Patrick K. McFaddin

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Education

Ph.D., Mathematics — May 2016
University of Georgia — Athens, GA

- Advisor: Daniel Krashen
- Dissertation: K-cohomology of generalized Severi-Brauer varieties

M.A., Mathematics — August 2011
University of Georgia — Athens, GA

- Advisor: Robert Varley

B.A., with Honors in Mathematics — May 2010
University of Southern California — Los Angeles, CA

Employment

Fordham University — Aug. 2019 - Present
Assistant Professor (tenure-track)

University of South Carolina — Aug. 2016 - June 2019
Visiting Research Assistant Professor

University of Georgia — June 2010- May 2016
Graduate Research and Teaching Assistant

Research Interests

Algebra and algebraic geometry: algebraic K-theory, derived categories, algebraic cycles, motives and motivic cohomology, central simple algebras, algebraic groups, homogeneous and toric varieties, and Galois cohomology.

Publications

1. (with M. Ballard, A. Duncan, A. Lamarche) Separable algebras and coflasque resolutions. arXiv:2006.06876, to appear in *Adv. Math.*
2. (with L. Ji, S. Li, D. Moore, M. Stevenson) Weil restriction of schemes and beyond. In P. Belmans, W. Ho, & A. De Jong (Eds.), *Stacks Project Expository Collection* (London Mathematical Society Lecture Notes Series, pp. 194-221, 2022). Cambridge: Cambridge University Press.

3. A.T.V.'s for (geometric) off-roading: a gentle introduction to arithmetic toric varieties. *Notices Amer. Math. Soc.* 69 (2022), no. 7, 1113–1125.

4. (with M. Ballard and A. Duncan) Derived categories of centrally-symmetric smooth toric Fano varieties. *Math. Nachr.* 295 (2022), no. 2, 218–241.

5. (with M. Ballard, N. Chidambaram, D. Favero, and R. Vandermolen) Kernels for Grassmann flops. *J. Math. Pures Appl.* (9) 147 (2021), 29-59.

6. (with M. Ballard and A. Duncan) On derived categories of arithmetic toric varieties. *Ann. K-Theory* 4 (2019), no. 2, 211-242.

7. Zero-cycles with coefficients for the second generalized symplectic involution variety of an algebra of degree 4, *J. Pure Appl. Algebra*, 223 (2019), no. 7, 2822-2830.

8. (with M. Ballard and A. Duncan) The toric Frobenius morphism and a conjecture of Orlov, *Eur. J. Math.* 5 (2019), no. 3, 640-645.

9. The group of K_1-zero-cycles on the second generalized Severi-Brauer variety of an algebra of index 4. *J. Algebra* 479 (2017), 192-202.

10. (with V. Alexeev, et al.) Extended Torelli map to the Igusa blowup in genus 6, 7, and 8. *Exp. Math.* 21 (2012), no. 2, 193-203.

Submitted articles and preprints

11. (with M. Ballard, A. Duncan, A. Lamarche) Consequences of the existence of exceptional collections in arithmetic and rationality. arXiv:2009.10175, submitted 2023.

12. (with T. Needham) Interleaving distances, monoidal actions and 2-categories. arXiv:2311.11936, submitted 2023.

Physics and Astronomy Research

13. (with E. J. Rhodes, et al.) Temporal changes in the frequencies and widths of the solar p-mode oscillations. Proceedings of SOHO 24/GONG 2010, pp. 134-138, 2011.

14. (with E. J. Rhodes, et al.) Temporal changes in the frequencies of the solar p-mode oscillations during solar cycle 23. Proceedings of the IAU, Vol. 6, Symposium S273, pp. 389-393, 2011.

Awards

Faculty Research Grant (Award: $5,500) 2023-2024
Fordham University

Academic Year Faculty Fellowship Spring 2023
Fordham University

PIC Math Program (Award: $6,000) Summer 2021-Summer 2022
Mathematical Association of America

Fordham A&S Deans' Challenge Grant (Award: $9,500) Spring 2021
Enhancing the Flipped-Hybrid Approach, Grant Leader: Melkana Brakalova

Fordham A&S Deans' Challenge Grant (Award: $10,000) Fall 2020
Flipped-Hybrid Approach to Math Instruction, Grant Leader: Melkana Brakalova

AMS–Simons Travel Grant (Award: $4,000) July 2018–June 2021
American Mathematical Society and the Simons Foundation

Great Lakes National Scholarship Aug. 2015
Great Lakes Educational Loan Services

Outstanding Teaching Assistant March 2015
University of Georgia

VIGRE Graduate Fellowship Aug. 2011–July 2012
National Science Foundation

Selected Talks

(Co)flasque resolutions and Brauer indistinguishability March 2024
AMS Southeastern Sectional Meeting, Florida State University

