Chris Smeenk

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Areas of Specialty

Philosophy of science, Philosophy of physics, History of physics.

Areas of Competence

Early modern philosophy, Epistemology, History of philosophy of science.

Academic Appointments

Western University

- Professor, Philosophy, 2019 – Present.
- Associate Professor, 2011– 2019.
- Assistant Professor, 2007 – 2011.
- Director, Rotman Instititue of Philosophy, 2012 – 13 (*interim*), 2015 – present (except for sabbatical leave, 2019-20).
- Cross-appointment with Applied Mathematics, 2011 – 2021 (department closed).
- Graduate Faculty Membership, Institute for the History and Philosophy of Science of Technology, University of Toronto, 2021 – present.

University of California, Los Angeles

- Assistant Professor, 2003 – 2007.

Visiting Positions

- Member, Foundational Questions Institute, 2020–Present.
- Visiting Professor, McGill University (Philosophy), 2019 – 2020.
- Visiting Fellow, Whitney Humanities Center at Yale University, 2014 – 2015 (sabbatical leave).
- Postdoctoral Fellow, 2002 – 2003, Dibner Institute for History of Science and Technology (MIT).

Education

PhD, History and Philosophy of Science, *University of Pittsburgh*, 2003

> "Approaching the Absolute Zero of Time: Theory Development in Early Universe Cosmology."
> Supervisory committee: John Earman and John Norton (co-chairs), Al Janis, and Laura Ruetsche

M.A., Philosophy, *University of Pittsburgh*, 2002

M.S., Physics and Astronomy, *University of Pittsburgh*, 2001

B.A., Physics and Philosophy, *Yale College*, 1995

> *Cum laude*, with distinction in the major.

Awards and Honors

- USC Teaching Honour Roll, 2012-13, 2015-16
- Milton K. Munitz Prize in Philosophy, for the essay: "The Logic of Cosmology Revisited." (Awarded July 2008; judged by Hilary Putnam and Richard Gale.)
- University of California Office of the President Research Fellowship in the Humanities (awarded for 2007-08, declined to move to UWO)
- NEH Summer Seminar in the Humanities fellowship: Leibniz, summer 2003
- Slater Fellowship in History of Physics, American Philosophical Society, 2001-02
- A. W. Mellon Pre-Doctoral Fellowship, University of Pittsburgh, 1995-96, 2000-1
- Pre-Doctoral Fellowship at the Max Planck Institute for the History of Science (Berlin), Summers 1997, 1998, 2000, and 2001
- Bergin Cup (for scholarship in the humanities, Timothy Dwight College), 1995
- DeForest Pioneers Prize for Physics, Yale University, 1995

Grants

- New Directions in Philosophy of Cosmology (March 2018 – Dec. 2020). John Templeton Foundation grant – US $ 1,369,872. Co-Principal Investigators: Chris Smeenk and Jim Weatherall (UC Irvine), with collaborators Robert Brandenberger (McGill) and James Bullock (UC Irvine)
- Laws, Methods, and Minds in Cosmology. John Templeton Foundation grant. Principal Investigator: Chris Smeenk, with co-Investigators John Manchak and Jim Weaterhall (both University of California, Irvine; Logic and Philosophy of Science). Grant support (over 18 months): $ US 205,834.
- Bridging Across Scales: Emergence and Effective Theories. John Templeton Foundation Grant, Physics of Emergence funding program. Principal Investigator: Bob Batterman (University of Pittsburgh); co-investigators – Chris Smeenk and Mark Wilson (University of Pittsburgh). Grant support (over three years, 2012 - 2015): $ US 489,739.
- Philosophy of Contemporary Cosmology: UWO Large ADF grant, $ CAD 25,000.
- Integrating Complexity: Environment and History Workshop (Oct. 7 - 10, 2010), with Gillian Barker and Eric Desjardins. SSHRC 646-2010-0116 (co-investigator) – $ CAD 19,260.
- Philosophy of Quantum Field Theory Workshop (April 24-26, 2009): SSHRC 646-2008-1136 (principal investigator) – $ CAD 14,355; Fields Institute (co-investigator with W. Myrvold) – $ CAD 3,000.

Publications

Books and Edited Collections

B3. PSA 2014: *Contributed Papers - link* (Volume 82, Dec. 2015) and *Symposia - link* (Volume 83, Dec. 2016). Two special issues of *Philosophy of Science*, roughly 500 pages each, based on contributions to the Philosophy of Science Association Biennial meeting (2014). As Program Chair for the meeting, I was also editor of the proceedings volumes.

B2. "Philosophy of Quantum Field Theory," special issue of *Studies in the History and Philosophy of Modern Physics* **42** (2011). Co-edited with Wayne Myrvold, with an editorial introduction, pp. 77-80.

B1. *The Genesis of General Relativity*, assistant editor, with J. Renn, M. Schemmel, and C. Martin. Vol. III, *Theories of Gravitation in the Twilight of Classical Physics*; Vol. IV, *Alternative Approaches to General Relativity*. Boston Studies in the Philosophy of Science, Vol. 250. Dordrecht: Springer, 2007. (2 volumes, 1,152 pages.)

