

Michael E. Miller

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Employment

- 2024-present *Associate Professor*, Department of Philosophy, University of Toronto
2019-2024 *Assistant Professor*, Department of Philosophy, University of Toronto
2017-2019 *Assistant Professor*, Department of Philosophy and IHPST, University of Toronto

Education

- 2017 *Ph.D.*, History and Philosophy of Science, University of Pittsburgh
2011 *M.A.*, Philosophical Foundations of Physics, Columbia University
2008 *B.A. with Honors*, Physics and Philosophy, University of Chicago

Interests

AOS: Philosophy of Physics, Philosophy of Science, Metaphysics
AOC: Logic, Philosophy of Mathematics, History of Physics

Books

Divergences in Quantum Field Theory
Under contract for the *Cambridge Elements Series in The Foundations of Contemporary Physics*, edited by Richard Dawid and James Wells. Expected 2025, CUP.

Articles

- forth. From Classical to Quantum Indeterminacy, and Back, *Philosophy of Science* (with Patrick Fraser)
- 2024 The Conventionality of Real Valued Quantities, *Philosophy of Science* 91(5): 1274 - 1284. (with Marissa Bennett)
- 2024 Cluster Decomposition and Two Senses of Isolability, *Philosophy of Physics* 2(1): 12, 1-38. (with John Dougherty and Porter Williams)
- 2023 Mathematical Structure and Empirical Content, *The British Journal for the Philosophy of Science*, 74(2): 511-532.
- 2021 Worldly Imprecision, *Philosophical Studies*, 178:2895-2911.
- 2021 Infrared Cancellation and Measurement, *Philosophy of Science*, 88(5):1125-1136.

- 2018 Haag's Theorem, Apparent Inconsistency, and the Empirical Adequacy of Quantum Field Theory, *The British Journal for the Philosophy of Science*, 69(3):801-820.
- 2015 The Origins of Schwinger's Euclidean Green's Functions, *Studies in the History and Philosophy of Modern Physics*, 50:5-12.

Reviews

- 2022 From Scales to Levels, *Studies in the History and Philosophy of Science* 97:126-127. Review of Robert Batterman: A middle way. Oxford University Press.
- 2017 What, if anything, does quantum field theory explain?, *Metascience* 26:455-457. Review of Jonathan Bain: CPT invariance and the spin-statistics connection. Oxford University Press.

Talks

- 2025 *Ultraviolet Divergences and the Breakdown of Quantum Field Theory at Short Distance*
Laboratory for Quantum Theory at the Extremes, University of Illinois at Chicago
- 2025 *Full Precision and Its Failure*
Philosophy of High Energy Physics, University of Pittsburgh
- 2025 *Narratability in Quantum Field Theory* (with Ding Jia)
Eastern APA, New York
- 2024 *Precision and Determinacy* (with Patrick Fraser)
Bergen Philosophy of Science Workshop, University of Bergen
- 2024 *What is the Renormalon Problem* (with John Dougherty and James Fraser)
Asymptotic Expansions in Physics, IHPST Paris
- 2024 *Cluster Decomposition and Two Senses of Isolability* (with Porter Williams and John Dougherty)
Causal Worlds, Perimeter Institute for Theoretical Physics
- 2024 *From classical to quantum indeterminacy, and back* (with Patrick Fraser)
Society for the Metaphysics of Science Meeting, Online
- 2024 Philosophy of Science Associate Meeting, New Orleans
- 2024 *Epistemic and Semantic Effective Realism*
Canadian Society for the History and Philosophy of Science, McGill University.
- 2024 *Representing Quantum Indeterminacy*
Models, Representation, and Computation, IHPST Paris.
- 2023 *Precision and Quantum Metaphysical Indeterminacy* (with Patrick Fraser)
Discreteness and Precision in Physics, IHPST Paris.

