

David Keating

CONTACT INFORMATION	Department of Mathematics 1305 W Green St. Urbana, IL 61801	Office: 105 at 508 S Sixth St. 714-474-6532 dkeating@illinois.edu https://davidalipio.github.io
EMPLOYMENT/ EDUCATION	University of Illinois, Urbana-Champaign , Urbana, IL RTG Postdoctoral Research Associate, August 2024 - present University of Wisconsin-Madison , Madison, WI Van Vleck Visiting Assistant Professor, August 2021- May 2024 University of California, Berkeley , Berkeley, CA Ph.D., Mathematics, August 2015 - May 2021 <ul style="list-style-type: none">• Advisor: Prof. Nicolai Reshetikhin• Thesis: “Limit shapes in two-dimensional lattice models arising from physics and combinatorics.” B.A., Mathematics, May 2015 B.A., Physics, May 2015	
RESEARCH INTEREST	I am interested in statistical mechanics of two-dimensional lattice models, integrable probability, and combinatorics.	
PUBLICATIONS AND PREPRINTS	<ol style="list-style-type: none">1. Keating, D. and Francesco, P.d. “Limit shapes for domain-wall (colored) vertex models,” <i>preprint</i> (2025), arXiv:2509.25442 [math-ph].2. Keating, D., Kim, M., Loeser, E., and Lyu, H. “The stochastic box-ball system,” <i>preprint</i> (2025), arXiv:2509.20779 [math.PR].3. Keating, D. and Vu, H.T. “Perfect t-embeddings of uniformly weighted generalized tower graphs,” <i>preprint</i> (2025), arXiv:2509.18791 [math-ph].4. Guse, J., Keating, D., and Jiang, D. “Colored vertex models and interacting reverse plane partitions,” <i>preprint</i> (2025), arXiv:2505.13806 [math.CO].5. Keating, D. and Xu, J. “Edge universality of β-additions through Dunkl operators,” submitted for publication (2024), arXiv:2411.12149 [math.PR].6. Li, Z., Keating, D., and Prause, I. “Asymptotics of Bounded Lecture-Hall Tableaux,” submitted for publication (2024), arXiv:2309.15235 [math.PR].7. Keating, D. and Nicoletti, M. “Shuffling algorithm for coupled tilings of the Aztec diamond,” <i>Annales Henri Poincaré</i>, vol. 25, no. 12, pp. 5187-5229 (2024), arXiv:2303.09089 [math.CO].8. Corteel, S., Gitlin, A., and Keating, D. “Colored vertex models and k-tilings of the Aztec diamond,” <i>Transactions of the AMS</i>, accepted (2024), arXiv:2202.06020 [math.CO] (2022).	

9. Gitlin, A. and **Keating, D.** “A Vertex Model for Supersymmetric LLT Polynomials,” *Annales de l’Institut Henri Poincaré D* 11, no. 3 (2023):571-640, arXiv:2110.10273 [math.CO].
10. **Keating, D.** “Equivalences of LLT polynomials via lattice paths.” *Combinatorial Theory*, accepted (2025), arXiv:2104.05862 [math.CO].
11. Corteel, S., Gitlin, A., **Keating, D.**, and Meza, J. “A Vertex Model for LLT Polynomials.” *International Mathematics Research Notices*, Volume 2022, Issue 20, October 2022, Pages 15869-15931, arXiv:2012.02376 [math.CO].
12. **Keating, D.** “Area Statistics for Large Oscillating Tableaux.” *Preprint* (2020), arXiv:2010.10093 [math.CO].
13. **Keating, D.**, Reshetikhin, N., and Sridhar, A. “Integrability of Limit Shapes of the Inhomogeneous Six Vertex Model.” *Communications in Mathematical Physics* 391, 1181-1207 (2022), arXiv:2004.08971 [math-ph].
14. Corteel, S., **Keating, D.**, and Nicoletti, M. “Arctic curves phenomena for bounded lecture hall tableaux.” *Communications in Mathematical Physics* 382, 1449-1493 (2021), arXiv:1905.02881 [math.CO].
15. **Keating, D.**, Reshetikhin, N., and Sridhar, A. “Conformal Limit for Dimer Models on the Hexagonal Lattice.” *Journal of Mathematical Sciences* 242, 701-714 (2019).
16. **Keating, D.** and Sridhar, A. “Random Tilings with the GPU.” *Journal of Mathematical Physics* 59, 091420 (2018), arXiv:1804.07250 [cs.OH].
17. Carlsson, J., Khrabrov, A., Kaganovich, I., Sommerer, T., and **Keating, D.** “Validation and benchmarking of two particle-in-cell codes for a glow discharge.” *Plasma Sources Science and Technology*, 26(1) (2016), arXiv:1711.10830 [physics.plasm-ph].
18. Bhowmik, D., Nowakowski, M., You, L., Lee, O., **Keating, D.**, Wong, M., Boker, J., and Salahuddin, S. “Deterministic Domain Wall Motion Orthogonal To Current Flow Due To Spin Orbit Torque” *Scientific Reports* 5 (2015), arXiv:1407.6137 [cond-mat.mtrl-sci].

