

Jacob Richey

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I am a postdoctoral fellow at the Rényi Institute in Budapest. My research field is combinatorial probability and statistics, including current projects related to: stochastic particle systems, random matrices, and mixing times for Markov chains.

Employment

- (2023-) Postdoctoral fellow, Alfréd Rényi Institute of Mathematics (Budapest, Hungary).
Faculty advisors: [Gábor Pete](#), [Balázs Ráth](#)
- (2020-2023) Postdoctoral fellow, University of British Columbia (Vancouver, Canada).
Faculty advisors: [Omer Angel](#), [Gordon Slade](#).

Education

- (2014-2020) PhD Mathematics, University of Washington.
Advisor: [Christopher Hoffman](#)
- (2010-2014) B.A. Mathematics and Chinese Language, Dartmouth College.
Thesis advisor: [Peter Winkler](#).

Papers

Published

1. [Random walks on regular trees cannot be slowed down](#). Omer Angel, Jacob Richey, Yinon Spinka, Amir Yehudayoff. Electron. J. Probab. 29: 1-15 (2024). DOI: 10.1214/24-EJP1109
2. [Intersections of random sets](#). Jacob Richey, Amites Sarkar. Journal of Applied Probability. 2022;59(1):131-151. doi:10.1017/jpr.2021.34
3. [Active phase for activated random walk on \$\mathbb{Z}\$](#) . Chris Hoffman, Jacob Richey, Leonardo Rolla. Commun. Math. Phys. 399, 717–735 (2023). <https://doi.org/10.1007/s00220-022-04572-x>
4. [Rumor source detection with multiple observations under adaptive diffusion protocols](#). Miklos Z. Racz, Jacob Richey. IEEE Transactions on Network Science and Engineering, vol. 8, no. 1, pp. 2-12, 1 Jan.-March 2021, doi: 10.1109/TNSE.2020.3022621
5. [Activated random walk on a cycle](#). Riddhipratim Basu, Shirshendu Ganguly, Chris Hoffman, Jacob Richey. Ann. Inst. H. Poincaré Probab. Statist. 55(3): 1258-1277 (August 2019). DOI: 10.1214/18-AIHP918
6. [A smooth transition from Wishart to GOE](#). Miklos Racz, Jacob Richey. J Theor Probab 32, 898–906 (2019). <https://doi.org/10.1007/s10959-018-0808-2>

Submitted

7. *Diffusion-limited annihilating-coalescing systems*. Sungwon Ahn, Matt Junge, Hanbaek Lyu, Lily Reeves, Jacob Richey, David Sivakoff. arXiv:2305.19333. Submitted to the Electronic Journal of Probability, 2023.
8. *Active phase for the Stochastic Sandpile on \mathbb{Z}* Chris Hoffman, Yiping Hu, Jacob Richey, Douglas Rizzolo. arXiv:2212.08293. Submitted to Communications on Pure and Applied Mathematics, 2023.

Preprint

9. *Shifts of Finite Type Obtained by Forbidding a Single Pattern*. Nishant Chandgotia, Brian Marcus, Jacob Richey, Chengyu Wu. arXiv:2409.09024 (September, 2024).
10. *Word length, bias, and symmetry in Penney's ante*. Matthew Drexel*, April Ju*, Peter Peng*, and Jacob Richey.

Theses

11. *Counting clusters on a grid*. Jacob Richey. Undergraduate honors thesis, Dartmouth College, 2014.

Invited talks

- *Patterns, hitting times and entropy for shifts of finite type*
 - Kutzsem research seminar ‘24 (Rényi Institute, Budapest)
 - Rutgers combinatorics seminar ‘23
 - PIMS dynamics seminar ‘23 (UBC, Vancouver, Canada)
- *Finding the source of a random diffusion*. ([slides](#))
 - Cornell probability seminar ‘23
 - CUNY probability seminar ‘23
 - Dartmouth colloquium ‘21
 - University of Victoria probability seminar ‘21
- *Phase transition for activated random walk and the stochastic sandpile* ([slides](#))
 - Kutzsem research seminar ‘23 (Rényi Institute, Budapest)
 - University of Delaware probability seminar ‘23
 - Cornell probability seminar ‘20
 - Random Structures and Algorithms ‘23 (Carnegie Mellon, Pittsburgh)
 - CRM Workshop ‘22 (Montreal)
 - AMS Special Session on Stochastic Spatial Models, JMM ‘20 (Denver)
- *Rumor source detection with multiple observations under adaptive diffusion protocols* ([slides](#))
 - SIAM Workshop on Network Science ‘18 (Portland, OR)
 - Dynasnet Workshop ‘23 (Lednice, Czech Republic)
- *Phase transition for parking with coalescence*
 - Northwest Probability Seminar ‘22.

