

# Peter M. McDonald

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## Education

- 2018–2024 **Ph.D. Mathematics**, *University of Utah*, Salt Lake City, UT, USA  
Thesis: Two applications of derived categories to the study of singularities  
Advisors: Srikanth Iyengar and Karl Schwede
- 2012–2016 **B.A. Mathematics (Highest Honors)**, *Williams College*,  
Williamstown, MA, USA  
Phi Beta Kappa, Magna Cum Laude, Sigma Xi

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## Employment

- Aug. 2024–Present **Lecturer**, *University of Illinois, Chicago*, Chicago, IL, USA
- Aug. 2018–2024 **Graduate Teaching Assistant**, *University of Utah*, Salt Lake City,  
UT, USA
- Sep. 2016–May 2018 **Associate**, *EY-Parthenon*, Boston, MA, USA

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## Awards

- Spring 2023 **NSF-RTG Fellowship (DMS-1840190)**, *University of Utah*
- Summer 2022 **NSF-RTG Fellowship (DMS-1840190)**, *University of Utah*
- Summer 2021 **Departmental Summer Research Fellowship**, *University of Utah*
- Summer 2020 **NSF-RTG Fellowship (DMS-1840190)**, *University of Utah*
- Spring 2020 **NSF-RTG Fellowship (DMS-1840190)**, *University of Utah*
- 2016 **Robert F. Rosenberg Prize in Mathematics**, *Williams College*
- 2014–2016 **Robert F. Rosenberg Scholarship in Mathematics**, *Williams College*
- 2014 **Erastus C. Benedict, Class of 1821, Prize in Mathematics, First Prize**, *Williams College*

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## Publications

- [5] Peter M. McDonald. Homological properties of the relative Frobenius morphism. <https://arxiv.org/abs/2401.01880>, 2024. Submitted.
- [4] Peter M. McDonald. Multiplier ideals and klt singularities via (derived) splittings. <https://arxiv.org/abs/2307.07906>, 2023. Submitted.

- [3] Sarah M. Fleming, Lena Ji, S. Loepp, Peter M. McDonald, Nina Pande, and David Schwein. Completely controlling the dimensions of formal fiber rings at prime ideals of small height. *J. Commut. Algebra*, 11(3):363–388, 2019.
- [2] Sarah M. Fleming, Lena Ji, S. Loepp, Peter M. McDonald, Nina Pande, and David Schwein. Controlling the dimensions of formal fibers of a unique factorization domain at the height one prime ideals. *J. Commut. Algebra*, 10(4):475–498, 2018.
- [1] Thomas Garrity and Peter McDonald. Generalizing the Minkowski question mark function to a family of multidimensional continued fractions. *Int. J. Number Theory*, 14(9):2473–2516, 2018.

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## Teaching

### University of Illinois, Chicago

Fall 2024 **Math 181: Calculus II**  
**Math 310: Applied Linear Algebra**

### University of Utah

Summer 2024 **Math 2210: Calculus III**  
 Spring 2024 **Math 1070: Introduction to Statistical Inference**  
 Fall 2023 **Math 1320: Engineering Calculus II**  
 Summer 2023 **Math 1100: Business Calculus**  
 Fall 2022 **Math 1100: Business Calculus**  
 Spring 2022 **Math 2210: Calculus III**  
 Fall 2021 **Math 1220: Calculus II**  
 Spring 2021 **Math 2210: Calculus III**  
 Fall 2020 **Math 2210: Calculus III**  
 Fall 2019 **Math 1320: Engineering Calculus II**

### Williams College (Teaching Assistant)

Spring 2016 **Math 478: On Expressing Numbers**, *Williams College*  
 Fall 2015 **Math 372: Complex Analysis**, *Williams College*  
 Spring 2015 **Math 351: Applied Real Analysis**, *Williams College*  
 Fall 2014 **Math 355: Abstract Algebra**, *Williams College*  
 Spring 2014 **Math 351: Applied Real Analysis**, *Williams College*  
 Fall 2013 **Math 150: Multivariable Calculus**, *Williams College*

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## Invited Talks

Oct. 2024 **An explicit derived McKay correspondence for some complex reflection groups**, *AMS Sectional*, University at Albany  
 March. 2024 **Multiplier ideals and klt singularities via (derived) splittings**, *Math Seminar*, Montana State University

- Feb. 2024 **Multiplier ideals and klt singularities via (derived) splittings**, *Number Theory and Algebraic Geometry Seminar*, Simon Fraser University
- Jan. 2024 **Multiplier ideals and klt singularities via (derived) splittings**, *AMS Special Session on Recent Developments in Commutative Algebra*, Joint Mathematics Meetings, San Francisco
- Nov. 2023 **Multiplier ideals and klt singularities via (derived) splittings**, *Algebra Seminar*, University of Missouri
- Nov. 2023 **Multiplier ideals and klt singularities via (derived) splittings**, *Algebraic Geometry Seminar*, Purdue University
- Oct. 2023 **Multiplier ideals and klt singularities via (derived) splittings**, *AMS Sectional Meeting*, Creighton University
- Apr. 2023 **Multiplier ideals and klt singularities via (derived) splittings**, *Combinatorics, Algebra and Geometry Seminar*, George Mason University
- Apr. 2023 **Homological properties of the relative Frobenius map**, *AMS Sectional Meeting*, University of Cincinnati
- Oct. 2022 **Homological properties of the relative Frobenius map**, *AMS Sectional Meeting*, University of Utah
- Apr. 2022 **A derived splinter characterization of klt singularities**, *Commutative Algebra Seminar*, University of Michigan (Virtual)
- Aug. 2015 **The relationship between a local ring and its completion**, *MAA MathFest*, Washington D.C., USA, with Sarah Fleming and Lena Ji