- Merely Dense Time in the Representational Theory of Measurement* (with Marissa Bennett)
 2023 Discreteness and Precision in Physics, IHPST Paris.
 2023 The 21st UK and European Conference on Foundations of Physics, University of Bristol.
- Why Go Effective?* (with James Fraser)
 2023 British Society for the Philosophy of Science, University of Bristol
 2023 Foundations of Quantum Field Theory, Western University
 2023 Pacific APA, San Francisco
- On the Common Structure of Perturbative and Axiomatic Field Theory in Borel Summable Models*
 2023 European Philosophy of Science Association, Belgrade
 2023 17th Congress of Logic, Methodology, and Philosophy of Science and Technology, Buenos Aires
 2022 Approximations to Second Order: Historical and Philosophical Perspectives, Max Planck Institute for the History of Science
- The Conventionality of Real Valued Quantities* (with Marissa Bennett)
 2023 Society for the Metaphysics of Science, Dalhousie University
 2022 Philosophy of Science Association, Pittsburgh
 2022 Canadian Philosophical Association, Online
- A Philosopher Looks at Epstein-Glaser Renormalization*
 2021 Higher Structures Emerging From Renormalization, The Erwin Schrödinger Institute
- The (Un?)reasonable Effectiveness of Mathematics in the Natural Sciences*
 2021 Higher Structures Emerging From Renormalization, The Erwin Schrödinger Institute
- Approximations to What Exactly?*
 2021 Approximations in Physics Workshop, Max Planck Institute for the History of Science (Online)
- Quantum Determinables*
 2021 Canadian Society for the History and Philosophy of Science, University of Alberta (Online)
- Cluster Decomposition and Entanglement*
 2021 Philosophy of Physics Seminar, University of Oxford (Online)
- Whence Distributions?*
 2021 Constructing Quantum Theories Workshop, University of Washington (Online)
- Infrared Cancellation and Measurement*
 2021 Philosophy of Science Association Meeting, Baltimore
 2021 The 20th UK and European Conference on Foundations of Physics, École Normale Supérieure
 2020 Philosophy of Physics Reading Group, Caltech (Online)
 2019 Workshop for David Albert, Columbia University

- The Framework of Quantum Field Theory*
 2020 Philosophy of Science Reading Group, Rutgers University (Online)
- Laws and Precision*
 2020 Laws, Causation, and Modality Workshop, Simon Fraser University (Online)
- Worldly Imprecision*
 2020 Colloquium, University of Southern California (Online)
 2019 Society for the Metaphysics of Science, University of Toronto
 2019 Workshop on Metaphysical Indeterminacy, Dartmouth College
- Quantum Field Theory, Finitely*
 2019 Foundations of Quantum Field Theory Workshop, Western University
- Empirical Adequacy Debugged*
 2019 Canadian Society for the History and Philosophy of Science, University of British Columbia
- One Weird Thing About Fundamentality*
 2018 The Future of the Foundations of Physics, Columbia University
- Fundamental, Yet Imprecise*
 2018 Philosophy of Science Association Meeting, Seattle
 2018 British Society for Philosophy of Science Annual Meeting, University of Oxford
- Indeterminacy at Large-Order*
 2018 Rutgers-Columbia Workshop on Metaphysics of Science, Rutgers University
- Not All Failures of Empirical Adequacy are Created Equal*
 2018 Scientific Theory Construction: Measurement and Constraints, University of Montreal
 2018 45th Annual Philosophy of Science Conference, Inter-University Centre Dubrovnik
- On the Common Structure of Perturbative and Axiomatic Field Theory*
 2017 Canadian Society for the History and Philosophy of Science, Ryerson University
- Is the Empirical Content of Quantum Field Theory Inexact?*
 2017 The University of Illinois at Chicago
- Three Obstacles to the Interpretation of Quantum Field Theory*
 2017 The University of Toronto
 2017 California Institute of Technology
- Why are there Ultraviolet Divergences at All?*
 2016 Philosophy of Science Association Meeting, Atlanta
- The Significance of Perturbative Finiteness*
 2016 Space and Time After Quantum Gravity Summer Institute, Williams Bay

- 2016 *State-Space Semantics for Divergent Perturbation Theory*
Philosophy of Science Working Group University of Michigan
- 2015 *Mathematical Structure and the Meaning of ‘Quantum Field’*
Sigma Club, London School of Economics
- 2015 Munich Center for Mathematical Philosophy, Ludwig-Maximilians-Universität
- 2015 *Exact Models and Physical Semantics*
British Society for Philosophy of Science Annual Meeting, University of Manchester
- 2015 *The Underdetermination of Field Theoretic Structure*
Philosophy of Logic, Math, and Physics Graduate Conference, University of Western Ontario
- 2015 IPP Conference on the Mathematical and Conceptual Foundations of Physics, Princeton University
- 2014 NY/NJ Philosophy of Science Group, Columbia University
- 2014 *The Origins of Schwinger’s Euclidean Green’s Functions*
History of Science Society Meeting, Chicago
- 2014 *Haag’s Theorem and Successful Applications of Scattering Theory*
Philosophy of Science Association Meeting, Chicago
- 2014 IPP Conference on the Mathematical and Conceptual Foundations of Physics, UC Irvine

