

Yi Sun

CONTACT INFORMATION	Address: Department of Statistics, The University of Chicago, Chicago, IL 60637. Email: ysisun@statistics.uchicago.edu Webpage: ysisun.io
RESEARCH	Probability and applications to machine learning and high-dimensional statistics.
EMPLOYMENT	The University of Chicago Chicago, IL Assistant Professor (tenure-track), 2020–present. Columbia University New York, NY Joseph F. Ritt Assistant Professor, 2019–2020; Simons Fellow, 2016–2019.
EDUCATION	Massachusetts Institute of Technology Cambridge, MA Ph.D., Mathematics, advised by Pavel Etingof, 2011–2016. University of Cambridge Cambridge, UK M.A.St., Mathematics, with distinction, 2010–2011. Harvard University Cambridge, MA A.M., Mathematics, 2006–2010. A.B., Mathematics, <i>magna cum laude</i> , with secondary field in Economics, 2006–2010. Phi Beta Kappa (one of 24 juniors inducted)
GRANTS	NSF Grant DMS-1701654/2039183, 2017–2021. (\$141,999, Highly Recommended)
FELLOWSHIPS	Simons Junior Fellowship, 2016–2019. (\$364,214)
AND AWARDS	Open Philanthropy Project Grant, 2019. (\$10,000, co-PI) NSF Mathematical Sciences Postdoctoral Research Fellowship, 2016–2019 (declined). Johnson Prize for best research paper by MIT graduate student in mathematics, 2016. NSF Graduate Research Fellowship, 2012–2015. Churchill Scholarship, 2010–2011. / MIT Praecis Presidential Fellowship, 2011–2012. COMAP Math Contest in Modeling, Outstanding Winner, SIAM Prize, 2008 and 2009. Intel Science Talent Search, 2 nd Place, 2006. / Putnam Competition, 10 th Place, 2009. Int'l Math Olym., Silver Medal, 2006. / Asian Pacific Math Olym., Gold Medal, 2005. Int'l Physics Olympiad, Gold Medal, 2004. / USA Computing Olympiad, Finalist, 2005.
MATHEMATICS AND STATISTICS RESEARCH	19. <i>Likelihood landscape and maximum likelihood estimation for the discrete orbit recovery model</i> (with Z. Fan, T. Wang, and Y. Wu), submitted, 2020. arXiv:2004.00041 18. <i>Probabilistic conformal blocks for Liouville CFT on the torus</i> (with P. Ghosal, G. Remy, and X. Sun), preprint, 2020. arXiv:2003.03802 17. <i>Principal components in linear mixed models with general bulk</i> (with Z. Fan and Z. Wang), Annals of Statistics, to appear. arXiv:1903.09592 16. <i>Gaussian fluctuations for products of random matrices</i> (with V. Gorin), submitted, 2019. arXiv:1812.06532 15. <i>Spiked covariances and principal components analysis in high-dimensional random effects models</i> (with Z. Fan and I. Johnstone), preprint, 2018. arXiv:1806.09529 14. <i>Affine Macdonald conjectures and special values of Felder-Varchenko functions</i> (with E. Rains and A. Varchenko), Sel. Math. N. S. 24 (2018), 1549–1591. arXiv:1610.01917 13. <i>Laguerre and Jacobi analogues of the Warren process</i> (single author, with an appendix by A. Sarantsev), submitted, 2017. arXiv:1610.01635 12. <i>Traces of intertwiners for quantum affine algebras and difference equations (after Etingof-Schiffmann-Varchenko)</i> (single author), Transform. Groups 23 (2018), 1167–1215. arXiv:1609.09038 11. <i>Matrix models for multilevel Heckman-Opdam and multivariate Bessel measures</i> (single author), submitted, 2016. arXiv:1609.09096 10. <i>Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions</i> (single author), Commun. Math. Phys. 347 (2016), 573–653. arXiv:1508.03918 9. <i>The polynomial representation of the type A_{n-1} rational Cherednik algebra in char-</i>

