# Erik Curiel

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(last updated: 26. Jan. 2021)

## EDUCATION

**Ludwig-Maximilians-Universität** Dekanat der Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft: Habilitation, admitted June 2018, expected fall 2020

**University of Chicago** Department of Philosophy: Ph.D., June 2005
Joint Ph.D. Advisors: Prof. David Malament and Prof. Howard Stein

**Harvard University** Physics and Philosophy (double major): A.B., June 1990.

## AREAS OF SPECIALIZATION

**Philosophy of Physics** Spacetime Theories; Quantum Field Theory on Curved Spacetime; Cosmology; Thermodynamics and Statistical Mechanics; Classical Mechanics; Quantum Gravity

**Philosophy of Science** Semantics of Theories; Scientific Knowledge and Reasoning; Methodology, Models, and Experiment; Evidence and Confirmation; Ontology; Realism and Instrumentalism; Causality

**Theoretical Physics** General Relativity; Black Hole Thermodynamics and Semi-Classical Gravity

## AREAS OF COMPETENCE

**Ancient Greek Philosophy** (including the ancient Greek texts)

**Philosophy of Cognitive Science and Mind**

**Moral Psychology/Action Theory**

**History of 20th Century Analytic Philosophy and Logical Empiricism**

**History of Physics**

## ACADEMIC APPOINTMENTS

**Munich Center for Mathematical Philosophy (MCMP)**

Assistant Professor (wissenschaftlicher Mitarbeiter), LMU Munich, May 2016 (ongoing, 8 months a year 2016–2019, 10 months a year 2020 onward), fully funded by 2 competitive Eigene Stelle (Single PI) grants from the Deutsche Forschungsgemeinschaft (German Research Foundation); Postdoctoral Research Fellow, Sep. 2013–Apr. 2016

https://www.mcmp.philosophie.uni-muenchen.de/people/faculty/curiel/index.html

**Black Hole Initiative**

Senior Research Fellow, Harvard Univ., Sep. 2016 (ongoing, 4 months a year 2016–2019, 2 months a year 2020 onward), by invitation

https://bhi.fas.harvard.edu/people/erik-curiel

**Rotman Institute for Philosophy**

Assistant Professor/Postdoctoral Fellow, Univ. of Western Ontario, Sep. 2010–Aug. 2013

**London School of Economics**

Tutorial Fellow, Department of Philosophy, Logic and Scientific Method, Sep. 2009–Aug. 2010

**University of Pittsburgh**

Postdoctoral Fellow, Center for Philosophy of Science, Sep. 2008–Aug. 2009

**Stanford University**

Lecturer, Philosophy Department, Sep. 1998–Aug. 1999; Humanities Fellow, Sep. 1999–Aug. 2000

**University of Chicago**

Lecturer, Philosophy Department, Winter Term 1997

## PHILOSOPHY PUBLICATIONS

**('***' prefixed means ≥75 citations; '**' ≥50 citations; '*' ≥20 citations)**

"What Can It Mean to Ask, Why Is There Something Rather Than Nothing?", in *Science, Philosophy, and Theology Engage the New Cosmology: Building on the Legacy of Stephen Hawking*, M. A. Meyers and E. Priest (Eds.), forthcoming 2021, Templeton Press; URL: <http://strangebeautiful.com/papers/curiel-what-means-something-not-nothing.pdf>

"The Many Definitions of a Black Hole", *Chinese Journal of Physics*, forthcoming 2021, Chinese translation of "The Many Definitions of a Black Hole" in *Nature Astronomy*, doi:10.1038/s41550-018-0602-1

"Schematizing the Observer and the Epistemic Content of Theories", *Studies in History and Philosophy of Modern Physics*, forthcoming 2021 (Preprint: arXiv:1903.02182 [physics.hist-ph])

"Measurement and Coordination: Reichenbachian Themes" (with Flavia Padovani), in *Neo-Kantian Perspectives on the Exact Sciences*, F. Biagioli and M. Giovanelli (Eds.), Routledge, forthcoming 2021

"Preface to Special Issue on the Philosophy of Howard Stein" (with Tom Pashby and James Weatherall), *Studies in History and Philosophy of Modern Physics*, 2020, doi:10.1016/j.shpsb.2020.09.001

"Framework Confirmation by Newtonian Abduction", *Synthese*, 2020, doi:10.1007/s11229-019-02400-9 (preprint: arXiv:1804.07414 [physics.hist-ph])

*"Singularities and Black Holes", *The Stanford Encyclopedia of Philosophy*, Spring 2019 Edition, Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/entries/spacetime-singularities>

*"On Geometric Objects, the Non-Existence of a Gravitational Stress-Energy Tensor, and the Uniqueness of the Einstein Field Equation", *Studies in History and Philosophy of Modern Physics*, 2019, doi:10.1016/j.shpsb.2018.08.003 (preprint: arXiv:0908.3322v3 [gr-qc])

***"A Primer on Energy Conditions", in *Towards a Theory of Spacetime Theories*, D. Lehmkuhl, G. Schiemann, and E. Scholz (Eds.), Einstein Studies, Birkhäuser, 2017, doi:10.1007/978-1-4939-3210-8_3 (preprint: arXiv:1405.0403 [gr-qc])

*"On the Existence of Spacetime Structure", *The British Journal for the Philosophy of Science*, 2016, doi:10.1093/bjps/axw014 (preprint: arXiv:1503.03413 [physics.hist-ph]). A manuscript containing technical appendices for the constructions and arguments, and further discussion, is available at <http://strangebeautiful.com/papers/curiel-exist-st-struct-tech-apdx.pdf>.

**"Classical Mechanics Is Lagrangian; It Is Not Hamiltonian", *The British Journal for the Philosophy of Science*, 2014, doi:10.1093/bjps/axs034

"Singularities and Black Holes in Relativistic Spacetimes" (with Peter Bokulich), *The Stanford Encyclopædia of Philosophy*, Fall 2012 Edition, Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/fall2012/entries/spacetime-singularities/>

*"General Relativity Needs No Interpretation", *Philosophy of Science*, 2009, doi:10.1086/599277

HIATUS IN ACADEMIC CAREER FOR PERSONAL REASONS, 2001–2008 (see section "Additional Information" at end of CV)

*"Against the Excesses of Quantum Gravity: A Plea for Modesty", *Philosophy of Science*, 2001, doi:10.1086/392926

*"The Constraints General Relativity Places on Physicalist Accounts of Causality", *Theoria*, 2000, URL = <http://www.jstor.org/stable/23918569>

**"The Analysis of Singular Spacetimes", *Philosophy of Science*, 1999, 10.1086/392720; a revised and extended version is available at <http://strangebeautiful.com/phil-phys.html>

## PHYSICS AND BIOLOGY PUBLICATIONS
### ('***' prefixed means ≥75 citations; '**' ≥50 citations; '*' ≥20 citations)

"Two-Dimensional Area and Matter Flux in the Theory of Causal Fermion Systems" (with Felix Finster and José Maria Isidro), 2021, *International Journal of Modern Physics D*, doi:10.1142/S0218271820500984 (Preprint: arXiv:1910.06161 [math-ph])

*"The Many Definitions of a Black Hole", *Nature Astronomy*, 2019, doi:10.1038/s41550-018-0602-1 (free read-only SharedIt link: https://rdcu.be/bfNpM; preprint: arXiv:1808.01507 [gr-qc]). Reviewed in Mark Buchanan's monthly column in *Nature Physics*, https://www.nature.com/articles/s41567-018-0299-1; the basis for an article in the popular science and culture magazine *Nautilus*, http://nautil.us/blog/think-you-know-the-definition-of-a-black-hole-think-again

"Summing over Spacetime Dimensions in Quantum Gravity" (with Felix Finster and José Maria Isidro), *Symmetry*, 2020, doi:10.3390/sym12010138 (arXiv:1910.11209 [gr-qc])

"Singularities in Reissner-Nordström Black Holes" (with Paul Chesler and Ramesh Narayan), *Classical and Quantum Gravity*, 2020, doi:10.1088/1361-6382/ab5b69 (preprint: arXiv:1902.08323 [gr-qc]); the subject of an interview and article, "Black Hole Singularities Are As Inescapable As Ex-

pected", by S. Nadis in the general science journal *Quanta*, https://www.quantamagazine.org/black-hole-singularities-are-as-inescapable-as-expected-20191202/ (December 2019)