Invited Commentary

- 2024 *In Defense of Pure Reason*
Canadian Institute for Advanced Research, Santa Barbara.
- 2023 *Commentary on “Leveraging Distortions: Explanation, Idealization, and Universality in Science” (Collin Rice)*
APA Pacific Division Meeting, Portland.
- 2023 *Naturalness, Renormalization, and Fundamentality*
Foundations of Modern Physics Group Meeting, University of Michigan.
- 2023 *Symposium on “A Middle Way” (Robert Batterman)*
The Center for Philosophy of Science, University of Pittsburgh.
- 2021 *Roundtable on the Foundations of Quantum Field Theory*
Higher Structures Emerging From Renormalization, The Erwin Schrödinger Institute.
- 2020 *Panel on Quantum Biology*
Department of Biochemistry, University of Toronto (Online)
- Commentary on “On the Ostrogradski Instability; or, Why Physics Really Uses Second Derivatives” (Noel Swanson)*

- 2019 Society for the Metaphysics of Science, University of Toronto.
Fundamentality and the Ultimate Aspirations of Physics
- 2018 Panel with Kerry McKenzie, Porter Williams, David Albert, and Rachel Rosen, Columbia University.
Introduction to Major Approaches to Quantum Field Theory
- 2018 Rutgers-Columbia Workshop on Metaphysics of Science, Rutgers University.
Why Philosophy of Quantum Field Theory?
- 2018 IHPST Research Seminar, University of Toronto.
Haag's Theorem and the Infrared
- 2017 Interpreting QM[∞], University of Michigan.
Big Questions: Some Fundamental Problems in Physics
- 2016 Invited Discussant, 20th annual Seven Pines Symposium, Stillwater.
Commentary on "What Explains the Spin-Statistics Connection?" (Jonathan Bain)
- 2016 APA Pacific Division Meeting, San Francisco.
Commentary on "Is the Renormalization Group Explanation a Non-Causal Explanation?" (Min Tang)
- 2015 Society for the Metaphysics of Science, Rutgers, September 2015.
New Directions in the Foundations of Physics
- 2014 Invited Discussant, Washington D.C.
Commentary on "Why (It Seems) We Cannot Influence the Past" (Alison Fernandes)
- 2012 Pitt-CMU Graduate Conference, University of Pittsburgh.

Poster Presentations

- 2022 *Violations of Causal Faithfulness are not Measure Zero (with Patrick Fraser)*
Biennial Meeting of the Philosophy of Science Association, Pittsburgh.

Teaching

UNDERGRADUATE COURSES

- Winter 2024 PHL255 · Introduction to Philosophy of Science, PHL198 · Philosophy of Time
Fall 2023 PHL356 · Philosophy of Physics
Winter 2023 PHL 455 · Seminar in Philosophy of Science, PHL198 · Philosophy of Time
Winter 2022 PHL356 · Philosophy of Physics
Winter 2021 PHL198 · Philosophy of Time (two sections), PHL355 · Philosophy of Science
Fall 2020 PHL 198 · Philosophy of Time, PHL356 · Philosophy of Physics
Winter 2020 PHL 355 · Philosophy of Science

Fall 2019 PHL198 · Philosophy of Time, PHL356 · Philosophy of Physics
 Fall 2018 PHL356 · Philosophy of Physics
 Winter 2017 PHL356 · Philosophy of Physics
 Fall 2017 PHL345 · Intermediate Logic, HPS200 · Science and Values
 Spring 2017 Myth and Science, University of Pittsburgh
 Fall 2016 Philosophy of 20th Century Physics, University of Pittsburgh
 Spring 2015 Philosophy of 20th Century Physics, University of Pittsburgh
 Fall 2014 Principles of Scientific Reasoning, University of Pittsburgh

GRADUATE COURSES

Fall 2023 PHL2198 · Advanced Introduction to the Philosophy of Science
 Fall 2021 PHL2198 · Advanced Introduction to the Philosophy of Science
 Summer 2021 PHL1000 · Independent Reading (with Trevor Teitel and Youness Ayaita)
 Winter 2021 PHL2105 · Quantum Metaphysics (with Trevor Teitel)
 Winter 2020 PHL1000 · Independent Reading (with Marissa Bennett and Alice Huang)
 Winter 2020 PHL1000 · Independent Reading (with Yasmin El Gebali)
 Winter 2019 PHL2169 · Laws of Nature (with Jessica Wilson)
 Fall 2018 HPS1000 · IHPST Proseminar (with Rebecca Woods)
 Winter 2017 HPS3005 · Varieties of Structuralism

