

# Lei, Qi

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

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

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

**EMPLOYMENT** *Princeton University, NJ, United States* July 2020 - Present

- Postdoc Research Associate (CIFellow), Electrical and Computer Engineering Department
- Postdoc Mentor: Jason D. Lee

**EDUCATION** *University of Texas at Austin, TX, United States* August 2014 - May 2020

- Ph.D., Oden Institute for Computational Sciences and Engineering
- Advisors: Inderjit S. Dhillon and Alexandros G. Dimakis

*Zhejiang University, Zhejiang, China* Sep 2010 - June 2014

- B.S., School of Mathematics (with honors), Chu Kochen Honors (GPA 3.92/4.0, rank 1<sup>st</sup>)
- Advisor: Qunsheng Peng, State Key Lab of CAD&CG.

**AWARDS and RECOGNITIONS**

- Computing Innovation Fellowship Computing Research Association, 2020-2022
- Simons-Berkeley Research Fellowship Simons Institute, 2019 summer
- The National Initiative for Modeling and Simulation Research Fellowship UT Austin, 2014-2018
- Young Investigators Lecturers in Engineering and Applied Science Caltech, 2021
- Outstanding Dissertation Award Oden Institute, 2020
- Rising Star for EECS UIUC, 2019
- Rising Star for Computational and Data Science UT Austin, 2020
- Meritorious Winner (First Prize) for The Mathematical Contest in Modeling (MCM) COMAP, 2014
- The Excellence Scholarship (top honor) Zhejiang Univ, 2014

**PUBLICATIONS**

1. **Qi Lei**, Wei Hu, Jason D. Lee. “Near-Optimal Linear Regression under Distribution Shift”, *International Conference of Machine Learning (ICML), 2021: 6164-6174*
2. 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*
3. 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*
4. 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, 2021*
5. **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, 2021: 1441-1449*
6. Xiao Wang, **Qi Lei**, Ioannis Panageas. “Fast Convergence of Langevin Dynamics on Manifold: Geodesics meet Log-Sobolev”, *Proc. of Neural Information Processing Systems (NeurIPS), 2020*
  7. Jiacheng Zhuo, **Qi Lei**, Alexandros G. Dimakis, Constantine Caramanis. “Communication-Efficient Asynchronous Stochastic Frank-Wolfe over Nuclear-norm Ball”, *The 23rd International Conference on Artificial Intelligence and Statistics, 2020: 1464-1474*
  8. **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*
  9. **Qi Lei**, Jiacheng Zhuo, Constantine Caramanis, Inderjit S. Dhillon, Alexandros G. Dimakis. “Primal-Dual Block Frank-Wolfe”, *Proc. of Neural Information Processing Systems (NeurIPS), 2019: 13866-13875*
  10. **Qi Lei**, Ajil Jalal, Inderjit S. Dhillon, Alexandros G. Dimakis. “Inverting Deep Generative models, One layer at a time”, *Proc. of Neural Information Processing Systems (NeurIPS), 2019: 13910-13919*
  11. **Qi Lei**, Jinfeng Yi, Roman Vaculin, Lingfei Wu, Inderjit S. Dhillon. “Similarity Preserving Representation Learning for Time Series Analysis”, *The 28th International Joint Conference on Artificial Intelligence (IJCAI), 2019: 2845-2851*
  12. **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 )
  13. Jinfeng Yi, **Qi Lei**, Wesley M Gifford, Ji Liu, Junchi Yan, Bowen Zhou. “Fast Unsupervised Location Category Inference from Highly Inaccurate Mobility Data”, *Proceedings of the 2019 SIAM International Conference on Data Mining 2019: 55-63*
  14. 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*
  15. 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*
  16. 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*
  17. 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”, *AISTATS 2018: 793-802*
  18. 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*
  19. **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*

20. 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
21. **Qi Lei**, Kai Zhong, Inderjit S. Dhillon. “Coordinate-wise Power Method”, *Neural Information Processing System(NIPS)*, 2016: 2056-2064
22. 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
23. Maria R. D’Orsogna, **Qi Lei**, Tom Chou, “First assembly times and equilibration in stochastic coagulation-fragmentation”, *The Journal of Chemical Physics*, 2015: 143.1, 014112
24. Jiazhou Chen, **Qi Lei**, Yongwei Miao, Qunsheng Peng, “Vectorization of Line Drawing Image based on Junction Analysis”, *Science China Information Sciences*, 2014:1-14
25. 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. 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*
2. Jason D. Lee\*, **Qi Lei\***, Nikunj Saunshi\*, Jiacheng Zhuo\*, “Predicting What You Already Know Helps: Provable Self-Supervised Learning”, *NeurIPS 2020 Workshop: Self-Supervised Learning - Theory and Practice*
3. Jay Whang, **Qi Lei**, Alex Dimakis, “Compressed Sensing with Invertible Generative Models and Dependent Noise”, *NeurIPS 2020 Workshop: Deep Learning and Inverse Problems*
4. **Qi Lei**, Ajil Jalal, Inderjit Dhillon, Alexandros Dimakis, “Inverting Deep Generative models, One layer at a time”, *ICML 2019 Workshop on Invertible Neural Networks and Normalizing Flows*
5. Rashish Tandon, **Qi Lei**, Alexandros G. Dimakis, Nikos Karampatziakis, “Gradient Coding”, *NIPS 2016 Workshop on ML Systems (MLSys)*

