

Richard Y. Zhang

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Updated: August 2026

Appointments

University of Illinois at Urbana-Champaign
Associate Professor with tenure (2026–)
Assistant Professor (2019–2026)
Electrical and Computer Engineering
Coordinated Science Laboratory

Urbana, IL, USA

University of California, Berkeley
Postdoctoral Scholar (2017–2019)
Industrial Engineering and Operations Research

Berkeley, CA, USA

ISO New England
Research Intern (2014)
Business Architecture & Technology

Holyoke, MA, USA

Education

Massachusetts Institute of Technology
Ph. D., Electrical Engineering and Computer Science (2017)

Cambridge, MA, USA

Massachusetts Institute of Technology
S. M., Electrical Engineering and Computer Science (2012)

Cambridge, MA, USA

University of Canterbury
B. E. (Hons), Electrical and Computer Engineering (2009)
First class honours.

Christchurch, New Zealand

Selected Awards and Honors

- 2025 *Mathematical Programming* Meritorious Service Award.
- 2025 List of Teachers Ranked as Excellent, Spring 2025, Fall 2024, Spring 2021.
- 2022 Nominated for ECE Ronald W. Pratt Outstanding Teaching Award.
- 2021 National Science Foundation CAREER Award.
- 2015 IEEE APEC Outstanding Presentation Award (with Yiou He), poster track: *System Design Considerations for Power Electronics*.
- 2014 IEEE APEC Outstanding Presentation Award, oral track: *Magnetic Components, Design and Characterization*.
- 2012 MIT-Imperial College Global Fellow.
- 2010 William Georgetti Scholarship, 4 selected nationwide in New Zealand by a panel comprising the Governor-General, the Prime Minister, and the Chief Justice of the Supreme Court.
- 2008 University of Canterbury Senior Scholar, 25 awarded university-wide out of 13,718 undergraduates.
- 2007 Brian Morrison Memorial Scholarships in Engineering, awarded to one student “likely in their future lives to promote and foster racial tolerance, co-operation, and understanding”.

Research Grants

Total funding awarded to my group is \$1.126M.

- 2024 **Sole PI**, US Navy Office of Naval Research Award N00014-24-1-2671: *Rank Overparameterization in the Nonconvex Low-rank Factorization: Global Optimality and Large-Scale Algorithms*. Sep 2024–Aug 2027. Total \$383k.
- 2022 **Co-PI**, C3 AI Digital Transformation Institute: *High Performance Provably Robust AI methods for Cybersecurity Tasks on the Critical Infrastructure*. May 2022–Feb 2025. PI Zico Kolter (CMU). Co-PI share \$143k / \$257k.
- 2021 **Sole PI**, National Science Foundation Award ECCS-2047462: *CAREER: Structure-Exploiting Optimization for Power Systems and Applications to Large-Scale Networks*. Feb 2021–Jan 2026. Total \$500k.
- 2018 **Co-PI**, National Science Foundation Award ECCS-1808859: *Low-Complexity Algorithms for Sparse Conic Optimization with Applications to Energy Systems and Machine Learning*. Aug 2018–Jul 2022. PI Somayeh Sojoudi (UC Berkeley). Co-PI share \$100k / \$360k.

Preprints

1. A.D. McRae, R. Y. Zhang, Sharp Recovery and Landscape Guarantees for the Nonconvex Matrix LASSO. Preprint, Apr. 2026. arXiv: 2604.19381

2. H.-M. Chiu, R. Y. Zhang, Well-conditioned Primal-Dual Interior-point Method for Low-rank Semidefinite Programming. Preprint, Jul. 2024. arXiv: 2407.14013
3. I. Guzel, A.D. McRae, R. Y. Zhang, Spectral Initialization and Certification for Power System Angle Estimation. Preprint, Jul. 2026. arXiv: 2607.06762