GRADUATE SUPERVISION

Supervisor

2024-present Patrick Fraser (Philosophy): *in progress*
 2021-present Marissa Bennett (Philosophy): *in progress* (with Jessica Wilson)

Committee Member

2021-present David Rattray (Philosophy): *in progress*
 2020-present Greg Horne (Philosophy): *in progress*
 2020-2022 Austin Due (IHPST): *Side Effects in Medicine*
 2019-2022 Zhixiang Chang (IHPST): *On the Explanatory and Interpretive Functions of Mathematical Models in Evolutionary Biology*
 2018-2021 Atoosa Kasirzadeh (IHPST): *Applying Mathematics to the Natural and Social World*

Specialist Exam Committee Member

2024-2025 Sooyoung Moon (Philosophy)
 2024-2025 Silvia Castillo Vergara (IHPST)
 2023-2024 Patrick Fraser (Philosophy)
 2021-2022 Marissa Bennett (Philosophy)
 2021-2022 David Rattray (Philosophy)
 2019-2020 Greg Horne (Philosophy)
 2019-2020 Austin Due (IHPST)
 2018-2019 Zhixiang Chang (IHPST)
 2017-2018 Atoosa Kasirzadeh (IHPST)

External Examiner

- 2024 Kalan Kucera (University of Alberta): *Equivalences in Material Structures*
2019 Elliot Carter (Philosophy): *Perceiving Temporal Structure*
2018 Noah Stemeroff (IHPST): *Mathematics, Structuralism, and the Promise of Realism*

Faculty Advisor

- 2023-2024 Amelia Kush, Tessa Ng, John Tzatzanis, Joseph Urban
2022-2023 Paul McKarris, Marybel Menzies, Matthew Valiquette, Victoria Wang
2021-2022 Patrick Fraser, Kye Palider, Dylan Jones, Thalia Wang
2020-2021 Ameer Sarwar
2019-2020 Alice Huang
2018-2019 Kristen Beard, Austin Due (IHPST)

IVGS Supervisor

- 2023 Krzysztof Tarkowski, Nicolaus Copernicus University

UNDERGRADUATE SUPERVISION

Independent Studies

- 2023 Independent Study, Kai Zhang and Alexander Marcu
2020 Independent Study, Ariel Kelman
2019-2020 Independent Study, Patrick Fraser
2017-2018 Independent Study, Grace Field

Socrates Project

- 2023-2024 Supervisor, Anne Maquia Landin
2018-2019 Supervisor, Stefan Vladusic

Other Undergraduate Supervision

- 2022-2023 Independent Study (PHY372), Alexandra Holgate and Rosalie Cormier
2022-2023 ENGSCI Thesis Supervisor (ESC499), Liwei Pan
2016 Brackenridge Summer Research Fellowship Program, Wes Roberts

Awards and Grants

- 2024 *SIG Grant*, University of Toronto (\$1,500)
2023 *Connection Grant* (with Doreen Fraser and Chris Smeenk), SSHRC (\$18,000)
2023 *Connection Grant* (with Denis Walsh), SSHRC (\$7,000)
2022-2025 *Partnership Grant* (with Vincent Ardourel), CNRS (\$115,560)
2022 *Ernest Nagel Early-Career Scholar Essay Award*, PSA
2018-2023 *Insight Grant*, SSHRC (\$67,336)
2018-2020 *Connaught New Researcher Award*, University of Toronto (\$10,000)

- 2017 *SIG Grant*, University of Toronto (\$2,000)
- 2015 *Robert K. Clifton Memorial Prize*, University of Western Ontario
- 2015 *Junior Fellowship*, Munich Center for Mathematical Philosophy

Professional Service

FOUNDATIONS OF PHYSICS

- 2023-present Book Review Editor

PHILSCI-ARCHIVE

- 2022-2023 Editorial Chair
- 2017-2023 Member of the Board
- 2016-17 Academic Manager
- 2014-15 Academic Manager
- 2012-13 Academic Manager

