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ACADEMIC APPOINTMENT

2022 – Associate Professor with Tenure (2022/11 –), Assistant Professor (2022/1 – 2022/10), *Duke University*
Main Appointment: Department of Biostatistics & Bioinformatics
Secondary Appointment: Department of Electrical & Computer Engineering
Affiliated with: Fuqua School of Business, Rhodes Information Initiative

2016 – 21 Assistant Professor, *Pennsylvania State University*
Department of Statistics

EDUCATION

2016 **Ph.D. Operations Research**, *Princeton University*
Thesis: Some Interactions of Modern Statistics and Optimization
Advisors: Han Liu and Robert J. Vanderbei, Committee Members: Jianqing Fan and Mengdi Wang

2010 **B.S. (First-Class Honor), Mathematics and Statistics**, *National University of Singapore*
Thesis: Using a Distributed SDP Approach to Solve Simulated Protein Molecular Conformation Problems
Advisor: Kim-Chuan Toh

PUBLICATIONS AND SELECTED WORKING PAPERS

(* indicates a junior student collaborator, and † indicates corresponding author if not first author.)

1. "Anti-Concentration Inequalities for the Difference of Maxima of Gaussian Random Vectors." A. Belloni, **E.X. Fang**, S. Shen* (2024+) *Under review at* **Operations Research**
2. "Online Learning for Inventory Control Problems under Random Yield." Z. Zheng*, Q. Chen, **E.X. Fang**, C. Shi (2024+) *Under review at* **Operations Research**
3. "Ranking of Large Language Model with Nonparametric Prompts." Z. Wang*, Y. Han*, **E.X. Fang**, L. Wang, J. Lu (2024+) *Under review at* **Annals of Statistics**
4. "Risk-Sensitive Deep RL: Variance-Constrained Actor-Critic Provably Finds Globally Optimal Policy." H. Zhong*, X. Deng*, **E.X. Fang**, Z. Yang, Z. Wang, R. Li (2024+) *Under revision at* **Journal of the American Statistical Association**
5. "Offline Personalized Pricing with Censored Demand." Z. Qi, J. Tang*, **E.X. Fang**, C. Shi (2024+) *Accepted by* **Manufacturing & Service and Operations Management**
6. "Data-Driven Compositional Optimization in Misspecified Regimes." S. Yang*, **E.X. Fang**, and U. Shanbhag (2024+) *Accepted by* **Operations Research**
7. "Nearly Dimension-Independent Sparse Linear Bandit over Small Action Spaces via Best Subset Selection." Y. Wang*, Y. Chen*, **E.X. Fang**, Z. Wang and R. Li. (2024) **Journal of the American Statistical Association**. 119 (545), 246-258
8. "Online performative gradient descent for learning nash equilibria in decision-dependent games." Z. Zhu, **E.X. Fang**, Z. Yang (2023) *Short version appeared at* **NeurIPS'23**.
9. "Pivotal Estimation of Linear Discriminant Analysis in High Dimensions." **E.X. Fang**, Y. Mei, Y. Shi, Q. Xu, and T. Zhao (2023) **Journal of Machine Learning Research**. 24 (1), 14312-14356
10. "PASTA: Pessimistic Assortment Optimization." J. Dong*, W. Mo, Z. Qi, C. Shi, **E.X. Fang**, and V. Tarokh (2024+) *Short version at* **ICML'23**
11. "Combinatorial Inference on the Optimal Assortment in Multinomial Logit Models." Shuting Shen*, Xi Chen, **E.X. Fang**, and J. Lu (2024+) *Abstract at* **EC'23**, *Manuscript under revision at* **Operations Research**
12. "Robust Matrix Estimations Meet Frank-Wolfe Algorithm." Naimin Jin*, **E.X. Fang**, and C.Y. Tang (2023) **Machine Learning**. 112 (7), 2723-2760

13. "Lagrangian Inference in Ranking Problems." Y. Liu[*], **E.X. Fang**[†] and J. Lu[†]. (2023) **Operations Research**. 71 (1), 202-223

14. "Fairness-Oriented Learning for Optimal Individualized Treatment Rules." **E.X. Fang**, Z. Wang and L. Wang. (2023) **Journal of the American Statistical Association**. 118 (543), 1733-1746

