Xiaoyu He

Georgia Institute of Technology
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Employment

Georgia Institute of Technology 2024–
Richard Duke Early Career Assistant Professor

Princeton University 2021–2024
NSF Postdoctoral Research Fellow

Education

Stanford University 2016–2021
Ph.D. in Mathematics, Advisor: Jacob Fox

Harvard University 2012–2016
B.A. in Mathematics with Secondary in Computer Science

Selected Honors and Awards

NSF Mathematical Sciences Postdoctoral Research Fellowship 2021–2024
NSF Graduate Research Fellowship 2018–2021
Putnam Competition N1 (top 15) 2013
Google Code Jam Top 500 2014
International Math Olympiad:
Gold Medal (x2) 2010, 2011
Silver Medal 2012

Research Interests

Extremal, probabilistic, and algebraic combinatorics, especially in Ramsey theory, graph coloring, additive combinatorics, discrete geometry, and coding theory, with applications to computer science.

Teaching and Mentorship

Georgia Tech Assistant Professor
Math 7018 (Probabilistic Combinatorics) Spring 2026
Math 8022 (Topics in Ramsey and Turán Theory) Fall 2025
Georgia Tech REU Mentor Summer 2025
Math 7018 (Probabilistic Combinatorics) Spring 2025
Math 4022 (Introduction to Graph Theory) Fall 2024

Princeton University Lecturer
MAT 378 (Theory of Games) Spring 2024

MAT 175 (Math for Economics/Life Sciences) Fall 2023
MAT 378 (Theory of Games) Spring 2023
MAT 104 (Calculus II) Fall 2022
Princeton University Summer REU Mentor Summer 2022

Stanford University Teaching Assistant
Math 63DM (Modern Mathematics: Discrete Methods) Spring 2020
Math 61DM (Modern Mathematics: Discrete Methods) Fall 2017

Stanford University Course Assistant
Math 120 (Groups and Rings) Spring 2018
Math 19 (Calculus 1) Winter 2017
Math 104 (Applied Matrix Theory) Fall 2016

Stanford University Directed Reading Program 2017–2020
Mentored 8 undergraduate students over several years

Stanford University Research Institute in Mathematics 2017 –2021
Co-authored four papers with undergraduates published in:
Combin. Probab. Comput., *Discrete Math.*, and *Electronic J. Combin.*

MIT-PRIMES Research Mentor 2016

Harvard University Teaching Assistant
Math 130 (Classical Geometry) Spring 2015
Math 114 (Analysis II) Fall 2014
Math 113 (Complex Analysis) Spring 2014

MIT-PRIMES Circle Mentor 2013-2014

Other Professional Experience

Referee for: Annals of Mathematics, Discrete Mathematics, Electronic Journal of Combinatorics, Journal of Combinatorial Theory Series A, Journal of Combinatorial Theory Series B, SIAM Journal on Discrete Mathematics, Random Structures and Algorithms, Combinatorica, Discrete Applied Mathematics, Annals of Applied Probability

Reviewer for Math Reviews 2019

Co-organizer for Georgia Tech School of Math Colloquium 2024–

Co-organizer for Georgia Tech Combinatorics Seminar 2024–

Co-organizer for Stanford Kiddie Colloquium 2017–2018

Papers

46. Xiaoyu He, Logan Post
Asymptotically half of binary words are shuffle squares
preprint (2025)

45. Xiaoyu He, Nitya Mani, Jiaxi Nie, Nathan Tung, Fan Wei
New Sidorenko-type inequalities in tournaments
preprint (2025)

44. Xiaoyu He, Ghaura Mahabaduge, Krishna Pothapragada, Josh Rooney, Jasper Seabold

Ramsey numbers of grid graphs
preprint (2025)

43. Ruben Ascoli, Xiaoyu He, and Hans Hung-Hsun Yu
Polynomial-to-exponential transition in 3-uniform Ramsey numbers
preprint (2025)

42. Xiaoyu He, Jiaxi Nie, Yuval Wigderson, and Hans Hung-Hsun Yu
Off-diagonal Ramsey numbers for linear hypergraphs
preprint (2025)

