

# Soham Jana

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## Research interests

Theoretical and methodological aspects of high-dimensional statistics, mixture modeling, distance based estimators, neural networks.

## Education

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|--|----------|
| <b>PhD. in Statistics and Data Science</b><br>Yale University, New Haven, CT, USA<br>Thesis: Learning non-parametric and high-dimensional distributions<br>via information-theoretic methods<br>Advisor: Prof. Yihong Wu   | May 2022 |
| <b>Master of Statistics (Hons.)</b> (First class with distinction)<br>Indian Statistical Institute, Kolkata, West Bengal, India<br>Specialization: Theoretical Statistics<br>Dissertation: Characterization of single-integral non-kernel divergences<br>Advisor: Prof. Ayanendranath Basu | May 2017 |
| <b>Bachelor of Statistics (Hons.)</b> (First class with Distinction)<br>Indian Statistical Institute, Kolkata, West Bengal, India  | May 2015 |

## Work experiences

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| <b>University of Notre Dame, Notre Dame, IN, USA</b><br>Assistant Professor, Department of Applied and<br>Computational Mathematics and Statistics.                                | August 2024 – Current     |
| <b>Princeton University, Princeton, NJ, USA</b><br>Postdoc, Department of Operations Research and<br>Financial Engineering<br>Hosts: Prof. Sanjeev Kulkarni and Prof. Jianqing Fan | June 2022 – July 2024     |
| Researcher, The First Republic Bank Research and<br>Lifelong Learning Program  | June 2022 – May 2023      |
| Lecturer   | Spring 2023 and Fall 2023 |

## Grants and awards

## Professional Development

Kaneb Center Course Design Academy, University of Notre Dame  
*Award Amount: USD 5000*

2024 – 2025

### Preprints (“\*”: Authors list not in alphabetical order)

1. Chen, X.<sup>†</sup>, Jana, S.<sup>†</sup>, Metzler, C.A., Maleki, A. and Jalali, S.\*, 2025. **Multilook Coherent Imaging: Theoretical Guarantees and Algorithms**. arXiv preprint arXiv:2505.23594. <sup>†</sup> Equal contributions.
2. Shange Tang, Soham Jana, Jianqing Fan\*. **Factor adjusted spectral clustering for mixture models**. arXiv preprint arXiv:2408.12564 (2024). Under major revision at the **Journal of American Statistical Association**.
3. Soham Jana, Kun Yang, and Sanjeev Kulkarni\*. **Adversarially robust clustering with optimality guarantees**. arXiv preprint arXiv:2306.09977 (2023). Under major revision at the **IEEE Transactions on Information Theory**.
4. Soham Jana, Yury Polyanskiy, and Yihong Wu. **Optimal empirical Bayes estimation for the Poisson model via minimum-distance methods**. arXiv preprint arXiv:2209.01328 (2022). Under minor revision at **Information and Inference - a journal of IMA**.

### Journal publications (“\*”: Authors list not in alphabetical order)

1. Soham Jana, Jianqing Fan, and Sanjeev Kulkarni.\* **A provable initialization and robust clustering method for general mixture models**. IEEE Transactions on Information Theory (2025). DOI: 10.1109/TIT.2025.3585804
2. Soham Jana, Henry Li, Yutaro Yamada, and Ofir Lindenbaum. **Support recovery with Stochastic Gates: theory and application for linear models**. Elsevier Signal Processing (2023), 213, p.109193.
3. Yanjun Han, Soham Jana and Yihong Wu, **Optimal Prediction of Markov Chains With and Without Spectral Gap**, in IEEE Transactions on Information Theory, vol. 69, no. 6, pp. 3920-3959, June 2023, doi: 10.1109/TIT.2023.3239508. (**Extended from the NeurIPS version with analysis of higher-order Markov chains and different loss functions**)
4. Soham Jana and Ayanendranath Basu.\* **A characterization of all single-integral, non-kernel divergence estimators**. IEEE Transactions on Information Theory 65.12 (2019): 7976-7984.

