Zeyu Guo

Assistant Professor

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Education

2017.6 **Doctor of Science**, *Computing and Mathematical Sciences Department, California Institute of Technology*
PhD thesis: *$\mathcal{P}$-schemes and Deterministic Polynomial Factoring over Finite Fields*
Advisor: Chris Umans

2014.6 **Master of Science**, *Computing and Mathematical Sciences Department, California Institute of Technology*
Master's thesis: *Randomness-Efficient Curve Sampling*
Advisor: Chris Umans

2010.6 **Bachelor of Science**, *School of Computer Science, Fudan University*

Research Interests

Pseudorandomness, Coding Theory, Algebraically Complexity Theory, Algebraic Methods in Theoretical Computer Science

Work and Research Experience

2022.10–present **Assistant Professor**, *Department of Computer Science and Engineering, The Ohio State University*

2024.1–2024.3 **Visitor**, *Simons Institute for the Theory of Computing, UC Berkeley*
Attendee of the program "Error-Correcting Codes: Theory and Practice" in Spring 2024

2021.9–2022.7 **Research Associate**, *Department of Computer Science, The University of Texas at Austin*
Advisor: David Zuckerman

2019.9–2021.8 **Postdoctoral Researcher**, *Department of Computer Science, University of Haifa*
Advisor: Noga Ron-Zewi

2017.10–2019.7 **Research Associate**, *Department of Computer Science and Engineering, Indian Institute of Technology Kanpur*
Advisor: Nitin Saxena

2010.9–2017.6 **Graduate Research Assistant**, *California Institute of Technology*
Advisor: Chris Umans

2013.8–2013.9 **Visiting Student**, *Max Planck Institute for Computer Science*

2012.8–2012.9 **Visiting Student**, *Max Planck Institute for Computer Science*

2008.9- 2009.1 **Exchange Student**, *The University of Hong Kong*
Advisor: Francis Y. L. Chin

2007.3- 2008.9 **Research Assistant**, *Fudan University*
Advisor: Hong Zhu

Teaching Experience

2023 Autumn **Instructor**, *Foundations II: Data Structures and Algorithms, CSE 2331, The Ohio State University*

2023 Autumn **Instructor**, *Intermediate Studies in Computation Theory (Algebraic Complexity Theory), CSE 5329, The Ohio State University*

2023 Autumn **Guest Lecturer**, *Departmental Research Seminar, CSE 6891, The Ohio State University*

2023 Spring **Instructor**, *Computability and Complexity, CSE 6321, The Ohio State University*

2023 Spring **Instructor**, *Computability and Complexity, CSE 6321, The Ohio State University*

2014 Spring **Head Teaching Assistant**, *Introduction to Algorithms, CS38, Caltech*

2013 Spring **Teaching Assistant**, *Complexity Theory, CS151, Caltech*

2012 Winter **Teaching Assistant**, *Computer Algorithms, CS138, Caltech*

Students

Zihan Zhang (Ph.D. student, 2023.1 – present)

Postdocs

Ashish Dwivedi (postdoc, 2023.8 – 2024.9, Ph.D. from IIT Kanpur)

Summer Interns

Zhai'enhe Zhou (undergraduate summer intern, 2024.7 – 2024.8, undergraduate at USTC)

Publications

- Alexander Golovnev, **Zeyu Guo**, Pooya Hatami, Satyajeet Nagargoje, and Chao Yan. Hilbert Functions and Low-Degree Randomness Extractors. To appear in *RANDOM 2024*.
- Ashish Dwivedi, **Zeyu Guo**, and Ben Lee Volk. Optimal Pseudorandom Generators for Low-Degree Polynomials Over Moderately Large Fields. To appear in *RANDOM 2024*.
- **Zeyu Guo**, Chaoping Xing, Chen Yuan, and Zihan Zhang. Random Gabidulin Codes Achieve List Decoding Capacity in the Rank Metric. To appear in *FOCS 2024*.
- **Zeyu Guo** and Zihan Zhang. Randomly Punctured Reed-Solomon Codes Achieve the List Decoding Capacity over Polynomial-Size Alphabets. In *Proceedings of the 64th Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 164–176, 2023.
- **Zeyu Guo**, Ben Lee Volk, Akhil Jalan, and David Zuckerman. Extractors for Images of Varieties. In *Proceedings of the 55th Annual ACM Symposium on Theory of Computing (STOC)*, pages 46–59, 2023.

