

# CURRICULUM VITAE

Steven Awodey



## Academic Appointments

Carnegie Mellon University

Department of Philosophy: *Professor*, 2008–present;  
*Assoc. Prof.*, 2002–2008; *Asst. Prof.*, 1997–2002.

Department of Mathematical Sciences: *Professor*, 2014–present

University of Pittsburgh

Department of History and Philosophy of Science: *Adjunct Professor*, 2005–present.

## Visiting Appointments

Institute of Advanced Scientific Studies (IHÉS), Paris (France),  
*Research Visitor*, June, 2022.

Center for Advanced Studies, Norwegian Academy of Science, Oslo (Norway)  
*Research Fellow*, March–June, 2019.

Hausdorff Institute for Mathematics, Bonn (Germany)  
*Visiting Researcher*, Summer Semester 2018.

Isaac Newton Institute for Mathematical Sciences, Cambridge University (UK)  
*Visiting Research Scientist*, Summer Semester 2017.

University of Stockholm (Sweden), Department of Mathematics  
*Visiting Professor*, Spring Semester 2016.

Institut Henri Poincaré for Mathematical Research, Paris (France)  
*Visiting Professor*, Spring Semester 2014.

Institute for Advanced Study (Princeton), School of Mathematics  
*Member*, Academic Year 2012–13

University of Munich (Germany), Departments of Philosophy and Mathematics  
*Visiting Professor*, Summer Semesters 2011–14.

University of Jena (Germany), Department of Philosophy  
*Fulbright Visiting Professor*, Winter Semester 2007.

University of Constance (Germany), Department of Philosophy  
*Visiting Professor*, Summer Semester 2003.

Mittag-Leffler Mathematical Research Institute, The Royal Swedish Academy of Sciences  
*Research Fellow*, Summer 2001.

## Educational History

The University of Chicago: *Ph.D. Philosophy* (with honors), 1997  
Dissertation: *Logic in Topoi: Functorial Semantics for Higher-Order Logic*  
Supervised by: S. Mac Lane (Mathematics) and W.W. Tait (Philosophy)  
*M.Sc. Mathematics*, 1992

Philipps-Universität Marburg, Germany: *Magister Artium* Philosophy, 1989  
*Vordiplom* Mathematics, 1989

## Awards and Grants

Air Force Office of Scientific Research, “Logical aspects of  $\infty$ -topoi: Higher models and higher theories,” Supplemental postdoctoral support. 2022–2023. (\$100,000)

Army Research Office, “Homotopy Type Theory and the Formalization of Mathematics,” Postdoctoral support. 2021–23. (\$360,000)

Air Force Office of Scientific Research, “Logical aspects of  $\infty$ -topoi: Univalent Universes,” Supplemental postdoctoral support. 2021–2022. (\$100,000)

Air Force Office of Scientific Research, “Synthetic and Constructive Mathematics of Higher Structures in Homotopy Type Theory,” Multi-Disciplinary University Research Initiative (MURI), Team member. 2020–2026. (\$2.5 mil.)

Air Force Office of Scientific Research, “Logical aspects of  $\infty$ -topoi,” Postdoctoral support. 2020–2023. (\$450,000)

Air Force Office of Scientific Research, “Homotopy Type Theory: Unified Foundations for Mathematics and Computation,” Multi-Disciplinary University Research Initiative (MURI), Principal Investigator. 2014–2020. (\$7.5 mil.)

Air Force Office of Scientific Research, “Homotopy Type Theory Research Group,” Principal Investigator. 2016–17. (\$300,000)

Air Force Office of Scientific Research, “A New Mathematics of Information,” Principal Investigator. 2011–2014. (\$375,000)

National Science Foundation, Topology and Foundations: “Homotopy and Type Theory,” Principal Investigator. 2010–2013. (\$250,000)

National Endowment for the Humanities, Scholarly Editions: “The Collected Works of Rudolf Carnap, Phase II.” 2010–2013. (\$150,000)

Fulbright Scholar Award, Senior Researcher and Lecturer. Jena, Germany, 2007–2008. Award Title: “The Collected Works of Rudolf Carnap.”

National Endowment for the Humanities, Collaborative Research Grant: “The Collected Works of Rudolf Carnap, Phase I.” 2007–2010. (\$125,000)

## Publications

### Books

*Homotopy Type Theory: Univalent Foundations of Mathematics*, The Univalent Foundations Program, Institute for Advanced Study, 2013.

*Category Theory*, S. Awodey, Oxford Logic Guides 49, Oxford University Press, 2006. 2nd edition, Oxford Logic Guides 52, 2010.

*Frege’s Lectures on Logic: Carnap’s Student Notes, 1911–1914*. Edited, translated, and with an introductory essay by S. Awodey and E. Reck, with a preface by Gottfried Gabriel. Open Court, 2004.

*Carnap Brought Home: The View from Jena*. S. Awodey and C. Klein (ed.s), Open Court, 2004.

### Articles

Cartesian cubical model categories, arXiv:2305.00893, May 2023.

On Hofmann-Streicher Universes, arXiv:2205.10917, May 2022.

Kripke-Joyal Forcing for Type Theory and Uniform Fibrations, (with N. Gambino, S. Hazratpour), arXiv:2110.14576, October 2021.

The Homunculus Brain and Categorical Logic, (with M. Heller), *Philosophical Problems in Science*, 2020.

Sheaf Representations and Duality in Logic, in: *Joachim Lambek: The Interplay of Mathematics, Logic, and Linguistics*, Claudia Casadio and Philip J. Scott (ed.s), Springer Verlag, 2020.

Mathesis Universalis and Homotopy Type Theory, in: *Mathesis Universalis, Computability and Proof*, Stefania Centrone and Peter Schuster (ed.s), Springer Verlag, 2019.

A Cubical Model of Homotopy Type Theory, *Annals of Pure and Applied Logic*, 2018.

Polynomial Pseudomonads and Dependent Type Theory, (with C. Newstead), arXiv:1802.00997, 2018.