Journal Articles

4. R. Y. Zhang, Nonnegative Low-rank Matrix Recovery Can Have Spurious Local Minima. *Optimization Letters* 20, 683–704 (2026). doi: 10.1007/s11590-026-02290-0 | arXiv: 2505.03717
5. R. Y. Zhang, Sharp Global Guarantees for Nonconvex Low-Rank Recovery in the Noisy Overparameterized Regime. *SIAM Journal on Optimization* 35 (3), 2128–2154 (2025). doi: 10.1137/24M1697980 | arXiv: 2104.10790
6. R. Y. Zhang, Improved Global Guarantees for the Nonconvex Burer–Monteiro Factorization via Rank Overparameterization. *Mathematical Programming* 213, 1009–1038 (2025). doi: 10.1007/s10107-024-02160-6 | arXiv: 2207.01789
7. R. Y. Zhang, Complexity of Sparse Semidefinite Programs with Small Treewidth. *Mathematical Programming* 213, 201–237 (2025). doi: 10.1007/s10107-024-02137-5 | arXiv: 2306.15288
8. G. Liang, G. Zhang, S. Fattahi, R.Y. Zhang, Simple Alternating Minimization Provably Solves Complete Dictionary Learning. *SIAM Journal on Mathematics of Data Science* 7 (3), 855–883 (2025). doi: 10.1137/23M1568120 | arXiv: 2210.12816
9. I. Guzel, R. Y. Zhang, Power System State Estimation by Phase Synchronization and Eigenvectors. *IEEE Transactions on Control of Network Systems* 12 (3), 2207–2218 (2025). doi: 10.1109/TCNS.2025.3558802 | arXiv: 2409.12828
10. G. Zhang, S. Fattahi, R.Y. Zhang, Preconditioned Gradient Descent for Overparameterized Nonconvex Burer–Monteiro Factorization with Global Optimality Certification. *Journal of Machine Learning Research* 24 (163), 1–55 (2023). link | arXiv: 2206.03345
11. R.Y. Zhang, J. Lavaei, Sparse Semidefinite Programs with Guaranteed Near-Linear Time Complexity via Dualized Clique Tree Conversion. *Mathematical Programming* 188 (1), 351–393 (2021). doi: 10.1007/s10107-020-01516-y | arXiv: 1710.03475
12. S.-W. Park, R.Y. Zhang, J. Lavaei, R. Baldick, Uniqueness of Power Flow Solutions Using Monotonicity and Network Topology. *IEEE Transactions on Control of Network Systems* 8 (1), 319–330 (2021). doi: 10.1109/TCNS.2020.3027783
13. Y. Ouyang, R.Y. Zhang, J. Lavaei, P. Varaiya, Large-Scale Traffic Signal Offset Optimization. *IEEE Transactions on Control of Network Systems* 7 (3), 1176–1187 (2020). arXiv: 1911.08368
14. R.Y. Zhang, S. Sojoudi, J. Lavaei, Sharp Restricted Isometry Bounds for the Inexistence of Spurious Local Minima in Nonconvex Matrix Recovery. *Journal of Machine Learning Research* 20 (114), 1–34 (2019). link | arXiv: 1901.01631
15. R.Y. Zhang, J. Lavaei, R. Baldick, Spurious Local Minima in Power System State Estimation. *IEEE Transactions on Control of Network Systems* 6 (3), 1086–1096 (2019). doi: 10.1109/TCNS.2019.2920586

16. R.Y. Zhang, C. Jozs, S. Sojoudi, Conic optimization for control, energy systems, and machine learning: Applications and algorithms. *Annual Reviews in Control* 47, 323–340 (2019). doi: 10.1016/j.arcontrol.2018.11.002 | arXiv: 1709.08841
17. R.Y. Zhang, J.K. White, GMRES-Accelerated ADMM for Quadratic Objectives. *SIAM Journal on Optimization* 28 (4), 3025–3056 (2018). doi: 10.1137/16M1059941 | arXiv: 1601.06200
18. S. Fattahi, R. Y. Zhang, S. Sojoudi, Linear Time Algorithms for Sparse Inverse Covariance Estimation. *IEEE Access* 7, 12658–12672 (2018). doi: 10.1109/ACCESS.2018.2890583
19. R.Y. Zhang, J.K. White, Toeplitz-Plus-Hankel Matrix Recovery for Green’s Function Computations on General Substrates. *Proceedings of the IEEE* 103 (11), 1970–1984 (2015). doi: 10.1109/JPROC.2015.2461005
20. R.Y. Zhang, J.K. White, J.G. Kassakian, Fast simulation of complicated 3D structures above lossy magnetic media. *IEEE Transactions on Magnetics* 50 (10), 7027416 (2014). doi: 10.1109/TMAG.2014.2323933

Conference Proceedings in Machine Learning

With acceptance rates of 15–25%, the proceedings at top machine learning conferences are regarded as archival publications. They are held to the same rigorous standards as journal articles in other academic disciplines, and are similarly valued in terms of impact and recognition.

