

# Pat Lank

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## PERSONAL

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- Born on October 7th, 1993
- Citizenship: United States

## RESEARCH INTERESTS

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Algebraic geometry, commutative algebra, triangulated categories

## POSITIONS

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Università degli Studi di Milano

Fall 2024 — Present

- Postdoctoral researcher
- Supervisor: Amnon Neeman

Simons-Laufer Mathematical Sciences Institute

April 2024

- Research associate

## EDUCATION

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University of South Carolina

January 2021 to May 2024

- Phd in Mathematics
- Advisor: Matthew Ballard

University of New Mexico

August 2017 to December 2020

- M.Sc. in Mathematics
- Advisor: Alexandru Buium

University of Massachusetts in Lowell

August 2015 to August 2017

- B.Sc. in Mathematics

## RESEARCH

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- "Compact approximation and descent for algebraic stacks" joint with Jack Hall, Fei Peng, and Alicia Lamarche, *in preparation*
- "Integral transforms on singularity categories for Noetherian schemes" joint with Uttaran Dutta and Kabeer Manali Rahul, *in preparation*
- "Mayer-Vietoris squares and generation for monoidal triangulated categories" joint with Timothy De Deyn and Kabeer Manali Rahul, *in preparation*
- "Compact objects detect big generators for weak approximable triangulated categories" joint with Timothy De Deyn and Kabeer Manali Rahul, *in preparation*
- "Regular locus and singularity categories for noncommutative algebras over schemes" joint with Timothy De Deyn and Kabeer Manali Rahul, *in preparation*
- "Derived characterizations for rational pairs à la Schwede-Takagi and Kollár-Kovács" joint with Peter McDonald and Sridhar Venkatesh - [arXiv version](#)
- "Descent and generation for noncommutative coherent algebras over schemes" joint with Timothy De Deyn and Kabeer Manali Rahul - [arXiv version](#)
- "Classification and nonexistence for t-structures on derived categories of schemes" joint with Alexander Clark, Kabeer Manali Rahul and Chris J. Parker - [arXiv version](#)
- "Approximability and Rouquier dimension for noncommutative algebras over schemes" joint with Timothy De Deyn and Kabeer Manali Rahul - [arXiv version](#)
- "Triangulated characterizations of singularities" joint with Sridhar Venkatesh - [arXiv version](#)
- "Closedness of the singular locus and generation for derived categories" joint with Souvik Dey - [arXiv version](#)
- "Dévissage for generation in derived categories" joint with Souvik Dey - [arXiv version](#)

- *Approximation by perfect complexes detects Rouquier dimension*, joint with Noah Olander - [arXiv version](#); accepted to Mosc. Math. J.
- "A note on generation and descent for derived categories of noncommutative schemes" joint with Anirban Bhaduri, Souvik Dey - [arXiv version](#)
- *Descent conditions for generation in derived categories*, J.Pure Appl. Algebra (2024)
- "Strong generation for module categories" joint with Souvik Dey, Ryo Takahashi - [arXiv version](#)
- "High Frobenius pushforwards generate the bounded derived category" joint with Matthew Ballard, Srikanth Iyengar, Alapan Mukhopadhyay, and Josh Pollitz - [arXiv version](#)
- *Generation and dimension for derived categories*, PhD thesis, 2024

