Robert Hough

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Born: June 27, 1985—Midland, Michigan, U.S.A.
Nationality: American

Current position

Associate Professor, Department of Mathematics, SUNY Stony Brook

Areas of specialization

Analytic number theory, discrete probability.

Appointments held

2012-2013	Postdoctoral research fellow, DPMMS, Cambridge
2013-2015	Postdoctoral research fellow, Maths Institute, Oxford
2015-2016	Member, Institute for Advanced Study, Princeton
2016-2021	Assistant Professor, Stony Brook University
2022-present	Associate Professor, Stony Brook University

Education

2007	BSc in Mathematics, Stanford, major GPA 4.2
2008	MSc in Computer Science, Stanford, GPA 4.141
2012	PhD in Mathematics, Stanford

Honors and awards

2020	SUNY Stony Brook Trustees Faculty Award.
2020	Sloan Research Fellowship, Alfred P. Sloan Foundation.
2017	Mathematics Association of America, David P. Robbins Prize in Algebra, Combinatorics and Discrete Mathematics. Awarded at the 2017 Joint Mathematics Meeting.
2011–2012	Ric Weiland Graduate Research Fellowship, Stanford University
2007	J.E. Wallace Sterling Award for Scholastic Achievement, Stanford University
2003–2005	Honorable Mention, William Lowell Putnam Competition
2003	Boothe Prize for Excellence in Writing, Stanford University

Grants

2017-2018 NSF Grant DMS-1712682, "Probabilistic methods in discrete structures and applications."

2018-2021 NSF Grant DMS-1802336, "Analysis of Discrete Structures and Applications."

2012-2015 NSF Postdoctoral Fellowship, declined.

Publications and Talks

2012 Equidistribution of Heegner points, Maths Institute, Oxford

2012 Value distribution of central values in two families of L-functions, DPMMS, Cambridge

2013 Two consequences of the resonance method, Bristol University

2013 Solution of the minimum modulus problem for covering systems, Pál Erdős Centennial Conference, Budapest

2013 Erdős' problems on covering systems, UDM, Montreal (I suggested work on large gaps between primes!)

2013-2016 Covering systems and the Lovász Local Lemma, Bristol Combinatorics Seminar; DPMMS Cambridge; Maths Institute Oxford; London Number Theory Seminar; Stanford Number Theory Seminar; BYU Number Theory Seminar; Colloquium Texas AM; Colloquium Oregon State; IDA-CCR, Princeton; Microsoft Research, Redmond; Colloquium, Stony Brook; Colloquium UBC; IAS Princeton; Plenary Talk, SERMON; South Carolina Number Theory Seminar

2014 Quantitative results on covering systems, Plenary talk, SIAM Conference on Discrete Mathematics, Minneapolis

2015 Extreme central values of L-functions, Illinois Number Theory Seminar; Rutgers Number Theory Seminar

2015 Mixing and cut-off in cycle walks, Hebrew University, Jerusalem

2016 Distribution results in number theory and combinatorics, Kings College London.

2016 Random walk on unipotent groups, Cornell Probability Seminar; UBC Probability Seminar; South Carolina Combinatorics Seminar

2017 Sandpiles on the square lattice and unipotent matrix walks. Microsoft Research, Redmond; U. Washington Probability Seminar; Harvard Probability Seminar.

2017 The shape of cubic fields. Combinatorial and Additive Number Theory, CUNY.

2017 Quantitative results on covering systems of congruences, Carnegie Mellon, Algorithms, Combinatorics and Optimization Seminar.

2017 The shape of cubic and quartic fields. Ohio State Number Theory Seminar.

2018 Covering systems of congruences. Georgia Tech Colloquium.

2018 The local limit theorem on nilpotent Lie groups, Georgia Tech Combinatorics Seminar, Princeton Probability seminar.

2018-2020 The shape of cubic and quartic number fields, Tufts University, Joint Math Meetings, Columbia University Arithmetic and Automorphic Forms Seminar, Maine-Quebec Number Theory Conference, PANTS XXXIII, UC San Diego Number Theory Seminar, U Illinois Urbana Champaign Number Theory Seminar.

2019-2020

Sandpiles on the square lattice. CANT 2019 Memorial Conference in honor of Jean Bourgain, CUNY Probability Seminar, Columbia Probability Seminar.

2020 Randomizing a 15 puzzle. CANT 2020

2020 Recent results on random walk on a group. Stony Brook Colloquium.

2020 On the local conditions describing quartic fields. Quebec Vermont number theory seminar. I discuss a paper refining work cited in Manjul Bhargava's Fields medal!

Journal articles

Author's listed in alphabetical order.