	<i>acteristic $p \mid n$ (with S. Devadas), Commun. Algebra 45 (2016), 1926-1934. arXiv:1505.07891</i>	
	8. <i>A representation-theoretic proof of the branching rule for Macdonald polynomials</i> (single author), Math. Res. Lett. 23 (2016), 887–927. arXiv:1412.0714	
	7. <i>A new integral formula for Heckman-Opdam hypergeometric functions</i> (single author), Adv. Math. 289 (2016), 1157–1204. arXiv:1406.3772	
	6. <i>Finite dimensional representations of the rational Cherednik algebra for G_4</i> (single author), J. Algebra 323 (2010), 2864–2887. arXiv:0910.5527	
COMPUTER SCIENCE RESEARCH	5. D. Kang*, Y. Sun*, D. Hendrycks, T. Brown, and J. Steinhardt, <i>Testing robustness against unforeseen adversaries</i> , submitted, 2019. arXiv:1908.08016	
	4. T. Hashimoto, Y. Sun, and T. Jaakkola, <i>From random walks to distances on unweighted graphs</i> , NIPS 2015. arXiv:1511.00573	
	3. T. Hashimoto, Y. Sun, and T. Jaakkola, <i>Metric recovery from directed unweighted graphs</i> , NIPS 2014 workshop (Best Student Paper), AISTATS 2015. arXiv:1411.5720	
	2. Y. Sun and M. Sundararajan, <i>Axiomatic attribution for multilinear functions</i> , ACM Conf. on Electronic Commerce 2011. arXiv:1102.0989	
OTHER RESEARCH	1. R. G. Yang*, P. Y. Wang*, Y. Sun, A. Litwin-Kumar, R. Axel, and LF Abbott, <i>Evolving the olfactory system</i> , submitted, 2019. CCN 2019, NeurIPS 2019 Neuro+AI Workshop.	
RESEARCH PRESENTATIONS	46. Google X Testing robustness against unforeseen adversaries	March 2020
	45. UW Madison: Mathematics Colloquium Fluctuations for products of random matrices	February 2020
	44. UChicago: Statistics Colloquium Fluctuations for products of random matrices	January 2020
	43. AMS Fall Western Sectional Meeting Fluctuations for products of random matrices	November 2019
	42. ICML 2019 Workshop: Uncertainty and Robustness in DL (poster) Transfer of robustness against adversarial and stochastic distortions	June 2019
	41. OpenAI Transfer of robustness against adversarial and stochastic distortions	June 2019
	40. Virginia: Integrable Probability Summer School Fluctuations for products of random matrices	June 2019
	39. UCSD: Probability Seminar Fluctuations for products of random matrices	January 2019
	38. Yale: Geometry, Symmetry, and Physics Seminar Affine Macdonald conjectures and special values of Felder-Varchenko functions	April 2018
	37. Simons Society of Fellows Retreat A probabilistic view on random covariance matrices	February 2018
	36. PCMI: Research Program on Random Matrices Algebraic structures for multilevel eigenvalue densities	July 2017
	35. Rochester: Probability Seminar Laguerre and Jacobi analogues of the Warren process	April 2017
	34. Perimeter Institute: Mathematical Physics Seminar Affine Macdonald conjectures and special values of Felder-Varchenko functions	April 2017
	33. Rutgers: Lie Group / Quantum Mathematics Seminar Affine Macdonald conjectures and special values of Felder-Varchenko functions	April 2017
	32. Columbia-Princeton Probability Day Laguerre and Jacobi analogues of the Warren process	March 2017
	31. ESI: Workshop on Elliptic Hypergeometric Functions	March 2017

	Affine Macdonald conjectures and special values of Felder-Varchenko functions	
30.	Columbia: Probability Seminar Laguerre and Jacobi analogues of the Warren process	November 2016
29.	Columbia: Mathematical Physics Seminar Affine Macdonald conjectures and special values of Felder-Varchenko functions	October 2016
28.	IESC: QIS's, CFT's, and Stochastic Processes (poster) Laguerre and Jacobi analogues of the Warren process	September 2016
27.	MIT: Infinite-Dimensional Algebra Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	March 2016
26.	MIT: Integrable Probability Seminar Laguerre and Jacobi analogues of the Warren process	February 2016
25.	HCM: Asymptotic Analysis in Strongly Coupled Systems (poster) Laguerre and Jacobi analogues of the Warren process	January 2016
24.	NIPS 2015 (poster) From random walks to distances on unweighted graphs	December 2015
23.	ETH Zurich: ITS Talks in Theoretical Sciences 2015 Random matrices and representation theory	November 2015
22.	UC Berkeley: RTGC Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	November 2015
21.	ETH Zurich: Mathematical Physics Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	October 2015
20.	NEU: Geometry, Physics and Representation Theory Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	October 2015
19.	Columbia: Mathematical Physics Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	October 2015
18.	Yale: Geometry, Symmetry, and Physics Seminar Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	September 2015
17.	FPSAC 2015 (poster) A representation-theoretic proof of the branching rule for Macdonald polynomials	July 2015
16.	Clay Math Inst.: Random Polymers and Algebraic Combinatorics A representation-theoretic proof of the branching rule for Macdonald polynomials	May 2015
15.	AISTATS 2015 (poster) Metric recovery from directed unweighted graphs	May 2015
14.	ICERM: Workshop on Limit Shapes (poster) A representation-theoretic proof of the branching rule for Macdonald polynomials	April 2015
13.	NIPS 2014: Workshop on Networks (poster) Metric recovery from directed unweighted graphs	December 2014
12.	UC Berkeley: GRASP Seminar A representation-theoretic proof of the branching rule for Macdonald polynomials	November 2014
11.	IHP: Workshop on Macdonald Processes and Hecke Algebras A new integral formula for Heckman-Opdam hypergeometric functions	May 2014
10.	MIT: Integrable Probability Seminar A new integral formula for Heckman-Opdam hypergeometric functions	April 2014
OUTREACH PRESENTATIONS	9. Math Olympiad Program 2018 Threshold signatures	June 2018
	8. MIT "Meta-Math" Meetup 2017 How to do a Literature Search	May 2017
	7. Summer Program in Applied Rationality and Cognition 2016 Problem Solving: Contests vs. Real Life	August 2016
	6. Math Olympiad Summer Program 2016	June 2016

