David I. Spivak

Massachusetts Institute of Technology
Department of Mathematics
Cambridge, MA 02139 USA

Phone: +1 510 684 6425
Email: dspivak@math.mit.edu
Homepage: http://math.mit.edu/~dspivak

Education

Ph.D. Mathematics, University of California, Berkeley, 2007

Advisor: Peter Teichner

Thesis title: Quasi-smooth Derived Manifolds

B.S. Mathematics, University of Maryland, College Park, 2000

Employment

Massachusetts Institute of Technology

2013 – *Present*: Research Scientist, Department of Mathematics

2019 – *Present*: Research Affiliate, Laboratory for Information and Decision Systems (LIDS)

2010 – 2013: Postdoctoral Associate, Department of Mathematics

Topos Institute

2019 – *Present*: Co-founder

Conexus AI

2016 – *Present*: Co-founder and Chief Scientific Officer

University of Oregon

2007 – 2010: Paul Olum Visiting Assistant Professor, Department of Mathematics

2008: Guest Instructor, Department of Computer and Information Sciences

University of California, Berkeley

2001 – 2007: Graduate Student Instructor/Researcher, Department of Mathematics

University of Maryland, College Park

1999 – 2000: Strauss Teaching Assistant, Department of Mathematics

Grants

As Principal Investigator (totaling $3,561,500)

Air Force Office of Scientific Research (AFOSR)

2019 – 2022: "A Category-Theoretic Approach to Agent Interaction: Information, Communication, Planning, and Learning", $540,000

2016 – 2020: "Pixel Matrices and other compositional analyses of interconnected systems", $900,000

2013 – 2018: "Categorical Approach to Agent Interaction", $900,000

Honeywell Incorperated

2019 – 2020 : "Temporal Type Theory for Autonomy", $120,000

National Science Foundation (NSF)

2016 – 2017: "I-Corps: Solving Information-Integration Problems Using Category Theory", $50,000

2015: "I-Corps Site Program Award", $1,500

Office of Naval Research (ONR)

2013 – 2015: "Categorical Informatics," $540,000

2010 – 2013: "Categorical Information Theory," $360,000

2009 – 2010: "Databases and Networks," $150,000

As Co-Principal Investigator (totaling $300,000)

National Aeronautics and Space Administration (NASA)

2014 – 2017: "Category-theoretic Approaches for the Analysis of Distributed Systems", $300,000

Editorial Board Membership

Compositionality. Founding editor. http://www.compositionality-journal.org

Publications

Books

Fong, B.; **Spivak, D.I.** (2018) *An Invitation to Applied Category Theory: Seven Sketches in Compositionality*. Cambridge University Press.

Schultz, P.; **Spivak, D.I.** (2017) *Temporal Type Theory: A Topos-theoretic Approach to Systems and Behavior.* Springer Birkhäuser.

Spivak, D.I. (2014) *Category Theory for the Sciences*. Cambridge: MIT Press. 486 pages

Journal Articles and Book Chapters

Kock, J.; **Spivak, D.I.** (2019) "Decomposition space slices are toposes". *Proceedings of the American Mathematical Society*. Available online: https://arxiv.org/abs/1807.06000.

Forssell, H.; Gylterud, H.K.; **Spivak, D.I.** (2020) "Type theoretical databases." *Journal of Logic and Computation*. Available online http://arxiv.org/abs/1406.6268.

Daimler, E.; **Spivak, D.I.** (2020) "Pattern Domains". In *After Shock: The World's Foremost Futurists Reflect on 50 Years of Future Shock–And Look Ahead to the Next 50*, John Schroeter, ed.

Brown, K.; **Spivak, D.I.**; Wisnesky, R. (2019) "Categorical Data Integration for Computational Science". *Computational Materials Science* Vol 164, pp. 127 – 132. Available online: https://arxiv.org/abs/1903.10579.

Fong, B.; **Spivak, D.I.** (2019) "Hypergraph categories". *Journal of Pure and Applied Algebra*, Vol 233, Issue 11, pp. 4746 – 4777. Available online: https://arxiv.org/abs/1806.08304.

Spivak, D.I.; Vasilakopoulou C.; Schultz, P. (2019) "Dynamical systems and sheaves." *Applied Categorical Structures*. Available online: http://arxiv.org/abs/1609.08086.

