Arjun Krishnan

University of Rochester
Department of Mathematics
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Research Interests

Probability theory, percolation and disordered systems, stochastic homogenization of Hamilton-Jacobi equations, ergodic theory, concentration of measure.

Employment

Assistant Professor July 2017–Present
University of Rochester, Department of Mathematics

Wiley Assistant Professor/Lecturer January 2015–June 2017
University of Utah, Department of Mathematics

Fields Postdoctoral Fellow July–December 2014
Fields Institute for Research in Mathematical Sciences

Associate Research Engineer October 2008–June 2009
New Technologies Division, MTU Detroit Diesel Inc., Redford, MI

Education

Doctor of Philosophy in Mathematics Sept 2009–May 2014
New York University, Courant Institute of Mathematical Sciences
Advisors: S.R.S. Varadhan, S. Chatterjee
Dissertation: Variational formula for the time-constant of first-passage percolation

Master of Science in Mechanical Engineering August 2008
University of Michigan
Advisor: B.I. Epureanu
Thesis: The Random Walker: Stochastic Mechano-Chemical Models for Motor Proteins

Bachelor of Technology in Mechanical Engineering July 2006
Indian Institute of Technology Madras
Advisors: A. Ramesh, V. Babu, R.I. Sujith

Awards and Grants

NSF Conference Grant 2020-2022 PI: Arjun Krishnan Co-PI: Jack Hanson, City University of New York Award Number: 2002388 Title: First-passage percolation and related models Amount: $20,000

Simons Collaboration Grant May 2019-2024
PI: Arjun Krishnan Award Number: 638966 Title: Busemann functions and related properties Amount: $42,000

AMS Simons Travel Grant May 2014
PI: Arjun Krishnan Amount: $4,000

MacCracken Fellowship 2010–2014
Awarded by New York University in support of graduate studies in mathematics

William Mirsky Memorial Award March 2008
Awarded by University of Michigan for outstanding research and academic achievements

Bronze Medalist August 2002
Represented India at the International Chemistry Olympiad.

Best Experimental Work Award June 2002
Awarded by the Indian National Chemistry Olympiad

Publications and Preprints

A. Krishnan, S. Mkrtchyan, and S. Neville. On the phase diagram of the polymer model. *arXiv:2402.12580 [math-ph], Submitted.* (Feb. 2024). DOI: 10.48550/arXiv.2402.12580.

A. Krishnan and S. Kuzgun. The KPZ two-point function with Gaussian initial data. *In preparation* (2023)

A. Krishnan, F. Rassoul-Agha, and T. Seppäläinen. On the coalescence time of Busemann geodesics in first-passage percolation. *In preparation* (2023)

A. Krishnan, F. Rassoul-Agha, and T. Seppäläinen. Geodesic length and shifted weights in first-passage percolation. *Comm. Amer. Math. Soc.* 3 (2023), pp. 209–289. ISSN: 2692-3688. DOI: 10.1090/cams/18.

J. Chaika and A. Krishnan. Stationary coalescing walks on the lattice II: entropy. *Nonlinearity* 34.10 (Oct. 2021), pp. 7045–7063. DOI: 10.1088/1361-6544/ac1162.

I. Alevy and A. Krishnan. Negative correlation of adjacent Busemann increments. *Ann. Inst. Henri Poincaré Probab. Stat.* 58.4 (2022), pp. 1942–1958. ISSN: 0246-0203. DOI: 10.1214/21-aihp1236.

A. Krishnan and S. Neville. Kostka Numbers and Longest Increasing Subsequences. *arXiv:1907.03881 [math], Submitted.* (July 2019). DOI: 10.48550/arXiv.1907.03881.

J. Chaika and A. Krishnan. Stationary coalescing walks on the lattice. *Probability Theory and Related Fields* (2018). DOI: https://doi.org/10.1007/s00440-018-0893-2

A. Krishnan and J. Quastel. Tracy–Widom fluctuations for perturbations of the log-gamma polymer in intermediate disorder. *Ann. Appl. Probab.* 28.6 (2018), pp. 3736–3764. ISSN: 1050-5164. DOI: 10.1214/18-AAP1404

A. Krishnan. Variational Formula for the Time Constant of First-Passage Percolation. *Comm. Pure. Appl. Math.* 69.10 (June 2016), pp. 1984–2012. DOI: 10.1002/cpa.21648.

