

Michael Cuffaro

<http://www.michaelcuffaro.com>

Areas of Specialisation

Philosophy of physics; Philosophy of computing; History and philosophy of science; Kant.

Areas of Competence

Legal & political philosophy; Agent-based modelling in political philosophy; Frege; Hobbes.

Academic Appointments and Affiliations

- Alexander van Humboldt Research Fellow, Munich Center for Mathematical Philosophy, LMU Munich: January 2020 – present
- Descartes Centre, Utrecht University: Senior Visiting Fellow, January 2020 – March 2020
- Institute for Quantum Optics and Quantum Information, Vienna: Visiting Researcher, March and April 2019
- Visiting Scholar, Munich Center for Mathematical Philosophy, LMU Munich, May 2017.
- Rotman Institute of Philosophy, University of Western Ontario: Postdoctoral Research Fellow, October 2016 – March 2019
- Munich Center for Mathematical Philosophy, LMU Munich: Postdoctoral Research Fellow, September 2013 – September 2015

Degrees Earned

Ph.D., Philosophy, Received: June 2013.

- INSTITUTION: University of Western Ontario. London, Ontario, Canada.
- PH.D. SUPERVISOR: Professor Wayne Myrvold.
- PH.D. DISSERTATION: “On the Physical Explanation for Quantum Computational Speedup.”

Short abstract: An investigation into the philosophical implications of the circumstance that quantum computers are, as I argue, able to take advantage of the phenomenon of quantum entanglement with dramatic effect.

M.A., Philosophy, Received: August 2008.

- INSTITUTION: Concordia University. Montréal, Québec, Canada.
- M.A. SUPERVISOR: Professor Gregory Lavers.
- M.A. THESIS: “A Metaphysically Neutral Theory of Singular Scientific Explanation.”

Bachelor of Computer Science (with Minor in Philosophy), Received: May 2000.

- INSTITUTION: Concordia University. Montréal, Québec, Canada.

Languages

English (native speaker), French (near fluent), Italian (near fluent), German (intermediate)

Publications (since 2010)¹

Monographs

Understanding Quantum Raffles: Quantum Mechanics on an Information-Theoretic Approach - Structure and Interpretation (with Michael Janas and Michel Janssen). Part of the series: Boston Studies in the Philosophy of Science, Springer, Forthcoming.

Edited volumes

(with Samuel C. Fletcher) *Physical Perspectives on Computation, Computational Perspectives on Physics*, Cambridge University Press (2018).

Edited conference proceedings

(with Philippos Papayannopoulos) *Proceedings of the 9th International Workshop on Physics and Computation*, Electronic Proceedings in Theoretical Computer Science 273 (2018).

Journal articles

Information Causality, The Tsirelson Bound, and the ‘Being-Thus’ of Things. *Studies in History and Philosophy of Modern Physics* (in press; advance access available online).

(with James A. Overton and Chris Mungall) String of PURLs – Frugal Migration and Maintenance of Persistent Identifiers. *Data Science* (in press; advance access available online).

Reconsidering No-Go Theorems from a Practical Perspective. *British Journal for the Philosophy of Science* 69 (2018): 633-655.

On the Significance of the Gottesman-Knill Theorem. *British Journal for the Philosophy of Science* 68 (2017): 91-121.

How-Possibly Explanations in (Quantum) Computer Science. *Philosophy of Science* 82 (2015): 737-748.

(with Wayne C. Myrvold) On the Debate Concerning the Proper Characterisation of Quantum Dynamical Evolution. *Philosophy of Science* 80 (2013): 1125-1136.

Many Worlds, the Cluster-state Quantum Computer, and the Problem of the Preferred Basis. *Studies in History and Philosophy of Modern Physics* 43 (2012): 35-42.

Kant and Frege on Existence and the Ontological Argument. *History of Philosophy Quarterly* 29 (2012): 337-354.

(with Ryan Muldoon and Michael Borgida) The Conditions of Tolerance. *Politics, Philosophy and Economics* 11 (2012): 322-344.

On Thomas Hobbes’s Fallible Natural Law Theory. *History of Philosophy Quarterly* 28 (2011): 175-190.