21. Peng Xu*, Chun Ying Hou*, Xiaohui Chen, Richard Y. Zhang, Scalable Second-order Riemannian Optimization for K-means Clustering. *ICLR 2026*, Rio de Janeiro, Brazil, Apr. 23–27, 2026. (* equal contribution) arXiv: 2509.21675
22. Hong-Ming Chiu, Hao Chen, Huan Zhang, Richard Y. Zhang, SDP-CROWN: Efficient Bound Propagation for Neural Network Verification with Tightness of Semidefinite Programming. *ICML 2025*, Vancouver, Canada, Jul. 13–19, 2025. **Selected for Spotlight (one of 313/12107 submissions)**. arXiv: 2506.06665
23. Y. Zhuang, X. Chen, Y. Yang, R.Y. Zhang, Statistically Optimal K-means Clustering via Nonnegative Low-rank Semidefinite Programming. *ICLR 2024*, Vienna, Austria, May 7–11, 2024. **Selected for Oral (one of 85/7262 submissions)**. arXiv: 2305.18436
24. G. Zhang, H.-M. Chiu, R.Y. Zhang, Fast and Minimax Optimal Estimation of Low-Rank Matrices via Non-Convex Gradient Descent. *AISTATS 2024*, Valencia, Spain, May 2–4, 2024. arXiv: 2305.17224
25. H.-M. Chiu, R.Y. Zhang, Tight Certification of Adversarially Trained Neural Networks via Nonconvex Low-Rank Semidefinite Relaxations. *ICML 2023*, Honolulu, HI, Jul. 23–29, 2023. arXiv: 2211.17244
26. G. Zhang, H.-M. Chiu, R.Y. Zhang, Accelerating SGD for Highly Ill-Conditioned Huge-Scale Online Matrix Completion. *NeurIPS 2022*, New Orleans, LA, Nov. 28–Dec. 9, 2022. arXiv: 2208.11246
27. G. Zhang, S. Fattahi, R.Y. Zhang, Preconditioned Gradient Descent for Over-Parameterized Nonconvex Matrix Factorization. *NeurIPS 2021*, Virtual conference, Dec. 6–14, 2021. [link](#)
28. G. Zhang, R.Y. Zhang, How many samples is a good initial point worth in Low-rank Matrix Recovery? *NeurIPS 2020*, Virtual conference, Dec. 6–12, 2020. **Selected for Spotlight (one of**

280/9454 submissions). arXiv: 2006.06915

29. R.Y. Zhang, On the Tightness of Semidefinite Relaxations for Certifying Robustness to Adversarial Examples. *NeurIPS 2020*, Virtual conference, Dec. 6–12, 2020. arXiv: 2006.06759
30. R.Y. Zhang, C. Jozs, S. Sojoudi, J. Lavaei, How Much Restricted Isometry is Needed In Nonconvex Matrix Recovery? *NeurIPS 2018*, Montreal, QC, Dec. 3–8, 2018. **Selected for Spotlight (one of 168/4856 submissions)**. arXiv: 1805.10251
31. R.Y. Zhang, S. Fattahi, S. Soujoudi, Large-Scale Sparse Inverse Covariance Estimation via Thresholding and Max-Det Matrix Completion. *ICML 2018*, Stockholm, Sweden, Jul. 10–15, 2018. link | arXiv: 1802.04911
32. C. Jozs, Y. Ouyang, R. Y. Zhang, J. Lavaei, S. Sojoudi, A theory on the absence of spurious solutions for nonconvex and nonsmooth optimization. *NeurIPS 2018*, Montreal, QC, Dec. 3–8, 2018. arXiv: 1805.08204

