

Mitchell Faulk

Personal Information

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Research Interests

Complex geometry, Kähler geometry, and canonical metrics

Employment

Postdoctoral Scholar, Vanderbilt University 2019–present

Education

Columbia University 2014–2019

Degree: PhD in Mathematics, 2019
Thesis: Some canonical metrics on Kähler orbifolds
Advisor: Melissa Liu
Distinction: NSF Graduate Research Fellowship

University of Notre Dame 2010–2014

Degree: BS in Mathematics, 2014
Distinction: Summa Cum Laude, Phi Beta Kappa

Awards

2015–2018	NSF Graduate Research Fellowship
2014	Columbia University Dean’s Fellowship
2014	Senior G.E. Prize for Honors Mathematics Majors at Notre Dame
2012–2013	SUMR Scholarship at Notre Dame
2010	National Merit Scholarship
2010	Illinois High School Association All-State Academic Scholarship

Publications

A. Published papers

1. M. Farber, M. Faulk, C.R. Johnson, and E. Marzion, (2014). Equal entries in totally positive matrices. *Linear Algebra and its Applications*, **454**, 91-106.
2. M. Farber, M. Faulk, C.R. Johnson, and E. Marzion, (2014). Exact results for perturbation to total positivity and to total nonsingularity. *Electronic Journal of Linear Algebra*, **27**, 779-97.
3. M. Faulk, (2018). On Yau's theorem for effective orbifolds. *Expositiones Mathematicae*. doi: 10.1016/j.exmath.2018.07.003.
4. M. Faulk, (2019). Some canonical metrics on Kähler orbifolds. PhD thesis. Columbia University.

B. Preprints

1. M. Faulk, (2018). Asymptotically conical Calabi-Yau orbifolds, I. arXiv:1809.01556.
2. M. Faulk and M. Liu, (expected November 2021). Embedding Deligne–Mumford stacks into GIT quotient stacks of linear representations.

C. In preparation

1. M. Faulk, R. Rasdeaconu, and I. Suvaina, (expected 2022). Scalar–flat metrics on quasi-projective manifolds.

Talks

1. On decay rates for Yau's theorem on asymptotically conical manifolds (Vanderbilt University, October 2019)
2. On decay rates for Yau's theorem on asymptotically conical manifolds (Harvard University, February 2019)
3. On decay rates for Yau's theorem on asymptotically conical manifolds (Northwestern University, February 2019)
4. Asymptotically conical Calabi-Yau orbifolds (University of Notre Dame, Geometric Analysis Seminar, November 2018)
5. Geometric vertex operator algebras (Columbia University, Undergraduate Math Society, November 2016)
6. Topological quantum field theories (Columbia University, Undergraduate Math Society, February 2015)
7. Dualizability in higher categories (University of British Columbia, West Coast Algebraic Topology Summer School, July 2014)
8. Geometric vertex operator algebras: An approach to conformal field theory (University of Notre Dame, College of Science Joint Annual Meeting, May 2014)
9. Vertex operator algebras: Algebraic realizations of the geometry of string theory (University of Notre Dame, *Talk Science* lecture series, November 2013)
10. Equal entries in totally positive matrices (University of Notre Dame, College of Science Joint Annual Meeting, May 2013)
11. Problems involving totally nonnegative matrix perturbations (College of William and Mary, NSF REU, August 2012)

Teaching Experience

A. Vanderbilt

1. MATH 2610: Ordinary Differential Equations (Spring 2020, Spring 2021, Fall 2021)
2. MATH 2420: Methods of Ordinary Differential Equations (Fall 2021)
3. MATH 2300: Multivariable Calculus (Fall 2019, Fall 2020, Spring 2021, Summer 2021)
4. MATH 1200: Single-Variable Calculus I (Summer 2020)

B. Columbia

1. MATH S4061: Intro to Modern Analysis I (Summer 2019)
2. MATH V3952: Undergraduate Seminars II (Spring 2016)
3. MATH UN1202: Calculus IV (Summer 2016, Summer 2018)
4. MATH UN1101: Calculus I (Spring 2017, Summer 2017)

C. University of Notre Dame

1. SUMR six-week enhancement summer workshop [Principal organizer] (Summer 2013: Abstract Linear Algebra, Summer 2014: Lie Groups, Summer 2015: Knot Theory)

Service to Department

A. Vanderbilt

1. Principal organizer of Shanks Workshop *Interactions in Complex Geometry* (11-12 December 2021)
2. Supervisor of independent studies courses for graduate student Sam Rizzo (Spring 2020, Fall 2020, Spring 2021)
3. Mentor for Undergraduate Directed Readings Program (Spring 2020, Spring 2021)

B. Columbia

1. Organizer of graduate reading seminar on toric varieties/stacks (Spring 2017, Summer 2017, Fall 2017, Fall 2018)
2. Active participant of informal complex geometry research seminar (Spring 2016, Fall 2016, Spring 2017, Fall 2017, Spring 2018, Fall 2018)

C. Notre Dame

1. Organizer of undergraduate reading seminar in Abstract Algebra (Spring 2013)
2. Organizer of help session for Honors Calculus I and II (Fall 2012, Spring 2013)
3. Tutor at Notre Dame Math Library (Spring 2013, Fall 2013, Spring 2014)
4. Web master of undergraduate Math Club (Spring 2013, Fall 2013, Spring 2014)

Outreach

A. Vanderbilt

1. An essay I've written appears in Jessica Wynne's photography book *Do Not Erase: Mathematicians and Their Chalkboards* (published 2021)
2. Faculty evaluator of undergraduate poster fair (Fall 2019)

B. Columbia

1. Consultant for artist Kenneth Pietrobono (Fall 2018 and Spring 2019)
2. Helped Jessica Wynne with her photography project (Summer 2018)
3. Volunteer at “Girls’ Science Day” (Fall 2015)

C. Notre Dame

1. Volunteer at “Math Academy” through *Riverbend Community Math Center* (Summer 2014)
2. Volunteer at local science fairs (Spring 2012, Spring 2013)
3. Volunteer at “Art-to-Science” camp on Notre Dame’s campus (Summer 2011)