

EDUCATION	<b>University of Chicago</b> Ph.D. in Computer Science Dissertation — <i>Expanders with Symmetry: Constructions and Applications.</i> Committee: <a href="#">Madhur Tulsiani</a> , <a href="#">Janos Simon</a> , <a href="#">Bill Fefferman</a> , and <a href="#">Ryan O'Donnell</a> . M.S. in Computer Science Thesis — <i>Quantum LDPC Codes: An exposition of recent results</i>	2024 2021
	<b>Indian Institute of Technology Kanpur, India</b> Bachelor of Technology (B.Tech.) in Computer Science and Engineering	2018
RESEARCH INTERESTS	Pseudorandomness, Expander Graphs, Complexity Theory, Classical and Quantum Error Correction, Property Testing, Analysis of Boolean functions.	
RESEARCH EXPERIENCE	<b>Motwani Postdoctoral Fellow, Stanford University</b> Advisors: <a href="#">Prof. Mary Wootters</a> and <a href="#">Prof. Tselil Schramm</a> Developed a new algorithmic framework for low soundness homomorphism testing.	Sep 2024 – Ongoing
	<b>Graduate Research Assistant, University of Chicago</b> Advised by <a href="#">Prof. Madhur Tulsiani</a> and <a href="#">Prof. Janos Simon</a> Conducted research on topics in expanders, coding theory, and complexity theory.	Oct 2018 – Aug 2024
	<b>Quantum Error Correction Theorist, Infleqtion</b> Co-designed and implemented a Python library featuring tools for quantum LDPC code construction and analysis. Used this to discover quantum Tanner codes with good parameters.	Jan – Mar 2024
	<b>Undergraduate Research Project, IIT Kanpur</b> Supervised by <a href="#">Prof. Nitin Saxena</a> Project : <i>Algebraic Independence</i> Proved a new criterion for the algebraic independence of multivariate polynomials.	Aug – Nov 2017
	<b>Research Intern, Université de Montréal</b> Supervised by <a href="#">Prof. Matilde Lalín</a> Project : <i>The Mahler measure for arbitrary tori</i> Proved new relations between an extension of the Mahler measure and <i>L</i> -function values.	May – July 2017
	<b>Research Intern, Indian Institute of Science Education and Research Mohali</b>	May – July 2016

Supervised by Prof. Kapil Paranjape

Project : *An Elementary Route to Grassmannians*

Explored different aspects of algebraic geometry and rediscovered Kleiman and Laskov's elementary proof that the Grassmannian is a projective variety.

PREPRINTS

[1] **Low Soundess Linearity Testing for the Half-Slice**

with Haakon Larsen, Silas Richelson, and Sourya Roy.

Preprint: [link](#)

[2] **A General Framework for Low Soundess Homomorphism Testing**

with Sourya Roy. *In Submission.*

doi:[10.48550/arXiv.2509.05871](https://doi.org/10.48550/arXiv.2509.05871)

[3] **Derandomized Non-Abelian Homomorphism Testing in Low Soundness Regime**

with Sourya Roy. *In Submission.*

doi:[10.48550/arXiv.2405.18998](https://doi.org/10.48550/arXiv.2405.18998)

[4] **List Decodable Quantum LDPC Codes**

with Thiago Bergamaschi, Fernando Granha Jeronimo, Shashank Srivastava, and Madhur Tulsiani. *Presented as a poster at Quantum Information Processing (QIP) 2025*

doi:[10.48550/arXiv.2411.04306](https://doi.org/10.48550/arXiv.2411.04306)

REFEREED

CONFERENCE

PUBLICATIONS

[5] **Pseudorandomness of Expander Walks via Fourier Analysis on Groups**

with Fernando Granha Jeronimo and Sourya Roy

*In Proc. of 29th International Conference on Randomization and Computation, (RANDOM) 2025.*

doi:[10.4230/LIPIcs.ITCS.2022.88](https://doi.org/10.4230/LIPIcs.ITCS.2022.88)

[6] **Explicit Codes approaching Generalized Singleton Bound using Expanders**

with Fernando Granha Jeronimo, Shashank Srivastava, and Madhur Tulsiani

*In Proc. of IEEE Annual Symposium on Foundations of Computer Science, (STOC) 2025.*

*Invited to Special Issue of SIAM Journal of Computing (SICOMP).*

doi:[10.1145/3717823.3718302](https://doi.org/10.1145/3717823.3718302)

[7] **Almost Ramanujan Expanders from Arbitrary Expanders via Operator Amplification**

with Fernando Granha Jeronimo, Sourya Roy, and Avi Wigderson.

*In Proc. of IEEE Annual Symposium on Foundations of Computer Science, (FOCS) 2022.*

doi:[10.1109/FOCS54457.2022.00043](https://doi.org/10.1109/FOCS54457.2022.00043)

[8] **Explicit Quantum LDPC Codes and Abelian Lifts**

with Fernando Granha Jeronimo, Ryan O'Donnell, Pedro Paredes, and Madhur Tulsiani.

