Ryan Cory-Wright

PhD Candidate · Operations Research Center-MIT

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Education

Massachusetts Institute of Technology *Cambridge, MA*

PhD in Operations Research *June 2022*

Advisor: Dimitris Bertsimas | Thesis: Towards High-Dimensional Optimization Over Integers and Matrices
Coursework: Optimization (Linear, Integer, Robust, Semidefinite), Operations Management, Machine Learning, Probability

University of Auckland *Auckland, New Zealand*

BE (1st Class Hons) in Engineering Science *May 2017*

Advisors: Golbon Zakeri, Andy Philpott | Thesis: Pricing Wind Under Uncertainty

Research Interests

Methodological: Optimization (Discrete/Conic), Machine Learning (High-Dimensional), Statistics (Sparse/Low-Rank).
Applications: Energy (Market Design/Renewable Integration), Finance, Business Analytics (Predictive/Prescriptive).

Honors and Awards

2021 **Finalist, Best Student Poster Competition**, Mixed-Integer Programming Workshop
Finalist, Best Student Poster Competition, IPCO

2020 **First place, George Nicholson Student Paper Competition**, INFORMS
First place, William Pierskalla Best Paper Award, INFORMS Healthcare Appl. Society
Finalist, Best Student Poster Competition, Mixed-Integer Programming Workshop

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 of New Zealand

2014-16 **Deans List (top 5% of cohort)**, Faculty of Engineering, University of Auckland
First in Course Award x5, University of Auckland

2013 **Outstanding Scholar (top 50 high-school students in New Zealand)**, NZQA

Publications

* Ryan is a primary author on all listed articles. Other primary authors are bolded.

From Predictions to Prescriptions: A Data-Driven Response to COVID-19
with Dimitris Bertsimas et al., Health Care Management Science, 2021.
- First place, INFORMS Healthcare Applications Society William Pierskalla Best Paper Award (2020).

On Stochastic Auctions in Risk-Averse Electricity Markets With Uncertain Supply
with Golbon Zakeri, Operations Research Letters, 48(3):376-384, 2020.

On Polyhedral and Second-Order Cone Decompositions of Semidefinite Optimization Problems
with Dimitris Bertsimas, Operations Research Letters. 48(1):78-85, 2020.

Payment Mechanisms for Electricity Markets With Uncertain Supply
with Andy Philpott and Golbon Zakeri, Operations Research Letters. 46(1):116-121, 2018.
- First place, Operations Research Society of New Zealand Young Practitioner's Prize (2016).

Completed Works

A New Perspective on Low-Rank Optimization
with Dimitris Bertsimas and Jean Pauphilet, under review at Mathematical Programming.

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Rank Constraints
with Dimitris Bertsimas and Jean Pauphilet, under review at Operations Research (first decision: major revision).

- First place, INFORMS George Nicholson Student Paper Competition (2020).
- Finalist, MIP Workshop student poster competition (2021).

Solving Large-Scale Sparse PCA to Certifiable (Near) Optimality
with Dimitris Bertsimas and Jean Pauphilet, under review at JMLR (first decision: R&R).

A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints
with Dimitris Bertsimas and **Jean Pauphilet**, under review at SIAM J. Optimization (first decision: minor revision).

- First place, INFORMS Computing Society Student Paper Competition (2019).
- Finalist, MIP Workshop student poster competition (2020).

A Scalable Algorithm for Sparse Portfolio Selection
with Dimitris Bertsimas, under review at INFORMS Journal on Computing (second decision: minor revision).

Articles in Preparation

Sparse And Low-Rank Matrix Decomposition: A Discrete Optimization Approach
with Dimitris Bertsimas and **Nicholas Johnson**, targeted at JMLR (August 2021).

A Copositive Approach to Pricing Unit Commitment in Pool Markets
with **Golbon Zakeri**, targeted at Operations Research (February 2022).

Books in Preparation

High-Dimensional Optimization Over Integers and Matrices
with **Dimitris Bertsimas** and **Jean Pauphilet**, Dynamic Ideas Press, targeted to appear in 2023.

Research Experience

COVID Analytics: Core Team Member *Cambridge, MA*
Principal Investigator: Dimitris Bertsimas *2020*

- Lead effort to extract features from COVID-related clinical research papers early in the pandemic, which allowed us to more accurately tune parameters in machine learning tools developed to combat the pandemic.
- Core team awarded the 2020 William Pierskalla INFORMS Healthcare Applications Society best paper award for their efforts.
- Material from the effort available at: covidanalytics.io

Operations Research Center-MIT: Research Assistant *Cambridge, MA*
Supervisor: Dimitris Bertsimas *2017 - Present*

- Developed techniques for solving central problems in OR/ML literatures, with focus on certifiable optimality, scalability.
- Made methodological and algorithmic contributions to the fields of discrete and conic optimization, including developing new algorithms for solving cardinality and rank constrained problems to certifiable optimality.