### Conference publications (“\*”: Authors list not in alphabetical order)

1. Soham Jana, Yury Polyanskiy, Anzo Teh, and Yihong Wu. **Empirical Bayes via ERM and Rademacher complexities: the Poisson model**. In Conference on Learning Theory 2023 Jul 15, PMLR 195:5199-5235.

2. Yanjun Han, Soham Jana, and Yihong Wu. [Optimal prediction of Markov chains with and without spectral gap](#). NeurIPS 2021.
3. Soham Jana, Yury Polyanskiy, and Yihong Wu. [Extrapolating the profile of a finite population](#). In Conference on Learning Theory 2020 Jul 15 (pp. 2011-2033). PMLR.

## Conferences and invited talks

Joint Statistical Meetings Nashville, TN, USA	August 2025
IMS New Researchers Conference Nashville, TN, USA	July-August 2025
International Webinar on Recent Trends in Statistical Theory and Applications Kerala, India	July 2025
International Indian Statistical Association Lincoln, NEB, USA	June 2025
International Indian Statistical Association Cochin, Kerala, India	December 2024
Joint Statistical Meetings Portland, OR, USA	August 2024
University of Notre Dame Statistics Department Seminar Notre Dame, IN, USA	February 2024
University of Wisconsin-Madison Statistics Department Seminar Madison, WI, USA	February 2024
University of Texas at Dallas Statistics Department Seminar Richardson, TX, USA	January 2024
Indian Statistical Institute ISRU Department Seminar Kolkata, West Bengal, India	July 2023
Conference on Learning Theory (COLT) Bangalore, Karnataka, India	July 2023
Neural Information Processing systems (NeurIPS) Virtual	December 2021
Conference on Learning Theory (COLT) Graz, Austria	July 2020

## Teaching

## University of Notre Dame

Introduction to probability (ACMS 30530) Fall 2024, Fall 2025

Modern Machine Learning Techniques with Application (ACMS 80870) Spring 2025

## Princeton University

Probability and stochastic systems (ORF 309/ENG 309/MAT 380) Spring 2023

Statistical machine learning (ORF 570) Fall 2023

## Professional activities

### Paper reviewer

Annals of Statistics (2)

IEEE Transactions on Information Theory (7)

IEEE International Symposium on Information Theory (1)

Electronic Journal of Statistics (3)

Stat - an ISI Journal (1)

Algorithmic Learning Theory (3)

Bernoulli (1)

Statistica Sinica (1)

Journal of Statistical Planning and Inference (1)

### Invited organizational duties at conferences

*CFE-CMStatistics Conference* December 2025

*Session organizer: Recent advances in Causal Inference*

*Joint Statistical Meetings* August 2025

*Session chair: New Advances in Optimization Algorithms for Causal Discovery*

*Joint Statistical Meetings* August 2024

*Session chair: New Advances in Nonparametric Hypothesis Testing - Part I*

*Session chair: New Developments in Non-Euclidean Statistics*

*IEEE Conference on Information Sciences and Systems* March 2024

*Session chair: Machine learning and statistical inference*

**Community Service: Teaching at Math Circle, Notre Dame** Spring 2025

*Promoting STEM education among school children*

**Yale S&DS M.A. admission committee** 2021

Reviewer: one of the committee members handling over 150 applications and making admission recommendations

**Yale S&DS graduate reading group** 2020

Co-organizer Scheduled talks and lead discussion sessions

**Yale Women in Data Science (WiDS) workshop** 2020

Served as a mentor for Yale undergrad students participating in the WiDS Datathon Challenge 2020

**South Asian Graduate and Professional Association** 2018 – 2021  
**at Yale (SAGA)**

Treasurer, core committee member and cultural committee head

Objective: organizing socio-cultural events to promote cultural exchanges at Yale

**Other awards**

INSPIRE Scholarship, Govt. of India 2012-2017

Indian National Mathematical Olympiad (INMO) merit certificate 2012  
(For ranking among top 75 in INMO)