Articles and Book Chapters

A24. "Determinism and General Relativity," with Christian Wüthrich. Accepted for publication in *Philosophy of Science*. Preprint arXiv:2009.07555.

A23. "Validating the Universe in a Box," with Sarah Gallagher. *Philosophy of Science* **87** (2020). Preprint arXiv:2001.09101.

A22. "Some Reflections on the Structure of Cosmological Knowledge." *Studies in the History and Philosophy of Modern Physics* **71** (2020): 220-231.

A21. "Q.E.D., QED," with Adam Koberinski. *Studies in the History and Philosophy of Modern Physics* **71** (2020): 1-13.

A20. "Gaining Access to the Early Universe," in *Why Trust Theory? Epistemology of Fundamental Physics*, edited by R. Dawid, K. Thebault, and R. Darshati. Cambridge: Cambridge University Press (2019), pp. 315-338.

A19. "Philosophical Aspects of Cosmology," in *Oxford Handbook of the History of Modern Cosmology*, edited by H. Kragh and M.S. Longair. Oxford: Oxford University Press (2019), pp. 497-530.

A18. "Inflation, Dark Matter, and Dark Energy," with Malcolm Longair, in *Oxford Handbook of the History of Modern Cosmology*, edited by H. Kragh and M.S. Longair. Oxford: Oxford University Press (2019), pp. 426-464.

A17. "The Cosmos As Involving Local Laws and Inconceivable without Them", with Yann Benétreau-Dupin. *The Monist* (2017) **100** (3): 357-372.

A16. "Inflation and the Origins of Structure," in *Beyond Einstein: Perspectives on Geometry, Gravitation, and Cosmology in the Twentieth Century*, edited by D. Rowe, T. Sauer, and S. Walter. *Einstein Studies* (Volume 14), Boston: Springer (2018): pp. 205-241.

A15. "Testing Inflation," in *Philosophy of Cosmology*, edited by K. Chamcham, J. D. Barrow, J. Silk and S. Saunders. Cambridge: Cambridge University Press (2017), pp. 206-227.

A14. "Philosophy of the Physical Sciences," with Carl Hoefer. In *Oxford Handbook of the Philosophy of Science*, ed. by Paul Humphreys. Oxford: Oxford University Press (published online 2015; in print Sept. 2016).

A13. "Philosophical Geometers and Geometrical Philosophers," in *The Language of Nature: Reassessing the Mathematization of Natural Philosophy in the Seventeenth Century*, edited by B. Hill, G. Gorham, and E. Slowik. Minneapolis: University of Minnesota Press (2016), pp. 308-338.

A12. "Predictability crisis in early universe cosmology." *Studies in the History and Philosophy of Modern Physics* **46** (2014): 122-133.

A11. "Newton's *Principia*," with Eric Schliesser. In *Oxford Handbook for the History of Physics*, edited by J. Buchwald and R. Fox. Oxford: Oxford University Press (2014), pp. 109-165.

A10. "Einstein's Role in the Creation of Relativistic Cosmology." In *The Cambridge Companion to Einstein*, edited by M. Janssen and C. Lehner. Cambridge University Press (2014), pp. 228-269.

A9. "Time in Cosmology," in *The Blackwell Companion to the Philosophy of Time*, ed. by A. Bardon and H. Dyke. Oxford: Blackwell (2013), pp. 201-219.

A8. "Philosophy of Cosmology," in *Oxford Handbook for the Philosophy of Physics*, edited by R. Batterman. Oxford: Oxford University Press (2013), pp. 607-652.

A7. "Cotes' Queries: Newton's Empiricism and Conceptions of Matter," with Z. Biener. In *Interpreting Newton: Critical Essays*, edited by A. Janiak and E. Schliesser. Cambrdige: Cambridge University Pres (2012), pp. 105-137.

A6. "Time Travel and Time Machines," with C. Wüthrich. In *Oxford Handbook on Time*, edited by C. Callender. Oxford: Oxford University Press (2011), pp. 577-630.

A5. "Mie's Theories of Matter and Gravitation," with C. Martin. In *The Genesis of General Relativity*, pp. 623-632.

A4. "Do the Laws of Physics Forbid the Operation of Time Machines?" (with J. Earman and C. Wüthrich). *Synthese* **169** (2009): 91-124.

A3. "The Elusive Higgs Mechanism." *Philosophy of Science* **73** (2006): 487-499.

A2. "False Vacuum: Early Universe Cosmology and the Development of Inflation," in *The Universe of General Relativity*, edited by J. Eisenstaedt and A. J. Kox, *Einstein Studies* Vol. 11, Boston: Birkhauser (2005), pp. 223-257.

A1. "Pendulums, Pedagogy, and Matter: Lessons from the editing of Newton's *Principia*," with Zvi Biener, *Science and Education* **13** (2004): 309-320. Reprinted in Matthews, M., Gauld, C., and Stinner A. (eds.), *The Pendulum: Scientific, Historical, Philosophical, and Educational Perspectives* (2005), Dordrecht: Springer.

