

MICHAEL CHING - CURRICULUM VITAE

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EMPLOYMENT

- **Amherst College**
Associate Professor of Mathematics (2017-present)
Assistant Professor of Mathematics (2011-2017)
- **University of Georgia**
Assistant Professor of Mathematics (2008-2011)
- **The Johns Hopkins University**
J.J. Sylvester Assistant Professor (2005-2008)

EDUCATION

- **Massachusetts Institute of Technology** (2001-2005)
Ph.D. Mathematics June 2005
Thesis Advisor: Haynes Miller
- **University of Cambridge - Trinity College** (1997-2001)
M.A. Mathematics February 2004 (automatically conferred three years after B.A.)
Certificate of Advanced Study in Mathematics, June 2001
B.A. Mathematics (Hons.), First Class, June 2000

EXTERNAL FUNDING AND VISITING POSITIONS

- NSF Research Grant: DMS-1709032: RUI: Calculus of Functors and Applications in Homotopy Theory (July 2017 - June 2021)
- NSF Research Grant: DMS-1308933: RUI: Koszul Duality of Operads and the Calculus of Functors (July 2013 - June 2017)
- NSF Research Grant: DMS-0968221: FRG: The Calculus of Functors and the Theory of Operads: Interactions and Applications (June 2010 - May 2013)
- Research Visitor: Isaac Newton Institute, Cambridge, UK (Sept - Dec 2018)
- Research Visitor: Hausdorff Trimester Program, Bonn, Germany (July 2015)
- Visiting Assistant Professor: Massachusetts Institute of Technology (Sept - Dec 2014)
- Research Member: Mathematical Sciences Research Institute (January - May 2014)

PUBLICATIONS AND PREPRINTS

18. *Dual tangent structures for ∞ -toposes*
arxiv:2101.08805, 18 pages, submitted
17. *Tangent ∞ -categories and Goodwillie calculus*
arxiv:2101.07819, 128 pages, submitted
(joint with Kristine Bauer and Matthew Burke)
16. *Koszul duality for topological E_n -operads*
arxiv:2002.03878, 54 pages, submitted
(joint with Paolo Salvatore)
15. *Infinity-operads and Day convolution in Goodwillie calculus*
arxiv:1801.03467, 52 pages
to appear in Journal of the London Mathematical Society
14. *Goodwillie Calculus*
Handbook of Homotopy Theory, CRC Press (2019), 1–38
(joint with Gregory Arone)
13. *Derived Koszul duality and TQ-homology completion of structured ring spectra*
Advances in Mathematics 341 (2019), 118–187
(joint with John E. Harper)
12. *A nilpotent Whitehead theorem for TQ-homology of structured ring spectra*
Tbilisi Mathematical Journal 11(3) (2018), 69–79
(joint with John E. Harper)
11. *Manifolds, K-theory and the calculus of functors*
Contemporary Mathematics 682 (2017), 1–38
(joint with Gregory Arone)
10. *Cross-effects and the classification of Taylor towers*
Geometry & Topology 20-3 (2016), 1445–1537
(joint with Gregory Arone)
9. *Higher homotopy excision and Blakers-Massey theorems for structured ring spectra*
Advances in Mathematics 298 (2016), 654–692
(joint with John E. Harper)
8. *A classification of Taylor towers for functors of spaces and spectra*
Advances in Mathematics 272 (2015), 471–552
(joint with Gregory Arone)
7. *Coalgebraic models for combinatorial model categories*
Homology, Homotopy and Applications 16(2) (2014), 171–184
(joint with Emily Riehl)
6. *A note on the composition product of symmetric sequences*
J. Homotopy Relat. Struct. 7 (2012), 237–254
5. *Apollonian circle packings of the half-plane*
Journal of Combinatorics 3 (2012), 1–49
(joint with John Doyle)
4. *Bar-cobar duality for operads and modules of spectra*
Journal of Topology 5 (2012), 39–80

3. *Operads and chain rules for the calculus of functors*
Astérisque 338 (2011), 158 pages
(joint with Gregory Arone)
2. *A chain rule for Goodwillie derivatives of functors from spectra to spectra*
Trans. Amer. Math. Soc. 362 (2010), 399–426
1. *Bar constructions for topological operads and the Goodwillie derivatives of the identity*
Geometry & Topology 9 (2005), 833–933