AWARDS

AIM, SQuaRE with Amol Aggarwal, Arvind Ayyer, Sylvie Corteel, Matthew Nicoletti, and Leonid Petrov	2024 - present
Nominated: Postdoctoral Excellence in Mentoring and Outreach Award	2023
Université de Paris, Guest Researcher	2022
Herb Alexander Thesis Prize	2021
Outstanding GSI Award	2018

INVITED TALKS

1. *A vertex model for LLT polynomials*, UIUC Integrability and Representation Theory Seminar, UIUC, September 2024.
2. *Vertex models, symmetric polynomials, and tilings*, UIUC Algebra-Geometry-Combinatorics seminar, UIUC, September 2024.
3. *The stochastic box-ball system*, Geometry, Statistical Mechanics, and Integrability Workshop IV: Vertex Models: Algebraic and Probabilistic Aspects of Universality, Institute for Pure and Applied Mathematics, May 2024.
4. *Coupled Tilings of the Aztec Diamond*, JMM Special Session on Solvable Lattice Models and their Applications, January 2024.
5. *Coupled Tilings of the Aztec Diamond*, Mathematical Physics Seminar, Purdue University, November 2023.
6. *Double dimers, coupled tilings, and LLT polynomials*, Integrable Probability Seminar, MIT, October 2023.
7. *Double dimers, coupled tilings, and LLT polynomials*, DIMERS Closing Conference, Sorbonne Université, July 2023.
8. *k-tilings of the Aztec Diamond*, Berkeley Probability Seminar, UC Berkeley, April 2023.
9. *k-tilings of the Aztec Diamond*, Journées Cartes, Institute of Theoretical Physics, June 2022.
10. *k-tilings of the Aztec Diamond*, Enumerative and Analytic Combinatorics Seminar, Université Paris Cité, June 2022.
11. *Lattice models and LLT polynomials*, Madison Combinatorics Seminar, UW Madison, May 2022.
12. *k-tilings of the Aztec Diamond*, Madison Probability Seminar, UW Madison, April 2022.
13. *k-tilings of the Aztec Diamond*, Solvable lattice model seminar, Stanford University, February 2022.
14. *A Vertex Model for LLT Polynomials*, Berkeley Combinatorics Seminar, UC Berkeley, December 2020.
15. *A Vertex Model for LLT Polynomials*, CMS Winter Meeting, December 2020.
16. *Arctic Curves, Lecture Hall Tableaux, and the Tangent Method*, LPSM Friday Seminar, Sorbonne University, November 2019.
17. *Arctic Curves, Lecture Hall Tableaux, and the Tangent Method*, Berkeley Combinatorics Seminar, UC Berkeley, September 2019.
18. *Arctic Curves in Lecture Hall Tableaux*, Asymptotic Algebraic Combinatorics Workshop, Banff International Research Station, March 2019.
19. *Random Tilings with the GPU*, Representation Theory, Mathematical Physics and Integrable Systems, Centre International de Rencontres Mathématiques, June 2018.