Beurier, E.; Pastor, D.; **Spivak, D.I.** (2019) "Memoryless Systems Generate the Class of all Discrete Systems," International Journal of Mathematics and Mathematical Sciences, vol. 2019.

Spivak, D.I. (2017) "Categories as mathematical models." *Categories for the Working Philosopher*. Oxford University Press. Available online http://arxiv.org/abs/1409.6067

Wisnesky, R.; Breiner, S.; Jones, A.; **Spivak, D.I.**; Subrahmanian, E. (2017) "Using category theory to facilitate multiple manufacturing service database integration." *ASME. Journal of Computing and Information Science in Engineering* Vol 17, No 2.

Spivak, D.I.; Schultz, P.; Rupel, D. (2017) "String diagrams for traced and compact categories are oriented 1-cobordisms." *Journal of Pure and Applied Algebra*. Vol 221, No 8, pp. 2064 – 2110. Available online: http://arxiv.org/abs/1508.01069

Schultz, P.; **Spivak, D.I.**; Vasilakopoulou, C.; Wisnesky, R. (2017) "Algebraic databases." *Theory and Applications of Categories*, Vol 32, pp. 547 – 619. Available online: http://www.tac.mta.ca/tac/volumes/32/16/32-16.pdf

Spivak, D.I.; Tan, J.Z. (2016) "Nesting of dynamic systems and mode-dependent networks." *Journal of Complex Networks.* Available online: https://arxiv.org/abs/1502.07380.

Kock, J.; **Spivak, D.I.** (2016) "Homotopy composition of cospans." *Communications in Contemporary Mathematics*. Available online: http://arxiv.org/abs/1602.1493699

Vagner, D.; **Spivak, D.I.**; Lerman, E. (2015) "Algebras of open dynamical systems on the operad of wiring diagrams." *Theory and Application of Categories* Vol 30, No 51, pp. 1793–1822. Available online: http://www.tac.mta.ca/tac/volumes/30/51/30-51abs.html.

Giesa, T.; Jagadeesan, R.; **Spivak, D.I.**; Buehler, M.J. (2015) "Matriarch: a Python library for materials architecture." *ACS Biomaterials Science & Engineering*. Available online: http://pubs.acs.org/doi/full/10.1021/acsbiomaterials.5b00251.

Brommer D.B.; Giesa T.; **Spivak, D.I.**; Buehler, M.J. (2015) "Categorical prototyping: Incorporating molecular mechanisms into 3D printing." *Nanotechnology*.

Spivak, D.I. (2014) "Database queries and constraints via lifting problems." *Mathematical structures in computer science*. Available online: http://arxiv.org/abs/1202.2591

Spivak, D.I. (2012) "Functorial data migration." *Information and Communication*. Vol 217, pp. 31 – 51. Available online: http://arxiv.org/abs/1009.1166

Giesa, T.; **Spivak, D.I.**; Buehler, M.J. (2012) "Category theory based solution for the building block replacement problem in materials design." *Advanced Engineering Materials* Vol 14, No 9, pp. 810–817.

Spivak, D.I.; Kent, R.E. (2012) "Ologs: A categorical framework for knowledge representation." *PLoS ONE* Vol 7, No 1.

Wong, J.Y.; McDonald, J.; Taylor-Pinney, M.; **Spivak, D.I.**; Kaplan, D.L.; Buehler, M.J. (2012) "Materials by design: Merging proteins and music." *Nano Today* Vol 7, No 6, pp. 488 – 495.

Giesa, T.; **Spivak, D.I.**; Buehler M.J. (2011) "Reoccurring patterns in hierarchical protein materials and music: The power of analogies." *BioNanoScience* Vol 1, No 4, pp. 153-161.

Spivak, D.I.; Giesa, T.; Wood, E.; Buehler, M.J. (2011) "Category theoretic analysis of hierarchical protein materials and social networks." *PLoS ONE* Vol 6, No 9.

Dugger, D.; **Spivak, D.I.** (2011) "Rigidification of quasi-categories." *Algebraic and Geometric Topology* Vol 11 pp. 225-261.

Dugger, D.; **Spivak, D.I.** (2011) "Mapping spaces in quasi-categories." *Algebraic and Geometric Topology* Vol 11 pp. 263-325.