Conference Proceedings in Engineering

33. S.W. Park, R.Y. Zhang, J. Lavaei, R. Baldick, Monotonicity Between Phase Angles and Power Flow and Its Implications for the Uniqueness of Solutions. *HICSS 52*, Grand Wailea, HI, Jan. 8–11, 2019.
34. R.Y. Zhang, J. Lavaei, Sparse Semidefinite Programs with Near-Linear Time Complexity. *CDC 2018*, Miami Beach, FL, Dec. 17–19, 2018. arXiv: 1710.03475v1
35. R.Y. Zhang, J. Lavaei, Efficient Algorithm for Large-and-Sparse LMI Feasibility Problems. *CDC 2018*, Miami Beach, FL, Dec. 17–19, 2018.
36. Y. Ouyang, R.Y. Zhang, J. Lavaei, P. Varaiya, Conic Approximation with Provable Guarantee for Traffic Signal Offset Optimization. *CDC 2018*, Miami Beach, FL, Dec. 17–19, 2018.
37. S. Fattahi, R.Y. Zhang, S. Sojoudi, Sparse Inverse Covariance Estimation for Chordal Structures. *ECC 2018*, Limassol, Cyprus, Jun. 12–15, 2018. arXiv: 1711.09131
38. R.Y. Zhang*, C. Jozs*, S. Sojoudi, Conic Optimization Theory: Convexification Techniques and Numerical Algorithms. *ACC 2018*, Milwaukee, WI, Jun. 27–29, 2018. doi: 10.23919/ACC.2018.8430887 | arXiv: 1709.08841
39. R.Y. Zhang, J. Lavaei, R. Baldick, Spurious Critical Points in Power System State Estimation. *HICSS 51*, Waikoloa Village, HI, Jan. 3–6, 2018. doi: 10.24251/HICSS.2018.325
40. R.Y. Zhang, J. Lavaei, Modified Interior-Point Method for Large-and-Sparse Low-Rank Semidefinite Programs. *CDC 2017*, Melbourne, Australia, Dec. 12–15, 2017. doi: 10.1109/CDC.2017.8264510 | arXiv: 1703.10973
41. R.Y. Zhang, J. Elizondo, J.L. Kirtley, J.K. White, Certifying Microgrid Stability Under Large-Signal Intermittency. *COMPEL 2016*, Trondheim, Norway, Jun. 27–30, 2016. doi: 10.1109/COMPEL.2016.7556707
42. R.Y. Zhang, J. Elizondo, J.L. Kirtley, J.K. White, Small-Signal Stability Verification Issues for Transmission Systems with Distributed Renewables. *PESGM 2016*, Boston, MA, USA, Jul. 17–21, 2016. doi: 10.1109/PESGM.2016.7741724

43. J. Elizondo, R.Y. Zhang, P.-H. Huang, J.K. White, J.L. Kirtley, Inertial and Frequency Response from Microgrids with Induction Motors. *COMPEL 2016*, Trondheim, Norway, Jun. 27–30, 2016. doi: 10.1109/COMPEL.2016.7556722
44. R.Y. Zhang, A.-T. Avestruz, J.K. White, S.B. Leeb, Design of Resonance Damping via Control Synthesis. *COMPEL 2015*, Vancouver, BC, Canada, Jul. 12–15, 2015. doi: 10.1109/COMPEL.2015.7236464
45. J. Elizondo, R.Y. Zhang, J.K. White, J.L. Kirtley, Robust Small Signal Stability for Microgrids under Uncertainty. *PEDG 2015*, Aachen, Germany, Jun. 22–25, 2015. doi: 10.1109/PEDG.2015.7223059
46. Y. He, R.Y. Zhang, J.G. Kassakian, An energy-based method for the assessment of battery and ultracapacitor in pulse load applications. *APEC 2015*, Charlotte, NC, USA, Mar. 15–19, 2015. **Outstanding Presentation Award (Poster)**. doi: 10.1109/APEC.2015.7104686
47. C.R. Sullivan, R.Y. Zhang, Analytical model for effects of twisting on litz-wire losses. *COMPEL 2014*, Santander, Spain, Jun. 22–25, 2014. doi: 10.1109/COMPEL.2014.6877187
48. R.Y. Zhang, J.K. White, J.G. Kassakian, C.R. Sullivan, Realistic litz wire characterization using fast numerical simulations. *APEC 2014*, Ft. Worth, TX, USA, Mar. 16–20, 2014. **Outstanding Presentation Award (Oral)**. doi: 10.1109/APEC.2014.6803390
49. C.R. Sullivan, R.Y. Zhang, Simplified design method for litz wire. *APEC 2014*, Ft. Worth, TX, USA, Mar. 16–20, 2014. doi: 10.1109/APEC.2014.6803681
50. B. Heffernan, R. Duke, R. Zhang, P. Gaynor, M. Cusdin, A go-cart as an electric vehicle for undergraduate teaching and assessment. *AUPEC 2010*, Christchurch, New Zealand, Dec. 5–8, 2010.

HICSS = Hawaii International Conference on System Sciences. CDC = IEEE Conference on Decision and Control. ACC = American Control Conference. ECC = European Control Conference. PESGM = IEEE Power & Energy Society General Meeting. PEDG = International Symposium on Power Electronics for Distributed Generation Systems. COMPEL = Workshop on Control and Modeling for Power Electronics. APEC = Applied Power Electronics Conference & Exposition. AUPEC = Australasian Universities Power Engineering Conference.

