Cheng Guo

CONTACT INFORMATION

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RESEARCH INTERESTS

My research develops theoretically-grounded and computationally-scalable methods to improve the operations of large-scale markets complicated by features such as nonconvexity, stochasticity, network effects, and strategic behavior, with electricity markets as a primary motivation. On the theoretical side, I study market design with provable performance guarantees and rigorous analysis, grounded in duality theory and state-of-the-art conic programming methods. On the computational side, I develop novel decomposition and convex relaxation methods for mixed-integer nonlinear, stochastic, and robust optimization, enabling the solution of large-scale market operations problems that were previously intractable.

EXPERIENCE

Clemson University, Clemson, SC 2021 - present
School of Mathematical and Statistical Sciences
Assistant Professor, area: Operations Research

Columbia University, New York, NY 2021 - 2022
Department of Industrial Engineering and Operations Research
Visiting Researcher
- Host: Daniel Bienstock
- DOE ARPA-E PERFORM (Performance-based Energy Resource Feedback, Optimization, and Risk Management) project

EDUCATION

University of Toronto, Toronto, ON 2017 - 2021
Department of Mechanical and Industrial Engineering
Ph.D. in Industrial Engineering, GPA: 3.96/4.00
- Advisor: Merve Bodur
- Selected courseworks: Stochastic Programming & Robust Optimization, Modeling Interactions on Networks, OM Matching Markets, Mathematical Methods in Power Systems

Columbia University, New York, NY 2015 - 2017
Department of Industrial Engineering and Operations Research
M.S. in Operations Research
- Selected courseworks: Transportation Analytics & Logistics, Optimization I, Programming for Financial Engineering, Seminar on Queueing Theory

Wuhan University, Wuhan, China 2011 - 2015
School of Economics and Management
B.A. in Economics, B.S. in Mathematics
- Hongyi Honor Program Outstanding Graduates Award
- Selected courseworks: Advanced Microeconomics, Industrial Organization, Advanced Macroeconomics, Advanced Financial Theory, Advanced Econometrics, Dynamic Programming, Chaotic Dynamical Systems, Topology, Functional Analysis

Journal Articles

(*: corresponding author; Underline: student coauthor)

[J5] **Cheng Guo***, Merve Bodur, Joshua A. Taylor, *Copositive Duality for Discrete Energy Markets*, **Management Science** (forthcoming). [pdf]

[J4] **Cheng Guo***, Harsha Nagarajan, Merve Bodur, *Tightening Quadratic Convex Relaxations for the Alternating Current Optimal Transmission Switching Problem*, **INFORMS Journal on Computing** (forthcoming). [pdf]

[J3] Daniel Bienstock, Yury Dvorkin, **Cheng Guo***, Robert Mieth, Jiayi Wang, *Risk-Aware Security-Constrained Unit Commitment*, **IEEE Transactions on Energy Markets, Policy and Regulation** 2.4 (2024): 536-551. [pdf]

[J2] **Cheng Guo***, Merve Bodur, Dimitri J. Papageorgiou, *Generation Expansion Planning with Revenue Adequacy Constraints*, **Computers & Operations Research** 142 (2022): 105736. [pdf]

[J1] **Cheng Guo***, Merve Bodur, Dionne M. Aleman, and David R. Urbach, *Logic-based Benders Decomposition and Binary Decision Diagram Based Approaches for Stochastic Distributed Operating Room Scheduling*, **INFORMS Journal on Computing** 33.4 (2021): 1551-1569. [pdf]

Preprints

[P2] **Cheng Guo**, Jiayi Wang, Ozan Candogan, *Endogenous Entry in Networked Markets with Production and Edge Capacity Constraints*. [pdf]

[P1] **Cheng Guo**, Christian Kroer, Yury Dvorkin, Daniel Bienstock, *Incentivizing Investment and Reliability: A Study on Electricity Capacity Markets*. [pdf]

Working Papers

[W2] **Cheng Guo**, Lauren Henderson, Ryan Cory-Wright, Boshi Yang, *A Semidefinite Relaxation for Copositive Dual Pricing in Discrete Energy Markets*.

[W1] Benjamin J. Hamlin, **Cheng Guo**, Margaret Wiecek, *Stochastic Dual Dynamic Programming for Multiobjective Multistage Problems*.

