

Subhabrata Sen

Curriculum Vitae

Department of Statistics
Harvard University
1 Oxford Street, SC 713, Cambridge-02138
☎ +1 617 998 2402
✉ subhabratasen@fas.harvard.edu

Employment

- 2019- **Assistant Professor**, *Department of Statistics, Harvard University*
- 2017-2019 **Schramm Postdoctoral Fellow**, *Microsoft Research New England and Massachusetts Institute of Technology, Department of Mathematics*

Education

- 2013-2017 **Ph.D.**, *Department of Statistics, Stanford University*
-Advisor- Dr. Amir Dembo and Dr. Andrea Montanari.
- Thesis title- Optimization, Random Graphs, and Spin glasses.
- 2011-2013 **M.Stat**, *Indian Statistical Institute, Kolkata, India*
- 2008-2011 **B.Stat (Hons)**, *Indian Statistical Institute, Kolkata, India*

Awards and Honors

- 2022 **NSF CAREER Award**, *Statistical Inference in high-dimensions using Variational Approximations, 2023-2028.*
- 2022 **Invited Tutorial Lecturer**, *Georgia Tech AI Institute for Advances in Optimization*
- 2022 **Long term Visitor**, *Program on Graph limits and Processes on Networks, Simons Institute for the Theory of Computing, UC Berkeley*
- 2021 **Long term Visitor**, *Program on Computational Complexity of Statistical Inference, Simons Institute for the Theory of Computing, UC Berkeley*
- 2020 **Extraordinary Teaching in Extraordinary Times**, *Harvard College*
- 2018 **AMS Simons Travel Grant**
- 2018 **Bernoulli Society New Researcher Award**, *Honorable mention*
- 2017 **Probability Dissertation Award**, *Department of Statistics, Stanford University*
- 2014 **IISA Student Paper Competition**, *winner in Theory category*
- 2013-2016 **William R. and Sara Hart Kimball endowed Stanford Graduate Fellowship**
- 2013 **Mrs. M.R. Iyer Memorial Award**, *for academic performance in M.Stat*

- 2013 **Prasanta Chandra Mahalanobis Memorial Award**, *for academic performance in M.Stat*
- 2011 **Nikhilesh Bhattacharya Memorial Award**, *for academic performance in B.Stat*
- 2011 **D.Basu Memorial Award**, *for academic performance in the B.Stat Programme*
- 2011 **Mrs. M.R. Iyer Memorial Gold Medal**, *for the highest aggregate in B.Stat (2008-11)*
- 2010-2011 **Indian Academy of Sciences Summer Research Fellowship**
- 2008-2013 **INSPIRE Scholarship**, *Department of Science and Technology, Govt. of India*

Preprints and Publications

- 2023 **Bayes optimal learning in high-dimensional linear regression with network side information**
- with Sagnik Nandy, in submission, IEEE IT
- 2022 **Random linear estimation with rotationally-invariant designs: Asymptotics at high temperature**
- with Yufan Li, Zhou Fan and Yihong Wu, in submission, IEEE IT, conference version accepted at ISIT
- 2022 **Sparse Signal Detection in Heteroscedastic Gaussian Sequence Models: Sharp Minimax Rates**
- with Julien Chhor and Rajarshi Mukherjee, in submission, Bernoulli.
- 2022 **Spectral Universality of Regularized Linear Regression with Nearly Deterministic Sensing Matrices**
- with Rishabh Dudeja and Yue Lu, in submission, IEEE IT.
- 2022 **A New Central Limit Theorem for the Augmented IPW Estimator: Variance Inflation, Cross-Fit Covariance and Beyond**
- with Kuanhao Jiang, Rajarshi Mukherjee and Pragya Sur, Annals of Statistics (major revision)
- 2022 **High-dimensional Asymptotics of Langevin Dynamics in Spiked Matrix Models**
- with Tengyuan Liang and Pragya Sur, Information and Inference (major revision)
- 2022 **Universality of Approximate Message Passing with Semi-Random Matrices**
- with Rishabh Dudeja and Yue Lu, Annals of Probability (to appear)
- 2022 **The TAP free energy for high-dimensional linear regression**
- with Jiaze Qiu, Annals of Applied Probability (to appear)