"Numerical Evolution of Shocks in the Interior of Kerr Black Holes" (with Paul Chesler and Ramesh Narayan), *Physical Review D*, 2019, doi:10.1103/PhysRevD.99.084033 (arXiv:1808.07502 [gr-qc]); the subject of an interview and article, "Peering Inside Realistic Black Holes", by S. Nadis in the popular science magazine *Discover*, http://discovermagazine.com/2019/septemberoctober/taking-the-plunge (September/October 2019)

**"$\alpha_1$-Antitrypsin Deficiency Caused by the $\alpha_1$-Antitrypsin $\text{Null}_{\text{Mattawa}}$ Gene" (with David Curiel, Marc Brantly, Larue Stier and Ronald Crystal), *Journal of Clinical Investigation*, 1989, doi:10.1172/JCI113994

## CITATION STATISTICS AND INDICES
## (Nov. 2020, Google Scholar + ResearchGate)

| | |
|---|---|
| **total citations:** | 563 |
| **average citations:** | 21 |
| **median citations:** | 10 |
| **h-index:** | 14 |
| **i10-index:** | 17 |
| $\geq$ **75 citations:** | 1 |
| $\geq$ **50 citations:** | 4 |
| $\geq$ **20 citations:** | 11 |

## ERDŐS NUMBER 4

## RESEARCH GRANTS (€604,960 since 2016)

**Deutsche Forschungsgemeinschaft (German Research Foundation)** Eigene Stelle Grant (sole PI) for €293,800, MCMP (LMU Munich), Jan 2020–Dec. 2022, full funding for research project "Gravitation, Quantum Theory, and Thermodynamics: The Crossroads of Physics and Philosophy" (CU 338/1-2, http://gepris.dfg.de/gepris/projekt/312032894)

**Ludwig-Maximilians-Universität/Cambridge Partnership** co-PI with Dr. Jeremy Butterfield (Trinity College, Cambridge), €12,900, Dec. 2019–Dec. 2021, project: "Foundational Problems in Semi-Classical Gravity"

**Deutsche Forschungsgemeinschaft (German Research Foundation)** Eigene Stelle Grant (sole PI) for €283,260, MCMP (LMU Munich), May 2016–Dec. 2019, full funding for research project "Gravitation, Quantum Theory, and Thermodynamics: The Crossroads of Physics and Philosophy" (CU 338/1-1, http://gepris.dfg.de/gepris/projekt/312032894)

**Ludwig-Maximilians-Universität/Cambridge Partnership** co-PI with Dr. Jeremy Butterfield (Trinity College, Cambridge), €7,500, Dec. 2018–Dec. 2019, project: "Foundations of Black Hole Thermodynamics"

**Erasmus Foundation** International Academic Mobility Grant, €1,500 a year (2017–2021), annual 2-week Erasmus Fellowship, Univ. of Florence, Dept. of Letters and Philosophy

## PRIZES, HONORS, ACCOLADES

**IOP Publishing Trusted Reviewer 2020** "consistent delivery of high quality and timely reviews" for referee work for the journals *Classical and Quantum Gravity*, *European Journal of Physics*, and *Journal of Physics Communications*

**Black Hole Initiative Research Prize** $15,000 (May 2019) for "the thoughtful integration of the disciplines of both philosophy and physics" for the paper "Numerical Evolution of Shocks in the Interior of Kerr Black Holes" (with Paul Chesler and Ramesh Narayan), *Physical Review D*, 99(2019, 8):084033, doi:10.1103/PhysRevD.99.084033

## EDITED VOLUMES

Lead Guest Editor, *Synthese* topical issue, "All Things Reichenbach", forthcoming 2021 (co-guest editor Flavia Padovani)

Lead Guest Editor, *Studies in History and Philosophy of Modern Physics* special issue, proceedings of the conference "The Philosophy of Howard Stein", 2020 (co-guest editors Thomas Pashby and James Weatherall):

## VISITING FELLOWSHIPS

**Smithsonian Astrophysical Observatory** Senior Research Fellow, Radio and Geoastronomy Division (Cambridge, MA): Feb.–May 2018; Feb.–May 2019; Oct.–Nov. 2020

**University of Florence** Erasmus Fellow, Department of Letters and Philosophy: Mar. 2017; Mar. 2018; Mar. 2019; Mar. 2020; Mar. 2021

**Trinity College** Visiting Scholar, Univ. of Cambridge, Jun.–Aug. 2010

## RESEARCH AFFILIATIONS

**Causal Fermion System Global Working Group** research organization dedicated to work on the Causal Fermion System approach to quantum gravity (https://causal-fermion-system.com/)

**Trinity College (Cambridge) and MCMP (LMU Munich) Collaborative Research Group** "Foundations of Semi-Classical Gravity and Black Hole , Thermodynamics" Co-Project Leader (with Dr. Jeremy Butterfield), Jan.–Dec. 2019

**Lichtenberg Group for History and Philosophy of Physics** Univ. of Bonn, Collaboration Fellow, Oct. 2018–present

**Deutsche Forschungsgemeinschaft Research Group** "Category Theory in Philosophy of Science", Associate Member, MCMP, Nov. 2017–present

**Irvine-LSE-Munich-PoliMi-Salzburg Scientific Network for Foundations of Physics** MCMP Chair, Sep. 2017–present

**Arts and Humanities Research Council (UK) Research Group** "Time in Quantum Gravity and Cosmology", Associate Member, Univ. of Bristol, Jun. 2017–present

## MANUSCRIPTS SUBMITTED FOR PUBLICATION

"Are Classical Black Holes Hot or Cold?", submitted to *Philosophy of Science*, Feb. 2020 (arXiv:1408.3691 [gr-qc])

"Classical Black Holes Are Hot", submitted to *European Journal of Physics*, Dec. 2019 (arXiv:1408.3691 [gr-qc])

"Kinematics, Dynamics, and the Structure of Physical Theory", submitted to *The British Journal for the Philosophy of Science*, Nov. 2019 (arXiv:1603.02999 [physics.hist-ph])

"If Metrical Structure Were Not Dynamical, Counterfactuals in General Relativity Would Be Easy", submitted to *Erkenntnis*, Nov. 2019 (arXiv:1509.03866 [physics.hist-ph])

"A Simple Proof of the Uniqueness of the Einstein Field Equation in All Dimensions", submitted to *General Relativity and Gravitation*, Oct. 2019 (arXiv:1601.03032 [gr-qc])

"Measure, Topology and Probabilistic Reasoning in Cosmology", submitted to *The British Journal for the Philosophy of Science*, Sep. 2019 (arXiv:1509.01878 [gr-qc])

"On the Challenges the Sons of Ariston Pose to Socrates, and Socrates' Confounding Responses", submitted to *Apeiron*, Aug. 2019

"On the Propriety of Physical Theories as a Basis for Their Semantics", submitted to *Noũs*, Jul. 2019

"Why Rigid Designation Cannot Stand on Scientific Ground", submitted to *Mind*, Jun. 2019

## UNPUBLISHED MANUSCRIPTS

"On Learning Philosophy", <http://strangebeautiful.com/papers/curiel-learning-philosophy.pdf>

"The Delicacy of Causal Ascription and Bell's Theorem", expanded version of talk given at the American Philosophical Association's Eastern Division Conference, Atlanta, GA, Dec. 1996. <http://strangebeautiful.com/papers/curiel-bell-delicate-caus.pdf>

"On the Formal Consistency of Theory and Experiment, with Applications to Problems in the Initial-Value Formulation of the Partial-Differential Equations of Mathematical Physics", a corrected and clarified version of the last chapter of my doctoral dissertation, *Three Papers on How Physics Bears on Philosophy, and How Philosophy Bears on Physics*. URL: <http://strangebeautiful.com/papers/curiel-theory-experiment.pdf>

"The Geometry of the Euler-Lagrange Equation", <http://strangebeautiful.com/papers/curiel-geom-ele.pdf>

## SUMMER SCHOOLS AND EXTENDED SEMINARS

**Urbino International School in Philosophy of Physics XXIV** "Black Holes and the Information-Loss Paradox": 5 lectures on cosmic censorship, classical black hole mechanics, black hole thermodynamics, the Information-Loss Paradox and quantum gravity (Urbino, Jun. 2021)