#### UNDER REVIEW PREPRINTS

1. 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”, *arxiv preprint*
2. 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”, *arxiv preprint*
3. Kurtland Chua, **Qi Lei**, Jason D. Lee. “How Fine-Tuning Allows for Effective Meta-Learning”, *arxiv preprint*
4. Lemeng Wu, Mao Ye, **Qi Lei**, Jason D. Lee, and Qiang Liu. “Steepest Descent Neural Architecture Optimization: Escaping Local Optimum with Signed Neural Splitting”, *arxiv preprint*
5. Minhao Cheng, **Qi Lei**, Pin-Yu Chen, Inderjit Dhillon, Cho-Jui Hsieh. “CAT: Customized Adversarial Training for Improved Robustness”, *arxiv preprint*

## PATENTS

- “Method and System for General and Efficient Time Series Representation Learning via Dynamic Time Warping.”  
**Q. Lei**, J. Yi, R. Vaculin, and W. Sun
- “Real-Time Cold Start Recommendation and Rationale within a Dialog System”.  
**Q. Lei**, J. Yi, R. Vaculin, M. Pietro

## TEACHING

*Department of Electrical and Computer Engineering, Princeton University* Fall 2020

- Theory of Deep Learning: Representation and Weakly Supervised Learning: *Teaching Assistant*

*Department of Electrical and Computer Engineering, UT Austin* Fall 2019

- Scalable Machine Learning: *Teaching Assistant*

*Oden Institute for Computational Engineering and Sciences, UT Austin* Fall 2015

- Mathematical Methods in Applied Engineering and Sciences: *Instructor Intern*

## EXPERIENCE

*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

*Facebook/Photo&Video Search* June 2018 - September 2018

- Explored offline/online evaluation gaps by estimating expected number of clicks based on historical logging data.

*Amazon/A9 Product Search* May 2017 - August 2017

- Inline search suggestions: used deep learning methods for NLP user search tasks.

*Amazon Web Services (AWS Deep Learning Team)* January 2017 - April 2017

- Documentations for MXNet: a deep learning framework designed for both efficiency and flexibility.

*IBM Thomas J. Watson Research Center* May 2016 - October 2016

- Partnered with one of the largest American financial companies on a challenge problem of predicting its clients’ propensity of trading options
- Create World of Watson Session recommendation system:  
<https://myibm.ibm.com/events/wow/watson/>

## SERVICE

*Conference Reviewer:* MLSys (19,20,Meta-reviewer’21), COLT (21), STOC (20), NeurIPS (16,17,18,19,20,21), ICML (18,19,20,21), ICLR (18,19,20,21), AISTATS (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

## INVITED TALKS & ORAL PRESENTATIONS

1. “ Few-Shot Learning via Learning the Representation, Provably.”
  - IAS, Princeton, NJ, 2020

- Simons Institute Reunion, virtual, 2020
  - UC Berkeley, virtual, 2020
2. “Predicting What You Already Know Helps: Provable Self-Supervised Learning.”
    - Institute for Foundations of Machine Learning, virtual, 2020
    - One-World ML seminar, virtual, 2020
    - UW-Madison, virtual, 2020
  3. “Provable representation learning.”
    - Young Researcher Spotlight Talk at “Seeking Low-dimensionality in Deep Learning” workshop, virtual, 2020
    - Microsoft Research, virtual, 2021
    - Caltech Young Investigators Lecture Series, virtual, 2021
  4. “SGD Learns One-Layer Networks in WGANs.”
    - International Conference of Machine Learning (ICML), virtual, 2020
    - Workshop on Learning and Testing in High Dimensions, Simons Institute, 2020
  5. “Deep Generative models and Inverse Problems.”
    - Minisymposium on Machine Learning for Solving Partial Differential Equations and Inverse Problems, 2019 SIAM Texas-Louisiana Section, Dallas, TX, USA, 2019
    - Google Research, virtual, 2021
  6. “Similarity Preserving Representation Learning for Time Series Analysis.”
    - The 28th International Joint Conference on Artificial Intelligence (IJCAI), Macao, 2019
  7. “Discrete Adversarial Attacks and Submodular Optimization with Applications to Text Classification.”
    - Simons-Berkeley Fellows Talk, Berkeley, CA, USA & SysML19, Stanford, CA, USA, 2019
  8. “Recent Advances in Primal-Dual Coordinate Methods for ERM.”
    - Minisymposium on Recent Progress in Coordinate-wise Descent Methods, SIAM Conference on Computational Science and Engineering, Spokane, WA, USA, 2019
    - International Conference of Machine Learning (ICML), Sydney, 2017
  9. “Coordinate Descent Methods for Matrix Factorization.”
    - Minisymposium on Recent Advances in Nonnegative Matrix Factorization, SIAM Annual Meeting, Boston, USA, 2016

## PROGRAMMING SKILLS

C/C++(proficient), Python(proficient), Matlab(proficient), C#(prior experience)

Familiar with Deep Learning packages(Pytorch, Tensorflow, Theano, MXNet)