Book Reviews

R8. Essay Review of *Kant's Construction of Nature*, by Michael Friedman. *Philosophy of Science* **82** (2015): 718-726.

R7. Review of *Newton and the Origin of Civilization*, by Jed Buchwald and Mordechai Feingold. *HOPOS* **4** (2014): 383-387.

R6. Review of *Geometric Possibility*, by Gordon Belot. *Philosophia Mathematica* **21** (2013): 416-421.

R5. Essay Review of Richard Healey, *Gauging What's Real*, *Metascience* **18** (2009): 11-22.

R4. "Tools without Theories," review of *Drawing Theories Apart: The Dispersion of Feynman Diagrams in Postwar Physics*, by D. Kaiser. *Metascience* **15** (2006): 333-337.

R3. Review of *Reading Natural Philosophy*, edited by D. Malament, *Studies in the History and Philosophy of Modern Physics* 36 (2005): 194-199.

R2. Review of *The Future of Spacetime*, Stephen Hawking et al., *Studies in the History and Philosophy of Modern Physics* **34** (2003): 680-683.

R1. Essay review of *The Cambridge Companion to Newton*, with Zvi Biener. *Notre Dame Philosophical Review* 2003.01.04, published online at http://ndpr.nd.edu.

Other Publications

O3. "Philosophy of Cosmology," with George Ellis. *Stanford Encyclopedia of Philosophy* (*link*).

O2. "Cosmology," entry in the *Routledge Companion to the Philosophy of Science*, second edition, edited by S. Psillos and M. Curd. New York: Routledge, 2013, pp. 609-620.

O1. Entry on Dennis Sciama, for *New Dictionary of Scientific Biography*, ed. by N. Koertge et al. New York: Scribner's.

Selected Works in Progress

Books and Edited Collections

WP6. *Oxford Handbook of Newton*, co-editor with Eric Schliesser. Roughly two thirds of chapters now published online (at Oxford Handbooks Online), print volume expected to appear in 2021.

WP5. *Time and Again: On the Logical, Metaphysical, and Physical Possibility of Time Travel*, with J. B. Manchak and C. Wüthrich. Proposal accepted by Oxford University Press (Oxford, UK).

WP4. *The Aim and Structure of Cosmological Theory*, with Jim Weatherall. Book proposal accepted by Oxford University Press (Oxford, UK) as of July 2018, expected publication in 2021.

WP3. *Turning Data into Evidence: Festschrift for George E. Smith* (working title), edited volume, co-edited with Eric Schliesser and Marius Stan. Proposal accepted as part of *Boston Studies in the Philosophy and History of Science*, Springer.

Articles and Book Chapters

WP2. "Cosmology and Physical Astronomy in the General Scholium," in *Newton's General Scholium*, edited by S. Snobelen, S. Ducheyne, and S. Mandelbrote. Refereed and accepted, to be published in 2021.

WP1. "Rethinking the Cosmological Constant Problem," with Adam Koberinski.

Invited Talks

IT62. "Censorship and the Limits of GR," Black Hole Institute, Harvard, colloquium (Feb. 25, 2020).

IT61. "Explaining the Initial State?" NYU Abu Dhabi Conference on Foundations of Cosmology and Quantum Gravity, invited speaker (Jan. 18, 2020).

IT60. "General Relativity Stands Alone?" McGill Space Institute, colloquium (Oct. 1, 2019).

IT59. "How Scientific Theories get their Content: (Replacing) A Just-So Story," Fifth Annual HPSC Lecture, McGill (Sept. 16, 2019).

IT58. "Two Challenges to Cosmological Probabilities," invited speaker at Probabilities in Cosmology, Gröningen (June 22-23, 2019).

IT57. Invited keynote speaker at Urbino Summer School in Philosophy of Physics (series of four talks, June 17-20, 2019).

IT56. "Newton and Phenomenalism," invited speaker at 2019 Du Châtelet Prize Workshop, Duke University (April 4-5, 2019; presented remotely due to scheduling conflicts).

IT55. "Q.E.D., QED," Invited speaker at Deutsche Physikalische Gesellschaft, spring meeting in Munich (March 20, 2019).

IT54. "Fine Tuning and the Scope of Physical Laws," invited speaker at Understanding Our Place in the Universe symposium, Jerusalem (March 17-19, 2019).

IT53. "Spacetime Geometry of the Universe," invited speaker at The Origins and Evolution of Space-Time, Pontifical Lateran University, Rome (November 27-28, 2018).

IT52. Panelist in "Shedding Light on Dark Matter," Presidential Symposium at the Philosophy of Science Association meeting, Seattle (November 2, 2018).

IT51. "Reflections on the Newtonian Style," invited speaker at "On the Question of Evidence" (conference in honor of G.E. Smith), Tufts University (May 2018).

IT50. "Philosophical Views on Evidence in Cosmology," invited participant and speaker at Seven Pines Symposium, Minnesota (May 2018).

IT49. "Eliminative Reasoning in Cosmology," invited speaker at "Scientific Theory Construction: Measurement and Empirical Constraints" (Montreal, UQAM, May 2018) and at the International Summer School: Particle Physics at the Crossroads (Wüppertal, July 2018).

