Soumik Pal

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CURRENT POSITION

University of Washington, Seattle

Robert B. Warfield Jr. Endowed Faculty Fellow. *July 2020 onwards.*
Professor of **Mathematics**. *July 2018 onwards.*
Associate Chair of the Department of Mathematics. *July 2023 onwards.* [1]

Adjunct Professor of **Applied Mathematics**. *July 2016 onwards.*
Adjunct Professor of **Statistics**. *July 2024 onwards.*

PREVIOUS POSITION

University of Washington, Seattle

Tenure-track Assistant Professor of Mathematics. *July 2008– Aug 2012.*

Cornell University, Ithaca

Visiting Assistant Professor (Mathematics and ORIE) *July 2006 – June 2008.*

EDUCATION

Columbia University, New York Ph.D. *2006*.

Indian Statistical Institute, Calcutta, India Bachelor of Statistics *2000*.

RESEARCH INTERESTS

I work in probability theory. My current research focus is on the Monge-Kantorovich optimal transport problem and its applications, primarily to statistics. I also work on interacting processes, random matrix theory, random graphs and trees, and mathematical finance.

RESEARCH GRANTS and AWARDS

I am a **Fellow of the IMS** since 2025. I was a **Faculty Fellow** at the University of Washington during 2011–2013 and a **Robert B. Warfield Jr. Endowed Faculty Fellow** since 2020.
My research is/was partially supported by the following grants:

- Co-PI and the first recipient of the PIMS Research Network grant (Kantorovich Initiative) during 2022–2025.
- PI in NSF grant DMS-2052239 during 2021–2024.
- Co-PI in NSF grant DMS-2134012 Scaling Laws of Deep Learning (Scale MoDL) during 2022–2025.
- PI in NSF Infrastructure grant (PIHOT) DMS-2133244 during 2022 – 2025.
- Co-PI in NSF SSTEM 2221335 (Collaborative Research: Pacific Alliance for Low-Income Inclusion in Statistics & Data Science) during 2022–2028.

[1] This CV was last updated on October 19, 2025.

- Co-PI in PIMS Collaborative Research Grant (PIHOT) during 2021–2023.
- NSF grant DMS-1612483 during 2016–2021
- UW-RRF grant during 2016–2017
- NSF grant DMS-1308340 during 2013 – 2016
- NSF grant DMS-1007563 during 2010 – 2014

MENTORING EXPERIENCE

Ph.D. students mentored

- Tobias Johnson (2014). Faculty at CUNY.
- Andrey Sarantsev (2015). Associate Professor at University of Nevada, Reno.
- Ting-Kam Leonard Wong (2016). Assistant Professor at University of Toronto.
- David Clancy (2022). Currently a postdoc at University of Wisconsin, Madison.
- Lang Liu (2022). Joined Citadel Securities.
- Raghavendra Tripathi (2024). Currently a postdoc at NYU, Abu Dhabi.
- Current graduate student: Garrett Mulcahy.

Postdocs mentored

- Noah Forman. Assistant professor at MacMaster University.
- Moumanti Poddar. Assistant professor at IISER, Pune, India.
- Nabarun Deb. Assistant professor at University of Chicago.
- Andrea Ottolini. Assistant professor at University of Alabama, Birmingham.