Invited Seminar Talks

- 2026 University of Illinois, Industrial & Enterprise System Engineering, Graduate Seminar. Mar 13, 2026. (Host: Roy Dong.)
- 2025 Stanford University, ISL Colloquium, Stanford, CA. Mar 6, 2025. (Host: Madeleine Udell.)
Power Systems Engineering Research Center (PSERC) Webinar Series, virtual. Feb 12, 2025. (Host: Alejandro Dominguez-Garcia, UIUC.)
- 2024 Purdue University, Applied Math Seminar, West Lafayette, IN. Nov 1, 2024. (Host: Xiangxiong Zhang.)
University of Washington, Institute for Foundations of Data Science (IFDS) ML-OPT Seminar, Seattle, WA. Oct 18, 2024. (Host: Simon S. Du.)
University of Southern California, Probability and Statistics Seminar, Los Angeles, CA. Oct 4, 2024. (Host: Xiaohui Chen.)

University of California, Los Angeles, Dept. of Mathematics Colloquium, Los Angeles, CA. Oct 3, 2024. (Host: Guido Montúfar.)

University of Göttingen, Göttingen, Germany. Jul 2, 2024. (Host: Max Pfeffer.)

University of Vienna, Vienna, Austria. May 8, 2024. (Host: Immanuel Bomze.)

Johns Hopkins University, Data Science Seminar, Baltimore, MD. May 1, 2024. (Hosts: Fei Lu, Mauro Maggioni, Xiong Wang.)

Georgia Institute of Technology, Atlanta, GA. Mar 11, 2024. (Host: Siva Teja Maguluri.)

2023 University of Michigan, Communications and Signal Processing Seminar, Ann Arbor, MI. Nov 2, 2023. (Host: Jeffrey Fessler.)

University of California, Berkeley, Development Engineering Guest Lecture, Berkeley, CA. Mar 14, 2023. (Hosts: Anil Aswani, Shankar Sastry.)

2022 C3.ai Digital Transformation Institute (DTI) Colloquium Series, virtual. Dec 1, 2022. (Host: Gauri Joshi, CMU.)

2021 Power Systems Engineering Research Center (PSERC) Webinar Series, virtual. Feb 16, 2021. (Host: Alejandro Domínguez-García, UIUC.)

2019 University of Canterbury, Christchurch, New Zealand. Dec 20, 2019. (Host: Rick Millane.)

University of Auckland, Auckland, New Zealand. Dec 16, 2019. (Host: Nirmal Nair.)

University of British Columbia, Vancouver. Dec 9, Canada, 2019. (Host: Christine Chen.)

Invited Conference Talks

Student speaker speaking on my behalf indicated in *.

2026 R. Y. Zhang, *INFORMS Annual Meeting*, San Francisco, CA. Nov 1-4, 2026. (Host: M. Diaz, U Chicago.)

R. Y. Zhang, *SIAM Optimization Conference*, Edinburgh, UK. Jun 2-5, 2026. (Host: L. Tuncel, U. Waterloo.)

H.-M. Chiu*, R. D. C. Monteiro, R. Y. Zhang, *SIAM Optimization Conference*, Edinburgh, UK. Jun 2-5, 2026. (Host: Makoto Yamashita, Institute of Science Tokyo.)

R. Y. Zhang, *INFORMS Optimization Conference*, Atlanta, GA. Mar 20-22, 2026. (Host: J. Dahl.)

H.-M. Chiu*, R. D. C. Monteiro, R. Y. Zhang, *INFORMS Optimization Conference*, Atlanta, GA. Mar 20-22, 2026. (Hosts: Yang Zheng, UC San Diego; Lijun Ding, UC San Diego; Feng-Yi Liao, UC San Diego.)

2025 H.-M. Chiu*, G. Zhang, R. Y. Zhang, Fast and Accurate Estimation of Low-Rank Matrices from Noisy Measurements via Preconditioned Non-Convex Gradient Descent, *INFORMS Annual Meeting*, Atlanta, GA. (Host: S. Fattahi, U. Michigan.)

I. Guzel*, R. Y. Zhang, Power System State Estimation by Phase Synchronization and Eigenvectors, *INFORMS Annual Meeting*, Atlanta, GA. (Host: B. Jabbari Marand, NC State U.)

