

Patrick K. McFaddin

Lowenstein 808G
Department of Mathematics
Fordham University

pmcfaddin@fordham.edu
mcfaddin.github.io

Education

Ph.D., Mathematics

University of Georgia

May 2016

Athens, GA

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

M.A., Mathematics

University of Georgia

August 2011

Athens, GA

- Advisor: Robert Varley

B.A., with Honors in Mathematics

University of Southern California

May 2010

Los Angeles, CA

Employment

Fordham University

Assistant Professor (tenure-track)

Aug. 2019 - Present

University of South Carolina

Visiting Research Assistant Professor

Aug. 2016 - June 2019

University of Georgia

Graduate Research and Teaching Assistant

June 2010- May 2016

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 interleaving.

Publications

1. (with M. Ballard, A. Duncan, A. Lamarche) Separable algebras and coflasque resolutions. *Adv. Math.* 444 (2024), Paper No. 109596.
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.

Last updated May 4, 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. 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) <i>Fordham University</i>	2023-2024
Academic Year Faculty Fellowship <i>Fordham University</i>	Spring 2023
PIC Math Program (Award: \$6,000) <i>Mathematical Association of America</i>	Summer 2021–Summer 2022
Fordham A&S Deans' Challenge Grant (Award: \$9,500) <i>Enhancing the Flipped-Hybrid Approach, Grant Leader: Melkana Brakalova</i>	Spring 2021
Fordham A&S Deans' Challenge Grant (Award: \$10,000) <i>Flipped-Hybrid Approach to Math Instruction, Grant Leader: Melkana Brakalova</i>	Fall 2020
AMS–Simons Travel Grant (Award: \$4,000) <i>American Mathematical Society and the Simons Foundation</i>	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

Coflasque resolutions, torsors, and rationality

April 2024

AMS Central Sectional Meeting, University of Wisconsin, Milwaukee

Galois cohomology and limitations of the derived category

April 2024

AGNT Seminar, Rice University

Fundamentals of groups of loops

April 2024

Undergraduate Colloquium, Rice University

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

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
<i>Recitation Instructor</i>	
· Math 2005–Multivariable Calculus II	Spring 2022
· Math 2005–Multivariable Calculus II	Spring 2021
University of South Carolina	
<i>Instructor of Record</i>	
· 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	
<i>Instructor of Record</i>	
· 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
<i>Recitation Instructor</i>	
· Math 2200–Analytic Geometry and Calculus	Spring 2011
	Fall 2010
Instructor for Math Kangaroo Course Level 3-4	Fall 2022
<i>Math Kangaroo USA</i>	
Instructor for independent tutorial course on ring theory	Summer 2021
<i>Students: F. Azad, Z. Chen, Z. van Zant</i>	
Mental Health and International Students	Nov. 2018
<i>International Accelerator Program, University of South Carolina</i>	
FLIP (Focus on Learning, Innovation and Pedagogy) Participant	Fall 2017
<i>Center for Teaching Excellence, University of South Carolina</i>	
Observer of first-time graduate instructors	Spring 2015
<i>University of Georgia, supervised by Lisa Townsley</i>	
UGA graduate student teacher training	2010- 2014
<i>Courses with Robert Rumley, Jon Hanke, Matt Mastin, and Lisa Townsley</i>	

Professional Activities

MoMath Math Gym Host	May 2020–Present
<i>National Museum of Mathematics, New York, NY</i>	
Faculty Advisor for Math-CISC Major	Fall 2019–Present
<i>Fordham University</i>	