## INVITED TALKS

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- Algebra seminar, Charles University (Univerzita Karlova), February 2025
- Topology seminar, Universität Hamburg, January 2025
- Algebraic Geometry Northeastern Section (AGNES), Dartmouth University, November 2024
- Algebraic Geometry Seminar, Purdue University, October 2024
- AMS Special Session on Commutative Algebra and its Applications, Howard University, Washington, DC April 2024
- COMA/NAG Joint Graduate Student Seminar for Simons-Laufer Mathematical Sciences Institute March 2024
- AMS Contributed Paper Session on Commutative Algebra at the Joint Mathematics Meetings January 2024
- Algebraic Geometry seminar, University of Georgia October 2023
- Syzygies and mirror symmetry workshop, American Institute of Mathematics September 2023
- New Directions in Group Theory and Triangulated Categories May 2023
- Georgia Algebraic Geometry Symposium, University of Georgia May 2023
- Categorical methods in moduli theory, University of Pennsylvania April 2023
- AMS Special Session on Interactions between Noncommutative Ring Theory and Algebraic Geometry, Spring Central Sectional April 2023
- AMS Special Session on Recent Developments in Commutative Algebra, Southeast Sectional March 2023
- Algebraic Geometry seminar, University of Utah September 2022
- Algebraic Geometry & Singularity theory workshop, University of Washington June 2022
- Commutative Algebra Regional Expository Seminar April 2022
- University of South Carolina, Algebraic Geometry & Commutative Algebra Seminar February 2022
- Commutative Algebra Regional Expository Seminar October 2021
- University of South Carolina, Algebraic Geometry Number Theory Seminar March 2021
- Algebra & Geometry Seminar, University of New Mexico November 2019
- Algebra & Geometry Seminar, University of New Mexico December 2018
- Women in Mathematics in New England (WIMIN 2016), Smith College September 2016
- MAA Northeast Spring Section Meeting, University of New England June 2016

## ORGANIZATION

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- Algebraic geometry seminar, Università degli Studi di Milano Spring 2025
- Derived categories and noncommutative enthusiasts (D.A.N.C.E) online seminar January 2025 to present
- Joint Mathematics Meeting Special Session on Derived Categories, Arithmetic and Geometry January 2024
- Graduate colloquium, University of South Carolina Fall 2021 to Spring 2023
- Algebraic geometry & commutative algebra seminar, University of South Carolina Fall 2021 to Spring 2023

## GRANTS

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- AMS Graduate Student Sectional Travel Grant Spring 2023

## AWARDS

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- Outstanding Graduate Student Award in Mathematics at University of South Carolina Spring 2024
- Teaching Award from Student Disability Resource Center at University of South Carolina Fall 2023

## REFeree & REVIEW

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- Rend. Sem. Mat. Univ. Padova, zbMATH Open

## SERVICE

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|--|--------------------------|
| • Math 111 Textbook Committee for University of South Carolina | Spring 2024              |
| • Math Tutoring Center Coordinator                             | Summer 2023              |
| • Graduate Student Panel Committee                             | Summer 2021, Spring 2022 |
| • Proctor for UNM PNM State Wide Mathematics Exam              | Fall 2017, Spring 2019   |
| • City-wide Concert & Fundraiser, Nashua NH Soup Kitchen       | Fall 2011                |

## TEACHING

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### University of South Carolina

#### Instructor of Record

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|---|---------------------------------------|
| • MATH 241 - Calculus III                             | Summer 2021, Summer 2022              |
| • MATH 174 - Discrete structures for computer science | Spring 2023                           |
| • MATH 122 - Business Calculus                        | Spring 2021, Spring 2022, Spring 2024 |
| • MATH 115 - Precalculus                              | Fall 2021                             |
| • MATH 111 - Basic College Mathematics                | Fall 2021 (overload), Fall 2022       |
| • MATH 111i - Intensive Basic College Mathematics     | Fall 2023                             |

### University of New Mexico

#### Instructor of Record

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|---|-------------|
| • MATH 180 - Calculus I                                     | Summer 2020 |
| • MATH 121 - College Algebra                                | Fall 2017   |
| • MATH 101, 102, 103 - Intermediate Algebra Part I, II, III | Fall 2018   |

#### Graduate Teaching Assistant

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|---|-------------|
| • MATH 521 - Abstract Algebra               | Spring 2020 |
| • MATH 327 - Discrete Structures            | Spring 2019 |
| • MATH 322 - Modern Algebra                 | Spring 2019 |
| • MATH 321 - Linear Algebra W/ Applications | Fall 2019   |
| • Math 319 - Number theory                  | Spring 2020 |