

Pratik Misra

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EMPLOYMENT

Postdoctoral researcher <i>Technical University of Munich</i> <i>Mentor: Mathias Drton</i>	September 1, 2023 – August 31, 2025 <i>Munich, Germany</i>
Postdoctoral researcher <i>Institute for Mathematical and Statistical Innovation</i> <i>University of Chicago</i>	September 18, 2023 – October 19, 2023 <i>Chicago, USA</i>
Postdoctoral researcher <i>Math Data Lab, KTH Royal Institute of Technology</i> <i>Mentor: Liam Solus</i>	September 1, 2021 – August 31, 2023 <i>Stockholm, Sweden</i>

EDUCATION

PhD in Mathematics <i>North Carolina State University</i> <i>Advisor: Seth Sullivant</i> <i>Thesis: Combinatorial problems on trees and graphical models</i>	August 10, 2016 - August 3, 2021 <i>Raleigh, NC</i> <i>Defense date: April 30, 2021</i>
MSc in Mathematics <i>Indian Institute of Technology, Madras</i>	August 1, 2014 - July 22, 2016 <i>Chennai, India</i>
BSc in Mathematics <i>Institute of Mathematics and Applications</i>	August 1, 2011 - June 30, 2014 <i>Bhubaneswar, India</i>

RESEARCH INTERESTS

Algebraic Statistics, Graphical Models, Causality

HONORS AND AWARDS

National Science Foundation Research Assistantship, USA	2017 - 2020
National Board of Higher Mathematics MA/MSc Scholarship, India	2014 - 2016
Qualified CSIR - UGC Junior Research Fellowship Test , India	2015
National Board of Higher Mathematics Undergraduate Scholarship, India	2011-2014

PUBLICATIONS

- Mathias Drton, Leonard Henckel, Benjamin Hollering, Pratik Misra (2024). Faithlessness in Gaussian graphical models. (Revisions requested by *Bernoulli*). <https://arxiv.org/abs/2404.05306>
- Shelby Cox, Pratik Misra, Pardis Semnani (2024). Homaloidal polynomials and Gaussian models of maximum likelihood degree 1 (Accepted in *Algebraic Statistics*). <https://arxiv.org/abs/2402.06090>
- Danai Deligeorgaki, Alex Markham, Pratik Misra, Liam Solus (2023). Combinatorial and algebraic perspectives on the marginal independence structure of Bayesian networks. *Algebraic Statistics* 14-2, 233–286. doi: 10.2140/astat.2023.14.233. <https://arxiv.org/abs/2210.00822>
- Jane Ivy Coons, Aida Maraj, Pratik Misra, Miruna-Stefana Sorea (2023). Symmetrically colored Gaussian graphical models with toric vanishing ideals. *SIAM Journal of Applied Algebra and Geometry* (7), 133-158. doi: 10.1137/21M1466943. <https://arxiv.org/abs/2111.14817>

5. Alex Markham, Danai Deligeorgaki, Pratik Misra, Liam Solus (2022). A transformational characterization of unconditionally equivalent Bayesian networks. *Proceedings of The 11th International Conference on Probabilistic Graphical Models, PMLR* (186), 109-120. <https://arxiv.org/abs/2203.00521>
6. Pratik Misra, Seth Sullivant (2022). Directed Gaussian graphical models with toric vanishing ideals. (29 p) *Advances in Applied Mathematics* (138), Paper No. 102345. <https://arxiv.org/abs/2105.13357>
7. Pratik Misra, Seth Sullivant (2020). Gaussian graphical models with toric vanishing ideals. *Annals of the Institute of Statistical Mathematics* (73), no.4, 757-785. <https://arxiv.org/abs/1912.02265>
8. Pratik Misra, Seth Sullivant (2019). Bounds on the expected size of the maximum agreement subtree for a given tree shape. *SIAM Journal on Discrete Mathematics* (33), no.4 2316-2325. <https://arxiv.org/abs/1809.04488>.