Impredicative Encodings of (Higher) Inductive Types, (with J. Frey and S. Speight), In: *Proceedings of the 33rd Annual ACM/IEEE Symposium on Logic in Computer Science (LICS 2018)*.

Univalence as a Principle of Logic, In: *L.E.J. Brouwer, Fifty Years Later*, D. van Dalen, G. Jongbloed, J.W. Klop and J. van Mill (ed.s). *Indagationes Mathematicae*, 2018.

A Proposition is the (Homotopy) Type of its Proofs, in: *Logic, Philosophy of Mathematics, and their History: Essays in Honor W.W. Tait*, edited by Erich Reck, College Publications, 2019.

Homotopy Initial Algebras in Type Theory, (with N. Gambino and K. Sojakova), *Journal of the Association for Computing Machinery*, 2017.

Carnap and the Invariance Conception of Logical Truth, *Synthese*, 2017.

Natural Models of Homotopy Type Theory, *Mathematical Structures in Computer Science*, 2016.

Homotopy Type Theory: Unified Foundations of Mathematics and Computation, (with R. Harper). *SIGLOG Newsletter*, Association for Computing Machinery, 2014.

Topos Semantics for Higher-Order Modal Logic, (with K. Kishida and H.-C. Kotsch). *Logique et Analyse*, 2014.

Voevodsky's Univalence Axiom in Homotopy Type Theory, (with Á. Pelayo and M. A. Warren). *Notices of the American Mathematical Society*, 2013.

Structuralism, Invariance, and Univalence, *Philosophia Mathematica*, 2013.

Homotopy Type Theory and the Large-Scale Formalization of Mathematics, (with T. Coquand), *The Institute Letter*, *Institute for Advanced Study*, 2013.

First-Order Logical Duality (with H. Forssell), *Annals of Pure and Applied Logic*, 2013.

Martin-Löf Complexes (with P. Hofstra and M. Warren). *Annals of Pure and Applied Logic*, 2013.

Relating Topos Theory and Set Theory via Categories of Classes, (with C. Butz, A. Simpson, T. Streicher). *Annals of Pure and Applied Logic*, 2013.

Inductive Types in Homotopy Type Theory, (with N. Gambino and K. Sojakova). *Logic in Computer Science (LICS)* 2011.

Type Theory and Homotopy. In *Essays on the Foundations of Mathematics in Honor of Per Martin-Löf*, edited by Peter Dybjer et al. Springer 2012.

Topological Completeness of First-Order Modal Logic (with K. Kishida). *Advances in Modal Logic (AiML)* 2012.

Kripke Semantics for Martin-Löf Type Theory (with F. Rabe). In *Logical Methods in Computer Science*, 2011.

From Sets, to Types, to Categories, to Sets. In *Foundations of Mathematics*, G. Sommaruga (ed.), Springer-Verlag, 2011.

Explicating 'Analytic'. In *Rudolf Carnap on Explication*, edited by Pierre Wagner, Palgrave Macmillan, 2011.

Gödel and Carnap (with A.W. Carus). In a collection of essays on Kurt Gödel, edited by Charles Parsons et al., *Lecture Notes in Logic*, Association for Symbolic Logic.

- Lawvere-Tierney Sheaves in Algebraic Set Theory (with P. Lumsdaine, N. Gambino, M. Warren). *The Journal of Symbolic Logic*, 2009.
- Homotopy-Theoretic Models of Identity Types (with M. Warren). *Mathematical Proceedings of the Cambridge Philosophical Society*, 2009.
- Kripke Semantics for Martin-Löf Type Theory (with F. Rabe). In *Typed Lambda Calculus and its Applications*, Electronic Notes in Computer Science, 2009.
- From Wittgenstein’s Prison to the Boundless Ocean of Logical Syntax (with A.W. Carus). In *Carnap’s Logical Syntax*, P. Wagner (ed.), Palgrave Macmillan, 2009.
- Topology and Modality: Topological Semantics for First-Order Modal Logic (with K. Kishida). *The Review of Symbolic Logic*, 2008.
- An Brief Introduction to Algebraic Set Theory. *The Bulletin of Symbolic Logic*, 2008.
- Sheaf Toposes for Realizability (with A. Bauer). *Archive for Mathematical Logic*, 2008.
- Relating Topos Theory and Set Theory via Categories of Classes (Research Announcement) (with C. Butz, A. Simpson, T. Streicher). *The Bulletin of Symbolic Logic*, 2007.
- The Turning Point: Philosophy of Mathematics in Logical Empiricism (With A.W. Carus). In *The Cambridge Companion to Logical Empiricism*, A. Richardson and T. Ubel (ed.s), 2007.
- Carnap’s Quest for Analyticity: The *Studies in Semantics*. In *The Cambridge Companion to Carnap*, M. Friedman and R. Creath (ed.s), 2007.
- Carnap’s Dream: Gödel, Wittgenstein, and *Logical Syntax* (with A.W. Carus). *Synthese*, 2007.
- Continuity and Logical Completeness: An Application of Topos Theory. In *The Age of Alternative Logics*, G. Heinzmann (ed.), Kluwer, 2006.
- Predicative Algebraic Set Theory (with M. Warren). *Theory and Applications of Categories* Vol. 15(1), CT2004, 1–39.
- Categorical Models of Intuitionistic Theories of Sets and Classes (with H. Forssell). *Theory and Applications of Categories* Vol. 15(5), CT2004, 147–163.
- Ultrasheaves and Double Negation (with Jonas Eliasson). *Notre Dame Journal of Formal Logic*, 45(4), 2004, 235–245.
- Propositions as [Types] (with A. Bauer). *Journal of Logic and Computation*, 14(4), 2004, pp. 447–471.
- An Answer to G. Hellman’s Question “Does Category Theory Provide a Framework for Mathematical Structuralism?”. *Philosophia Mathematica* (3), vol. 12, 2004, pp. 54–64.
- How Carnap Could Have Replied to Gödel (with A.W. Carus). In *Carnap Brought Home: The View from Jena*, Awodey and Klein (ed.s), Open Court, 2004.