- Vishwas Bhargava, Sumanta Ghosh, **Zeyu Guo**, Mrinal Kumar, and Chris Umans. Fast Multivariate Multipoint Evaluation Over All Finite Fields. In *Proceedings of the 63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 221–232, 2022. Journal version to appear in the Journal of the ACM.
- **Zeyu Guo**, Ray Li, Chong Shangguan, Itzhak Tamo, and Mary Wootters. Improved List-Decodability and List-Recoverability of Reed–Solomon Codes via Tree Packings. In *Proceedings of the 62nd Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 708–719, 2021. Journal version in *SIAM Journal on Computing* 53(2): 389–430, 2024.
- **Zeyu Guo**. Variety-Evasive Subspace Families. In *Proceedings of the 36th Computational Complexity Conference (CCC)*, pages 20:1–20:33, 2021.
- **Zeyu Guo** and Noga Ron-Zewi. Efficient List-Decoding with Constant Alphabet and List Sizes. In *Proceedings of the 53rd Annual ACM Symposium on Theory of Computing (STOC)*, pages 1502–1515, 2021. Journal version in *IEEE Transactions on Information Theory* 68(3): 1663–1682, 2022.
- **Zeyu Guo**. Factoring Polynomials over Finite Fields with Linear Galois Groups: An Additive Combinatorics Approach. In *Proceedings of the 45th International Symposium on Mathematical Foundations of Computer Science (MFCS)*, pages 42:1–42:14, 2020.
- **Zeyu Guo** and Rohit Gurjar. Improved Explicit Hitting-Sets for ROABPs. In *Proceedings of the 24th International Workshop on Randomization and Computation (RANDOM)*, pages 4:1–4:16, 2020.
- **Zeyu Guo**. Deterministic Polynomial Factoring over Finite Fields: A Uniform Approach via $\mathcal{P}$-Schemes. *Journal of Symbolic Computation* 96: 22–67, 2020.
- **Zeyu Guo**, Mrinal Kumar, Ramprasad Saptharishi, and Noam Solomon. Derandomization from Algebraic Hardness: Treading the Borders. In *Proceedings of the 60th Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, pages 147–157, 2019. Journal version in *SIAM Journal on Computing* 51(2): 315–335, 2022.
- **Zeyu Guo**, Nitin Saxena, and Amit Sinhababu. Algebraic Dependencies and PSPACE Algorithms in Approximative Complexity. In *Proceedings of the 33rd Computational Complexity Conference (CCC)*, pages 10:1–10:21, 2018. Journal version in *Theory of Computing* 16(15): 1–30, 2019.
- **Zeyu Guo**, Anand Kumar Narayanan, and Chris Umans. Algebraic Problems Equivalent to Beating Exponent 3/2 for Polynomial Factorization over Finite Fields. In *Proceedings of the 41st International Symposium on Mathematical Foundations of Computer Science (MFCS)*, pages 47:1–47:14, 2016.
- **Zeyu Guo** and He Sun. Gossip vs. Markov Chains, and Randomness-Efficient Rumor Spreading. In *Proceedings of the 26th ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pages 411–430, 2015.
- **Zeyu Guo**. Randomness-Efficient Curve Samplers, In *Proceedings of the 17th International Workshop on Randomization and Computation (RANDOM)*, pages 575–590, 2013.
- Francis Y. L. Chin, **Zeyu Guo**, and He Sun. Minimum Manhattan Network is NP-Complete, In *Proceedings of the 25th Annual Symposium on Computational Geometry (SoCG)*, pages 393–402, 2009. Journal version in *Discrete and Computational Geometry* 45(4): 701–722, 2011.

- **Zeyu Guo**, He Sun, and Hong Zhu. Greedy Construction of 2-Approximation Minimum Manhattan Network, In *Proceedings of the 19th International Symposium on Algorithms and Computation (ISAAC)*, LNCS 5369, pages 4–15, 2008. Journal version in *International Journal of Computational Geometry and Applications* 21(3): 331–350, 2011.
- **Zeyu Guo**, He Sun, and Hong Zhu. A Fast 2-Approximation Algorithm for the Minimum Manhattan Network Problem, In *Proceedings of the 4th International Conference on Algorithmic Aspects in Information and Management (AAIM)*, LNCS 5034, pages 212–223, 2008.

Presentations

2024.10 Computer Science Seminar, Chennai Mathematical Institute, India (online talk).

2024.8 The 28th International Conference on Randomization (RANDOM 2024), London, UK.

2024.6 Research Center for Mathematics and Interdisciplinary Sciences, Shandong University, Qingdao, China.

2024.4 Theory Seminar at the University of Illinois Urbana-Champaign, Urbana, Illinois, USA.

2023.12 International Workshop on Algebraic Geometric Codes and Related Fields, Shanghai Jiaotong University, China (online talk).

