

# Michael Simkin | Massachusetts Institute of Technology

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CONTACT INFORMATION  
Massachusetts Institute of Technology  
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PERSONAL INFORMATION  
Birthyear: 1985  
Citizenship: Canada, Israel, USA  
Languages: English, Hebrew

RESEARCH INTERESTS  
Probabilistic combinatorics, combinatorial designs, random graphs and hypergraphs, and related computational questions.

- EMPLOYMENT
- 2023 - Present: Instructor (Departmental Postdoc), Massachusetts Institute of Technology.
  - 2020 - 2023: Postdoctoral fellow, Center of Mathematical Sciences and Applications, Harvard University.

- EDUCATION
- Hebrew University of Jerusalem, Israel**
- 2014 - 2020: PhD, Einstein Institute of Mathematics and Federmann Center for the Study of Rationality. Adviser: Prof. Nati Linial.
  - 2011 - 2014: MSc **magna cum laude** in mathematics. Adviser: Prof. Gil Kalai.
  - 2008 - 2011: BSc **summa cum laude** in Amirim honors program, major in mathematics, minor in computer science, and significant coursework in physics.

PUBLICATIONS **Preprints**

- Ramsey and Turán numbers of sparse hypergraphs, with Jacob Fox, Maya Sankar, Jonathan Tidor, and Yunkun Zhou. *arXiv:2401.00359* (2024).
- A toolkit for robust thresholds, with Huy Tuan Pham, Ashwin Sah, and Mehtaab Sawhney. *arXiv:2210.03064* (2022).
- $(n, k, k - 1)$ -Steiner systems in random hypergraphs. *arXiv:1711.01975* (2017).

**Published/Accepted**

- High-girth Steiner triple systems, with Matthew Kwan, Ashwin Sah, and Mehtaab Sawhney. *Annals of Mathematics*, to appear. *arXiv:2201.04554* (2022).
- The number of  $n$ -queens configurations. *Advances in Mathematics*, 427: 109127 (2023).
- Threshold for Steiner triple systems, with Ashwin Sah and Mehtaab Sawhney. *Geometric and Functional Analysis (GAFA)* 33: 1141-1172 (2023).
- Substructures in Latin squares, with Matthew Kwan, Ashwin Sah, and Mehtaab Sawhney. *Israel Journal of Mathematics* 256: 363-416 (2023).

- A lower bound for the  $n$ -queens problem, with Zur Luria. *Proceedings of the 2022 Annual ACM-SIAM Symposium on Discrete Algorithms* (SODA 2022).
- What is learned in knowledge graph embedding?, Michael R. Douglas, Michael Simkin, Omri Ben-Eliezer, Tianqi Wu, Peter Chin, Trung V. Dang, Andrew Wood. *Complex Networks & Their Applications X* (CNA 2021).
- Perfect matchings in random subgraphs of regular bipartite graphs, with Roman Glebov and Zur Luria. *Journal of Graph Theory*, 97: 208-231 (2021).
- A randomized construction of high girth regular graphs, with Nati Linial. *Random Structures & Algorithms*, 58; 345-369 (2021).
- The threshold problem for Latin boxes, with Zur Luria. *Random Structures & Algorithms*, 55; 926-949 (2019).
- Monotone subsequences in high-dimensional permutations, with Nati Linial. *Combinatorics, Probability, and Computing*, 27(1): 69-83 (2018).

HONORS AND AWARDS

2022     AMS-Simons Travel Grant  
 2018     Klein Prize (Fourth year PhD)  
 2015     Klein Prize (First year PhD)  
 2014     Awarded MSc magna cum laude  
 2011     Awarded BSc summa cum laude  
 2011     Dean's prize (third year BSc)  
 2009     Dean's prize (first year BSc)

TEACHING EXPERIENCE

2023 - Present: Massachusetts Institute of Technology

- Research mentor, Undergraduate Research Opportunity (UROP)
- Spring 2024: Probability and Random Variables (Teaching Assistant)
- Fall 2023: Combinatorial Analysis (Instructor of Record)

2022: Research mentor, Harvard CMSA Introduction to Mathematical Research.