*In Proc. of 13th Innovations in Theoretical Computer Science Conference (ITCS) 2022.*

doi:[10.4230/LIPIcs.ITCS.2022.88](https://doi.org/10.4230/LIPIcs.ITCS.2022.88)

[9] **Symbolic determinant identity testing and non-commutative ranks of matrix Lie algebras**

with Gábor Ivanyos and Youming Qiao.

*In Proc. of 13th Innovations in Theoretical Computer Science Conference, (ITCS) 2022.*

JOURNAL PUBLICATIONS [10] **Almost Ramanujan Expanders from Arbitrary Expanders via Operator Amplification**  
 with Fernando Granha Jeronimo, Sourya Roy, and Avi Wigderson.  
*FOCS22 Special Issue of SIAM Journal of Computing (SICOMP)*.  
 doi:10.1137/22M1538739

[11] **The Mahler measure for arbitrary tori**  
 with Matilde Lalín.  
*Res. Number Theory*, 4, 16 (2018).  
 doi:10.1007/s40993-018-0112-3

AWARDS AND FELLOWSHIPS	Motwani Postdoctoral Fellowship, Stanford University MITACS Globalink Research Internship, Canada Academic Excellence Award, IIT Kanpur Summer Research Fellowship Programme, Indian Academy of Science KVPY National Fellowship, DST, Government of India	2024 2017 2016-17 2016 2014
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TEACHING EXPERIENCE	<b>Teaching Assistant</b> , University of Chicago	
	• Algorithms, Master's	Fall (2018, 2020, 2022), Winter (2020, 2021)
	• Introduction to Formal Languages, Undergraduate	Spring 2022
	• Theory of Algorithms, Undergraduate	Winter (2019, 2022)
	• Discrete Math, Master's	Fall 2019
	<b>Teaching Assistant</b> , Toyota Technological Institute at Chicago (TTIC)	
	• Mathematical Toolkit, Graduate	Spring 2021, Fall (2021, 2023)
	• Algorithms, Graduate	Winter 2023
	<b>Teaching Assistant</b> , Indian Institute of Technology, Kanpur (IITK)	
	• Fundamentals of Computing, Undergraduate	Fall 2017

INVITED TALKS	<b>Homomorphism Testing: A General Framework</b>	
	Northeastern University, CS Theory Seminar	October 2025
	Carnegie Mellon University (CMU), CS Theory Lunch	October 2025
	Columbia University, CS Theory Lunch	October 2025
	University of Pennsylvania, CS Theory Seminar	October 2025
	Stanford University, CS Theory Lunch	October 2025
	Santa Clara University, Math/CS Colloquium Series	May 2025
	International Centre for Theoretical Sciences, HDX and Codes Workshop	May 2025

## **Derandomized Non-Abelian Homomorphism Testing in Low Soundness Regime**

International Institute of Information Technology Hyderabad	Sep 2024
Indian Institute of Technology Hyderabad	Aug 2024
Simons Institute for Theory of Computing	July 2024

## **Quantum Tanner Codes**

Infleqtion, Chicago	Nov 2023
Simons Institute for Theory of Computing	Aug 2023

## **Meeting Ramanujan, well almost!**

Institute for Data, Econometrics, Algorithms, and Learning (IDEAL)	Mar 2023
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POSTERS AND CONFERENCE TALKS	<b>List Decodable Quantum LDPC Codes.</b> Quantum Information Processing (QIP 2025).	Mar 2025
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POSTERS AND CONFERENCE TALKS	<b>Structured Derandomization: Pseudorandomness with Symmetries.</b> Institute for Data, Econometrics, Algorithms, and Learning Annual Meeting.	Jun 2023
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	<b>Explicit Abelian Lifts and Quantum LDPC Codes.</b> Innovations in Theoretical Computer Science (ITCS 2022)	Feb 2022
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	<b>SDIT and non-commutative ranks of matrix Lie algebras</b> Innovations in Theoretical Computer Science (ITCS 2022)	Feb 2022
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ACADEMIC SERVICE	<b>Conference and Journal Subreviewer</b> <ul style="list-style-type: none"><li>Reviewed articles multiple times for venues like STOC, FOCS, ITCS, SODA, RANDOM, ICALP, IEEE Transactions on Information Theory, Theory of Computing (ToC).</li></ul>	
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## **Conference Volunteer**

- ACM Symposium on Theory of Computing (STOC) 2020.
- Foundations of Software Technology and Theoretical Computer Science (FSTTCS) 2017.

## **TTIC – UChicago Theory Reading Groups**

Co-organized (with Prof. Madhur Tulsiani) the theory reading group on these topics,

- Random Matrix Theory Jan – Mar 2023
- High Dimensional Expanders 2021
- External Speaker Series Dec 2020 – Feb 2021