Teaching & Outreach

- (Spring, 2024) Taught a two-month-long minicourse on topics in large deviations at the Rényi Institute for graduate students, postdocs and faculty.
- (September 2022) Volunteer at STEM Britannia science event for youth. Vancouver, BC.
- (2020-2023) Lead instructor for multiple undergraduate courses in probability and calculus at the University of British Columbia. Class sizes ranged from 50 to 120. I was often in charge of one or two TAs.
- (2016-2021) Ran the second year course for [UW Math Circle](#), an NSF-supported math outreach program for advanced middle and high school students. Designed, tested, and taught new interactive lessons and activities in game theory, group theory, geometry, probability, and number theory.
- (2016-2020) Lead instructor for 10+ undergraduate courses in advanced multivariable calculus and linear algebra at University of Washington. Class sizes ranged from 30 to 50.
- (Summer, 2015) Junior staff at [Hampshire College Summer Studies in Mathematics](#). Led problem sessions, wrote and graded problem sets, taught a mini-course, and gave a ‘prime time’ lecture. (Six days a week, 8 hours a day for 2 months.)
- (2012-2014) Personal tutor for students in mathematics courses at Dartmouth College.

Undergraduate mentoring

- (2021-2023) Undergraduate Research Opportunities [REX](#) at UBC. Mentor for two undergraduate research groups (three students each) in ‘21-22 and ‘22-23, culminating in a poster session. One project recently led to a submitted publication. Topics: street light percolation, coin bias in Penney’s ante.
- (2015-2020) Washington Experimental Mathematics Lab ([WXML](#)). Co-led two undergraduate research projects, usually 3 or 4 students, over the course of a year or more, culminating in a poster presentation. Topics: statistics for random walks, randomness of the discrete logarithm.
- (Summer, 2015) [University of Washington Inverse Problems REU](#). Gave a lecture at the REU colloquium, and advised an undergraduate student research project that resulted in a publication ([link](#)).

Organizing & Service

- (2021-2023) Organizer, UBC probability seminar. Selected and coordinated speaker visits (some zoom), and maintained the seminar website ([link](#)) and youtube page.
- (2023-) Reviewer for MR reviews (8 articles reviewed)
- Peer reviewer for: *Journal of the London Mathematical Society*, *Electronic Journal of Probability*, *Stochastic Models*

Conferences/visits

- Attended and presented a talk
 - Random Structures and Algorithms, June 2023. Pittsburgh, PA
 - Northwest Probability Seminar, October 2022. Seattle, WA

- CRM Workshop on Interacting Particle Systems and Hydrodynamic Limits, March 2022. Montreal, Canada
- JMM 2020. Denver, CO
- Attended
 - Saint-Flour Probability Summer School, July 2024. Saint-Flour, France
 - Permutations and Probability (BIRS), September 2021. Banff, Canada
 - AMS MRC on Stochastic Spatial Models, Summer 2019. Providence, RI
 - Virginia Integrable Probability Summer School 2019. UVA, Charlottesville, VA
 - Visitor at NYU Shanghai for two weeks in May 2019. Sponsor: Leonardo Rolla. Shanghai, China
 - Northwestern Probability Summer School, 2018. Northwestern University, Evanston, IL
 - Recent trends in Continuous and Discrete Probability, 2018. Georgia Tech, Atlanta, GA

Awards

- Gerald B. Folland Fellowship (2019)

Other

Resident of New York City

Languages: English, Mandarin Chinese

Programming languages: Python, Mathematica, Matlab, L^AT_EX

Last updated: September 26, 2024