Spivak, D.I. (2010) "Derived smooth manifolds." *Duke Mathematical Journal* Vol 153, no. 1, pp. 55-128.

Batra, P.; Dobrescu, B.A.; **Spivak, D.I.** (2006) "Anomaly-free sets of fermions." *Journal of Mathematical Physics*, Vol 47.

Refereed Conference Papers and Technical Reports

Fong, B.; **Spivak, D.I.**; Tuyéras, R. (2019) "Backprop as Functor: A compositional perspective on supervised learning". *LICS 2019*. Available online: http://arxiv.org/abs/1711.10455.

Wisnesky, R.; **Spivak, D.I.**; Schultz, P. (2017) "Algebraic model management." *WADT'16 post-proceedings*, Springer.

Spivak, D.I.; Ernadote, D.; Hammami, O. (2016) "Pixel matrices: An elementary technique for solving nonlinear systems." *2016 IEEE International Symposium on Systems Engineering (ISSE)*. Available online http://arxiv.org/abs/1605.00190.

Forssell, H.; Gylterud, H.K.; **Spivak, D.I.** (2016) "Type theoretical databases." *Logical Foundations of Computer Science*. Available online http://arxiv.org/abs/1406.6268.

Subrahmanian, E.; Wisnesky, R.; **Spivak, D.I.**; Schultz, P. (2015) "Functorial data migration: From theory to practice." *NIST Interagency/Internal Report (NISTIR)*. Available online: http://arxiv.org/abs/1502.05947.

Morton, J.; **Spivak, D.I.** (2015) "A operad-based normal form for morphism expressions in a closed compact category." *Higher-dimensional rewriting and applications*, http://hdra15.gforge.inria.fr.

Spivak, D.I.; Wisnesky, R. (2015) "Relational foundations for functorial data migration." *Proceedings of the International Symposium on Database Programming Languages (DBPL)*, ACM. Available online: http://arxiv.org/abs/1212.5303.

Gross, J.; Chlipala, A.; **Spivak, D.I.** (2014) "Experience implementing a performant category-theory library in Coq." *5th conference on interactive theorem proving (ITP'14)*. Available online: http://arxiv.org/abs/1401.7694.

Spivak, D.I.; Wisnesky, R. (2013) "A functorial query language." *Data-Centric Programming workshop (DCP2014)*. Available online: http://research.microsoft.com/en-us/events/dcp2014/wisnesky.pdf.

Preprints

Myers, D.J.; **Spivak, D.I.** (2020) "Dirichlet polynomials form a topos". Available online: https://arxiv.org/abs/2003.04827.

Genovese, F.; **Spivak, D.I.** (2020) "A Categorical Semantics for Guarded Petri Nets". Available online: https://arxiv.org/abs/2002.02762.

Fong, B.; **Spivak, D.I.** (2019) "Regular and relational categories: Revisiting 'Cartesian bicategories I' ". Available online: http://arxiv.org/abs/1909.00069.

Fong, B.; **Spivak, D.I.** (2019) "Supplying bells and whistles in symmetric monoidal categories". Available online: http://arxiv.org/abs/1908.02633.

Spivak, D.I. (2019) "Generalized Lens Categories via Functors $C^{\mathrm{op}} \to \mathsf{Cat}$". Available online: https://arxiv.org/abs/1908.02202.

Fong, B.; Speranzon, A.; **Spivak, D.I.** (2019) "Temporal Landscapes: A graphical temporal logic for reasoning". Available online: https://arxiv.org/abs/1904.01081.

Fong, B.; **Spivak, D.I.** (2018) "Graphical Regular Logic". Available online: http://arxiv.org/abs/1812.05765.

Fong, B.; Myers, D.J.; **Spivak, D.I.** (2018) "Behavioral Mereology". *Submitted.* Available online: http://arxiv.org/abs/1811.00420.

Liu, C.T.; **Spivak, D.I.** (2018) "Evaluating the Pixel Array Method as Applied to Partial Differential Equations". Available online: https://arxiv.org/abs/1808.01724.

Speranzon, A.; **Spivak, D.I.**; Varadarajan, S. (2018) "Abstraction, Composition and Contracts: A Sheaf Theoretic Approach". Available online: http://arxiv.org/abs/1802.03080.

