2019 **Introduction to Theoretical Computer Science**, *Co-Teacher*
University of Edinburgh, School of Informatics.
Spring 2018 **Introduction to Theoretical Computer Science**, *Tutor*
University of Edinburgh, School of Informatics.
Spring 2017 **Algorithms, Data Structures and Learning**, *Tutor*
University of Edinburgh, School of Informatics.

- Spring 2016 **Algorithmic Game Theory and Applications**, *Tutor and marker*
University of Edinburgh, School of Informatics.
- Spring 2015 **Introduction to discrete mathematics**, *TA and marker*
Aalto University, Department of Mathematics and Systems analysis.
- Summer **Measure and Integral**, *TA*
2013 University of Helsinki, Department of Mathematics and Statistics.
- Springs **Logic: basic part and Logic: supplementary part I**, *TA*
2012-2013 University of Helsinki, Department of Philosophy.
- Falls **Introduction to logic**, *TA*
2010-2012 University of Helsinki, Department of Philosophy.

Supervision

- 10/2023- **Kostas Kvietinkas**, *MSc project*
University College London, Department of Computer Science
- Summer **Tanguy Massacrier**, *Research internship*
2021 University of Ottawa, Department of Mathematics and Statistics

Reviewer

- Books Springer, Oxford University Press
- Journals Journal of Mathematical Physics, Nature Communications, PRX Quantum, Physical Review Letters, Physical Review A, Quantum, Quantum Information Processing, Annals of Pure and Applied Logic, Journal of Pure and Applied Algebra, Journal of Algebra and Its Applications, Compositionality, Theory and Applications of Categories, Applied Categorical Structures, Journal of Logical and Algebraic Methods in Programming
- Conference Quantum Physics and Logic (QPL) 2023, 26th International Workshop on Algebraic
PC member Development Techniques (WADT 2022), Quantum Physics and Logic (QPL) 2022, Applied Category Theory 2021, Fourth Symposium on Compositional Structures (SYCO 4)
- Conference Logic in Computer Science, Quantum Information Processing, Quantum Physics
subreviewer and Logic, Eurocrypt, Foundations of Software Science and Computation Structures, Theory of Cryptography Conference

Talks

- Selected invited seminar and workshop talks
- 10/2023 **Atlantic Category Theory Seminar**
Dalhousie University
- 3/2023 **Seminar of Chalmers Security & Privacy Lab**
Chalmers University of Technology
- 2/2023 **Quantum Cryptography Seminar**
Université de Montréal
- 1/2023 **AMS Special Session on Applied Category Theory**, *Joint Mathematics Meeting*
Boston
- 9/2022 **Quantum Cryptography Seminar**
TU Berlin

- 8/2022 **Bilkent University mathgrad seminar**
Bilkent University
- 11/2021 **Quantum Seminar**
University of Geneva
- 10/2021 **Quantum Cryptography Seminar**
ETH Zürich
- 5/2021 **Category theory seminar**
Cambridge
- 8/2020 **TallCat seminar**
Tallinn
- 12/2019 **Logic and Structure in Computer Science and Beyond**
Leiden
- 7/2019 **Workshop on Contextuality as a resource in quantum computation**
Oxford
- 3/2019 **The Oxford Advanced Seminar on Informatic Structures**
Oxford
- 9/2018 **Category Theory Seminar**
Cambridge
- 3/2018 **Combining Viewpoints in Quantum Theory**
Edinburgh
- 11/2016 **Categories, Logic, and Physics, Scotland**
Glasgow
- 10/2016 **Copenhagen Programming Language Seminar**
Copenhagen
Selected contributed talks
- 7/2022 **17th Conference on the Theory of Quantum Computation, Communication and Cryptography (TQC 2022)**
University of Urbana-Champaign
- 4/2022 **25th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS 2022)**
Munich
- 8/2021 **International Category Theory Conference**
Genoa
- 7/2021 **International Conference on Applied Category Theory**
Cambridge
- 6/2021 **Structure meets Power Workshop**
LICS 2021 Satellite event
- 6/2021 **Canadian Mathematical Society summer meeting**
Ottawa
- 5/2021 **Workshop: Quantum Contextuality in Quantum Mechanics and Beyond**
Prague
- 7/2019 **Applied Category Theory Conference**
Oxford

- 7/2019 **International Category Theory Conference**
Edinburgh
- 5/2019 **Workshop: Quantum Contextuality in Quantum Mechanics and Beyond**
Prague
- 6/2018 **15th International Conference on Quantum Physics and Logic**
Halifax
- 4/2018 **103rd Peripatetic Seminar on Sheaves and Logic**
Brno
- 8/2016 **International Category Theory Conference**
Halifax
- 6/2015 **Mathematical Foundations of Programming Semantics XXXI**
Nijmegen

Publications

Note: All authors have contributed equally to the research in every publication, being listed in alphabetical order by last name. This is in line with common practice in mathematics and computer science—see e.g. the culture statement from the American Mathematical Society: <http://www.ams.org/profession/leaders/culture/CultureStatement04.pdf>

Journal Articles

- [1] A. Broadbent and M. Karvonen. Categorical composable cryptography: extended version. *Logical Methods in Computer Science*, 19:30:1–30:46, 4, 2023.
- [2] M. Karvonen. Neither Contextuality nor Nonlocality Admits Catalysts. *Physical Review Letters*, 127:160402, 16, 2021.
- [3] M. Karvonen. Biproducts without pointedness. *Cahiers de topologie et géométrie différentielle catégoriques*, 61(3):229–238, 2020.
- [4] C. Heunen and M. Karvonen. Limits in dagger categories. *Theory and Applications of Categories*, 34(18):468–513, 2019.
- [5] C. Heunen and M. Karvonen. Monads on dagger categories. *Theory and Applications of Categories*, 31(35):1016–1043, 2016.

Conference Proceedings

- [6] A. Broadbent and M. Karvonen. Categorical composable cryptography. In *Foundations of Software Science and Computation Structures (FoSSaCS)*, volume 13242 of *Lecture Notes in Computer Science*, pages 161–183. Springer, 2022.
- [7] S. Abramsky, R. S. Barbosa, M. Karvonen, and S. Mansfield. A comonadic view of simulation and quantum resources. In *2019 34th Annual ACM/IEEE Symposium on Logic in Computer Science (LICS)*, pages 1–12. IEEE, 2019.
- [8] C. Heunen, R. Kaarsgaard, and M. Karvonen. Reversible effects as inverse arrows. In *Mathematical Foundations of Programming Semantics (MFPS)*, volume 341 of *Electronic Notes in Theoretical Computer Science*, pages 179–199. Elsevier, 2018.
- [9] M. Karvonen. Categories of empirical models. In *Proceedings of QPL 2018*, volume 287 of *Electronic Proceedings in Theoretical Computer Science*, pages 239–252, 2018.
- [10] C. Heunen and M. Karvonen. Reversible monadic computing. In *Mathematical Foundations of Programming Semantics (MFPS)*, volume 319 of *Electronic Notes in Theoretical Computer Science*, pages 217–237, 2015.

Peer-Reviewed Book Chapters

- [11] R. S. Barbosa, M. Karvonen, and S. Mansfield. Closing Bell: Boxing Black Box Simulations in the Resource Theory of Contextuality. In *Samson Abramsky on Logic and Structure in Computer Science and Beyond*, Outstanding Contributions to Logic. Springer, 2023.