

Yuling Yan

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APPOINTMENTS

University of Wisconsin-Madison, Madison, WI

Aug. 2024 - Now

- Assistant Professor, Department of Statistics

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

July. 2023 - Aug 2024

- Norbert Wiener Postdoctoral Associate
- Mentors: Philippe Rigollet and Martin J. Wainwright

Princeton University, Princeton, NJ

Sept. 2018 - June 2023

- Ph.D. in Operations Research and Financial Engineering (M.A. awarded in Sept 2020)
- Advisors: Yuxin Chen and Jianqing Fan

Peking University, Beijing, China

Sept. 2014 - July 2018

- B.S. in Statistics, School of Mathematical Sciences

RESEARCH INTERESTS

Statistics, optimization, diffusion models, reinforcement learning, and their applications in generative AI and social sciences. A few highlights of my recent research:

- **Inference and uncertainty quantification for low-rank models.** We solved open problems on optimal construction of confidence intervals for noisy matrix completion [J8., P3.], and use it to evaluate the effects of *Affordable Care Act* across U.S. states [P4.]. We developed the first inferential algorithm for PCA [J3.].
- **Learning in the space of probability measures.** We developed the first efficient algorithm for solving the nonparametric MLE of Gaussian mixture models [J2.]. We established state-of-the-art convergence theory for diffusion generative models [C1.] and its adaptivity to unknown low-dimensional structures [C2., P8.].
- **Bridging convex and nonconvex optimization.** We settled minimax optimality of convex optimization for noisy matrix completion [J9.], robust PCA [J7.], and blind deconvolution [J6.] by establishing the striking connection that *nonconvex optimization is essentially solving convex relaxation with nuclear norm penalization*.
- **Mechanism design for peer review.** Our *isotonic mechanism* provably elicit private information from the authors to improve peer review process in machine learning conferences [J1.], and the improved efficiency is confirmed by *an experiment conducted during ICML 2023* [P2.].
- **Offline reinforcement learning.** We designed sample-optimal offline RL algorithms in both single- and multi-agent setups [J5., J4.], as well as minimax optimal reward-agnostic exploration schemes [C3.].

AWARDS

IMS Lawrence D. Brown Award , Institute of Mathematical Statistics	2024
ICCM Best Thesis Award , International Consortium of Chinese Mathematicians	2023
— <i>declined due to inability to attend the award ceremony</i>	
Norbert Wiener Postdoctoral Fellowship , Massachusetts Institute of Technology	2023
IMS Hannan Graduate Student Travel Award , Institute of Mathematical Statistics	2023
Charlotte Elizabeth Procter Honorific Fellowship , Princeton University	2022
Best Student Paper Award (Statistical Learning & Data Science), American Statistical Association	2022
Excellent Graduate , Peking University	2018
Yang Xin Lotus Virtue Fellowship , Peking University	2017
The May 4th Fellowship , Peking University	2016
Samsung Fellowship , No. 2 High School Affiliated to East China Normal University	2013

JOURNAL PUBLICATIONS

- J1. **Yuling Yan**, Weijie J. Su, Jianqing Fan, “Isotonic Mechanism for Exponential Family Estimation in Machine Learning Peer Review,” *Journal of the Royal Statistical Society: Series B*, in press, 2025+.
- J2. **Yuling Yan***, Kaizheng Wang*, Philippe Rigollet (* = **equal contribution**), “Learning Gaussian Mixtures Using Wasserstein-Fisher-Rao Gradient Flow,” *Annals of Statistics*, vol. 52, no. 4, pp. 1774-1795, 2024.
- J3. **Yuling Yan**, Yuxin Chen, Jianqing Fan, “Inference for Heteroskedastic PCA with Missing Data,” *Annals of Statistics*, vol. 52, no. 2, pp. 729-756, 2024.
- J4. **Yuling Yan**, Gen Li, Yuxin Chen, Jianqing Fan, “Model-based Reinforcement Learning for Offline Zero-Sum Markov Games,” *Operations Research*, vol. 72, no. 6, pp. 2430-2445, 2024.
- J5. **Yuling Yan**, Gen Li, Yuxin Chen, Jianqing Fan, “The Efficacy of Pessimism in Asynchronous Q-Learning,” *IEEE Transactions on Information Theory*, vol. 69, no. 11, pp. 7185-7219, 2023.
- J6. Yuxin Chen, Jianqing Fan, Bingyan Wang, **Yuling Yan (alphabetical order)**, “Convex and Nonconvex Optimization Are Both Minimax-Optimal for Noisy Blind Deconvolution under Random Designs,” *Journal of the American Statistical Association*, vol. 118, no. 542, pp. 858-868, 2023.
- J7. Yuxin Chen, Jianqing Fan, Cong Ma, **Yuling Yan (alphabetical order)**, “Bridging Convex and Nonconvex Optimization in Robust PCA: Noise, Outliers, and Missing Data,” *Annals of Statistics*, vol. 49, no. 5, pp. 2948-2971, 2021.
- J8. Yuxin Chen, Jianqing Fan, Cong Ma, **Yuling Yan (alphabetical order)**, “Inference and Uncertainty Quantification for Noisy Matrix Completion,” *Proceedings of the National Academy of Science*, vol. 116, no. 46, pp. 22931-22937, 2019.
- J9. Yuxin Chen, Yuejie Chi, Jianqing Fan, Cong Ma, **Yuling Yan (alphabetical order)**, “Noisy Matrix Completion: Understanding Statistical Guarantees for Convex Relaxation via Nonconvex Optimization,” *SIAM Journal on Optimization*, vol. 30, no. 4, pp. 3098-3121, 2020.
- J10. **Yuling Yan**, Bret Hanlon, Sebastien Roch, Karl Rohe, “Asymptotic Seed Bias in Respondent-driven Sampling,” *Electronic Journal of Statistics*, vol. 14, no. 1, pp. 1577-1610, 2020.

