

# Kaizheng Wang

<https://kw2934.github.io> | [kaizheng.wang@columbia.edu](mailto:kaizheng.wang@columbia.edu)

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## ACADEMIC POSITION

**Columbia University, New York, NY, USA**

Jul. 2020 -

Assistant Professor, Department of Industrial Engineering and Operations Research

Member, Data Science Institute

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## EDUCATION

**Princeton University, Princeton, NJ, USA**

Sep. 2015 - Jun. 2020

Ph.D. in Operations Research and Financial Engineering, Department of ORFE

**Peking University, Beijing, China**

Sep. 2011 - Jul. 2015

B.S. in Mathematics and Applied Mathematics, School of Mathematical Sciences

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## PUBLICATIONS AND PREPRINTS

( $\alpha$ - $\beta$ : author names are sorted alphabetically;  $\dagger$ : student/postdoc supervised.)

Preprints under review

- A Stability Principle for Learning under Non-Stationarity  
Chengpiao Huang $\dagger$ , Kaizheng Wang. ( $\alpha$ - $\beta$ )  
arXiv:2310.18304, 2023.
- Pseudo-Labeling for Kernel Ridge Regression under Covariate Shift  
Kaizheng Wang.  
arXiv:2302.10160, 2023.
- Learning Gaussian Mixtures Using the Wasserstein-Fisher-Rao Gradient Flow  
Yuling Yan\*, Kaizheng Wang\*, Philippe Rigollet. (\* = equal contribution)  
arXiv:2301.01766, 2023.
- Variable Clustering via Distributionally Robust Nodewise Regression  
Kaizheng Wang, Xiao Xu, Xun Yu Zhou. ( $\alpha$ - $\beta$ )  
arXiv:2212.07944, 2022.

- Adaptive Data Fusion for Multi-Task Non-Smooth Optimization.  
Henry Lam, Kaizheng Wang, Yuhang Wu<sup>†</sup>, Yichen Zhang. ( $\alpha$ - $\beta$ )  
arXiv:2210.12334, 2022.
- Clustering a Mixture of Gaussians with Unknown Covariance.  
Damek Davis, Mateo Díaz, Kaizheng Wang. ( $\alpha$ - $\beta$ )  
arXiv:2110.01602, 2021.

#### Journal publications

- Adaptive and Robust Multi-Task Learning.  
Yaqi Duan, Kaizheng Wang. ( $\alpha$ - $\beta$ )  
**Annals of Statistics** 51(5): 2015-2039, 2023.
- Communication-Efficient Accurate Statistical Estimation.  
Jianqing Fan, Yongyi Guo, Kaizheng Wang. ( $\alpha$ - $\beta$ )  
**Journal of American Statistical Association** 118 (542): 1000-1010, 2023.
- An  $\ell_p$  Theory of PCA and Spectral Clustering.  
Emmanuel Abbe, Jianqing Fan, Kaizheng Wang. ( $\alpha$ - $\beta$ )  
**Annals of Statistics** 50 (4): 2359-2385, 2022.
- Modern Data Modeling: Cross-Fertilization of the Two Cultures.  
Jianqing Fan, Cong Ma, Kaizheng Wang, Ziwei Zhu. ( $\alpha$ - $\beta$ )  
**Observational Studies** 7 (1): 65-76, 2021.
- Robust High Dimensional Factor Models with Applications to Statistical Machine Learning.  
Jianqing Fan, Kaizheng Wang, Yiqiao Zhong, Ziwei Zhu. ( $\alpha$ - $\beta$ )  
**Statistical Science** 36(2): 303-327, 2021.
- Entrywise Eigenvector Analysis of Random Matrices with Low Expected Rank.  
Emmanuel Abbe, Jianqing Fan, Kaizheng Wang, Yiqiao Zhong. ( $\alpha$ - $\beta$ )  
**Annals of Statistics** 48 (3): 1452-1474, 2020.
- Implicit Regularization in Nonconvex Statistical Estimation: Gradient Descent Converges Linearly for Phase Retrieval, Matrix Completion and Blind Deconvolution.  
Cong Ma, Kaizheng Wang, Yuejie Chi, Yuxin Chen.  
**Foundations of Computational Mathematics** 20: 451-632, 2020.  
Short version accepted by **International Conference on Machine Learning (ICML)** 2018.

- Factor-Adjusted Regularized Model Selection.  
Jianqing Fan, Yuan Ke, Kaizheng Wang ( $\alpha$ - $\beta$ )  
**Journal of Econometrics** 216 (1): 71-85, 2020.
- Comment on “A Tuning-Free Robust and Efficient Approach to High-Dimensional Regression”.  
Jianqing Fan, Cong Ma, Kaizheng Wang ( $\alpha$ - $\beta$ )  
**Journal of American Statistical Association** 115 (532): 1720-1725, 2020.
- Distributed Estimation of Principal Eigenspaces.  
Jianqing Fan, Dong Wang, Kaizheng Wang, Ziwei Zhu. ( $\alpha$ - $\beta$ )  
**Annals of Statistics** 47 (6): 3009-3031, 2019.
- Spectral Method and Regularized MLE are both Optimal for Top-K Ranking.  
Yuxin Chen, Jianqing Fan, Cong Ma, Kaizheng Wang ( $\alpha$ - $\beta$ )  
**Annals of Statistics** 47 (4): 2204-2235, 2019.
- Stochastic Representations for the Wave Equation on Graphs and Their Scaling Limits.  
Kaizheng Wang  
**Journal of Mathematical Analysis and Applications** 449 (1): 808-828, 2017.
- On the Neumann Problem for Harmonic Functions in the Upper Half Plane.  
Kaizheng Wang  
**Journal of Mathematical Analysis and Applications** 419 (2): 839-848, 2014.