A. Krishnan. Variational formula for the time-constant of first-passage percolation. Thesis (Ph.D.)–New York University. ProQuest LLC, Ann Arbor, MI, 2014. ISBN: 978-1-321-16163-2.

A. Krishnan and B. I. Epureanu. Renewal-Reward Process Formulation of Motor Protein Dynamics. *Bulletin of mathematical biology* 73.10 (2011), pp. 2452–2482. DOI: https://doi.org/10.1007/s11538-011-9632-x

Conference Proceedings

A. Krishnan and B. I. Epureanu. A stochastic mechano-chemical model for cooperative motor protein dynamics. *Proceedings of SMASIS 2008*. 2008

A. Krishnan, K. Balasubramaniam, and R. I. Sujith. Asymptotic Solution for the One Dimensional Euler Equations for Isentropic Flow in a Variable Area Duct. *Proceedings of the 37th AIAA Fluid Dynamics Conference and Exhibit*. 2007. DOI: 10.2514/6.2007-4005

A. Krishnan et al. Prediction of NOx reduction with Exhaust Gas Recirculation using the Flame Temperature Correlation Technique. *Proceedings of the National Conference on Advances in Mechanical Engineering*. 2006, pp. 18–19

Teaching

Instructor

University of Rochester

- MTH 471 Real Analysis — Fall 2024
- MTH 248 Graph Theory — Spring 2024
- MTH 506 Topics in Probability: Random Matrices — Spring 2024
- MTH 403 Theory of Probability — Spring 2023
- MTH 202 Introduction to Stochastic Processes — Spring 2023
- MTH 201 Introduction to Probability — Fall 2022
- MTH 504 Stochastic Processes — Fall 2021
- MTH 201 Introduction to Probability — Fall 2021
- MTH 507 Advanced Topics in Probability: First-Passage Percolation — Fall 2020
- MTH 165 Linear Algebra and Differential Equations — Fall 2020
- MTH 165 Linear Algebra and Differential Equations — Spring 2020
- MTH 202 Introduction to Stochastic Processes — Spring 2020
- MTH 471 Real Analysis — Fall 2019
- MTH 201 Introduction to Probability — Spring 2019
- MTH 201 Introduction to Probability — Fall 2018
- MTH 504 Stochastic Processes — Spring 2018
- MTH 202 Introduction to Stochastic Processes — Spring 2018
- MTH 201 Introduction to Probability — Fall 2017

University of Utah

- Stochastic Processes and Simulation - II — Spring 2017
- Stochastic Processes and Simulation - I — Fall 2016
- Introduction to Probability — Spring 2016

- Actuarial Mathematics — Spring 2016
- Introduction to Statistics — Spring 2015

New York University

- Putnam Mathematical Competition — Fall 2011
- Calculus II — Summer 2011
- Putnam Mathematical Competition — Fall 2010
- Calculus I — Summer 2010

Teaching Assistant
New York University

- Theory of Numbers — Fall 2012
- Probability Limit Theorems II — Spring 2012
- Basic Probability — Spring 2012
- Ordinary Differential Equations — Spring 2011

Graduate Student Instructor
University of Michigan

- Thermodynamics — Winter 2008
- Fluid Dynamics — Fall 2007
- Thermodynamics — Winter 2007

Research Advising

This is a list of postdocs I have worked with it, and students I have advised. If I have been a thesis advisor, I have specifically highlighted those.