**Università degli Studi di Firenze** Dipartimento di Lettere e Filosofia, Erasmus Fellow Block Seminar: "Foundations of Spacetime Theories" (Mar. 2021; Mar. 2020 [postponed due to COVID-19]; Mar. 2019; Mar. 2018; Mar. 2017)

**Università degli Studi di Urbino Carlo Bo** Dipartimento di Scienze Pure e Applicate, Block Seminar: "Singularities and Black Hole Thermodynamics in Semi-Classical Gravity" (Mar. 2020) [postponed due to COVID-19]

**Munich and Lausanne International Summer School in Philosophy of Physics VI** "The Nature of Entropy": 2 lectures on black hole entropy and information-loss (Lenzkirch-Saig, Germany, Jul. 2019)

**Urbino International School in Philosophy of Physics XXII** "Philosophy of Cosmology": 5 lectures on cosmological singularities, inflation, alternative theories of gravity, the Past Hypothesis, and fine-tuning (Urbino, Jun. 2019)

**Munich and Lausanne International Summer School in Philosophy of Physics II** "Probabilities in Physics": 1 lecture on probabilistic reasoning in cosmology and fine-tuning (Lenzkirch-Saig, Germany, Jul. 2014)

## PHILOSOPHY OF PHYSICS TALKS 2018–PRESENT
**(for older talks see p. 20 below)**

### "Interaction and Evolution in Quantum Mechanics"

- 20th UK and European Conference on Foundations of Physics (Paris, Oct. 2021)
- Black Hole Initiative, Harvard Univ., Colloquium (online, Mar. 2021)
- Université Grenoble Alpes, Quantum Engineering Institute Colloquium (Apr. 2020) [postponed due to COVID-19]
- 16th International Congress of Logic, Methodology and Philosophy of Science and Technology, Triennial Conference (Prague, Aug. 2019)
- MCMP, "Workshop on the Foundations of Quantum Mechanics" (LMU Munich, Jun. 2018)

### "Singularities in Classical and Semi-Classical Gravity—Theory Failure or New Physics?"

- Urbino International School in Philosophy of Physics XXII "Black Holes and the Information-Loss Paradox", Univ. of Urbino (Jun. 2021)
- Harvard University, Harvard Foundations of Physics Workshop "Black Holes" (online, Jan. 2021)

### "Are Classical Black Holes Hot or Cold?"

- Urbino International School in Philosophy of Physics XXII "Black Holes and the Information-Loss Paradox", Univ. of Urbino (Jun. 2021)

### "Is Black Hole Entropy Real Entropy?"

- Urbino International School in Philosophy of Physics XXII "Black Holes and the Information-Loss Paradox", Univ. of Urbino (Jun. 2021)
- Munich and Lausanne International Summer School in Philosophy of Physics VI "The Nature of Entropy" (Lenzkirch-Saig, Germany, Jul. 2019)

**"The Zeroth Law for Black Holes, and the Rest of Thermodynamics"**

- Urbino International School in Philosophy of Physics XXII "Black Holes and the Information-Loss Paradox", Univ. of Urbino (Jun. 2021)

**"Semi-Classical Gravity as Effective Field Theory and the Information-Loss Paradox"**

- Urbino International School in Philosophy of Physics XXII "Black Holes and the Information-Loss Paradox", Univ. of Urbino (Jun. 2021)
- Université de Genève, Département de Philosophie Colloquium (online, Oct. 2020)
- Università degli Studi di Urbino Carlo Bo, Dipartimento di Scienze Pure e Applicate (online, Jul. 2020)
- Univ. of Oxford, Faculty of Philosophy Colloquium (online, May 2020)
- Munich and Lausanne International Summer School in Philosophy of Physics VI "The Nature of Entropy" (Lenzkirch-Saig, Germany, Jul. 2019)

**"The Dynamics of Classical Physics Determines the Structure of Newtonian Spacetime; That of Quantum Physics Does Not"**

- Warsaw University of Technology, International Center for Formal Ontology, Warsaw Spacetime Colloquium (online, Jan. 2021)

**"Odd Models of Black Hole Evaporation, or, One Thing to Try When You Can't Solve Equations"**

- Université de Genève, Geneva Symmetry Group Colloquium (online, Nov. 2020)
- Black Hole Initiative, Harvard Univ., Colloquium (online, Nov. 2020)

**"Semi-Classical Gravity as Effective Field Theory and the Information-Loss Paradox"**

- Université de Genève, Département de Philosophie Colloquium (online, Oct. 2020)
- Università degli Studi di Urbino Carlo Bo, Dipartimento di Scienze Pure e Applicate (online, Jul. 2020)
- Univ. of Oxford, Faculty of Philosophy Colloquium (online, May 2020)
- Munich and Lausanne International Summer School in Philosophy of Physics VI "The Nature of Entropy" (Lenzkirch-Saig, Germany, Jul. 2019)

**"Relationalism, Corollary VI, and the Metaphysics of Force in *Principia*"**

- Univ. of Oxford, "Simonfest: A Conference in Honor of Simon Saunders on the Occasion of His 65th Birthday" (Jul. 2020) [postponed due to COVID-19]

**"On the Epistemological and Metaphysical Relations among Causal, Topological, Affine and Metric Structure in General Relativity"**

- Univ. of Bonn, Lichtenberg Group for History and Philosophy of Physics conference, "The Epistemology of Global and Large Scale Structure of Spacetime in General Relativity and Beyond" (Jun. 2020) [postponed due to COVID-19]

**"On the Mathematical, Physical, and Conceptual Cogency of Quantum Field Theory on Curved Spacetime"**

- Université de Genève and University of Illinois at Chicago, "Beyond Spacetime" Project Colloquium (online, Apr. 2020)

- Università degli Studi di Urbino Carlo Bo, Dipartimento di Scienze Pure e Applicate (Mar. 2020) [postponed due to COVID-19]
- Max-Planck-Institut für Wissenschaftsgeschichte, colloquium (Berlin, Jul. 2019)
- Foundations of Physics 2016, The 18th UK and European Conference on Foundations of Physics (London, Jul. 2016)
- British Society for Philosophy of Science, Annual Conference (Cardiff, Jul. 2016)

**"Matter versus Spacetime Geometry"**

- Sixth International Conference on the Nature and Ontology of Spacetime (Varna, Bulgaria, May 2020) [postponed due to COVID-19]

**"Two Paths to the Einstein Field Equation from Horizon Thermodynamics"**

- Univ. of Cambridge, Cambridge/LMU Collaboration Workshop on the Foundations of Black Hole Thermodynamics and Semi-Classical Gravity (Oct. 2019)
- Colloquium for "Space and Time After Quantum Gravity" Project (Univ. of Illinois, Chicago, Mar. 2018)
- First Annual Bristol-MCMP Workshop on Foundations of Physics, "Causal Horizons" (Bristol, Jan. 2017)

**"A Panopticon for Foundational Problems in Black Hole Thermodynamics and Semi-Classical Gravity"**

- Univ. of Cambridge, Cambridge/LMU Collaboration Workshop on the Foundations of Black hole Thermodynamics and Semi-Classical Gravity (Sep. 2019)

**"Hawking Radiation, Unruh Radiation, and the Equivalence Principle"**

- European Philosophy of Science Association, Biennial Conference (Geneva, Sep. 2019)

**"Empiricism, Quantum Theory and the Causal Theory of Time"**

- MCMP conference "All Things Reichenbach" (LMU Munich, Jul. 2019)

**"Singularities in Contemporary Cosmology"**

- Urbino International School in Philosophy of Physics XXII "Philosophy of Cosmology", Univ. of Urbino (Jun. 2019)

**"How to Decide between Dark Matter and Alternative Theories of Gravity"**

- Urbino International School in Philosophy of Physics XXII "Philosophy of Cosmology", Univ. of Urbino (Jun. 2019)

**"Measure, Topology and Probabilistic Reasoning in Cosmology"**

- Urbino International School in Philosophy of Physics XXII "Philosophy of Cosmology", Univ. of Urbino (Jun. 2019)

**"A Survey of Foundational Problems with Inflationary Cosmology"**

- Urbino International School in Philosophy of Physics XXII "Philosophy of Cosmology", Univ. of Urbino (Jun. 2019)