Analogues of simplicial/singular homology for schemes Feb. 2024
Algebra Seminar, Fordham University

Tori, toric varieties, and K-theory Oct. 2023
Algebra Seminar, Fordham University

Derived categories and rationality of twisted forms Nov. 2021
Derived, Birational, and Categorical Algebraic Geometry, BIRS

Ciphers, cryptography, and modular arithmetic March 2021
Mobile Math Circle, University of South Alabama

Separable algebras and rationality of arithmetic toric varieties Feb. 2021
Algebra Seminar, Rutgers University

Derived categories and rationality of twisted forms of toric varieties Jan. 2021
JMM Special Session on Galois Cohomology and Arithmetic Geometry

Algebraic groups, torsors, and twisted forms Jan. 2020
Lincoln Center Math Seminar, Fordham University

Twisted forms of toric varieties, their derived categories, and rationality Nov. 2019
Brauer Groups, Derived Categories and Birational Geometry, BIRS

Arithmetic and geometry of algebraic cycles Oct. 2019
Lincoln Center Math Seminar, Fordham University

Resolutions of tori and derived categories of toric varieties Sept. 2019
Emerging Research in Alg. Groups, Motives, and K-Theory, St. Petersburg, Russia

Toric varieties and their derived categories Feb. 2019
Mathematics Department Colloquium, Georgia Southern University

Geometric study of subfields of some non-commutative algebras Nov. 2018
Carolina Math Seminar, University of South Carolina

Algebraic cycles on homogeneous varieties Oct. 2018
Algebra, Geometry, and Number Theory Seminar, Tufts University

Galois descent for exceptional collections on toric varieties Sept. 2018
Algebra Seminar, University of Tennessee, Knoxville

Exceptional collections on some arithmetic toric varieties July 2018
K-theory Conference Workshop, Universidad de Buenos Aires

Derived categories of arithmetic toric varieties June 2018
The 13th Brauer Group Conference, Pingree Park, CO

Groups of loops: they're fundamental! Feb. 2018
PME and Gamecock Math Club, University of South Carolina

Introduction to Algebraic Cycles Feb. 2018
Motives Seminar, University of South Carolina

Exceptional collections on toric varieties Nov. 2017
Algebraic Geometry Seminar, University of South Carolina

Lectures on non-commutative motives May–June 2017
K-theory and related fields trimester program, Hausdorff Institute

Chow groups with coefficients for some twisted homogeneous varieties March 2017
Algebraic Geometry Seminar, Courant Institute of Mathematical Sciences

K_1-zero-cycles for some homogeneous varieties of type A_n and C_n March 2017
Algebra Seminar, University of Alberta

Zero-cycles with coefficients for some twisted homogeneous varieties March 2017
Georgia Algebraic Geometry Symposium, University of Georgia

K_1-zero-cycles on twisted Grassmannians Sept. 2016
Topological Approaches to Arithmetic and Algebraic Geometry, University of Georgia

Chow groups with coefficients and generalized Severi-Brauer varieties Feb. 2016
Algebra and Number Theory Seminar, Emory University

Teaching and Training

Fordham University
Instructor of Record

- Math 3005–Abstract Algebra — Spring 2024
- Math 1100–Finite Mathematics — Spring 2024
- Math 2006–Linear Algebra — Fall 2023
- Math 1100–Finite Mathematics (2 sections) — Fall 2023
- Math 1206–Calculus I — Summer 2022
- Math 3005–Abstract Algebra — Spring 2022
- Math 4002–Preparation for Industrial Careers in Math — Spring 2022
- Math 1100–Finite Mathematics (2 sections) — Fall 2021
- Math 3002–Differential Equations — Fall 2021
- Math 3005–Abstract Algebra — Summer 2021
- Math 3005–Abstract Algebra — Spring 2021
- Math 2004–Multivariable Calculus I (2 sections) — Fall 2020
- Math 3002–Differential Equations — Fall 2020
- Math 1203–Applied Calculus — Spring 2020
- Math 1205–Applied Statistics — Spring 2020

· Math 1100–Finite Mathematics — Fall 2019
· Math 1108–Math for Business: Finite — Fall 2019

Recitation Instructor

· Math 2005–Multivariable Calculus II — Spring 2022
· Math 2005–Multivariable Calculus II — Spring 2021

University of South Carolina
Instructor of Record

· Math 599–Abstract Algebra and Music — Fall 2018
· Math 544–Linear Algebra — Spring 2018
· Math 142–Calculus I (2 sections) — Fall 2017
· Math 747–Algebraic Geometry: Schemes — Spring 2017
· Math 242–Elementary Differential Equations (2 sections) — Fall 2016

