

# Lei, Qi

---

Website: <https://cecilialeiqi.github.io/>

Google Scholar: <https://scholar.google.com/citations?user=kG0gaowAAAAJ&hl=en>

Email: [qilei@princeton.edu](mailto:qilei@princeton.edu)

## Professional Experience

*New York University, NY, United States* September 2022 -  
• Assistant Professor in Mathematics and Data Science, Courant Institute of Mathematical Sciences and the Center for Data Science

*Princeton University, NJ, United States* July 2020 - August 2022  
• Associate Research Scholar (CIFellow), Electrical and Computer Engineering Department September 2021 - Present  
• Postdoc Research Associate (CIFellow), Electrical and Computer Engineering Department July 2020 - September 2021  
• Mentor: Jason D. Lee

*Institute for Advanced Study, Princeton, NJ, United States* September 2019 - July 2020  
• Visiting Graduate Student for the “Special Year on Optimization, Statistics, and Theoretical Machine Learning”

*Simons Institute, Berkeley, CA, United States* May 2019 - August 2019  
• Research Fellow for the Foundations of Deep Learning Program

## Education

*University of Texas at Austin, TX, United States* August 2014 - May 2020  
• Ph.D., Oden Institute for Computational Sciences and Engineering  
• Advisors: Alexandros G. Dimakis and Inderjit S. Dhillon

*Zhejiang University, Zhejiang, China* Sep 2010 - June 2014  
• B.S., School of Mathematics (with honors) (GPA 3.92/4.0, rank 1<sup>st</sup>)

## Awards and Recognitions

- NYU Research Catalyst Prize NYU, 2023
- Whitehead Fellowship for Junior Faculty in Biomedical and Biological Sciences NYU, 2023
- Computing Innovation Fellowship CRA, 2020-2022
- Simons-Berkeley Research Fellowship Simons Institute, 2019
- The National Initiative for Modeling and Simulation Research Fellowship UT Austin, 2014-2018
- Young Investigators Lecturer award Caltech, 2021
- Outstanding Dissertation Award Oden Institute, 2021
- Rising Star for Machine Learning University of Maryland, 2021
- Rising Star for EECS UIUC, 2019 & MIT, 2021
- Rising Star for Computational and Data Science UT Austin, 2020

## Thesis

**Qi Lei**, “Provably effective algorithms for min-max optimization” May 2020  
*Received the 2021 Outstanding Dissertation Award, Oden Institute*

## Publications

(\* indicates

$\alpha$ - $\beta$  order)