CONFERENCE ORGANIZATION

- 2023 Co-organizer, *Discreteness and Precision in Physics*, Toronto-CNRS Workshop, IHPST Paris
- 2023 Organizer, *Between Discrete and Continuous Time*, UK & European Foundations Symposium
- 2023 Co-organizer, *Foundations of Quantum Field Theory*, Western University
- 2023 Organizer, *Why the quantum?*, CPA Symposium
- 2023 Co-organizer, *Scientific Understanding and Representation*, University of Toronto
- 2022 Organizer, *The Representational Theory of Measurement and Physical Quantities*, PSA Symposium
- 2022 Organizer, *The Representational Theory of Measurement and Physical Quantities*, CPA Symposium
- 2019 Co-organizer, *Conference for David Albert*, Columbia University
- 2019 Co-organizer, *Annual Meeting of The Society for the Metaphysics of Science*, University of Toronto
- 2019 Co-organizer, *Quantum Field Theory Then and Now*, University of Pittsburgh
- 2019 Co-organizer, *Early Career Workshop in the History and Philosophy of Physics*, University of Pittsburgh
- 2014 Co-organizer, *The Physics of Emergence*, University of Pittsburgh
- 2013 Co-organizer, *Irvine-Princeton-Pittsburgh Conference on the Mathematical and Conceptual Foundations of Physics*, University of Pittsburgh

JOURNAL REFEREE

Analysis, The Asian Journal of Philosophy, The British Journal for the Philosophy of Science, Dialectica, Entropy, Erkenntnis, European Journal for Philosophy of Science, Foundations of Physics, Foundations of Science, International Studies in the Philosophy of Science, Journal for General Philosophy of Science, Mind, Noûs, Philosophical Studies, Philosophy of Science, Philosophies, Studies in the History and Philosophy of Modern Physics, Studies in the History and Philosophy of Science, Synthese, Theoria

BOOK REFEREE

Cambridge University Press, Routledge, Taylor and Francis

CONFERENCE REFEREE

Philosophy of Science Association, Canadian Philosophical Association, Irvine-Princeton-Pittsburgh Conference on the Mathematical and Conceptual Foundations of Physics, Pitt-CMU Graduate Conference

GRANT REFEREE

Swiss National Science Foundation

PHILOSOPHY OF SCIENCE ASSOCIATION

2022 PSA Program Committee

CANADIAN PHILOSOPHICAL ASSOCIATION

2022, 2023 CPA Program Committee

SOCIAL SCIENCE AND HUMANITIES RESEARCH COUNCIL

2021-2023 Interdisciplinary Insight Grant Adjudication Committee

University Service

2022-2025 Graduate Education Council, School of Graduate Studies

2022 Presenter, SSHRC Insight Grant Webinar, Center for Research and Innovation Support

Departmental Service

DEPARTMENTAL COMMITTEES

2022-present Climate Committee

2022-2024 Graduate Admissions Committee

2022-2024 Graduate Executive Committee

2022-2023 Undergraduate Curriculum Committee

2022 CLTA Search Committee

2021-2022 Philosophy of Science Search Committee

2020-2022 Policy and Planning Committee

- 2020-2021 Philosophy of Science Search Committee
- 2018-2019 Metaphysics Search Committee
- 2017-2018 Metaphysics and Epistemology Search Committee
- 2018-2019 Policy and Planning Committee
- 2017-2018 Ad-hoc committee on IHPST graduate task force report
- 2017-2018 Ad-hoc committee on HPS100Y requirements

ADDITIONAL SERVICE

- 2017-present LPS Interest Group Coordinator, Philosophy
- 2018 Research Seminar Coordinator, IHPST
- 2017-2018 Martha Lile Love Essay Award Committee

Outreach

- 2023 Steering Committee Member, School of Cosmic Future, University of Toronto
- 2023 Organizer, Science Rendezvous, University of Toronto
- 2023 Lecturer, Introduction to Philosophy of Quantum Field Theory, De Leidsche Flesch
- 2023 Noësis Interview
- 2022, 2023 Lecturer, CPA Summer Institute
- 2021 Lecturer, Phantoms and Philosophy, Philosophy Course Union
- 2021 Discussant, Everything You Always Wanted to Know About Everett, Physics and Philosophy Specialists
- 2019 Discussant, The Greater Picture, Physics and Philosophy Specialists
- 2018 Discussant, Quantum Weirdness, HPSUS
- 2018-19 Organizer, Science Rendezvous, University of Toronto

Affiliations

American Philosophical Association, Philosophy of Science Association, British Society for Philosophy of Science, History of Science Society, Canadian Society for the History and Philosophy of Science, Canadian Philosophical Association, Society for the Metaphysics of Science, Philosophy of Physics Society, European Philosophy of Science Association

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