University of Georgia
Instructor of Record

· Math 2260–Calculus II for Science and Engineering — Fall 2015
· Math 1113–Pre-Calculus — Spring 2015
· Math 2250–Calculus I for Science and Engineering — Spring 2014
· Math 1113–Pre-Calculus — Fall 2013

Recitation Instructor

· Math 2200–Analytic Geometry and Calculus — Spring 2011, Fall 2010

Instructor for Math Kangaroo Course Level 3-4 — Fall 2022
Math Kangaroo USA

Instructor for independent tutorial course on ring theory — Summer 2021
Students: F. Azad, Z. Chen, Z. van Zant

Mental Health and International Students — Nov. 2018
International Accelerator Program, University of South Carolina

FLIP (Focus on Learning, Innovation and Pedagogy) Participant — Fall 2017
Center for Teaching Excellence, University of South Carolina

Observer of first-time graduate instructors — Spring 2015
University of Georgia, supervised by Lisa Townsley

UGA graduate student teacher training — 2010- 2014
Courses with Robert Rumley, Jon Hanke, Matt Mastin, and Lisa Townsley

Professional Activities

Member of the Special Projects Committee — Fall 2022–Present
National Association of Mathematicians

Core Curriculum Committee — Nov. 2020–Present
Fordham University

MoMath Math Gym Host — May 2020–Present
National Museum of Mathematics, New York, NY

Faculty Advisor for Math-CISC Major Fall 2019–Present
Fordham University

Math Kangaroo State Directors Meeting Oct. 2022
Math Kangaroo USA

Seminar on the Future of Jesuit Higher Education Fall 2022
Fordham University

AMS-SMF-EMS Special Session on Derived Cat. and Rationality July 2022
Co-organizer with M. Ballard and E. Macrì; Grenoble, France

Early-Career Faculty Panelist Aug. 2021
New Faculty Orientation, Fordham University

Career Day Volunteer Jan. 2020
The Equity Project Charter School

New Faculty Seminar on Mission Fall 2019
Fordham University

New Beginnings Life Skills Program Volunteer Fall 2018–Summer 2019
South Carolina Department of Juvenile Justice

Magellan Explorer Project Advisor Spring 2017–Spring 2018
for Danielle Wood, University of South Carolina

Top Scholar Review Committee Member and Interviewer Fall 2017–Spring 2018
University of South Carolina

Motives at South Carolina Spring 2018
Seminar Organizer

Comprehensive Exam Committee Member Spring 2017–Fall 2018
University of South Carolina

- Candace Bethea
- Tracy Huggins
- Alicia Lamarche
- Robert Vandermolen

Journal Referee 2017–Present

- *Pacific Journal of Mathematics*
- *Journal of the European Mathematical Society*
- *Épijournal de Géométrie Algébrique*

South Carolina 4 Square Club (SC4SC) Fall 2017–Spring 2019
Club Advisor

USC Graduate Student Seminar April 2019
Job Market Panelist Sept. 2017

UGA conference on algebraic and analytic aspects of quadratic forms July 2017
Co-organizer with D. Krashen, P. Clark, and K. Thompson

University of South Carolina High School Math Competition Feb. 2017
Volunteer Judge and Proctor Feb. 2018

UGA Graduate Student Bootcamp June 2016
Job Market Panelist/Speaker on "How to give a good math talk"

University of Georgia Math Camp June 2016
Graduate Instructor July 2014

Project REFOCUS Spring 2016
21st Century Skills Program Volunteer Fall 2015

University of Georgia High School Math Tournament Nov. 2014
Volunteer Nov. 2013

A Place Called Home Non-Profit Youth Center Spring 2008
Volunteer Tutor, K-12, all subjects

Member of the American Mathematical Society

Member of the National Association of Mathematicians

Skills

Technology

Self-instructed coding in Python, HTML, website building, Mathematica, Sage, Git, LaTeX, MyMathLab, MyLab Math, WebAssign, WebWork, BlackBoard, experience with Windows, Mac, Linux (via Ubuntu) operating systems.

Language

- French, limited working proficiency
- Spanish, elementary proficiency

Conferences and Workshops Attended

Special Session on algebraic groups and local-global principles March 2024
AMS Southeastern Sectional Meeting, Florida State University

Syzygies and Mirror Symmetry Sept. 2023
American Institute of Mathematics, Pasadena, CA

MAA MathFest Aug. 2022
Philadelphia, PA

Derived, Birational, and Categorical Algebraic Geometry Nov. 2021
Banff International Research Station, Banff, AB, Canada

Undergraduate Faculty Program on Motivic Milnor Numbers Aug. 2021
Park City Math Institute and Institute for Advanced Study

Quadratic forms, linear algebraic groups and beyond May 2020-July 2022
Organizers: P. Gille, Z. Reichstein, K. Zainoulline

Algebraic groups and algebraic geometry June 2021
In honor of Zinovy Reichstein's 60th birthday

PIC Math Faculty Workshop June 2021
Mathematical Association of America

Algebra and Geometry of Homogeneous Spaces June 2021
Organizers: N. Karpenko, N. Lemire, K. Zaynullin

Joint Mathematics Meetings Jan. 2021
Washington, D.C.