2009 Hough, Bob. "Tessellation of a triangle by repeated barycentric subdivision." *Elec Comm Prob*, 14 (2009): 270–277.

2011 Hough, Bob. "Summation of a random multiplicative function on numbers having few prime factors." *Math Proc Cambridge Phil Soc*, vol. 150, no. 2 (2011): 193–214.

2012a Hough, Bob. "Zero-density estimate for modular form L-functions in weight aspect." *Acta Arith* 154 (2012): 187–216.

2012b Hough, Bob. "The random k-cycle walk." *Prob Theory and Rel Fields* (2015).

2012c Hough, Bob. and Yunjiang Jiang. "Asymptotic mixing time analysis of a random walk on the orthogonal group." *Ann. Prob.*, to appear.

2013a Hough, Bob. "The resonance method for large character sums." *Mathematika* 59, no. 01 (2013): 87–118.

2014 Hough, Bob. "The distribution of the logarithm in an orthogonal and a symplectic family of L-functions." *Forum Math* 26, no. 2 (2014): 523–546.

2015a Hough, Bob. "Solution of the minimum modulus problem for covering systems." *Annals of Math* 181, no. 1 (2015): 361–382.

2016a Hough, Bob. "The angle of large values of L-functions." *Journal of Number Theory* 167, (2016): 353–393.

2016b Hough, Bob and Pace Nielsen. "Quantitative results on covering systems." *Duke Math Journal*, to appear.

2016c Hough, Bob. "Mixing and cut-off in cycle walks." *Electronic Journal of Probability*, (2017).

2016d Hough, Bob. "Equidistribution of bounded torsion CM points." *Journal d'Analyse Math.*, to appear.

2016f Diaconis, P., and Bob Hough. "Random walk on unipotent matrix groups." *Annales scientifiques de l'école normale supérieure*, to appear.

2017a Hough, Bob. "Maass form twisted Shintani $\mathscr{L}$-functions." *Proceedings of the American Mathematical Society* (2017).

2017b Hough, Bob, Dan Jerison and Lionel Levine. "Sandpiles on the square lattice." *Communications Math. Physics*, to appear.

2017c Hough, Bob. "The shape of cubic fields." *Research in the Mathematical Sciences.*

2017d Hough, Bob. "The shape of quartic fields." Submitted.

2018 Hough, Robert. "The local limit theorem on nilpotent Lie groups." *Probability Theory and Related Fields*, (2018).

2018 Hough, Robert. "The local zeta function in enumerating quartic fields." *Journal of Number Theory.*

2019 Hough, Robert and Hyojeong Son. "Cut-off for sandpiles on tiling graphs." *Annals of Probability*, to appear.

2019 Hough, Robert and Hyojeong Son. "The spectrum of the abelian sandpile model." Mathematics of Computation, to appear.

2019 Chu, Yang, and Robert Hough. "Randomizing a '15 puzzle'." Preprint.

2020 Robert Hough and Eun Hye Lee. "Eisenstein series twisted Shintani zeta functions." Preprint.

Teaching

2008 Teaching assistant, Single Variable Calculus, Stanford University.

2009–2012 Teaching assistant, Honors Multivariable Calculus, Stanford University

2013 Taught course, Topics in analytic number theory, Part III at DPMMS Cambridge

2016 Taught course, Honors single variable calculus, Stony Brook

2017 Taught course, Topics in probability, Stony Brook

2017 Taught course, Introduction to analysis, Stony Brook

2018 Taught course, Calculus II, Stony Brook

2018 Taught course, Topics in number theory, Stony Brook

2019 Taught course, Calculus III, Stony Brook

2019 Taught course, Multi-dimensional analysis, Stony Brook

2019 Taught course, Analysis III, graduate functional analysis, Stony Brook

2019 Taught seminar, William Lowell Putnam Competition Seminar, Stony Brook

2020 Taught course, Analysis II, graduate analysis, Stony Brook

2020 Taught course, Introduction to analysis, Stony Brook

2020 Taught course, Multivariable calculus and linear algebra, Stony Brook.

2020 Taught course, Number theory, Stony Brook.

Departmental activities

2016- Organized the department colloquium series

2017- Created and helped organize the analysis seminar

2017- Assistant instructor at the Stony Brook Math Circle

2019- Organized Stony Brook's William Lowell Putnam Competition Seminar. In 2019 the team placed 21st in the US with one student in the top 75 in the US individually.

Service to the profession

Referee for Journal of Number Theory, Random Structure and Algorithms, IMRN, Mathematika, Forum of Math Sigma, Duke Math Journal, Acta Mathematica, The Ramanujan Journal, Journal of Theoretical Probability, Research in Mathematical Sciences.

2019 NSF Panelist for CAREER grants in Division of Mathematical Sciences.