- R. Y. Zhang, Sharp Global Guarantees for Nonconvex Low-rank Recovery in the Noisy Overparameterized Regime, *International Conference on Continuous Optimization (ICCOPT)*, Los Angeles, CA. Jul 21-24, 2025. (Hosts: C. W. Royer, U. Paris Dauphine-PSL; F. Goyens, UCLouvain.)
- I. Guzel*, R. Y. Zhang, Power System State Estimation by Phase Synchronization and Eigenvectors, *International Conference on Continuous Optimization (ICCOPT)*, Los Angeles, CA. Jul 21-24, 2025. (Hosts: M. S. Andersen, Danish Technical U.)
- H.-M. Chiu*, R. Y. Zhang, Well-conditioned primal-dual interior-point method for accurate low-rank semidefinite programming, *International Conference on Continuous Optimization (ICCOPT)*, Los Angeles, CA. Jul 21-24, 2025. (Hosts: Sunyoung Kim, Ewha W. U., Makoto Yamashita, Tokyo Tech.)
- 2024 R. Y. Zhang, Statistically Optimal K-Means Clustering via Nonnegative Low-Rank Semidefinite Programming, *INFORMS Annual Meeting*, Seattle, WA. Oct 20-23, 2024. (Host: Yongchun Li, Georgia Tech.)
- R.Y. Zhang, Complexity of Chordal Conversion for Sparse Semidefinite Programs with Small Treewidth, *25th International Symposium on Mathematical Programming (ISMP)*, Montreal, Canada. Jul 21-26, 2024. (Host: F. Permenter, Toyota Research Institute.)
- G. Zhang*, R.Y. Zhang, Fast Nonconvex Matrix Estimation with Global Optimality Certification, *25th International Symposium on Mathematical Programming (ISMP)*, Montreal, Canada. Jul 21-26, 2024. (Hosts: Alex L. Wang, Purdue U.; Lijun Ding, Texas A&M.)
- H.-M. Chiu*, R.Y. Zhang, Well-conditioned primal-dual interior-point method for accurate low-rank semidefinite programming, *25th International Symposium on Mathematical Programming (ISMP)*, Montreal, Canada. Jul 21-26, 2024. (Host: M. Kočvara, U. Birmingham.)
- I. Guzel*, R.Y. Zhang, Power System State Estimation by Phase Synchronization and Eigenvectors, *Federal Energy Regulatory Commission (FERC) Conference "Increasing Real-Time and Day-Ahead Market and Planning Efficiency through Improved Software"*, Jul 9-11, 2024.
- R.Y. Zhang, Statistically Optimal K-means Clustering via Nonnegative Low-rank Semidefinite Programming, *SIAM Conference on Applied Linear Algebra (LA24)*, Paris, France. May 13-17, 2024. (Hosts: A. Uschmajew, U. Augsburg; B. Vandereycken, U. Geneva.)
- Y. Zhuang*, X. Chen, Y. Yang, R.Y. Zhang, Statistically Optimal K-means Clustering via Nonnegative Low-rank Semidefinite Programming, *International Conference on Learning Representations (ICLR)*, Vienna, Austria. May 7-11, 2024. Oral presentation
- 2023 R.Y. Zhang, Improved Global Guarantees for the Nonconvex Burer–Monteiro Factorization via Rank Overparameterization, *10th International Congress on Industrial and Applied Mathematics*, Tokyo, Japan. Aug 20–25, 2023. (Hosts: C. Kümmeler, UNCC; J. Maly, LMU Munich; D. Stöger, KU Eichstätt-Ingolstadt.)
- R.Y. Zhang, Improved Global Guarantees for the Nonconvex Burer–Monteiro Factorization via Rank Overparameterization, *SIAM Conference on Optimization (OP23)*, Seattle, WA. May 31–Jun 3, 2023. (Hosts: E. Levin, Caltech; J. Kileel, U. Texas at Austin; N. Boumal, EPFL.)
- G. Zhang*, R.Y. Zhang, Preconditioned Gradient Descent for Algebraic and Geometric Optimization, *SIAM Conference on Optimization (OP23)*, Seattle, WA. May 31–Jun 3, 2023. (Hosts: O. Leung, Caltech; M. Diaz, Caltech; E. O'Reilly, Caltech.)
- H.-M. Chiu*, R.Y. Zhang, Neural Network Verification via Nonconvex Low-Rank Semidefinite

