

# Patrick K. McFaddin

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## 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, and Galois cohomology.

## Publications

1. (with M. Ballard and A. Duncan) On derived categories of arithmetic toric varieties. *Ann. K-Theory* 4 (2019), no. 2, 211-242.
2. 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.
3. (with M. Ballard and A. Duncan) The toric Frobenius morphism and a conjecture of Orlov, *Eur. J. Math.* 5 (2019), no. 3, 640-645.

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Last updated June 3, 2020

4. 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.
5. (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

6. (with M. Ballard, N. Chidambaram, D. Favero, and R. Vandermolen) Kernels for Grassmann flops. arXiv:1904.12195, submitted.
7. (with M. Ballard and A. Duncan) Derived categories of centrally-symmetric smooth toric Fano varieties. arXiv:1812.09392, submitted.
8. (with M. Ballard, A. Duncan, A. Lamarche) Separable algebras and coflasque resolutions. In preparation, 2020.
9. (with M. Ballard, A. Duncan, A. Lamarche) Consequences of the existence of exceptional collections in arithmetic and rationality. In preparation, 2020.

### Physics and Astronomy Research

10. (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.
11. (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

#### AMS–Simons Travel Grant

*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

#### 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

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

## Teaching and Training

### Fordham University

*Instructor of Record*

· 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

### 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

### **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**

### **MoMath Math Gym Host (via Zoom)**

May 2020

*National Museum of Mathematics, New York, NY*

### **Career Day Volunteer**

Jan. 2020

*The Equity Project Charter School*

### **Faculty Advisor for Math-CISC Major**

Fall 2019- Present

*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

<b>Referee</b> <i>Pac. J. Math and J. Eur. Math. Soc.</i>	2017-2020
<b>South Carolina 4 Square Club (SC4SC)</b> <i>Club Advisor</i>	Fall 2017- Spring 2019
<b>USC Graduate Student Seminar</b> <i>Job Market Panelist</i>	April 2019 Sept. 2017
<b>UGA conference on algebraic and analytic aspects of quadratic forms</b> <i>Co-organizer with D. Krashen, P. Clark, and K. Thompson</i>	July 2017
<b>University of South Carolina High School Math Competition</b> <i>Volunteer Judge and Proctor</i>	Feb. 2017 Feb. 2018
<b>UGA Graduate Student Bootcamp</b> <i>Job Market Panelist/Speaker on "How to give a good math talk"</i>	June 2016
<b>University of Georgia Math Camp</b> <i>Graduate Instructor</i>	June 2016 July 2014
<b>Project REFOCUS</b> <i>21st Century Skills Program Volunteer</i>	Spring 2016 Fall 2015
<b>University of Georgia High School Math Tournament</b> <i>Volunteer</i>	Nov. 2014 Nov. 2013
<b>A Place Called Home Non-Profit Youth Center</b> <i>Volunteer Tutor, K-12, all subjects</i>	Spring 2008
<b>Member of the American Mathematical Society</b>	

## Skills

### Technology

Self-instructed coding in Python, HTML, website building, Mathematica, Sage, Git, L<sup>A</sup>T<sub>E</sub>X, MyMathLab, WebAssign, WebWork, BlackBoard, experience with Windows, Mac, Linux (via Ubuntu) operating systems.

### Language

- French, limited working proficiency
- Spanish, elementary proficiency

## Conferences and Workshops Attended

<b>Electronic Algebraic K-Theory Seminar</b> <i>Organizers: B. Antieau, E. Elmanto, A. Mathew, M. Yakerson</i>	June 2020
<b>Quadratic forms, linear algebraic groups and beyond</b> <i>Organizers: P. Gille, Z. Reichstein, K. Zainoulline</i>	May-June 2020
<b>Teaching as a legitimate application of college mathematics</b> <i>META Math Webinar, Mathematical Association of America</i>	May 2020

