

CURRICULUM VITAE

SUMIT MUKHERJEE

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EDUCATION

- 09/2009–06/2014 Ph.D. in Statistics at Stanford University
Thesis: Estimation in exponential families with unknown normalizing constant
Advisor: Professor Persi Diaconis
- 07/2007–05/2009 Master’s in Statistics at Indian Statistical Institute.
- 07/2004–05/2007 Bachelor’s in Statistics at Indian Statistical Institute.
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POSITIONS HELD

- 07/2020–present Associate professor, Department of Statistics, Columbia University.
- 07/2014–06/2020 Assistant professor, Department of Statistics, Columbia University.
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GRANTS AND AWARDS

- NSF Grant DMS-2113414 as PI (\$170,000), Time frame: July 2021-June 2025.
- NSF Grant DMS-1712037 as PI (\$197,120), Time frame: July 2017-June 2021.
- Lenfest Jr Faculty Development Grant Award in 2021 (\$3,000)
- NSF Grant DMS-1939082 (\$30,000) as PI for organizing the conference “Talking across Fields” at Stanford University in January 2020.
- Department of Statistics teaching award in the academic year 2012-2013 at Stanford University for outstanding service as a teaching assistant.
- *Mahalanobis Internation Symposium on Statistics Prize* in 2009 for the most outstanding Masters of Statistics student in Statistics at the Indian Statistical Institute during 2007-2009.
- *ISIAA MRS. M.R. Iyer Gold Medal* for outstanding performance in Bachelor of Statistics Examination at the Indian Statistical Institute for the year 2007.
- National Board of Higher Mathematics (NBHM) scholarship in 2007-2009.

RESEARCH INTERESTS

- **Inference on Ising models**

Asymptotics of the normalizing constant/partition function, inference on parameters using pseudo-likelihood, fluctuations of magnetization (sum of spins)

- **Persistence of Gaussian processes**

Decay rate of probability that a stationary Gaussian process persists/stays above a level line for a long time. Existence and properties of the exponent which governs the decay rate.

- **Random Permutations**

Non uniform probability distributions on the space of permutations (such as Mallows models), and their connection to permutation limit theory (analogous to graph limit theory). Limit distributions for commonly studied permutation statistics.

- **Exponential Random Graph Models (ERGM)**

Inference on ERGMs, degeneracy, limit distributions for statistics on graphs.

- **Generalized Birthday Problem**

Asymptotic distribution of number of monochromatic copies of a subgraph (cycles, stars, cliques) in a big graph, when the vertices of the big graph are colored uniformly at random.

PEER-REVIEWED PUBLICATIONS

1. S. Bhattacharya, N. Deb and S. Mukherjee,
LDP for Inhomogeneous U-Statistics, To appear at *Annals of Applied Probability*.
2. B. Bhattacharya, S. Das, S. Mukherjee and S. Mukherjee,
Fluctuations of Quadratic Chaos,
Communications in Mathematical Physics, 405(237), 2024.
3. D. Lacker, S. Mukherjee, and L.C. Yeung,
Mean field approximations via log-concavity,
International Mathematics Research Notices, 2024(7): 6008-6042, 2024.
4. Y. Xu and S. Mukherjee,
Signal Detection in Degree Corrected ERGMs,
Bernoulli, 30(3): 1746-1773, 2024.
5. Y. Xu and S. Mukherjee,
Inference in Ising models on dense regular graphs,
Annals of Statistics, 51(3): 1183-1206, 2023.
6. J. Borga, S. Das, S. Mukherjee and P. Winkler,
Large deviation principle for random permutations ,
International Mathematics Research Notices, 2024(3): 2138-2191, 2024.