Postdoctoral Scholars/Visiting Assistant Professors

1. Daniel Slonim — *University of Virginia*
2. Evan Sorensen — *Columbia University*
3. Sefika Kuzgun — *University of Rochester*
4. Ian Alevy — *University of Rochester*

Graduate Students

1. Roan James — *(PhD advisor) University of Rochester*
2. Shantanu Deodhar — *University of Rochester*
3. Atal Bhargava — *Purdue University*
4. Semin Yoo — *University of Rochester*
5. Scott Neville — *University of Michigan-Ann Arbor*

Undergraduate Students

University of Rochester

1. Benjamin Noe, *Project: Formula 1 Race Laptime Predictor*
2. Ajay Patel, *Project: Formula 1 Race Laptime Predictor*
3. Kenneth Lee, *Reading course: Mathematical Finance*
4. Stuti Shah, *Reading course: Tilings and Ergodic Theory*, *Writing course: Crystalline Symmetries*
5. Xuchen Fang, **Honors Thesis:** *On the Last Passage Time in Periodic Environments*
6. Kaile Ding, *Writing Course: Fluctuations of the Passage-Time around the Time-Constant*
7. Boping Nong, *Reading course: Measure Theory with Probability*
8. Aijia Zhang, *Writing course: On the Random Walk Hypothesis in Finance*
9. Chengyuan Wang, *Reading course*

University of Utah

1. Scott Neville, *Research advisor*
2. Willem Collier, *Reading course*
3. Stephen Harman, *Reading course*

Talks and Presentations

Chronological

Date	Type	Location and Title
Oct 2024	Seminar	University of Arizona, Tuscon *On the phase diagram of the polymer model*
Aug 2024	Seminar	Indian Institute of Science, Bangalore *On the phase diagram of the polymer model*
Jul 2024	Seminar	Institute of Mathematical Sciences, Chennai, *First-Passage Percolation, A Model in the KPZ Growth Class*
Jul 2024	Colloquium	Indian Statistical Institute, Bangalore, *On the phase diagram of the polymer model*
Dec 2023	Seminar	University of Utah, *Coexistence of phase in directed polymers*
Oct 2023	Seminar	University of Montreal, *Coexistence of phase in directed polymers*
Sep 2023	Seminar	University of Rochester, *Coexistence of phase in directed polymers*
Aug 2023	Invited Talk	South East Probability Conference II, *Polymer phase transitions at fixed temperature*

Jun 2022	Invited Talk	Annual Meeting of the IMS, London, *Stationary Coalescing Walks on the Lattice*
Jun 2022	Seminar	Tata Institute of Fundamental Research - Center for Applied Mathematics, *First-Passage Percolation and Stochastic Homogenization*
Jun 2022	Minicourse	Indian Institute of Science, Bangalore, *Geometry of Geodesics*
May 2022	Colloquium	Indian Statistical Institute, Bangalore, *First-Passage Percolation, A Model in the KPZ Growth Class*
Mar 2022	Invited Talk	AMS Spring Sectional, *First-pair Coalescence Time for Busemann Geodesics*
Oct 2021	Seminar	New York University, *Negative Correlation of Busemann Increments*
May 2021	Seminar	University of Arizona, *Negative Correlation of Busemann Increments*
Mar 2021	Seminar	McGill University, *Negative Correlation of Busemann Increments*
Mar 2020	Seminar	New York University, *Stationary coalescing walks*
Oct 2019	Invited Talk	AMS Sectional, SUNY Binghampton, *On the Steele-Zhang conjecture in first-passage percolation*
Oct 2019	Invited Talk	AMS Sectional, SUNY Binghampton, *Busemann functions and coalescence of geodesics*
Feb 2019	Seminar	Georgia Tech, *Stationary coalescing walks*
Oct 2018	Seminar	Carnegie Mellon University, *Stationary coalescing walks*
Sep 2018	Seminar	University of Minnesota, *Stationary coalescing walks*
Sep 2018	Seminar	Temple University, *Stationary coalescing walks*
Apr 2018	Invited Talk	AMS Sectional, Boston University, *Stationary coalescing walks*
Feb 2018	Seminar	Northwestern University, *Stationary coalescing walks*
Sep 2017	Seminar	University of Connecticut, *Stationary coalescing walks*
Mar 2017	Talk	Centre International de Recontres Mathematiques, Marseille, France, *Stationary coalescing walks*
Dec 2016	Special Seminar/Job Talk	Temple University, *Fluctuations of polymer models in intermediate disorder*
Apr 2016	Invited Talk	AMS Sectional, Fargo, ND, *Fluctuations of polymer models in intermediate disorder*
Feb 2016	Special Seminar/Job Talk	Penn State University, *Stochastic Homogenization and First-Passage Percolation*
Jan 2016	Special Seminar/Job Talk	Carnegie Mellon University, *Stochastic Homogenization and First-Passage Percolation*
Nov 2015	Invited Talk	AMS Sectional, Rutgers University, *Fluctuations of polymer models in intermediate disorder*
Aug 2015	Seminar	University of Illinois at Urbana-Champaign, *Stochastic Homogenization and First-Passage Percolation*
May 2015	Seminar	PDE and Probability, University of British Columbia, *Fluctuations of polymer models in intermediate disorder*
Mar 2015	Seminar	University of Illinois at Urbana-Champaign, *Fluctuations of polymer models in intermediate disorder*
Dec 2014	Seminar	University of Wisconsin-Madison, *Variational Formula for the Limit Shape of First-Passage Percolation*
Nov 2014	Invited Talk	Workshop on First-Passage Percolation, IMPA, Brazil, *Variational Formula for the Limit Shape of First-Passage Percolation*
Nov 2014	Invited Talk	Workshop on First-Passage Percolation, IMPA, Brazil, *Variational Formula for the Limit Shape of First-Passage Percolation*

