

Cassandra Marcussen

Contact	Email Address: cmarcussen@g.harvard.edu Website: https://cassmarcussen.github.io/
Research Interests	Theoretical computer science, probability, and combinatorics, with a focus on sublinear algorithms, random graphs, property testing, and average-case complexity.
Education	Harvard University2022 – Expected May 2027 Ph.D. candidate in Computer Science Advisor: Madhu Sudan Columbia University in the City of New York2018 – 2022 B.A. in Mathematics and Computer Science <i>magna cum laude</i>
Honors and Awards	· NDSEG Fellowship (National Defense Science and Engineering Graduate Fellowship) (2024) · NSF Graduate Research Fellowship; declined in favor of NDSEG (2024) · NCWIT Collegiate Award – National Finalist (2021) · AWM Student Chapter Award for Scientific Excellence (2020) · Columbia Oxbridge Scholar, selected to study mathematics and computer science at St. Anne’s College, Oxford; visit canceled due to COVID-19 (2019) · John Jay Scholar, Columbia University Scholars Program (2018 – 2022) · Verizon App Challenge: Best in Nation, awarded \$20,000 (2017)
Publications	Coauthors are listed alphabetically unless marked with *. Quality Control Algorithms for Pattern Counting, with Ronitt Rubinfeld and Madhu Sudan, To appear, SODA (2027), arXiv:2608.03439. k-Coloring Graphs in Sublinear Average Time, with Edward Pyne, Ronitt Rubinfeld, Asaf Shapira, and Shlomo Tauber, To appear, FOCS (2026), arXiv:2607.26592. Quality control in sublinear time: a case study via random graphs, with Ronitt Rubinfeld and Madhu Sudan, To appear, FOCS (2026), arXiv:2508.16531. Learning and Testing Convex Functions, with Renato Ferreira Pinto Jr., Elchanan Mossel, and Shivam Nadimpalli, RANDOM (2026), arXiv:2511.11498. Finding the Root in Random Nearest Neighbor Trees, with Anna Brandenberger, Elchanan Mossel, and Madhu Sudan, Random Structures & Algorithms (2026), arXiv:2411.14336. Bounds on higher graph gonality, with Lisa Cenek, Lizzie Ferguson, Eyobel Gebre, Jason Meintjes, Ralph Morrison, Liz Ostermeyer, and Shefali Ramakrishna, To appear, Australasian Journal of Combinatorics (2026), arXiv:2206.06907.

Scramble number and tree-cut decompositions, with *Lisa Cenek, Lizzie Ferguson, Eyobel Gebre, Jason Meintjes, Ralph Morrison, Liz Ostermeyer, Shefali Ramakrishna, and Ben Weber*, [The Art of Discrete and Applied Mathematics \(2026\)](#), arXiv:2209.01459.

A Fast Coloring Oracle for Average Case Hypergraphs, with *Edward Pyne, Ronitt Rubinfeld, Asaf Shapira, and Shlomo Tauber*, [RANDOM \(2025\)](#). Selected for a contributed presentation at Highlights of Algorithms (2026). arXiv:2507.10691.

Characterizing the Distinguishability of Product Distributions through Multicalibration, with *Aaron (Louie) Putterman and Salil Vadhan*, [CCC \(2025\)](#), arXiv:2412.03562.

Errors are Robustly Tamed in Cumulative Knowledge Processes, with *Anna Brandenberger, Elchanan Mossel, and Madhu Sudan*, [COLT \(2024\)](#), [Proceedings of the National Academy of Sciences \(2025\)](#), arXiv:2309.05638.

Uniformity Testing over Hypergrids with Subcube Conditioning, with *Xi Chen*, [SODA \(2024\)](#), arXiv:2302.09013.

Uniform scrambles on graphs, with *Lisa Cenek, Lizzie Ferguson, Eyobel Gebre, Jason Meintjes, Ralph Morrison, Liz Ostermeyer, and Shefali Ramakrishna*, [Australasian Journal of Combinatorics \(2023\)](#), arXiv:2108.09821.

Preprints

Graph Spectral Sparsification is in Catalytic Logspace, with *Edward Pyne and Ronitt Rubinfeld*, 2026, arXiv:2608.21594.

Recovering Assignments with One-Sided Noise, with *Elchanan Mossel and Colin Sandon*, 2026, arXiv:2607.24073.

The gonality of circulant graphs, with *Lisa Cenek, Lizzie Ferguson, Eyobel Gebre, Jason Meintjes, Ralph Morrison, Liz Ostermeyer, and Shefali Ramakrishna*, 2025, arXiv:2508.05761.

Beyond Worst Case Local Computation Algorithms, with *Amartya Shankha Biswas, Ruidi Cao, Edward Pyne, Ronitt Rubinfeld, Asaf Shapira, and Shlomo Tauber*, 2025, arXiv:2403.00129.

Technical Reports

Data Preparation of the nuMoM2b Dataset *, with *A. Goretzky, A. Dmitrienko, I. Tang, N. Lari, O. Kunhardt, R. Rashid Khan, A. Catto, D. Mallia, A. Leshchenko, A. Lin, A. Raja, A. Salleb-Aouissi, Itsik Pe'er, R. Wapner, C. Gyamfi-Bannerman*, Technical report, 2021, on medRxiv.

Conference and Invited Talks

- Brown University CS Theory Seminar (2026)
- STOC Workshop on Testing in the Modern World (2026)
- Tufts Theory Seminar (2026)
- Harvard Theory of Computation Seminar – Lightning Talk (2026)
- Chicago Junior Theorists Workshop (2025)
- MIT Algorithms & Combinatorics Seminar (2025)
- MIT Sublinear Reading Group (2025)
- Workshop on Local Algorithms (2025)

	· CCC (2025) · COLT (2024) · SODA (2024) · Young Mathematicians Conference (2021)
Teaching Experience	· Teaching Fellow for Essential Coding Theory (Harvard CS 229r) Fall 2023 · Teaching Assistant (TA), Quantum Computation Summer 2023 PCMI Undergraduate Summer School · TA for Advanced Algorithms (Columbia COMS 4232) Spring 2022 · TA for Introduction to Cryptography (Columbia COMS 4261) Spring 2022 · TA for Analysis of Algorithms I (Columbia CSOR 4231) Summer & Fall 2021 · TA for Artificial Intelligence (Columbia COMS 4701) Spring 2021 · TA for Discrete Mathematics (Columbia COMS 3203) Fall 2020 · Lecturer and TA for Introduction to Proofs Fall 2020, Fall 2021 Four-week proof-writing workshop run by the Columbia Undergraduate Math Society
Leadership and Seminars	Organizer, TGINF September 2022 – May 2026 Harvard seminar for theoretical computer science graduate students and postdocs. Columbia Undergraduate Learning Seminar in Theoretical Computer Science Founder and Organizer March 2021 – May 2022 · Established ten reading groups, led three, and recruited pairs of graduate and undergraduate students to organize the others. Columbia-Barnard Association for Women in Mathematics Co-President May 2021 – May 2022
Research Experience	· SMALL REU – Williams College: Mathematics Researcher (Summer 2021)
Industry Experience	· Microsoft Research – Real-World Reinforcement Learning: Independent Developer in Open Source Fest (Summer 2020) · Google: STEP Software Engineering Intern (Summer 2020) · Amazon: AFE Software Engineering Intern (Summer 2019)
Reviewing	ITCS (2026, 2027), FOCS (2026), ICALP (2026), RANDOM (2025, 2026), STOC (2024, 2025), Applied Probability Journals (2025)