1. Hoang Phan, Andrew G Wilson, **Qi Lei**. “Controllable Prompt Tuning For Balancing Group Distributional Robustness”, *To appear at ICML 2024*
2. Hong J Jeon, Jason D Lee, **Qi Lei**, Benjamin Van Roy. “An Information-Theoretic Analysis of In-Context Learning”, *To appear at ICML 2024*
3. Qian Yu, Yining Wang, Baihe Huang, **Qi Lei**, Jason D Lee. “Sample Complexity for Quadratic Bandits: Hessian Dependent Bounds and Optimal Algorithms”, *Advances in Neural Information Processing Systems 36*, 2023
4. Yijun Dong, Kevin Miller, **Qi Lei**, Rachel Ward. “Cluster-aware Semi-supervised Learning: Relational Knowledge Distillation Provably Learns Clustering”, *Advances in Neural Information Processing Systems 36*, 2023
5. Jianwei Li, **Qi Lei**, Wei Cheng, Dongkuan Xu. “Towards Robust Pruning: An Adaptive Knowledge-Retention Pruning Strategy for Language Models”, *EMNLP conference*, 2023
6. Jianwei Li, Weizhi Gao, **Qi Lei**, Dongkuan Xu. “Breaking through Deterministic Barriers: Randomized Pruning Mask Generation and Selection”, *EMNLP findings*, 2023
7. Tianci Liu, Tong Yang, Quan Zhang, **Qi Lei**. “Optimization for Amortized Inverse Problems”, *International Conference of Machine Learning (ICML)*, 2023
8. Zihan Wang, Jason Lee, **Qi Lei**. “Reconstructing Training Data from Model Gradient, Provably”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023: 6595-6612
9. Shuo Yang, Yijun Dong, Rachel Ward, Inderjit Dhillon, Sujay Sanghavi, **Qi Lei**. “Sample Efficiency of Data Augmentation Consistency Regularization”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023: 3825-3853
10. Kurtland Chua, **Qi Lei**, Jason Lee. “Provable Hierarchy-Based Meta-Reinforcement Learning”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023: 10918-10967
11. Qian Yu, Yining Wang, Baihe Huang, **Qi Lei**, Jason Lee. “Optimal Sample Complexity Bounds for Non-convex Optimization under Kurdyka-Lojasiewicz Condition”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023: 6806-6821
12. Minhao Cheng, **Qi Lei**, Pin-Yu Chen, Inderjit Dhillon, Cho-Jui Hsieh, “Cat: Customized adversarial training for improved robustness”, *International Joint Conference on Artificial Intelligence (IJCAI)*, 2022: 673-679
13. Jason D. Lee\*, **Qi Lei**\*, Nikunj Saunshi\*, Jiacheng Zhuo\*, “Predicting What You Already Know Helps: Provable Self-Supervised Learning”, *Neural Information Processing Systems (NeurIPS)*, 2021: 309-323
14. Baihe Huang\*, Kaixuan Huang\*, Sham M. Kakade\*, Jason D. Lee\*, **Qi Lei**\*, Runzhe Wang\*, Jiaqi Yang\*, “Optimal Gradient-based Algorithms for Non-concave Bandit Optimization”, *Neural Information Processing Systems (NeurIPS)*, 2021: 29101-29115
15. Kurtland Chua, **Qi Lei**, Jason D. Lee. “How Fine-Tuning Allows for Effective Meta-Learning”, *Neural Information Processing Systems (NeurIPS)*, 2021: 8871-8884
16. Baihe Huang\*, Kaixuan Huang\*, Sham M. Kakade\*, Jason D. Lee\*, **Qi Lei**\*, Runzhe Wang\*, Jiaqi Yang\*, “Going Beyond Linear RL: Sample Efficient Neural Function Approximation”, *Neural Information Processing Systems (NeurIPS)*, 2021: 8968-8983

17. **Qi Lei**, Wei Hu, Jason D. Lee. “Near-Optimal Linear Regression under Distribution Shift”, *International Conference of Machine Learning (ICML)*, 2021: 6164-6174
18. Tianle Cai\*, Ruiqi Gao\*, Jason D Lee\*, **Qi Lei\***. “A Theory of Label Propagation for Subpopulation Shift”, *International Conference of Machine Learning (ICML)*, 2021: 1170-1182
19. Jay Whang, **Qi Lei**, Alexandros G. Dimakis. “Solving Inverse Problems with a Flow-based Noise Model”, *International Conference of Machine Learning (ICML)*, 2021: 11146-11157
20. Simon S. Du\*, Wei Hu\*, Sham M. Kakade\*, Jason D. Lee\*, **Qi Lei\***. “Few-Shot Learning via Learning the Representation, Provably”, *International Conference on Learning Representations (ICLR)*, 2021
21. **Qi Lei\***, Sai Ganesh Nagarajan\*, Ioannis Panageas\*, Xiao Wang\*. “Last iterate convergence in no-regret learning: constrained min-max optimization for convex-concave landscapes”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2021: 1441-1449
22. Xiao Wang, **Qi Lei**, Ioannis Panageas. “Fast Convergence of Langevin Dynamics on Manifold: Geodesics meet Log-Sobolev”, *Neural Information Processing Systems (NeurIPS)*, 2020
23. Jiacheng Zhuo, **Qi Lei**, Alexandros G. Dimakis, Constantine Caramanis. “Communication-Efficient Asynchronous Stochastic Frank-Wolfe over Nuclear-norm Ball”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020: 1464-1474
24. **Qi Lei**, Jason Lee, Alexandros G. Dimakis, Contantinos Daskalakis. “SGD Learns One-Layer Networks in WGANs”, *International Conference of Machine Learning (ICML)*, 2020: 5799-5808
25. **Qi Lei**, Jiacheng Zhuo, Constantine Caramanis, Inderjit S. Dhillon, Alexandros G. Dimakis. “Primal-Dual Block Generalized Frank-Wolfe”, *Neural Information Processing Systems (NeurIPS)*, 2019: 13866-13875
26. **Qi Lei**, Ajil Jalal, Inderjit S. Dhillon, Alexandros G. Dimakis. “Inverting Deep Generative models, One layer at a time”, *Neural Information Processing Systems (NeurIPS)*, 2019: 13910-13919
27. **Qi Lei**, Jinfeng Yi, Roman Vaculin, Lingfei Wu, Inderjit S. Dhillon. “Similarity Preserving Representation Learning for Time Series Analysis”, *International Joint Conference on Artificial Intelligence (IJCAI)*, 2019: 2845-2851
28. **Qi Lei**, Lingfei Wu, Pin-Yu Chen, Alexandros G. Dimakis, Inderjit S. Dhillon, Michael Witbrock. “Discrete Adversarial Attacks and Submodular Optimization with Applications to Text Classification”, *Systems and Machine Learning (MLSys)*, 2019 (covered by Nature News )
29. Jinfeng Yi, **Qi Lei**, Wesley M Gifford, Ji Liu, Junchi Yan, Bowen Zhou. “Fast Unsupervised Location Category Inference from Highly Inaccurate Mobility Data”, *SIAM International Conference on Data Mining 2019*: 55-63
30. Zhewei Yao, Amir Gholami, **Qi Lei**, Kurt Keutzer, Michael W. Mahoney. “Hessian-based Analysis of Large Batch Training and Robustness to Adversaries”, *Neural Information Processing Systems (NIPS)*, 2018: 4954-4964
31. Jiong Zhang, **Qi Lei**, Inderjit S. Dhillon. “Stabilizing Gradients for Deep Neural Networks via Efficient SVD Parameterization”, *International Conference of Machine Learning (ICML)*, 2018: 5801-5809