Oct 2014	Seminar	Math Finance and Probability Seminar, Rutgers University, *Variational Formula for the Limit Shape of First-Passage Percolation*
May 2014	Seminar	Frontier Probability Days, University of Arizona, *Variational Formula for the Limit Shape of First-Passage Percolation*
Aug 2013	Talk	ZiF Summer School, Bielefeld University, *Variational Formula for the Limit Shape of First-Passage Percolation*
Jul 2013	Talk	Cornell Summer School, Cornell University, *Variational Formula for the Limit Shape of First-Passage Percolation*
Apr 2013	Talk	Graduate Seminar, New York University, *Variational Formula for the Limit Shape of First-Passage Percolation*
Nov 2009	Talk	Mostly Biomathematics Lunchtime Seminar, New York University, *Renewal-Reward Processes and Single-Molecule Experiments on Motor Proteins*

By Topic

Geometry of Geodesics

- *Minicourse*, Indian Institute of Science, Bengaluru May 2022

First-Passage Percolation, A Model in the KPZ Growth Class

- *Colloquium*, Indian Statistical Institute Bangalore, May 2022

Negative Correlation of Busemann Increments

- *McGill Probability Seminar*, McGill (online), Mar 2021
- *Arizona Probability Seminar*, Arizona (online), May 2021
- *NYU Probability Seminar*, NYU (online), Oct 2021

Busemann functions and coalescence of geodesics

- *AMS Sectional*, (online), Mar 2022
- *AMS Sectional*, SUNY Binghamton, Oct 2019

On the Steele-Zhang conjecture in first-passage percolation

- *AMS Sectional*, SUNY Binghamton, Oct 2019

Stationary coalescing walks

- *Invited Talk*, Annual Meeting of the IMS, University of London, Jun 2022
- *Probability Seminar*, Courant Institute (NYU), Mar 2020
- *Probability Seminar*, Georgia Tech, Feb 2019
- *Probability Seminar*, Carnegie Mellon, Oct 2018.
- *Probability Seminar*, University of Minnesota, Sep 2018.
- *Probability Seminar*, Temple University, Sep 2018.
- *AMS Sectional Meeting*, Boston University, April 2018.
- *Probability Seminar*, Northwestern University, Feb 2018.
- *Probability Seminar*, University of Connecticut, Sep 2017.
- *Random Structures in Statistical Mechanics and Mathematical Physics*, C.I.R.M Luminy, Mar-Apr 2017.

Fluctuations of polymer models in intermediate disorder

- *Special Session on Probability, AMS Spring Sectional*, Fargo, ND, Apr 2016.
- *Special Session on Probability, Combinatorics and Statistical Mechanics, III of the AMS Fall Eastern Sectional Meeting*, Rutgers University, November 2015.
- *PDE and Probability Seminar*, University of British Columbia, May 2015.
- *Probability Seminar*, University of Illinois at Urbana-Champaign, March 2015.

