

RUCHIRA RAY

CURRICULUM VITAE

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EDUCATION

Columbia University, New York, NY
PhD, Statistics
MPhil, Statistics

September 2021 — Present
September 2021 — May 2026 (Expected)
December 2023

Yale University, New Haven, CT
MA, Statistics & Data Science
BS, Statistics & Data Science (with distinction in major)

August 2017 — May 2021

RESEARCH POSITIONS HELD

Yale University, Autism Center of Excellence
Research Assistant

New Haven, CT
May 2020 – August 2021

- Developed a new statistical imputation algorithm to improve the classification of autism spectrum disorders using inter-region brain connectivity data from fMRI brain scans.
- Developed longitudinal statistical models to examine the relationship between brain connectivity and attention to face among newborns during the first year of life.

Yale University, Department of Statistics and Data Science
Student Researcher

New Haven, CT
May 2019 – May 2021

- Assessed the statistical properties of a new estimator for Gaussian mixture cluster means of high dimensional data. It has potential applications in image processing and pattern recognition.

Yale University, Nanobiology Institute, Berro Lab
Student Researcher

West Haven, CT
May 2018 – December 2019

- Developed a mathematical model of the dynamic biomechanical pathways of protein reactions during endocytosis – the model reasonably explains the response observed in vitro in yeast cells.

AWARDS

- International Society of Bayesian Analysis (ISBA) Student Travel Award July 2024
- Columbia University Graduate School of Arts and Sciences (GSAS) Student Travel Award July 2024
- Columbia University Arts and Sciences Graduate Council (ASGC) Student Travel Award June 2023
- Yale Institute for Foundations of Data Science, Travel Award April 2024
- Simons Institute, Travel Award May 2023
- Columbia University Graduate Fellowship September 2021 –
- Yale University Dean's Research Fellowship May – August 2020
- Yale University Trumbull College Richter Fellowship May – August 2020
- Yale University First-Year Summer Research Fellowship May – August 2018
- National Honor Society member (Warren Township High School chapter) August 2016 – May 2017
- National Merit Scholarship August 2013 – May 2017

RESEARCH INTERESTS

- Differential privacy
- Probabilistic machine learning
- Generalized Bayesian inference
- Frequentist analysis of Bayesian methods

PUBLICATIONS

- **R. Ray**, M. Avella Medina, and C. Rush, "Statistical Guarantees for Data-driven Posterior Tempering"
Available online: <https://arxiv.org/abs/2601.09122>

- **R. Ray**, M. Avella Medina, and C. Rush, “Asymptotics for power posterior mean estimation,” 59th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, September 2023
Available online: <https://ieeexplore.ieee.org/document/10313460> or at <https://arxiv.org/abs/2310.07900>

PRESENTATIONS (*Invited)

- **R. Ray**, M. Avella Medina, and C. Rush, “Statistical Guarantees for Data-driven Posterior Tempering”
 - Workshop on Advances in post-Bayesian methods, University College London, May 2025
 - Optimization and Statistical Learning Workshop, Columbia University, April 2025
 - *Student Seminar, Columbia University Department of Statistics, March 2025
 - International Society for Bayesian Analysis (ISBA) World Meeting, Venice, Italy, July 2024
 - *Forty Years at the Interplay of Information Theory, Probability and Statistical Learning, Yale Institute for Foundations of Data Science, New Haven, CT, April 2024
 - Columbia University Data Science Day, New York, NY, March 2024
 - *Workshop on Information-Theoretic Methods for Trustworthy Machine Learning, Simons Institute, Berkeley, CA, May 2023
 - Minghui Conference, Columbia University Department of Statistics, May 2023
- **R. Ray**, M. Avella Medina, and C. Rush, “Asymptotics for power posterior mean estimation”
 - Minghui Conference, Columbia University Department of Statistics, April 2024
 - *59th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL, September 2023
- W.D. Brinda and **R. Ray**, “The Third Moment Tensor Method with Principal Components and Basis Expansion,” American Statistical Association Joint Statistical Meeting, Washington DC, August 2022
- A. Vermetti, **R. Ray**, et al., “Predictive Links between Saliency Network Connectivity and Attention to Social Partners in Neonates with Familial History of Autism”
 - International Society for Autism Research, Annual Meeting, Austin, TX, May 2022
Available online: https://cdn.ymaws.com/www.autism-insar.org/resource/resmgr/files/insar_2022/2022_Abstract_Book.pdf (pp. 274)
 - International Congress of Infant Studies, Ottawa, Canada, July, 2022
Available online: <https://infantstudies.org/wp-content/uploads/2022/07/ICIS-2022-Abstract-ProceedingsJuly07.pdf> (pp. 200 – 201)
- **R. Ray** and J. Berro, “A New Biomechanical Mathematical Model of Force Effects on Actin Dynamics During Clathrin-mediated Endocytosis”
 - American Society for Cell Biology Annual Meeting, Washington DC, December 2019
Available online: <https://www.molbiolcell.org/doi/10.1091/mbc.E19-11-0617> (Abstract P89/B91)
 - *Annual Conference on Quantitative Biology, Northwestern University, Evanston, IL, October 2019

Received first place for Undergraduate Research

ACADEMIC SERVICE

Reviewing 2024 –

- Journal of Machine Learning Research (JMLR) (1)
- Symposium on Foundations of Responsible Computing (FORC) (2)

Conference/Seminar Organizing

- Lightning talks organizer, Columbia University Minghui Conference April 2025
- Co-organizer, Columbia Statistics PhD Student Seminar June 2024 – May 2025

Panels

- Panelist at Andover Girls STEM Conference April 2025
- Panelist at GROW Columbia 2024 September 2024

Mentorship

- Mentor for Women in Science at Columbia (WISC) January 2025 –

TEACHING EXPERIENCE

Columbia University, Department of Statistics

New York, NY

Qualifying Exam Tutor

- Tutor for the Core Competency Qualifying Exam

Summer 2025

Recitation Leader and Graduate Teaching Assistant

- Statistical Inference and Modeling (Masters)
- Probability and Statistics for Data Science (Masters)
- Probability (Masters)

Spring 2025

Fall 2024

Fall 2021

Graduate Teaching Assistant

- Machine Learning (Masters)
- Exploratory Data Analysis and Visualization (Masters)
- Interpretable Machine Learning (Masters)
- Machine Learning (Undergrad)

Spring 2024

Fall 2023, Fall 2022

Spring 2023

Spring 2022

Yale University, Department of Statistics and Data Science

New Haven, CT

Undergraduate Teaching Assistant

- Theory of Statistics (Masters, Undergrad)
- Probability and (Bayesian) Statistics (Masters, Undergrad)

Spring 2020, Spring 2019

Fall 2019

SKILLS

- **Programming:** R, Python, Stan, MATLAB, Java