**"What Does It Mean to Ask Whether There Is Something Rather Than Nothing?"**

- Templeton Foundation Symposium "Understanding Our Place in the Cosmos: Beyond the Legacy of Stephen Hawking" (Mishkenot Sha'ananim Conference Center, Jerusalem, Mar. 2019)

**"What Is the Einstein Field Equation, and Why Does It Matter for Quantum Gravity?"**

- Univ. of Bonn, Inst. für Philosophie Colloquium (Dec. 2018)

**"The Many Failures of Determinism in General Relativity and Semi-Classical Gravity"**

- Black Hole Initiative, Harvard Univ., Workshop "Determinism and Indeterminism in Spacetime" (Nov. 2018)

**"Irreversibility in Thermodynamics and in Statistical Mechanics"**

- The 19th European and UK Conference on Foundations of Physics (Utrecht, Jul. 2018)

**"Entropy is Modal—What's Up with That?"**

- British Society for Philosophy of Science, Annual Conference (Oxford, Jul. 2018)

**"Thermodynamical Irreversibility Has Nothing to Do With Temporal Asymmetry"**

- MCMP, Workshop "Second Annual Joint Bristol-MCMP Workshop on the Foundations of Physics" (LMU Munich, Jan. 2018)

## PHILOSOPHY OF SCIENCE TALKS 2018–PRESENT

**(for older talks see p. 23 below)**

**"On the Epistemic Import of the Mathematical Representation of Analogue Black Holes (Or: Can Dumb Holes Speak Only in Metaphor, Never Anaphor? Or, rather: Simulacra, Saturnalia, and Wild Extrapolation)"**

- MCMP, Conference "Mathematics and Analogical Reasoning" (LMU Munich, Aug. 2021)

**"What to Do When You Can't Solve Equations"**

- MCMP, Colloquium (online, Nov. 2020)
- Wichita State Univ., Philosophy Dept. Workshop "What Equations Don't Say" (online, Jul. 2020)

**"A Sketch of a Category-Theoretic Semantics for Physical Theories"**

- MCMP, Conference "Category Theory in Philosophy of Science" (LMU Munich, Aug. 2020) [postponed]

**"Kinematics, Not Dynamics, Grounds the Modeling of Measurements"**

- Conference "Measurement at the Crossroads 2020: Measuring and Modeling" (Università Cattolica del Sacro Cuore, Milan, Jun 2020) [postponed due to COVID-19]

**"Schematizing the Observer and the Epistemic Content of Theories"**

- Univ. of Western Ontario, Rotman Institute of Philosophy, "New Directions in Philosophy of Cosmology" Research Group Seminar (online, Jun. 2020)
- Univ. of Florence, Dept. of Philosophy Colloquium (Mar. 2019)
- Univ. of Chicago, Conference "The Philosophy of Howard Stein" (Jun. 2017)
- MCMP, Conference "Making and Breaking Theories: Applying Physical Models" (LMU Munich, Jun. 2017)

**"Bayesian Confirmation as a Scientific Theory"**

- MCMP, Conference "Bayesian Philosophy of Science" (LMU Munich, Jun. 2020) [postponed due to COVID-19]

**"Representation and Realism"**

- Univ. of Salzburg, Dept. of Philosophy (KGW) Colloquium (May 2020) [postponed due to COVID-19]
- Univ. of Florence, Dept. of Philosophy Colloquium (Mar. 2020) [postponed due to COVID-19]

**"How Can Physics Bear on Ontology? Or, The Dialectical Dance of Realism and Instrumentalism"**

- Boston Colloquium for Philosophy of Science, Center for Philosophy & History of Science, Boston Univ. (Feb. 2020)
- MCMP Colloquium (LMU Munich, Nov. 2018)
- Univ. of Barcelona, Dept. of Philosophy Colloquium (Nov. 2018)
- 5th Bi-Annual South African Philosophy of Science and Logic Conference, Keynote Speaker (Rhodes Univ., Grahamstown, South Africa, Jan. 2017)

**"Why Rigid Designation Cannot Stand on Scientific Ground"**

- MCMP Colloquium (LMU Munich, Nov. 2019)
- Ninth European Congress of Analytic Philosophy, Triennial Conference (LMU, Munich, Aug. 2017)
- Philosophical Society of South Africa, Annual Conference (Grahamstown, SA, Jan. 2017)
- Univ. of Pittsburgh, Center for the Philosophy of Science Colloquium (Feb. 2009)

**"Kinematics, Dynamics, and the Structure of Physical Theory"**

- Univ. of Bonn, Inst. für Philosophie Colloquium (Oct. 2019)
- Philosophy of Science Association, Biennial Conference (Atlanta, Nov. 2016)
- Univ. of Pittsburgh Center for Philosophy of Science, Quadrennial Fellows Conference, Plenary Session (Lund, Sweden, Jul. 2016)
- MCMP, Conference "The Semantics of Physical Theories" (Jun. 2016)

**"The Categories of Physical Systems and Theories"**

- MCMP, Conference "Categorical Equivalence in Philosophy of Science" (LMU Munich, Jul. 2018)

**"Semantics of Theories: Epistemology, Yes; Ontology, No"**

- Univ. of Florence, Dept. of Philosophy Colloquium (Mar. 2018)
- European Philosophy of Science Association, Biennial Conference (Exeter, UK, Sep. 2017)

## PHYSICS AND MATHEMATICS TALKS 2018–PRESENT

**(for older talks see p. 24 below)**

**"Semi-Classical Gravity as Effective Field Theory and the Information-Loss Paradox"**

- Univ. of Regensburg, Lehrstuhl for Mathematik Colloquium (online, Jul. 2020)

**"Marolf's Boundary Unitarity Argument and Related Holography Arguments against Information Loss Beg the Causal Question"**

- Perimeter Inst., Conference "2020 Quantum Gravity" (online, Jul. 2020)

**"What Is the Einstein Field Equation, and Why Does It Matter for Quantum Gravity?"**

- City Univ. of Dublin, Centre for Astrophysics and Relativity Seminar (Nov. 2019)
- Center for Astrophysics, Inst. for Theory and Computation Colloquium (Harvard Univ., Mar. 2017)
- Max Planck Inst. for Gravitational Physics, Albert Einstein Inst. Conference "Dashed Hopes: What Hasn't Worked in Quantum Gravity (and Why)?" (Berlin, Jul. 2016)
- Radboud Univ., High Energy Physics Group, Colloquium (May 2016)

**"A Survey of Foundational Problems for Classical Black Holes and the Hawking Effect"**

- Center for Interdisciplinary Exploration and Research in Astrophysics colloquium, Northwestern Univ. (Evanston, IL, May. 2019)

**"How to Decide between Dark Matter and Alternative Theories of Gravity"**

- Inst. for Theoretical Particle Physics and Cosmology, RWTH Aachen Univ., Conference "Dark Matter and Modified Gravity" (Aachen, Germany, Feb. 2019)

**"The Problem of the Interior for Holographic Black Holes"**

- Tsinghua Univ., Yau Mathematical Sciences Center, Tsinghua Sanya International Mathematics Forum Conference "Black Holes and Holography" (Sanya, Hainan Province, China, Jan. 2019)

**"On the Existence of Translation-Invariant Borel Measures on Infinite Dimensional Fréchet Manifolds"**

- Hong Kong Univ. of Science and Technology, Inst. for Advanced Study Conference "Black Holes, Inflation, and Gravitational Waves" (Hong Kong, Jan. 2019)

**"On the Mathematical, Physical, and Conceptual Cogency of Quantum Field Theory On Curved Spacetime"**

- Tsinghua Univ., Yau Mathematical Sciences Center Colloquium (Beijing, Jan. 2019)
- Max Planck Inst. for Mathematics in the Sciences, Conference "Progress and Visions in Quantum Theory in View of Gravity: Bridging Foundations of Physics and Mathematics" (Leipzig, Sep. 2018)
- Deutsche Physikalische Gesellschaft (German Physics Society), Annual Conference (Hamburg, Mar. 2016)

**"Two Paths to the Einstein Field Equation from Horizon Thermodynamics"**

- Univ. of Regensburg, Lehrstuhl for Mathematik Colloquium (Dec. 2018)