2015 - 2020: Teaching Assistant, Hebrew University of Jerusalem:

- Spring 2020: Discrete Mathematics
- Spring 2019: Linear Algebra 2
- Fall 2019, Fall 2018, Fall 2017, Fall 2016: Mathematical Tools in Computer Science
- Spring 2018: Linear Algebra 1
- Spring 2017, Fall 2015: Advanced Calculus for Computer Science Students
- Spring 2016, Spring 2015: Calculus 2 for Computer Science Students

2016 - 2017: Lecturer, Israeli Ministry of Education for elementary school mathematics teachers.

ADDITIONAL EXPERIENCE

2021 - 2023     Organizer, Harvard CMSA colloquium.  
 2021 - 2022     Organizer, Harvard CMSA combinatorics, physics, and probability seminar.  
 2017 - 2020     Librarian, Federmann Center for the Study of Rationality.

NON-ACADEMIC EMPLOYMENT

2012 - 2014: Firmware engineer, Intel Corporation.

## TALKS

- Combinatorics Seminar, Technion, January 2024.
- Combinatorics Seminar, Hebrew University, January 2024.
- Combinatorics Seminar, Tel Aviv University, January 2024.
- Theory Seminar, New York University, November 2023.
- Random Structures and Algorithms Conference, Pittsburgh, June 2023.
- Combinatorics Seminar, Bar-Ilan University, November 2022.
- Combinatorics Seminar, Stanford University, November 2022.
- Discrete Mathematics Seminar, Rutgers University, September 2022.
- Random Structures and Algorithms Conference, Gniezno, August 2022.
- Algorithms, Combinatorics, and Optimization Seminar, Carnegie Mellon University, April 2022.
- Tel-Aviv University combinatorics seminar, April 2022
- Technion combinatorics seminar, April 2022.
- Hebrew University combinatorics seminar, April 2022.
- Bar-Ilan combinatorics seminar, April 2022.
- University of British Columbia discrete mathematics seminar, March 2022.
- Brandeis University combinatorics seminar, January 2022.
- Symposium on Discrete Algorithms (SODA), January 2022.
- Complex Networks & their Applications (CNA), December 2021.
- Worcester Polytechnic Institute Discrete Mathematics Seminar, October 2021.
- University of Bristol Combinatorics Seminar, October 2021.
- Auburn University Discrete Mathematics Seminar, October 2021.
- MIT Combinatorics Seminar, October 2021.
- Copenhagen-Jerusalem Combinatorics Seminar, September 2021.
- Harvard University CMSA Interdisciplinary Science Seminar, September 2021.
- Members' Seminar, Harvard University CMSA, September 2021.
- Combinatorics Seminar, Hebrew University of Jerusalem, Israel, June 2021.
- Combinatorics Seminar, Bar-Ilan University, March 2021.
- Combinatorics Seminar, Georgia Tech, January 2021.
- Members' Seminar, Harvard University CMSA, October 2020.
- Combinatorics Seminar, Hebrew University of Jerusalem, Israel, December 2019.
- Combinatorics Seminar, Tel-Aviv University, December 2019.
- Combinatorics Seminar, Technion, December 2019.
- Random Structures and Algorithms Conference, Zurich, July 2019.
- Annual meeting of the Israel Mathematical Union, Jerusalem, June 2019.
- Combinatorics Seminar, Tel-Aviv University, November 2018.
- Combinatorics Seminar, Hebrew University of Jerusalem, Israel, November 2018.
- Combinatorics Seminar, Bar-Ilan University, November 2018.
- Combinatorics Seminar, University of Oxford, November 2018.
- Algorithms, Combinatorics, and Optimization Seminar, Carnegie Mellon University, October 2018.

- Discrete Mathematics Seminar, Princeton University, October 2018.
- Students Combinatorics Day, Bar Ilan University, July 2018.
- Geometric, Topological, and Computational Aspects of High Dimensional Expanders, Israel Institute of Advanced Study, March 2018.
- Combinatorics Seminar, Hebrew University of Jerusalem, Israel, May 2017.