41. Xiaoyu He and Jiaxi Nie
Generalized Erdős-Rogers problems for hypergraphs
preprint (2025)

40. Ruben Ascoli and Xiaoyu He
Rational values of the weak saturation limit
preprint (2025)

39. David Conlon, Jacob Fox, Benjamin Gunby, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte, Hans Yu
When are off-diagonal hypergraph Ramsey numbers polynomial?
Proc. Amer. Math. Soc. (2025), to appear

38. Xiaoyu He, Tomas Juskevicius, Bhargav Narayanan, Sam Spiro
The reverse Littlewood-Offord problem of Erdős
preprint (2024)

37. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
Big line or big convex polygon
Comput. Geom. 131 (2026), 102218

36. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Huy Tuan Pham, Andrew Suk, Jacques Verstraëte
A question of Erdős and Graham on Egyptian fractions
preprint (2024)

35. David Conlon, Jacob Fox, Benjamin Gunby, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
On off-diagonal hypergraph Ramsey numbers
Int. Math. Res. Not. IMRN (2025)

34. Benjamin Gunby, Xiaoyu He, Bhargav Narayanan, Sam Spiro
Antichain codes
Bull. London Math. Soc. 55 (2023), 3053–3062

33. Xiaoyu He, Ray Li
Approximating binary longest common subsequence in near-linear time
STOC (2023)

32. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
Hypergraph Ramsey numbers of stars versus cliques
Random Structures Algorithms 63 (2023), 442–456

31. Noga Alon, Gabriela Bourla, Ben Graham, Xiaoyu He, Noah Kravitz
Logarithmically larger deletion codes of all distances
IEEE Transactions on Information Theory 70 (2023), 125–130

30. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
Set-coloring Ramsey numbers via codes
Studia Sci. Math. Hungar. 61 (2024), 1–15

29. Noga Alon, Benjamin Gunby, Xiaoyu He, Eran Shmaya, Eilon Solan
Identifying the Deviator
Ann. Appl. Probab. 34 (2024), 4694–4708

28. Benjamin Gunby, Xiaoyu He, Bhargav Narayanan
Down-set Thresholds
Random Structures Algorithms 63 (2023), 442–456

27. Xiaoyu He, Emily Huang, Ihyun Nam, Rishubh Thaper
Shuffle squares and reverse shuffle squares
European J. Combin. (2024)

26. Jacob Fox, Xiaoyu He, Yuval Wigderson
Ramsey goodness of books revisited
Advances in Combinatorics (2023)

25. Xiaoyu He, Jiaxi Nie, Sam Spiro
Maximal independent sets in clique-free graphs
European J. Combin. 106 (2022), 103575

24. Venkatesan Guruswami, Xiaoyu He, Ray Li
The zero-rate threshold for adversarial bit-deletions is less than 1/2
FOCS (2021)

23. Jacob Fox, Xiaoyu He, Yuval Wigderson
Ramsey numbers of sparse digraphs
Israel J. Math. (2024)

22. Jacob Fox, Xiaoyu He, Sammy Luo, Max Xu
Multicolor list Ramsey numbers grow exponentially
J. Graph Theory 101 (2022), 389–396

21. Xiaoyu He, Yuzu Ido, Benjamin Przybocki
Hat guessing on books and windmills
Electron. J. Combin. 29 (2022), P1.12

20. Persi Diaconis, Ron Graham, Xiaoyu He, Sam Spiro
Card guessing with partial feedback
Combin. Probab. Comput. 31 (2021), 1–20

19. Xiaoyu He, Ray Li
Hat guessing numbers of degenerate graphs
Electron. J. Combin. 27 (2020), P3.58

18. Jacob Fox, Xiaoyu He
Independent sets in hypergraphs with a forbidden link
Proc. London Math. Soc. (2021)

17. John Engbers, Aysel Erey, Jacob Fox, Xiaoyu He
Tomescu's graph-coloring conjecture for l-connected graphs
SIAM J. Discrete Math. (2021), 1478–1502

16. Jacob Fox, Xiaoyu He, Yuval Wigderson
Ramsey, Paper, Scissors
Random Structures Algorithms 57 (2020), 1157–1173

15. Xiaoyu He, Matthew Kwan
Universality of random permutations
Bull. London Math. Soc. 52 (2020), 515–529

14. Ryan Alweiss, Chady Ben Hamida, Xiaoyu He, Alexander Moreira
On the subgraph query problem
Combin. Probab. Comput. 30 (2020), 1–16