The Kantian Framework of Complementarity. *Studies in History and Philosophy of Modern Physics* 41 (2010): 309-317.

¹Most of these, and other, papers are available online at <http://www.michaelcuffaro.com/papers.shtml>; otherwise they are available upon request. Note that prior to 2010 I published two papers in the graduate student journal *GNOSIS*. These are also available from the above link.

Encyclopedia entries

(with Amit Hagar) “Quantum Computing,” in the *Stanford Encyclopedia of Philosophy* (online).

Book chapters

“Grete Hermann, Quantum Mechanics, and the Evolution of Kantian Philosophy.”
Forthcoming in *Women in the History of Analytic Philosophy* (Springer), J. Peijnenburg and S. Verhaegh (eds.).

“Universality, Invariance, and the Foundations of Computational Complexity in the light of the Quantum Computer.” In *Technology and Mathematics: Philosophical and Historical Investigations* (Springer-Verlag), Sven Ove Hansson, ed. (2018).

Articles in non-refereed conference proceedings

Kant’s Views on Non-Euclidean Geometry. *Proceedings of the Canadian Society for History and Philosophy of Mathematics* 25 (2012): 42-54.

Wittgenstein on Prior Probabilities. *Proceedings of the Canadian Society for History and Philosophy of Mathematics* 23 (2010): 85-98.

Book reviews

Essay review (with Emerson P. Doyle) of Bub & Bub’s *Totally Random* (Princeton University Press). Forthcoming in *Foundations of Physics*.

Review of “Quantum Information Theory and the Foundations of Quantum Mechanics”, by Christopher G. Timpson. *Philosophy of Science* 81 (2014): 681-684.

Works in Progress

Papers under review

“The Philosophy of Quantum Computing,” Forthcoming in *Quantum Computing in the Arts and Humanities* (Springer), Eduardo Miranda (ed.).

Other papers in progress (working titles)

“The Open Systems View” (with Stephan Hartmann).

“Objective Reality as an Emergent Phenomenon” (with Markus Müller).

Grants, Scholarships, and Awards

Alexander von Humboldt Research Fellowship for Experienced Researchers (including German language scholarship), awarded in January 2020; host: Munich Center for Mathematical Philosophy.

Senior Visiting Fellowship, awarded in June 2019, Descartes Centre, University of Utrecht. (with Wayne Myrvold, Markus Müller, and Lucas Dunlap) Social Sciences and Humanities Research Council (SSHRC) Connection Grant for the workshop: “Information-Theoretic Interpretations of Quantum Mechanics,” Spring 2016 competition.

Ontario Graduate Scholarship Award (OGS). Awarded in three consecutive years (2011, 2012, 2013).

Joseph L. Rotman Institute of Science and Values Research Seed Grant, for the project “Rational Motivations for Tolerant Political Views,” headed by Dr. Ryan Muldoon (09/2009 – 05/2010).

Presentations and Commentaries (since 2010)²

Invited talks

“Interpreting quantum mechanics” (via videoconference), American Physical Society March meeting, March 2021.

Guest lecture on quantum computing, honours seminar: “The Age of Entanglement” (regular lecturer: Michel Janssen), University of Minnesota, December 2020.

Lectures on the Philosophy of Quantum Computing (via videoconference), 23rd International School in Philosophy of Physics, University of Urbino, Italy, June 2020.

“Quantum Computing and Representation,” Workshop on Representation in Computation, Hebrew University of Jerusalem, May 2020. *Postponed due to COVID-19.*

“Quantum Causality, Empirical Test, and the Concept of an Open System,” Conference on Causation, Hebrew University of Jerusalem, May 2020. *Postponed due to COVID-19.*

“(Quantum) Causality, Interventions, and Open Systems,” at University of Montreal Workshop on Philosophy of Science, April 2020. *Cancelled due to COVID-19.*

“Grete Hermann, Quantum Mechanics, and the Evolution of Kantian Philosophy,” Faculty of Philosophy Colloquium, University of Groningen, February 19, 2020.

“How Quantum Mechanics changed Kantian Philosophy: The Thought of Grete Hermann,” Descartes Centre Colloquium, Utrecht University, February 18, 2020.

