

## Contact Information

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## Employment

2017–present **University of Kentucky**  
Assistant Professor

2014–2017 **University of Oxford**  
Glasstone Research Fellow

## Education

2009–2014 **Stanford University**  
PhD in Mathematics  
Advisor: K. Soundararajan  
Dissertation: *Dichotomy between structure and randomness in combinatorial number theory*

2006–2009 **Massachusetts Institute of Technology**  
Bachelor of Science in Mathematics, minor in Economics  
Bachelor of Science in Computer Science

2005–2006 **Beijing University**

## Preprints and publications

1. (with W. Xu) “A robust version of Freiman’s  $3k - 4$  Theorem and applications.”  
Submitted.
2. (with A. Granville) “When does the Bombieri-Vinogradov theorem hold for a given multiplicative function?”  
*Forum Math. Sigma* 6 (2018), e15, 23 pp.
3. (with S. Drapeau, A. Granville) “Smooth-supported multiplicative functions in arithmetic progressions beyond the  $x^{1/2}$ -barrier.”  
*Mathematika* 63 (2017), no. 3, 895–918.
4. (with A. Granville) “Bombieri-Vinogradov for multiplicative functions, and beyond the  $x^{1/2}$ -barrier.”

Submitted.

5. (with B. Bhattacharya, S. Ganguly, Y. Zhao) “Upper tails for arithmetic progressions in a random set”.  
*IMRN*, accepted.
6. (with K. Matomäki) “When the sieve works II”.  
Submitted.
7. (with K. Matomäki, J. Maynard) “Vinogradov’s theorem with almost equal summands.”  
*Proc. Lond. Math. Soc. (3)* 115 (2017), no. 2, 323-347.
8. “Gowers norms of multiplicative functions in progressions on average”.  
*Algebra Number Theory* 11 (2017), no. 4, 961-982.
9. (with S. Drappeau) “Weyl sums, mean value estimates, and Waring’s problem with friable numbers”.  
*Acta Arith.* 176 (2016), no. 3, 249-299.
10. (with K. Matomäki) “Vinogradov’s three primes theorem with almost twin primes”.  
*Compos. Math.* 153 (2017), no. 6, 1220-1256.
11. “Narrow arithmetic progressions in the primes”.  
*Int. Math. Res. Not. IMRN* 2017, no. 2, 391-428.
12. “Polynomial values modulo primes on average and sharpness of the larger sieve”.  
*Algebra Number Theory* 9 (2015), no. 10, 2325-2346.
13. “On an inverse ternary Goldbach problem”.  
*Amer. J. Math.* 138 (2016), no. 5, 1167-1191.
14. “Finding linear patterns of complexity one”.  
*Int. Math. Res. Not. IMRN* 2015, no. 9, 2311-2327.
15. (with P. Diaconis, K. Soundararajan) “Carries, group theory, and additive combinatorics”.  
*Amer. Math. Monthly* 121 (2014), no. 8, 674-688.
16. “Large values of the additive energy in  $\mathbb{R}^d$  and  $\mathbb{Z}^d$ ”.  
*Math. Proc. Cambridge Philos. Soc.* (2014) 156: 327-341.

17. “An  $L$ -function-free proof of Vinogradov’s three primes theorem”.  
*Forum Math. Sigma* 2 (2014), e27, 26 pp.
18. “Character sums over unions of intervals”.  
*Forum Math.* 27 (2015), no. 5, 3017-3026.
19. “A density version of the Vinogradov three primes theorem”.  
*Duke Math. J.* 163 (2014), no. 3, 489-512.
20. “On character sums and exponential sums over generalized arithmetic progressions”.  
*Bull. London Math. Soc.* (2013) 45 (3): 541-550.

### **Academic Honors and Grants**

- NSF DMS-1802224, Algebra and Number Theory, 2018-2021.
- Pölya teaching fellow award, Stanford, 2014.
- ACM-ICPC World Finals: Second Place Team (North America Champions), 2008.
- William Lowell Putnam Mathematical Competition: Putnam Fellow, 2007; Top 25 Individuals, 2006.
- International Mathematical Olympiad: Gold Medal, 2005.
- Chinese National Olympiad in Informatics: Gold Medal, 2003.