	Distribution Testing: Is this die fair?	
	5. MIT Open House 2016 Universality: Mathematics in the real world	April 2016
	4. Math Olympiad Summer Program 2015 Fair coin flips from unfair coins	June 2015
	3. Math Olympiad Summer Program 2014 The Ising model	June 2014
	2. Math Olympiad Summer Program 2013 Random matrices	June 2013
	1. Math Olympiad Summer Program 2012 Random partitions and Fock space	June 2012
OTHER PUBLICATIONS	6. <i>54th International Mathematical Olympiad</i> (with J. Berman and Z. Feng), <i>Mathematics Magazine</i> 86 (2013), 309–313.	
	5. <i>53rd International Mathematical Olympiad</i> (with Z. Feng), <i>Mathematics Magazine</i> 85 (2012), 312–317.	
	4. <i>52nd International Mathematical Olympiad</i> (with Z. Feng), <i>Mathematics Magazine</i> 84 (2011), 316–319.	
	3. <i>51st International Mathematical Olympiad</i> (with Z. Feng and P. Loh), <i>Mathematics Magazine</i> 83 (2010), 320–323.	
	2. <i>A simulation based model of traffic circles</i> (with C. Chang and Z. Fan), <i>The UMAP Journal</i> 30 (2009), 225–244.	
	1. <i>hsolve: A difficulty metric and puzzle generator for Sudoku</i> (with C. Chang and Z. Fan), <i>The UMAP Journal</i> 29 (2008), 303–324.	
TEACHING	Columbia University	2017–2020
	Instructor. Fall 2017: Calculus II. Spring 2019: Graduate reading course on representation theory. Fall 2019: Calculus II. Spring 2020: Calculus II.	
	Cyberspace Mathematical Competition	Summer 2020
	Problem Captain. Manage grading team for one of 8 problems for first year of international online math competition.	
	US National Math Olympiad Summer Program	Summers 2007–2018
	Instructor (2010, 2012–2018); Assistant (2007–2009). Design curriculum, give lectures, and personally coach US team to International Mathematical Olympiad.	
	MIT MathROOTS	Summers 2015–2016
	Academic Coordinator. Design curriculum, give lectures, and manage academic team, guest lectures, and website for first two years of outreach program in problem solving for underrepresented minority students. Covered on MIT homepage and Notices of the AMS.	
	MIT Undergraduate Research Opportunities Program	Fall 2012–2015
	Mentor two undergraduate research projects, leading to published research paper.	
	• Sheela Devadas (rational Cherednik algebras in char $p \leq n$), 2014–2015.	
	• Ryan Yoo (characters of rational Cherednik algebras in char $p > n$), 2012–2014.	
	Massachusetts Institute of Technology	Spring 2015
	Teaching Assistant for Differential Equations. Evaluations: 6.2 (7.0)	
	MIT Directed Reading Program	January 2011
	Mentor reading project on representation theory of the symmetric group.	
	Harvard University	Spring 2009
	Course Assistant for Probability Theory. Evaluations: 4.3 (5.0)	
PROFESSIONAL ACTIVITIES	Columbia Probability Seminar	2016–2020
	Co-organize weekly probability seminar.	
	Summer School in Probability	Summer 2017
	Co-organize graduate summer school “Dyson-Schwinger equations, topological expansions,	

and random matrices” at Columbia.

MIT Interacting Particle Systems Learning Seminar 2012–2013

Organize learning seminar on recent developments in interacting particle systems.

Google Research Summer 2010

Research intern. Research attribution and cost-sharing methods, leading to paper published in EC 2010. Mentor: Mukund Sundararajan

SERVICE

Reviewer: Probability Theory and Related Fields, Selecta Mathematica (N.S.), SIGMA, Journal of Theoretical Probability, Europhysics Letters, Information and Inference, Algebraic Combinatorics.

Qualifying Exam Committee: Ivan Danilenko (Columbia), Maithreya Sitaraman (Columbia)

LANGUAGES

Python, PyTorch, C++, \LaTeX , Magma, Mathematica / Mandarin (native), French