“Quantum Computing’s Impact on the Foundations of Computational Complexity Theory,” Philosophy of Science Seminar, Utrecht University, February 14, 2020.

“Kant and Frege on Existence and the Ontological Argument,” Utrecht University Theoretical Philosophy Colloquium, February 11, 2020.

“Interpreting Quantum Mechanics,” Workshop on Quantum Mechanics, Max Planck Institute for the History of Science, Berlin, January 9-10, 2020.

²A full list is available online at <http://www.michaelcuffaro.com/talks.shtml>.

Invited talks (continued)

“Putting Probabilities First: How Hilbert Space Generates and Constrains Them,”

- Workshop on Interpreting Quantum Mechanics: Old and New Philosophical Problems, Politecnico di Milano, Milan, Italy, March 2019.
- Workshop on New Directions in the Foundations of Physics, Viterbo, Italy, May 2019 (with Michel Janssen and Michael Janas).

“From Mental States to the Objective World: Methodological and Ontological Approaches,” Workshop on Biological Mentality, Ann Arbor, Michigan, September 2018.

“Classical Simulations of Quantum Correlations,” Workshop on Analogue Experimentation, University of Bristol, July 2018.

“Information Causality, the Tsirelson Bound, and the ‘Being-Thus’ of Things,”

- Institute for Quantum Optics and Quantum Information Vienna, April 17, 2019.
- New Directions in the Foundations of Physics Workshop, Viterbo, Italy, June 2018.
- University of Minnesota, Physics Interest Group, November 2017.
- University of Geneva, Philosophy Department, September 2017.

“Objective Reality as an Emergent Phenomenon” (with Markus Müller), University of Montreal Workshop on Scientific Theory Construction, May 2018.

“The Foundations of Computational Complexity in the Light of Quantum Computing,” Western University Applied Mathematics Colloquium, London, Ontario, October 2017.

Member of an invited panel: “Participatory Realism: How Far Goes Too Far?” at the Workshop on Participatory Realism, Stellenbosch, South Africa, June 2017.

“A New Constructional System” (with Markus Müller),

- Munich Center for Mathematical Philosophy, May 2017.
- University of Bristol, Philosophy Department, May 2017.

“Causality and Complementarity in Kant, Hermann, and Bohr,” University of Hannover, Philosophy Department, May 2017.

“Quantum Computation and the Foundations of Computational Complexity Theory,” Perimeter Institute for Theoretical Physics, Waterloo, Ontario, March 2017.

“Quantum Reflections on Computational Complexity,” for the Inter-University Workshop on History and Philosophy of Mathematics, Montreal, Quebec, February 2017.

Member of an invited panel of experts on quantum computing, Undergraduate Research Conference, Physics and Astronomy Department, Western Ontario, March 2016.

“A Different Perspective on the Quantum-Classical Divide,” Università Degli Studi Firenze, Florence, Italy, May 2015.

Internal keynote lecture on “The Copenhagen Interpretation(s) of Quantum Mechanics,” at the MCMP Graduate Conference in the Philosophy of Physics, Munich, Germany, April 2015.

“The Kantian Framework of Niels Bohr’s Philosophy of Science: The Electron as Noumenon,” Concordia University, Montréal, Québec, September, 2014.

Invited talks (continued)

“Reconsidering Quantum No-Go Theorems from a Computational Perspective,”

- University of Oxford, Oxford, UK, June 2014.
- University of Bristol, Bristol, UK, June 2014.

“The Physical and Computational Significance of the Bell Inequalities,” Workshop: Entanglement and Speed-up: Philosophical Issues in Quantum Computing, Stuttgart, Germany, May 2014.

“Explaining Quantum Speedup,” University of Minnesota, Minneapolis, Minnesota, January 2013.

Talks in workshops I’ve (co-)organised

“Ernst Cassirer and Grete Hermann: Metaphysics and Methodology”, Workshop on Conceptual and Methodological Aspects of Physics: Historical Perspectives, Utrecht University, March 6, 2020.

“Information Causality, the Tsirelson Bound, and the ‘Being-Thus’ of Things,” Workshop in Memory of William Demopoulos, University of Western Ontario, September 2017.

