Stephen McKean

Contact Information

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Research Interests

Arithmetic geometry, arithmetic topology, commutative algebra, applied topology.
Motivic homotopy theory, enumerative geometry, algebraic cycles, anabelian geometry, quadratic forms, residue pairings, topological materials, topological neuroscience.

Education

Duke University, Durham, North Carolina
Ph.D. in Mathematics, expected May 2022

Advisor: Kirsten Wickelgren
Certificate in College Teaching

Georgia Institute of Technology, Atlanta, Georgia
M.S. in Mathematics, December 2019

University of Utah, Salt Lake City, Utah
B.S. in Mathematics, May 2017

Magna cum laude
Minors in Physics and German
Undergraduate Research Scholar Designation

Honors & Awards

2019 **FESTA Fellowship,** School of Math, Georgia Tech
Departmental award for students exhibiting superior academic and leadership skills.

2019 **Graduate committee travel support,** School of Math, Georgia Tech
Departmental award to fund travel to a domestic conference.

2018 **Bob Price Travel Fellowship,** School of Math, Georgia Tech
Departmental award to fund travel to an international conference.

2016 **Calvin H. Wilcox Memorial Scholarship,** Department of Math, U of U
Departmental award for outstanding undergraduates.

2011 **President's Scholarship,** University of Utah
Awarded to matriculating undergraduates on the basis of academic excellence.

Teaching Awards

2021 **L.P. Smith Award,** Department of Mathematics, Duke
Departmental award for long-term commitment to excellence in teaching.

2021 **Bass Instructional Fellowship,** Duke
Fellows propose, design, and teach an innovative undergraduate course.

2019 ***Thank a Teacher* Certificate,** Georgia Tech
Awarded to instructors by their students.

2019 **Outstanding Student Evaluations Award,** School of Math, Georgia Tech
Departmental award for teaching assistants with highest student evaluations.

Papers & Preprints

10. **New invariants for circles of Apollonius.**
In preparation.

9. **Lifts, transfers, and degrees of univariate maps,**
with Thomas Brazelton.
In preparation.

8. **Heights over finitely generated fields,**
   with Soumya Sankar.
   Submitted, 2021.

7. **Conics meeting eight lines over perfect fields,**
   with Cameron Darwin, Aygul Galimova, and Miao (Pam) Gu.
   Submitted, 2021.
   arXiv:2107.05543

6. **Bézoutians and the $\mathbf{A}^1$-degree,**
   with Thomas Brazelton and Sabrina Pauli.
   Submitted, 2021.
   arXiv:2103.16614

5. **Rational lines on smooth cubic surfaces.**
   Preprint, 2021.
   arXiv:2101.08217

4. **Bézoutians and injectivity of polynomial maps.**
   Submitted, 2021.
   arXiv:2005.09797

3. **An arithmetic enrichment of Bézout's Theorem.**
   Math. Ann. 379(1), 633–660 (2021)
   arXiv:2003.07413

2. **All lines on a smooth cubic surface in terms of three skew lines,**
   with Daniel Minahan and Tianyi Zhang.
   New York J. Math. 27(1), 1305–1327 (2021)
   arXiv:2002.10367

1. **The trace of the local $\mathbf{A}^1$-degree,**
   with Thomas Brazelton, Robert Burklund, Michael Montoro, and Morgan Opie.
   Homology Homotopy Appl. 23(1), 243–255 (2021)
   arXiv:1912.04788

Invited Talks

* online

2021	Dec	Seminar on Machine Computation in Homotopy*, eCHT
	Apr	Algebraic Geometry Seminar*, Ohio State
	Feb	Motivic Geometry Seminar*, CAS (Oslo)
2019	Nov	Commutative Algebra Seminar, University of Utah
	Sep	Geometry and Topology in Arithmetic, AMS Central Sectional

Contributed Talks

* online
† short talk

2021	Sep	Hermitian K-Theory Research Seminar*, eCHT
2020	Dec	Triangle Area Graduate Math Conference*, NC State
	Apr	Motives Research Seminar*, eCHT
	Mar	Real Enumerative Geometry and Beyond†, Vanderbilt
2019	Jun	Arithmetic Topology Workshop†, PIMS
	Jun	Graduate Student Conference in AG&T, Temple
2018	Dec	Tech Topology Conference†, Georgia Tech

Selected Conferences Attended

* online

2021	Oct	New Techniques in Resolution of Singularities*, Oberwolfach
	Sep	Six Functor Formalism and Motivic Homotopy Theory, Milan
	Jul	Motivic Homotopy Graduate Summer School*, PCMI
	May	Topological Insights in Neuroscience*, MSRI
	Mar	Homotopic and Geometric Galois Theory*, Oberwolfach
2020	Aug	Monodromy and Galois Groups in Enumerative Geometry*, ICERM
	Aug	Stacks Project Workshop*, University of Michigan

