Abhijit Mudigonda

Contact Information

2624 Montebelluna Pl
Leander, TX 78641
(971)-282-7028

abhijit.mudigonda@gmail.com
abhijit-mudigonda
https://abhijit-mudigonda.github.io/math

Research Interests

Number Theory, Topology, Theoretical Computer Science

Education

University of Chicago

PhD Candidate in Computer Science, September 2021 - Present

Massachusetts Institute of Technology

B.S. in Mathematics, September 2015 - June 2019

Publications

B. Matschke and A. S. Mudigonda. *Quadratic Fields Admitting Elliptic Curves with Rational j-Invariant and Good Reduction Everywhere*. Journal of Number Theory. Volume 247, June 2023, Pages 162-210.

A. S. Mudigonda and R. R. Williams. *Time-Space Lower Bounds for Simulating Proof Systems with Quantum and Randomized Verifiers*. Proceedings of the 2021 Conference on Innovations in Theoretical Computer Science.

Patents

D. Gutfreund, Q. Fan, A. Mudigonda. Restructuring Deep Neural Networks to Reduce the Number of Parameters, USPA #20200160144. Published May 21, 2020.

Research Experience

06/2020 - 03/2021	*Quadratic Fields Admitting Elliptic Curves with Rational j-Invariant and Good Reduction Everywhere*
	Advisor: Benjamin Matschke, BU Department of Mathematics
09/2019 - 06/2020	*Time-Space Lower Bounds for Simulating Proof Systems with Quantum and Randomized Verifiers*
	Advisor: Ryan Williams, MIT CSAIL
06/2018 - 08/2018	*Uniform versions of algebraic circuit classes*
	Advisor: Ryan Williams, MIT CSAIL
02/2018 - 05/2018	$\mathbb{Z}^n$*-multidegree of projective compactifications of affine subspaces.*
	Advisor: Dhruv Ranganathan, MIT Department of Mathematics
01/2017 - 04/2017	*Expander graphs for parameter reduction in neural networks.*
	Advisor: Dan Gutfreund, IBM Research
06/2016 - 08/2016	*Predicting DNA sequencing accuracy.*
	Advisor: Paul Spellman, Knight Cancer Institute

Honors and Awards

2021 NSF Graduate Research Fellow
2021 UChicago Crerar Fellow
2015 North American Computational Linguistics Olympiad - U.S. Alternate (11^{th})
2014 International Biology Olympiad - Silver Medal (25^{th})
2014 United States National Chemistry Olympiad - High Honors (Top 50)

Selected Graduate Coursework

- ❑ Galois Representations and Modular Forms
- ❑ Algebraic Topology
- ❑ Advanced Complexity Theory
- ❑ Probabilistic Method in Combinatorics
- ❑ Graph Theory and Additive Combinatorics
- ❑ Physics and Computation
- ❑ Representation Theory of Lie Groups
- ❑ Differential Topology
- ❑ Complex Analysis
- ❑ Distr. of Class Groups of Global Fields
- ❑ Number Theory II (Automorphic Forms)
- ❑ Fine-Grained Algorithms and Complexity

Work Experience

08/2020 - 09/2021 — *Software Engineer, Facebook Reality Labs (Oculus)*

Worked on the XROS platform team, developing the operating system for the Oculus Quest 2 and successors.

09/2017 - 12/2017 — *Grader, MIT Department of Mathematics*

Theory of Computation (18.404).

06/2017 - 08/2017 — *Software Engineering Intern, Facebook*

Worked on ZippyDB, a persistent distributed key-value service built on top of RocksDB.

Gained experience with distributed architectures and asynchronous programming.

Teaching Experience

06/2020 - 08/2020 — *Summer STEM Institute Research Mentor*

Mentored two high school students in theoretical and applied quantum computing research projects.

01/2019 — *MIT Global Teaching Labs Teacher*

Taught physics and biology to high school students at the Liceo Scientifico Michelangelo Grigoletti in Pordenone, Italy.

06/2015 - 06/2018 — *USA Biology Olympiad Teaching Assistant*

Wrote practical and theoretical examinations to select the 2015, 2016, 2017, and 2018 U.S. representative teams.

Gave lectures on topics ranging from developmental physiology to biostatistics.

11/2015 - 11/2016 — *MIT Educational Studies Program Teacher*

Taught courses in spectral graph theory and a cappella arranging

Conferences Attended

Midwest Arithmetic Geometry and Number Theory Symposium 2022 (10/2022)

Algorithmic Number Theory Symposium 2022 (08/2022)

Arizona Winter School 2022. (03/2022)

Innovations in Theoretical Computer Science 2021. (01/2021)

Probability, Representation Theory, and Symmetric Functions, MIT. (08/2019)

Workshop on Algebraic Methods in Combinatorics, Harvard CMSA. (11/2017)

Writing

Profinite Groups, Infinite Galois Theory, and an application to Kummer Theory, for Seminar in Algebra.

Sphere Packing in 8 *Dimensions*, for Number Theory II.

Towards Quantum PCP: A Proof of the NLETS Theorem, for Physics and Computation, and the corresponding blog post.

Combinatorics of the Grassmannian, official course notes.

An Algebraic Approach to the Dirac Equation, for Quantum Physics III.

Structure Determination of a Suzuki-Miyaura Coupling Product, for Biochemistry and Organic Lab.

Talks

UT Austin Quantum Information Seminar, *Time-Space Lower Bounds for Simulating Proof Systems with Quantum and Randomized Verifiers* (01/2021).

Summer STEM Institute, *Surviving a Very Specific Alien Abduction, or, an Introduction to Error-Correcting Codes* (07/2020).

MIT Great Ideas in Theoretical Computer Science, *The "Majority is Stablest" Theorem* (05/2020).

Skills

Languages:	Python, C++, Shell, Hack, Kotlin
(Real) Languages:	English, Telugu, Spanish
Music:	A cappella arranging, Singing, Beatboxing, Piano

References

Ryan Williams, Assistant Professor, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology. (617)-253-5851, `rrw@mit.edu`

Benjamin Matschke, Research Assistant Professor, Department of Mathhematics and Statistics, Boston University. (617)-343-1481, `matschke@bu.edu`

Melanie Matchett Wood, Professor of Mathematics, Mathematics Department, Harvard University. (617)-495-2171, `mmwood@harvard.edu`

Dhruv Ranganathan, University Lecturer, Department of Pure Mathematics and Mathematical Statistics, University of Cambridge. +44 1223-765000, `dr508@cam.ac.uk`