Ryan Cory-Wright

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Academic Appointments

Imperial College London, Imperial College Business School — *London, UK*
Assistant Professor of Analytics and Operations — *2023-current*
Affiliated Faculty, Imperial-X AI Initiative

IBM Research, MIT-IBM Research Lab — *Cambridge, MA*
Herman Goldstine Postdoctoral Fellow — *2022-2023*

Education

Massachusetts Institute of Technology, Operations Research Center — *Cambridge, MA*
Ph.D. in Operations Research — *2017-2022*
Thesis committee: Dimitris Bertsimas (advisor), Alexandre Jacquillat, Robert Freund
Thesis: Integer and matrix optimization: A nonlinear approach

University of Auckland, Faculty of Engineering — *Auckland, New Zealand*
B.E. (1st Class Honors) in Engineering Science — *2014-2016*
Thesis: Pricing wind under uncertainty | Advisors: Andy Philpott, Golbon Zakeri

Research Interests

Methodological: Optimization (Integer, Semidefinite, Conic, Under Uncertainty), Machine Learning (Interpretability, Scientific Discovery), Statistics (Cross-Validation, High-Dimensional, Rank Constraints, Sparsity Constraints)
Applications: Business Analytics, Energy (Decarbonization, Pricing Schemes), Finance

Selected Academic Honors and Awards

2024	Meritorious Reviewer Award, INFORMS Journal on Computing
2023	IBM 2023 Accomplishment Award, IBM Department of Mathematical Sciences
	Finalist, Practice-Based Research Competition, M&SOM Society
2022	IBM Herman Goldstine Fellowship, IBM Department of Mathematical Sciences
2021	First place, Student Paper Competition, INFORMS Data Mining Society
2020	First place, George Nicholson Student Paper Competition, INFORMS
	First place, William Pierskalla Paper Award, INFORMS Health Applications Society
2019	First place, ICS Student Paper Award, INFORMS Computing Society
2017	Senior Scholar Award (top of graduating class), University of Auckland
2016	First place, Young Practitioner's Prize, Operations Research Society New Zealand
2014-16	Deans List (top 5% of cohort), Faculty of Engineering, University of Auckland
2013	Outstanding Scholar (top 50 high-school students in New Zealand), NZQA

Working Papers

5. *Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions*
D. Bertsimas, R. Cory-Wright, S. Lo and J. Pauphilet, submitted.

4. *Gain Confidence, Reduce Disappointment: A New Approach to Cross-Validation for Sparse Regression*
R. Cory-Wright and A. Gómez, submitted.

3. *Sparse PCA With Multiple Components*
R. Cory-Wright and J. Pauphilet, submitted.

2. *AI Hilbert: A New Paradigm for Scientific Discovery by Unifying Data and Background Knowledge*
   R. Cory-Wright, B. El Khadir, C. Cornelio, S. Dash and L. Horesh, revision at **Nature Communications**.
   - IBM Research Accomplishment Award (2023).

1. *A Stochastic Benders Decomposition Scheme for Large-Scale Data-Driven Network Design*
   D. Bertsimas, R. Cory-Wright, J. Pauphilet and P. Petridis, major revision at **INFORMS Journal on Computing**.

Journal Papers

11. *Decarbonizing OCP*
    D. Bertsimas, R. Cory-Wright and V. Digalakis Jr., **Manufacturing & Service Operations Management**, 2023+.
    - Finalist, M&SOM practice-based research competition (2023)
    - Honorable mention, MIT Operations Research Center Student Paper Competition (Digalakis, 2023)

10. *Sparse Plus Low-Rank Matrix Decomposition: A Discrete Optimization Approach*
    D. Bertsimas, R. Cory-Wright and N. A. G. Johnson, **Journal of Machine Learning Research**, 24(267):1–51, 2023.
    - First place, INFORMS Data Mining Society Student Paper Competition (2021)

9. *A New Perspective on Low-Rank Optimization*
   D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Mathematical Programming**, 202(1-2):47–92, 2023.

8. *Mixed-Projection Conic Optimization: A New Paradigm for Modeling Rank Constraints*
   D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Operations Research**, 70(6):3321–3344, 2022.
   - First place, INFORMS George Nicholson Student Paper Competition (2020).