Modal Operators and the Formal Dual of Birkhoff's Completeness Theorem (with J. Hughes). *Mathematical Structures in Computer Science*, vol. 13 (2003), pp. 233–258.

Carnap versus Gödel: On Syntax and Tolerance (with A.W. Carus). *Continental and Analytic Aspects of Logical Empiricism*, Parini and Salmon (ed.s), University of Pittsburgh Press, 2003.

Categoricity and Completeness: 19th Century Axiomatics to 21st Century Semantics, (with E. Reck). *History and Philosophy of Logic*, 23 (2002), pp. 1–30, pp. 77–94.

Elementary Axioms for Local Maps of Toposes (with L. Birkedal). *Journal of Pure and Applied Algebra*, 177 (2003), pp. 215–230.

Local Realizability Toposes and a Modal Logic for Computability, (with L. Birkedal and D.S. Scott). *Mathematical Structures in Computer Science*, vol. 12 (2002), pp. 319–334.

Carnap, Completeness, and Categoricity: The *Gabelbarkeitssatz* of 1928 (with A.W. Carus). *Erkenntnis* 54 (2001), pp. 145–172.

Topological Representation of the  $\lambda$ -Calculus. *Mathematical Structures in Computer Science*, vol. 10 (2000), pp. 81–96

Topological Completeness for Higher-Order Logic (with C. Butz). *Journal of Symbolic Logic* 65(3) (2000), pp. 1168–82.

Sheaf Representation for Topoi. *Journal of Pure and Applied Algebra* 145, pp. 107–21.

Structure in Mathematics and Logic: A Categorical Perspective. *Philosophia Mathematica* (3), vol. 4 (1996), pp. 209–237.

## Abstracts

The Homotopical Interpretation of Constructive Type Theory (Workshop Report). With R. Garner, P. Martin-Löf, and V. Voevodsky. Oberwolfach Reports 8(1), pp. 609–638, European Mathematical Society, 2011.

Carnap and Gödel (abstract). *Bulletin of Symbolic Logic*, vol. 12 (2006), p. 144.

Kripke Semantics for Lambda-Calculus (abstract). *Bulletin of Symbolic Logic*, vol. 12 (2006), p. 144.

Algebraic Set Theory (abstract). *Bulletin of Symbolic Logic*, vol. 12 (2006), p. 144.

Developments in Mac Lane Set Theory (abstract). With Butz, Simpson, Streicher. *Bulletin of Symbolic Logic*, vol. 9 (2003), p. 60.

Topological Completeness Results for Type Theories and Higher-Order Logic (abstract). *Bulletin of Symbolic Logic*, vol. 6 (2000), p. 242.

Axiom of Choice and Excluded Middle in Categorical Logic (abstract). *Bulletin of Symbolic Logic*, vol. 1 (1995), p. 344.

## Reviews and Notices

Memorial Notice: Saunders Mac Lane. *Bulletin of Symbolic Logic*, 13 (2007), pp. 115–119.

Memorial Notice: Saunders Mac Lane. *Proceedings of the American Philosophical Society*, 151/3 (2007), pp. 351–356.

Review: *Sketches of an Elephant: A Topos Theory Compendium*, *The Bulletin of Symbolic Logic*, 11 (2005), pp. 65–69.

Review: *Alfred Tarski and the Vienna Circle* (with D.S. Scott), *The Review of Modern Logic*, 9 (2004), pp 88–92.

## Public Lectures

### Invited and Plenary Lectures

“Intensionality, invariance, and univalence”, Logica 2022, Prague, August 2022.

“Algebraic type theory”, Conference for Thierry Coquand’s 60th Birthday, University of Gothenburg, Sweden, August 2022.

“Categorical Logic”, three lectures, Autumn School on Logic and Computation, Fischbachau, Germany, September 2022.

“Tutorial on polynomial functors and type theory”, two lectures, Topos Institute Workshop on Polynomial Functors, March 2022.

“Model structures from models of HoTT”, Topos Institute Seminar, June 2021.

“Polynomial functors and natural models of type theory”, Topos Institute Workshop on Polynomial Functors, March 2021.

“Intensionality, invariance, and univalence”, 23rd Krakow Methodological Conference, Copernicus Center, Krakow, Poland, November 2019

“Intensionality, invariance, and univalence”, 2019 Reinhardt Memorial Lecture, Department of Philosophy, University of Boulder, September 2019

“Intensionality, invariance, and univalence”, 2019 Skolem Lecture, Department of Philosophy, University of Oslo, May 2019

“A Quillen model structure on cartesian cubical sets”, Center for Advanced Studies, Norwegian Academy of Science, Oslo, Norway, March 2019

“An overview of homotopy type theory”, Felix Hausdorff Commemorative Colloquium, Hausdorff Center for Mathematics, Bonn, Germany, June 2018

“Impredicative encodings in homotopy type theory”, Mathematical Research Institute, Oberwolfach, Germany, November 2017

“Univalence as an axiom in foundations”, *Axiomatisches Denken* at 100 years, Zurich, Switzerland, October 2017

“Impredicative encodings in homotopy type theory”, *Big Proof*, Newton Institute for Mathematics, Cambridge University, UK, July 2017

“Impredicative encodings of inductive types”, *Proof Theory as Mathesis Universalis*, Alexander von Humboldt-Kolleg, Como, Italy, July 2017

“A cubical model of homotopy type theory”, Invited series of four lectures in Logic and Topology, Department of Mathematics, University of Stockholm, May–June 2016.

“Recent work in homotopy type theory”, Invited Plenary Lecture, Logical Foundations of Computer Science, January 2016.

“Cubical homotopy type theory”, Invited Plenary Lecture, European Logic Colloquium and Congress on LMPs, Helsinki, August 2015.

“Homotopy Type Theory”, Hari Sahasrabudhe Inflections in Computer Science Lecture, Indian Institute of Technology, Kanpur, India, January 2015.

“Univalence as a New Principle of Logic”, Inaugural Lecture, Calgary Mathematics and Philosophy Lecture Series, October 2014.