PROFESSIONAL SERVICE

- With Young-Heon Kim (UBC) and Brendan Pass (U Alberta), we founded the **Kantorovich Initiative** which is a research network focussed on the mathematics and interdisciplinary applications of Monge Kantorovich Optimal Transport. Our activities are funded by PIMS and NSF. Check out `kantorovich.org`.
- Member of the **BIRS** advisory board from 2025.
- **Associate Editor** for *Bernoulli* from 2025.
- **Associate Editor** for *Electronic Journal of Probability* and *Electronic Communications in Probability* during 2021 –.
- **Associate Editor** for *The Annals of Probability* during 2012–2017.
- **Associate Editor** for *The Annals of Applied Probability* during 2010–2015.
- **Associate Editor** for *Stochastic Models* during 2019 – 2024.
- I have served as a member of the NSF Probability panel and the IMS New Researchers Committee.
- I have served as a referee for many top journals, including: *The Annals of Applied Probability*, *The Annals of Probability*, *Annals of l'Institute Henri Poincaré*, *Applied Mathematics Research Express*, *Biometrics*, *Biometrika*, *Communications in Pure and Applied Mathematics*, *Electronic Communications in Probability*, *Electronic Journal of Probability*, *ESAIM*, *Finance and Stochastics*, *IEEE, Information Theory*, *Inventiones*, *Journal of European Mathematical Society*, *Journal of Functional Analysis*, *Mathematical Finance*, *Probability Theory and Related Fields*, *Stochastic Processes and their Applications*, *Stochastic Models*, and many more.

LIST OF PUBLISHED ARTICLES

1. Computing strategies for achieving acceptability; a Monte-Carlo approach. *Stochastic Processes and their Applications* **117** 1587–1605, 2007.
2. Symmetrization of Bernoulli. *Electronic Communications in Probability* **13** 194–197, 2008.
3. One dimensional Brownian particle systems with rank dependent drifts. With J. PITMAN. *The Annals of Applied Probability* **18** (6) 2179–2207, 2008.
4. A phase transition behavior for Brownian motions interacting through their ranks. With S. CHATTERJEE. *Probability Theory and Related Fields* **147** (1-2) 123–159, 2010.
5. A combinatorial analysis of interacting diffusions. With S. CHATTERJEE. *Journal of Theoretical Probability*, **24** (4) 939–968, 2011.
6. Analysis of continuous strict local martingales using h-transforms. With P. PROTTER. *Stochastic Processes and their Applications*, **120** (8) 1424 –1443, 2010.
7. Crowding of Brownian spheres. With K. BURDZY and J. SWANSON. *ALEA: Latin American Journal of Probability and Mathematical Statistics* **7** 193–205, 2010.
8. An excursion-theoretic approach to stability of discrete-time stochastic hybrid systems. With D. CHATTERJEE. *Applied Mathematics and Optimization* **63** (2), 217–237, 2011.
9. Analysis of the market weights under the Volatility-stabilized market models. *The Annals of Applied Probability* **21** (3), 1180–1213, 2011.
10. Markov processes on time-like graphs. With K. BURDZY. *The Annals of Probability*, **39** (4), 1332–1364, 2011.
11. Archimedes' principle for Brownian liquid. With K. BURDZY and Z-Q. CHEN. *The Annals of Applied Probability* **21** (6), 2053–2074, 2011.
12. Sparse regular random graphs: spectral density and eigenvectors. With I. DUMITRIU. *The Annals of Probability* **40** (5), 2197–2235, 2012.
13. Concentration for multidimensional diffusions and their boundary local times. *Probability Theory and Related Fields* **154** (1), 225–254, 2012.
14. Convergence rates for rank-based models with applications to portfolio theory. With T. ICHIBA and M. SHKOLNIKOV. *PTRF* **156**, 415–448, 2012.
15. Extinction of Fleming-Viot-type particle systems with strong drift. With K. BURDZY and M. BIENIEK. ECP **17** (11), 2012.
16. Brownian approximation to counting graphs. *SIAM J Discrete Math* **26** (3), 1181–1188, 2012.
17. Brownian earthworm. With K. BURDZY and Z-Q. CHEN. *The Annals of Probability* **41** (6), 3697–4427, 2013.
18. Functional limit theorems for random regular graphs. With I. DUMITRIU, T. JOHNSON, and E. PAQUETTE. *PTRF* **156**, 921–975, 2013.
19. Wright-Fisher model with negative mutation rates. *The Annals of Probability* **41** (2), 503–526, 2013.

