Yi Sun

CONTACT INFORMATION	Address:	Department of Statistics, The University of Chicago, Chicago, IL 60637.
	Email:	yisun@statistics.uchicago.edu
	Webpage:	yisun.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, *magna cum laude*, with secondary field in Economics, 2006–2010.
	Phi Beta Kappa (one of 24 juniors inducted)

GRANTS FELLOWSHIPS AND AWARDS	NSF Grant DMS-1701654/2039183, 2017–2021. ($141,999, Highly Recommended)
	Simons Junior Fellowship, 2016–2019. ($364,214)
	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, 2nd Place, 2006. / Putnam Competition, 10th 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. *Likelihood landscape and maximum likelihood estimation for the discrete orbit recovery model* (with Z. Fan, T. Wang, and Y. Wu), submitted, 2020. `arXiv:2004.00041`

18. *Probabilistic conformal blocks for Liouville CFT on the torus* (with P. Ghosal, G. Remy, and X. Sun), preprint, 2020. `arXiv:2003.03802`

17. *Principal components in linear mixed models with general bulk* (with Z. Fan and Z. Wang), Annals of Statistics, to appear. `arXiv:1903.09592`

16. *Gaussian fluctuations for products of random matrices* (with V. Gorin), submitted, 2019. `arXiv:1812.06532`

15. *Spiked covariances and principal components analysis in high-dimensional random effects models* (with Z. Fan and I. Johnstone), preprint, 2018. `arXiv:1806.09529`

14. *Affine Macdonald conjectures and special values of Felder-Varchenko functions* (with E. Rains and A. Varchenko), Sel. Math. N. S. **24** (2018), 1549–1591. `arXiv:1610.01917`

13. *Laguerre and Jacobi analogues of the Warren process* (single author, with an appendix by A. Sarantsev), submitted, 2017. `arXiv:1610.01635`

12. *Traces of intertwiners for quantum affine algebras and difference equations (after Etingof-Schiffmann-Varchenko)* (single author), Transform. Groups **23** (2018), 1167–1215. `arXiv:1609.09038`

11. *Matrix models for multilevel Heckman-Opdam and multivariate Bessel measures* (single author), submitted, 2016. `arXiv:1609.09096`

10. *Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions* (single author), Commun. Math. Phys. **347** (2016), 573-653. `arXiv:1508.03918`

9. *The polynomial representation of the type A_{n-1} rational Cherednik algebra in char-*

acteristic $p \mid n$ (with S. Devadas), Commun. Algebra **45** (2016), 1926-1934. `arXiv:1505.07891`

8. *A representation-theoretic proof of the branching rule for Macdonald polynomials* (single author), Math. Res. Lett. **23** (2016), 887–927. `arXiv:1412.0714`

7. *A new integral formula for Heckman-Opdam hypergeometric functions* (single author), Adv. Math. **289** (2016), 1157–1204. `arXiv:1406.3772`

6. *Finite dimensional representations of the rational Cherednik algebra for G_4* (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, *Testing robustness against unforeseen adversaries*, submitted, 2019. `arXiv:1908.08016`

4. T. Hashimoto, Y. Sun, and T. Jaakkola, *From random walks to distances on unweighted graphs*, NIPS 2015. `arXiv:1511.00573`

3. T. Hashimoto, Y. Sun, and T. Jaakkola, *Metric recovery from directed unweighted graphs*, NIPS 2014 workshop (Best Student Paper), AISTATS 2015. `arXiv:1411.5720`

2. Y. Sun and M. Sundararajan, *Axiomatic attribution for multilinear functions*, 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, *Evolving the olfactory system*, submitted, 2019. CCN 2019, NeurIPS 2019 Neuro+AI Workshop.

RESEARCH
PRESENTATIONS

47. Bernoulli-IMS One World Symposium   August 2020
Likelihood landscape and maximum likelihood estimation for the discrete orbit recovery model

46. Google X   March 2020
Testing robustness against unforeseen adversaries

45. UW Madison: Mathematics Colloquium   February 2020
Fluctuations for products of random matrices

44. UChicago: Statistics Colloquium   January 2020
Fluctuations for products of random matrices

43. AMS Fall Western Sectional Meeting   November 2019
Fluctuations for products of random matrices

42. ICML 2019 Workshop: Uncertainty and Robustness in DL (poster)   June 2019
Transfer of robustness against adversarial and stochastic distortions

41. OpenAI   June 2019
Transfer of robustness against adversarial and stochastic distortions

40. Virginia: Integrable Probability Summer School   June 2019
Fluctuations for products of random matrices

39. UCSD: Probability Seminar   January 2019
Fluctuations for products of random matrices

38. Yale: Geometry, Symmetry, and Physics Seminar   April 2018
Affine Macdonald conjectures and special values of Felder-Varchenko functions