2023.10 Theory Seminar at Johns Hopkins University, Baltimore, Maryland, USA.

2023.6 The 55th Annual ACM Symposium on Theory of Computing (STOC 2023), Orlando, Florida, USA.

2022.9 The 63rd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022), Denver, Colorado, USA.

2022.9 Theory Seminar at the University of Michigan, Ann Arbor, USA.

2022.2 The 62nd Annual IEEE Symposium on Foundations of Computer Science (FOCS 2021), virtual conference.

2021.11 The 4th Annual Meeting of the SIAM Texas-Louisiana Section, Minisymposium of Algorithmic Algebra and Geometry, UTRGV, South Padre Island, USA.

2021.7 The 36th Computational Complexity Conference (CCC 2021), virtual conference.

2021.6 The 53rd ACM Symposium on Theory of Computing (STOC 2021), virtual conference.

2020.12 Research Center for Mathematics and Interdisciplinary Sciences, Shandong University, Qingdao, China.

2020.11 Technion Theory Lunch, Technion, Haifa, Israel (online talk).

2020.8 The 45th International Symposium on Mathematical Foundations of Computer Science (MFCS 2020), virtual conference.

2020.8 The 24th International Workshop on Randomization and Computation (RANDOM 2020), virtual conference.

2019.3 Workshop on Algebraic Complexity Theory (WACT 2019), Tata Institute of Fundamental Research, Bengaluru, India.

2019.3 Theory Seminar at Indian Institute of Technology Bombay, Mumbai, India.

2019.1 MPI-INF and MPI-MiS joint workshop on Theoretical Computer Science and Algebraic Geometry, Max Planck Institute for Informatics, Saarbrücken, Germany.

2016.8 The 41st International Symposium on Mathematical Foundations of Computer Science (MFCS 2016), Krakow, Poland.

2015.7 The 12th International Conference on Finite Fields and Their Applications (FQ 12), Saratoga Springs, USA.

2015.1 The 26th ACM-SIAM Symposium on Discrete Algorithms (SODA 2015), San Diego, USA.

2013.8 China Theory Week, Aarhus University, Denmark.

2012.8 Max Planck Institute for Informatics, Saarbrücken, Germany

2009.6 The 25th Annual Symposium on Computational Geometry (SoCG 2009), Aarhus University, Denmark.

2009.4 The 2nd Annual Meeting of Asian Association for Algorithms and Computation (AAAC 2009), Zhejiang University, China.

2008.6 The 4th International Conference on Algorithmic Aspects in Information and Management (AAIM 2008), Fudan University, China.

2008.4 The 1st Annual Meeting of Asian Association for Algorithms and Computation (AAAC 2008), The University of Hong Kong, China.

Honors

2013 **Invited to participate in China Theory Week**

2009 **President's Medal of Fudan University**.

2009 **Wangdao Scholar**, Sponsored by Fudan Undergraduate Research Opportunities Program

2008 **Chun-Tsung Scholar**, Sponsored by Chun-Tsung Undergraduate Research Endowment, which was established by Professor Tsung-Dao Lee

2005 **Bronze Medal**, National Olympiad in Informatics.

References

Chris Umans
Professor
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David Zuckerman
Professor
The University of Texas at Austin
diz@cs.utexas.edu

Noga Ron-Zewi
Associate Professor
University of Haifa
noga@cs.haifa.ac.il

Nitin Saxena
Professor
Indian Institute of Technology Kanpur
nitin@cse.iitk.ac.in

Service to the community

- Program Committee Member for: RANDOM 2024
- Session Chair for: RANDOM 2024

- Reviewer for: SIAM Journal on Computing, Theory of Computing, Theoretical Computer Science, TheoretiCS, IEEE Transactions on Information Theory, Journal of Combinatorial Theory - Series A, COCOON 2013, STOC 2014, SODA 2019, FOCS 2019, COCOON 2019, ITCS 2020, STACS 2020, STOC 2020 (x3), CCC 2020 (x2), FOCS 2020, MFCS 2020, ITCS 2021, ISSAC 2021, RANDOM 2021, MFCS 2021, STOC 2022 (x2), ICALP 2022, CCC 2022, SODA 2023, ISIT 2023, CCC 2023, FOCS 2023, FSTTCS 2023, SODA 2024, ITCS 2024, STOC 2024 (x2), CCC 2024, RANDOM 2024, SODA 2025, ITCS 2025

Computer Skills

Programming	C/C++, Python
OS	Windows, Linux
Typography	LaTeX
Mathematical software	SAGE, GAP, Mathematica, Matlab