Fong, B.; **Spivak, D.I.**; Tuyéras, R. (2017) "Backprop as Functor: A compositional perspective on supervised learning". Available online: http://arxiv.org/abs/1711.10455.

Spivak, D.I.; Dobson, M.R.C.; Kumari, S.; Wu, L. (2016) "Pixel Arrays: A fast and elementary method for solving nonlinear systems." *Submitted.* Available online: https://arxiv.org/abs/1609.00061.

Lerman, E.; **Spivak, D.I.** (2016) "An algebra of open continuous time dynamical systems and networks." *Submitted.* Available online: http://arxiv.org/abs/1602.01017.

Spivak, D.I. (2015) "The steady states of coupled dynamical systems compose according to matrix arithmetic." Available online: http://arxiv.org/abs/1512.00802.

Schultz, P.; **Spivak, D.I.**; Wisnesky, R. (2015) "QINL: Query-integrated Languages." Available online: http://arxiv.org/abs/1511.06459.

Pérez, M.; **Spivak, D.I.** (2015) "Toward formalizing ologs: Linguistic structures, instantiations, and mappings." *Submitted.* Available online: http://arxiv.org/abs/1503.08326.

Spivak, D.I.; Schultz, P.; Wisnesky, R. (2015) "A purely equational formalism for functorial data migration." Available online: http://arxiv.org/abs/1503.03571.

Rupel, D.; **Spivak, D.I.** (2013) "The operad of temporal wiring diagrams: formalizing a graphical language for discrete-time processes." *Submitted.* Available online http://arxiv.org/abs/1307.6894.

Spivak, D.I. (2013) "The operad of wiring diagrams: Formalizing a graphical language for databases, recursion, and plug-and-play circuits." Available online: http://arxiv.org/abs/1305.0297.

Spivak, D.I. (2012) "Kleisli database instances." Available online: http://arxiv.org/abs/1209.1011.

Spivak, D.I.. (2010) "Table manipulation in simplicial databases." Available online: http://arxiv.org/abs/1003.2682.

Spivak, D.I. (2009) "Simplicial databases." Available online: `http://arxiv.org/abs/0904.2012`.

Teaching Experience

At Massachusetts Institute of Technology

Graduate classes

Category Theory for Scientists, Spring 2013

Undergraduate classes

Applied Category Theory, IAP 2019
Differential Equations (as Teaching Assistant), Spring 2012

Informal courses

Category Theory Reading Course, 2015 – 2016
Seven Sketches in Compositionality, Winter (IAP) 2018

At University of Oregon

Graduate classes and seminars

Categorical Informatics, Winter 2010
Characteristic Classes, Fall 2008
Mathematical Methods in Computer Science, Fall 2008
Category Theory in Computer Science, Spring 2008

Undergraduate classes

Linear Algebra, Spring 2010, Winter 2008
Calculus III, Winter 2009
Differential Equations, Winter 2009, Fall 2007
Calculus II, Fall 2008
Discrete Mathematics, Fall 2007

At University of California, Berkeley

Undergraduate classes

Precalculus (160 students, managing four TAs leading sections), Spring 2005, Fall 2004

Various undergraduate classes (as Teaching Assistant), Fall 2001 – Spring 2007

At University of Maryland, College Park

Undergraduate classes

Calculus I, II (as Teaching Assistant), Fall 1999 – Spring 2000

Mini-courses

"Category Theory", one-day, 6-hour mini-course, Google X, September 2019

"Category Theory", one-day, 6-hour mini-course, LambdaConf, May 2017

"Applied Category Theory", four-day, 8-hour mini-course, École Polynechnique Fédéral Lausanne, September 2015

"Derived Manifolds", two-day, 4-hour mini-course, University of Toronto, February 2010

Awards and Honors

Best Poster Award, Hybrid Systems: Computation and Control conference, 2017

Outstanding Graduate Student Instructor, University of California, Berkeley, 2002

VIGRE Fellowship, University of California, Berkeley, 2000-2001

Graduated Magna Cum Laude, with Honors in Mathematics, University of Maryland, 2000