ORGANIZATION	2025	
	Co-organized the SLMath summer school “Graphical Models in Algebraic Combinatorics.”	
	Notes and exercises available on my website.	
	2024 - present	
	Co-organized the University of Illinois Algebra-Geometry-Combinatorics Seminar.	
	2024 - present	
	Co-organized the University of Illinois Integrability and Representation Theory Seminar	
	2022 - 2023	
	Co-organized the University of Wisconsin Probability Seminar.	
TEACHING EXPERIENCE	At UIUC:	
	Instructor	Fall 2025
	Math 413 - Introduction to Combinatorics	
	Instructor	Fall 2024
	Math 441 - Differential Equations	
	At UW Madison:	
	Instructor	Spring 2023
	Math 699 - Independent study	
	A reading course on “Integer Partitions” by George Andrews.	
	Instructor	Fall 2022, Spring 2023
	Math 390 - Undergraduate research	
	Numerical study of coupled tilings.	
	Instructor	Fall 2022, Spring and Fall 2023, Spring 2024
	Math 632 - Introduction to Stochastic Processes	
	Instructor	Spring 2022
	Math 475 - Introduction to Combinatorics	
	Instructor	Fall 2021, Spring 2024
	Math 431 - Introduction to Probability	
	At UC Berkeley:	
	Teaching Assistant	Spring 2021
	Math 54 - Linear Algebra	
	Instructor: Prof. Katrin Wehrheim	
	Teaching Assistant	Spring 2020
	Math 128A - Numerical Analysis	
	Instructor: Prof. Per-Olof Persson	
	Teaching Assistant	Spring 2019
	Math 54 - Linear Algebra and Differential Equations	
	Instructor: Prof. Ming Gu	

	Teaching Assistant	Fall 2018
	Math 54 - Linear Algebra and Differential Equations	
	Instructor: Prof. Constantin Teleman	
	Teaching Assistant	Spring and Fall 2017
	Math 53 - Multivariable Calculus	
	Instructor: Prof. Edward Frenkel	
	Teaching Assistant	Fall 2016
	Math 54 - Linear Algebra and Differential Equations	
	Instructor: Prof. Ming Gu	
	Teaching Assistant	Spring 2016
	Math 1B - Calculus	
	Instructor: Dr. Alexander Paulin	
	Teaching Assistant	Fall 2015
	Math 1A - Calculus	
	Instructor: Dr. Alexander Coward	
UNDERGRADUATE	Tosh Omprakash	2025
MENTORING	Project: Simulation of colored interacting particle systems.	
	Brian Wang	2025
	Project: Random reverse plane partitions using bijectivization of the Yang-Baxter equation.	
	Ran through the Illinois Combinatorics Lab for Undergraduate Experiences.	
	David Jiang, Jonah Guse	2023
	Project: Generating functions for coupled plane partitions.	
	Jonah is now a graduate student at UC Davis.	
	Noah Bertz, Harsha Kenchareddy, Wei Zhiyuan, Ying Zheng, Lucas Allen	Fall 2022, Spring 2023
	Project: Numerical study of coupled tilings.	
	Ran through the Madison Experimental Mathematics lab.	
	Matthew Nicoletti	2019
	Project: Simulations of large lecture hall tableaux.	
	Matthew is now a postdoc at Stanford.	
	Murat Magomedov	2019
	Project: Kawasaki Dynamics and the Ising Model.	
	Danny Wu	2018
	Project: Numerical computing fluctuations in the DWBC six vertex model.	
	Pavel Dmitriev	2017
	Project: Numerically computing correlation functions in the DWBC six vertex model.	

Melissa Joseph

2016

Project: Glueing formulas for discrete Laplacians.

Melissa is now a postdoc at University of Utah.

CODE

<https://github.com/GPUTilings>

A library for generating random tilings with Markov chain Monte Carlo on the GPU.