	Jul	Motivic, Equivariant, and Non-Commutative Homotopy Theory*, IHÉS
2019	Sep	Computations in Motivic Homotopy Theory, Universität Regensburg
	Jun	Arithmetic Topology Workshop, University of British Columbia (PIMS)
	Mar	Arizona Winter School, University of Arizona
2018	Jul	Homotopy Theory and Arithmetic Geometry, Imperial College
	Jun	The Roots of Topology, University of Chicago
	Mar	Arizona Winter School, University of Arizona

Teaching Experience

* online
† self-designed

2021	Fa	Instructor	The Art of Proof†, Duke
2020	Fa	Instructor	Laboratory Calculus I*, Duke
	Sp	TA	Linear Algebra and Differential Equations*, Duke
2019	Fa	Head TA	Differential Calculus, Georgia Tech
	Su	Instructor	Algebra Comp Prep Course, Georgia Tech
	Sp	Instructor	Calculus for Life Sciences, Georgia Tech
2018	Fa	Head TA	Differential Calculus, Georgia Tech
	Su	LA	Differential Calculus, Georgia Tech
	Sp	TA	Integral Calculus, Georgia Tech
2017	Fa	TA	Multivariable Calculus, Georgia Tech
	Su	Instructor	Pre-calculus, Statistics, and Algebra, Utah TRIO
	Sp	SI Leader	Trigonometry, University of Utah
2016	Fa	SI Leader	Intermediate Algebra, University of Utah
	Sp	SI Leader	Intermediate Algebra, University of Utah
2015	Fa	SI Leader	Calculus I, University of Utah

Undergrad Mentoring

2021	Su	Santino Panzica (Duke), *Topological insulators*
	Su	Will Strong (Duke), *Topological insulators*
	Su	Luke Triplett (Duke), *Topological insulators*
	Sp	Camilo Martinez (Unicauca), *Polynomials over finite fields*
2020	Fa	Michael Klyachman (Whitney Young High School), *Snaith's theorem*
	Su	John Igieobo (Georgia Tech), *Unstable Euler classes*
	Su	Steven Sanchez (Georgia Tech), *Unstable Euler classes*
	Su	Dae'Shawn Taylor (Georgia Tech), *Unstable Euler classes*

Department Service

2021	Presenter for website workshop, Duke
2021	Speaker for first-year TA training, Duke
2021	Presenter and panelist for first-year bootcamp, Duke
2021–22	Diversity, Equity, and Inclusion Team, Duke
2021	DOmath project manager, Duke
2021	AWM undergrad mentor, Duke
2020, 21	Designed DOmath t-shirts, Duke
2020	REU project assistant, Duke
2020	Co-organizer, presenter, and panelist for first-year bootcamp, Duke
2019	Instructor for first-year TA training, Georgia Tech
2019	Panelist for grad student orientation, Georgia Tech
2018, 19	Panelist for admitted grad student day, Georgia Tech
2018	Panelist for first-year course: "Getting Involved," Georgia Tech
2018	Designed and organized School of Math t-shirts, Georgia Tech
2018	Co-organizer of the Intersection Theory Learning Seminar, Georgia Tech
2018–19	Co-organizer of the Research Horizons Seminar, Georgia Tech
2018–19	Mathematics Graduate Student Council, Georgia Tech

Professional Service	2021–	Reviewer, Mathematical Reviews
	2020	Tutor, Durham Public Schools
	2020–21	Tutor, SPIRE Fellows, Duke
	2020–	Reviewer, zbMATH
	2019	Judge for UROP poster presentations, Georgia Tech
	2017–19	College of Sciences Graduate Student Diversity Council, Georgia Tech
	Referee:	IMRN
Outreach	2021	Math Employment Experience for High School Students, Duke
	2021	Co-organizer and instructor, Durham Math Circle
	2020–	Founder, organizer, and mentor, Twoples
	2019	9^{th} Grade Speaker Series, Gwinnett School of Math, Science, and Tech
	2019	SMASH Morehouse Networking Night, Morehouse College
	2017–20	High School Math Competition, Georgia Tech
	2015, 16	Project Youth, University of Utah
Relevant Skills	Language:	English (native), German (fluent), French (basic)
	Design:	Photoshop/GIMP (proficient), Inkscape (proficient)
	Coding:	Python/Sage (moderate), HTML/CSS (moderate), Macaulay2 (basic)