Outstanding Senior Award, University of Maryland, 2000

Carol Karp Award for Outstanding Logic Student, University of Maryland, 2000

Related Professional Experience

Mentorship and Management

Supervised Postdocs

Dr. Paolo Perrone, Massachusetts Institute of Technology, 2020 – present
Dr. Brendan Fong, Massachusetts Institute of Technology, 2017 – present
Dr. Rémy Tuyéras, Massachusetts Institute of Technology, 2017 – 2018 (~ 18 months)
Dr. Patrick Schultz, Massachusetts Institute of Technology, 2014 – 2017 (~ 3 years)
Dr. Christina Vasilakopoulou, Massachusetts Institute of Technology, 2015 – 2016 (~ 12 months)
Dr. Marco Pérez, Massachusetts Institute of Technology, 2014 – 2015 (~ 12 months)
Dr. Ryan Wisnesky, Massachusetts Institute of Technology, 2014 – 2015 (~ 18 months)

Research papers by postdocs under my supervision, on which I am not an author:

Fong, B.; Johnson, M. (2019) "Lenses and Learners". Available online: https://arxiv.org/abs/1903.03671.

Fong, B.; Sarazola, M. (2018) "A recipe for black box functors". Available online: https://arxiv.org/abs/1812.03601.

Fong, B.; Zanasi, F. (2018) "Universal Constructions for (Co)Relations: categories, monoidal categories, and props." *Logical Methods in Computer Science* Volume 14, Issue 3. Available online: https://arxiv.org/abs/1710.03894.

Baez, J.C.; **Fong, B.** (2018) "A Compositional Framework for Passive Linear Networks." Available online: https://arxiv.org/abs/1504.05625v5.

Tuyéras, R., "Category Theory for Genetics I: mutations and sequence alignments". *Theory and Applications of Categories* Vol. 33, 2018, No. 40, pp 1269-1317.

Tuyéras, R., "Category theory for genetics II: genotype, phenotype and haplotype". Available online: https://arxiv.org/abs/1805.07004.

Malecha, G.; **Wisnesky, R.** (2015) "Using Dependent Types and Tactics to Enable Semantic-optimization of Language-integrated Queries", *International Symposium on Database Programming Languages*.

Schultz, P. (2015) "Regular and exact (virtual) double categories." Available online: http://arxiv.org/abs/1505.00712.

Schultz, P.; Wisnesky, R. (2017) "Algebraic Data Integration." *Journal of Functional Programming*. Available online: https://arxiv.org/abs/1503.03571.

Supervised Graduate Student Research

David Darais, student at Harvard University, 2014

Ryan Wisnesky, student at Harvard University, 2012 – 2013

Ralph Hutchison, student at University of Oregon, 2010

Paea LePendu, student at University of Oregon, 2009

Applied Category Theory Adjoint School

Oxford 2019, Autopoiesis group: Bruno Gavranović, David Jaz Myers, Toby St Clere Smithe, and Sophie Libkind.

Supervised Undergraduate Student Research

Lawrence Wu, Advanced Undergraduate Project in Electrical Engineering and Computer Science, 2016

21 students, totaling 29 student-semesters, in the MIT Undergraduate Research Opportunity Program, 2011 – present

Undergraduate research papers on which I am not an author:

Ngotiaoco, T. (2017) "Compositionality of the Runge-Kutta Method." https://arxiv.org/abs/1707.02804

Supervised High School Student Research

Ravi Jagadeesan, Research Science Institute; supervised jointly with Professor Markus Buehler and Tristan Giesa, 2013

Committees

Ph.D. Qualifying Examination Committee

William Yu, Massachusetts Institute of Technology, Department of Mathematics, 2014

Ph.D. Thesis Committee

Elie Adam, Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science, 2016

Sophie Raynor, University of Aberdeen, Department of Mathematics, 2018

Steering, Program, and Organizing Committees

Applied Category Theory Conference, MIT 2020. (Scientific chair, Steering committee)

Applied Category Theory Conference, Oxford, UK 2019. (Steering committee)

SIAM Network Science Workshop, Snowbird, Utah, USA 2019.