Derived categories and (non)commutative algebraic geometry Dec. 2020
Canadian Mathematical Society Winter Meeting

Birational, categorical, and derived algebraic geometry Nov. 2020
Banff International Research Station, Banff, AB, Canada

Madison Moduli Weekend Sept. 2020
University of Wisconsin, Madison

Workshop on ∞-categories and applications Aug. 2020
Max Planck Institute for Mathematics

Online Inquiry Based Learning July 2020
Mathematical Association of America

Electronic Algebraic K-Theory Seminar June 2020
Organizers: B. Antieau, E. Elmanto, A. Mathew, M. Yakerson

Teaching as a legitimate application of college mathematics May 2020
META Math Webinar, Mathematical Association of America

Brauer Groups, Derived Categories and Birational Geometry Nov. 2019
Banff International Research Station, Banff, AB, Canada

Emerging Research in Algebraic Groups, Motives, and K-Theory Sept. 2019
Euler International Mathematical Institute, St. Petersburg, Russia

Rationality problems in algebraic geometry July 2019
American Institute of Mathematics, San Jose, CA

Derived algebraic geometry and its applications March 2019
Mathematical Sciences Research Institute, Berkeley, CA

Joint Mathematics Meetings Jan. 2019
Baltimore, MD

Carolina Math Seminar Nov. 2018
University of South Carolina

K-theory Conference Workshop (ICM Satellite) July 2018
Universidad de Buenos Aires, Argentina

K-theory Conference School (ICM Satellite) July 2018
Universidad Nacional de La Plata, Argentina

The 13$^{\text{th}}$ Brauer Group Conference June 2018
Colorado State Mountain Campus, Pingree Park, CO

Discover USC April 2018
Mentor for Danielle Wood, University of South Carolina

A Day of Algebraic Geometry in Savannah March 2018
Georgia Southern University

Georgia Algebraic Geometry Symposium Feb. 2018
Georgia Institute of Technology

Joint Mathematics Meetings Jan. 2018
San Diego, CA

Stacks Project Workshop July-Aug. 2017
University of Michigan

CAAATQuaFs (Conference on Quadratic Forms) July 2017
University of Georgia

K-theory and Related Fields Trimester Program May-June 2017
Hausdorff Research Institute for Mathematics

Georgia Algebraic Geometry Symposium March 2017
University of Georgia

Lectures in Arithmetic Geometry at Rice Feb. 2017
Rice University

Topological Approaches to Arithmetic and Algebraic Geometry Sept. 2016
University of Georgia

Arithmetic Algebraic Geometry Aug. 2016
Courant Institute of Mathematical Sciences

Joint Mathematics Meetings Jan. 2016
Seattle, WA

Georgia Algebraic Geometry Symposium Oct. 2015
Emory University

Local-Global Principles and Their Obstructions Oct. 2015
University of Pennsylvania

Grad Student Bootcamp for the Alg. Geom. Research Institute July 2015
University of Utah

The 12^{th} Brauer Group Conference June 2015
Colorado State Mountain Campus, Pingree Park, CO

Arizona Winter School: Arithmetic and Higher-Dimensional Varieties March 2015
University of Arizona

Georgia Algebraic Geometry Symposium Oct. 2014
University of Georgia

Representation Theory and K-Theory May 2014
University of Southern California

Southeastern Lie Theory Workshop May 2014
University of Georgia

Georgia Algebraic Geometry Symposium Oct. 2013
University of Georgia

Torsors, Nonassociative Algebras, and Cohomological Invariants June 2013
Fields Institute

Homotopical Methods in Algebraic Geometry May 2013
University of Southern California

Workshop on Torsors, Motives, and Cohomological Invariants May 2013
Fields Institute

Oberwolfach Seminar on Algebraic Groups and Patching Oct. 2012
Mathematisches Forschungsinstitut Oberwolfach

Georgia Algebraic Geometry Symposium May 2012
University of Georgia

VIGRE Summer School Program in Algebraic Geometry May 2012
University of Georgia

Arizona Winter School: Ramification and Geometry March 2012
University of Arizona

Algebraic Geometry Northeastern Series Workshop Oct. 2011
Stony Brook University

A Celebration of Algebraic Geometry Aug. 2011
Harvard University

K-Theory and Motives March 2011
University of California, Los Angeles

Compact Moduli and Vector Bundles May 2010
University of Georgia