Department of Mathematics, University of Chicago
Room E-416
5734 S. University Avenue, Chicago IL 60637, USA
✉ sayan.das@columbia.edu
sayan-pq.github.io

Sayan Das

Employment

2026- **Assistant Professor**, *Department of Mathematics*, Vanderbilt University, Nashville.

2023–2026 **L.E. Dickson Instructor**, *Department of Mathematics*, University of Chicago, Illinois.
-Mentor: Ewain Gwynne.

Education

2018–2023 **Ph.D. in Mathematics**, *Columbia University, New York*.
-Advisor: Ivan Corwin.

2016–2018 **Master of Statistics (M.Stat)**, *Indian Statistical Institute, Kolkata*.

2013-2016 **Bachelor of Statistics (B.Stat (Hons.))**, *Indian Statistical Institute, Kolkata*.

Research Interests

Directed Polymers, Large Deviations, Integrable Probability, Stochastic Partial Differential Equations, Permutations.

Preprints

26. **Invariant measures for half-space geometric LPP: classification and the one force–one solution principle**, *Sayan Das, Evan Sorensen, and Zongrui Yang*, Submitted, [arXiv].
25. **Pinning in non-critical half-space geometric last passage percolation**, *Sayan Das, Evgeni Dimitrov, and Zongrui Yang*, Submitted, [arXiv].
24. **Fluctuation exponents of the open KPZ equation in the maximal current phase**, *Andres A. Contreras Hip, Sayan Das, and Antonios Zitridis*, Submitted, [arXiv].
23. **The half-space KPZ line ensemble and its scaling limit**, *Sayan Das and Christian Serio*, Submitted, [arXiv].
22. **Solving marginals of the LDP for the directed landscape**, *Sayan Das and Li-Cheng Tsai*, Submitted, [arXiv].

Publications

21. **Upper tail large deviations of the directed landscape**, *Sayan Das, Duncan Dauvergne, and Bálint Virág*, To appear in Duke Mathematical Journal, [arXiv].
20. **Lower tail large deviations of the stochastic six vertex model**, *Sayan Das, Yuchen Liao, and Matteo Mucciconi*, To appear in International Mathematics Research Notices, [arXiv][Journal].
19. **Convergence to stationary measures for the half-space log-gamma polymer**, *Sayan Das and Christian Serio*, Journal of Functional Analysis Vol. 289, No. 4, Aug 2025, [arXiv][Journal].
18. **Temporal Increments of the KPZ equation with general initial data**, *Sayan Das*, Electron. J. Probab. 29: 1-28 (2024), [arXiv][Journal].
17. **Multiplicative SHE limit of random walks in space–time random environments**, *Sayan Das, Hindy Drillick, and Shalin Parekh*, Probab. Theory Relat. Fields (2024)., [arXiv][Journal].
16. **Localization of the continuum directed random polymer**, *Sayan Das and Weitao Zhu*, Probab. Theory Relat. Fields (2024)., [arXiv][Journal].
15. **The half-space log-gamma polymer in the bound phase**, *Sayan Das and Weitao Zhu*, Communications in Mathematical Physics 405, no. 8 (2024): 1-46., [arXiv][Journal].
14. **KPZ exponents for the half-space log-gamma polymer**, *Guillaume Barraquand, Ivan Corwin, and Sayan Das*, Probab. Theory Relat. Fields (2024)., [arXiv][Journal].

13. **Large deviations for the q-deformed polynuclear growth**, *Sayan Das, Yuchen Liao, and Matteo Mucciconi*, The Annals of Probability, 53(4), 1223-1286., [arXiv][Journal].
12. **KPZ equation limit of sticky Brownian motion**, *Sayan Das, Hindy Drillick, and Shalin Parekh*, Journal of Functional Analysis Vol. 287, No. 10, Nov 2024, [arXiv][Journal].
11. **Long and short time laws of iterated logarithms for the KPZ fixed point**, *Sayan Das, Promit Ghosal, and Yier Lin*, Electronic Journal of Probability, 29, 1-38., [arXiv][Journal].
10. **Fluctuations of Quadratic Chaos**, *Bhaswar B. Bhattacharya, Sayan Das, Somabha Mukherjee, and Sumit Mukherjee*, Communications in Mathematical Physics, 405(10), 237., [arXiv][Journal].
9. **Large deviation principle for random permutations**, *Jacopo Borga, Sayan Das, Sumit Mukherjee, and Peter Winkler*, International Mathematics Research Notices, Volume 2024, Issue 3, February 2024, Pages 2138–2191, [arXiv][Journal].
8. **A fourth moment phenomenon for asymptotic normality of monochromatic subgraphs**, *Sayan Das, Zoe Himwich and Nitya Mani*, Random Structures & Algorithms 63.4 (2023): 968-996., [arXiv][Journal].
7. **Short- and long-time path tightness of the continuum directed random polymer**, *Sayan Das and Weitao Zhu*, Ann. Inst. H. Poincaré Probab. Statist. 60(1): 343-372, Feb 2024, [arXiv][Journal].
6. **Law of iterated logarithms and fractal properties of the KPZ equation**, *Sayan Das and Promit Ghosal*, Ann. Probab. 51(3): 930-986 (May 2023), [arXiv][Journal].
5. **Large Deviations for Discrete β-ensembles**, *Sayan Das and Evgeni Dimitrov*, Journal of Functional Analysis Vol 283, Issue 1, [arXiv][Journal].
4. **Motif estimation in large graphs: The fourth moment phenomenon**, *Bhaswar B. Bhattacharya, Sayan Das, and Sumit Mukherjee*, Ann. Statist. 50(2): 987-1011, [arXiv][Journal].
3. **Upper-tail Large Deviation Principle for ASEP**, *Sayan Das and Weitao Zhu*, Electron. J. Probab. 27: 1-34 (2022), [arXiv][Journal].
2. **Fractional moments of the Stochastic Heat Equation**, *Sayan Das and Li-Cheng Tsai*, Ann. Inst. H. Poincaré Probab. Statist. 57 (2) 778-799, May 2021, [arXiv][Journal].
1. **Extremal process of the zero-average Gaussian free field for $d \geq 3$**, *Sayan Das, and Rajat Subhra Hazra*, Statistics & Probability Letters, 146, pp.42-49, [arXiv][Journal].

