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

Ph.D. in Computer Science, University of Chicago — 2018 – 2024 (Expected)
Advised by Prof. Madhur Tulsiani and Prof. Janos Simon

M.S. in Computer Science, University of Chicago — 2018 – 2021
Thesis title: *Quantum LDPC Codes: An exposition of recent results*

B.Tech., Indian Institute of Technology Kanpur (IITK), India — 2014 – 2018
Bachelor of Technology (B.Tech.) in Computer Science and Engineering

PREPRINT

[1] List Decodable Quantum LDPC Codes
with Shashank Srivastava, and Madhur Tulsiani
Preprint, in submission.

PUBLICATIONS

[2] Almost Ramanujan Expanders from Arbitrary Expanders via Operator Amplification
with Fernando G. Jeronimo, Sourya Roy, and Avi Wigderson
In Proc. of IEEE Annual Symposium on Foundations of Computer Science, ***(FOCS) 2022***
Invited to Special Issue of SIAM Journal of Computing ***(SICOMP)***

[3] Explicit Quantum LDPC Codes and Abelian Lifts
with Fernando G. Jeronimo, Ryan O'Donnell, Pedro Paredes, and Madhur Tulsiani
In Proc. of 13th Innovations in Theoretical Computer Science Conference ***(ITCS) 2022***

[4] 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***

[5] The Mahler measure for arbitrary tori
with Matilde Lalín.
In *Research in Number Theory, March 2018*

AWARDS AND FELLOWSHIPS

MITACS Globalink Research Internship, Canada — 2017
Summer Research Fellowship Programme, Indian Academy of Science — 2016
KVPY National Fellowship, DST, Government of India — 2014

RESEARCH EXPERIENCE

Graduate Research Assistant, University of Chicago — Oct 2018 – Ongoing
Advised by Prof. Madhur Tulsiani and Prof. Janos Simon

Undergraduate Research Project, IIT Kanpur — Aug – Nov 2017
Supervised by Prof. Nitin Saxena
Project : *Algebraic Independence*

Research Intern, Université de Montréal — May – July 2017
Supervised by Prof. Matilde Lalin
Project : *The Mahler measure for arbitrary tori*

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 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,

- High Dimensional Expanders
- Random Matrix Theory