**"Measure, Topology and Probabilistic Reasoning in Cosmology"**

- City Univ. of Dublin, Centre for Astrophysics and Relativity Seminar (Dec. 2018)
- Erwin Schrödinger International Inst. for Mathematics and Physics, Conference "Concepts of Probability in the Sciences" (Vienna, Oct. 2018)
- Univ. of Oxford, Dept. of Physics Workshop "Fine-Tuning in Cosmology" (Oxford, Oct. 2017)
- Munich and Lausanne International Summer School in Philosophy of Physics II "Probabilities in Physics" (Lenzkirch-Saig, Germany, Jul. 2014)

**"Energy Conditions in Spacetime Theories"**

- Univ. of York, Dept. of Physics, Conference "Energy Conditions in Quantum Theory and Gravity" (Sep. 2018)

**"A Strengthened Zeroth Law for Black Hole Thermodynamics"**

- Black Hole Initiative, Colloquium (Harvard Univ., Mar. 2018)
- NEB-17: Recent Developments in Gravity, Hellenic Society for Relativity, Gravitation and Cosmology Annual Conference (Mykonos, Sep. 2016)
- Radboud Univ., High Energy Physics Group, Colloquium (May 2016)

## ANCIENT PHILOSOPHY TALKS

**"The Structure of Phronēsis in *Ethica Nicomachea*, Book VI"**

- Univ. Of Western Ontario, Classics Dept. Colloquium (Feb. 2012)
- Univ. of California, Berkeley, Committee on Ancient Philosophy Colloquium (May 2000)

**"On the Challenges the Sons of Ariston Pose to Socrates in the *Republic*, Socrates's Confounding Responses to Them, and the Character of Justice"**

- Univ. Of Western Ontario, Working Group on Ancient Philosophy Colloquium, (Jan. 2011)

**"Taking 'Pleasure' in Plato's *Republic*"**

- Univ. of California, Berkeley, Committee on Ancient Philosophy Colloquium (Feb. 1999)

**"On the Translation and Interpretation of Aristotle's *Generation and Corruption*, Book II, Chapter 6"**

- Midwest Ancient Philosophy Workshop (Chicago, Feb. 1998)

**"On the Translation and Interpretation of Aristotle's *Generation and Corruption*, Book II, Chapter 5"**

- Midwest Ancient Philosophy Workshop (Chicago, Nov. 1996)

## GENERAL PHILOSOPHY TALKS

**"On the Possibility of Progress in Philosophy"**

- Ludwig-Maximilians-Universität, Philosophy Faculty colloquium (Nov. 2016)

**"On the Use and Abuse of Scientific Examples in Philosophy"**

- Univ. of Ghent, Sarton Center for History of Science Colloquium (Mar. 2015)

**"On Learning, Reading, and Writing Philosophy"**

- Univ. of Kent, Dept. of Philosophy Colloquium (Sep. 2009)

## TEACHING EXPERIENCE

**Ludwig-Maximilians-Universität**

**Metaphysical Problems of Physics** Summer 2021, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**A Survey of the Philosophy of Charles Sanders Peirce** Summer 2020, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**A Survey of the Philosophy of Howard Stein** Winter 2018–19, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**Foundations of Thermodynamics and Statistical Mechanics** Winter 2017–18, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**The Structure and Semantics of Scientific Theories** Winter 2016–17, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**The Philosophy of Space, Time and Spacetime** Winter 2015–16, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**The Semantics of Scientific Theories** Summer 2015, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**Kant and the Philosophy of Science** Winter 2014–15, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, graduate seminar

**Singularities and Black Holes in Relativistic Spacetimes** Summer 2014, Fakultät für Physik (cross-listed, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft), graduate seminar

**Einstein for Everyone** Summer 2014, Fakultät für Philosophie, Wissenschaftstheorie und Religionswissenschaft, undergraduate course

## University of Western Ontario

**Einstein for Everyone** Spring 2013, Dept. of Philosophy, undergraduate course

**Introduction to Ancient Philosophy** Fall 2012, Dept. of Philosophy, undergraduate course

**General Relativity** Fall 2011–Spring 2012, Dept. of Physics and Astronomy (cross-listed with Dept. of Philosophy), two-term graduate course

**Contemporary Metaphysics** Spring 2011, Dept. of Philosophy, advanced undergraduate course

**Philosophy of Quantum Mechanics** Fall 2010, Dept. of Philosophy, advanced undergraduate course

## London School of Economics

**Survey of the Philosophy of Science** Spring 2010, Dept. of Philosophy, Logic and Scientific Method, graduate course

**Morality and Values** (lectures on Aristotle's *Nicomachean Ethics*) Spring 2010, Dept. of Philosophy, Logic and Scientific Method, graduate course

**Fundamental Maths for Philosophy of the Special Sciences** Spring 2010, Dept. of Philosophy, Logic and Scientific Method, informal graduate lectures (volunteer course)

**The Philosophical Foundations of Physics** Fall 2009, Dept. of Philosophy, Logic and Scientific Method, graduate course

**The History and Philosophy of Scientific Revolutions** Fall 2009, Dept. of Philosophy, Logic and Scientific Method, advanced undergraduate course

## Stanford University

**Introduction to the Humanities** Fall 1999–Spring 2000, Core Freshman Curriculum

**Philosophy of Space, Time and Spacetime** Spring 1999, Philosophy Dept., graduate and upper-level undergraduate course

**Determinism in Physics** Winter 1999, Philosophy Dept., graduate seminar (co-taught with Prof. Patrick Suppes)

**Central Topics in Philosophy of Science** Winter 1999, Philosophy Dept., upper-level undergraduate course

**Survey of Early 20th Century Analytic Philosophy** Fall 1998, Philosophy Dept., graduate and upper-level undergraduate course

### University of Chicago

**Philosophical and Scientific Understandings of Causation** Winter, 1997, Committee on the Conceptual Foundations of Science, honors upper-level undergraduate seminar

## STUDENT SUPERVISION

### PhD Theses

**Giovanni Sommazzi** (expected 2023) *On the Emergence of Spacetime in AdS-CFT and Canonical Quantum Gravity*, Primary Advisor, MCMP (LMU Munich)

**Alex Mathie** (expected 2022) *Foundational Problems in Black Hole Thermodynamics*, Primary Advisor, MCMP (LMU Munich)

**Jamee Elder** (2020) *The Epistemology of Gravitational Wave Astrophysics*, Associate Advisor (primary supervisor Prof. Don Howard), Philosophy Dept., Univ. of Notre Dame

**Martin Lesourd** (2019) *Causality, Black Holes, Prediction, and Counterfactuals in General Relativity*, External Reader (primary supervisor Dr. Chris Timpson), Faculty of Philosophy, Univ. of Oxford

**Juliusz Doboszewski** (2019) *Is General Relativity Indeterministic? Selected Case Studies*, External Reader (primary supervisor Dr. Hab. Jerzy Gołosz) Inst. of Philosophy, Jagiellonian Univ.

**Marina Baldiserra-Pacchetti** (2018) *Modeling, Uncertainty and Target Systems in Complex Sciences*, External Reader (primary supervisor Prof. Robert Batterman), Dept. of History and Philosophy of Science, Univ. of Pittsburgh

**Saad Anis** (2016) *On the Role of Mathematics in Scientific Reasoning*, External Reader (primary supervisor Prof. Chris Smeenk), Philosophy Dept., Univ. of Western Ontario

**Amy Wuest** (2015) *Philipp Frank: Philosophy of Science, Pragmatism, and Social Engagement*, External Reader (primary supervisor Prof. Kathleen Okruhlik), Philosophy Dept., Univ. of Western Ontario

**Jonathon Everett** (2014) *Constitutive or Regulative Principles? The Kantian Legacy for Contemporary Philosophy of Science*, External Reader (primary supervisor Prof. Michela Massimi), Dept. of Science and Technology Studies, Univ. College (London)

### MA Theses

**Anne Deng** (expected 2021) *The Role of Rigor and Mathematics in Philosophy of Physics: Quantum Mechanics as a Case Study in Metaphysics*, Primary Supervisor, MCMP (LMU Munich)

**Allyson (Allie) Richards** (expected 2020) *Modeling Perception in SET with Predictive Coding*, Primary Supervisor, MCMP (LMU Munich)

**Leonardo Ortiz Acuña** (2020) *The Problem of the Arrow of Time in the Context of Special Relativity*, Primary Supervisor, MCMP (LMU Munich)

