

IAN MERTZ

Contact

www.cs.toronto.edu/~mertz
ian.mertz@warwick.ac.uk

Employment

Centre for Discrete Mathematics
and its Applications (DIMAP)
University of Warwick, UK

EDUCATION & FUNDING

EDUCATION (PRIMARY)

University of Warwick (Coventry, UK) Fall 2022 - Summer 2024
Postdoctoral researcher
Advisor: Igor Carboni Oliveira

University of Toronto (Toronto, ON, Canada) Winter 2018 - Summer 2022
Ph.D. in Computer Science Thesis: *The Complexity of Composition:
New Approaches to Depth and Space*
Advisor: Toniann Pitassi

University of Toronto (Toronto, ON, Canada) Fall 2016 - Winter 2018
M.Sc. in Computer Science Thesis: *Proof Complexity and Automatability*
Advisor: Toniann Pitassi, Stephen Cook

Rutgers University - New Brunswick (Piscataway, NJ, USA) Fall 2012 - Spring 2016
B.S. in Computer Science, B.A. in Mathematics, Thesis: *Complexity Theory Through a
B.A. in East Asian Language Studies (concentration in Japanese)* Spectrum of Computation Models
Advisor: Eric Allender
Summa cum laude, honors program

EDUCATION (EXTERNAL)

Simons Institute for the Theory of Computing Spring 2023
Special Semester on Metacomplexity, visiting researcher

Institute for Advanced Study Fall 2017, Spring 2019,
Visiting graduate student researcher Spring 2020, Spring 2022

Simons Institute for the Theory of Computing Fall 2018
Special Semester on Lower Bounds in Complexity Theory, visiting graduate student researcher

Ritsumeikan University Summer 2015
Study abroad semester

Princeton University, Rutgers University-Camden Summer 2012
Rajiv Gandhi (Rutgers University-Camden)

RESEARCH FUNDING

Royal Society URF (*Igor Carboni Oliveira*) 2022 - 2024
Natural Sciences and Engineering Research Council of Canada (NSERC) (*Toniann Pitassi*) 2016 - 2022
National Science Foundation (NSF) (*Eric Allender*) 2013 - 2016

PERSONAL GRANTS, HONORS, & AWARDS

Computer Science 50th Anniversary Graduate Scholarship	2022
Alfred B. Lehman Graduate Scholarship in Computer Science	2021
NSF Graduate Research Fellowship Program - Honorable Mention	2016
Dean's List	2012 - 2016
Scarlet Scholarship	2012 - 2016
NSF Research Experience for Undergraduates (REU)	2014
School of Arts and Sciences Excellence Award	2013
Aresty Summer Science Program	2013

RESEARCH

RESEARCH INTERESTS

- catalytic computation
- composition theorems
- space complexity
- circuit complexity
- automatability
- combinatorics

PUBLICATIONS

Tree Evaluation is in Space $O(\log n \cdot \log \log n)$

James Cook, Ian Mertz

ACM Symposium on Theory of Computing (STOC '24) (to appear), 2024.

Reusing Space: Techniques and Open Problems

Ian Mertz

Bulletin of the EATCS, 141 pp. 57-106, 2023.

Trading Time and Space in Catalytic Branching Programs

James Cook, Ian Mertz

Computational Complexity Conference (CCC '22), 234 (8) pp. 1-21, 2022.

Lifting with Sunflowers

Shachar Lovett, Raghu Meka, Ian Mertz, Toniann Pitassi, Jiapeng Zhang

Innovations in Theoretical Computer Science (ITCS '22), 215 (104) pp. 1-24, 2022.

Encodings and the Tree Evaluation Problem

James Cook, Ian Mertz

Electronic Colloquium on Computational Complexity (ECCC), TR21-054, 2023.

Automating Cutting Planes is NP-hard

Mika Göös, Sajin Korothe, Ian Mertz, Toniann Pitassi

ACM Symposium on Theory of Computing (STOC '20) pp. 68-77, 2020.

Catalytic Approaches to the Tree Evaluation Problem

James Cook, Ian Mertz

ACM Symposium on Theory of Computing (STOC '20), pp. 752-760, 2020.

Short Proofs Are Hard to Find

Ian Mertz, Toniann Pitassi, Yuanhao Wei

International Colloquium on Automata, Languages and Programming (ICALP '19), Leibniz International Proceedings in Informatics (LIPIcs), 84 (132) pp. 1-16, 2019.

Dual VP Classes

Eric Allender, Anna Gál, Ian Mertz

Computational Complexity, 26 (3) pp. 583-625, 2017.

International Symposium on Mathematical Foundations of Computer Science (MFCS '15), Lecture Notes in Computer Science, 9235 pp. 14-25, 2015.

Complexity of Regular Functions

Eric Allender, Ian Mertz

Journal of Computer and System Sciences (J. Comput. Syst. Sci.), LATA 2015 special issue, 104 pp. 5-16, 2019.

International Conference on Language and Automata Theory and Applications (LATA '15), Lecture Notes in Computer Science, 8977 pp. 449-460, 2015.