“Introduction to Homotopy Type Theory”, Summer School on Proof, Truth, and Computation, Chiemsee, Germany, July 2014.

“Natural Models of Homotopy Type Theory”, Workshop on Semantics of Constructive Type Theory, Institut Henri Poincaré, Paris, June 2014.

“Advances in Homotopy Type Theory”, TYPES 2014, Institut Henri Poincaré, Paris, May 2014.

“Homotopy Type Theory and Univalent Foundations”, Quantum Logic and Computation, Clay Mathematics Institute, Oxford University, September 2013.

“Overview of Homotopy Type Theory”, Conference on Type Theory, Homotopy Theory, and Formalized Mathematics, Barcelona, September 2013.

“Advances in Homotopy Type Theory”, Humboldt Workshop on Proof, Bern, Switzerland, September 2013.

“Homotopy Type Theory and Univalent Foundations”, Invited plenary lecture, Workshop on Logic, Language, Information, and Computation, Darmstadt, Germany, August 2013.

“Carnap and Invariance”, Workshop on Carnap’s Logic, Munich Center for Mathematical Philosophy, July 2013.

“Two lectures on Homotopy Type Theory”, Munich Center for Mathematical Philosophy, June 2013.

“Advances in Homotopy Type Theory”, LICS and MFPS, New Orleans, June 2013.

“Homotopy Type Theory and Univalent Foundations”, Invited plenary lecture, TYPES 2013, Toulouse, France, April 2013.



“Univalence, Invariance, Structuralism”, Workshop on Philosophy of Mathematics, Toulouse, France, April 2013.

“Natural Models of Type Theory”, Univalent Foundations Seminar, Institute for Advanced Study, April 2013.

“Univalent Foundations,” Members Seminar, School of Mathematics, Institute for Advanced Study, December 2012.

“Homotopy Type Theory and Univalent Foundations,” Invited plenary lecture, Logical Foundations of Computer Science, Bath, England, July 2012.

“Homotopy Type Theory and Univalent Foundations,” Invited lecture, What are Foundations of Mathematics and what are they for?, Cambridge University, July 2012.

“Homotopy Type Theory,” Invited plenary lecture, Logic, Methodology and Philosophy of Science, Nancy, July 2011.

“Homotopy Type Theory,” Invited plenary lecture, European Logic Colloquium 2011, Barcelona, July 2011.

“Homotopy Type Theory,” Invited plenary lecture, Topology, Algebra, Category Theory and Logic, July 2011.

“Higher Inductive Types,” Invited series of lectures, Luminy Workshop on Equality and Identity, Marseille, June 2011.

“Constructive type theory and homotopy theory,” School of Mathematics, Institute for Advanced Study, Princeton, December 2010.

“Carnap’s conception of analyticity,” Institut Wiener Kreis, Vienna, July 2010.

“Homotopy and type theory,” Workshop on Constructive Mathematics, Chiemsee, Germany, June 2010.

“Homotopy and type theory,” Principles of Programming Semantics, University Paris 7 Diderot, June 2010.

“From Sets to Types to Categories to Sets,” Ideals of Proof, Ecole Normale Supérieure, Paris, June 2010.

“Homotopy and type theory,” Invited Plenary Lecture, Logic Colloquium 2009, Sofia, Bulgaria, July 2009.

“Explicating ‘Analytic’,” Carnap’s Ideal of Explication, Paris 1, May 2009.

“Ideals of Proofs,” Workshop on Categorical Structuralism, Paris 7, May 2009.

“Homotopy Theory and Type Theory,” Philosophy and Foundations of Mathematics (Martin-Löf Colloquium), Uppsala University, Sweden, May 2009.

“Category Theory and Categorical Logic,” (6 lectures) Departments of Philosophy and Mathematics, Universities of Sendai (Tohoku) and Kyoto, Japan, March 2009.

“Saunders Mac Lane and Modern Logic,” Oberwolfach Mathematical Research Institute, Germany, February 2009.

“Structuralism in Mathematics and Philosophy of Mathematics,” (3 lectures) Joint workshop with S. Shapiro, University of Regensburg, Germany, April 2008.

“Homotopy Type Theory,” (2 lectures), Departments of Mathematics and Informatics, University of Nancy, France, September 2007.

“Stone Duality, Topology, and Modality for First-Order Logic,” Foundational Methods in Computer Science (FMCS 07), Colgate University, June 2007.

“Topological Semantics for First-Order Modal Logic,” *Mathematical Methods in Philosophy*, Banff International Research Station, Banff, Canada, February 2007.

“Algebraic Models of Intensional Type Theory,” Workshop on Identity Types, Department of Mathematics, University of Uppsala, Sweden, December 2006.

“Algebraic Set Theory,” Plenary Lecture, Canadian Mathematical Society Annual Meeting, Calgary, June 2006.

“Carnap and Gödel,” Gödel Symposium, Association for Symbolic Logic Annual Meeting, Montreal, May 2006.

“Topology and Modality,” Saunders Mac Lane Memorial Conference, Mathematics Department, The University of Chicago, April 2006.

“Carnap’s Dream: The Boundless Ocean,” International Symposium on Carnap’s *Logical Syntax of Language*, Paris 1, October 2005.

Three invited lectures on “Algebraic Set Theory”, International Summer School in Topos Theory, Haute-Bodeux, Belgium, May 2005.

“Algebraic Set Theory,” Plenary lecture, Annual Meeting of the Association for Symbolic Logic, Stanford, March 2005.

“Ideal Models of Algebraic Set Theory,” Plenary lecture, *Category Theory 2004*, Vancouver, July 2004.

“Categories of Sets and Classes,” Ramifications of Category Theory (in honor of F.W. Lawvere), Florence, Italy, November 2003.

“Continuity and Logical Completeness,” *History and Outcomes of Alternative Semantics*, Poincare Archives, University of Nancy, France, November 2002.

“Modal and Intensional Types in Categorical Logic,” Plenary lecture, *Logic Colloquium 2001*, Vienna, August 2001.