32. Jinfeng Yi, **Qi Lei**, Junchi Yan, Wei Sun. “Session expert: A lightweight conference session recommender system”, *IEEE International Conference on Big Data (Big Data)*, 2018: 1677-1682
33. Lingfei Wu, Ian En-Hsu Yen, Jinfeng Yi, Fangli Xu, **Qi Lei**, Michael Witbrock. “Random Warping Series: A Random Features Method for Time-Series Embedding”, *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2018: 793-802
34. Hsiang-fu Yu, Cho-Jui Hsieh, **Qi Lei**, Inderjit S. Dhillon. “A Greedy Approach for Budgeted Maximum Inner Product Search”, *Neural Information Processing Systems (NIPS)*, 2017: 5453-5462
35. **Qi Lei**, Enxu Yen, Chao-yuan Wu, Inderjit S. Dhillon, Pradeep Ravikumar. “Doubly Greedy Primal-Dual Coordinate Methods on Sparse Empirical Risk Minimization”, *International Conference of Machine Learning (ICML)*, 2017: 2034-2042
36. Rashish Tandon, **Qi Lei**, Alexandros G. Dimakis, Nikos Karampatziakis, “Gradient Coding: Avoiding Stragglers in Distributed Learning”, *International Conference of Machine Learning (ICML)*, 2017: 3368-3376
37. **Qi Lei**, Kai Zhong, Inderjit S. Dhillon. “Coordinate-wise Power Method”, *Neural Information Processing System (NIPS)*, 2016: 2056-2064
38. Arnaud Vandaele, Nicolas Gillis, **Qi Lei**, Kai Zhong, Inderjit S. Dhillon. “Coordinate Descent Methods for Symmetric Nonnegative Matrix Factorization”, *IEEE Transactions on Signal Processing*, 64.21 (2016): 5571-5584
39. Maria R. D’Orsogna, **Qi Lei**, Tom Chou, “First assembly times and equilibration in stochastic coagulation-fragmentation”, *Journal of Chemical Physics*, 2015: 143.1, 014112
40. Jiazhou Chen, **Qi Lei**, Yongwei Miao, Qunsheng Peng, “Vectorization of Line Drawing Image based on Junction Analysis”, *Science China Information Sciences*, 2014:1-14
41. Jiazhou Chen, **Qi Lei**, Fan Zhong, Qunsheng Peng, “Interactive Tensor Field Design Based on Line Singularities”, *Proceedings of the 13th International CAD/Graphics*, 2013