7. N. Deb, R. Mukherjee, S. Mukherjee and M. Yuan,
Detecting Structured Signals in Ising Models,
Annals of Applied Probability, 34 (1A):1-45, 2024.
8. N. Deb and S. Mukherjee,
Fluctuations in Mean-Field Ising models,
Annals of Applied Probability, 33(3), 1961-2003, 2023.
9. F. Aurzada and S. Mukherjee,
Persistence probabilities of weighted sums of stationary Gaussian sequences,
Stochastic Processes and their Applications, 159: 286-319, 2023.
10. S. Mukherjee and S. Sen,
Variational Inference in high-dimensional linear regression,
Journal of Machine Learning Research, 23(304):1-56, 2022.
11. S. Mukherjee and Y. Xu,
Statistics of the two star ERGM,
Bernoulli, 29(1):24-51, 2023.
12. B.B. Bhattacharya, S. Das and S. Mukherjee,
Motif Estimation via Subgraph Sampling: The Fourth Moment Phenomenon,
Annals of Statistics, 50(2):987-1011, 2022.
13. B.B. Bhattacharya, S. Mukherjee and S. Mukherjee,
Asymptotic Distribution of Bernoulli Quadratic Forms,
Annals of Applied Probability, 31(4):1548-1597, 2021.
14. F. Aurzada, S. Mukherjee and O. Zeitouni,
Persistence exponents in Markov chains,
Annales Henri Poincaré, 57(3):1411-1441, 2021.
15. S. Mukherjee,
Degeneracy in sparse ERGMs with functions of degrees as sufficient statistics,
Bernoulli, 26(2):1016-1043, 2020.
16. P. Ghosal and S. Mukherjee,
Joint estimation of parameters in Ising model,
Annals of Statistics, 48(2):785-810, 2020.
17. B.B. Bhattacharya, S. Mukherjee and S. Mukherjee,
Birthday Paradox, Monochromatic Subgraphs, and the Second Moment Phenomenon,
SIAM Journal of Discrete Mathematics, 34(1):794-824, 2019.
18. B.B. Bhattacharya and S. Mukherjee,
Monochromatic Subgraphs in Randomly Colored Graphons,
European Journal of Combinatorics, 81:328-353, 2019.
19. B.B. Bhattacharya and S. Mukherjee,
Limit Theorems for Monochromatic Stars,
Random Structures and Algorithms, 55:831-853, 2019.

20. S. Chatterjee and S. Mukherjee,
On Estimation in Tournaments and
Graphs under Monotonicity Constraints,
IEEE Transactions of Information Theory, 65:3525-3539, 2019.
21. R. Mukherjee, S. Mukherjee and S. Sen,
Detection Thresholds for the β -Model on Sparse Graphs.
Annals of Statistics, 46(3):1288-1317, 2018.
22. R. Mukherjee, S. Mukherjee and M. Yuan,
Global Testing Against Sparse Alternatives under Ising Models,
Annals of Statistics, 46(5):2062-2093, 2018.
23. B.B. Bhattacharya and S. Mukherjee,
Inference in Ising models,
Bernoulli, 24(1):493-525, 2018.
24. B.B. Bhattacharya, and S. Mukherjee,
Degree sequence of random permutation graphs,
Annals of Applied Probability, 27(1):439-484, 2017.
25. B.B. Bhattacharya, P. Diaconis and S. Mukherjee,
Universal Poisson and Normal Limit Theorems in Graph Coloring Problems with Connections to
Extremal Combinatorics,
Annals of Applied Probability, 27(1):337-394, 2017.
26. A. Dembo, and S. Mukherjee,
Persistence of Gaussian process: non summable correlations,
Probability Theory and Related Fields, 169(3):1007-1039, 2017.
27. A. Basak and S. Mukherjee,
Universality of the mean-field for the Potts model,
Probability Theory and Related Fields, 168(3):557-600, 2017.
28. S. Mukherjee,
Fixed points and cycle structure of random permutations,
Electronic Journal of Probability, 21:1-18, 2016.
29. S. Mukherjee,
Estimation in exponential families on permutations,
Annals of Statistics, 44(2):853-875, 2016.
30. B.B. Bhattacharya and S. Mukherjee,
Exact and Asymptotic Results on Coarse Ricci Curvature of Graphs,
Discrete Mathematics, 338(1):23-42, 2015.
31. A. Dembo and S. Mukherjee,
No zero-crossings for random polynomials and the heat equation,
Annals of Probability, 43(1):85-118, 2015.

PREPRINTS

32. P. Ghosal and S. Mukherjee,
Universality of Persistence of Random Polynomials, Arxiv 2024.
33. H. Lyu and S. Mukherjee,
Concentration and limit of large random matrices with given margins, Arxiv 2024.
34. S. Mukherjee, J. Qiu and S. Sen,
On Naive Mean-Field Approximation for high-dimensional canonical GLMs, Arxiv 2024.
35. S. Mukherjee, B. Sen and S. Sen,
A Mean Field Approach to Empirical Bayes Estimation in High-dimensional Linear Regression , Arxiv 2023.
36. S. Bhattacharya, N. Deb and S. Mukherjee,
Gibbs Measures with Multilinear Forms, Arxiv 2023.
37. S. Mukherjee and D. Tagami
Inference on a class of exponential families on permutations, Arxiv 2023.
38. N.D. Feldheim, O.N. Feldheim and S. Mukherjee,
Persistence and Ball Exponents for Gaussian Stationary Processes, Arxiv 2021.
39. C.C. Margossian and S. Mukherjee,
Simulating Ising and Potts models at critical and cold temperatures using auxiliary Gaussian variables, Arxiv 2021.

