

# Tushant Mittal

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RESEARCH INTERESTS	Algebraic techniques and structured constructions to tackle computational problems. Areas – Pseudorandomness, Quantum Error Correction, All flavours of Complexity Theory.	
EDUCATION	<b>Ph.D. in Computer Science</b> , University of Chicago Advised by Prof. Madhur Tulsiani and Prof. Janos Simon	2018 – 2024 (Expected)
	<b>M.S. in Computer Science</b> , University of Chicago Thesis title: <i>Quantum LDPC Codes: An exposition of recent results</i>	2018 – 2021
	<b>B.Tech.</b> , Indian Institute of Technology Kanpur (IITK), India Bachelor of Technology (B.Tech.) in Computer Science and Engineering	2014 – 2018
PREPRINT	[1] List Decodable Quantum LDPC Codes with Shashank Srivastava, and Madhur Tulsiani <i>Preprint, in submission.</i>	
PUBLICATIONS	[2] <a href="#">Almost Ramanujan Expanders from Arbitrary Expanders via Operator Amplification</a> with Fernando G. Jeronimo, Sourya Roy, and Avi Wigderson <i>In Proc. of IEEE Annual Symposium on Foundations of Computer Science, (FOCS) 2022</i> <i>Invited to Special Issue of SIAM Journal of Computing (SICOMP)</i>	
	[3] <a href="#">Explicit Quantum LDPC Codes and Abelian Lifts</a> with Fernando G. Jeronimo, Ryan O'Donnell, Pedro Paredes, and Madhur Tulsiani <i>In Proc. of 13th Innovations in Theoretical Computer Science Conference (ITCS) 2022</i>	
	[4] <a href="#">Symbolic determinant identity testing and non-commutative ranks of matrix Lie algebras</a> with Gábor Ivanyos and Youming Qiao <i>In Proc. of 13th Innovations in Theoretical Computer Science Conference (ITCS) 2022</i>	
	[5] <a href="#">The Mahler measure for arbitrary tori</a> with Matilde Lalín. <i>In Research in Number Theory, March 2018</i>	
AWARDS AND FELLOWSHIPS	<a href="#">MITACS Globalink Research Internship</a> , Canada	2017
	<a href="#">Summer Research Fellowship Programme</a> , Indian Academy of Science	2016
	<a href="#">KVPY National Fellowship</a> , DST, Government of India	2014
RESEARCH EXPERIENCE	<b>Graduate Research Assistant</b> , University of Chicago Advised by Prof. Madhur Tulsiani and Prof. Janos Simon	Oct 2018 – Ongoing
	<b>Undergraduate Research Project</b> , IIT Kanpur Supervised by Prof. Nitin Saxena Project : <i>Algebraic Independence</i>	Aug – Nov 2017
	<b>Research Intern</b> , Université de Montréal Supervised by Prof. Matilde Lalín Project : <i>The Mahler measure for arbitrary tori</i>	May – July 2017

**Research Intern**, Indian Institute of Science Education and Research (IISER) Mohali    May – July 2016  
 Supervised by **Prof. Kapil Paranjape**  
 Project : *An Elementary Route to Grassmannians*

TEACHING  
EXPERIENCE

**Teaching Assistant**, University of Chicago

- Algorithms, Master's
- Discrete Math, Master's
- Theory of Algorithms, Undergraduate
- Introduction to Formal Languages, Undergraduate

**Teaching Assistant**, Toyota Technological Institute at Chicago (TTIC)

- Mathematical Toolkit, Graduate
- Algorithms, Graduate

**Teaching Assistant**, Indian Institute of Technology, Kanpur (IITK)

- Fundamentals of Computing, Undergraduate

SELECTED  
TALKS

**Simons Institute for Theory of Computing, Reading Group**

August 2023

- Talk – *Quantum Tanner Codes*

**Institute for Data, Econometrics, Algorithms, and Learning (IDEAL) Annual Meeting**

June 2023

- Poster – *Structured Derandomization: Pseudorandomness with Symmetries*

**Institute for Data, Econometrics, Algorithms, and Learning (IDEAL) Seminar**

Summer 2023

- Talk – *Meeting Ramanujan, well almost!*

**Talks at Conferences**

- *Explicit Abelian Lifts and Quantum LDPC Codes*

ITCS 2022

- *SDIT and non-commutative ranks of matrix Lie algebras*

ITCS 2022

ACADEMIC  
SERVICE

**Conference Reviewer**

- Innovations in Theoretical Computer Science (ITCS)
- ACM-SIAM Symposium on Discrete Algorithms (SODA)
- ACM Symposium on Theory of Computing (STOC)
- International Workshop on Randomization and Computation (RANDOM)
- EATCS International Colloquium on Automata, Languages and Programming (ICALP)

**Conference Volunteer**

- ACM Symposium on Theory of Computing, STOC
- Foundations of Software Technology and Theoretical Computer Science , FSTTCS

2020

2017

**TTIC – UChicago Theory Reading Groups**

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

- High Dimensional Expanders
- *Random Matrix Theory*