“Continuity and Logical Completeness: An Application of Topos Theory,” *Center for Philosophy of Science Annual Lecture Series*, University of Pittsburgh, February 2001.

“Carnap versus Gödel: On Syntax and Tolerance,” Invited lecture, *Continental and Analytic Aspects of Logical Empiricism*, Florence, Italy, November 1999.

“Some Logical Properties of Local Maps of Toposes” Plenary lecture, *Category Theory ‘99*, Coimbra, Portugal, July 1999.

“Topological Completeness for Higher-Order Logic,” Stefan Banach International Mathematical Center, Warsaw, Poland, December 1996.

### **Other Public Lectures**

“The isotropy group of a topos and logical schemes”, Category Theory Octoberfest (in honor of Pieter Hofstra), October 2022.

“Algebraic type theory”, Laboratory for Informatics Seminar, University of Cambridge, September 2022.

“On Hofmann-Streicher Universes”, Stockholm Logic Seminar, May 2022.

“Kripke-Joyal semantics for type theory”, Workshop on Syntax and Semantics of Type Theory, Stockholm, May 2022.

“Kripke-Joyal semantics for type theory”, University of Pennsylvania Logic and Computation Seminar, April 2022.

“Kripke-Joyal forcing for Martin-Löf type theory”, ASL annual meeting, Cornell University, April 2022.

“From possible worlds to homotopy theory”, Reed College Mathematics Colloquium, November 2021.

“Univalence in  $\infty$ -topoi”, International Conference on Category Theory 2021, Genoa, Italy, July 2021.

“Model structures from models of HoTT”, Topos Institute Colloquium, June 2021.

“An algebraic proof of the Frobenius condition”, Erik Palmgren Memorial Conference, November 2020

“Intensionality, Invariance, and Univalence”, Midwest Philosophy of Mathematics Workshop, November 2020.

“Quillen model structures from models of HoTT”, Cambridge Category Seminar, October 2020.

“Composition, Filling, and Fibrancy of the Universe”, *Foundations and Applications of Univalent Mathematics*, Department of Mathematics, University of Munich, December 2019.

“Intensionality, Invariance, and Univalence”, Munich Center for Mathematical Philosophy, December 2019.

“An Algebraic Proof of Frobenius in Cubical Sets”, Category Theory Octoberfest, Johns Hopkins University, October 2019.

“A Quillen model structure on the category of cartesian cubical sets”, International Conference on Homotopy Type Theory, Carnegie Mellon University, August 2019

“Impredicative Encodings in Homotopy Type Theory”, Logic Seminar, Ohio State University, February 2019.

“Model Categories and Model Categories”, Category Theory Octoberfest, New York, New York, October 2018.

“Polynomial monads and type theory”, *Categories in homotopy theory and rewriting*, Centre International de Rencontres Mathématiques Luminy, Marseille, France, October 2017

“Univalence as a Principle of Logic”, Workshop on Foundations of Mathematical Structuralism, Munich Center for Mathematical Philosophy, October 2016

“Univalence as a Principle of Logic”, Workshop on Homotopy Type Theory in Philosophy, Department of Philosophy, University of Bristol, September 2016

“Natural Models of HoTT”, Logic Colloquium 2016, University of Leeds, UK, July 2016.

“Fibrant replacement in cubical sets”, Workshop on Homotopy Type Theory, Department of Mathematics, University of Leeds, July 2016

“On the cubical model of HoTT”, Departmental Colloquium, Department of Computer Science, University of Gothenburg, June 2016

“Univalence as a New Principle of Logic”, Midwest PhilMath Workshop, Notre Dame, November 2015.

“On the Cubical Model of HoTT”, German Mathematical Society, Hamburg, September 2015.

“Cubical Sets”, Foundational Methods in Computer Science, Colgate University, May 2015.

“Univalence as a New Principle of Logic”, Special Session on Univalent Foundations, joint APA/ASL Winter Meeting, Philadelphia, December 2014.

“Univalence as a New Principle of Logic”, Indiana University Philosophy Department Colloquium, November 2014.

“Homotopy Type Theory”, Indiana University Logic Colloquium, November 2014.

“Homotopy Type Theory”, Calgary Mathematics Department Colloquium, October 2014.

“Univalence as a New Principle of Logic”, Munich Center for Mathematical Philosophy, July 2014.

“Natural Models of Homotopy Type Theory”, Category Theory 2014, Cambridge University, July 2014.

“Recent Advances in Homotopy Type Theory”, Annual Meeting of the American Mathematical Society, Topology Session, Baltimore, January 2014.

“Univalent Foundations”, Association for Symbolic Logic, Waterloo, Canada, May 2013.

“Univalent Foundations,” Topology Seminar, Mathematics Department, MIT, November 2012.

“Natural Models of Type Theory,” Union College Mathematics Meeting, October 2013.

“Free fibrations and singleton types,” Fourth workshop on formal topology topology, Ljubljana, June 2012.

“Hopf in HoTT,” Workshop on higher algebra, topology, and logic, Ljubljana, June 2012.

”Higher-order modal logic”, Second Munich modal logic workshop, June 2012.

“Three lectures on Homotopy Type Theory,” Munich Center for Mathematical Philosophy, June 2012.

“Homotopy Inductive Types,” Mathematics, Algorithms and Proofs, Leiden (Netherlands), December 2011.

“Higher Inductive Types,” Category Theory Octoberfest, Ottawa, October 2011.

“On an Occasionally Heard Objection to Carnap’s Theory of Logical Truth,” Munich Center for Mathematical Philosophy, July 2011.

“Higher Inductive Types,” Workshop on Constructive Logic, Department of Mathematics, Munich, June 2011.

“Identity, Isomorphism, and Univalence,” Munich Center for Mathematical Philosophy, June 2011.

“Categories and Modal Logic,” Munich Center for Mathematical Philosophy, June 2011.

“Homotopy Type Theory,” Mathematics Department Colloquium, Nijmegen, June 2011.

“Homotopy Type Theory,” Mathematics Department Colloquium, Munich, May 2011.