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- 2021 **TAP equations for orthogonally invariant spin glasses at high temperature**
- with Zhou Fan and Yufan Li, in submission, Probability and Mathematical Physics
- 2021 **Regret Minimization in Isotonic, Heavy-Tailed Contextual Bandits via Adaptive Confidence Bands**
- with Sabyasachi Chatterjee, Electronic Journal of Statistics (major revision)
- 2021 **Variational Inference in high-dimensional linear regression**
- with Sumit Mukherjee, Journal of Machine Learning Research
- 2020 **Contextual Stochastic Block Model: Sharp Thresholds and Contiguity**
- with Chen Lu, Journal of Machine Learning Research
- 2020 **A large deviation principle for block models**
- with Christian Borgs, Jennifer Chayes, Julia Gaudio, Samantha Petti, Combinatorics, Probability and Computing (accept modulo minor revisions)
- 2020 **On Minimax Exponents of Sparse Testing**
- with Rajarshi Mukherjee
- 2019 **The Overlap Gap Property in Principal Submatrix Recovery**
- with David Gamarnik and Aukosh Jagannath, Probability Theory & Related Fields, 181.4(2021):757-814.
- 2019 **Limits of Sparse Configuration Models and Beyond: Graphexes and Multi-Graphexes**
- with Christian Borgs, Jennifer T. Chayes, Souvik Dhara, Annals of Probability, 49.6 (2021):2830-2873.
- 2019 **Large deviation for uniform graphs with given degrees**
- with Souvik Dhara, Annals of Applied Probability, 32.3(2022):2327-2353.
- 2018 **Long ties accelerate noisy threshold-based contagions**
- with Dean Eckles, Elchanan Mossel and M. Amin Rahimian.
- 2018 **Contextual Stochastic Block Models**
- with Yash Deshpande, Andrea Montanari and Elchanan Mossel, Neural Information Processing Systems (NeurIPS) 2018 (spotlight).
- 2018 **Preferential Attachment when Stable**
-with Svante Janson and Joel Spencer, Advances in Applied Probability, 51.4(2019):1067-1108.
- 2018 **The threshold for refutation of random regular NAE 3-SAT**
- with Yash Deshpande, Andrea Montanari, Ryan O' Donnell and Tselil Schramm, ACM-SIAM Symposium on Discrete Algorithms (SODA) 2019.
- 2017 **On the unbalanced cut problem and the generalized Sherrington-Kirkpatrick model**
- with Aukosh Jagannath, Annales de l'Institut Henri Poincare (D), 8.1 (2020): 35-88.

- 2017 **Testing Degree corrections in Stochastic Block Models**
 - with Rajarshi Mukherjee, *Annales de l'Institut Henri Poincaré (B)*, 57.3(2021): 1583-1635.
- 2017 **A connection between Max κ -cut and the inhomogeneous Potts spin glass in the large degree limit**
 - with Aukosh Jagannath and Justin Ko, *Annals of Applied Probability*, 28.3(2018):1536-1572.
- 2016 **Phase transitions of extremal cuts for the configuration model**
 - with Souvik Dhara and Debankur Mukherjee, *Electronic Journal of Probability*, Vol 17, paper-86.
- 2016 **Detection Thresholds for the β Model on Sparse Graphs**
 - with Rajarshi Mukherjee and Sumit Mukherjee, *Annals of Statistics*, 46.3(2018):1288-1317.
- 2016 **Optimization on Sparse Random Hypergraphs and Spin Glasses**
 - *Random Structures & Algorithms*, 53.3(2018), 504-536.
- 2016 **Optimal Adaptive Inference in Random Design Binary Regression**
 - with Rajarshi Mukherjee, *Bernoulli*, 24.1 (2018), 699-739.
- 2015 **High temperature asymptotics of orthogonal mean field spin glasses**
 - with Bhaswar B. Bhattacharya, *Journal of Statistical Physics*, 162.1(2016), 63-80.
- 2015 **Semidefinite Programs on Sparse Random Graphs and Applications to Community Detection**
 - with Andrea Montanari, Conference version in Proceedings of 48th STOC (2016).
- 2015 **Extremal Cuts of Sparse Random Graphs**
 - with Amir Dembo and Andrea Montanari, *Annals of Probability*, 45.2 (2017), 1190-1217.
- 2011 **Some observations on HC-128**
 -with S. Moitra, G.Paul and R. Sengupta
 -“Designs, Codes and Cryptography”, Volume 59, Numbers 1-3, 231-245, DOI: 10.1007/s10623-010-9459-8

Tutorial

- 2022 **A Short Tutorial on Mean-Field Spin Glass Techniques for Non-Physicists**
 - with Andrea Montanari

Invited Talks

- 2023 **Invited Talk**, *Cargese Stat Phys and ML back together again*
 2023 **Flair Seminar**, *EPFL*