- Relaxations, *SIAM Conference on Optimization (OP23)*, Seattle, WA. May 31–Jun 3, 2023. (Host: Xin Jiang, Lehigh.)
- 2022 G. Zhang*, S. Fattahi, R.Y. Zhang, Preconditioned Gradient Descent for Overparameterized Nonconvex Burer-Monteiro Factorization with Global Optimality Certification, *INFORMS Annual Meeting*, Indianapolis, IN, 2022. (Hosts: S. Fattahi, U. Michigan; C. Jozs, Columbia U.)
- 2021 R.Y. Zhang, J.K. White, GMRES-Accelerated ADMM for Quadratic Objectives: Eigenvalues of the Iteration Matrix and Optimal Acceleration, *SIAM Conference on Computational Science and Engineering (CSE21)*, Virtual, Mar 1-5, 2021. (Hosts: Andersen M.-S. Ang, U. Waterloo; H. de Sterck, U. Waterloo.)
- 2020 G. Zhang*, R.Y. Zhang, How Many Samples is a Good Initial Point Worth?, *Advances in Neural Information Processing Systems (NeurIPS)*, Virtual, Dec 6-12, 2020. Spotlight presentation
- R.Y. Zhang, Scalable and Guaranteed Computation: Optimization and Machine Learning for the Future Electric Grid, *Power and Energy Conference at Illinois (PECI) Invited Lecture*, 2020. (Hosts: PEGI organizing committee.)
- 2018 R.Y. Zhang, C. Jozs, S. Sojoudi, J. Lavaei, How Much Restricted Isometry is Needed in Nonconvex Matrix Recovery?, *Advances in Neural Information Processing Systems (NeurIPS)*, Montreal, Canada, Dec 3-8, 2018. Spotlight presentation
- R.Y. Zhang, J. Lavaei, Sparse Conic Optimization: Low-rank Solutions and Near-linear Time Algorithms, *International Symposium on Mathematical Programming (ISMP)*, Bordeaux, France, Jul 1-6, 2018.
- R.Y. Zhang, J. Lavaei, Spurious Critical Points In Power Systems State Estimation, *International Symposium on Mathematical Programming (ISMP)*, Bordeaux, France, Jul 1-6, 2018.
- 2017 R.Y. Zhang, J. Lavaei, The Dangers of Local Search Algorithms for Power System State Estimation, *Federal Energy Regulatory Commission (FERC) Conference “Increasing Market and Planning Efficiency through Improved Software”*, Jun 2017. (Hosts: FERC conference organizing committee.)

Conference Organization Activities

- 2025 Organizer & Session Chair, Semidefinite and conic optimization. *International Conference on Continuous Optimization (ICCOPT)*, Los Angeles, CA. Jul 21-24, 2025. (Co-organizer: M. S. Andersen, Danish Technical U.)
- Organizer & Session Chair, Applications of semidefinite optimization. *International Conference on Continuous Optimization (ICCOPT)*, Los Angeles, CA. Jul 21-24, 2025. (Co-organizer: M. S. Andersen, Danish Technical U.)
- 2024 Organizer & Session Chair, Invited Sessions on Optimization. *60th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, Urbana, IL. Sep 25-27, 2023. (Co-organizer: S. Fattahi, U. Michigan.)
- 2023 Organizer & Session Chair, Recent Advances in Optimization. *59th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, Monticello, IL. Sep 26-29, 2023. (Co-organizer: S. Fattahi, U. Michigan.)
- Organizer & Session Chair, Recent Advances in Nonconvex Optimization. *SIAM Conference on*

- Optimization (OP23)*, Seattle, WA. May 31-June 3, 2023. (Co-organizer: S. Fattahi, U. Michigan.)
- 2022 Organizer, Adversarial Machine Learning and Distributed and Federated Learning. *C3.ai Digital Transformation Institute (DTI) Colloquium Series*, weekly virtual seminar series, Aug 25-Dec 8, 2022. (Co-organizer: G. Joshi, CMU.)
- Discussion Record Keeping Team, Grid at the Edge: Towards the Zero-Carbon Power Grid with Improved Visibility, Safety, and Reliability. *NSF-sponsored Joint US-European Workshop*, Split, Croatia. May 23-24, 2022. (Workshop Chairs: Mladen Kezunovic, Texas A&M; Christian Rehtanz, TU Dortmund.)
- Organizer & Session Chair, Recent Advances in Nonconvex Optimization I & II (two sessions). *INFORMS Annual Meeting*, Indianapolis, IN, USA. Oct 16-Oct 19, 2022. (Co-organizers: S. Fattahi, U. Michigan; C. Jozs, Columbia U.)
- 2018 Organizer & Session Chair, Sparse Semidefinite Programs with Machine Learning Applications. *INFORMS Annual Meeting 2018*, Phoenix, AZ, USA. Nov 4-Nov 7, 2019. (Co-organizer: J. Lavaei, UC Berkeley.)
- Organizer & Session Chair, Algorithms for power systems. *INFORMS Annual Meeting 2018*, Phoenix, AZ, USA. Nov 4-Nov 7, 2019. (Co-organizer: J. Lavaei, UC Berkeley.)
- 2017 Organizer & Session Chair, Control and Optimization Techniques for Power Systems I. *INFORMS Annual Meeting 2017*, Houston, TX, USA. Oct 22-Oct 25, 2017. (Co-organizer: J. Lavaei, UC Berkeley.)