## Workshop Articles

1. Chun-Yin Huang, **Qi Lei**, Xiaoxiao Li, “Efficient Medical Image Assessment via Self-supervised Learning”, *DALI@MICCAI Workshop*, 2022: 102-111 (**with Best Paper Honorable Mention**)
2. Tianci Liu, Quan Zhang, **Qi Lei**, “PANOM: Automatic Hyper-parameter Tuning for Inverse Problems”, *NeurIPS 2021 Workshop on Deep Learning and Inverse Problems*
3. Kaixuan Huang\*, Sham M. Kakade\*, Jason D. Lee\*, **Qi Lei\***, “A Short Note on the Relationship of Information Gain and Eluder Dimension”, *ICML 2021 Workshop on Reinforcement Learning Theory*
4. Jay Whang, **Qi Lei**, Alex Dimakis, “Compressed Sensing with Invertible Generative Models and Dependent Noise”, *NeurIPS 2020 Workshop: Deep Learning and Inverse Problems*

<b>Patents</b>	<ul style="list-style-type: none"> <li>• “Method and System for General and Efficient Time Series Representation Learning via Dynamic Time Warping.” <b>Q. Lei</b>, J. Yi, R. Vaculin, and W. Sun</li> <li>• “Real-Time Cold Start Recommendation and Rationale within a Dialog System”. <b>Q. Lei</b>, J. Yi, R. Vaculin, M. Pietro</li> </ul>	
<b>Teaching</b>	<i>Center for Data Science, New York University</i> <ul style="list-style-type: none"> <li>• Modern Topics in Statistical Learning Theory: <i>Instructor</i></li> </ul>	Spring 2023
	<i>Courant Institute Mathematics Department, New York University</i> <ul style="list-style-type: none"> <li>• Probability and Statistics: <i>Instructor</i></li> </ul>	Fall 2022
	<i>Department of Electrical and Computer Engineering, Princeton</i> <ul style="list-style-type: none"> <li>• Theory of Deep Learning: Representation and Weakly Supervised Learning: <i>Teaching Assistant</i></li> </ul>	Fall 2020
	<i>Department of Electrical and Computer Engineering, UT Austin</i> <ul style="list-style-type: none"> <li>• Scalable Machine Learning: <i>Teaching Assistant</i></li> </ul>	Fall 2019
	<i>Oden Institute for Computational Engineering and Sciences, UT Austin</i> <ul style="list-style-type: none"> <li>• Mathematical Methods in Applied Engineering and Sciences: <i>Instructor Intern</i></li> </ul>	Fall 2015
<b>Industry Experiences</b>	<i>Facebook/Photo&amp;Video Search</i> <ul style="list-style-type: none"> <li>• Explored offline/online evaluation gaps by estimating expected number of clicks based on historical logging data.</li> </ul>	June 2018 - September 2018
	<i>Amazon/A9 Product Search</i> <ul style="list-style-type: none"> <li>• Inline search suggestions: used deep learning methods for NLP user search tasks.</li> </ul>	May 2017 - August 2017
	<i>Amazon Web Services (AWS Deep Learning Team)</i> <ul style="list-style-type: none"> <li>• Documentations for MXNet: a deep learning framework designed for both efficiency and flexibility.</li> </ul>	January 2017 - April 2017
	<i>IBM Thomas J. Watson Research Center</i> <ul style="list-style-type: none"> <li>• Clients’ propensity prediction of trading options Partnered with one of the largest American financial companies on a challenge problem of predicting its clients’ propensity of trading options</li> <li>• Create World of Watson Session recommendation system: <a href="https://myibm.ibm.com/events/wow/watson/">https://myibm.ibm.com/events/wow/watson/</a></li> </ul>	May 2016 - October 2016
<b>Service</b>	Co-organizing the workshop on meta-learning at NeurIPS 2022	
	Co-organizing Mathematical Data Science Reading Group, which is a weekly departmental seminar series on Machine Learning Theory in ECE, Princeton, 2020-2021	
	Student mentor, Oden Institute, 2018-2020	
	<i>Conference Reviewer:</i> MLSys (19,20,Meta-reviewer’21, TPC’22), COLT (21,22), STOC (20), NeurIPS (16,17,18,19,20,21), ICML (18,19,20,21), ICLR (18,19,20,21), AIS-TATS (18,19,20,21), AAAI (20,21), ACML (19), and more	

*Journal Reviewer:* JSAIT(20), MOR (18,19,20), TNNLS (19,20), TKDE (19), ISIT (17,18), TIS (17), IT (16,17), and more