15. "Test of Significance for High-Dimensional Longitudinal Data." **E.X. Fang**, Y. Ning and R. Li. (2020) **Annals of Statistics**. 48(6), 2622-2645

16. "Optimal Two Stage Adaptive Enrichment Designs for Randomized Trials Using Sparse Linear Programming." M. Rosenblum, **E.X. Fang** and H. Liu. (2020) **Journal of the Royal Statistical Society: Series B**. 82(3), 749-772

17. "High-Dimensional Interaction Detection through an Optimization Approach." C.Y. Tang, **E.X. Fang** and Y. Dong. (2020) **Journal of Machine Learning Research**. 21(19), 1-25

18. "Inductive Bias of Gradient Descent based Adversarial Training on Separable Data." Y. Li[*], **E.X. Fang**, H. Xu, T. Zhao. *Short version accepted by* **ICLR'20**.

19. "Constructing a Confidence Interval for the Fraction Who Benefit from Treatment, Using Randomized Trial Data." E. Huang[*], **E.X. Fang**, D. Hanley and M. Rosenblum. (2019) **Biometrics**. 75(4), 1228-1239

20. "Misspecified Nonconvex Statistical Optimization for Phase Retrieval." Z.R. Yang[*], L. Yang[*], **E.X. Fang**[†], T. Zhao, Z. Wang, M. Neykov. (2019) **Mathematical Programming**. 176(1-2), 545-571

21. "Multi-Stage Stochastic Compositional Gradient Method." S.G. Yang[*], M. Wang and **E.X. Fang**[†]. (2019) **SIAM Journal on Optimization**. 29(1), 616-659

22. "Blessing of Massive Scale: Spatial Graphical Model Estimation with a Total Cardinality Constraint Approach." **E.X. Fang**, H. Liu and M. Wang. (2019) **Mathematical Programming**. 176(1-2), 175-205

23. "Adipocyte OGT Regulates a Fat-Sensing Adipose-to-Brain Axis That Induces Hyperphagia and Obesity." M.D. Li, N.B. Vera, Y. Yang, Bi Zhang, W. Ni, E. Ziso-Qejvanaj, S. Ding, K. Zhang, R. Yin, S. Wang, X. Zhou, **E.X. Fang**, T. Xu, E.M. Erion and X. Yang. (2018) **Nature Communications**. 9(1), 5103

24. "Max-Norm Optimization for Robust Matrix Recovery." **E.X. Fang**, H. Liu, K.C. Toh and W.X. Zhou. (2018) **Mathematical Programming**. 167(1), 5-35

25. "Accelerating Stochastic Composition Optimization." M. Wang, J. Liu and **E.X. Fang**. (2017) **Journal of Machine Learning Research**, 18, 1-23. *Short version appeared at* **NeurIPS'16**.

26. "Testing and Confidence Intervals for High Dimensional Cox Proportional Hazards Model." **E.X. Fang**, Y. Ning and H. Liu. (2017) **Journal of Royal Statistical Society: Series B**, 79(5), 1415-1437.

27. "Inequality in Treatment Benefits: Can We Determine if a New Treatment Benefits the Many or the Few?" E. Huang[*], **E.X. Fang**, D. Hanley and M. Rosenblum. (2017) **Biostatistics**, 18(2), 308-324.

28. "Mining Massive Amounts of Genomic Data: A Semiparametric Topic Modeling Approach." **E.X. Fang**, M.D. Li, M.I. Jordan and H. Liu. (2017) **Journal of the American Statistical Association**, 112(519), 921-932.

29. "Stochastic Compositional Gradient Descent: Algorithms for Minimizing Functions of Expected Values." M. Wang, **E.X. Fang** and H. Liu. (2017) **Mathematical Programming**, 161(1-2), 419-449.

30. "Generalized Alternating Direction Method of Multipliers: New Theoretical Insight and Application." **E.X. Fang**, B. He, H. Liu and X. Yuan. (2015) **Mathematical Programming Computation**, 7(2), 149-187.

31. "Using a Distributed SDP Approach to Solve Simulated Protein Molecular Conformation Problems." **X. Fang** and K.C. Toh. *Book Chapter* in **Distance Geometry: Theory, Methods, and Applications**, Mucherino, C. Lavor, L. Liberti, and N. Maculan eds., Springer, 2013, pp. 351–376.