“Homotopy Type Theory,” Mathematics Department Colloquium, Ljubljana, May 2011.

“Sets, types, and categories,” Department of Philosophy, Princeton University, March 2011.

“Survey of homotopy, higher categories, and type theory,” Category Theory Octoberfest, Dalhousie University, Halifax, October 2010.

“Higher categories in type theory,” Category Theory 2010, Genoa, Italy, June 2010.

“Recent work in type theory,” Annual Meeting of the Association for Symbolic Logic, Washington DC, June 2010.

“The homotopy interpretation of constructive type theory,” Mathematical Foundations of Programming Semantics, Ottawa, May 2010.

“Homotopy and type theory,” Department of Mathematics Colloquium, Pennsylvania State University Altoona, May 2010.

“Explicating ‘Analytic’,” Philosophy Department, University of Constance, Germany, December 2009.

“From Sets, to Types, to Categories, to Sets,” Annual ASL meeting, Notre Dame University, May 2009.

“Homotopical Semantics for Intensional Type Theory,” Category Theory 2008, Calais, France, June 2008.

“Homotopy and Intensionality,” Department of Mathematics, Cambridge University, May 2008.

“Topology and Modality,” Department of Mathematics, University of Uppsala, Sweden, May 2008.

“Topology and Modality,” Department of Mathematics, University of Ljubljana, Slovenia, April 2008.

“Homotopy and Intensionality,” Center for Mathematical Research, Barcelona, February 2008.

“Topology and Modality,” Department of Mathematics, University of Jena, Germany, February 2008.

“Carnap’s Dream,” Philosophy Department, University of Pittsburgh, May 2007.

“Recent Developments in Categorical Logic,” Spring Meeting Association of Symbolic Logic, Chicago, April 2007.

“Topology and Modality,” Philosophy Department Colloquium, Indiana University, November 2006.

“The Quest for Analyticity: Carnap’s *Studies in Semantics*,” Workshop on Rudolf Carnap, GAP.6, Annual meeting of the Gesellschaft für analytische Philosophie, Berlin, September 2006.

“Kripke Semantics for the Lambda-Calculus”, Association for Symbolic Logic Annual Meeting, Montreal, May 2006.

“Topology and Modality,” Mathematics Department, Reed College, Portland, Oregon, January 2006.

“Saunders Mac Lane, Modern Logic, and Carnap’s *Logical Syntax*,” *Impact of Categories*, Paris 1, October 2005.

“Continuity and Logical Completeness,” Institute for History and Philosophy of Mathematics, Paris 1, October 2005.

“*Carnaps Suche nach Analytizität*,” Philosophy Department Colloquium, University of Constance, Germany, June 2005.

“*Stetigkeit und logische Vollständigkeit*,” Mathematics Department Colloquium, University of Marburg, Germany, June 2005.

“*Carnaps Traum*,” Philosophy Department Colloquium, University of Jena, Germany, June 2005.

“Advances in Algebraic Set Theory.” Mathematics Department, Ohio State University, May 2005.

“Kripke Semantics for the Lambda-Calculus,” Mathematics Department, Wesleyan University, November 2004.

“Recent Advances in Algebraic Set Theory,” *Mathematical Foundations of Programming Semantics*, Carnegie Mellon University, May 2004.

“Categories of Sets and Classes,” Mathematics Department, University of Uppsala, Sweden, December 2003.

“Ideal Completeness of Categories of Classes,” Mathematics Department, Cambridge University, December 2003.

“Kripke Semantics for the Lambda Calculus,” Department of Informatics, University of Edinburgh, UK, November 2003.

“*Carnap’s Traum*,” Philosophy Department Colloquium, University of Constance, Germany, July 2003.

“Ideal Completeness of Categories of Classes,” PSSL, Mathematics Department, University of Utrecht, The Netherlands, June 2003.

“Sheaves and Logic,” Mathematics Department, Reed College, Portland, Oregon, October 2002.

“Carnap’s Feverish Dream,” Philosophy Department, Reed College, Portland, Oregon, October 2002.

“Algebraic Set Theory,” Mathematics Department, University of Pennsylvania, September 2002.

“Propositions as [Types],” FLoC ‘02, Copenhagen, Denmark, July 2002.

“Developments in Mac Lane Set Theory,” 2002 *ASL Annual Meeting*, Las Vegas, Nevada, June 2002.

“How Carnap Could Have Replied to Gödel,” *Carnap and the Roots of Analytic Philosophy*, Jena, Germany, September 2001.

“Propositions as [Types],” Seminar talk, Institute Mittag-Leffler, Stockholm, Sweden, June 2001.

“Continuity and Logical Completeness: An Application of Topos Theory,” Invited contribution, *Philosophy of Science Association*, Vancouver, Canada, November 2000.

“Relating Realizability Using Sheaves,” *American Mathematical Society Regional Meeting*, Toronto, Canada, September 2000.

“On Mac Lane Set Theory,” *Conference in honor of Saunders Mac Lane’s 90th Birthday*, Department of Mathematics, The University of Chicago, October 1999.

“Local Realizability Toposes and a Modal Logic for Computability” (joint work with L. Birkedal and D.S. Scott, presented by L. Birkedal). Workshop on Realizability Semantics and its Applications, LICS ‘99, Trento, Italy, June 1999.

“Topological Representation of the  $\lambda$ -Calculus,” Mathematics Department, Utrecht University, The Netherlands, June 1998.

“Carnap, Completeness, and Categoricity,” Center for Philosophy of Science, University of Pittsburgh, February 1998.

“*Carnaps Gabelbarkeitssatz von 1929*,” Philosophy Department, University of Jena, Germany, June 1997.

“Topological Representations of Higher-Order Logic,” Department of Computer Science, University of Braunschweig, Germany, April 1997.

“Sheaf Representation for Small Topoi,” Mathematics Department, University of Utrecht, The Netherlands, October 1996.

“Axiom of Choice and Excluded Middle in Categorical Logic,” Spring 1994 meeting of the Association for Symbolic Logic.