### **Selected Talks**

#### **Invited Conference and Workshop Talks**

- Jan 2019: Counting methods in number theory, Joint AMS/MAA Meeting, Baltimore (planned).
- Sep 2018: Arithmetic Ramsey theory, University of Manchester.
- Aug 2018: Additive combinatorics and its applications, AIM.
- May 2018: International Conference on Mathematics and Statistics (ICOMAS 2018), University of Memphis.
- Oct 2017: Workshop on additive combinatorics, CMSA, Harvard.
- May 2017: Recent developments in analytic number theory, MSRI, Berkeley.

- Jan 2017: Pseudorandomness boot camp, Simons Institute for the Theory of Computing, Berkeley.
- Apr 2015: One-day meeting in additive combinatorics, Oxford.
- Oct 2014: New horizons in additive combinatorics, CRM, Montreal.
- Sep 2014: Analytic number theory workshop, Clay Mathematical Institute, Oxford.

## Seminar Talks

- Nov 2018: Discrete CATS seminar, University of Kentucky (planned).
- Oct 2018: Number theory seminar, University of Georgia.
- Oct 2018: Number theory seminar, University of Manchester.
- Sep 2018: Analysis seminar, University of Kentucky.
- Jun 2018: Seminaire d'Algebre et de Theorie des Nombres, EPFL.
- Mar 2018: Number theory seminar, UIUC.
- Feb 2018: Harmonic analysis and automorphic form, Ohio State University.
- Sep 2017: Algebra and number theory seminar, University of Kentucky.
- Oct 2016: Number theory seminar, University of Warwick.
- Apr 2016: London number theory seminar, King's College London.
- Feb 2016: Number theory seminar, University of Manchester.
- Oct 2015: Heibronn seminar, University of Bristol.
- May 2015: Seminaire d'Algebre et de Theorie des Nombres, EPFL.
- Feb 2015: Number theory seminar, University of Oxford.
- Oct 2014: Analytic number theory seminar, CRM, Montreal.
- Mar 2014: Québec-Vermont Number Theory Seminar, Montreal.
- Oct 2013: Number theory seminar, Stanford University.

## Teaching

*University of Kentucky*

<http://www.ms.uky.edu/~xsh228/>

- MA213 (Calculus III), Fall 2017.
- MA322 (Matrix algebra), Spring 2018.
- MA671 (Complex analysis), Spring 2018.
- MA765 (Topic class on analytic number theory), Fall 2018.

## *University of Oxford*

- Consultation sessions for C3.8 Analytic Number Theory, Trinity Term 2015.

## *Stanford University*

- Teaching assistant for Math 21 Calculus, Spring 2014.
- Teaching assistant for Math 42 Calculus (Accelerated), Fall 2013.
- Teaching assistant for Math 51 Linear Algebra and Differential Calculus of Several Variables, Spring 2011, Winter 2012, Fall 2012.

## *Massachusetts Institute of Technology*

- Math tutor for the Office of Minority Education, 2007-2009.

## Students supervised

- Summer 2017: Wenqiang Xu, Undergraduate research, Oxford.
- 2016: James Herring, Mathematics Part B Dissertation, Oxford (co-supervised with J. Andrade).  
Dissertation: *Repeated Convolution of Arithmetic Functions and the Riemann Zeta-Function*.

## Professional service

- Organizer, Number Theory Seminar, Oxford, 2015-2016.
- Assessor, Part B/C dissertations, Oxford, 2016.
- Examiner, Confirmation of status viva of Freddie Manners, Oxford, 2015.
- Examiner, Transfer of status viva of Sofia Lindqvist, Oxford, 2016.

- Journal refereeing: *Compositio Mathematica*, *Journal of the European Mathematical Society*, *Advances in Mathematics*, *Mathematische Annalen*, *IMRN*, *Proceedings of the LMS*, *Journal of the LMS*, *Mathematika*, *Journal of Number Theory*.
- Reviewer for AMS Mathematical Reviews.

## Other

- Citizenship: China.
- Languages: Chinese (native), English (fluent).