Invited Talks

Aug 2026 **American Institute of Mathematics (AIM) Workshop: Gibbsian Line ensembles**, *Pasadena*, CA.
Jul 2026 **Coin Flippers Conference 2026**, *Newark*, Delaware.
May 2026 **CMO-BIRS Workshop: Recent Developments in Stochastic Analysis**, *Oaxaca*, Mexico.
Apr 2026 **Brin MRC workshop: The Kardar-Parisi-Zhang Universality Class & Related Topics**, *University of Maryland, Baltimore*, MD.
Feb 2026 **IIT Madras Math Colloquium**, *Chennai*, India.
Jan 2026 **University of Pennsylvania Stat Colloquium**, *Philadelphia*, PA.
Jan 2026 **Stony Brook University Math Colloquium**, *Long Island*, NY.
Dec 2025 **Academia Sinica Math Colloquium**, *Taipei*, Taiwan.
Nov 2025 **Florida State University Stat Colloquium**, *Tallahassee*, Florida.
Nov 2025 **Vanderbilt Math Colloquium**, Nashville, Tennessee.
Oct 2025 **Emerging Synergies between Stochastic Analysis and Statistical Mechanics**, *BIRS*, Canada.
Sep 2025 **Columbia University**, *New York*.
Sep 2025 **Ohio State University**, *Columbus, Ohio*.
Sep 2025 **University of Michigan**.
Aug 2025 **Frontiers in Stochastic Analysis Conference**, *Purdue*.
Jul 2025 **Invited session on Random Growth and KPZ Universality at Stochastic Processes and their Applications Conference**, *Wrocław*, Poland.
Dec 2024 **Los Angeles Probability Forum**.
Sep 2024 **Purdue Probability Seminar**.
Sep 2024 **University of Toronto Probability Seminar**.
Sep 2024 **University of British Columbia**.

Apr 2024 **Lehigh-Minnesota joint probability seminar**, *Online*.
Mar 2024 **University of Utah Stochastic Seminar**.
Mar 2024 **Penn / Temple Probability Seminar**.
Jan 2024 **Northwestern University Probability Seminar**.
Jan 2024 **Joint Mathematics Meetings**, *Special Session on Large Random Permutations*, San Francisco.
Nov 2023 **University of Michigan**.
Oct 2023 **University of Illinois Chicago**.
Aug 2023 **National University of Singapore Probability Seminar**.
Aug 2023 **Random Matrix days, Indian Statistical Institute**.
Apr 2023 **University of Chicago Probability Seminar**.
Jan 2023 **University of North Carolina Probability Seminar**.
Dec 2022 **UC Berkeley Probability Seminar**.
Dec 2022 **Stanford Probability Seminar**.
Nov 2022 **MIT Probability Seminar**.
Nov 2022 **University of Chicago Probability Seminar**.
Oct 2022 **KTH Random Matrix Theory Seminar**, *Online*.
Oct 2022 **Cornell University Probability Seminar**.
Sep 2022 **University of Toronto Probability Seminar**.
May 2022 **Probability and the City Seminar**, *Online*.
Mar 2022 **UC Berkeley Probability Seminar**, *Online*.
Mar 2022 **University of Wisconsin-Madison Probability Seminar**.
Mar 2022 **University of Utah Stochastic Seminar**.
Mar 2022 **Columbia Integrable Probability Seminar**, *Online*.
May 2021 **Columbia Princeton Probability Day 2021 (Short Talk)**, *Online*.
Feb 2021 **Columbia Integrable Probability Seminar**, *Online*.