**Alfredo García Cid** (2020) *The Meaning of Entropy in Quantum Statistical Mechanics*, Primary Supervisor, MCMP (LMU Munich)

**Alexander Niederklapfer** (2019) *Irreducible Representations as Particles in Quantum Field Theory*, Reader, MCMP (LMU Munich)

**Augusto Clot** (2019) *Philosophical Problems of Inflationary Cosmology*, Reader, Faculty of Philosophy, Univ. of Florence

**Giovanni Buonocore** (2018) *A Unified Account of Realism and Anti-Realism in Physics and Biology*, Joint Primary Supervisor, Faculty of Philosophy, Univ. of Padua

**Marina Baldiserra-Pacchetti** (2010) *Einstein on Locality in Quantum Mechanics*, Primary Supervisor, Dept. of Philosophy, Logic and Scientific Method, London School of Economics

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

**Foundational Questions Institute (FQXi)** by invitation (Mar. 2016)

## CONFERENCE GRANTS (€51,300 for 8 conferences)

**Ludwig-Maximilians-Universität/Cambridge Partnership** €7,500, for week-long workshop "Foundational Problems in Semi-Classical Gravity and Black Hole Thermodynamics", Univ. of Cambridge, Oct. 2019

**Deutsche Forschungsgemeinschaft (German Research Foundation)** €12,000, for international conference "All Things Reichenbach", MCMP (LMU Munich), Jul. 2019

**META, Politecnico di Milano** €3,000 for international conference "Analogical Reasoning in Science", MCMP (LMU Munich), Oct. 2018

**Deutsche Forschungsgemeinschaft (German Research Foundation)** €5,000, for international conference "The Second Law of Thermodynamics", MCMP (LMU Munich), Sep. 2017

**The Franke Institute for the Humanities (Univ. of Chicago)** $10,000, for international conference "The Philosophy of Howard Stein", The Univ. of Chicago, Jun. 2017, primary applicant

**Foundational Questions Institute (FQXi)** $4,500, for international conference "The Philosophy of Howard Stein", The Univ. of Chicago, Jun. 2017, primary applicant

**British Society for the Philosophy of Science** £300, for First Annual Bristol-MCMP Workshop on Foundations of Physics "Causal Horizons", Univ. of Bristol, Jan. 2017, primary applicant

**Deutsche Forschungsgemeinschaft (German Research Foundation)** €9,000, for international conference "The Semantics of Scientific Theories", MCMP (LMU Munich), Jun. 2016, primary applicant

## ORGANIZATION OF INTERNATIONAL CONFERENCES AND SYMPOSIA

**Foundational Problems in Semi-Classical Gravity and Black Hole Thermodynamics** LMU/Cambridge Partnership workshop (Univ. of Cambridge, Oct. 2019, 5 days, co-organizer)

**Symmetry and Equivalence in Physics** Second Annual Irvine-LSE-Munich-PoliMi-Salzburg Network Conference for Senior Researchers (Salzburg, Sep. 2019, 1.5 days, co-organizer)

**Philosophy and Foundations of Physics** Second Annual Irvine-LSE-Munich-PoliMi-Salzburg Conference for Junior Researchers (Salzburg, Sep. 2019, 1.5 days, co-organizer)

**All Things Reichenbach** MCMP (LMU Munich, Jul. 2019, 3 days, co-organizer)

**Black Holes and Holography** Yau Mathematical Sciences Center, Tsinghua Univ. (Tsinghua Sanya International Mathematics Forum, Hainan Province, China, Jan. 2019, 5 days, co-organizer); ongoing, one conference a year, indefinitely

**Black Holes, Inflation and Gravitational Waves** Inst. for Advanced Study, Hong Kong Univ. of Science and Technology (Hong Kong, Jan. 2019, 3 days, co-organizer)

**Foundational Problems of Black Holes and Gravitational Radiation** MCMP (LMU Munich, Oct. 2018, 2 days, head organizer)

**Analogical Reasoning in Science** MCMP (LMU Munich, Oct. 2018, 3 days, co-organizer)

**Problems of Time** First Annual Irvine-Munich-PoliMi-Salzburg Network Conference for Senior Researchers (Salzburg, Sep. 2018, 1.5 days, co-organizer)

**Philosophy and Foundations of Physics** First Annual First Irvine-Munich-PoliMi-Salzburg Conference for Junior Researchers (Salzburg, Sep. 2018, 1.5 days, co-organizer)

**The Second Annual Black Hole Initiative Conference** Harvard Univ. (May 2018, 3 days, co-organizer)

**Second Annual Bristol/MCMP Foundations of Physics Conference** MCMP (LMU Munich, Jan. 2018, 1 day, head organizer)

**The Second Law of Thermodynamics** MCMP (LMU Munich, Sep. 2017, 2 days, head organizer)

**Symmetries and Symmetry Breaking II** MCMP (LMU Munich, Jun. 2017, 1 day, co-organizer)

**The Philosophy of Howard Stein** Univ. of Chicago (Jun. 2017, 2 days, head organizer)

**The First Annual Black Hole Initiative Conference** Harvard Univ. (May 2017, 3 days, co-organizer)

**First Annual Bristol/MCMP Foundations of Physics Conference** "Causal Horizons", Univ. of Bristol (Jan. 2017, 1 day, co-organizer)

**The Semantics of Scientific Theories** MCMP (LMU Munich, Jun. 2016, 3 days, head organizer)

**The Foundations of Classical Field Theories** MCMP (LMU Munich, Dec. 2014, 1 day, co-organizer)

**Foundations of Gravity and Thermodynamics** Symposium, Philosophy of Science Association Biennial Conference (Chicago, Nov. 2014)

**New Horizons for Singularities in Classical Spacetime Theories** Symposium, Philosophy of Science Association Biennial Conference (San Diego, Nov. 2012)

**The Foundations of Physics** Philosophy Dept. and The Rotman Inst., Univ. of Western Ontario (May 2011, 2 days, co-organizer)

## SERVICE TO THE PROFESSION

**Editor for Physics Journals** Topical Editor (Foundations of Gravitational Theories) for *Universe*

**External Grant Reviewer** Austrian Federal Ministry of Education, Science and Research (Bun-

desministerium für Bildung, Wissenschaft und Forschung); European Research Council (EU); French National Research Agency (Agence Nationale de la Recherche); Marie Skłodowska-Curie Individual Fellowships (European Commission); National Science Foundation (USA); Polish National Science Centre (Narodowe Centrum Nauki); John Templeton Foundation

**Referee for Philosophy, Physics, and Mathematics Publishing Houses** Cambridge University Press; The Fields Inst. for Research in Mathematical Sciences; Springer-Verlag

**Referee for Philosophy Journals** *Analysis*; *Australasian Journal of Philosophy*; *The British Journal for the Philosophy of Science*; *Dialogue*; *Ergo*; *Erkenntnis*; *European Journal for Philosophy of Science*; *Foundations of Science*; *HOPOS*; *International Studies in the Philosophy of Science*; *Journal for General Philosophy of Science*; *Mind*; *Philosophical Review*; *Philosophical Studies*; *Philosophies*; *Philosophy of Science*; *South African Journal of Philosophy*; *Studies in History and Philosophy of Modern Physics*; *Studies in History and Philosophy of Science*; *Synthese*; *Theoria*

**Referee for Physics Journals** *Classical and Quantum Gravity*; *Entropy*; *European Journal of Physics*; *Foundations of Physics*; *General Relativity and Gravitation*; *International Journal of Physics Research and Applications*; *Journal of Physics Communications*; *Physica Scripta*; *Philosophical Transactions of the Royal Society*; *Universe*

**Program Committee (Major Conferences)** British Society for Philosophy of Science Annual Conference, 2017, 2019, 2020; The 19th UK and European Conference on Foundations of Physics, 2018

**Philosophy of Science Association** chief architect and webmaster (volunteer) for the PSA's new website, http://www.philsci.org, Jan. 2008–Jun. 2009

## SERVICE TO THE DEPARTMENT

### MCMP (LMU, Munich)

- Chair of the Munich-Bonn History and Philosophy of Physics Research Collaboration, 2018–present
- Chair of the Irvine-LSE-Munich-PoliMi-Salzburg Scientific Network for Foundations of Physics, 2017–present
- Faculty Search Committees, 2014–present
- Visiting Fellows Committees, 2014–2017
- Colloquiums Coordinator, 2013–2015