IT48. "Shifting Status of the Expanding Universe Models," invited speaker at Thinking about Space and Time: 100 Years of Applying and Interpreting General Relativity, Bern, Switzerland (September 2017).

IT47. "Underdetermination in the Early Universe," invited speaker at Probing the spacetime fabric: from concepts to phenomenology conference in Trieste, Italy (July 2017).

IT46. "Some Reflections on the Structure of Cosmological Knowledge," invited speaker at The Philosophy of Howard Stein, University of Chicago (June 2017).

IT45. "Confirming QED," Symposium: The Relationship Between Quantum Field Theory And High-Energy Particle Physics, Canadian Society for the History and Philosophy of Science (May 2017).

IT44. "Newtonian Time," Annual Conference in the History of Metaphysics: Time. University of Toronto (April 2017).

IT43. "Explaining the Initial State," Foundations of Cosmology Workshop, University of Michigan (April 2017).

IT42. "Explaining the Origin of the Universe," Invited Symposium: Philosophy of Physics and Cosmology in Practice, APA Pacific Division Meeting in Seattle, WA (April 2017).

IT41. "Challenges to Primordial Cosmology," Methodology and Epistemology in Cosmology conference, UC Irvine, Irvine, CA (February 2017).

IT40. "Newton's Empiricism," Annual Colloquium Series, Institute for the History and Philosophy of Science and Technology at the University of Toronto, (February 2017).

IT39. "Einstein's General Theory of Relativity," at the Royal Astronomical Society of Canada London Centre monthly meeting at the Cronyn Observatory (January 2017).

IT38. "Measurement and Content," at the University of Cincinnati (January 2017).

IT37. "Measurement and Empirical Content," Annual Lecture Series (invited), University of Pittsbrugh Center for Philosophy of Science (February 2016).

IT36. "All Roads Lead to General Relativity," Centenary Conference on the History of General Relativity, Berlin (Dec. 2015).

IT35. "Gaining Access to the Early Universe," Philosophy of Science conference at Inter-University Centre, Dubrovnik (April 2015), LMU Munich (Dec. 2015), Stanford History and Philosophy of Science Colloquium (March 2016).

IT34. "Predictions in Eternal Inflation," invited speaker at the Rutgers Workshop on Philosophy of Cosmology. Rutgers, New Brunswick NJ (April 2014).

IT33. "Three Positions on Gauge Symmetry," invited speaker at the UC Irvine workshop on Foundations of Gauge Theories. UC Irvine (March 2014).

IT32. "Bayesian Anthropics" and "Predictions in Eternal Inflation," invited speaker at the Fourth Oxford Minicourse: Anthropics, Selection Effects, and Fine-Tuning in Cosmology. St. Anne's College, Oxford (December 2013).

IT31. "Reflections on the Cosmological Constant," invited speaker at Relativity Meets Quantum Theory. LSE, London (Nov. 2013).

IT30. "Cosmology and Physical Astronomy," invited speaker at "Newton's General Scholium to the *Principia*." King's College, Halifax (Oct. 2013).

IT29. "Cosmological Laws without Real Time," invited speaker at Boston University Colloquium on the Philosophy of Science, "Time in Cosmology." Boston University (Oct. 2013).

IT28. "Time's Arrow in Cosmology," invited talk at Time and Matter conference, Venice, Italy (March 2013).

IT27. "Philosophical Geometers and Geometrical Philosophers," paper presented at Mathematization of Nature workshop, London, ON (Oct. 2012).

IT26. "Measurement and Underdetermination," Institute for the History and Philosophy of Science and Technology, University of Toronto, Colloquium talk (January 2012); Canadian Society for the History and Philosophy of Science meeting (Waterloo, May 2012).

IT25. "Multiverse Theories in Cosmology," Philosophy of Science conference at Inter-University Centre, Dubrovnik (April 2012).

IT24. "Predictability Crisis in Early Universe Cosmology," paper given at Philosophy of Cosmology workshop, Granada, Spain, September 2011.

IT23. "Determinism in General Relativity," invited talk at Universitat Autonoma de Barcelona, September 2011.

IT22. "Time Travel and Determinism in General Relativity," talk at philosophy of time workshop, North Carolina State, April 2011.

IT21. "Philosophical Aspects of Black Holes." Invited plenary talk at the Deutsche Physikalische Gesellschaft, Bonn. March 2010.

IT20. "From the H-Bomb to the Big Bang." Department of Physics and Astronomy Colloquium, UWO. December 2009.

IT19. "Time Travel and Time Machines." (Based on paper with Christian Wüthrich.) Southern California Philosophy of Physics Reading Group. University of California, Irvine. May 2009.

IT18. "The Effectiveness of Group Theory in Quantum Mechanics." Southwest Ontario Philosophy of Physics Group. Perimeter Institute. March 2009.

IT17. "The Epistemology of Cosmology." Tufts University, Philosophy Department Colloquium. October 2008.