37. Simons Society of Fellows Retreat   February 2018
A probabilistic view on random covariance matrices

36. PCMI: Research Program on Random Matrices   July 2017
Algebraic structures for multilevel eigenvalue densities

35. Rochester: Probability Seminar   April 2017
Laguerre and Jacobi analogues of the Warren process

34. Perimeter Institute: Mathematical Physics Seminar   April 2017
Affine Macdonald conjectures and special values of Felder-Varchenko functions

33. Rutgers: Lie Group / Quantum Mathematics Seminar   April 2017
Affine Macdonald conjectures and special values of Felder-Varchenko functions

32. Columbia-Princeton Probability Day   March 2017
Laguerre and Jacobi analogues of the Warren process

31. ESI: Workshop on Elliptic Hypergeometric Functions   March 2017
Affine Macdonald conjectures and special values of Felder-Varchenko functions

30. Columbia: Probability Seminar   November 2016
Laguerre and Jacobi analogues of the Warren process

29. Columbia: Mathematical Physics Seminar   October 2016
Affine Macdonald conjectures and special values of Felder-Varchenko functions

28. IESC: QIS's, CFT's, and Stochastic Processes (poster)   September 2016
Laguerre and Jacobi analogues of the Warren process

27. MIT: Infinite-Dimensional Algebra Seminar   March 2016
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

26. MIT: Integrable Probability Seminar   February 2016
Laguerre and Jacobi analogues of the Warren process

25. HCM: Asymptotic Analysis in Strongly Coupled Systems (poster)   January 2016
Laguerre and Jacobi analogues of the Warren process

24. NIPS 2015 (poster)   December 2015
From random walks to distances on unweighted graphs

23. ETH Zurich: ITS Talks in Theoretical Sciences 2015   November 2015
Random matrices and representation theory

22. UC Berkeley: RTGC Seminar   November 2015
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

21. ETH Zurich: Mathematical Physics Seminar   October 2015
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

20. NEU: Geometry, Physics and Representation Theory Seminar   October 2015
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

19. Columbia: Mathematical Physics Seminar   October 2015
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

18. Yale: Geometry, Symmetry, and Physics Seminar   September 2015
Traces of intertwiners for quantum affine $\mathfrak{sl}_2$ and Felder-Varchenko functions

17. FPSAC 2015 (poster)   July 2015
A representation-theoretic proof of the branching rule for Macdonald polynomials

16. Clay Math Inst.: Random Polymers and Algebraic Combinatorics   May 2015
A representation-theoretic proof of the branching rule for Macdonald polynomials

15. AISTATS 2015 (poster)   May 2015
Metric recovery from directed unweighted graphs

14. ICERM: Workshop on Limit Shapes (poster)   April 2015
A representation-theoretic proof of the branching rule for Macdonald polynomials

13. NIPS 2014: Workshop on Networks (poster)   December 2014
Metric recovery from directed unweighted graphs

12. UC Berkeley: GRASP Seminar   November 2014
A representation-theoretic proof of the branching rule for Macdonald polynomials

11. IHP: Workshop on Macdonald Processes and Hecke Algebras   May 2014
A new integral formula for Heckman-Opdam hypergeometric functions

10. MIT: Integrable Probability Seminar   April 2014
A new integral formula for Heckman-Opdam hypergeometric functions

OUTREACH
PRESENTATIONS

9. Math Olympiad Program 2018   June 2018
Threshold signatures

8. MIT "Meta-Math" Meetup 2017   May 2017
How to do a Literature Search

7. Summer Program in Applied Rationality and Cognition 2016   August 2016
Problem Solving: Contests vs. Real Life

6. Math Olympiad Summer Program 2016   June 2016
Distribution Testing: Is this die fair?

5. MIT Open House 2016   April 2016
Universality: Mathematics in the real world

4. Math Olympiad Summer Program 2015   June 2015
Fair coin flips from unfair coins

3. Math Olympiad Summer Program 2014   June 2014
The Ising model

2. Math Olympiad Summer Program 2013   June 2013
Random matrices

1. Math Olympiad Summer Program 2012   June 2012
Random partitions and Fock space

OTHER
PUBLICATIONS

6. 54th *International Mathematical Olympiad* (with J. Berman and Z. Feng), Mathematics Magazine **86** (2013), 309–313.

5. 53nd *International Mathematical Olympiad* (with Z. Feng), Mathematics Magazine **85** (2012), 312–317.

4. 52nd *International Mathematical Olympiad* (with Z. Feng), Mathematics Magazine **84** (2011), 316–319.

3. 51st *International Mathematical Olympiad* (with Z. Feng and P. Loh), Mathematics Magazine **83** (2010), 320–323.

2. *A simulation based model of traffic circles* (with C. Chang and Z. Fan), The UMAP Journal **30** (2009), 225–244.

1. `hsolve`*: A difficulty metric and puzzle generator for Sudoku* (with C. Chang and Z. Fan), The UMAP Journal **29** (2008), 303–324.

TEACHING

University of Chicago   2020–present
Instructor. Autumn 2020: Introduction to Mathematical Probability.

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** Co-organize weekly probability seminar.	2016–2020

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

Last updated: July 31, 2020.