University of Auckland- Dept of Engineering Science: Research Assistant *Auckland, New Zealand*
Supervisor: Golbon Zakeri *2016-2017*

- Designed techniques for pricing electricity with uncertain supply, risk-aversion.
- Implemented pricing mechanism on a full-scale replica of the New Zealand Market.

Teaching Experience

15.071 The Analytics Edge *MIT*

Head Teaching Assistant *Fall 2020*

- Head TA for a class which introduces Sloan MBA students to data analytics. Class held virtually due to COVID-19.
- Duties: preparing/leading recitations, developing/grading assignments, holding office hours, supervising final projects.

15.S60 Computing in Operations Research and Statistics *MIT*

Session Instructor: Advanced Computational Optimization *Jan 2019, Jan 2020*

- Instructor for 3-hour session which provides PhD students with overview of software tools used in optimization and statistics.

15.095 Machine Learning Under a Modern Optimization Lens *MIT*

Teaching Assistant *Fall 2019*

- TA for a course which provides masters/PhD students with a modern treatment of machine learning using the lenses of convex, robust and mixed-integer optimization.
- Duties: preparing/leading recitations, developing/grading assignments/exams, holding office hours, supervising projects.

15.093 Optimization Methods *MIT*

Teaching Assistant *Fall 2018*

- TA for course which provides masters students with a unified overview of main algorithms and applications of optimization.
- Duties: preparing/leading recitations, developing/grading assignments, answering Piazza questions, holding office hours.

Mentoring Experience

15.089 Analytics Capstone *MIT*

Project Mentor *Summer 2018, Summer 2019*

- Advised two projects completed by teams of two Master of Business Analytics (MBaN) students, who respectively applied machine learning techniques to predict fund flows at the financial advisor level for a large investment management company, and applied prescriptive analytics to optimize fund flows for a large investment management company.
- Summer 2018 mentees received award for best capstone presentation in graduating class.

Industry Experience

SUEZ Smart Solutions *Auckland, New Zealand*

Assistant Optimization Engineer *2014-2016*

- Developed and maintained several VBA/SQL tools used by SUEZ engineers in daily operations, including automating a 9-step process for updating historical demand curves which previously took SUEZ around 30 hours per client per year.
- Assisted with installing Aquadapt (SUEZ's pump scheduling optimization software) for two of SUEZ's newest clients.

Selected Invited Talks

High-Dimensional Optimization Over Integers and Matrices.
Presented at: The University of Auckland Engineering Science Seminar Series, October 2020.

Mixed-Projection Conic Optimization: A New Paradigm for Modeling Low-Rank Constraints.
Presented at: INFORMS Nicholson Finalists Session, November 2020; ORC Student Seminar Series, December 2020, MIT LIDS & Stats Tea Talks Series, March 2021, IPCO, May 2021 (poster), MIP Workshop, May 2021 (poster).

A Unified Approach to Mixed-Integer Optimization Problems With Logical Constraints.
Presented at: ICCOPT, August 2019; INFORMS, October 2019, MIT ORC Student Seminar Series, November 2019; MIT LIDS Student Conference, January 2020, MIP Workshop, May 2020.

A Scalable Algorithm for Sparse Portfolio Selection.
Presented at: INFORMS Annual Meeting, November 2018; ORC 65th anniversary, November 2018 (poster); LIDS student conference, January 2019; MIP Workshop, June 2019 (poster).

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

Professional Activities and Service

2019, 21 **INFORMS Annual Meeting**, Session Chair

2020 **MIT MBaN Capstone Project Matching**, Wrote software to allocate 60 MBaN students to capstone (industry) projects, taking into account student/company preferences

2019 **ORC Student Seminar Series**, (Inaugural) Coordinator

2019 **MIT ORC Qualifying Exam**, Tester and Proctor

2017- **Member**, INFORMS, Mathematical Optimization Society

Peer Review

Referee: European Journal of Operational Research; IEEE Transactions on Power Systems; INFORMS Journal On Computing; INFORMS Journal on Optimization; Journal of Global Optimization; Omega.

Skills and Activities

Programming: Julia (preferred), R, VBA, SQL, MATLAB, Mathematica, C++, HTML, CSS.
Software: JuMP (preferred), Gurobi (preferred), MOSEK (preferred), CPLEX, most languages/solvers, LaTeX, Git.
Languages: English (native), French (conversational), German (beginner).
Extracurriculars: Skiing, Running, Hiking, Water polo, Swimming, Chess, Outward Bound New Zealand Alumni .
Citizenship: New Zealand, Ireland.