IT16. "Inflation as a Theory of Structure Formation." Invited speaker at Beyond Einstein: Perspectives on Geometry, Gravitation, and Cosmology in the 20th Century. Johannes Gutenberg Universität, Mainz, Germany. September 2008.

IT15. "The Cosmological Constant Problem." Alumni Lecture, Department of History and Philosophy of Science, University of Pittsburgh. March 2008.

IT14. Philosopher in Residence, Oklahoma State University. (Public lecture and departmental colloquium). March 2007.

IT13. "The Limits of Evidential Reasoning in Newton's Argument for Universal Gravitation," with Zvi Biener. Invited speaker at Newton as/and Philosophy. Leiden, Netherlands, June 2007.

IT12. "From the H-Bomb to the Big Bang" (invited speaker). UCLA History of Science Colloquium Series, April 2007.

IT11. "Confirming Inflation?" Deutsche Physikalische Gesellschaft (invited speaker), Heidelberg, March 2007; Utrecht University Institute for the History and Foundations of Science (invited speaker), June 2007.

IT10. "Fine-Tuning Problems and Early Universe Cosmology," UWO and Caltech. January 2007.

IT9. "Gravitational Energy and Substantivalism." Second Conference on the Ontology of Spacetime. Montreal, June 2006.

IT8. "Einstein and the Birth of Relativistic Cosmology." UCSD Science Studies Colloquium, April 2006.

IT7. "Theory and Evidence in Early Universe Cosmology." Indiana University History and Philosophy of Science Colloquium, Feb. 2006.

IT6. "Newton on Constrained Motion: Methodological Morals from Section X of the *Principia*" (based on paper with George Smith). Stanford History and Philosophy of Science Colloquium, Nov. 2005; Indiana University History and Philosophy of Science, Feb. 2006; Newton as / and Philosophy, Leiden, June 2007.

IT5. "Realism and Newton's Invisible Realm." Invited speaker at Second German-American Frontiers of the Humanities conference, sponsored by the American Philosophical Society and Humboldt Foundation. Hamburg, Oct. 2005.

IT4. "Fine Tuning Problems in Cosmology." University of California, Irvine, Department of Logic and Philosophy of Science Colloquium Series, Dec. 2004.

IT3. "Pursuit and Persuasion in Inflationary Cosmology." University of Minnesota, History of Science and Technology Colloquium, Dec. 2002; History of Science Society, Nov. 2002.

IT2. "Physics and Philosophy at the Absolute Zero of Time." University of Chicago, Committee on the Conceptual and Historical Studies of Science and UCLA Department of Philosophy, Feb. 2002.

IT1. "An Inflationary Field: Two Decades of Early Universe Cosmology." Yale University Department of History, Feb. 2002.

IT0. "False Vacuum: Early Universe Cosmology and the Discovery of Inflation," invited speaker at Sixth International Conference on the History of General Relativity, Amsterdam. June 2002.

Academic Talks

AT27. "Epistemology of Structure Formation Simulations," with Sarah Gallagher. Symposium presentation at the Philosophy of Science Association meeting, Seattle (November 3, 2018).

AT26. "Analysis of Singular Spacetimes," presentation at the Rotman Summer Institute on Philosophy of Cosmology (June 2018).

AT25. "Mechanical Explanations and the Direction of Time," Franke Program in Science and the Humanities (Yale). Organizer, moderator of discussion, featuring talks by David Albert and Tim Maudlin. (April 2015.)

AT24. "Spacetime and Dualities," with Keizo Matsubara. Beyond Spacetime Conference, UC San Diego (March 2015).

AT23. Author meets critics session for *Kant's Construction of Nature*, by M. Friedman. Central Division of the American Philosophical Association, St. Louis (February 2015).

AT22. "Physics Meets Philosophy in the Early Universe," Whitney Humanities Center, Yale University, Fellow's luncheon talk. (October 2014.)

AT21. Invited participant and speaker, Summer School in Philosophy of Cosmology. Santa Cruz (July 2013).

AT20. "Confirming Inflation?," *Philosophy of Science Association meeting* contributed paper, San Diego (Nov. 2012).

AT19. "Higgs and Confinement," paper given in a symposium, co-organized with Michael Stöltzner, at *Philosophy of Science Association Meeting*. Montreal, November 2010.

AT18. "Determinism and General Relativity," contributed paper, with Christian Wüthrich, given at *Philosophy of Science Association Meeting*. Montreal, November 2010.

AT17. "Cosmological Laws," paper given at *Laws of Nature: Their Nature and Knowability*. Perimeter Institute. May 2010.

AT16. "Quantitative Empiricism," paper given at *Newton and Empiricism*. University of Pittsburgh, Center for the Philosophy of Science, April 2010.

AT15. "What is a Higgs Boson?," paper given in symposium "The Higgs, Goldstone, and the LHC," at the European Philosophy of Science Association Conference. Vrije Universiteit, Amsterdam. October 2009.

AT14. Invited Commentator, "Philosophy of Cosmology 2009: Characterising Science and Beyond," University of Oxford. September 2009.