“On Algorithmic How-Possibly Explanation,” Workshop on Recent Work on Explanation and Confirmation, Munich Center for Mathematical Philosophy, May 2017.

Conference presentations

“Quantum Mechanics and Kantian Philosophical Method: An Exploration of the Views of Grete Hermann,” Workshop on *How Quantum Mechanics Changed Philosophy*, Bergische Universität Wuppertal, January 2020.

“Comparing Ernst Cassirer’s and Grete Hermann’s Views on Quantum Mechanics,” *Kant and the Contemporary World*, Catania, Italy, October 2018.

“An Open View of Quantum Systems” (with Stephan Hartmann),

- Philosophy of Science Association (PSA) meeting, Seattle, WA, November 2018.
- British Society for Philosophy of Science (BSPS) meeting, Oxford, UK, July 2018.

“Employing Agent-Based Computer Simulations in Developing Theories of Distributive Justice” (with Molly Kao),

- Canadian Philosophical Association Annual Meeting, Montreal, Quebec, June 2018.
- Conference on Models and Simulations 8, University of South Carolina, March 2018.

“Information Causality, the Tsirelson Bound, and the ‘Being-Thus’ of Things,”

- 9th European Congress of Analytic Philosophy, Munich, Germany, August 2017.
- Triennial International Conference of the Italian Society for Logic and Philosophy of Science, Bologna, Italy, June 2017.

Conference presentations (continued)

“Quantum Reflections on Computational Complexity,”

- Foundations of Physics Conference, London, UK, July 2016.
- Canadian Society for History and Philosophy of Mathematics (CSHPM) Annual Meeting, Calgary, Alberta, May 2016.

“(Neo-)Kantian Frameworks for the Foundations of Quantum Mechanics,”

- History of Philosophy of Science Society (HOPOS) 2016 Meeting, Minneapolis, Minnesota, June 2016.
- Canadian Society for History and Philosophy of Science (CSHPS) Annual Meeting, Calgary, Alberta, May 2016.

“On the Limits of Classical Computational Systems,” Nordic Network for Philosophy of Science Meeting, Helsinki, Finland, April 2015.

“How-Possibly Explanations in Quantum Computer Science,”

- Philosophy of Science Association (PSA) Meeting, Chicago, Illinois, November 2014.
- International Conference of the Italian Society for Logic and Philosophy of Sciences, Rome, Italy, June 2014.

“On the Significance of the Gottesman-Knill Theorem,”

- Deutsche Physikalische Gesellschaft (German Physical Society) meeting, Working Group on Philosophy of Physics, Berlin, Germany, March 2014.
- Foundations of Physics Conference, Munich, Germany, July 2013.

“Is Entanglement Sufficient to Enable Quantum Speedup?”, Irvine-Pittsburgh-Princeton (IPP) Conference on the Mathematical and Conceptual Foundations of Physics, Pittsburgh, Pennsylvania, April 2013.

“On the Physical Explanation for Quantum Computational Speedup,” University of Western Ontario (public talk), London, Ontario, March 2013.

“On the Debate Concerning the Proper Characterisation of Quantum Dynamical Evolution,” Philosophy of Science Association (PSA) Meeting, San Diego, California, November 2012.

“Reflections on the Role of Entanglement in the Explanation of Quantum Computational Speedup,” Canadian Society for History and Philosophy of Science (CSHPS) Meeting, Waterloo, Ontario, May 2012.

“Kant’s Views on non-Euclidean Geometry,” Canadian Society for History and Philosophy of Mathematics (CSHPM) Meeting, Waterloo, Ontario, May 2012.

“Many Worlds, the Cluster-state Quantum Computer, and the Problem of the Preferred Basis,”

- 14th Congress of Logic, Methodology and Philosophy of Science (CLMPS), Nancy, France, July 2011.
- Canadian Society for History and Philosophy of Science (CSHPS) Meeting, Fredericton, New Brunswick, May 2011.

“Kant’s Arguments for Transcendental Idealism,” Canadian Philosophical Association (CPA) Meeting, Fredericton, New Brunswick, May 2011.

