Patrick K. McFaddin

Lowenstein 808G Department of Mathematics Fordham University pmcfaddin@fordham.edu mcfaddin.github.io

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

May 2010

· Advisor: Robert Varley

B.A., with Honors in Mathematics 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, Galois cohomology, and categorical approaches to metric and geometric topology.

Publications

- 1. (with M. R. Ballard, A. Duncan, and A. Lamarche) Separable algebras and coflasque resolutions. *Adv. Math.* 444 (2024), Paper No. 109596.
- 2. (with L. Ji, S. Li, D. Moore, and 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.

Last updated November 14, 2024

- 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. R. Ballard and A. Duncan) Derived categories of centrally-symmetric smooth toric Fano varieties. *Math. Nachr.* 295 (2022), no. 2, 218–241.
- 5. (with M. R. Ballard, N. K. Chidambaram, D. Favero, and R. R. Vandermolen) Kernels for Grassmann flops. J. Math. Pures Appl. (9) 147 (2021), 29-59.
- 6. (with M. R. 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. R. 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. R. Ballard, A. Duncan, and 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.
- 13. (with N. A. Castro and J. Joseph) Relative group trisections. arXiv:2406.14530, submitted 2024.

Physics and Astronomy Research

- 14. (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.
- 15. (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) American Mathematical Society and the Simons Foundation	July 2018–June 2021
Great Lakes National Scholarship Great Lakes Educational Loan Services	Aug. 2015
Outstanding Teaching Assistant University of Georgia	March 2015
VIGRE Graduate Fellowship National Science Foundation	Aug. 2011–July 2012

Selected Talks

Categorical approaches to interleaving distance Algebra Seminar, Fordham University	Nov. 2024
Coflasque resolutions, torsors, and rationality AMS Central Sectional Meeting, University of Wisconsin, Milwaukee	April 2024
Galois cohomology and limitations of the derived category $AGNT\ Seminar,\ Rice\ University$	April 2024
Fundamentals of groups of loops Undergraduate Colloquium, Rice University	April 2024
(Co)flasque resolutions and Brauer indistinguishability AMS Southeastern Sectional Meeting, Florida State University	March 2024
Analogues of simplicial/singular homology for schemes Algebra Seminar, Fordham University	Feb. 2024
Tori, toric varieties, and K-theory Algebra Seminar, Fordham University	Oct. 2023
Derived categories and rationality of twisted forms Derived, Birational, and Categorical Algebraic Geometry, BIRS	Nov. 2021
Ciphers, cryptography, and modular arithmetic Mobile Math Circle, University of South Alabama	March 2021
Separable algebras and rationality of arithmetic toric varieties Algebra Seminar, Rutgers University	Feb. 2021
Derived categories and rationality of twisted forms of toric varieties JMM Special Session on Galois Cohomology and Arithmetic Geometry	Jan. 2021
Algebraic groups, torsors, and twisted forms Lincoln Center Math Seminar, Fordham University	Jan. 2020
Twisted forms of toric varieties, their derived categories, and rationality Brauer Groups, Derived Categories and Birational Geometry, BIRS	Nov. 2019
Arithmetic and geometry of algebraic cycles Lincoln Center Math Seminar, Fordham University	Oct. 2019
Resolutions of tori and derived categories of toric varieties Emerging Research in Alg. Groups, Motives, and K-Theory, St. Petersburg, Russia	Sept. 2019

Toric varieties and their derived categories Mathematics Department Colloquium, Georgia Southern University	Feb. 2019
Geometric study of subfields of some non-commutative algebras Carolina Math Seminar, University of South Carolina	Nov. 2018
Algebraic cycles on homogeneous varieties Algebra, Geometry, and Number Theory Seminar, Tufts University	Oct. 2018
Galois descent for exceptional collections on toric varieties Algebra Seminar, University of Tennessee, Knoxville	Sept. 2018
Exceptional collections on some arithmetic toric varieties K-theory Conference Workshop, Universidad de Buenos Aires	July 2018
Derived categories of arithmetic toric varieties The 13 th Brauer Group Conference, Pingree Park, CO	June 2018
Introduction to Algebraic Cycles Motives Seminar, University of South Carolina	Feb. 2018
Exceptional collections on toric varieties Algebraic Geometry Seminar, University of South Carolina	Nov. 2017
Lectures on non-commutative motives K-theory and related fields trimester program, Hausdorff Institute	May–June 2017
Chow groups with coefficients for some twisted homogeneous varieties Algebraic Geometry Seminar, Courant Institute of Mathematical Sciences	March 2017
K_1 -zero-cycles for some homogeneous varieties of type A_n and C_n Algebra Seminar, University of Alberta	March 2017
Zero-cycles with coefficients for some twisted homogeneous varieties Georgia Algebraic Geometry Symposium, University of Georgia	March 2017
K_1 -zero-cycles on twisted Grassmannians Topological Approaches to Arithmetic and Algebraic Geometry, University of Geo	Sept. 2016
Chow groups with coefficients and generalized Severi-Brauer varieties Algebra and Number Theory Seminar, Emory University	Feb. 2016