20. Concentration of measure for systems of Brownian particles interacting through their ranks. With M. SHKOLNIKOV. *The Annals of Applied Probability* **24** (4), 1482–1508, 2014.
21. Cycles and eigenvalues of sequentially growing random regular graphs. With T. JOHNSON. *The Annals of Probability* **42** (4), 1396–1437, 2014.
22. On meteors, earthworms, and wimps. With S. BILLEY, K. BURDZY, and B. SAGAN. To appear in *The Annals of Applied Probability* **25** (4) 1729–1779, 2015.
23. Systems of Brownian particles with asymmetric collisions. With I. KARATZAS and M. SHKOLNIKOV. *Annales de l'Institut Henri Poincaré (B)* **52** (1), 323–354, 2016.
24. The geometry of relative arbitrage. With T.-K. L. WONG. *Mathematics and Financial Economics* **10** (3), 263–293, 2015.
25. Embedding optimal transports in statistical manifolds. Special invited article for the *Indian Journal of Pure and Applied Mathematics*, **48** (4), 541–550, 2017.
Available at `http://arxiv.org/abs/1708.08148`.
26. Surfactant-free shape control of gold nanoparticles enabled by unified theoretical framework of nanocrystal synthesis. With M. A. WALL ET AL.. *Advanced Materials*, **29** (21) 2017. (Note: Mathematical collaboration with a group of chemists.)
27. Exponentially concave functions and a new information geometry. With T.-K. L. WONG. *The Annals of Probability*, **46** (2), 1070–1113, 2018.
28. Uniform control of local times of spectrally positive stable processes. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *The Annals of Applied Probability*, **28** (4), 2592–2634, 2018.
29. Intertwining diffusions and wave equations. With M. SHKOLNIKOV. Preprint available at `http://arxiv.org/abs/1306.0857`.
30. Exponentially concave functions and high-dimensional stochastic portfolio theory. *Stochastic Processes and their Applications* **129** (9), 3116–3128, 2019.
31. The random transposition dynamics on random regular graphs and the Gaussian free field. With S. GANGULY. *Annales de l'Institut Henri Poincaré (B)* **56**(4), 2935–2970, 2020. `http://arxiv.org/abs/1409.7766`.
32. Twin peaks. With K. BURDZY. *Random Structures & Algorithms* **56** (2), 432–460, 2020.
33. A note on transportation cost inequalities for diffusions with reflections. With A. SARANTSEV. *ECP*, **24** (21), 1–11, 2019.
34. Multiplicative Schrödinger problem and the Dirichlet transport. With T.-K. L. WONG. *Probability Theory and Related Fields* **178** (1), 613–654. 2020.
35. Projections of the Aldous chain on binary trees: intertwining and consistency. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *Random Structures and Algorithms* **57** (3), 2020.
36. Floodings of metric graphs. With K. BURDZY. *Probability Theory and Related Fields*, **177** (1), 577–620, 2020.
37. Diffusions on a space of interval partitions: construction from marked Lévy processes. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *EJP* (25), paper no. 133, 1–46, 2020.