Invited Discussion

1. Discussion of "A Bayesian Conjugate Gradient Method by J. Cockayne, C.J. Oates, I.C. Ipsen and M. Girolami." X. Li and **E.X. Fang**. (2019) **Bayesian Analysis**, 14(3), 977-979

Editorial Work

Associate Editor for: *Journal of the American Statistical Association (2024 –)*, *Operations Research (2024 –)*, *Annals of Statistics (2023 –)*

Selected Awards and Honors

2022 Whitehead Scholarship

2017 AMS-Simons Foundation Travel Grant ($4,000)

2017 IMS Laha/Travel Award

2016 Best Paper Prize for Young Researchers in Continuous Optimization by Mathematical Optimization Society (**Only 1 paper selected in 3 years**)

2016 IMS Laha/Travel Award

2016 ENAR Distinguished Student Paper Award (2 papers selected)

2015 IMS Laha/Travel Award

2004 First Prize, Chinese High-School Olympic Competition in Chemistry

PhD Student Supervision

Jiawei Wen (2016 – 2020) (Co-advised with Runze Li) Penn State University **Awarded B2D2K Fellowship by NIH**
Initial placement: Data Scientist, Facebook
Junyi Liao (2024 –) (Co-advised with Vahid Tarokh) (Duke University)

Postdoc Supervision

Yichi Zhang (2023 – 2024) (Co-advised with Alex Belloni) Duke University
Initial placement: Assistant Professor of Statistics, Indiana University
Shuting Shen (2023 – 2025) (Co-advised with Alex Belloni) (Duke University)

Selected Undergraduate/Master Student Supervision

Edward Chen (2018) Penn State University **Awarded NSF Graduate Research Fellowship**
Now: PhD Student of Computer Science at Stanford University
Flora Shi (2023) Duke University
Now: PhD Student of EECS at MIT
Zihan Zhu (2024) Duke University
Now: PhD Student of Statistics at Wharton

Teaching

2022 – **Instructor**, *Duke University*
Decision 614: Forecasting (Daytime MBA at Fuqua School of Business)
CompSci 565 (Formerly 597): Modern Optimization for Statistical Machine Learning (Jointly offered by B&B, CS, and Rhodes Information Initiative)
Biostat 906: Statistical Inference (PhD core course at B&B)

2017 – 21 **Instructor**, *Penn State University*
STAT 509: Design and Analysis of Clinical Trials
STAT 500: Applied Statistics
STAT 450: Computational Statistics
IME 322: Probabilistic Models in Industrial Engineering
STAT 597: Modern Optimization in Statistics (New Topic Course)
STAT 597: Nonconvex Optimization in Statistics (New Topic Course)

2011 – 13 **Teaching Assistant**, *Princeton University*
ORF 401: E-Commerce ORF 522: Linear Optimization ORF 523: Integer Programming

Research Funding

1. *Collaborative Research: AI Tools to Knowledge Discovery and Rigorous Reasoning in Polyhedral Geometry*, National Science Foundation, Role: PI, Amount: $300,000, Period: 2024/9/15 — 2027/8/31
2. *Risk-Sensitive Statistical Learning: Methods, Algorithms, and Theories*, National Science Foundation, Role: PI, Amount: $337,985, Period: 2024/6/15 — 2027/6/30
3. *Collaborative Research: High-Dimensional Decision Making and Inference with Applications for Personalized Medicine*, National Science Foundation, Role: Lead PI, Amount: $160,000, Period: 2020/7/1 — 2023/6/30
4. *Collaborative Research: Algorithms for Optimal Adaptive Enrichment Design in Randomized Trial*, National Science Foundation, Role: Lead PI, Amount: $200,000, Period: 2020/6/1 — 2023/5/31
5. *Optimization and Statistical Procedures for Big Data and Applications*, National Science Foundation, Role: Co-PI, Amount: $350,000, Period: 2018/7/1 — 2021/6/30
6. *Center for Complex Data To Knowledge in Drug Abuse and HIV Behavioral Science*, National Institute on Drug Abuse, Role: Co-Investigator, 5% credit (PI: Linda Colins), Amount: $13,513,452, Period: 2017/6/1 — 2019/5/31.
7. *Novel Methods for Optimal Adaptive Trial Design*, Penn State University Methodology Center Pilot Funding, Role: PI, Amount: $20,000, Period: 2017/8/1 — 2018/7/31