RECENT AND UPCOMING TALKS

- 2021:
 - Operads, Calculus and Homotopy Theory in Topology, Lille, France (July 2021)
 - ***Tangent ∞ -Categories and Goodwillie Calculus***
Notre Dame Topology Seminar (online, April 2021)
Masaryk University Algebra Seminar, Brno, Czech Republic (online, April 2021)
Warwick Algebraic Topology Seminar (online, March 2021)
University of Virginia Topology Seminar (online, February 2021)
- 2020:
 - ***Goodwillie Calculus and Operads***
Operad Pop-up Conference (online, August 2020)
 - ***Representable Tangent ∞ -Categories and Functor Calculus***
Calgary Peripatetic Seminar (online, July 2020)
 - ***Tangent ∞ -Categories and Goodwillie Calculus***
MIT Topology Seminar (online, April 2020)
Binghamton University Geometry and Topology Seminar (February 2020)
- 2019:
 - ***Self-Koszul-Duality of Stable E_n -Operads***
Equivariant Topology and Derived Algebra, Trondheim, Norway (July 2019)
 - ***Tangent ∞ -Categories and Goodwillie Calculus***
Foundational Methods in Computer Science, Kananaskis, AB (2 talks, May 2019)
Current Directions in Homotopical Algebra, Pohang, Korea (May 2019)
Johns Hopkins University Topology Seminar (March 2019)
 - ***Pro-Operads and the Classification of Taylor Towers for Spectrum-Valued Functors***
Workshop on Functor Calculus, Ohio State University, Columbus, OH (March 2019)
 - ***Inequality***
Brown University Math Department Horizons Seminar (February 2019)
- 2018:
 - ***Pro-Operads and the Classification of Taylor Towers for Spectrum-Valued Functors***
Transpennine Topology Triangle, Sheffield, UK (October 2018)
 - ***Tangent ∞ -Categories and Goodwillie Calculus***
Isaac Newton Institute, Cambridge, UK (October 2018)
Stockholm University Topology Seminar, Sweden (September 2018)
 - ***Day Convolution, ∞ -Operads and Goodwillie Calculus***
Category Theory 2018, University of the Azores, Portugal (July 2018)
Workshop on Infinity-Operads, Utrecht, Netherlands (June 2018)

- AMS Sectional Meeting, Columbus, OH (March 2018)
- University of Calgary Peripatetic Logic and Category Theory Seminar (March 2018)
- 2017:
 - *Operads, Pro-Operads and the Calculus of Functors*
MIT Topology Seminar (December 2017)
 - *Apollonian Circle Packings*
Amherst College Math Colloquium (February 2017)

RECENT AND UPCOMING CONFERENCES

- Operad Pop-Up Conference, online (August 2020)
- Equivariant Topology and Derived Algebra, Trondheim, Norway (July 2019)
- SYM 10 Years Old, Copenhagen, Denmark (June 2019)
- Foundational Methods in Computer Science, Kananaskis, AB (May 2019)
- Current Directions in Homotopical Algebra, Pohang, Korea (May 2019)
- Workshop on Functor Calculus, Ohio State University, Columbus, OH (March 2019)
- Homotopy Harnessing Higher Structures, Isaac Newton Institute, Cambridge, England (September - December 2018)
- AMS Sectional Meeting, Columbus, OH (March 2018)
- Homotopy Theory in the Ecliptic, Reed College, Portland, OR (August 2017)
- Alpine Conference on Applied and Algebraic Topology, Saas, Switzerland (August 2016)
- Topology of Manifolds, Lisbon, Portugal (June 2016)
- Workshop on Homotopy Type Theory, Fields Institute, Toronto, Canada (May 2016)
- Factorizable Structures in Topology and Algebraic Geometry, Banff (August 2015)
- Homotopy Theory, Manifolds and Field Theories, Hausdorff Institute of Mathematics, Bonn, Germany (July 2015)
- Functor Calculus Workshop, Münster, Germany (June 2015)
- Lehigh University Geometry and Topology Conference, Bethlehem, PA (May 2015)
- Mid-Atlantic Topology Conference, Charlottesville, VA (April 2015)
- Geometry and Topology, Princeton, NJ (March 2015)
- Homotopical Algebra, Operads and Grothendieck – Teichmüller groups, Nice, France (September 2014)
- Stable Homotopy Theory: Structured Ring Spectra and Their Invariants, Manchester, UK (September 2014)
- Category Theory 2014, Cambridge, UK (July 2014)
- Manifolds, K-Theory and Related Topics, Dubrovnik, Croatia (June 2014)
- MSRI Semester in Algebraic Topology, Berkeley, CA (January-May 2014)