### Black Hole Initiative (Harvard University)

- Post-Doctoral Fellows Hiring Committee, 2017–present
- Visiting Fellows Coordinator, 2017–present
- Chair of the Colloquium Committee, 2017–2018
- Philosophy Workshop Coordinator, 2017–2018

### Rotman Institute of Philosophy (University of Western Ontario)

- Post-Doctoral Search Committees, 2012-2013

## SERVICE TO THE LOCAL COMMUNITY

**Black Hole Initiative (Harvard University)** organized and led philosophy reading group

**MCMP (LMU, Munich)** organized bi-weekly philosophy of physics reading group; program committee for many conferences hosted by the MCMP; fostering active collaborations with mathematics and physics departments

**Rotman Institute of Philosophy (University of Western Ontario)** organized bi-weekly philosophy of physics reading group; organized bi-weekly general philosophy of science reading group; organized weekly reading group on James Clerk Maxwell; program committee for every conference orgznized by the Rotman Inst.; fostered active collaborations with mathematics and physics departments

**London School of Economics** organized weekly reading group on Plato's **Statesman** (one in English, and a subsidiary group for Greek readers); delivered weekly informal graduate lecture series on the fundamentals of topology and real analysis

**Stanford University** organized weekly reading groups on Russell's **The Analysis of Matter** and Carnap's **Meaning and Necessity**; fostered active collaborations with mathematics and physics departments

## PUBLIC OUTREACH AND EDUCATION

***Nautilus*** interview by Brian Gallagher, May 2020, about my paper "What Can It Mean to Ask, Why Is There Something Rather Than Nothing?", for a forthcoming article

***American Scientist*** survey essay "What Is a Black Hole?" for a general audience, forthcoming 2020

**Every Little Thing** science advisor for Gimlet media podcast (https://gimletmedia.com/shows/every-little-thing), April 2020–present

***Quanta*** "Black Hole Singularities Are as Inescapable as Expected", interview and article by S. Nadis in the popular science magazine *Discover*, https://www.quantamagazine.org/black-hole-singularities-are-as-inescapable-as-expected-20191202/ (December 2019), about my paper "Singularities in Reissner-Nordström Black Holes" (with Paul Chesler and Ramesh Narayan, *Classical and Quantum Gravity*, 2019, doi:10.1088/1361-6382/ab5b69)

***Discover*** "Peering Inside Realistic Black Holes", interview and article by S. Nadis in the popular science magazine *Discover*, http://discovermagazine.com/2019/septemberoctober/taking-the-plunge (September/October 2019), about my paper "Numerical Evolution of Shocks in the Interior of Kerr Black Holes" (with Paul Chesler and Ramesh Narayan, *Physical Review D*, 2019, doi:10.1103/PhysRevD.99.084033

***Nautilus*** "Think You Know the Definition of a Black Hole? Think Again", article by Brian Gallagher in the popular online science and culture magazine *Nautilus* (http://nautil.us/blog/think-you-know-the-definition-of-a-black-hole-think-again), based on my paper "The Many Definitions of a Black Hole" (*Nature Astronomy*, 2019, doi:10.1038/s41550-018-0602-1)

***Nature Astronomy* Online Community** blogger for a general audience (ongoing from Oct. 2018)

**University of Western Ontario** public lecture "Black Holes" (Mar. 2012)

**London School of Economics** public lecture "Singularities in General Relativity" (Oct. 2009)

## LANGUAGES

**Ancient Greek** reading (fluent)

**German** reading (excellent), speaking (adequate)

**Spanish** reading and speaking (excellent)

## RECOMMENDERS

**Prof. David Malament (Emeritus)**, Univ. of California, Irvine, Dept. of Logic and Philosophy of Science, dmalamen@uci.edu, +1 949-824-7374

**Prof. Howard Stein (Emeritus)**, Univ. of Chicago, Philosophy Dept., hstein@uchicago.edu, +1 773-702-8513

**Prof. Michael Friedman**, Stanford Univ., Philosophy Dept., mlfriedman@stanford.edu, +1 650-723-2547

**Prof. Harvey Brown (Emeritus)**, Oxford Univ., Faculty of Philosophy, harvey.brown@philosophy.ox.ac.uk, +44 1865 276926

**Prof. Dr. Stephan Hartmann**, Ludwig-Maximilians-Universität, Munich Center for Mathematical Philosophy, Chair, S.Hartmann@lmu.de, +49 189 2180 3320

**Prof. William Harper (Emeritus)**, Univ. of Western Ontario, Philosophy Dept., wlharp@uwo.ca, +1 519-661-2111

## FURTHER REFERENCES

**Dr. Jeremy Butterfield**, Senior Research Fellow, Trinity College, Univ. of Cambridge, jb56@cam.ac.uk

**Prof. John Earman (Emeritus)**, Univ. of Pittsburgh, History and Philosophy of Science Dept., jearman@pitt.edu, +1 412-624-1052

**Prof. Carlo Rovelli**, Centre de Physique Theorique de Luminy, Université de Marseille, rovelli@cpt.univ-mrs.fr, +33 (0) 6 14 59 38 85

## ADDITIONAL INFORMATION

From June of 2000 to August of 2008 I did not hold an academic position. During that time, my mother was chronically and acutely ill, and she had neither health insurance nor any other means to pay her medical bills. My academic position in 2000 at Stanford University did not pay enough for me to pay her medical bills. I therefore left Stanford and took employment in the computer industry in order to earn enough to pay her medical bills and otherwise support her. When I no longer had that obligation in 2008, I returned immediately to academia.

That also explains why I held a lectureship in 1998-1999 and a post-doctoral position in 1999-2000, both at Stanford, but did not receive my Ph.D. until 2005: when I was hired for the positions at Stanford, it was with the agreement that I would finish my Ph.D. in 1999. My mother's illness prevented me from completing it then. I worked on it afterward when I could, while I held positions in software.

## PHILOSOPHY OF PHYSICS TALKS 1996–2017

### "Continuum Spacetime as the Limit of Discrete Structure"

- Institut des Hautes Études Scientifiques, Conference "Quantum Gravity: Physics and Philosophy" (Paris, Oct. 2017)

**"The Problem of Approximate Symmetries in General Relativity"**

- Leibniz Universität, Institut für Philosophie Conference "Symmetries in Physics" (Hannover, Jul. 2017)
- Laboratoire des Recherches sur les Sciences de la Matière (CEA-Saclay), Conference "Symmetries in Physics" (Paris, Dec. 2016)

**"Classical Black Holes Are Hot"**

- Max Planck Inst. for Radio Astronomy, Deutsche Physikalische Gesellschaft (German Physics Society) Conference "Do Black Holes Exist?—Physics and Philosophy of Black Holes" (Bad Honnef, Germany, Apr. 2017)
- Philosophy of Science Association, Biennial Conference (Chicago, Nov. 2014)
- Univ. of Oxford, Philosophy of Cosmology Programme Conference "Philosophy of Cosmology" (Tenerife, Sep. 2014)
- British Society for Philosophy of Science, Annual Conference (Cambridge, Jul. 2014)
- California Technical Inst., Division of the Humanities Colloquium (Jan. 2016)
- Italian Society for Logic and Philosophy of Sciences, Triennial Conference (Rome, Jun. 2014)
- NYU/Columbia/Rutgers Philosophy of Physics Group, Colloquium (New York City, Mar. 2014)
- MCMP, Colloquium (Dec. 2013)
- Southern California Group on the Philosophy of Physics, Colloquium, Univ. of California (Irvine, Nov. 2011)
- European Philosophy of Science Association, Biennial Conference (Athens, Oct. 2011)

**"Why the Four-Dimensional Einstein Field Equation Is Not Equivalent to the 3+1 Canonical Representation, Plus a Few (Mostly Dismissive) Remarks about the Hole Argument"**

- London School of Economics, Dept. of Philosophy, Logic and Scientific Method Workshop "The Hole Shebang: New Perspectives on the Hole Argument" (Jul. 2016)

**"What Is Generic and What Is Special about the Universe?"**

- Hebrew Univ., Joint MCMP/Edelstein Center Conference "Probabilities in Science and Philosophy" (Jerusalem, May 2016)
- 15th Congress of Logic, Methodology and Philosophy of Science, Triennial Conference (Helsinki, Aug. 2015)