Core Curriculum Committee <i>Fordham University</i>	Nov. 2020–Present
Member of the Special Projects Committee <i>National Association of Mathematicians</i>	Fall 2022–Spring 2024
Math Kangaroo State Directors Meeting <i>Math Kangaroo USA</i>	Oct. 2022
Seminar on the Future of Jesuit Higher Education <i>Fordham University</i>	Fall 2022
AMS-SMF-EMS Special Session on Derived Cat. and Rationality <i>Co-organizer with M. Ballard and E. Macrì; Grenoble, France</i>	July 2022
Early-Career Faculty Panelist <i>New Faculty Orientation, Fordham University</i>	Aug. 2021
Career Day Volunteer <i>The Equity Project Charter School</i>	Jan. 2020
New Faculty Seminar on Mission <i>Fordham University</i>	Fall 2019
New Beginnings Life Skills Program Volunteer <i>South Carolina Department of Juvenile Justice</i>	Fall 2018–Summer 2019
Magellan Explorer Project Advisor <i>for Danielle Wood, University of South Carolina</i>	Spring 2017–Spring 2018
Top Scholar Review Committee Member and Interviewer <i>University of South Carolina</i>	Fall 2017–Spring 2018
Motives at South Carolina <i>Seminar Organizer</i>	Spring 2018
Comprehensive Exam Committee Member <i>University of South Carolina</i>	Spring 2017–Fall 2018
<ul style="list-style-type: none"> · Candace Bethea · Tracy Huggins · Alicia Lamarche · Robert Vandermolen 	
Journal Referee	2017–Present
<ul style="list-style-type: none"> · <i>Pacific Journal of Mathematics</i> · <i>Journal of the European Mathematical Society</i> · <i>Épjournal de Géométrie Algébrique</i> 	
South Carolina 4 Square Club (SC4SC) <i>Club Advisor</i>	Fall 2017–Spring 2019
USC Graduate Student Seminar <i>Job Market Panelist</i>	April 2019 Sept. 2017
UGA conference on algebraic and analytic aspects of quadratic forms <i>Co-organizer with D. Krashen, P. Clark, and K. Thompson</i>	July 2017

University of South Carolina High School Math Competition	Feb. 2017
<i>Volunteer Judge and Proctor</i>	Feb. 2018
UGA Graduate Student Bootcamp	June 2016
<i>Job Market Panelist/Speaker on “How to give a good math talk”</i>	
University of Georgia Math Camp	June 2016
<i>Graduate Instructor</i>	July 2014
Project REFOCUS	Spring 2016
<i>21st Century Skills Program Volunteer</i>	Fall 2015
University of Georgia High School Math Tournament	Nov. 2014
<i>Volunteer</i>	Nov. 2013
A Place Called Home Non-Profit Youth Center	Spring 2008
<i>Volunteer Tutor, K-12, all subjects</i>	
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, L^AT_EX, 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 geometry	April 2024
<i>AMS Central Sectional Meeting, University of Wisconsin, Milwaukee</i>	
Special Session on algebraic groups and local-global principles	March 2024
<i>AMS Southeastern Sectional Meeting, Florida State University</i>	
Szygies and Mirror Symmetry	Sept. 2023
<i>American Institute of Mathematics, Pasadena, CA</i>	
MAA MathFest	Aug. 2022
<i>Philadelphia, PA</i>	
Derived, Birational, and Categorical Algebraic Geometry	Nov. 2021
<i>Banff International Research Station, Banff, AB, Canada</i>	
Undergraduate Faculty Program on Motivic Milnor Numbers	Aug. 2021
<i>Park City Math Institute and Institute for Advanced Study</i>	

Quadratic forms, linear algebraic groups and beyond <i>Organizers: P. Gille, Z. Reichstein, K. Zainoulline</i>	May 2020-July 2022
Algebraic groups and algebraic geometry <i>In honor of Zinovy Reichstein's 60th birthday</i>	June 2021
PIC Math Faculty Workshop <i>Mathematical Association of America</i>	June 2021
Algebra and Geometry of Homogeneous Spaces <i>Organizers: N. Karpenko, N. Lemire, K. Zaynullin</i>	June 2021
Joint Mathematics Meetings <i>Washington, D.C.</i>	Jan. 2021
Derived categories and (non)commutative algebraic geometry <i>Canadian Mathematical Society Winter Meeting</i>	Dec. 2020
Birational, categorical, and derived algebraic geometry <i>Banff International Research Station, Banff, AB, Canada</i>	Nov. 2020
Madison Moduli Weekend <i>University of Wisconsin, Madison</i>	Sept. 2020
Workshop on ∞-categories and applications <i>Max Planck Institute for Mathematics</i>	Aug. 2020
Online Inquiry Based Learning <i>Mathematical Association of America</i>	July 2020
Electronic Algebraic K-Theory Seminar <i>Organizers: B. Antieau, E. Elmanto, A. Mathew, M. Yakerson</i>	June 2020
Teaching as a legitimate application of college mathematics <i>META Math Webinar, Mathematical Association of America</i>	May 2020
Brauer Groups, Derived Categories and Birational Geometry <i>Banff International Research Station, Banff, AB, Canada</i>	Nov. 2019
Emerging Research in Algebraic Groups, Motives, and K-Theory <i>Euler International Mathematical Institute, St. Petersburg, Russia</i>	Sept. 2019
Rationality problems in algebraic geometry <i>American Institute of Mathematics, San Jose, CA</i>	July 2019
Derived algebraic geometry and its applications <i>Mathematical Sciences Research Institute, Berkeley, CA</i>	March 2019
Joint Mathematics Meetings <i>Baltimore, MD</i>	Jan. 2019
Carolina Math Seminar <i>University of South Carolina</i>	Nov. 2018
K-theory Conference Workshop (ICM Satellite) <i>Universidad de Buenos Aires, Argentina</i>	July 2018
K-theory Conference School (ICM Satellite) <i>Universidad Nacional de La Plata, Argentina</i>	July 2018
The 13th Brauer Group Conference <i>Colorado State Mountain Campus, Pingree Park, CO</i>	June 2018
Discover USC <i>Mentor for Danielle Wood, University of South Carolina</i>	April 2018