## Editorial Activities

Coordinating Editor, *Journal of Symbolic Logic* (2023–present), Editor, *Journal of Symbolic Logic* (2020–2023), *Mathematical Logic Quarterly*, *Philosophia Mathematica*, *Bulletin of Symbolic Logic* (Reviews Managing Editor 2008–2013), *Review of Symbolic Logic* (Advisory Board).

Co-Founder and Editor, *Homotopy Type Theory*, weblog.

Series Managing Editor, *Full Circle: Publications from the Archives for Scientific Philosophy, the University of Pittsburgh*, Open Court Publishing Company. Five vols., 2004–2014.

Editorial Board Member, *The Collected Works of Rudolf Carnap*, Oxford U. Press, 12 vols., 2019–present.

Editorial Board Member, *The Selected Papers of Dana S. Scott*, Oxford U. Press, 2 vols., forthcoming.

Co-Editor with N. Gambino and E. Palmgren, “From Type Theory and Homotopy Theory to Univalent Foundations”, *Mathematical Structures in Computer Science*, 2014.

## Professional Activities

Hiring, promotion and tenure external referee for Cambridge University (Computer Science), Johns-Hopkins University (Mathematics), University of Regensburg, Germany (Mathematics), University of Ottawa (Mathematics), Dalhousie University, Canada (Mathematics), Royal Swedish Academy of Science (Mathematics), Institute for Advanced Study (Mathematics).

Scientific committee member and local organizing committee Chair, Second International Conference on Homotopy Type Theory (HoTT 2023), Carnegie Mellon University, Pittsburgh, May 2023.

Scientific committee member and Chair, International Conference on Category Theory (CT 2019), University of Edinburgh, Scotland, July 2019.



Program committee member and local organizing committee Chair, International Conference on Homotopy Type Theory (HoTT 2019), Carnegie Mellon University, Pittsburgh, August 2019.

Co-Organizer of a trimester program on “Types, Sets, and Constructions”, along with a workshop on “Sets, types, and homotopy type theory”, Hausdorff Research Institute for Mathematics, Bonn, Germany, June 2018.

Organizer, “Category Theory Octoberfest”, CMU, October 2017.

Co-Organizer (with Thierry Coquand and Vladimir Voevodsky) of a special research year on “Univalent Foundations of Mathematics,” Institute for Advanced Study, Princeton, 2012–13.

Co-Organizer of a special session on “Univalent Foundations”, Association for Symbolic Logic, Waterloo, Canada, May 2013.

Co-Organizer of a Conference on Type Theory, Homotopy Theory, and Formalized Mathematics, Barcelona, September 2013.

Organizer of a Symposium in Honor of Dana Scott’s 80th Birthday, CMU, October 2013.

Scientific or Program committee member: Logic in Computer Science (LICS 2020, 2016, 2007), Category Theory (CT 2019), Homotopy Type Theory (HoTT 2019), Advances in Modal Logic (AiML 2022), Typed Lambda Calculus and its Applications (TLCA 2015), Mathematical Foundations of Programming Semantics (MFPS 2014, 2012), Workshop on Logic, Language, Information and Computation (WoLLC 2014, 2012), Logical Foundations of Computer Science (LFCS 2021, 2020, 2019, 2018, 2017, 2013), Topology, Algebra, Category Theory in Logic (TACL 2013), Association for Symbolic Logic North American Annual Meeting (ASL 2013).

Special session organizer: “Univalent Foundations” ASL 2013; “Homotopy Type Theory,” European Logic Colloquium 2012; “Homotopy Type Theory,” Mathematical Foundations of Programming Semantics (MFPS 2012).

Project Member: “CORCON: Correctness by Construction”, EU-funded grant for travel funds for scientific collaboration, 2014–19.

Foundations Panel member, National Science Foundation, 2011.

Co-Organizer (with Richard Garner, Per Martin-Löf, and Vladimir Voevodsky) of a mini-workshop “The homotopy interpretation of constructive type theory,” Oberwolfach Mathematical Research Institute, Germany, March 2011.

Organizer of the “Category Theory Novemberfest,” Pittsburgh, November 2009.

Co-Organizer of a Workshop on “Rudolf Carnap” at the Annual Meeting of the *Gesellschaft für Analytische Philosophie*, Berlin, September 2006.

Organizer of a session on “Algebraic Set Theory” at the Canadian Mathematical Society Annual Meeting, Calgary, June 2006.

Organizer of a Workshop on “Modal Logic” at Carnegie Mellon University, May 2006.

Special session organizer: “Logical Foundations of Programming Semantics”, *Association for Symbolic Logic Annual Meeting and Mathematical Foundations of Programming Semantics*, May 2004 ; “Category Theory and Structuralism”, *Association for Symbolic Logic Spring Meeting*, April 2004; “Constructivism and Categorical Logic”, *Association for Symbolic Logic Annual Meeting*, June 2000.

Organizer of Logic and Computation and Philosophy Department Colloquia, Carnegie Mellon University, 1998–present.

Co-organizer of *Midwest Logic and Philosophy of Mathematics Workshop*, Carnegie Mellon University, Dec. 2000.

Advisory Board member, Carnap Collection, Archive of Scientific Philosophy, University of Pittsburgh.

Referee for: *Advances in Mathematics*, *Journal of Symbolic Logic*, *Journal of Philosophical Logic*, *Synthese*, *Erkenntnis*, *Logical Methods in Computer Science*, *Mathematical Logic Quarterly*, *Amsterdam Logic Colloquium*, *Notre Dame Journal of Formal Logic*, *Annals of Pure and Applied Logic*, *Mathematical Structures in Computer Science*, *Proceedings of the London Mathematical Society*, *ACM Transactions on Computational Logic*, *Theoretical Informatics and Applications*, *European Association for Computer Science Logic*, *Principles and Practice of Declarative Programming*, *LICS*, *Mathematical Reviews*, Oxford University Press, Cambridge University Press, MIT Press, National Science Foundation, Canadian Research Council, Dutch Scientific Foundation, European Research Council, Leverhulme Foundation.

