

# 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, (non)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, Alicia Lamarche
  - *in preparation*
- "Integral transforms on singularity categories for Noetherian schemes"
  - joint with Uttaran Dutta, Kabeer Manali Rahul
  - *in preparation*
- "Zariski descent for singularity categories"
  - joint with Timothy De Deyn, Kabeer Manali Rahul
  - *in preparation*
- "Compact objects detect big generators for weak approximable triangulated categories"
  - joint with Timothy De Deyn, Kabeer Manali Rahul
  - *in preparation*
- "Regular locus and singularity categories for noncommutative algebras over schemes"
  - joint with Timothy De Deyn, Kabeer Manali Rahul
  - *in preparation*
- "Derived characterizations for rational pairs à la Schwede-Takagi and Kollár-Kovács"
  - joint with Peter McDonald, Sridhar Venkatesh

- arXiv version
- "Descent and generation for noncommutative coherent algebras over schemes"
  - joint with Timothy De Deyn, Kabeer Manali Rahul
  - arXiv version
- "Classification and nonexistence for t-structures on derived categories of schemes"
  - joint with Alexander Clark, Kabeer Manali Rahul, Chris J. Parker
  - arXiv version
- "Approximability and Rouquier dimension for noncommutative algebras over schemes"
  - joint with Timothy De Deyn, Kabeer Manali Rahul
  - arXiv version
- *Triangulated characterizations of singularities*
  - joint with Sridhar Venkatesh
  - arXiv version
  - accepted to Nagoya Math. J.
- "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*
  - arXiv version
  - 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, Josh Pollitz
  - arXiv version
- *Generation and dimension for derived categories*
  - PhD thesis, 2024

## INVITED TALKS

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| • Algebraic geometry seminar, University of Glasgow,   | March 2025     |
| • 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, Simons-Laufer Mathematical Sciences Institute             | March 2024     |
| • AMS contributed paper session on commutative algebra, 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, interactions between noncom. ring theory and alg. geo. 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 and singularity theory workshop, University of Washington	June 2022
• Commutative algebra regional expository seminar	April 2022
• Algebraic geometry and commutative algebra seminar, University of South Carolina,	February 2022
• Commutative algebra regional expository seminar	October 2021
• Algebraic geometry number theory seminar, University of South Carolina,	March 2021
• Algebra and geometry seminar, University of New Mexico	November 2019
• Algebra and geometry seminar, University of New Mexico	December 2018
• Women in mathematics in New England (WIMIN 2016), Smith College	September 2016
• MAA mortheast 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 and 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
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## 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
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## 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 and fundraiser, Nashua NH Soup Kitchen	Fall 2011

## TEACHING

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### University of South Carolina

#### Instructor of Record

• 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

- MATH 180 - Calculus I
- MATH 121 - College algebra
- MATH 101, 102, 103 - Intermediate algebra part I, II, III

Summer 2020  
Fall 2017  
Fall 2018

## Graduate Teaching Assistant

- MATH 521 - Abstract algebra
- MATH 327 - Discrete structures
- MATH 322 - Modern algebra
- MATH 321 - Linear algebra with applications
- Math 319 - Number theory

Spring 2020  
Spring 2019  
Spring 2019  
Fall 2019  
Spring 2020