Teaching and Training

Fordham University

 $Instructor\ of\ Record$

\cdot Math 1108–Math for Business: Finite	Fall 2024
· Math 1100–Finite Mathematics (VIA)	Fall 2024
· Math 1100–Finite Mathematics	Fall 2024
· Math 3005–Abstract Algebra	Spring 2024
· Math 1100–Finite Mathematics	Spring 2024
· Math 2006–Linear Algebra	Fall 2023
\cdot Math 1100–Finite Mathematics (2 sections)	Fall 2023
· Math 1206–Calculus I	Summer 2022
· Math 3005–Abstract Algebra	Spring 2022

\cdot Math 4002–Preparation for Industrial Careers in Math	Spring 2022
\cdot 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
\cdot 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 (VIA)	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
\cdot 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 Math Kangaroo USA	Fall 2022
Instructor for independent tutorial course on ring theory Students: F. Azad, Z. Chen, Z. van Zant	Summer 2021
Mental Health and International Students International Accelerator Program, University of South Carolina	Nov. 2018
FLIP (Focus on Learning, Innovation and Pedagogy) Participant Center for Teaching Excellence, University of South Carolina	Fall 2017
Observer of first-time graduate instructors University of Georgia, supervised by Lisa Townsley	Spring 2015
UGA graduate student teacher training Courses with Robert Rumley, Jon Hanke, Matt Mastin, and Lisa Townsley	2010- 2014

Professional Activities

Alicia Lamarche Robert Vandermolen

MoMath Math Gym Host National Museum of Mathematics, New York, NY	May 2020–Present
Faculty Advisor for the 3-2 Combined Engineering Program Fordham University	Fall 2024–Present
Faculty Advisor for Math-CISC Major Fordham University	Fall 2019–Present
Member of the Special Projects Committee National Association of Mathematicians	Fall 2022–Spring 2024
Core Curriculum Committee Fordham University	Fall 2020–Spring 2023
Math Kangaroo State Directors Meeting Math Kangaroo USA	Oct. 2022
Seminar on the Future of Jesuit Higher Education Fordham University	Fall 2022
AMS-SMF-EMS Special Session on Derived Cat. and Rational Co-organizer with M. Ballard and E. Macrì; Grenoble, France	dlity July 2022
Early-Career Faculty Panelist New Faculty Orientation, Fordham University	Aug. 2021
Career Day Volunteer The Equity Project Charter School	Jan. 2020
New Faculty Seminar on Mission Fordham University	Fall 2019
New Beginnings Life Skills Program Volunteer South Carolina Department of Juvenile Justice	Fall 2018–Summer 2019
Magellan Explorer Project Advisor for Danielle Wood, University of South Carolina	Spring 2017–Spring 2018
Top Scholar Review Committee Member and Interviewer University of South Carolina	Fall 2017–Spring 2018
Motives at South Carolina Seminar Organizer	Spring 2018
Comprehensive Exam Committee Member University of South Carolina · Candace Bethea · Tracy Huggins	Spring 2017–Fall 2018

Journal Referee 2017–Present

- · Épijournal de Géométrie Algébrique
- · Journal of Algebra
- · Journal of the European Mathematical Society
- · Notices of the American Mathematical Society
- · Pacific Journal of Mathematics

South Carolina 4 Square Club (SC4SC) Club Advisor	Fall 2017–Spring 2019
USC Graduate Student Seminar Job Market Panelist	April 2019 Sept. 2017
UGA conference on algebraic and analytic aspects of quadratic f Co-organizer with D. Krashen, P. Clark, and K. Thompson	forms July 2017
University of South Carolina High School Math Competition Volunteer Judge and Proctor	Feb. 2017 Feb. 2018
UGA Graduate Student Bootcamp Job Market Panelist/Speaker on "How to give a good math talk"	June 2016
University of Georgia Math Camp Graduate Instructor	June 2016 July 2014
Project REFOCUS 21st Century Skills Program Volunteer	Spring 2016 Fall 2015
University of Georgia High School Math Tournament $Volunteer$	Nov. 2014 Nov. 2013
A Place Called Home Non-Profit Youth Center Volunteer Tutor, K-12, all subjects	Spring 2008