Associate of the *Center for the Philosophy of Science*, University of Pittsburgh.

Member of the *American Mathematical Society*, *Association for Symbolic Logic*, *Deutsche Vereinigung für Mathematische Logik*, *Gesellschaft für Analytische Philosophie*.

## Scientific Mentorship

Postdoctoral research advisor:

Andrew Swan, 2019–22; Mathieu Anel, 2018–22; Jonas Frey, 2017–22; Felix Wellen, 2018–20; Ulrik Buchholtz, 2016–17; Bas Spitters, 2014–15.

Doctoral thesis advisor:

Clive Newstead, Ph.D. in Mathematics, Mathematics Department, CMU, August 2018. Chair. Thesis: “Algebraic models of dependent type theory.”

Egbert Rijke, Ph.D. in Pure and Applied Logic, Philosophy Department, CMU, August 2018. Chair. Thesis: “Classifying types: Investigations in synthetic homotopy theory.”

Kristina Sojakova, Ph.D. in Computer Science, School of Computer Science, CMU, April 2016. Winner of the 2016 SCS Dissertation Award. Co-Advised with Frank Pfenning. Thesis: “Higher-inductive types as homotopy-initial algebras.”

Spencer Breiner, Ph.D. in Pure and Applied Logic, Philosophy Department, CMU, December 2013. Chair. Thesis: “Scheme representation for first-order logic.”

Peter LeFanu Lumsdaine, Ph.D. in Mathematics, CMU, December 2010. Chair. Thesis: “Homotopy, higher categories, and type theory.”

Kohei Kishida, Ph.D. in Philosophy, University of Pittsburgh, December 2010. Chair. Thesis: “Topological semantics for first-order modal logic.”

Michael Warren, Ph.D. in Pure and Applied Logic, Philosophy Department, CMU, August 2008. Chair. Thesis: “Homotopy-theoretic models of intensional type theory.” Currently: Fields Institute Postdoctoral Fellow in Mathematics, Ottawa, Canada.

Henrik Forssell, Ph.D. in Pure and Applied Logic, Philosophy Department, CMU, December 2007. Chair. Thesis: “Stone duality for first-order logic.” Currently: Postdoctoral Fellow in Mathematics, Brno, Czech Republic.

Matthew Jackson, Ph.D. in Mathematics, University of Pittsburgh, June 2006. Thesis: “A Sheaf-Theoretic Approach to Measure Theory”. Winner of the Thomas C. Hales Distinguished Research Award in Mathematics. Currently: Assistant Professor, Lawrence University, Appleton, Wisconsin.

Jonas Eliasson, Ph.D. in Mathematics, University of Uppsala, Sweden, December 2003. Co-advisor with Viggo Stoltenberg-Hansen. Thesis: “Ultrasheaves”.

Jesse Hughes, Ph.D. in Pure and Applied Logic, Philosophy Department, CMU, 2001. Co-advisor with Dana Scott. Thesis: “A Study of Algebras and Coalgebras”.

Doctoral Committee Member:

Hugo Moeneclaey, external thesis examiner (Rapporteur), Department of Computer Science (IRIF), University of Paris, Centre (ED 386), 2022. Chair: Hugo Herbelin.

Christopher Dean, external thesis examiner, Department of Mathematics, Oxford University, 2022. Chair: Yakov Kremnitzer.

Jetze Zoethout, external thesis examiner, Department of Mathematics, Utrecht University, 2022. Chairs: Jaap van Oosten and Ieke Moerdijk.

Taichi Uemura, external thesis examiner, Institute for Logic, Language and Information, University of Amsterdam, 2021. Chairs: Sonja Smets and Benno van den Berg.

Philip Saville, external thesis examiner, Department of Computer Science, University of Cambridge, 2020. Chair: Marcelo Fiore.

Nikolai Kraus, external thesis examiner, Department of Computer Science, University of Nottingham, 2015. Chair: Thorsten Altenkirch.

Chad Brown, Ph.D. in Mathematics, CMU, 2003. Chair: Peter Andrews.

Andrej Bauer, Ph.D. in Pure and Applied Logic, School of Computer Science, CMU, 2001. Chair: Dana Scott.

Lars Birkedal, Ph.D. in Computer Science, CMU, 2000. Chair: Dana Scott.

Masters Thesis Advisor:

Fernando Larrain Langlois, MS in Logic and Computation, Philosophy Department, CMU, 2021. Thesis: “A Higher Inductive Presentation of the Integers.”

Sam Speight, MS in Logic and Computation, Philosophy Department, CMU, 2018. Chair. Thesis: “Impredicative encodings of inductive types in homotopy type theory.”

Colin Zwanziger, MS in Logic and Computation, Philosophy Department, CMU, 2016. Chair. Thesis: “Montague’s intensional logic as comonadic type theory.”

Patrick Walsch, MS in Logic and Computation, Philosophy Department, CMU, 2015. Chair. Thesis: “Justifying Path Induction.”

Jason Parker, MS Logic and Computation, Philosophy Department, CMU, 2015. Chair. Thesis: “Duality between cubes and bipointed sets.”

David Carper, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2011. Chair. Thesis: “Sheaf-Theoretic approach to Abstract Elementary Classes.”

Hans-Christof Kotzsch, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2011. Chair. Thesis: “Categorical Semantics for Bi-Intuitionistic and Bi-Modal Logic.”

Kohei Kishida, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2007. Chair. Thesis: “Topological Semantics for First-Order Modal Logic.”

Michael Warren, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2004. Chair. Thesis: “Predicative algebraic set theory.”

Henrik Forssell, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2004. Chair. Thesis: “Categorical models of intuitionistic theories of sets and classes.”

Orlin Vakarelov, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2002. Co-chair with Wilfried Sieg. Thesis: “Accessible domains from a categorical perspective”.

Jeff Helzner, M.S. in Pure and Applied Logic, Philosophy Department, CMU, 2000. Chair. Thesis: “Intuitionistic modal logic”.