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. *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
3. *Intersections of random sets.* Jacob Richey, Amites Sarkar. Journal of Applied Probability. 2022;59(1):131-151. doi:10.1017/jpr.2021.34
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.

Arxiv 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 bijections in Penney's ante*. Matthew Drexel*, Peter Peng*, and Jacob Richey. *Undergraduate. arXiv: 2409.19195 (September 2024).

Theses

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

Invited talks

- *Hitting times and entropy for shifts of finite type* (slides)
  - Los Angeles probability forum, October '24
  - Kutszem 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)
  - Ohio State University probability seminar, November '24
  - University of Wisconsin Madison probability seminar, October '24
  - Kutszem 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.

Undergraduate Teaching

- (2020-2023) Lead instructor for courses in probability and calculus at the University of British Columbia. Class sizes ranged from 80 to 120. I was often in charge of one or two TAs/graders.
  - MATH 302, Introduction to Probability. Quarters taught: Su23, W22, Su21
  - MATH 102, Differential Calculus with Applications to Life Sciences. W21.
  - MATH 303, Introduction to Stochastic Processes. W20.
- (2016-2020) Lead instructor for undergraduate courses in advanced multivariable calculus and linear algebra at the University of Washington. Class sizes ranged from 30 to 50.
  - MATH 308, Matrix Algebra with Applications. Quarters taught: W20, Sp18.
  - MATH 324, Advanced Multivariable Calculus I. F19, Sp19, F18, W18, F17, Su17, Sp17, W17, Su16.
- (2014-2016) Teaching assistant for courses in precalculus and calculus at the University of Washington. Led homework sections, usually two groups of 50 students, and helped with exam grading.
  - MATH 120, Precalculus. Quarters taught: F16, Sp16, F15.
  - MATH 111, Algebra with Applications. W15.
  - MATH 112, Application of Calculus to Business and Economics. Sp15.
  - MATH 125, Calculus with Analytic Geometry II. Su15, F14.

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.
- (2016-2021) Ran the advanced course at 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.
- (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) Private 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 (9 articles total)
- 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

- US citizen, resident of New York City
- Languages: English, Mandarin Chinese
- Programming languages: Python, Mathematica, Matlab, LaTeX

Last updated: November 5, 2024