PROFESSIONAL SERVICE

- Peer reviewer for 13 journals
- NSF panel reviewer
- PhD Thesis Committee: Luis Pereira, MIT (April 2013)
- MIT-Talbot Workshop Mentor (May 2012)
- Girls Inc. Math Tutor Training Workshop, Amherst College (March 2013, February 2012)
- Co-organizer of Banff International Research Station Workshop on Functor Calculus and Operads (March 2011)
- Main organizer for Georgia Topology Conference (May 2010)

TEACHING AT AMHERST COLLEGE

- **Math 111i: Introduction to Calculus (Intensive)** (Fall 2017, Fall 2016, Fall 2015)
first-semester calculus: limits, derivatives, integration (25-35 students)
- **Math 111: Introduction to Calculus** (Fall 2019, Fall 2013, Fall 2012, Fall 2011)
first-semester calculus: limits, derivatives, integration (20-30 students)
- **Math 121: Intermediate Calculus** (Spring 2012)
second-semester calculus: integration techniques, sequences and series (20 students)
- **Math 205: Inequality** (Spring 2018, Spring 2017)
K-12 math education in the U.S., co-taught and cross-listed with History and Black Studies (25 students)
- **Math 211: Multivariable Calculus** (Fall 2020, Fall 2017, Spring 2015, Spring 2013, Fall 2012, Fall 2011)
curves in \mathbb{R}^n , functions of several variables, Stokes' Theorem (25-50 students)
- **Math 220: Discrete Mathematics** (Spring 2021, Fall 2020, Spring 2016)
introduction to proof-writing, relations, functions (20-35 students)
- **Math 271: Linear Algebra** (Spring 2017, Fall 2016, Fall 2015)
linear systems, matrices, vector spaces, linear transformations (35 students)
- **Math 355: Introduction to Analysis** (Spring 2019, Spring 2012)
rigorous single-variable mathematical analysis (25 students)
- **Math 385: Mathematical Logic** (Fall 2019, Spring 2018)
propositional and predicate calculi, completeness and incompleteness (10 students)
- **Math 410: Galois Theory** (Spring 2016, Fall 2013)
field extensions, Galois Correspondence, solvability by radicals (2-9 students)
- **Math 455: Topology** (Spring 2021, Spring 2019, Spring 2015, Spring 2013)
an introduction to point-set and algebraic topology (10-20 students)
- **Special Topics courses taught:**
 - Motivic Homotopy Theory (Spring 2015)
 - Topics in Math Education (Spring 2015, Spring 2016)
 - Readings in Mathematics - Half Course (Spring 2015)
 - Homotopy Type Theory (Spring 2016)
 - Game Theory (Spring 2017)
 - Algebraic Topology (Spring 2017)
 - Reflections on Calculus (Fall 2017)
 - Higher Category Theory (Spring 2018)
 - Rational Homotopy Theory (Spring 2018)
 - Category Theory (Spring 2019)
- **Senior Thesis Students:**
 - Sunny Xiao (2013-14):
1 – 2 Quadruples in Self-Similar Unbounded Apollonian circle packings
 - Kyle Ferendo (2015-16):
The Maximal and Free (∞, n) -Categories of an $(\infty, n + 1)$ -Category
 - Fraser Binns (2016-17):
The Kervaire Invariant of the Lie Framed Torus

COLLEGE SERVICE

- Faculty Committee on Adjudication (2020-)
- Faculty Committee on Student Fellowships (2017-2018)
- Faculty Computing Committee (2015-2017)

DEPARTMENTAL SERVICE

- Petition/List Coordinator (2020)
- Math Fellows Co-coordinator (2019)
- Mellon Grant Co-PI (2019)
- Visiting Faculty Search Committee Chair (2019)
- Walker Prizes Coordinator (2016-2021)
- Faculty Search Committees (2012-2013, 2015-2017)
- MAA Student Chapter and Math Club Advisor (2012-2013, 2015-2017)
- Math Colloquium Coordinator (2015)
- Putnam Exam Problem-Solving Sessions (2011, 2012, 2013)

SCHOLARSHIPS AND AWARDS

- Amherst College Senior Sabbatical Fellowship (2018)
- Amherst College Lazerowitz Lectureship (2016)
- Amherst College Trustee Faculty Fellowship (2014)
- Excellence in Teaching Award (JHU Department of Mathematics, 2007)
- Dean's Educational & Student Advising Award (MIT School of Science, 2005)
for dedication to educational programs and student advising
- MIT Graduate Assistantship (2002-2005)
- Kennedy Memorial Trust Scholarship (2001-2002)
- International Mathematical Olympiad: Gold Medal (1996), Silver Medal (1997)