1st Annual Workshop on String Diagrams in Computation, Logic, and Physics, Oxford, UK 2017

Novel Approaches for Modeling, Abstraction, Composition, and Analysis of Systems of Systems mini-symposium, *SIAM Conference on Control and its Applications*, Pittsburgh, PA 2017

Workshop on Topology and Abstract Algebra for Biomedicine, *Pacific Symposium for Biocomputing*, Big Island, HI 2016

Agent-based Complex Systems workshop, *Institute of Pure and Applied Math* (Los Angeles, CA 2009)

Languages

English (native) and French (intermediate)

Presentations

Applied Category Theory

Invited Presentations

1. ETH Zurich, Special event seminar, 2019/09/25,
2. Category theory and Logic seminar, McGill University, 2010/09/10
3. Google X, 6-hour mini-course on category theory, 2019/09/05
4. Compose conference, Keynote presentation, 2019/06/25
5. MIT Algebra, Statistics, and Optimization seminar, 2019/05/09
6. Kensho AI Lab Academic Talk Series, 2019/02/27
7. Carnegie Mellon University, Department of Philosophy, 2019/02/15
8. Institute for Systems Research Seminar, University of Maryland, 2018/09/28
9. Topology Seminar, Universitat Autònoma de Barcelona, 2018/07/06
10. Toposes in Como, 2018/06/27
11. Special Seminar, Max Planck Institute for Mathematics in the Sciences, 2018/05/07
12. Applied Category Theory workshop, Lorentz Center, 2018/05/02

13. Applied Category Theory workshop, National Institute of Standards and Technology, 2018/03/16
14. Oxford Advanced Seminar on Informatic Structures, Oxford 2018/02/01
15. Applied topology seminar, University of Aberdeen, 2018/01/30
16. Applied Algebra and Topology seminar, MIT, 2017/12/05
17. Biomolecular Feedback Systems seminar, MIT, 2017/11/15
18. AMBER lab Robotics seminar, Caltech University, 2017/11/03
19. Category theory and Logic seminar, McGill University, 2017/10/03
20. Applied math seminar, McGill University, 2017/10/02
21. Topology Seminar, Universitat Autònoma de Barcelona, 2017/06/12
22. Emerging Topics in Network Dynamical Systems workshop, Lorentz Center, 2017/06/08
23. Compositionality workshop, Simons Institute for the Theory of Computing, 2016/12/06
24. Agenda des Écoles, Grand École Télécom Bretagne, 2016/11/10
25. Numerical Methods for PDEs Seminar, MIT Mathematics, 2016/10/26
26. E3 Science Lecture Series, Sandia National Labs, 2016/09/27
27. Workshop on Probability, Uncertainty, and Decisions, AFRL Dayton, 2016/06/27
28. 5th Mini-Symposium on Computational Topology, Boston, 2016/06/15
29. Mathematics Colloquium, New York University, Binghamton, 2016/04/07
30. Generalized Network Structures and Dynamics workshop, Mathematical Biosciences Institute, 2016/03/22
31. Invited Presentation, Amgen, 2016/03/17
32. Mathematics Colloquium, University of Massachusetts, Boston, 2015/10/14
33. Computational Category Theory Workshop, National Institute of Standards and Technology, 2015/09/28
34. Seminar, University of Oslo Department of Informatics, 2015/09/21
35. Lunch Seminar, MIT Laboratory for Information and Decision Systems, 2015/06/26
36. Invited Presentation, National Institute of Standards and Technology, 2015/06/18
37. Invited Presentation, National Institute of Standards and Technology, 2015/06/16
38. Foundational Methods in Computer Science conference, Colgate University, 2015/06/06
39. Categorical Foundations of Network Theory workshop, Institute for Scientific Interchange, 2015/05/28
40. Complex Systems Seminar, University of Pennsylvania, 2015/04/03
41. Applied Algebra and Network Theory Seminar, Pennsylvania State University, 2015/03/18
42. International Workshop on Design Theory, MINES ParisTech, 2015/01/26
43. Programming Languages Seminar, MIT Computer Science and Artificial Intelligence Laboratory, 2014/04/15
44. Bar talk, Institute for Advanced Study, 2014/03/20
45. Invited Presentation, PARC, 2014/03/03
46. Invited Presentation, Amgen, 2014/03/04
47. Invited Presentation, Oracle, 2014/02/28
48. Topology Seminar, University of Illinois Urbana-Champaign, 2014/02/25