<b>Brauer Groups, Derived Categories and Birational Geometry</b> <i>Banff International Research Station, Banff, AB, Canada</i>	Nov. 2019
<b>Emerging Research in Algebraic Groups, Motives, and K-Theory</b> <i>Euler International Mathematical Institute, St. Petersburg, Russia</i>	Sept. 2019
<b>Rationality problems in algebraic geometry</b> <i>American Institute of Mathematics, San Jose, CA</i>	July 2019
<b>Derived algebraic geometry and its applications</b> <i>Mathematical Sciences Research Institute, Berkeley, CA</i>	March 2019
<b>Joint Mathematics Meetings</b> <i>Baltimore, MD</i>	Jan. 2019
<b>Carolina Math Seminar</b> <i>University of South Carolina</i>	Nov. 2018
<b>K-theory Conference Workshop (ICM Satellite)</b> <i>Universidad de Buenos Aires, Argentina</i>	July 2018
<b>K-theory Conference School (ICM Satellite)</b> <i>Universidad Nacional de La Plata, Argentina</i>	July 2018
<b>The 13<sup>th</sup> Brauer Group Conference</b> <i>Colorado State Mountain Campus, Pingree Park, CO</i>	June 2018
<b>Discover USC</b> <i>Mentor for Danielle Wood, University of South Carolina</i>	April 2018
<b>A Day of Algebraic Geometry in Savannah</b> <i>Georgia Southern University</i>	March 2018
<b>Georgia Algebraic Geometry Symposium</b> <i>Georgia Institute of Technology</i>	Feb. 2018
<b>Joint Mathematics Meetings</b> <i>San Diego, CA</i>	Jan. 2018
<b>Stacks Project Workshop</b> <i>University of Michigan</i>	July-Aug. 2017
<b>CAATQuaFs (Conference on Quadratic Forms)</b> <i>University of Georgia</i>	July 2017
<b>K-theory and Related Fields Trimester Program</b> <i>Hausdorff Research Institute for Mathematics</i>	May-June 2017
<b>Georgia Algebraic Geometry Symposium</b> <i>University of Georgia</i>	March 2017
<b>Lectures in Arithmetic Geometry at Rice</b> <i>Rice University</i>	Feb. 2017
<b>Topological Approaches to Arithmetic and Algebraic Geometry</b> <i>University of Georgia</i>	Sept. 2016
<b>Arithmetic Algebraic Geometry</b> <i>Courant Institute of Mathematical Sciences</i>	Aug. 2016
<b>Joint Mathematics Meetings</b> <i>Seattle, WA</i>	Jan. 2016
<b>Georgia Algebraic Geometry Symposium</b> <i>Emory University</i>	Oct. 2015

<b>Local-Global Principles and Their Obstructions</b> <i>University of Pennsylvania</i>	Oct. 2015
<b>Grad Student Bootcamp for the Alg. Geom. Research Institute</b> <i>University of Utah</i>	July 2015
<b>The 12<sup>th</sup> Brauer Group Conference</b> <i>Colorado State Mountain Campus, Pingree Park, CO</i>	June 2015
<b>Arizona Winter School: Arithmetic and Higher-Dimensional Varieties</b> <i>University of Arizona</i>	March 2015
<b>Georgia Algebraic Geometry Symposium</b> <i>University of Georgia</i>	Oct. 2014
<b>Representation Theory and <math>K</math>-Theory</b> <i>University of Southern California</i>	May 2014
<b>Southeastern Lie Theory Workshop</b> <i>University of Georgia</i>	May 2014
<b>Georgia Algebraic Geometry Symposium</b> <i>University of Georgia</i>	Oct. 2013
<b>Torsors, Nonassociative Algebras, and Cohomological Invariants</b> <i>Fields Institute</i>	June 2013
<b>Homotopical Methods in Algebraic Geometry</b> <i>University of Southern California</i>	May 2013
<b>Workshop on Torsors, Motives, and Cohomological Invariants</b> <i>Fields Institute</i>	May 2013
<b>Oberwolfach Seminar on Algebraic Groups and Patching</b> <i>Mathematisches Forschungsinstitut Oberwolfach</i>	Oct. 2012
<b>Georgia Algebraic Geometry Symposium</b> <i>University of Georgia</i>	May 2012
<b>VIGRE Summer School Program in Algebraic Geometry</b> <i>University of Georgia</i>	May 2012
<b>Arizona Winter School: Ramification and Geometry</b> <i>University of Arizona</i>	March 2012
<b>Algebraic Geometry Northeastern Series Workshop</b> <i>Stony Brook University</i>	Oct. 2011
<b>A Celebration of Algebraic Geometry</b> <i>Harvard University</i>	Aug. 2011
<b><math>K</math>-Theory and Motives</b> <i>University of California, Los Angeles</i>	March 2011
<b>Compact Moduli and Vector Bundles</b> <i>University of Georgia</i>	May 2010