CONFERENCE PUBLICATIONS

- C1. Gen Li*, **Yuling Yan*** (* = **equal contribution**), “ $O(d/T)$ Convergence Theory for Diffusion Probabilistic Models under Minimal Assumptions,” *International Conference on Learning Representations (ICLR)*, 2025.
- C2. Gen Li*, **Yuling Yan*** (* = **equal contribution**), “Adapting to Unknown Low-Dimensional Structures in Score-Based Diffusion Models,” *Neural Information Processing Systems (NeurIPS)*, 2024.
- C3. Gen Li, **Yuling Yan**, Yuxin Chen, Jianqing Fan, “Minimax-Optimal Reward-Agnostic Exploration in Reinforcement Learning,” *Conference on Learning Theory (COLT)*, 2024.
- C4. Bingyan Wang*, **Yuling Yan***, Jianqing Fan (* = **equal contribution**), “Sample-Efficient Reinforcement Learning for Linearly-Parameterized MDPs with a Generative Model,” *Neural Information Processing Systems (NeurIPS)*, 2021.
- C5. Kaizheng Wang, **Yuling Yan**, Mateo Díaz, “Efficient Clustering for Stretched Mixtures: Landscape and Optimality,” *Neural Information Processing Systems (NeurIPS)*, 2020.

PREPRINTS

- P1. Gen Li, **Yuling Yan**, Yuxin Chen, Jianqing Fan, “Minimax-Optimal Reward-Agnostic Exploration in Reinforcement Learning,” arXiv preprint arXiv:2304.07278, under major revision at *Mathematics of Operations Research*, 2025 (accepted in part to COLT 2024).
- P2. Buxin Su, Jiayao Zhang, Natalie Collina, **Yuling Yan**, Didong Li, Kyunghyun Cho, Jianqing Fan, Aaron Roth, Weijie J. Su, “Analysis of the ICML 2023 Ranking Data: Can Authors’ Opinions of Their Own Papers Assist Peer Review in Machine Learning?” arXiv preprint arXiv:2408.13430, under revision at *Journal of the American Statistical Association*, 2025.
- P3. **Yuling Yan**, Martin J. Wainwright, “Entrywise Inference for Causal Panel Data: A Simple and Instance-Optimal Approach,” arXiv preprint arXiv:2401.13665, 2024.
- P4. Eric Z. Xia*, **Yuling Yan***, Martin J. Wainwright (* = **equal contribution**), “Inference in staggered adoption: Effects of the Affordable Care Act,” arXiv preprint arXiv:2412.09482, 2024.

- P5. Gen Li*, **Yuling Yan*** (* = **equal contribution**), “ $O(d/T)$ Convergence Theory for Diffusion Probabilistic Models under Minimal Assumptions,” arXiv preprint arXiv:2409.18959, 2024 (accepted in part to ICLR 2025).
- P6. Gen Li*, **Yuling Yan*** (* = **equal contribution**), “A Score-Based Density Formula, with Applications in Diffusion Generative Models,” arXiv preprint arXiv:2408.16765, 2024.
- P7. Jianqing Fan, **Yuling Yan**, Yuheng Zheng (**alphabetical order**), “When Can Weak Latent Factors Be Statistically Inferred?” arXiv preprint arXiv:2407.03616, 2024.
- P8. Jiaqi Tang, **Yuling Yan**, “Adaptivity and Convergence of Probability Flow ODEs in Diffusion Generative Models,” arXiv preprint arXiv:2501.18863, 2025.