Contributed Talks

Sep 2022 **Graduate Student Probability Conference**, *University of Wisconsin-Madison*.
Jun 2022 **Summer School in Probability**, *University of British Columbia*, Vancouver.
Oct 2021 **Program Associates Short Talk**, *MSRI*, Berkeley.
Nov 2020 **North East Probability Seminar 2020**, *Online*.
Aug 2020 **Bernoulli-IMS One World Symposium 2020**, *Online*.

Teaching and Teaching Assistantships

Instructor .
Fall 2026 **Probability (undergraduate level)**, *Vanderbilt University*.
Spring 2026 **Mathematical Methods in the Physical Sciences II**, *University of Chicago*.
Winter 2026 **Probability and Stochastic Processes I (for Financial math masters)**, *University of Chicago*.
Fall 2025 **Mathematical Methods in the Physical Sciences I (2 sections)**, *University of Chicago*.
Winter 2025 **Mathematical Methods in the Physical Sciences I (2 sections)**, *University of Chicago*.
Fall 2024 **Mathematical Methods in the Physical Sciences I (2 sections)**, *University of Chicago*.
Winter 2024 **Mathematical Methods in the Physical Sciences I (2 sections)**, *University of Chicago*.
Fall 2023 **Mathematical Methods in the Physical Sciences II (2 sections)**, *University of Chicago*.
Spring 2021 **Calculus I**, *Columbia University*.
Summer 2020 **Calculus III**, *Columbia University*.
TA .
Fall 2022 **Intro to Honors Mathematics**, *Columbia University*.
Spring 2022 **Undergraduate Probability**, *Columbia University*.
Fall 2020 **Calculus II**, *Columbia University*.

Spring 2020 **Honors Math II**, *Columbia University*.

Fall 2019 **Analysis and Probability I**, *Columbia University*.

Awards and Honours

2025 **Winner of Stochastic Process and Applications Travel Awards**, *sponsored by Elsevier*.

2021-22 **Peter and Catherine Klein Fellowship**, *for academic qualifications and contributions*, Columbia University, New York.

2021 **Stephen Della Pietra Program Associate Fellowship**, MSRI, Berkeley.

2021 **Winner of Student Paper Competition**, *Statistical theory and methodology section*, International Indian Statistical Association Conference, 2021.

2020-21 **Peter and Catherine Klein Fellowship**, *for academic qualifications and contributions*, Columbia University, New York.

2019-20 **Carl B. Boyer Memorial Fellowship**, *for academic qualifications and contributions*, Columbia University, New York.

2018 **PCM Memorial Award**, *for academic performance in M.Stat Programme*, Indian Statistical Institute, Kolkata.

2017 **D.Basu Memorial Award**, *for academic performance in B.Stat Programme*, Indian Statistical Institute, Kolkata.

2013-2018 **INSPIRE Scholarship**, *Department of Science and Technology*, Govt. of India.

Mentorship

Summer 2025 **Mentor in 'UChicago Math REU'**.
-**Students:** Xiaoxian Chen (UCLA)

Spring 2025 **Mentor in a quarter-long Reading/Research Course**.
-**Student:** Aaron Ho (UChicago)

Summer 2024 **Mentor in 'UChicago Math REU'**.
-**Students:** Shreyas Iyer (UChicago), Matthew Lys (UChicago)

Winter 2024 **Mentor in 'Association for Women in Mathematics (AWM) Mentor Network'**.
-**Student:** Ashna Jain (UMass Amherst)

Fall 2020 **Mentor in 'Twoples'**, *A Directed Reading Program for Math Undergraduates*.
-**Student:** Duncan Haystead (UC Berkeley)
-**Project Title:** The Moment Problem

Fall 2020 **Mentor in Columbia Directed Reading Program**.
-**Student:** Adiba Ejaz (Columbia)
-**Project Title:** Cover Time of a graph

Services

Organizer .

2023- **Co-organizer of UChicago Probability and Mathematical Physics Seminar**.

2020-21 **Co-organizer of Junior Integrable Probability Seminar**.

2020 **Organizer of Student Probability Seminar at Columbia**, *Spring 2020 - Fall 2020*.

Refereeing .

Annals of Probability, Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques, Electronic Journal of Probability (2), Communications in Mathematical Physics (2), Annals of Applied Probability, Duke Mathematical Journal, Journal of Statistical Physics, Random Structures & Algorithms, Publications mathématiques de l'IHÉS, Transactions of American mathematical society.

References

Ivan Corwin
Professor,
Department of Mathematics,
Columbia University.
ic2354@columbia.edu

Balint Virag
Professor,
Departments of Mathematics,
University of Toronto.
balint@math.toronto.edu

Ewain Gwynne
Professor,
Departments of Mathematics,
University of Chicago.
ewain@uchicago.edu

Jinho Baik
Professor,
Departments of Mathematics,
University of Michigan.
baik@umich.edu