38. Metrics on sets of interval partitions with diversity. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *ECP* **25** (38) 1–16, 2020.
39. Diffusions on a space of interval partitions: Poisson-Dirichlet stationary distributions. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *Annals of Probability* **49** (2), 793–831, 2021.
40. Can coherent predictions be contradictory? With K. BURDZY. *Advances in Applied Probability*, 53 (1), 2021.
41. Community detection in the sparse hypergraph stochastic block model. With Y. ZHU. *Random Structures and Algorithms*, **59** (3), 2021.
42. Shuffling cards by spatial motion. With PERSI DIACONIS. *Stochastic Processes and their Applications.* **152**. 2022.
43. Entropy Regularized Optimal Transport Independence Criterion. With Z. HARCHAOUI AND L. LIU. *International Conference on Artificial Intelligence and Statistics*, pages 11247–11279, PMLR 2022. Selected for oral presentation at AISTATS 2022 (only top 2.6% among 1685 submissions are selected for oral presentation).
44. Triangular Flows for Generative Modeling: Statistical Consistency, Smoothness Classes, and Fast Rates. With N. J. IRONS, M. SCETBON, AND Z. HARCHAOUI. *International Conference on Artificial Intelligence and Statistics*, pages 10161–10195, PMLR 2022.
45. Gradient flows on graphons: existence, convergence, continuity equations. With S. OH, R. SOMANI, AND R. TRIPATHI. *Journal of Theoretical Probability*. Online at `https://doi.org/10.1007/s10959-023-01271-8`. 2023.
46. Ranked masses in two-parameter Fleming-Viot diffusions. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. *Trans. Amer. Math. Soc.* **376** (2023).
47. On the difference between entropic cost and the optimal transport cost. *The Annals of Applied Probability.* **34** (1B), pages 1003–1028. 2024.
48. Asymptotics of discrete Schrödinger bridges via chaos decomposition. With Z. HARCHAOUI AND L. LIU. Preprint available at `arxiv.org/abs/2011.08963`. *Bernoulli* **30** (3), 1945-1970, 2024. A version of this work received the Best Paper award at the OTML workshop in Neurips 2021.
49. Limiting partition function for the Mallow's model: a conjecture and partial evidence. To appear in the special invited volume of the *Indian Journal of Pure and Applied Mathematics* dedicated to the memory of K. R. Parthasarathy. Preprint available at `https://arxiv.org/abs/2406.18855`. 2024.
50. The Benefits of Balance: From Information Projections to Variance Reduction. With L. LIU, R. MEHTA, Z. HARCHAOUI. Preprint available at `https://arxiv.org/abs/2408.15065` [stat.ML]. Accepted in Neurips 2024.
51. Projected Langevin Dynamics and a gradient flow for entropic optimal transport. With D. LACKER AND G. CONFORTI.
    Preprint available at `https://arxiv.org/abs/2309.08598`. To appear in *The Journal of European Math Society*.
52. Wasserstein mirror gradient flow as the limit of the Sinkhorn algorithm. With N. DEB, Y.-H. KIM, AND G. SCHIEBINGER.
    Preprint available at `https://arxiv.org/abs/2307.16421`. To appear in *The Annals of Probability*.

53. Stochastic optimization on matrices and a graphon McKean-Vlasov limit. With Z. HARCHAOUI, S. OH, R. SOMANI, AND R. TRIPATHI.
Preprint available at https://arxiv.org/abs/2210.00422. To appear in *The Annals of Applied Probability*.

PREPRINTS under review

All preprints are downloadable from the Math ArXiv.

1. The Aldous diffusion: a stationary evolution of the Brownian CRT. With N. FORMAN, D. RIZZOLO, AND M. WINKEL. Preprint available at https://arxiv.org/abs/2305.17269. 2023.
2. Path convergence of Markov chains on large graphs. With S. ATHREYA, R. SOMANI AND R. TRIPATHI.
Preprint available at https://arxiv.org/abs/2308.09214.
3. Iterated Schrödinger bridge approximation to Wasserstein gradient flows. With M. AGARWAL, Z. HARCHAOUI, AND G. MULCAHY.
Preprint available at https://arxiv.org/abs/2406.10823.
4. On the Wasserstein alignment problem. With B. SEN AND T.-K. L. WONG. Preprint available at https://arxiv.org/abs/2503.06838.

I also coauthored (with Tim Mesikepp) a textbook for undergraduates titled *Finite Markov chains and Monte-Carlo Methods: An Undergraduate Introduction* that is freely available for students at https://arxiv.org/abs/2510.14165.