7. *A Scalable Algorithm for Sparse Portfolio Selection*
   D. Bertsimas and R. Cory-Wright, **INFORMS Journal on Computing**, 34(3):1489-1511, 2022.

6. *Solving Large-Scale Sparse PCA to Certifiable (Near) Optimality*
   D. Bertsimas, R. Cory-Wright and J. Pauphilet, **Journal of Machine Learning Research**, 23(13):1-35, 2022.

5. *A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints*
   D. Bertsimas, R. Cory-Wright and J. Pauphilet, **SIAM Journal on Optimization**, 31(3):2340-2367, 2021.
   - First place, INFORMS Computing Society Student Paper Competition (2019).
   - Abridged eight-page version features in the 2020 INFORMS Computing Society Newsletter.

4. *From Predictions to Prescriptions: A Data-Driven Response to COVID-19*
   D. Bertsimas, L. Bouissoux, R. Cory-Wright et al., **Health Care Management Science**, 24:253-272, 2021.
   - First place, INFORMS Healthcare Applications Society William Pierskalla Best Paper Award (2020).

3. *On Stochastic Auctions in Risk-Averse Electricity Markets With Uncertain Supply*
   R. Cory-Wright and G. Zakeri, **Operations Research Letters**, 48(3):376-384, 2020.

2. *On Polyhedral and Second-Order Cone Decompositions of Semidefinite Optimization Problems*
   D. Bertsimas and R. Cory-Wright, **Operations Research Letters**, 48(1):78-85, 2020.

1. *Payment Mechanisms for Electricity Markets With Uncertain Supply*
   R. Cory-Wright, A. Philpott and G. Zakeri, **Operations Research Letters**, 46(1):116-121, 2018.
   - First place, Operations Research Society of New Zealand Young Practitioner's Prize (2016).
   - Preliminary version entitled "Cost-recovering, revenue-adequate single settlement schemes for electricity markets" appeared in Proceedings of the 2016 Joint NZSA and ORSNZ conference.

Books in Preparation

Integer and Matrix Optimization: A Nonlinear Approach
with Dimitris Bertsimas and Jean Pauphilet, Dynamic Ideas Press.

Teaching

Introduction to Machine Learning in Python (MSc AI applications and innovation) — *Imperial-X*
Autumn 2024 (scheduled)

Designed a new class that introduces students to machine learning and Python.

Decision Making Under Uncertainty (PhD) — *Imperial Business School*
Spring 2024

Designed a new class covering techniques for decision-making under uncertainty widely used in operations research. Includes stochastic optimization, robust optimization, and dynamic programming. Syllabus available here.

Data Structures and Algorithms (undergraduate) — *Imperial Business School*
Spring 2024

Designed a new undergraduate class, based on a pre-existing MSc class, which introduces computational problem solving through the design of algorithms and data structures in Python.

Optimisation and Decision Models (online MSc business analytics) — *Imperial Business School*
Spring 2024

Online class, which introduces students to theory and applications of linear, discrete, and nonlinear optimization.

Teaching Prior to Imperial

15.095 Machine Learning Under a Modern Optimization Lens — *MIT*
Head Teaching Assistant — *Fall 2019, 2021*

Kaufman Teaching Certificate Program — *MIT Teaching and Learning Lab*
Participant in eight practice- based workshops on teaching effectiveness — *Fall 2021*

15.071 The Analytics Edge — *MIT*
Head Teaching Assistant — *Fall 2020*

15.S60 Computing in Optimization and Statistics — *MIT*
Instructor — *Jan 2019, Jan 2020*

15.093 Optimization Methods — *MIT*
Teaching Assistant — *Fall 2018*

15.089 Master of Business Analytics Capstone — *MIT*
Capstone Project Mentor — *Summer 2018, Summer 2019*

Student Advising

- Lingjun Meng, Imperial Business School MRes candidate
  - Co-advisor (co-advisor: W. Wiesemann)
- Nicholas Johnson, MIT ORC PhD Candidate
  - Co-author (advisor: D. Bertsimas)
- Periklis Petridis, MIT ORC PhD Candidate
  - Co-author (advisor: D. Bertsimas)
- Vassilis Digalakis Jr., MIT ORC PhD, grad. in 2023
  - Co-authored job market paper (advisor: D. Bertsimas).