AT13. "Two Aspects of Group Theory and Quantum Mechanics." History of Quantum Physics 2. Utrecht University, Utrecht, Holland. July 2008.

AT12. "Measurements and Limits in Section 10 of Newton's *Principia*," (based on paper with George Smith). & HPS Conference in Integrated History and Philosophy of Science, Pittsburgh. October 2007.

AT11. Invited Commentator, Symposium on Time and Relativity. Institute for Advanced Study, University of Minnesota. October 2007.

AT10. Invited Commentator on Physical Relativity by Harvey Brown. American Philosophical Association, Pacific Division meeting. San Francisco, April 2007.

AT9. "Alternatives in Early Universe Cosmology." Seventh International Conference on the History of General Relativity. Tenerife, March 2005.

AT8. "The Elusive Higgs Mechanism." Philosophy of Science Association Annual Meeting, Nov. 2004. Session organizer.

AT7. "Causation and Gravitation." UCLA conference in History and Philosophy of Science, Nov. 2004. Conference co-chair.

AT6. "The Poor Man's Accelerator." Dibner Institute Colloquium. March 2003.

AT5. "Does Gravity Feign? Newton, Cotes, and the Essential Properties of Matter," with Zvi Biener. HOPOS fourth biennial Congress, Montreal. June 2002.

AT4. "Is Gravity at the Heart of the Matter? Mathematics and Philosophy in the Newton-Cotes Correspondence," with Zvi Biener. CSHPS Annual Meeting, Toronto. May 2002.

AT3. "Evolving Laws?" University of Western Ontario Graduate Conference in Logic, Math, and Physics. London, Ontario. May 2001.

AT2. "Predicting Isotropy: Chaotic Cosmology and the Horizon Problem." Joint Atlantic Seminar in the History of the Physical Sciences, George Washington University. Sep. 1999.

AT1. "Observational Indistinguishability and Global Structure." Graduate Conference in Logic and Philosophy of Science, Carnegie Mellon University. Mar. 1999.

Public Talks (selected)

OT8. CBC Ideas, *The Relativity Revolution: Albert Einstein and the making of the modern world* (*link*). Panel discussion with Doreen Fraser and Bianca Dittrich, moderated by Nahlah Ayed. (Stratford, August 2019; broadcast Dec. 2019.)

OT7. Panelist for Forest City Film Festival, discussion of *The Truth is in the Stars*, London (October 2017).

OT6. "How is Scientific Cosmology Possible?" O'Hara Lecture in Philosophy of Physics, University of Washington, Seattle (October 2017).

OT5. "Does Science Make Progress?," Philosophy of Science Cafe in Robarts Research Institute, UWO (July 2016).

OT4. "Why Mercury made Einstein's Heart Flutter," UWO Astronomy, public event for transit of Mercury (May 2016).

OT3. "Einstein's Universe," Classes without Quizzes, UWO (November 2015); Royal Astronomical Society of Canada (January 2017).

OT2. "Einstein's Path to a New Theory," London Public Library, Einstein Centenary (October 2015).

OT1. "Is Cosmology Possible as a Science?," invited public talk at the Royal Institute, London, UK (June 2013).

Courses Taught

Western University

- Philosophy 226: Philosophy of Science
- Philosophy 1022: Advanced Introduction to Philosophy (2011 G, 2012G)
- Philosophy 2032: Einstein for Everyone (2010 G, 2011 G, 2015 G)
- Philosophy 2320: Philosophy for Integrated Science (2017G, 2018G)
- Philosophy 2500: Introduction to Theory of Knowledge (2008 G, 2009 F, 2010 G)
- Philosophy 329 / 3320: Philosophy of Quantum Mechanics (2007 G, 2008 G)
- Philosophy 3330: Philosophy of Space and Time
- Philosophy 419: Seventeenth Century Natural Philosophy
- Philosophy 754: Foundations of Relativity Theory
- Philosophy 9203: Explanation and Evidence
- Philosophy 9209: Empiricism and the Philosophy of Science
- Philosophy 9224: Philosophy of Cosmology
- Philosophy 9227: Philosophy of Space and Time
- Philosophy 9229: Symmetry in Philosophy and Physics
- Philosophy 9250: Philosophy of Physics
- Philosophy 9620: Empiricism and the Structure of Theories
- Philosophy 9635: Proseminar (2011 – co-taught with Tracy Isaacs, 2013 F)
- Directed Reading Course: Foundations of Classical Field Theory

University of California, Los Angeles

- Philosophy 8: Introduction to Philosophy of Science (lower level undergraduate)
- Philosophy 119: Seventeenth Century Natural Philosophy (upper level undergraduate)
- Philosophy 124: Historical Introduction to the Philosophy of Science (upper level undergraduate)
- Philosophy 130: Philosophy of Space and Time (upper level undergraduate)
- Philosophy 131: Science and Metaphysics (upper level undergraduate)
- Philosophy 225: Confirmation Theory (graduate seminar)
- Philosophy 232: Kant's *Metaphysical Foundations of Natural Science* (graduate seminar)
- Philosophy 232: Scientific Realism (graduate seminar)
- Philosophy 224: Philosophy of Space and Time (graduate seminar)