MAJOR TEACHING EXPERIENCE

2023	PIMS online graduate course on Optimal Transport + Gradient Flows.
2022 -'23	Graduate probability sequence.
2021	PIMS online graduate course on Optimal Transport + Machine Learning.
2019 - '20	Year-long topics course on Monge-Kantorovich Optimal Transport.
2018 - '19	Revision of the undergraduate probability sequence.
2016-'17	Sabbatical leave (Fall). Calculus I (Spring). Advanced reading courses for two graduate students.
2015-'16	Calculus III (Fall and Spring).
2014-'15	Linear optimization (Winter). Graduate Topics Course on "Large Deviations" (Winter and Spring). Undergraduate Linear Analysis (Spring).
2013-'14	Calculus II (Fall). Linear optimization (Winter). Undergraduate Probability I (Spring).
2012-'13	Undergraduate Probability I (Winter). Linear optimization (Winter). Graduate Probability III (Spring). Graduate Topics course on "Random Matrix Theory for sparse random graphs" (Spring).
2011-'12	Calculus III (Fall). Linear optimization (Winter). Graduate Topics Course on "Optimal transport and concentration of measure" (Spring) .
2010-'11	Linear optimization (Winter).
2009-'10	Undergraduate Stochastic Processes (Fall). Undergraduate Mathematical Finance (Winter). Calculus III (Spring). Undergraduate Probability III (Spring).
2008-'09	Calculus I (Fall).

SERVICE TO THE DEPARTMENTAL COMMITTEES

- Associate Chair 2023 –.

- Director of ACMS undergraduate major 2021 – 2024.
- Planning Committee 2020-21.
- Appointments Committee 2019–'20. ACMS steering committee.
- Diversity committee. Member in 2015-'16. Member and Chair in 2016-'17. Built contacts and helped set-up policies and infrastructure towards meeting departmental diversity goals.
- Colloquium committee. Chair during 2013-'14, 2012-'13. Made colloquiums more popular and accessible by selecting speakers with highly recommended general audience communication skills and works of interdisciplinary flavor.
- Executive committee. Member in 2016-'17.
- Milliman committee. Member during 2012-'13.
- Library committee. Member during 2013-'14.
- **Service to the probability group.** Led the upgrading of the undergraduate and graduate probability sequences.

AN INCOMPLETE LIST OF CONFERENCES ORGANIZED

- BIRS-CMI workshop on Network models and Applications in Dec 2024.
- KI-KAIST summer school in optimal transport, stochastic analysis and applications to machine learning. June 2024.
- CAMS-PIMS Symposium on Optimal Transport and Applications in November 2023.
- Econometrics and optimal transport workshop in June 2023.
- Multiple KI retreats (one day conferences) in 2022 - 2023
- PRIMA congress workshop in Optimal Transport and Applications - Dec 2022.
- PIMS-IFDS-NSF Summer school in Optimal Transport - June 2022.
- Workshop titled Topology, Algebra, and Geometry in Computer Vision at the International Conference on Computer Vision - Oct 2021.
- Kantorovich Initiative kick-off workshop - Jan 2021.
- BIRS workshop on Entropic Regularization of Optimal Transport and Applications. - June 2021.
- 8th Western Conference on Mathematical Finance - March 2017.
  See `http://depts.washington.edu/amath/wcmf/`
- Conference of stochastic portfolio theory - May 2015.
  See `https://sites.google.com/site/sptconference2015/`
- PIMS Summer school in Probability - 2010.
  See `https://www.pims.math.ca/scientific-event/100621-pssp`

CONSULTING EXPERIENCE

Parametric Portfolios, Seattle.
See `http://docs.edhec-risk.com/ERI-Days-North-America-2013/presentations/2WS2.pdf`.

DOCTORAL THESIS

On capital requirements and optimal strategies to achieve acceptability. Ph.D. thesis, Columbia University, Department of Statistics. 2006. Advisor - Ioannis Karatzas.

INVITED TALKS

2024 Math of Data Science (workshop at National University of Singapore), INFORMS 2024, seminars at UBC and at the University of Washington.

2023 IDEAS Seminar at UNC Chapel-Hill (Feb), Math colloquium at University of Utah (April), ICERM workshop (May), Seminar in Brown university, IHP Paris (September), CAMS-PIMS Symposium on Optimal Transport and Applications at the American University in Beirut (November).

2022 Talks at Banff workshop on Stochastic Mass Transport (March), IMSI workshop on "Applied Optimal Transport" (May), UBC, Vancouver seminar (Sep).