Conference presentations (continued)

“How Should We Set the Social Minimum?,” Canadian Philosophical Association (CPA) Meeting, Montréal, Québec, May 2010.

“On Kant and Non-Euclidean Geometry,” Canadian Society for History and Philosophy of Science (CSHPS) Meeting, Montréal, Québec, May 2010.

“Wittgenstein on Prior Probabilities,” Canadian Society for History and Philosophy of Mathematics (CSHPM) Meeting, Montréal, Québec, May 2010.

“Kant and Frege on the Ontological Argument for the Existence of God,” Canadian Society for History and Philosophy of Mathematics (CSHPM), Montréal, Québec, May 2010.

“Employing Computer Simulations in Developing Theories of Liberal Toleration,” Models and Simulations 4, Toronto, Ontario, May 2010, co-authored presentation with Michael Borgida.

Commentaries

Corrado Matta, “Qualitative Research and Confirmation,” Nordic Network for Philosophy of Science Meeting, Helsinki, Finland, April 2015.

Sandra Lapointe, “Bolzano, Leibniz and Kant,” Plenary Session (Lapointe was the winner of the *Tenured Professor Essay Prize*) of the Canadian Philosophical Association (CPA) Meeting, Waterloo, Ontario, May 2012.

David DeVidi, “Mathematical Pluralism, Abstraction and Translation,” Canadian Philosophical Association (CPA) Meeting, Montréal, Québec, May 2010.

Teaching Experience

Instructorships and Teaching Assistantships

Instructor (April 2015 - September 2015):

Advanced seminar: Philosophy of Computing and Computer Science.
LMU Munich, Philosophy Department.

Instructor (October 2014 - March 2015):

Advanced seminar: Introduction to the Philosophy of Physics.
LMU Munich, Philosophy Department.

Instructor (April 2014 - September 2014):

Advanced seminar: Classical Concepts in Philosophy of Physics from Kant to the Present.
LMU Munich, Philosophy Department.

Instructor (October 2013 - March 2014):

Advanced seminar: Philosophy of Quantum Computation.
LMU Munich, Philosophy Department.

Instructor (January 2013 - May 2013):

Course: Big Ideas (i.e. Introduction to Philosophy).
The University of Western Ontario, Philosophy Department.

Instructor (January 2011 - May 2011):

Course: Basic Logic.
The University of Western Ontario, Philosophy Department.

Teaching Assistant (September 2009 - May 2010):

Course: Critical Thinking. Instructor: Professor Chris Viger.
The University of Western Ontario, Philosophy Department.

Teaching Assistant (September 2008 - May 2009):

Course: Introduction to Logic. Instructor: Dr. Zachary Silver.
The University of Western Ontario, Philosophy Department.

Teaching Assistant (January 2008 - May 2008):

Course: Introduction to Epistemology. Instructor: Pierre Daigneault.
Concordia University, Philosophy Department.

Teaching Assistant (September 2007 - December 2007):

Course: Critical Thinking. Instructor: Pierre Daigneault.
Concordia University, Philosophy Department.

Master's student thesis supervision and examination

MA Thesis 2nd Reader: Anna Sargsyan. LMU Munich, March 2016 - August 2016.

Topic: *Do Computer Simulations Provide Scientific Explanation and Understanding?*

Assistant Supervisor: Omid Charrakh (Winner of the 2017 Hanneke Janssen Memorial Prize for best Master's thesis in History and/or Philosophy of Modern Physics). LMU Munich, March 2015 - April 2016.

Topic: *The Philosophical Implications of the Pusey-Barrett-Rudolph (PBR) Theorem.*

MA Thesis 2nd Reader: Cameron Beebe. LMU Munich, February 2014 - January 2015.

Topic: *Fluid Mechanical Models in Physical and Computational Contexts.*

Non-Academic Teaching Experience

From 2000 to 2005, while employed as a software developer at Ericsson Communications, I was occasionally called upon to travel to customer sites (in Mexico, Canada, and the United States) in order to teach courses on how to use the network management software developed by my development team. My classes typically consisted of between 5 and 10 students (network and radio-frequency engineers), and they typically lasted for three complete days (i.e., for roughly seven hours per day).