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## Other Talks

- Mar. 2019 **The king chicken theorems**, *NMH Math Club*, Northfield Mount Herman High School
- Apr. 2016 **A two-dimensional  $(x, y)$** , *Senior Thesis Defense*, Williams College  
[Utah Student Commutative Algebra Seminar \(BIKES\)](#)
- Apr. 2024 **An introduction to the McKay correspondence**
- Sep. 2023 **Singularities in characteristic zero: multiplier ideals, trace ideals, and closure operations**
- Feb. 2023 **The test ideal and the multiplier ideal are morally equivalent**
- Mar. 2022 **An introduction to simplicial objects**
- Feb. 2022 **Splinters, singularities, and the homological conjectures**
- Nov. 2021  **$D(R)$  and  $\text{Ho}(\text{Mod-}R)$  are the same**
- Feb. 2021 **Complete and torsion modules**
- Nov. 2020 **Rational homotopy theory in commutative algebra: the homotopy Lie algebra**
- May 2020 **Computing  $R\pi_*\mathcal{F}$  for coherent sheaves on projective space**
- Apr. 2020 **Asymptotic stability of associated primes**

- Oct. 2019 **Injective modules and Matlis duality**
- Feb. 2019 **An introduction to positive characteristic methods: tight closure**
- Nov. 2018 **The Cohen structure theorem**
- [Utah Student Algebraic Geometry Seminar \(BAGELS\)](#)
- Feb. 2022 **Derived splinters and the vanishing conjecture for maps of Tor**
- Sep. 2021 **An introduction to F-singularities**
- Oct. 2020 **Derived splinters in positive characteristic**
- [Utah Graduate Student Colloquium](#)
- Sep. 2021 **On expressing numbers: decimals vs. continued fractions**
- Apr. 2020 **Phylogenetic algebraic geometry**
- Dec. 2019 **Scissors congruence and hidden motives**
- Oct. 2018 **Continued fractions and the Minkowski question-mark function**

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## Recent & Future Conferences/Workshops

- Oct. 2024 **AMS Sectional Meeting**, *University at Albany*
- Apr. 2024 **Recent Developments in Commutative Algebra**, *SLMath*
- Jan. 2024 **Introductory Workshop: Commutative Algebra**, *SLMath*
- Jan. 2024 **Joint Mathematics Meetings**, *San Francisco*
- Nov. 2023 **WAGS**, *Washington University in St. Louis*
- Oct. 2023 **AMS Sectional Meeting**, *Creighton University*
- Aug. 2023 **Summer CAMP**, *University of Nebraska, Lincoln*
- Jun. 2023 **Mathematics Research Community on Derived Categories, Arithmetic and Geometry**, *Java Center, NY*
- May 2023 **Algebraic Geometry and Singularities in Positive and Mixed Characteristic Special Month**, *University of Michigan*
- Apr. 2023 **AMS Sectional Meeting**, *University of Cincinnati*
- Apr. 2023 **WAGS**, *University of Washington*
- Oct. 2022 **AMS Sectional Meeting**, *University of Utah*
- Jun. 2022 **Algebraic Geometry and Singularities Learning Workshop & Conference**, *University of Washington*
- May. 2022 **KUMUNU**, *University of Nebraska*
- Apr. 2022 **WAGS**, *Colorado State University*

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## Professional Activities

- Jan. 2024 **Organizer, AMS Special Session on Derived Categories, Arithmetic, and Geometry (a Mathematics Research Communities session)**, *Joint Mathematics Meetings*
- Spring 2023, 2024 **Organizing Committee, Math for All SLC Satellite**, *University of Utah*

- Spring 2022 **Chair, BRIDGES Workshop Organizing Committee**, University of Utah
- Spring 2021 **BRIDGES Workshop Organizing Committee**, University of Utah
- 2020-2021 **Co-Organizer**, University of Utah Student Commutative Algebra Seminar
- 2020-2021 **Co-Chair**, University of Utah Graduate Student Advisory Committee
- 2020-2023 **GSAC Social Committee**, University of Utah
- 2019–2021 **Treasurer**, University of Utah Association of Women in Mathematics
- Spring 2019–2021 **Graduate Student Mentor**, University of Utah Directed Reading Program in Mathematics
- Spring 2019, 2020 **Recruitment Committee**, University of Utah Graduate Student Advisory Committee
- Fall 2018–Present **Graduate Student Mentor**, University of Utah Association of Women in Mathematics