2021 Seminar talks at Columbia University, ETH, Zurich. Invited conference speaker at "Schrödinger Problem and Mean-field PDE Systems: Computational and Theoretical Advances", Marseille, France.

2020 Colloquium in McMaster University (Feb), Colloquium in Applied Math at the Fields Institute, Toronto (Feb), PIMS Colloquium in University of Victoria (Jan). Canceled due to COVID: BIRS workshop on Stochastic Analysis, Mathematical Finance and Economics, BIRS workshop on Stochastic Mass Transports, plenary speaker at the conference Advances in Mathematical Finance and Optimal Transport at Centro di Giorgi, Pisa (Jun).

2019 Finger Lakes Probability Seminar, Cornell University. Thematic program on Optimal Transport at the Erwin Schrödinger Institute, Vienna, Austria. University of Vienna / IST Austria Probability seminar. Analysis seminar at UBC, Vancouver, Eigenfunctions seminar (2 lectures) at IISc, Bangalore.

2018 Seminar at UBC. Byrne Workshop at University of Michigan. Stochastic analysis and its applications, CMO Oaxaca. Summer school at IISER, Pune. Hausdorff school in Bonn on Optimal transport meets economic theory. Conference on Stochastic Analysis and its Applications, Bielefeld.

2017 Probability seminars at Duke University; Stanford University; U.C. Berkeley, University of Colorado, Boulder. Conference Invited talks at SPA 2017, Moscow, and Mathematical Finance, Probability, and Partial Differential Equations Conference at Rutgers University.

2016 IPAM workshop. Princeton University (ORFE). Hong-Kong UST. USC. Workshop at CMO, Oaxaca, on *Stochastic analysis and mathematical finance*. Plenary speaker at *Frontier probability days* conference, University of Utah.

2015 Probability seminar at the University of Chicago. Conference/workshop at Banff on *Groups, graphs, and stochastic processes* and in ETH Zurich on mathematical finance.

2014 Seminars at UC Berkeley, Columbia University, USC. Conference in honor of Jim Pitman at UCSB. IMS annual meeting Sydney, UW-Applied Math, University of Vienna, TU Vienna.

2013 University of Minnesota, Minneapolis, University of North Carolina at Chapel Hill.

2012 Seminars on Stochastic Processes 2012. Conference in honor of Ioannis Karatzas, Columbia University, probability seminars at CMU and MIT.

2011 Columbia University, FOCM, Budapest. IISA, Raleigh NC. Workshop on Stochastic Analysis, Banff. UW Madison (Probability Seminar), Math Day at the UW.

2010 Microsoft Research, Redmond. AMS Sectional meeting, Albuquerque. HKUST.

2009 Oregon State University, Stanford University, UC Santa Barbara, IISc Bangalore, ISI Bangalore, UT Austin, Third Western Conference in Math Finance (UCSB), Univ of WA (Probability seminar).

2008 Microsoft Research *NW Probability seminar*, Univ of WA *Statistics seminar*, UC Davis, UC San Diego, Cornell Univ.

2007 UW Madison, UC Berkeley, UCLA, Courant Institute, UC Irvine, Purdue Univ., UW Seattle, Cornell University, Rutgers Univ., Cornell University *3rd. Summer School in Probability*, CMU.

2006 Indian Statistical Inst., Univ. of Rochester, Cornell University, Univ. of Paris VI, Univ. of Conn., Stoors *Internat. Workshop on Appl. Prob., IWAP*, City Univ. of New York, CMU-Columbia-Cornell-Princeton *Conference on Math Finance.*

2005 EURANDOM, The Netherlands *Workshop on Risk Measures*, Princeton University *Columbia-Princeton Probability Day*, Columbia University.

SHORT ACADEMIC VISITS

Australian National University, Canberra *Dec 2022*.
ETH, Zurich *Sep 2015*.
University of Vienna, Vienna *Nov 2014*.
University of Paris VI, Paris *June 2006*.
Indian Institute of Science, Bangalore *August 2010*.
Hong Kong University of Science and Technology, Hong Kong *December 2010*.