Xiaoyu He

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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

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

37. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
    Big line or big convex polygon
    preprint (2024)

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
    preprint (2024)

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
    preprint (2022)

29. Noga Alon, Benjamin Gunby, Xiaoyu He, Eran Shmaya, Eilon Solan
    Identifying the Deviator
    preprint (2022)

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. (2021)

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

Rutgers Discrete Math Seminar	2024
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
19th International Conference on 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