A Day of Algebraic Geometry in Savannah <i>Georgia Southern University</i>	March 2018
Georgia Algebraic Geometry Symposium <i>Georgia Institute of Technology</i>	Feb. 2018
Joint Mathematics Meetings <i>San Diego, CA</i>	Jan. 2018
Stacks Project Workshop <i>University of Michigan</i>	July-Aug. 2017
CAAATQuaFs (Conference on Quadratic Forms) <i>University of Georgia</i>	July 2017
K-theory and Related Fields Trimester Program <i>Hausdorff Research Institute for Mathematics</i>	May-June 2017
Georgia Algebraic Geometry Symposium <i>University of Georgia</i>	March 2017
Lectures in Arithmetic Geometry at Rice <i>Rice University</i>	Feb. 2017
Topological Approaches to Arithmetic and Algebraic Geometry <i>University of Georgia</i>	Sept. 2016
Arithmetic Algebraic Geometry <i>Courant Institute of Mathematical Sciences</i>	Aug. 2016
Joint Mathematics Meetings <i>Seattle, WA</i>	Jan. 2016
Georgia Algebraic Geometry Symposium <i>Emory University</i>	Oct. 2015
Local-Global Principles and Their Obstructions <i>University of Pennsylvania</i>	Oct. 2015
Grad Student Bootcamp for the Alg. Geom. Research Institute <i>University of Utah</i>	July 2015
The 12th Brauer Group Conference <i>Colorado State Mountain Campus, Pingree Park, CO</i>	June 2015
Arizona Winter School: Arithmetic and Higher-Dimensional Varieties <i>University of Arizona</i>	March 2015
Georgia Algebraic Geometry Symposium <i>University of Georgia</i>	Oct. 2014
Representation Theory and K-Theory <i>University of Southern California</i>	May 2014
Southeastern Lie Theory Workshop <i>University of Georgia</i>	May 2014
Georgia Algebraic Geometry Symposium <i>University of Georgia</i>	Oct. 2013
Torsors, Nonassociative Algebras, and Cohomological Invariants <i>Fields Institute</i>	June 2013
Homotopical Methods in Algebraic Geometry <i>University of Southern California</i>	May 2013

Workshop on Torsors, Motives, and Cohomological Invariants <i>Fields Institute</i>	May 2013
Oberwolfach Seminar on Algebraic Groups and Patching <i>Mathematisches Forschungsinstitut Oberwolfach</i>	Oct. 2012
Georgia Algebraic Geometry Symposium <i>University of Georgia</i>	May 2012
VIGRE Summer School Program in Algebraic Geometry <i>University of Georgia</i>	May 2012
Arizona Winter School: Ramification and Geometry <i>University of Arizona</i>	March 2012
Algebraic Geometry Northeastern Series Workshop <i>Stony Brook University</i>	Oct. 2011
A Celebration of Algebraic Geometry <i>Harvard University</i>	Aug. 2011
K-Theory and Motives <i>University of California, Los Angeles</i>	March 2011
Compact Moduli and Vector Bundles <i>University of Georgia</i>	May 2010