

Roan Alexander James

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RESEARCH INTERESTS

Probability Theory, Stochastic Processes, Directed Polymer Models, Stochastic Partial Differential Equations, and the Kardar–Parisi–Zhang (KPZ) Universality Class.

EDUCATION

University of Rochester

PhD in Mathematics

Rochester, NY

Sep 2022 – Expected 2027

- Advisor: Professor Arjun Krishnan.
- Research focused on directed polymer models, stochastic heat equations, and the KPZ universality class.

University of Sheffield

Master of Mathematics (MMath)

Sheffield, UK

Sep 2017 – Jul 2021

- Awarded the **TM-Flett Prize** for the highest mark in Pure Mathematics.

PREPRINTS

- **James, R. A., Krishnan.** *A New Results in Intermediate Disorder For Directed Polymer in Dimension 1+1*. In preparation.

AWARDS AND HONORS

- **TM-Flett Prize**, University of Sheffield 2021
Awarded for outstanding academic achievement in Pure Mathematics.
- **Best Student in Biology**, High Storrs School 2017

TEACHING EXPERIENCE

University of Rochester

Rochester, NY

Instructor of Record

Term	Course	Course Title	Format
Summer 2023	ECO	Early Connection Opportunity: Basics of Mathematics	In Person
Summer 2024	ECO	Early Connection Opportunity: Basics of Mathematics	In Person
Summer 2025	MATH 201	Introduction to Probability	Online
Summer 2026	MATH 165	Linear Algebra and Differential Equations	Online
Fall 2026	MATH 162	Calculus II	In Person

Teaching Assistantships

Term	Course	Course Title
Spring 2022	MATH 143	Calculus III
Fall 2022	MATH 164	Multidimensional Calculus
Fall 2023	MATH 143	Calculus III
Fall 2023	MATH 202	Undergraduate Complex Analysis
Spring 2024	MATH 310	Undergraduate Game Theory
Fall 2024	MATH 503	Graduate Probability
Spring 2025	MATH 217	Politics and Mathematics
Fall 2025	MATH 265	Abstract Algebra
Fall 2026	MATH 143	Calculus III

TALKS AND LECTURES

Summer Lecture Series: Introduction to Polymer Models

A six-lecture introductory series on directed polymers in a random environment for graduate students with a background in basic probability.

- **Lecture 1: Directed Polymers in a Random Environment**

Summer Lecture Series, University of Rochester

The polymer measure on nearest-neighbour paths, the random environment $\{\omega(n, x)\}$, the partition function, and motivation from statistical mechanics.

- **Lecture 2: The Partition Function as a Martingale**

Summer Lecture Series, University of Rochester

The normalised partition function, its martingale property with respect to the environment filtration, and the almost-sure limit.

- **Lecture 3: The Zero–One Law and the Phase Transition**

Summer Lecture Series, University of Rochester

The weak- and strong-disorder dichotomy and the critical inverse temperature β_c .

- **Lecture 4: Weak Disorder and L^2 Techniques**

Summer Lecture Series, University of Rochester

Second moment computations, replica overlap, and uniform integrability in dimensions $d \geq 3$.

- **Lecture 5: Strong Disorder, Localisation, and Low Dimensions**

Summer Lecture Series, University of Rochester

Strong disorder in dimensions $d = 1, 2$, localisation of the path measure, and the role of free energy.

- **Lecture 6: Scaling Limits and Connections to the KPZ Class**

Summer Lecture Series, University of Rochester

Intermediate disorder scaling, convergence to the stochastic heat equation, and an outlook on KPZ universality.

Graduate Student Seminar: The Stochastic Heat Equation

- **The Stochastic Heat Equation, Part I: Construction and Mild Solutions**

Graduate Student Seminar, University of Rochester

Space–time white noise, the multiplicative stochastic heat equation, Walsh stochastic integration,

and existence and uniqueness of mild solutions via Picard iteration.

- **The Stochastic Heat Equation, Part II: Chaos Expansion and the KPZ Connection**

Graduate Student Seminar, University of Rochester

The Wiener chaos expansion, positivity and moment bounds, the Hopf–Cole transform linking the stochastic heat equation to KPZ, and intermittency.

Probability Seminar

- **The Second Moment Method for the Partition Function**

Probability Seminar, University of Rochester

The Paley–Zygmund inequality, second moment calculations in terms of random-walk overlap, weak disorder in transient dimensions, and limitations of the method in low dimensions.

- **Simple Random Walks and Discrete Stochastic Differential Equations**

Vertical Integration Workshop, University of Rochester

April 18, 2026

Simple random walks in random environments and their connection to stochastic partial differential equations, with scaled partition functions interpreted as discrete analogues of solutions to the Parabolic Anderson Model. This was based with joint work with Arjun Krishnan.

CONFERENCE AND SCHOOL ATTENDANCE

Date	Conference or School	Location	Financial Support
September 2024	Conference on New Developments in Probability	Centre de Recherches Mathématiques, Montreal	\$1,000 in travel expenses
October 2024	44th Midwest Probability Conference	Northwestern University, Evanston, Illinois	\$750 in travel expenses
November 2024	Northeast Probability Seminar	Columbia University, New York	\$700 in travel expenses
June 2025	School on Interacting Particle Systems and Random Matrix Theory	Alfréd Rényi Institute, Budapest	Accommodation and \$1,000 in travel expenses
November 2025	Northeast Probability Seminar	New York University, New York	\$700 in travel expenses
July 2026	Seminar on Stochastic Processes 2026	Union College, Schenectady, New York	Accommodation and \$250 in travel expenses
June 2026	MSRI Summer School: Random Growth Models and Hamilton–Jacobi Equations	University of California, Berkeley	Accommodation and \$850 in travel expenses

SERVICE, LEADERSHIP, AND MENTORING

Departmental and Professional Leadership

- **President, AMS Graduate Student Chapter**

American Mathematical Society Student Chapter, University of Rochester

Organise academic and professional-development events, coordinate with the national AMS and the department on funding and logistics, communicate conferences, fellowships, and travel opportunities, and support community-building across the graduate cohort.

- **Organiser, Graduate Student Seminar**

Department of Mathematics, University of Rochester

Manage the seminar schedule, recruit speakers, coordinate room bookings and announcements, and help graduate speakers prepare talks for a broad mathematical audience.

Mentoring and Undergraduate Research

- **Research Mentor — Undergraduate Research Project**

Liam Hillis, University of Rochester

Supervise an undergraduate project on directed polymer models in random environments, including a reading programme on polymer measures, partition functions, martingale convergence, second moment methods, and random-walk overlap estimates.

PROFESSIONAL EXPERIENCE

Portland Training

Administrative Assistant

Sheffield, UK

Aug 2021 – Aug 2022

- Managed complex datasets using Excel and coordinated customer interactions.
- Achieved two promotions within eight months as responsibilities increased.

TECHNICAL SKILLS

- **Languages & Tools:** $\text{\LaTeX}$, R / RStudio, Microsoft Excel.
- **Mathematical Areas:** Probability Theory, Stochastic Processes, Directed Polymers, Stochastic PDEs, and financial applications of probability.