INVITED SEMINAR TALKS

- University of Pennsylvania, November 2024.
- Cornell University. October 2024.
- Georgia Institute of Technology, November 2023.
- Brown University, May 2023.
- Ohio State University, March 2023.
- University of Victoria, October 2022.
- University of Denver, February 2022.
- Columbia University, January 2022.
- University of Luxembourg, November 2021
- Dartmouth, November 2021
- Indian Institute of Science, November 2021
- University of Pennsylvania, November 2021
- Seattle, October 2021

- Wisconsin Madison, October 2021
- Rutgers University, October 2021
- Texas A&M, October 2021
- Oxford, October 2021
- Cambridge, October 2021
- Yale, September 2021
- CMU, September 2021
- JSM Seattle, August 2021.
- University of Washington, Seattle, April 2021.
- University of California, Berkeley, April 2021.
- University of Chicago, March 2021.
- University of Connecticut, March 2021.
- University of Illinois at Urbana-Champaign, March 2021.
- Cornell University, March 2021.
- University of Southern California, November 2020.
- Joint Israeli Probability Seminar, November 2020.
- Harvard University, November 2020.
- New Jersey Institute of Technology, October 2020.
- Student Seminar in Statistics, Columbia University, October 2020.
- Stanford University, January 2020.
- Massachusetts Institute of Technology, November 2018.
- Student Seminar in Statistics, Columbia University, November 2018.
- University of Pennsylvania, April 2018.
- Georgia Institute of Technology, March 2017.
- Student Seminar in Statistics, Columbia University, January 2017.
- Massachusetts Institute of Technology, October 2016.
- University of Delaware, March 2016.
- University of Pennsylvania, March 2016.
- University of Alabama, February 2016.
- Indian Statistical Institute, January 2016.
- Student Seminar in Statistics, Columbia University, October 2015.
- Stanford University, July 2015.
- Indian Statistical Institute, January 2015.

- City University of New York, October 2014.
 - Student Seminar in Statistics, October 2014.
 - Pittsburgh University, March 2014.
 - Columbia University, February 2014.
 - Iowa State University, February 2014.
 - University of California Los Angeles, January 2014.
 - Stanford University, October 2013.
 - Indian Statistical Institute, January 2012.
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INVITED WORKSHOP/CONFERENCE TALKS

- INFORMS Applied Probability Society Conference, Atlanta, July 2025.
- Spring 2025 AMS Eastern Sectional Meeting, Hartford, April 2025.
- Efficient Approximate Bayesian Inference, BIRS workshop, March 2025.
- Fall 2024 AMS Eastern Sectional Meeting, Albany, October 2024.
- Joint Mathematical Meetings, San Francisco, January 2024.
- Midwest Probability Colloquium, Northwestern University, October 2023.
- Asymptotic Limits of Discrete Random Structures, ICERM, September 2023.
- Simons Institute for the Theory of Computing, Berkeley, September 2022.
- IMS Program “Stein’s Method: The Golden Anniversary” (Singapore), June 2022.
- EcoSta 2022 (Japan), June 2022.
- Joint Statistical Meetings, Virtual , August 2021.
- International Indian Statistical Association (IISA), May 2021.
- Spring Eastern Sectional Meeting of the AMS, March 2021.
- Oberwolfach, September 2020.
- EcoSta 2019 (Taiwan), May 2019.
- South Eastern Probability Conference (young speakers edition), May 2018.
- Berkeley-Columbia Meeting in Engineering and Statistics, April 2018.
- Stochastic Processes and their Applications, Moscow, July 2017.
- Joint Statistical Meetings, Chicago, July 2016.
- Stochastic processes under constraints (Augsburg University), July 2016.
- CRiSM workshop, Warwick University, April 2016
- Institute for Applied Statistics in Sri Lanka (IASSL), December 2014.
- International Indian Statistical Association (IISA), July 2014.

PROFESSIONAL ACTIVITIES

- Associate Editor for *Sankhya* (Series A) from 2021.
- Associate Editor for JASA/TAS Book Reviews from Jan 2020-December 2023.
- Served in the IMS committee on new researchers from Aug 2016-Aug 2019.

CONFERENCE/SESSION ORGANIZATION

- Co-organized the conference *Networks, Random Graphs and Statistics* at Columbia University in May 2016, with Yang Feng and Peter Orbanz.
- Co-organized the conference *Inference on Graphical Models* at Columbia University in October 2019, with Ming Yuan.
- Co-organized the conference *Talking across Fields* at Stanford University in January 2020, with Bhaswar Bhattacharya, Sourav Chatterjee and Amir Dembo.
- Organized the invited session *Recent Advances in Statistical Network Analysis* at JSM in August, 2021.
- Organized the invited session *Mean-field models in Probability and Statistics* at Informs in July, 2025.

