

# 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*
- "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*
- "Integral transforms on singularity categories for Noetherian schemes"
  - joint with Uttaran Dutta, Kabeer Manali Rahul
  - **arXiv version**
- "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     |

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| • 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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|  |                          |
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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      | Summer 2020 |
| • MATH 121 - College algebra | Fall 2017   |

- MATH 101, 102, 103 - Intermediate algebra part I, II, III

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