Reviewing and Editorial Activities

Conferences

- Area Chair, Neural Information Processing Systems (NeurIPS) 2021, 2022, 2023, 2024, 2025.
- Area Chair, International Conference on Machine Learning (ICML) 2023, 2024, 2025.
- Area Chair, International Conference on Learning Representations (ICLR) 2024, 2025.
- Senior Program Committee, AAAI Conference on Artificial Intelligence (AAAI) 2025.
- Associate Editor, IEEE Control Systems Society Conference Editorial Board 2019.

Journal Reviewing

SIAM Journal on Optimization, Mathematical Programming, Mathematics of Operations Research, Operation Research, Journal on Machine Learning Research, IEEE Transactions on Automatic Control, IEEE Transactions on Control of Network Systems, IEEE Transactions on Power Systems, IEEE Transactions on Smart Grid, IEEE Transactions on Power Electronics.

Dissertation Reviewing

External PhD Dissertation Reviewer, University of Leipzig, Faculty for Mathematics and Computer Science, Germany, 2025. (Formal invited external review under the German examination system.)

Grant Reviewing

US National Science Foundation, US Office of Naval Research.

Mentoring

PhD Advising

Hong-Ming Chiu, UIUC ECE, 2026 (*expected*). (Previous: BS, National Yang Ming Chiao Tung U.)

Iven Guzel, UIUC ECE, 2026 (*expected*). (Previous: BS & MS, Middle East Technical U.)

Jing-Teng (Jeter) Hwang, UIUC ECE, 2029 (*expected*). (Previous: BS, National Taiwan U.)

Jialun (Gavin) Zhang, *Over-parameterized Low-rank Matrix Optimization: Theory, Algorithms, Applications*. UIUC ECE. Defended Fall 2024. (Previous: BS, Harvey Mudd; MS, Stanford. Next: Meta)

MS Advising

Chun Ying (June) Hou, *Scalable Second-order Riemannian Optimization for K-means Clustering*. UIUC ECE, 2025. (Previous: BS, National Taiwan U. Next: UIUC ECE PhD)

PhD Committees

Yubo Zhuang, UIUC Statistics, 2026 (*expected*). (Previous: BS, Zhejiang U; MA, Columbia U.) Advisors: Xiaohui Chen, U. Southern California; Yun Yang, U. Maryland.

Undergraduate Thesis Advising

Jose Maria Sunyer Nestares, *Power System Security Analysis using Reinforcement Learning*. UIUC ECE, May 2020. (Next: MS student at U. Pontificia Comillas; Now: McKinsey & Co)

Teaching

ECE 530 Analysis Techniques for Large-Scale Electrical Systems. Instructor: Fall 2020, Fall 2022, Fall 2024.

ECE 330 Power Circuits and Electromechanics. Instructor: Fall 2019, Spring 2020, Spring 2021, Fall 2021, Spring 2022, Spring 2023, Fall 2023, Spring 2024, Spring 2025, Fall 2025.

Outreach

2024 Guest Speaker, *Women in Electrical and Computer Engineering (WECE)*.

2021 Session Chair, *Power and Energy Conference at Illinois (PECI)*. Student-organized IEEE conference held at the University of Illinois.

2020 Session Chair, *Power and Energy Conference at Illinois (PECI)*. Student-organized IEEE conference held at the University of Illinois.

2019 Faculty Mentor, *Rising Stars in EECS 2019*. Held at the University of Illinois at Urbana-Champaign.

2012–2013 Co-President, *MIT Energy Club*.

2011–2012 Content Co-Director, *MIT Energy Conference 2012*.

2011–2012 Executive Committee, *MIT Graduate Student Council*. Orientation co-chair.

2011–2012 Legislative Actions Subcommittee, *MIT Graduate Student Council*.

2010–2011 Workshop Lead, *MIT Energy Conference*. Led team of 4 to organize panel “Grid 101”.

2006–2009 Tutor, *Univ. of Canterbury International Student Support*. Tutoring services for international students, primarily those from East Asia, but also South Asia and the Middle East.

2006–2009 Tutor, *Univ. of Canterbury Pacific Academic Student Support*. Intensive tutoring and academic support for Pasifika students, either of native New Zealand Maori descent, or from Tonga, Samoa, Fiji, the Cook Islands, or another Pacific island.