13. Xiaoyu He, Yuval Wigderson
Hedetniemi's conjecture is asymptotically false
J. Combin. Theory Ser. B 146 (2020), 485–494

12. Xiaoyu He, Yuval Wigderson
Multicolor Ramsey numbers via pseudorandom graphs
Electron. J. Combin. (2020), P1.32

11. David Gonzalez, Xiaoyu He, Hanzhi Zheng
An upper bound for the restricted online Ramsey number
Discrete Math. 342 (2019), 2565–2569

10. David Conlon, Jacob Fox, Andrey Grinshpun, Xiaoyu He
Online Ramsey numbers and the subgraph query problem
Building Bridges II, Bolyai Soc. Math. Stud. 28 (2019)

9. Jacob Fox, Xiaoyu He, Freddie Manners
A proof of Tomescu's graph-coloring conjecture
J. Combin. Theory Ser. B 136 (2019), 204–221

8. Jared Bitz, Sarah Griffith, Xiaoyu He
Exponential lower bounds on the generalized Erdős-Ginzburg-Ziv constant
Discrete Math. 342 (2020), 112083

7. Xiaoyu He
Linear dependence between hereditary quasirandomness conditions
Electron. J. Combin. 25 (2018), P4.12

6. Xiaoyu He
Primes of the form $p^2 + Ny^2$
Harvard University senior thesis, manuscript (2016)

5. Xiaoyu He
Geometric progression-free sequences with small gaps II
INTEGERS 16, Paper No. A31, (2016), 9pp

4. Xiaoyu He
Zero-sum subsequences of length kq over finite abelian p-groups
Discrete Math. 339 (2016), 399–407

3. Xiaoyu He
Geometric progression-free sequences with small gaps
J. Number Theory 151 (2015), 197–210

2. Xiaoyu He
Cross number invariants of finite abelian groups
J. Number Theory 136 (2014), 100–117

1. Xiaoyu He
On the classification of universal rotor-routers
manuscript (2011)

Selected Talks

Stanford Combinatorics Seminar	2025
Duke University Combinatorics Seminar	2025
Random Structures and Algorithms (TU Wien)	2025
SLMath Workshop: Algebraic and Analytic Methods in Combinatorics	2025
Georgia Tech Combinatorics Seminar	2025
Atlanta Lecture Series in Graph Theory and Combinatorics	2024
NYU Discrete Math Seminar	2024
Georgia Tech Algorithms and Randomness Center Colloquium	2024
Stanford Combinatorics Seminar	2024
Rutgers Discrete Math Seminar	2024
Random Structures and Algorithms (Carnegie Mellon University)	2023
UT Austin Theory Seminar	2023
Shanghai Center for Mathematical Sciences (SCMS) Combinatorics Seminar	2023
Waterloo Colloquium	2023
Emory Colloquium	2023
Georgia Tech Colloquium	2023
Northwestern Probability Seminar	2023
UT Austin Colloquium	2023
UToronto Colloquium	2023
Dartmouth Colloquium	2023
Rutgers Colloquium	2022
UIC Colloquium	2022

BIRS Workshop on Extremal Combinatorics and Geometry	2022
Princeton PACM Colloquium	2022
Rutgers Discrete Math Seminar	2021
Princeton Discrete Math Seminar	2021
Georgia Tech Combinatorics Seminar	2020
Princeton Discrete Math Seminar	2019
Stanford Combinatorics Seminar	2019
Random Structures and Algorithms (ETH Zurich)	2019
Stanford Combinatorics Seminar	2019
Stanford Combinatorics Seminar	2018
Stanford Combinatorics Reading Seminar (7 total talks)	2017–2020
Stanford Kiddie Colloquium (7 total talks)	2016–2019
MIT Student Colloquium for Undergraduates in Mathematics	2015
Dartmouth Number Theory Seminar	2015
AMS Session on Number Theory, III, Joint Math Meetings	2015
AMS Session on Combinatorics and Number Theory, Joint Math Meetings	2014

Other Experience

Google Inc. Software Engineering Intern	2015
USA Math Olympiad Grader	2015
Duluth Research Experience for Undergraduates participant	2013, 2014
Math Olympiad Summer Camp Grader	2013
Jane Street Capital Trading Intern	2013
IdeaMath Year-round Program Instructor	2012–2013