INVITED TALKS

- T1. Towards Mathematical Foundations of Score-Based Diffusion Models
- Department Seminar, Department of Statistics and Data Science, Cornell University, Nov 2024.
 - Institute for Foundations of Data Science, University of Wisconsin-Madison, Oct 2024.
- T2. Entrywise Inference for Causal Panel Data: A Simple and Instance-Optimal Approach.
- Department Seminar, Mitch Daniel School of Business, Purdue University, Apr 2025
 - SDSCon 2024, Massachusetts Institute of Technology, Apr 2024.
- T3. Learning Gaussian Mixtures Using the Wasserstein-Fisher-Rao Gradient Flow.
- Bernoulli-IMS World Congress in Probability and Statistics, Bochum, Germany, Aug 2024.
 - ICORS meets DSSV 2024, George Mason University, July 2024.
- T4. The Isotonic Mechanism for Exponential Family Estimation.
- CMStatistics, King’s College London, Dec 2024.
 - Joint Statistical Meeting, Portland, OR, Aug 2024.
 - ICSA Applied Statistics Symposium, Ann Arbor, MI, Jun 2023.
- T5. Inference and Uncertainty Quantification for Low-Rank Models.
- TOPS Department Seminar, NYU Stern School of Business, Feb 2023.
 - Econometrics and Statistics Workshop, University of Chicago Booth School of Business, Feb 2023.
 - Department Seminar, Department of Statistics, Rutgers University, Jan 2023.
 - Department Seminar, Department of Statistics, University of Wisconsin-Madison, Jan 2023.
 - Department Seminar, Department of Statistics, UC Davis, Jan 2023.
 - Young Data Science Researcher Seminar, ETH Zurich, Dec 2022.
 - Department Seminar, Department of Data Science and Operations, Marshall School of Business, University of Southern California, Dec 2022.
 - CMStatistics, King’s College London, Dec 2022.
 - Department Colloquia, Department of Mathematics, University of Maryland, Nov 2022.
- T6. Model-based Reinforcement Learning for Offline Zero-Sum Markov Games.
- INFORMS Annual Meeting, Indianapolis, IN, Oct 2022.
 - ORIE Young Researchers Workshop, Cornell University, Oct 2022.
- T7. Inference for Heteroskedastic PCA with Missing Data.
- INFORMS Annual Meeting, Indianapolis, IN, Oct 2022.
 - Lunch Seminar, Department of Statistics, Harvard University, Oct 2022.
 - Joint Statistical Meeting, Washington DC, Aug 2022.
- T8. Bridging Convex and Nonconvex Optimization in Robust PCA: Noise, Outliers, and Missing Data.
- INFORMS Optimization Society Meeting, Greenville, SC, Mar 2022.
 - Department Seminar, Department of Statistics and Applied Probability, UC Santa Barbara, Mar 2022.
 - Two Sigma Ph.D. Research Symposium, Dec 2020.
 - INFORMS Annual Meeting, Nov. 2020.
 - ORFE Graduate Student Seminar, Princeton University, Oct 2020.

TEACHING EXPERIENCE

- STAT 615: Statistical Learning, University of Wisconsin-Madison, Spring 2025, Instructor.
- STAT 615: Statistical Learning, University of Wisconsin-Madison, Fall 2024, Instructor.
- ORF 309: Probability and Stochastic Systems, Princeton University, Spring 2021, Teaching Assistant.
- ELE 522: Large-Scale Optimization for Data Science, Princeton University, Fall 2019, Teaching Assistant.

PROFESSIONAL SERVICE

- Journal reviewer for *Annals of Statistics*, *Journal of the Royal Statistical Society: Series B*, *Journal of the American Statistical Association*, *Biometrika*, *Management Science*, *Operations Research*, *IEEE Transactions on Information Theory*, *Information and Inference: A Journal of the IMA*, *Journal of Business and Economic Statistics*, *IEEE Transactions on Signal Processing*, *Journal of Machine Learning Research*, *Journal of Multivariate Analysis*, *Journal of Computational and Graphical Statistics*, *IEEE Transactions on Computational Imaging*, *IEEE Signal Processing Letters*, *Journal of Nonparametric Statistics*.
- Conference reviewer for *Neural Information Processing Systems (NeurIPS 2021-2023)*, *International Conference on Machine Learning (ICML 2020-2024)*, *International Conference on Learning Representations (ICLR 2021)*, *Conference on Learning Theory (COLT 2025)*, *IEEE International Symposium on Information Theory (ISIT 2020-2021)*.
- Organizing committee for *Conference on Statistical Foundations of Data Science and their Applications in celebration of Jianqing Fan's 60th Birthday*, May 2023.
- Poster session committee for *The Women in Data Science (WiDS) Cambridge Conference*, Mar 2024.

SHORT-TIME VISITING POSITIONS

Massachusetts Institute of Technology, MA, USA

Sep. 2022 - Dec. 2022

- Visiting student at Department of Mathematics, hosted by Philippe Rigollet

University of California, Berkeley, CA, USA

Aug. 2021 - Nov. 2021

- Visiting student at Simons Institute for the Theory of Computing