**"Black Holes Really Are Thermodynamical Objects"**

- Trinity College (Univ. of Cambridge), Colloquium (May 2016)
- Univ. of Bristol, Depts. of Philosophy and Physics Joint Colloquium (Apr. 2016)

**"On the Physical and Thermodynamical Character of Cosmological Singularities"**

- Philosophy of Science Association, Biennial Conference (San Diego, Nov. 2012)

**"On the Principle of Equivalence and the Speciation of Physical Systems"**

- Univ. of Western Ontario, Philosophy Dept., Annual Philosophy of Physics Conference (Jun. 2015)

**"The Physical and Philosophical Significance of Energy Conditions in Spacetime Theories"**

- Univ. of Oxford, Faculty of Philosophy Colloquium (Oxford, Feb. 2015)

**"Some Puzzles and Theorems about Newtonian Gravitational Energy"**

- Rotman Inst. of Philosophy, Colloquium (London, ON, Mar. 2014)

**"On the Existence of Spacetime Structure"**

- Univ. of Western Ontario, Philosophy Dept. Annual Philosophy of Physics Conference (May 2013)
- Carnegie Mellon Univ., Philosophy Dept. Colloquium (Jan. 2009)
- Third International Conference on the Nature and Ontology of Spacetime (Montreal, Jun. 2008)

**"Singularities and the Cosmological Arrow of Time"**

- Foundational Questions Inst. (FQXi), Conference "On Time in Physics" (Univ. of California, San Diego, May 2012)

**"On the Status and Role of the Principle of Equivalence in General Relativity"**

- Stanford Univ., Suppes Center for History and Philosophy of Science Colloquium (May 2012)

**"Classical Mechanics Is Lagrangian; It Is Not Hamiltonian"**

- Perimeter Inst. of Theoretical Physics, Colloquium, Southwestern Ontario Group on the Foundations of Physics (Waterloo, ON, Mar. 2012)
- Univ. of Bristol, Colloquium, Dept. of Philosophy (Mar. 2011)
- Univ. of Pittsburgh, Center for the Philosophy of Science Colloquium (Sep. 2008)

**"There Is No Gravitational Stress-Energy Tensor"**

- Perimeter Inst. of Theoretical Physics, Southwestern Ontario Group on the Foundations of Physics Colloquium (Oct. 2010)
- British Society for the Philosophy of Science, Annual Conference (Dublin, July. 2010)
- Univ. of Oxford, Faculty of Philosophy Colloquium (Nov. 2009)
- The Joint Session of the Aristotelian Society and the Mind Association, Annual Conference (Norwich, Jul. 2009)

**"Questions about Laplacian Determinism in Newtonian Mechanics"**

- Bucknell Univ., Dept. of Philosophy Colloquium (Feb. 2009)

**"Does General Relativity Need an Interpretation?"**

- Philosophy of Science Association, Biennial Conference (Pittsburgh, Nov. 2008)

**"Against the Current Excesses of Quantum Gravity: A Plea for Modesty"**

- Philosophy of Science Association, Biennial Conference (Vancouver, Nov. 2000)

**"The Analysis of Singular Spacetimes"**

- Philosophy of Science Association, Biennial Conference (Kansas City, MO, Oct. 1998)
- Univ. of Pittsburgh, Dept. of the History and Philosophy of Science Colloquium (Sep. 1998)

**"Bell's Theorem and the Delicacy of Causal Ascription"**

- Tufts Univ., Philosophy Dept. Colloquium (Jan. 1999)

- American Philosophical Association, Eastern Division Annual Conference (Atlanta, Dec. 1996)
- Midwest Workshop on the Foundations of Physics, Colloquium (Chicago, Mar. 1996)

**"Defining Gravitational Energy in Newtonian Theory and in General Relativity"**

- Midwest Workshop on the Foundations of Physics, Colloquium (Chicago, Feb. 1998):

## PHILOSOPHY OF SCIENCE TALKS 2009–2017

**"Newtonion Abduction (Not IBE!) as Framework Confirmation"**

- Center for Advanced Studies, Conference "Reasoning in Physics" (LMU Munich, Dec. 2016)

**"Animadversions on the Semantic View of Theories"**

- Universidad Complutense, Methods of Causal Inference and Scientific Representation Group Colloquium (Madrid, Dec. 2016)
- Canadian Society for the History and Philosophy of Science, Annual Conference (Waterloo, ON, May 2012)

**"Aggregating Scientific Judgements in the Absence of Empirical Data"**

- Venice International Univ., Conference "Social Choice and its Philosophical Applications" (Oct. 2016)

**"Kinematical Constraints as Constitutive *A Priori* Components of Physical Theory"**

- Univ. of Konstanz, Philosophy Faculty Conference "Neo-Kantian Perspectives on Contemporary Philosophy of Science", (Jan. 2016)

**"If the Metric Were Not Dynamical, Counterfactuals in General Relativity Would Be Easy"**

- European Philosophy of Science Association, Biennial Conference (Düsseldorf, Sep. 2015)
- British Society for Philosophy of Science, Annual Conference (Manchester, Jul. 2015)

**"On Newton's Third Rule of Reasoning in Philosophy, 'The Universal Qualities of Bodies', and the Speciation of Physical Systems"**

- HOPOS, Annual Conference (Ghent, Jul. 2014)
- Univ. of Pittsburgh Center for the Philosophy of Science, Conference "Newton and Empiricism" (Apr. 2010)

**"On the Propriety of Representation as a New Basis for the Semantics of Physical Theories"**

- Univ. of Western Ontario, Colloquium, Dept. of Philosophy (London, ON, Jan. 2012)
- Univ. of Leeds, Colloquium, Dept. of Philosophy (Mar. 2011)
- London School of Economics, The Dept. of Philosophy, Logic and Scientific Method Colloquium (Nov. 2009)
- The Sigma Club, Colloquium (London, Oct. 2009)

## PHYSICS AND MATHEMATICS TALKS 1997–2017

### "Classical Black Holes Are Hot"

- Black Hole Initiative, Conference "First Annual BHI Conference on Black Holes" (Harvard Univ., May 2017)
- Univ. of Western Ontario, Dept. of Physics and Astrophysics Colloquium, (Mar. 2012)

### "A Weyl-Type Theorem in Geometrized Newtonian Gravity, and How It May Bear on Shape Dynamics"

- Perimeter Inst. of Theoretical Physics, Conference "Shape Dynamics Workshop" (Waterloo, ON, May 2017):

### "48 Years of Cosmic Censorship, and Still We Do Not Know What It Is"

- Deutsche Physikalische Gesellschaft (German Physics Society) Annual Conference, Plenary Speaker (Bremen, Mar. 2017)

### "Black Holes Really Are Thermodynamical Objects"

- Black Hole Initiative, Colloquium (Harvard Univ., Mar. 2017)
- Univ. of Oldenburg, Inst. of Physics, Mathematical Physics Colloquium (Nov. 2016)

### "Foundational Problems in Black Hole Thermodynamics"

- Univ. of Florence, Dept. of Physics and Astronomy Workshop "Black Holes and Thermodynamics" (Apr. 2016)

### "A Thermodynamical Classification of Cosmological Singularities"

- Radboud Univ., High Energy Physics Group Colloquium (Oct. 2015)

### "Generalizations of Lagrangian Mechanics Based on Generalizations of Tangent-Bundle Geometry"

- MCMP, Conference "Foundations of Classical Field Theory", (Dec. 2014)

### "The Geometry of the Euler-Lagrange Equation"

- Univ. of Western Ontario, Dept. of Applied Mathematics Colloquium (Mar. 2012)
- Deutsche Physikalische Gesellschaft (German Physics Society), Annual Conference (Bonn, Mar. 2010)
- Univ. of Chicago, Physics Dept., Relativity Group Colloquium (Oct. 1997)

### "An Invariant Characterization of the Intrinsic Geometry of the Tangent Bundle"

- Queen Mary College, Dept. of Physics Colloquium (Jan. 2010)
- Rutgers Univ., Dept. of Mathematics, Mathematical Physics Colloquium (Sep. 1998)

### "The Role of Configuration Space in Classical and in Quantum Mechanics"

- Pennsylvania State Univ., Dept. of Physics, Center for Gravitational Physics and Geometry Colloquium (PA, Sep. 1998)