Stephen McKean

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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

May 2022   **Duke University,** Durham, North Carolina
Ph.D. in Mathematics (expected)
» Advisor: Kirsten Wickelgren
» Certificate in College Teaching

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

May 2017   **University of Utah,** Salt Lake City, Utah
B.S. in Mathematics
» Magna cum laude
» Minors in Physics and German
» Undergraduate Research Scholar Designation

Academic 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, University of Utah
» 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 Seminar on Machine Computation in Homotopy*, eCHT
Algebraic Geometry Seminar*, Ohio State
Motivic Geometry Seminar*, Centre for Advanced Study (Oslo)
2019 Commutative Algebra Seminar, University of Utah
Geometry and Topology in Arithmetic, AMS Central Sectional

Contributed Talks

online *
short talk †

2021 Hermitian K-Theory Research Seminar*, eCHT
2020 Triangle Area Graduate Math Conference*, NC State
Motives Research Seminar*, eCHT
Real Enumerative Geometry and Beyond†, Vanderbilt

2019   Arithmetic Topology Workshop[†], PIMS
        Graduate Student Conference in AG&T, Temple
2018   Tech Topology Conference[†], Georgia Tech

Selected Conferences Attended   online *

2021   New Techniques in Resolution of Singularities*, Oberwolfach
        Six Functor Formalism and Motivic Homotopy Theory, Università degli Studi di Milano
        Motivic Homotopy Graduate Summer School*, PCMI
        Topological Insights in Neuroscience*, MSRI
        Homotopic and Geometric Galois Theory*, Oberwolfach
2020   Monodromy and Galois Groups in Enumerative Geometry*, ICERM
        Stacks Project Workshop*, University of Michigan
        Motivic, Equivariant, and Non-Commutative Homotopy Theory*, IHÉS
2019   Computations in Motivic Homotopy Theory, Universität Regensburg
        Arithmetic Topology Workshop, University of British Columbia (PIMS)
        Arizona Winter School, University of Arizona
2018   Homotopy Theory and Arithmetic Geometry, Imperial College
        The Roots of Topology, University of Chicago
        Arizona Winter School, University of Arizona

Teaching Experience   online *
                                                        self-designed †

2021   The Art of Proof[†] (instructor), Duke
2020   Laboratory Calculus I* (instructor), Duke
        Linear Algebra and Differential Equations* (TA), Duke
2019   Differential Calculus (head TA), Georgia Tech
        Algebra Comp Prep Course (instructor), Georgia Tech
        Calculus for Life Sciences (instructor), Georgia Tech
2018   Differential Calculus (head TA), Georgia Tech
        Differential Calculus (lecture assistant), Georgia Tech
        Integral Calculus (TA), Georgia Tech
2017   Multivariable Calculus (TA), Georgia Tech
        Pre-calculus, Statistics, and Algebra (instructor), Utah TRIO
        Trigonometry (supplemental instruction leader), University of Utah
2016   Intermediate Algebra (supplemental instruction leader), University of Utah
        Intermediate Algebra (supplemental instruction leader), University of Utah
2015   Calculus I (supplemental instruction leader), University of Utah

Undergraduate Mentoring

2021   Santino Panzica (Duke), Topological insulators
        Will Strong (Duke), Topological insulators
        Luke Triplett (Duke), Topological insulators
        Camilo Martinez (Universidad del Cauca), Polynomials over finite fields
2020   Michael Klyachman (Whitney Young High School), Snaith's theorem
        John Igieobo (Georgia Tech), Unstable Euler classes
        Steven Sanchez (Georgia Tech), Unstable Euler classes
        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
2020–22	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–now	Reviewer, Mathematical Reviews
2020	Tutor, Durham Public Schools
2020–21	Tutor, SPIRE Fellows, Duke
2020–now	Reviewer, zbMATH
2019	Judge for UROP poster presentations, Georgia Tech
2017–19	College of Sciences Graduate Student Diversity Council, Georgia Tech

Outreach

2021	Math Employment Experience for High School Students, Duke
2021	Co-organizer and instructor, Durham Math Circle
2020–now	Founder, organizer, and mentor, Twoples
2019	9th Grade Speaker Series, Gwinnett School of Math, Science, and Technology
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)