Honors and Awards

- Finalist for student Anna Deza, INFORMS Undergraduate OR Prize Competition, 2020
- Mixed Integer Programming Workshop Student Travel Support, 2019
- Hongyi Outstanding Graduates Award, 2015
- Economics and Management School Scholarship, 2013 - 2014

Funding

- Clemson University - Clemson Faculty SUCCEEDS: Program 1 (Project Initiation/SEED Funding, awarded to 16 PIs university-wide) (PI), 2024
- University of Toronto - Bert Wasmund Graduate Fellowships in Sustainable Energy Research, 2018

Teaching

Clemson University

Instructor

- MATH 8100 - Mathematical Programming (graduate): Fall 2022, Spring 2023, Spring 2024, Fall 2024
- MATH 4400/6400 - Linear Programming (undergraduate/graduate): Fall 2024, Fall 2025
- STAT 3090 - Introductory Business Statistics (undergraduate): Spring 2022 (virtual), Fall 2023, Fall 2024, Fall 2025

University of Toronto

Tutorial Teaching Assistant

- MIE 562 - Scheduling (undergraduate/graduate): Fall 2019, Fall 2020
- MIE 335 - Algorithms and Numerical Methods (undergraduate): Winter 2019

Wuhan University

Teaching Assistant

- Probability Theory (undergraduate): Fall 2014

Advising

Ph.D. Students

Lauren Henderson (since 2023), Benjamin Hamlin (since 2022, co-advised with Margaret Wiecek)

M.S. Students

Lauren Henderson (2024)

Undergraduate Students

Jiayi Wang (co-advised, Columbia B.S. 2022 → Stanford Ph.D.), Anna Deza (co-advised, U. Toronto B.A.Sc. 2020 → UC Berkeley Ph.D.), Ryan Do (co-advised, U. Toronto B.A.Sc. 2019 → U. Toronto M.Eng.)

Ph.D. Thesis Committee Member

Kristen Joyce, Sarah Kelly (2024)

M.S. Thesis Committee Member

Yunheng Jiang (2022)

Invited Talks

- Cornell University, FIND Seminar, Ithaca, NY — April, 2024
- Mixed Integer Programming Workshop, Los Angeles, CA — May, 2023
- Polytechnique Montreal, GERAD Seminar, Virtual — May, 2022
- Discrete Optimization Talks, Virtual — December, 2020

Conference Presentations

- (Upcoming) INFORMS Annual Meeting, Atlanta, GA — October, 2025
  - Session SA19: Sunday, October 26, 8:00 AM - 8:15 AM, Building A Level 4 A405
- IEEE Power and Energy Society (PES) General Meeting, Austin, TX — July, 2025
- International Conference on Continuous Optimization (ICCOPT), Los Angeles, CA — July, 2025
- Production and Operations Management Society (POMS) Conference, Atlanta, GA — May, 2025
- INFORMS Computing Society Conference, Toronto, ON — March, 2025

- INFORMS Annual Meeting, Seattle, WA — October, 2024
- International Symposium on Mathematical Programming, Montreal, QC — July, 2024
- INFORMS Optimization Society Conference, Houston, TX — March, 2024
- INFORMS Annual Meeting, Phoenix, AZ — October, 2023
- INFORMS MSOM Conference, Montreal, QC — June, 2023
- INFORMS Annual Meeting, Indianapolis, IN — October 2022
- International Conference on Continuous Optimization (ICCOPT), Bethlehem, PA — July, 2022
- INFORMS Optimization Society Conference, Greenville, SC — March, 2022
- INFORMS Annual Meeting, Virtual — October 2021
- International Conference on Game Theory (poster), Virtual — July 2021
- IPCO Conference (poster), Virtual — June 2021
- CORS Annual Conference, Virtual — June 2021
- Mixed Integer Programming Workshop (poster), Virtual — May 2021
- Grid Science Winter School (poster), Virtual — January 2021
- INFORMS Annual Meeting, Virtual — November 2020
- INFORMS Annual Meeting, Seattle, WA — October 2019
- DIMACS Workshop on MINLP (poster), Montreal, QC — October 2019
- Mixed Integer Programming Workshop (poster), Boston, MA — July 2019
- Optimization Days, Montreal, QC — May 2019
- INFORMS Computing Society Conference, Knoxville, TN — January 2019

Academic Service

- Journal reviewer for *Mathematical Programming, Management Science, Manufacturing & Service Operations Management, SIAM Journal on Optimization, INFORMS Journal on Computing, Transportation Science, Production and Operations Management, Computers and Operations Research, IEEE Transactions on Power Systems*
- Conference reviewer for *IEEE Power & Energy Society General Meeting (2024, 2025)*
- Vice President/President-Elect for INFORMS Junior Faculty Interest Group (JFIG) (2025-2027)
- Program committee member for Mixed Integer Programming (MIP) Workshop 2026
- Session Chair for INFORMS Optimization Society Conference (2022, 2024); INFORMS Annual Meeting (2019, 2021, 2022, 2023, 2024); CORS Annual Meeting (2021)

University Service

- Clemson University SMSS Research Committee (2023-present)
- Co-organizer of University of Toronto MIE UTORG Seminar (2019-2020)

Advanced Training

- "Cultivating an Inclusive Classroom Environment", Academic Impressions — 2024

Skills

- Programming language: Python, Julia, C++
- Software: Gurobi, CPLEX, Knitro, Mosek

Other Activities

- INFORMS UofT Student Chapter (Honorable Mention, 2020), Vice President (2019-2021)
- Columbia IEOR Mentorship Program, Mentor (2018-2020)
- Wuhan U. Women Soccer Team, Captain (2013-2015)