Professional Activities and Service

Referee service

Philosophy Journals: Philosophy of Science; British Journal for the Philosophy of Science; Studies in History and Philosophy of Modern Physics; Studies in History and Philosophy of Science; Synthese; European Journal for Philosophy of Science; Minds & Machines; Dialectica; Erkenntnis; International Journal for Philosophy of Science; Journal of the History of Philosophy; British Journal for the History of Philosophy; History of Philosophy Quarterly, Philosophical Quarterly; Hobbes Studies; Mind and Matter; Religious Studies; Philosophy, Theory, and Practice in Biology; Croatian Journal of Philosophy; GNOSIS.

Scientific journals: Foundations of Physics, International Journal of Theoretical Physics, Review of Symbolic Logic, Quantum.

Book publishers: Bloomsbury Press, Princeton University Press, Springer.

Conference, workshop, and symposium organisation

Co-organiser of the workshop: "Conceptual and Methodological Aspects of Physics: Historical Perspectives", Descartes Centre, Utrecht University, March 6, 2020.

Co-organiser of the special session on "History and Foundations of Computing In physics", of the Division of Computational Physics, at the American Physical Society annual meeting, Denver, CO., March 3, 2020.

Co-organiser of the "MCMP-Western Ontario Workshop on Computation in Scientific Theory and Practice," at the Munich Center for Mathematical Philosophy, May 31-June 2, 2019.

Co-organiser of the symposium "The Philosophy of Open Quantum Systems,"

- Philosophy of Science Association (PSA) meeting, Seattle, WA, Nov. 2018.
- British Society for Philosophy of Science (BSPS) meeting, Oxford, UK, July 2018.

Conference, workshop, and symposium organisation (continued)

Co-organiser of the “9th International Workshop on Physics and Computation” , Fontainebleau, France, June 25-29, 2018.

Co-organiser of the workshop: “Algorithmic Information, Induction and Observers in Physics,” Perimeter Institute for Theoretical Physics, Waterloo, Ontario, April 9-13, 2018.

Co-organiser of the “Workshop in Memory of William Demopoulos,” held at the University of Western Ontario in September, 2017.

Co-organiser of the workshop: “Recent work on Explanation and Confirmation,” held at the Munich Center for Mathematical Philosophy in May, 2017.

Co-organiser of the workshop: “Information-Theoretic Interpretations of Quantum Mechanics,” (a.k.a. ‘Bananarama’), University of Western Ontario in June 2016.

Co-organiser of the conference: Quantum Computation, Quantum Information, and the Exact Sciences, a two-day conference, organised in conjunction with the Max Planck Institute of Quantum Optics, held in January 2015 at LMU Munich.

Co-organiser (three years: 2011, 2012, 2013) of the annual Philosophy of Logic, Mathematics, and Physics (LMP) Graduate Conference at the University of Western Ontario.

Co-organiser (2010-2011 academic year) of the University of Western Ontario Philosophy Graduate Students Association Weekly Colloquium.

Co-organiser (2008) of the Concordia University Annual Philosophy Graduate Conference.

Reading group organisation

Organiser of a reading group on the philosophy of Ernst Cassirer, 2017-18 academic year, University of Western Ontario.

Organiser of the Rotman Institute of Philosophy’s philosophy of physics reading group, September 2017 – April 2019.

Co-organiser of a reading group on algorithmic information theory, 2016-17 academic year, University of Western Ontario.

Co-organiser of a reading group on the philosophy of quantum information theory, at LMU Munich, from April - July, 2014, organised in conjunction with members of the Max Planck Institute of Quantum Optics.

Administrative service

Postdoc hiring committee member, MCMP, April 2014.

Academic associations

Canadian Society for the History and Philosophy of Science, Canadian Society for the History and Philosophy of Mathematics, Canadian Philosophical Association, German Physical Society, British Society for the Philosophy of Science, Philosophy of Science Association, North American Kant Society, European Society for Analytic Philosophy.

Professional and non-profit associations

Free Software Foundation (FSF), Software in the Public Interest (SPI), Institute of Electrical and Electronics Engineers (IEEE).