

Yi Sun

CONTACT INFORMATION	Address: Department of Mathematics, Columbia University, New York, NY 10027. Email: yi.sun@math.columbia.edu Webpage: yisun.io
RESEARCH INTERESTS	Representation theory, integrable systems, and applications to probability theory and random matrices.
EMPLOYMENT	Columbia University New York, NY Simons Fellow (2016–present).
EDUCATION	Massachusetts Institute of Technology Cambridge, MA Ph.D., Mathematics (2011–2016), advised by Pavel Etingof. 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)
FELLOWSHIPS AND AWARDS	Simons Junior Fellowship, 2016–2019. 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. MIT Praecis Presidential Fellowship, 2011–2012. Churchill Scholarship for study at Cambridge, 2010–2011. William Lowell Putnam Competition, 10 th Place, 2009. COMAP Math Contest in Modeling, Outstanding Winner, SIAM Prize, 2008 and 2009. Intel Science Talent Search, 2 nd Place, 2006. International Mathematical Olympiad, Silver Medal, 2006. Asian Pacific Mathematics Olympiad, Gold Medal, 2005. International Physics Olympiad, Gold Medal, 2004.
MATHEMATICS RESEARCH	12. <i>Laquerre and Jacobi analogues of the Warren process</i> (single author), in preparation, 2016. 11. <i>Evaluation conjectures for affine Macdonald polynomials and special values of Felder-Varchenko functions</i> (with E. Rains and A. Varchenko), in preparation, 2016. 10. <i>Traces of intertwiners for quantum affine algebras and difference equations [after Etingof-Schiffmann-Varchenko]</i> (single author), preprint, 2016. 9. <i>Matrix models for multilevel Heckman-Opdam and multivariate Bessel measures</i> (single author), preprint, 2015. yisun.mit.edu/papers/20150909-multilevel.pdf 8. <i>Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions</i> (single author), Communications in Mathematical Physics (2016). arXiv:1508.03918 7. <i>The polynomial representation of the type A_{n-1} rational Cherednik algebra in characteristic $p \mid n$</i> (with S. Devadas), Communications in Algebra, to appear. arXiv:1505.07891 6. <i>A representation-theoretic proof of the branching rule for Macdonald polynomials</i> (single author), Mathematical Research Letters 23 (2016), 887–927. Extended abstract in FPSAC 2015. arXiv:1412.0714 5. <i>A new integral formula for Heckman-Opdam hypergeometric functions</i> (single author), Advances in Mathematics 289 (2016), 1157–1204. arXiv:1406.3772 4. <i>Finite dimensional representations of the rational Cherednik algebra for G_4</i> (single author), Journal of Algebra 323 (2010), 2864–2887. arXiv:0910.5527

OTHER RESEARCH	3. <i>From random walks to distances on unweighted graphs</i> (with T. Hashimoto and T. Jaakkola), NIPS 2015. arXiv:1511.00573	
	2. <i>Metric recovery from directed unweighted graphs</i> (with T. Hashimoto and T. Jaakkola), NIPS 2014 workshop (Best Student Paper), AISTATS 2015. arXiv:1411.5720	
	1. <i>Axiomatic attribution for multilinear functions</i> (with M. Sundararajan), ACM Conf. on Electronic Commerce 2011. arXiv:1102.0989	
RESEARCH PRESENTATIONS	18. MIT: Infinite-Dimensional Algebra Seminar	March 2016
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	17. MIT: Integrable Probability Seminar	February 2016
	Laguerre and Jacobi analogues of the Warren process	
	16. HCM: Asymptotic Analysis in Strongly Coupled Systems (poster)	January 2016
	Laguerre and Jacobi analogues of the Warren process	
	15. NIPS 2015 (poster)	December 2015
	From random walks to distances on unweighted graphs	
	14. ETH Zurich: ITS Talks in Theoretical Sciences 2015	November 2015
	Random matrices and representation theory	
	13. UC Berkeley: RTGC Seminar	November 2015
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	12. ETH Zurich: Mathematical Physics Seminar	October 2015
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	11. NEU: Geometry, Physics and Representation Theory Seminar	October 2015
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	10. Columbia: Mathematical Physics Seminar	October 2015
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	9. Yale: Geometry, Symmetry, and Physics Seminar	September 2015
	Traces of intertwiners for quantum affine \mathfrak{sl}_2 and Felder-Varchenko functions	
	8. FPSAC 2015 (poster)	July 2015
	A representation-theoretic proof of the branching rule for Macdonald polynomials	
	7. Clay Math Inst.: Random Polymers and Algebraic Combinatorics	May 2015
	A representation-theoretic proof of the branching rule for Macdonald polynomials	
	6. AISTATS 2015 (poster)	May 2015
	Metric recovery from directed unweighted graphs	
	5. ICERM: Workshop on Limit Shapes (poster)	April 2015
	A representation-theoretic proof of the branching rule for Macdonald polynomials	
	4. NIPS 2014: Workshop on Networks (poster)	December 2014
	Metric recovery from directed unweighted graphs	
	3. UC Berkeley: GRASP Seminar	November 2014
	A representation-theoretic proof of the branching rule for Macdonald polynomials	
	2. IHP: Workshop on Macdonald Processes and Hecke Algebras	May 2014
	A new integral formula for Heckman-Opdam hypergeometric functions	
	1. MIT: Integrable Probability Seminar	April 2014
	A new integral formula for Heckman-Opdam hypergeometric functions	
OUTREACH PRESENTATIONS	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 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	MIT MathROOTS Academic Coordinator. Design curriculum, give lectures, and manage academic team, guest lectures, website, and sponsorships for first two years of outreach program teaching problem solving to underrepresented minority students. Program received media coverage on MIT homepage and in Notices of the AMS.	Summers 2015–2016
	US National Math Olympiad Summer Program Instructor (2010, 2012–2016); Assistant (2007–2009). Design curriculum, give lectures, and personally coach US team to International Mathematical Olympiad.	Summers 2007–2016
	MIT Undergraduate Research Opportunities Program Mentor two undergraduate research projects, leading to published research paper.	Fall 2012–2015
	• 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 Teaching Assistant for Differential Equations. Evaluations: 6.2 (7.0)	Spring 2015
	MIT Directed Reading Program Mentor reading project on representation theory of the symmetric group.	January 2011
	Harvard University Course Assistant for Probability Theory. Evaluations: 4.3 (5.0)	Spring 2009
PROFESSIONAL ACTIVITIES	Columbia Probability Seminar Co-organize weekly probability seminar.	Fall 2016–Present
	MIT Interacting Particle Systems Learning Seminar Organize learning seminar on recent developments in interacting particle systems.	2012–2013
	Google Research Research intern. Research attribution and cost-sharing methods, leading to paper published in EC 2010. Mentor: Mukund Sundararajan	Summer 2010
LANGUAGES	Mandarin (native), French (conversational)	
COMPUTER	Sage, Magma, Mathematica, L ^A T _E X, C++, Python	

REFERENCES

Pavel Etingof (advisor), Professor, Massachusetts Institute of Technology, etingof@math.mit.edu.

Alexei Borodin, Professor, Massachusetts Institute of Technology, borodin@math.mit.edu.

Vadim Gorin, Assistant Professor, Massachusetts Institute of Technology, vadicgor@math.mit.edu.

Eric Rains, Professor, California Institute of Technology, rains@caltech.edu.

Valerio Toledano-Laredo, Professor, Northeastern University, V.ToledanoLaredo@neu.edu.

Po-Shen Loh (teaching), Associate Professor, Carnegie Mellon University, ploh@cmu.edu.