  - Initial placement: Assistant Professor of Operations Management, HEC Paris.
- Sean Lo, MIT Sloan MBAn, grad. in 2022
  - Co-author (MBAn advisor: D. Bertsimas)
  - Initial placement: MIT Operations Research Center PhD program

Oral Presentations

Invited Presentations at Academic Institutions

AI Hilbert: A New Paradigm for Scientific Discovery by Unifying Data and Background Knowledge
Imperial-X AI, April 2024 (scheduled).

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions
Toronto Rotman Young Scholar's Seminar Series, November 2023; Imperial College Control and Optimization, November 2023.

A New Perspective on Low-Rank Optimization
Lehigh ISE, November 2022.

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Rank Constraints
IBM TJ Watson Research Center, August 2022; Rice CAAM, January 2022; CMU Tepper OR, January 2022; USC Viterbi ISE, January 2022; Georgia Tech ISyE, January 2022; Johns Hopkins Carey OM, January 2022; Princeton ORFE, January 2022; Imperial College Analytics and Operations, October 2021; University of Auckland Engineering Science, October 2020.

Invited Presentations at Single-Track Workshops

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions
MIP Workshop, May 2023.

Conference Presentations and Guest Lectures

Title TBA
ISMP, July 2024.

AI Hilbert: A New Paradigm for Scientific Discovery by Unifying Data and Background Knowledge
IOS, March 2024.

Decarbonizing OCP
MSOM Practice-Based Research Finalists, June 2023.

Optimal Low-Rank Matrix Completion: Semidefinite Relaxations and Eigenvector Disjunctions
INFORMS, October 2023; SIAM Conference on Optimization, June 2023

Sparse PCA With Multiple Components
INFORMS, October 2022.

A New Perspective on Low-Rank Optimization
ICCOPT, July 2022; IOS, March 2022; INFORMS, October 2021.

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Low-Rank Constraints
INFORMS Nicholson Finalists, November 2020.

Solving Large-Scale Sparse PCA To Certifiable (Near) Optimality
Guest Lecture for MIT Class 15.095, November 2021; IOS, March 2020 (canceled, COVID-19).

A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints
INFORMS, October 2019; ICCOPT, August 2019.

A Scalable Algorithm for Sparse Portfolio Selection
INFORMS, November 2018.

Payment Mechanisms and Risk-Aversion in Electricity Markets With Uncertain Supply
ISMP, July 2018; ORSNZ Young Practitioner's Prize Finalists Session, December 2016.

Industry Experience

OCP Group and MIT Operations Research Center — *Cambridge, MA*
Research Assistant — *2021-22*

SUEZ Smart Solutions — *Auckland, New Zealand*
Assistant Optimization Engineer — *2014-2016*

Activities and Service

External

2024 London Operations Research Day, Co-Organizer
Various Session Chair, INFORMS Annual Meeting, ICCOPT, IOS, SIOPT, other conferences
Years Member, INFORMS (Main, Computing Society, Optimization Society)
Member, Mathematical Optimization Society

Imperial

2024- Imperial-X Executive Education, Program Lead

MIT

2019 MIT ORC Student Seminar Series, Coordinator

Peer Review

Ad-Hoc Journal Referee: *Operations Research, Management Science, Manufacturing and Service Operations Management, Journal of Machine Learning Research, Mathematics of Operations Research, Foundations of Computational Mathematics, INFORMS Journal On Computing, INFORMS Journal on Optimization, SIAM Journal on Optimization, SIAM Journal on Matrix Analysis and Applications, SIAM Journal on Mathematics of Data Science, Operations Research Letters, and other journals.*

- 2024 Meritorious Reviewer Award, INFORMS Journal on Computing.

Ad-Hoc Conference Referee: *Integer Programming and Combinatorial Optimization*

Other

Programming: Julia (preferred), Python, R, VBA, SQL, MATLAB, Mathematica, C++, HTML, CSS, etc.
Optimization: JuMP (preferred), Gurobi (preferred), MOSEK (preferred), CPLEX, etc.
Platforms: Mac OS X, Windows.
Citizenship: New Zealand, Ireland.