- 2023 **Invited Talk**, *GRAMSIA workshop*, Harvard CMSA
- 2023 **Invited Talk**, *Session on “Robust network inference”*, IISA conference
- 2023 **Invited Talk**, *Approximation Methods in Bayesian Analysis*, CIRM Luminy
- 2023 **Invited Talk**, *Mathematical Physics of Complex Systems*
- 2023 **Probability Seminar**, *UC Davis Mathematics*
- 2023 **Probability Seminar**, *Waterloo Statistics*
- 2022 **Statistics Colloquium**, *Cornell Statistics*
- 2022 **Invited Talk**, *Allerton Conference*
- 2022 **Statistics Colloquium**, *Texas A&M Statistics*
- 2022 **Invited Talk**, *Deep Learning Workshop and Summer school*, Simons Institute, UC Berkeley
- 2022 **Statistics and Stochastics seminar**, *MIT IDSS*
- 2021 **Invited Talk**, *Random Graphs and Statistical Inference: New Methods and Applications*, BIRS
- 2021 **Statistics Colloquium**, *Stanford Statistics*
- 2021 **Probability Seminar**, *Duke Mathematics*
- 2021 **Invited Talk**, *IMS Asia Pacific Rim Conference*, Melbourne (deferred due to COVID)
- 2020 **Probability Seminar**, *MIT Mathematics*
- 2020 **Probability Seminar**, *University of Wisconsin, Madison*
- 2020 **Invited Talk**, *Learning in Networks*, BIRS CMO (cancelled due to COVID)
- 2020 **Invited Talk**, *Computational Phase Transitions*, Simons Institute for the Theory of Computing
- 2020 **Invited Talk**, *Workshop on Critical and Collective Effects in Graphs and Networks*, Cape Cod, MA (deferred due to COVID)
- 2020 **Invited Talk**, *Youth in high dimensions*, ICTP, Trieste, Italy
- 2020 **Invited Talk**, *Eurandom workshop on graph limits*, EURANDOM Netherlands (cancelled due to COVID)
- 2019 **Department Colloquium**, *Indian Statistical Institute*
- 2019 **Probability Seminar**, *Brown University*
- 2019 **Data Science Seminar**, *UCSD Halicioglu Data Science Institute*
- 2019 **Statistics Seminar**, *CMU Statistics Department*
- 2019 **Data Science Seminar**, *NYU Center for Data Science*

- 2019 **Department Colloquium**, *Univ. of Illinois at Chicago Stat and Math*
- 2019 **Statistics Seminar**, *UChicago Statistics Department*
- 2019 **Department Colloquium**, *Harvard Statistics Department*
- 2019 **Department Seminar**, *UIUC Statistics Department*
- 2019 **Department Colloquium**, *Wharton Statistics Department*
- 2019 **ORFE Colloquium**, *Princeton ORFE*
- 2019 **Mathematics Colloquium**, *Georgia Institute of Technology*
- 2019 **Statistics Seminar**, *Duke University*
- 2018 **Applied Probability and Risk seminar**, *Columbia University*
- 2018 **Spin Glasses and Related Topics Workshop**, *BIRS*
- 2018 **Probability Seminar**, *Indian Statistical Institute*
- 2018 **Statistics and Stochastics Seminar**, *MIT IDSS*
- 2017 **Stochastics Seminar**, *Georgia Institute of Technology*
- 2017 **Combinatorics Seminar**, *Massachusetts Institute of Technology*
- 2017 **Random Matrix and Probability Theory Seminar**, *Harvard University*
- 2017 **Combinatorics Seminar**, *University of Bristol*
- 2017 **CRM-IMPA Joint Workshop**, *Challenges at the Interface of Optimization and Stochastic Processes*
- 2017 **Joint Mathematical Meeting**, *Atlanta*
-Session on Spin Glasses and Disordered Media.
- 2016 **Probability Seminar**, *University of Minnesota*
- 2016 **Probability Seminar**, *Courant Institute, NYU*
- 2016 **Probability Seminar**, *UC Berkeley*
- 2015 **PIMS Summer School 2015**, *Montreal*
- 2014 **IISA Conference 2014**, *Riverside*
- Awarded the best student paper award in the Theory category.
- 2014 **SIAM Conference on Discrete Mathematics**, *Minneapolis*
-contributed talk in the session on Random Structures.
- 2013 **Probability Seminar**, *ISI Delhi*
- 2013 **Prasanta Chandra Mahalanobis Memorial Lecture**, *ISI Kolkata*
- 2011 **D.Basu Memorial Lecture(2008-11)**, *ISI Kolkata*
-“Random Walks and Electrical Networks”

Mentoring and student collaborations

Postdoc

- Rishabh Dudeja, (2021-2023) (joint with Prof. Yue Lu.)