Graduate Supervision

Master's thesis:

- Ari Meadow, Dawn Starr (UCLA, 2006)
- Melissa Jacquart (2012)
- Roger Wilkinson (2018)

PhD committee member:

- Ioan Muntean (UCSD, Department of Philosophy), defended August 2009.
- Alex Manafu (UWO, Philosophy), thesis: "Emergence and Reduction in Science. A Case Study." Degree conferred Dec. 2011.
- Morgan Tait (UWO, Philosophy), thesis: "The Case for Quantum State Realism." Degree conferred May 2012.
- James Overton (UWO, Philosophy), thesis: "Explanation in *Science*." Degree conferred August 2012.
- Nicolas Fillion (UWO, Philosophy), thesis: "The Reasonable Effectiveness of Mathematics in the Natural Sciences." Degree conferred December 2012.
- Robert Moir (UWO, Philosophy), thesis: "Structures in Real Theory Application: A Study in Feasible Epistemology." Defended August 2013.
- Amy Wuest (UWO, Philosophy), thesis: "Science in the Social Context: Philipp Frank on Pragmatism, Theory Acceptance, Sociology, and the Unity of Science." Degree conferred August 2015.
- Molly Kao (UWO, Philosophy), thesis: "Evaluating the Quantum Postulate in the Context of Pursuit." Degree conferred May 2016.
- Nora Boyd (University of Pittsburgh, History and Philosophy of Science), thesis: "Scientific Progress at the Boundaries of Experience" (John Norton, supervisor). Prospectus defended June 2015, thesis successfully defended April 2018.
- Jamie Shaw (UWO, Philosophy), thesis: "Feyerabend and Pluralism." Prospectus defended July 2016, thesis successfully defended July 2018.
- Job Morales (UWO, Philosophy), thesis: "Dispositional Causal Realism." Prospectus defended December 2017.
- Adam Koberinski (UWO, Philosophy), thesis: "Theory construction in high-energy particle physics." defended August 2019.

PhD examiner:

- Dylan Gault (UWO, Philosophy), thesis: "Contemporary Cosmology as a Case Study in Scientific Methodology." Degree conferred December 2009.
- Spencer Hey (UWO, Philosophy), thesis: "Meta-heuristic Strategies in Scientific Judgment." Defended on Sept. 28, 2011.
- Michael Cuffaro (UWO, Philosophy), thesis: "On the Physical Explanation for Quantum Computational Speedup." Defended on March 11, 2012.
- Ryan Samaroo (UWO, Philosophy), thesis: "Some disputed aspects of inertia, with particular reference to the equivalence principle." Defended on August 28, 2013.
- Aaron Sidney Wright (University of Toronto, IHPST), thesis "More than Nothing: Histories of the Vacuum in Theoretical Physics, 1927-1981." Defended on July 31, 2014.
- Joshua Luczak (UWO, Philosophy), thesis: "On Non-equilibrium Statistical Mechanics." Defended on August 17, 2015.
- Matthew Ivanowich (UWO, Philosophy), thesis: "Representationalism About Sensory Phenomenology." Defended on Nov. 5, 2015.
- Fereshte Rajabi (UWO, Phyics and Astronomy), thesis: "Dicke's Super-radiance in Astrophysics." Completed on Sept. 3, 2016.
- Justin Bzovy (UWO, Philosophy), thesis: "Species Pluralism." Defended August 2016.
- Feraz Azhar (Cambridge University, Philosophy), thesis: "Probabilistic Reasoning in the Inflationary Multiverse." Defended successfully June 21, 2017.

- Robert Moir (Western, Applied Mathematics), thesis: "Feasible Computation in Symbolic and Numeric Integration." Defended successfully Dec. 15, 2017.

PhD supervision (all UWO, Philosophy):

- Yann Benétreau-Dupin, *Probabilistic Reasoning in Cosmology*, completed on Nov. 2, 2015.
- Saad Anis, *On the Role of Mathematics in Scientific Representation*, completed on March 21, 2016.
- Melissa Jacquart, *Similarity, Adequacy, and Purpose: Understanding the Success of Scientific Models*, completed on Oct. 12, 2016.
- Nathaniel Moore, *Rethinking Individuality in Quantum Mechanics*, completed on Sept. 3, 2019.
- Craig Fox, "Sciences that Investigate the Past," prospectus defended in June 2016.
- Marie Gueguen, *On Separating the Wheat from the Chaff: Surplus Structure and Artifacts in Scientific Theories*, completed on Sept. 3, 2019.

Postdoctoral Supervision

- Erik Curiel (July 2010 - August 2013)
- Giovanni Macchia (Sept. 2012 - Sept. 2013), funded by Goverment of Canada Post-Doctoral Research Fellowships for International Scholars
- Keizo Matsubara (Sept. 2013 - August 2015).
- Marc Holman (Aug. 2016 - July 2018), funded by John Templeton Foundation Grant.
- Michael Cuffaro (July 2017 - June 2019), funded by FQXi grant (PI: Markus Müller).
- Klodian Coko (August 2017 - July 2019), Rotman Institute postdoctoral fellow.
- Adam Koberinski (Nov. 2019 - present), funded by John Templeton Foundation grant.