Stochastic Homogenization and First-Passage Percolation

- *Seminar*, Tata Institute of Fundamental Research - Center for Applied Mathematics, June 2022
- *Special Seminar*, Temple University, Dec 2016.
- *Special Seminar*, Penn State University, Feb 2016.
- *Special Seminar*, Carnegie Mellon University, Jan 2016.
- *Statistical Science Seminar*, University College London, August 2015.
- *Arbeitsgemeinschaft ANGEWANDTE ANALYSIS*, Max Planck Institute, Leipzig, April 2015.

A stochastic homogenization approach to first-passage percolation

- *Fall Semester Postdoctoral Seminar*, Fields Institute, October 2014.

Variational formula for the time-constant of first-passage percolation

- *Probability Seminar*, University of Wisconsin-Madison, December 2014.
- Invited talk, *Workshop on First-Passage Percolation*, Instituto Nacional de Matemática Pura e Aplicada, November 2014.
- *Mathematical Finance and Probability Seminar*, Rutgers University, October 2014.
- Contributed talk, *37th Conference on Stochastic Processes and their Applications*, Universidad de Buenos Aires, July 2014.

Variational Formula for the Limit Shape of First-Passage Percolation

- *Frontier Probability Days*, University of Arizona, May 2014.
- *ZiF Summer School*, Bielefeld University, August 2013.
- *9th Cornell Probability Summer School*, Cornell University, July 2013.
- *Graduate Student Seminar*, NYU Courant Institute, April 2013.

Renewal-Reward Processes and Single-Molecule Experiments on Motor Proteins

- *Mostly Biomathematics Lunchtime Seminar*, NYU Courant Institute, November 2009.

Academic Service

Conference and Workshop Organizing

First-Passage Percolation and Related Models

- (with J. Hanson and R. Basu) This was a major workshop in the field of first-passage percolation organized at the International Center for Theoretical Sciences, Bengaluru, India. June 2022

AMS Spring Western Sectional Meeting

- (with Tom Alberts) Special Session on Topics in Probability April 2016

Seminars

University of Rochester, Department of Mathematics

- (co-organizer) Colloquium 2018–Present

- (co-organizer) Wing Lectures 2018–Present
- (co-organizer) Probability, Ergodic Theory, Mathematical Physics Seminar 2017–Present

University of Utah, Department of Mathematics
- (with Tom Alberts) Stochastics Seminars 2015–2017

New York University, Courant Institute of Mathematics
- Graduate Student/Postdoc Seminar Series 2012–2014

Referee
- Electronic Communications in Probability
- Electronic Journal of Probability
- Inventiones Mathematicae
- Journal of Theoretical Probability
- Probability Theory and Related Fields
- Proceedings of the American Mathematical Society
- Stochastic Processes and their Applications
- The Annals of Applied Probability

Thesis and Oral Examination Committees

Graduate Students

1. Donovan Snyder, PhD Oral Exam. *Mathematics* 2023-
2. Yuanyuan Pan, PhD Committee. *Mathematics* 2023-2024
3. Tsung-Kai Lin, PhD Oral Exam. *Mathematics* 2022-
4. Jorge Olivares, PhD Oral Exam. *Mathematics* 2022-2023
5. Andrew Read-McFarland, PhD Committee. *Computer Science* 2020-2022
6. Brianna Vick, PhD Committee. *Mathematics* 2020-2021
7. Hans Leonard, PhD Defence. *Political Science* 2020

Undergraduate Students Undergraduate Students

1. Byron Osterweil, Honors Thesis, *Mathematics* 2020
2. Chuanyi Wang, Honors Thesis, *Mathematics* 2021
3. Cole Durham, Honors Thesis, *Mathematics* 2021
4. Xiaobo Luo, Honors Thesis, *Mathematics* 2021
5. Giang Truong, Honors Thesis, *Mathematics* 2021

University Committees

- Graduate Committee, *Mathematics* 2021-

- Diversity and Inclusion Committee, *Mathematics* 2021-
- Undergraduate Research Committee, *Mathematics* 2020-2021
- Colloquium and Wing Lectures Committee, *Mathematics* 2018-2020
- Probability Seminar, *Mathematics* 2018-2020

Professional Memberships

American Mathematical Society (AMS) 2010–Present