Invited Talks

1. Machine Learning Seminar Series, Fall, 2024, Data Science Initiative, University of Minnesota, Virtual Talk
2. Department Colloquium, Fall, 2024, Department of Statistics and Probability, Michigan State University, Virtual Talk
3. Invited Session, Summer, 2024, Joint Statistical Meeting, Toronto
4. Department Colloquium, Fall, 2023, Department of Statistics and Operations Research, University of North Carolina at Chapel Hill, Chapel Hill
5. Applied Math and Analysis Seminar, Spring, 2023, Department of Mathematics, Duke University, Durham
6. Department Colloquium, Spring, 2023, Department of Biostatistics, University of North Carolina at Chapel Hill, Chapel Hill
7. Workshop on Optimization in the Big Data Era, Fall, 2022, IMS-NUS, Singapore
8. Department Colloquium, Fall, 2022, Department of Analytics and Operations, National University of Singapore, Singapore
9. Department Colloquium, Spring, 2021, Department of Applied Mathematics and Statistics, Johns Hopkins University, Virtual Talk
10. Department Colloquium, Fall, 2020, Department of Biostatistics, University of Texas Health Science Center at Houston, Virtual Talk
11. Department Colloquium, Fall, 2020, Department of Statistics, University of Georgia, Virtual Talk
12. Workshop in Operations Research and Data, Fall 2019, Fuqua School of Business, Duke University, Durham
13. Department Colloquium, Fall, 2019, Department of Industrial Engineering and Management Science, Northwestern University, Evanston
14. Department Colloquium, Spring, 2019, Department of Mathematics, University of California, San Diego, La Jolla
15. Statistics Seminar, Spring, 2019, School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta
16. Department Colloquium, Spring, 2019, Department of Industrial and Systems Engineering, University of Southern California, Los Angeles
17. Department Colloquium, Spring, 2018, Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor
18. Department Colloquium, Spring, 2018, Operations Research Group, Tepper Business School, Carnegie Mellon University, Pittsburgh
19. Seminar, Summer, 2017, Mathematical Science, IBM Research, Yorkstown

20. Department Colloquium, Fall, 2017, Department of Analytics and Operations, National University of Singapore
21. Conference on Nonconvex Optimization and Statistical Learning, Summer, 2017, Los Angeles
22. SIAM Conference on Optimization, Summer, 2017, Vancouver, BC, Canada
23. Department Colloquium, Spring, 2017, Department of Statistics, University of Minnesota, Twin Cities
24. Department Colloquium, Fall, 2016, Department of Statistics and Applied Probability, National University of Singapore
25. Department Colloquium, Fall, 2016, Department of Statistics, Temple University, Philadelphia
26. ICSA Applied Statistics Symposium, Summer, 2016. Atlanta
27. International Symposium on Mathematical Programming, Summer, 2015. Pittsburgh
28. Thematic Program on Statistical Inference, Learning, and Models for Big Data, Opening Conference, Spring, 2015, Fields Institute, Toronto, ON, Canada
29. Modeling and Optimization: Theory and Applications, Summer, 2014, Lehigh University
30. SIAM Conference on Optimization, Summer, 2014. San Diego

SERVICE

- Reviewer for: *Annals of Statistics*, *Biometrics*, *Biometrika*, *Biostatistics*, *Electronic Journal of Statistics*, *Journal of American Statistical Association*, *Journal of Royal Statistical Society: Series B*, *Management Science*, *Mathematical Programming*, *Mathematics of Operations Research*, *Operations Research*, *Optimization and Engineering*, *SIAM Journal on Optimization*, *IEEE Transactions on Signal Processing*, *Journal of Machine Learning Research*, *AISTATS*, *COLT*, *ICML*, *NeurIPS*.
- Organizer for: *Princeton Weekly Seminar on Optimization*, *Princeton Day of Statistics*, *SIAM Conference on Optimization Invited Session*, *INFORMS Annual Meeting Invited Session*, *Penn State Statistics Colloquium*, *Online Seminar on Mathematical Foundations of Data Science*[1]
- Grant Reviewer for: *National Science Foundation*, *Hong Kong Research Grants Council*

[1]Lead organizer, more than 3,000 participants. `https://sites.google.com/view/seminarmathdatascience/home`