- Julien Chhor, (2022-2024) (joint with Prof. Rajarshi Mukherjee.)
Ph.D.
- Dieyi Chen, Harvard Statistics (2023) (thesis committee).
- Sagnik Nandy, UPenn Wharton (2024) (joint work).
- Xiaomin Li, SEAS (2024) (thesis committee).
- Hong Hu, Harvard SEAS (2021) (thesis committee).
- Yufan Li, Harvard Statistics (2025 expected) (advisor).
- Yucong Ma, Harvard Statistics (2021) (thesis committee).
- Jiaze Qiu, Harvard Statistics (2024 expected) (advisor).
- Chen Lu, MIT Mathematics (2023 expected) (thesis committee).
- Samantha Petti, Georgia Tech. ACO (2020) (joint work).
- Julia Gaudio, MIT Operations Research (2020) (joint work).

Undergraduate

- William Hartog (undergraduate thesis).
- Karissa Huang (undergraduate thesis).
- Nancy Hu (undergraduate thesis).
- David Ma (undergraduate thesis).
- Richard Xu (undergraduate thesis).
- Chang Yu (summer research and undergraduate thesis).
- Jing Shang (undergraduate thesis).
- Lauren Chen (undergraduate research).

Teaching

Courses Taught:

- 2023(S) STAT 217: High-dimensional statistics: methods from statistical physics.
- 2021(S) STAT 171: Stochastic Processes (UG). (also 2022(S), 2023 (S))
- 2021(S) Probability II (PhD).
- 2020(S) Probability II (PhD).
- 2020(S) The Art and Practice of Teaching Statistics(PhD). (co-instructed with Xiao-Li Meng)
- 2019(F) The Art and Practice of Teaching Statistics(PhD). (co-instructed with Xiao-Li Meng)
- 2019(S) Seminar in Information Theory(UG).
- 2019(F) Differential Equations(UG).

Tutorials:

- 2017 Spin glass methods for community detection (1 hr), Connecting Communities via the block model, American Institute of Mathematics.

Grants

- 2022 Air Force Office of Scientific Research, *Analyzing multi-layer networks via graphex models*.
- 2022 Office of Naval Research, *Estimating the treatment effect in high-dimensions under interference*.
- 2022 NSF CAREER Award, *Statistical inference in high-dimensions using Variational Approximations*.
- 2020 Harvard Dean's Competitive Fund, *Rigorous Variational Bayes in high dimensions*.

Workshop Organization

- 2022 Radcliffe Exploratory Seminar, *Exploring and Exploiting High-dimensional Phenomena in Statistical Learning and Inference*, joint with Prof. Yue Lu and Prof. Pragya Sur.

Service

Journal Reviewer:

- Stat Annals of Statistics, Journal of the American Statistical Association, Journal of the Royal Statistical Society (B), Annals of Applied Statistics, Mathematical Statistics and Learning.
- Probability Annals of Probability, Proceedings of the AMS, Random Structures & Algorithms, SIAM Journal for Discrete Mathematics, Electronic Communications in Probability, Journal of Theoretical Probability, Probability Theory Related Fields.
- EE IEEE Transactions on Information Theory.
- CS SIAM Journal of Computing.
- ML Journal of Machine Learning Research.

Conference Reviewer:

- CS FOCS, STOC, SODA.
- ML NeurIPS, COLT.
- EE ISIT.

Grant Proposal Reviewer:

- Probability Dutch Research Council (NWO).
- Statistics Israel Science Foundation (ISF).

Departmental Service:

- Graduate Admissions Harvard Statistics, 2021-23.
- Dempster Award Committee member, Spring 2020.
- Colloquium Chair Harvard Statistics, Spring 2020, Fall 2020.
- Organizer Faculty lunch seminar series, Stanford Statistics, Fall 2014.

References

Dr. Amir Dembo
Professor,
Department of Statistics and
Department of Mathematics,
Stanford University.
Email:amir@math.stanford.edu

Dr. Andrea Montanari
Professor,
Department of Electrical Engineering and
Department of Statistics,
Stanford University.
Email:montanari@stanford.edu

Dr. Elchanan Mossel
Professor,
Department of Mathematics and
Institute for Data, Systems and Society,
Massachusetts Institute of Technology.
Email:elmos@mit.edu

Dr. Jennifer Chayes
Professor,
EECS,
Department of Mathematics,
Department of Statistics,
The School of Information.
Email:jchayes@berkeley.edu