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, IATEX, 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 ramification in algebraic and arithmetic geometral AMS Central Sectional Meeting, University of Wisconsin, Milwaukee	April 2024
Special Session on algebraic groups and local-global principles AMS Southeastern Sectional Meeting, Florida State University	March 2024
Syzygies and Mirror Symmetry American Institute of Mathematics, Pasadena, CA	Sept. 2023
MAA MathFest Philadelphia, PA	Aug. 2022
Derived, Birational, and Categorical Algebraic Geometry Banff International Research Station, Banff, AB, Canada	Nov. 2021
Undergraduate Faculty Program on Motivic Milnor Numbers Park City Math Institute and Institute for Advanced Study	Aug. 2021
Quadratic forms, linear algebraic groups and beyond Organizers: P. Gille, Z. Reichstein, K. Zainoulline	May 2020-July 2022
Algebraic groups and algebraic geometry In honor of Zinovy Reichstein's 60th birthday	June 2021
PIC Math Faculty Workshop Mathematical Association of America	June 2021
Algebra and Geometry of Homogeneous Spaces Organizers: N. Karpenko, N. Lemire, K. Zaynullin	June 2021
Joint Mathematics Meetings $Washington, D.C.$	Jan. 2021
Derived categories and (non)commutative algebraic geometry Canadian Mathematical Society Winter Meeting	Dec. 2020
Birational, categorical, and derived algebraic geometry Banff International Research Station, Banff, AB, Canada	Nov. 2020
Madison Moduli Weekend University of Wisconsin, Madison	Sept. 2020
Workshop on ∞ -categories and applications Max Planck Institute for Mathematics	Aug. 2020
Online Inquiry Based Learning Mathematical Association of America	July 2020
Electronic Algebraic K-Theory Seminar Organizers: B. Antieau, E. Elmanto, A. Mathew, M. Yakerson	June 2020
Teaching as a legitimate application of college mathematics META Math Webinar, Mathematical Association of America	May 2020
Brauer Groups, Derived Categories and Birational Geometry Banff International Research Station, Banff, AB, Canada	Nov. 2019
Emerging Research in Algebraic Groups, Motives, and K-Theory Euler International Mathematical Institute, St. Petersburg, Russia	Sept. 2019

Rationality problems in algebraic geometry	July 2019
American Institute of Mathematics, San Jose, CA	v
Derived algebraic geometry and its applications Mathematical Sciences Research Institute, Berkeley, CA	March 2019
Joint Mathematics Meetings Baltimore, MD	Jan. 2019
Carolina Math Seminar University of South Carolina	Nov. 2018
K-theory Conference Workshop (ICM Satellite) Universidad de Buenos Aires, Argentina	July 2018
K-theory Conference School (ICM Satellite) Universidad Nacional de La Plata, Argentina	July 2018
The 13 th Brauer Group Conference Colorado State Mountain Campus, Pingree Park, CO	June 2018
Discover USC Mentor for Danielle Wood, University of South Carolina	April 2018
A Day of Algebraic Geometry in Savannah Georgia Southern University	March 2018
Georgia Algebraic Geometry Symposium Georgia Institute of Technology	Feb. 2018
Joint Mathematics Meetings San Diego, CA	Jan. 2018
Stacks Project Workshop University of Michigan	July-Aug. 2017
CAAATQuaFs (Conference on Quadratic Forms) University of Georgia	July 2017
K-theory and Related Fields Trimester Program Hausdorff Research Institute for Mathematics	May-June 2017
Georgia Algebraic Geometry Symposium University of Georgia	March 2017
Lectures in Arithmetic Geometry at Rice Rice University	Feb. 2017
Topological Approaches to Arithmetic and Algebraic Geometry University of Georgia	Sept. 2016
Arithmetic Algebraic Geometry Courant Institute of Mathematical Sciences	Aug. 2016
Joint Mathematics Meetings Seattle, WA	Jan. 2016
Georgia Algebraic Geometry Symposium Emory University	Oct. 2015
Local-Global Principles and Their Obstructions University of Pennsylvania	Oct. 2015
Grad Student Bootcamp for the Alg. Geom. Research Institute University of Utah	July 2015

The 12 th Brauer Group Conference Colorado State Mountain Campus, Pingree Park, CO	June 2015
Arizona Winter School: Arithmetic and Higher-Dimensional Varieties University of Arizona	March 2015
Georgia Algebraic Geometry Symposium University of Georgia	Oct. 2014
Representation Theory and K-Theory University of Southern California	May 2014
Southeastern Lie Theory Workshop University of Georgia	May 2014
Georgia Algebraic Geometry Symposium University of Georgia	Oct. 2013
Torsors, Nonassociative Algebras, and Cohomological Invariants Fields Institute	June 2013
Homotopical Methods in Algebraic Geometry University of Southern California	May 2013
Workshop on Torsors, Motives, and Cohomological Invariants Fields Institute	May 2013
Oberwolfach Seminar on Algebraic Groups and Patching Mathematisches Forschungsinstitut Oberwolfach	Oct. 2012
Georgia Algebraic Geometry Symposium University of Georgia	May 2012
VIGRE Summer School Program in Algebraic Geometry University of Georgia	May 2012
Arizona Winter School: Ramification and Geometry University of Arizona	March 2012
Algebraic Geometry Northeastern Series Workshop Stony Brook University	Oct. 2011
A Celebration of Algebraic Geometry Harvard University	Aug. 2011
K-Theory and Motives University of California, Los Angeles	March 2011
Compact Moduli and Vector Bundles University of Georgia	May 2010