49. Programming Languages Seminar, Harvard University, 2014/02/19
50. Principles of Programming Seminar, Carnegie Mellon University, 2014/01/23
51. Invited Presentation, National Institute of Standards and Technology, 2013/06/12
52. Topology Seminar, University of Oregon, 2012/11/12
53. Geometry and Topology Seminar, Brown University, 2012/09/19
54. Invited Presentation, Mathfest Madison WI, 2012/08/04
55. Colloquium Presentation, Stanford Center for Biomedical Informatics Research, 2012/07/27
56. Invited Presentation, Office of Naval Research, 2012/06/13
57. Special Geometry Seminar, University of Texas, Austin, 2012/01/31
58. Invited Presentation, Amgen, 2012/01/24–25
59. Principles of Programming Seminar, Carnegie Mellon University, 2012/01/18
60. Mathematics in Science and Society Colloquium, University of Illinois Urbana-Champaign, 2011/11/29
61. Agent-based Complex Systems conference, Institute of Pure and Applied Mathematics, 2009/10/13
62. Topology Seminar, Johns Hopkins University, 2011/11/21
63. Invited Presentation, Amgen, 2011/02/17–18
64. Invited Presentation, Boston Haskell, 2011/01/20
65. Electrical Engineering and Computer Science seminar, Harvard University, 2010/11/03
66. Tech Talk, Galois, 2010/10/22
67. Topology Seminar, MIT Mathematics, 2010/09/20
68. Database Seminar, MIT Computer Science and Artificial Intelligence Laboratory, 2010/09/16
69. Semantics Reading Group, MIT Linguistics, 2010/09/15
70. Foundational Methods in Computer Science conference, University of Calgary, 2010/06/12
71. Tech Talk, Galois, 2010/06/03
72. Topology Seminar, University of Chicago, 2010/05/11
73. Mathematics Colloquium, Reed College, 2010/03/25
74. Invited Presentation, Amgen, 2010/03/15-16
75. Category Theory Seminar, Carnegie Mellon University, 2009/11/13
76. Agent-based Complex Systems conference, Institute for Pure and Applied Mathematics, 2009/10/13.
77. Category Theory Seminar, McGill University, 2009/05/19
78. Mathematics Colloquium, University of California, Riverside, 2009/04/29
79. Algebraic Topological Methods in Computer Science conference, University of Paris 7, 2008/07/07
80. Topology Seminar, University of Oregon, 2008/05/06
81. Computer Science Colloquium, University of Oregon, 2008/02/07.

Contributed Presentations

82. Plenary Talk, International Category Theory conference, 2019/07/11
83. Plenary Talk, International Category Theory conference, 2018/07/10

84. AMS Special session on Applied Category Theory, UC Riverside, 201711/04
85. Novel Approaches for Systems of Systems mini-symposium, SIAM, 2017/07/12
86. Dynamical Systems and Nonlinear Analysis session, SIAM, 2017/07/11
87. IAP Lecture, MIT Mathematics, 2017/01/30
88. Plenary Talk, International Category Theory conference, 2016/08/10
89. IAP Lecture, MIT Mathematics, 2016/01/11
90. IAP Lecture, MIT Mathematics, 2014/01/27

Derived Manifolds

Invited Presentations

91. Derived Algebraic Geometry conference, University of Salamanca, Spain, 2009/06/04
92. Category Theory Seminar, Université du Québec à Montréal, 2009/05/22
93. Topology Seminar, MIT Mathematics, 2009/05/04
94. Topology Seminar, Stanford University, 2009/02/03
95. Topology Seminar, University of Illinois Urbana-Champaign, 2008/10/04
96. CATS3 Conference, Centro de Giorgi, Pisa, Italia, 2008/09/03.

Contributed Presentations

97. Special Session on Homotopy Theory and Higher Algebraic Structures, American Mathematical Society Riverside, CA, 2009/04/30
98. Cascade Topology Conference, Portland State University, 2008/11/08
99. American Mathematical Society Sectional, U. British Columbia, 2008/10/04

Mapping Spaces in Quasi-categories

Invited Presentations

100. Topology Seminar, University of Illinois, Chicago, 2009/12/09
101. Deformation Theory Seminar, University of Pennsylvania,, 2009/11/18
102. Novemberfest Category Theory Conference, Carnegie Mellon University, 2009/11/15

Contributed Presentations

103. AMS sectional, University of California, Riverside, 2009/11/08.