PREPRINTS

1. Tobias Boege, Mathias Drton, Benjamin Hollering, Sarah Lumpp, Pratik Misra, Daniela Schkoda (2024). Conditional Independence in Stationary Diffusions (Submitted to *Probability Theory and Related Fields*). <https://arxiv.org/abs/2408.00583v1>
2. Tobias Boege, Kaie Kubjas, Pratik Misra, Liam Solus (2024). Colored Gaussian DAG models (Under review in *Journal of Royal Statistical Society Series B*). <https://arxiv.org/abs/2404.04024>

UPCOMING PROJECTS

1. Carlos Amendola, Tobias Boege, Ben Hollering, Pratik Misra. Algebraic properties of continuous Lyapunov models.

PROFESSIONAL EXPERIENCE

Data Science certification program at the Technical University of Munich	July 2024
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INVITED TALKS

16th International conference on Computational and Methodological Statistics, Berlin	December 2023
Plenary speaker at Algebraic Statistics and Our Changing World, IMSI Chicago	September 2023
Topic: "What will happen in Graphical Models and Causality"	
SIAM Conference on Applied Algebraic Geometry, Eindhoven	July 2023
Computations and Data in Algebraic Statistics, Casa Mathematica, Oaxaca	May 2023
Algebraic structures in statistical methodology, MFO, Oberwolfach	December 2022
Combinatorics seminar, KTH Royal Institute of Technology, Stockholm	November 2022
28th Nordic Congress of Mathematicians, Aalto University, Espoo	August 2022
Conference on the Mathematics of Complex Data, KTH, Stockholm	June 2022
Facets of CACAAG seminar, IIT Bombay (online)	January 2022
Applied CATS seminar, KTH Royal Institute of Technology, Stockholm	December 2021

CONTRIBUTED TALKS

Combinatorics seminar, Indian Institute of Science (IISc), Bangalore	August 2024
Seminar, NISER Bhubaneswar	February 2023
14th Nordic Combinatorial Conference, Tromsø	June 2022
Probability and Combinatorics seminar, Ohio State University (online)	February 2022
Webinar, Institute of Mathematics and Applications, Bhubaneswar	June 2021
Algebraic Statistics Mini Conference, University of Hawaii (online)	June 2020
LSSM online meeting, MPI Leipzig (online)	October 2020
Algebra and Combinatorics Seminar, North Carolina State University	September 2019

TEACHING EXPERIENCE

Technical University of Munich

Introduction to Data Science and Statistical Thinking (Lecture Assistant) Summer 2024

North Carolina State University

Elements of Calculus (Instructor) Spring 2021

Elements of Calculus (Recitation Leader) Fall 2020

Calculus for Life and Management Sciences (Instructor) Spring 2020

Calculus for Life and Management Sciences (Recitation Leader) Fall 2019

Calculus I (Lecture Assistant) Spring 2019, Fall 2018

Linear Algebra (Grader) Fall 2017

Calculus I (Grader) Summer 2017

Applied Differential Equations II (Grader) Summer 2017

Topics in Contemporary Mathematics (Lecture Assistant) Spring 2017

Pre-calculus I (Lecture Assistant) Fall 2016

MENTORING EXPERIENCE

Technical University of Munich

Bachelors and Masters seminar on Algebraic Statistics Summer 2024

Bachelors thesis supervision on Algebraic Statistics (ongoing) Fall 2024

Topic: *Learning the linear relations of undirected Gaussian graphical models with symmetries*

JOURNALS AND CONFERENCES REFEREED

Algebraic Statistics

SIAM Journal on Applied Algebra and Geometry

Formal Power Series and Algebraic Combinatorics Conference (FPSAC)

SIAM Undergraduate Research Online (SIURO)

Statistics In Transition new series

ORGANIZATIONAL ACTIVITIES

Co-organizer of “Algebraic Statistics and Graphical Models” session at the 11th World Congress in Probability and Statistics (2024), Ruhr University Bochum.

Co-organizer of “European workshop on Algebraic Statistics and Graphical Models” at Riessersee Hotel, Garmisch-Partenkirchen (2024).

Co-organizer of “Algebraic Methods in Biological Systems” mini symposium at SIAM Conference on Applied Algebraic Geometry (2023), Eindhoven University of Technology.

Co-organizer of applied CATS seminar (2022-2023), KTH.

Moderator for the Algebraic Statistics discussion session, Altogelis (2022), KTH.

Volunteer for Conference on the Mathematics of Complex Data (2022), KTH.

OUTREACH ACTIVITIES

Co-organized “*Alumni Day*” at IMA, Bhubaneswar to talk about various career options in Mathematics.

Gave a lecture on “*Introduction to Causality*” at IMA.

Co-organized a zoom session on “*Career opportunities for Undergrad and Masters students in Mathematics*” for undergraduate and Masters students in Odisha.

OTHER RESEARCH EXPERIENCES

Hidden Monomial Systems, M.Sc. project

2016

Indian Institute of Technology, Madras

Chennai, India

Mentor: Shantanu Sarkar

Powers of Squarefree Monomial Ideals, M.Sc. seminar

2015

Indian Institute of Technology, Madras

Chennai, India

Mentor: A.V. Jayanthan