#### Conference publications

- Model Assessment and Selection under Temporal Distribution Shift.  
Elise Han<sup>†</sup>, Chengpiao Huang<sup>†</sup>, Kaizheng Wang ( $\alpha$ - $\beta$ )  
Accepted by **International Conference on Machine Learning (ICML)**, 2024.
- Efficient Clustering for Stretched Mixtures: Landscape and Optimality.  
Kaizheng Wang, Yuling Yan, Mateo Díaz.  
**Neural Information Processing Systems (NeurIPS)** 33: 21309-21320, 2020.
- Implicit Regularization in Nonconvex Statistical Estimation: Gradient Descent Converges Linearly for Phase Retrieval and Matrix Completion.  
Cong Ma, Kaizheng Wang, Yuejie Chi, Yuxin Chen.  
**International Conference on Machine Learning (ICML)** 80: 3345-3354, 2018.

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## AWARDS

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- SIAM Activity Group on Imaging Science Best Paper Prize 2024
- Second Place Award - 2023 INFORMS Blue Summit Supplies Data Challenge 2023
- Harold W. Dodds Fellowship - Princeton University 2019 - 2020
- Gordon Y. S. Wu Fellowship - Princeton University 2015 - 2019
- SEAS Award for Excellence - Princeton University 2018

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## GRANTS

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- NSF Grant DMS-2210907 (\$179,999) 2022 – 2025  
Statistical and Computational Tools for Analyzing High-Dimensional Heterogeneous Data  
Role: PI
- Columbia University Data Science Institute Seed Fund (\$75,000) 2024 – 2025  
Policy Evaluation with Transfer Learning: How to assess safety performance of self-driving cars in NYC?  
Role: Co-PI

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## PROFESSIONAL SERVICES

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- Area chair/meta-reviewer: COLT 2024, ICML 2023 - 2024, NeurIPS 2021 - 2022
- Session chair: INFORMS Annual Meeting 2020 - 2022
- Cluster chair, 2022 CORS-INFORMS International Conference Jun. 2022
- Co-organizer, Wilks statistics seminar, Princeton University Jul. 2018 - May. 2019
- Co-organizer, the 6<sup>th</sup> Princeton Day of Statistics Jul. 2018 - Nov. 2018
- Reviewer for the following journals: Annals of Statistics, Bernoulli, Biometrika, Foundations of Computational Mathematics, IEEE Transactions on Information Theory, Journal of Business & Economic Statistics, Journal of Econometrics, Journal of Machine Learning Research, Journal of the American Statistical Association, Journal of the Royal Statistical Society: Series B, Management Science, Mathematics of Operations Research, Operations Research, etc.
- Reviewer for the following conferences: Conference on Learning Theory (COLT), International Conference on Machine Learning (ICML), IEEE International Symposium on Information Theory (ISIT), Neural Information Processing Systems (NeurIPS), ACM-SIAM Symposium on Discrete Algorithms (SODA), etc.

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## TEACHING EXPERIENCES

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At Columbia University:

- IEOR E8100 - High-Dimensional Probability with Applications (PhD): Spring 2021, 2023 & 2024;

- IEOR E4106 - Stochastic Models (Master): Spring 2024;
- IEOR E4102 - Stochastic Modeling for Management Science and Engineering (Master): Spring 2023;
- IEOR E4307 - Statistics and Data Analysis (Undergraduate): Fall 2020 & 2021;
- IEOR E3106 - Stochastic Systems and Applications (Undergraduate): Fall 2021 - 2023.

At Princeton University, as Assistants in Instruction (AIs):

- ORF 525 - Statistical Learning and Nonparametric Estimation (PhD): Spring 2019;
- ORF 363 - Computing and Optimization for Physical and Social Sciences (Undergraduate): Fall 2016;
- ORF 309 - Probability and Stochastic Systems (Undergraduate): Spring 2017 & 2018;
- ORF 245 - Fundamentals of Statistics (Undergraduate): Fall 2017 & 2018 (Head AI).

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## RESEARCH GROUP

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### Postdoctoral Research Scientist

- Zhongyuan Lyu (Data Science Institute Postdoc co-mentored with Yuqi Gu).

### Ph.D. students

- Chengpiao Huang  
Second Place Award in the 2023 INFORMS Blue Summit Supplies Data Challenge.
- Seok-Jin Kim

### Undergraduate students

- Elise Han  
Bonomi Scholarship in 2024.
- Alan Ma
- Eric Chen

### Alumni

- Naomi Toft (Undergraduate)
- Geraldine Nina Montano (Undergraduate): Bonomi Scholarship in 2023.
- Rain Wei (Undergraduate): Bonomi Scholarship in 2023.
- Yuhang Wu (Undergraduate)

Now a PhD student at the Decision, Risk, and Operations (DRO) division at Columbia Business School.  
Second Place Award in the 2023 INFORMS Blue Summit Supplies Data Challenge.

- Alice Chen (Master)
- Sara Zhao (Undergraduate): Stephen D. Guarino Memorial Award in 2022.
- Ethan Turok (Undergraduate)