Professional Service

Editorial Work

- Associate editor, *Philosophy of Science*, May 2012 — July 2016.
- Member of Editorial Board, *Philosophy of Science*, October 2018 — present.
- Member of Editorial Board, *Foundations of Physics*, December 2019 — present.

Conference and Workshop Organizing (selected)

- Foundations of Quantum Field Theory Workshop (held at UWO, June 12-14, 2019): chair of organizing committee (inculding Doreen Fraser, Wayne Myrvold, and Mike Miller).
- Understanding Replication Across the Sciences (held at UWO, Oct. 12-14, 2018): member of organizing committee (including Klodian Coko and Mike Anderson), funded through SSHRC Connection grant.
- Cosmology and the Future of Spacetime (held at UWO, June 12-14, 2017): chair of organizing committee (including Jim Weatherall), funded through JTF grant.
- Computationally Assisted Mathematical Discovery and Experimental Mathematics: ACMES 2 (held at UWO, May 12-15, 2016): member of organizing committee (chaired by Rob Corless), funded through Fields Institute grant.
- Algorithms and Complexity in Mathematics, Epistemology and Science (held at UWO, May 6-8, 2015): member of organizing committee (chaired by Rob Corless), funded through SSHRC and Fields Institute grants.
- Program chair for *Philosophy of Science Association* meeting (Nov. 2014).

  I chaired a committee of 20 colleagues, charged with vetting symposium proposals and contributed papers (55 symposia proposals and 340 contributed papers, of which we selected 30 symposia and 146 contributed papers). I also worked with the PSA president and executive secretary on various aspects of planning the meeting (held Nov. 6-9, 2014). Following the meeting, I edited two special issues of *Philosophy of Science*. The PSA funded two course buy-outs to support my work.

- Science and Reality (held at UWO, Oct. 5-6, 2013): organizer.
- Program Committee, Philosophy of Science Biennial Meeting (2012); Chair: Andrea Woody
- Quantum and Geometric Possibility: Belot - Ruetsche Book Bash (held at UWO, Sept. 15, 2012): organizer.
- Emergence and Effective Field Theory workshop (held at the Perimeter Institute, Oct. 26-28, 2011): co-organizer (with Bob Batterman, Leo Kadanoff, and Lee Smolin) of international workshop, with 18 speakers and approx. 60 registered participants.
- Philosophy of Cosmology workshop (held at UWO, May 6-7, 2011): chair of organizing committee (including Erik Curiel, Dylan Gault, and Bill Harper) for two-day workshop featuring 8 international speakers from physics and philosophy.
- Philosophy of Quantum Field Theory Workshop (held at UWO, April 24-26, 2009): chair of organizing committee (inculding Wayne Myrvold and Doreen Fraser), international workshop funded by SSHRC and Fields Institute grants

Departmental Committees

- Promotion and Tenure Committee, July 2015 – June 2018.
- Appointments Committee: July 2009 – June 30, 2013, July 2016 – July 2018.
- Search Committee for senior CRC: July 2016 – June 2017.
- Search Committee for Junior CRC (joint with Applied Mathematics): July 2012 – June 2013, Sept. 2017 – July 2018.
- Rotman Institute Steering Committee: Jan. 2009 – June 2014.
- Graduate Admissions Committee: Jan. 2010 – June 2013; Jan. 2018- June 2019.
- Philosophy of Science Area Committee Chair: July 2009 – July 2011.
- Speaker's Committee, 2007-08, Chairman: Charles Weijer.

- Outreach Committee, 2007-08, Chairman: Devin Henry.
- Advisor, Undergraduate Philosophy Club. 2008-2009

Other University Service

- Faculty of Arts and Humanities representative to Faculty of Science Council: May 2009 – June 2012.

Consulting and Refereeing

- Journal Referee for: *Philosophy of Science, Studies in the History and Philosophy of Modern Physics, Noûs, Journal of the History of Philosophy, Social Studies of Science, Synthese, International Studies in the Philosophy of Science, British Journal for the Philosophy of Science, Erkenntnis, Foundations of Physics, Canadian Philosophical Association, HOPOS, Journal for General Philosophy of Science, Southern Journal of Philosophy, Monthly Notices of the Royal Astronomical Society, Journal of Philosophy, Analysis, Philosophies, Annals of Science, Studies in the History and Philosophy of Science, European Journal of Physics, Einstein Studies, Historical Studies in the Natural Sciences*
- Member of award committee for Du Châtelet Prize in Philosophy of Physics (2018)
- Referee for book manuscripts: Oxford University Press, Cambridge University Press, Routledge.
- External assessor for tenure; promotion to full professor; Habilitation
- Reviewer for grant proposals: Netherlands Organization for Scientific Research, Austrian Science Foundation, US National Science Foundation, SSHRC, John Templeton Foundation, Guggenheim Foundation

Professional Societies

- Philosophy of Science Association, History of Science Society, History of Philosophy of Science Society