MENTORING ACTIVITIES

PhD students

- Nabarun Deb, co-advised by Bodhi Sen, graduated in 2022.
- Yuanzhe Xu, graduated in 2024.
- Jaesung Son, graduated in 2024.
- Seunghyun Lee, expected graduation in 2025.
- Victor Daniel, expected graduation in 2028.

Masters students

- Diahmin Hawkins (Bridge to PhD scholar), co-advised by Tian Zheng.

Under graduate students

- Daiki Tagami

PHD ORAL/DEFENSE EXAMS

- Diego Franco Saldana (Defense Exam, graduated in 2016)
- Morgane Austern (Defense Exam, graduated in 2019)
- Chi Wing Chu (Oral+Defense Exam, graduated in 2021)
- Rishabh Dudeja (Oral+Defense Exam, graduated 2021)
- Miguel Garcia (Oral Exam, graduated in 2021)
- Chaoyu Yuan (Defense Exam, graduated in 2021)
- Andrew Davison (Defense Exam, graduated in 2022)
- Alejandra Quintos (Oral+Defense Exam, graduated in 2022)
- Nabarun Deb (Oral+Defense Exam, graduated in 2022)
- Charles Margossian (Oral+Defense Exam, graduated in 2022)
- Yuanzhe Xu (Oral+Defense Exam, graduated in 2022)
- Alessandro Grande (Oral+Defense Exam, graduated 2022)
- William Reed Palmer (Oral+Defense Exam, graduated in 2023)
- Lane Chun Yeung (Oral+Defense Exam, graduated in 2023)
- Yilin Guo (Oral+Defense Exam, graduated in 2023)
- Jiaze Qiu (Defense Exam, Harvard university, graduated in 2023)
- Jaesung Son (Oral+Defense Exam, graduated in 2024)
- Ruchira Ray (Oral Exam, expected graduation in 2025)

COMMITTEES SERVED

- Co-organized the Statistics Seminar in 2 years (2014-2016).
- Served as Inference Qualifying Exam Chair in 5 years (2015-2018, 2020-2021, 2023-2024).
- Served in the Inference Qualifying Exam Committee in 8 years (2015-2024).
- Served in the Probability Qualifying Exam Committee in 1 year (2023-2024).
- Co-organized the Applied Probability Seminar in 6 years (2016-2021, 2023-2024).
- Served in the PhD Admissions Committee in 4 years (2018-2021,2023-2024).
- Served in the Core Competency Exam Committee for 6 years (2018-2024).
- Served in the Term Faculty Recruitment Committee in 2 years (2019-2020, 2022-2023).
- Chair of the Core Competency Exam Committee in 1 year (2020-2021)
- Served in the MA admissions committee in 2 years (2021-2022, 2022-2023)
- Served in the Statistics undergraduate advisory Committee in 1 year (2023-2024).
- Served in Yubo Wang's Faculty Review Committee.
- Served in Abraham Weishaus's Faculty Review Committee.
- Served in Marco Avella Medina's Mentoring Committee.

TEACHING EXPERIENCE

- Columbia University
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 - Probability I (GR 6301) in Fall 2023.
 - Topics in Modern Statistics (UN3293) in Spring 2023.
 - Topics in Probability Theory (GR6303) in Fall 2022.
 - Theoretical Statistics II (GR6202) in Spring 2022.
 - Undergraduate Mentored Research (W3107) in Spring 2021.
 - Introduction to Statistics with Calculus (UN1201) in Spring 2021.
 - Theoretical Statistics I (GR6201) in Fall 2020
 - Topics in Probability Theory (GR8301) in Spring 2020
 - Introduction to Statistics with Calculus (UN1201) in Fall 2019
 - Theoretical Statistics II (GR6202) in Spring 2018.
 - Theoretical Statistics I (GR6201) in Fall 2017.
 - Theoretical Statistics II (GR6202) in Spring 2017.
 - Theoretical Statistics I (GR6201) in Fall 2016.
 - Introduction to Statistical Inference (W3107)
 - Theoretical Statistics II (G6108) in Spring 2016.
 - Theoretical Statistics I (G6107) in Fall 2015.
 - Mathematical Methods for Statistics (W3103) in Fall 2014.

- Stanford University
 - Was the instructor for Probability Theory in a preparatory course for the first year PhD students for the upcoming qualifying exams, during the timeframe 2011-2013.