

Xiaoyu He

Department of Mathematics
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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.

Employment

Princeton University	2021–Present
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

Teaching and Mentorship

Princeton University Instructor	
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: <i>Combin. Probab. Comput., Discrete Math., and Electronic J. Combin.</i>	
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: 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

Reviewer for Math Reviews 2019

Co-organizer for Stanford Kiddie Colloquium 2017–2018

Papers

30. David Conlon, Jacob Fox, Xiaoyu He, Dhruv Mubayi, Andrew Suk, Jacques Verstraëte
Set-coloring Ramsey numbers via codes
preprint (2022)
29. Noga Alon, Ben Gunby, Xiaoyu He, Eran Shmaya, Eilon Solan
Identifying the Deviator
preprint (2022)
28. Benjamin Gunby, Xiaoyu He, Bhargav Narayanan
Down-set Thresholds
preprint (2021)
27. Xiaoyu He, Emily Huang, Ihyun Nam, Rishubh Thaper
Shuffle squares and reverse shuffle squares

- preprint (2021)
26. Jacob Fox, Xiaoyu He, Yuval Wigderson
Ramsey goodness of books revisited
preprint (2021)
 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. (2021), accepted for publication
 22. Jacob Fox, Xiaoyu He, Sammy Luo, Max Xu
Multicolor list Ramsey numbers grow exponentially
J. Graph Theory (2022), early view
 21. Xiaoyu He, Yuzu Ido, Benjamin Przytycki
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

BIRS Workshop on Extremal Combinatorics and Geometry	2022
Princeton PACM Colloquium	2022
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