INVITED TALKS

Conferences & workshops

ToniCS (Berkeley, CA, USA)	March 27, 2023
CCC 2022 (Philadelphia, PA, USA)	July 23, 2022
ITCS 2022 (Zoom)	February 3, 2022
STOC 2020 (Zoom)	June 22, 2020
ICALP 2019 (Patras, Greece)	July 9, 2019
LATA 2015 (Nice, France)	March 2, 2015

Seminars

Memorial University in Newfoundland Theory Seminar (St. John's, NL, Canada)	February 8, 2024
Institute for Advanced Study CSDM Seminar I (Princeton, NJ, USA)	January 29, 2024
Columbia University Theory Seminar (New York City, NY, USA)	December 1, 2023
McGill University Theory Seminar (Montréal, QC, Canada)	November 9, 2023
Online Complexity Seminar (Oxford-Warwick) (Zoom)	October 12, 2023
Universidade de Lisboa TOC Seminar (Lisboa, Portugal)	October 6, 2023
Oxford University Theory Seminar (Oxford, UK)	June 1, 2023
Metacomplexity: CS Conversations (Berkeley, CA, USA)	February 1, 2023
Charles University Theory Seminar (Prague, Czechia)	June 16, 2022
University of Copenhagen/Lund University MIAO Seminar (Zoom)	September 6, 2021
Institute for Advanced Study CSDM Seminar II (Princeton, NJ, USA)	December 5, 2017
University of Toronto Theory Student Seminar (Toronto, ON, Canada)	2016-2022 (various)

Course lectures

CSC 2451 - Quantum Computing: Foundations to Frontier (University of Toronto)	December 5, 2018
CSC 2429 - Advanced Data Structures (University of Toronto)	June 11, 2018
CSC 2429 - Proof Complexity, Mathematical Programming, and Algorithms (University of Toronto)	March 24, 2018
Complexity Theory (PACT Program)	Summer 2016 (weekly)

About research

Newark Academy (Livingston, NJ, USA)	December 12, 2023
Princeton High School (Princeton, NJ, USA)	April 22, 2014
PACT Program (Princeton, NJ, USA)	2013, 2014, 2016

RESEARCH VISITS

Rutgers University - New Brunswick

Michael Saks (Rutgers University), Michal Koucký (Charles University)

Fall 2023

McGill University

Robert Robere (McGill University), Pierre McKenzie (Université de Montréal)

November 2023

Universidade de Lisboa	October 2023
<i>Bruno Loff (Universidade de Lisboa)</i>	
Cambridge University	September 2023
<i>Sergii Strelchuk (Cambridge University), Sathya Subramanian (Cambridge University)</i>	
University of Warwick	July 2022
<i>Igor Carboni Oliveira (University of Warwick)</i>	
Charles University	June 2022
<i>Michal Koucký (Charles University)</i>	
Columbia University	2021-2024 (various)
<i>Toniann Pitassi (Columbia University)</i>	
Heidelberg Laureate Forum (HLF)	September 2019
<i>Invited graduate student participant</i>	
Heidelberg Laureate Forum (HLF)	September 2016
<i>Invited undergraduate student participant</i>	
Kyoto University	Summer 2015
<i>Kazuo Iwama (Kyoto University)</i>	

SERVICE

ORGANIZING POSITIONS

Latin American Symposium on Theoretical Informatics (LATIN 2024)	March 18-22, 2024
<i>Puerto Varas, Chile</i>	
Served on the Program Committee, including follow-up reviews for conditional acceptances.	
Computer Science Welfare and Communication Committee (WCC)	Spring 2023 -
<i>University of Warwick</i>	
Representing the postdoctoral researcher community to provide feedback on departmental culture and well-being to prepare a proposal for the Athena SWAN Charter and align department programs (specifically with regards to postdoctoral researchers) to that end.	
ToniCS: Celebrating the Contributions and Influence of Toniann Pitassi	March 27-29, 2023
<i>Simons Institute for the Theory of Computing</i>	
Proposed the workshop and served as one of the primary organizers on the Organizing Committee. Primary coordinator for the budget and banquet. Coordinated the schedule and solicited invitees and speakers, including almost all student speakers.	
Special Semester on Metacomplexity	Winter 2023
<i>Simons Institute for the Theory of Computing</i>	
Organized the CS Conversations seminar as well as the the social program for the semester. Budgeted and ran all external events, including weekly pub nights, hiking, climbing, board games, and other after hours events.	
Theory Student Seminar	Fall 2018 - Summer 2022
<i>University of Toronto</i>	
Organized the weekly student seminar for the theory group, including emails and departmental paperwork/coordination. Overhauled the website to include abstracts, slides, and other reference materials for talks given from 2002 onwards, as well as building tools for future organizers to use in keeping it updated.	

Computer Science Graduate Student Union..... *Winter 2018 - Summer 2022*
University of Toronto

Served in multiple administrative roles, including social coordinator, organizer for the semester-end pub nights, and manager for the building’s pop fridge. During the pandemic, organized a number of online events, served as a point of contact for students to the department with regards to financial support, and set up a message forum for the graduate department to use for both work-based and casual discussion.

Japanese Visual Culture Association..... *Fall 2012 - Spring 2015*
Rutgers University

President during the 2013-2014 school year. Instituted a variety of annual programs, including faculty-led classes on calligraphy, Japanese cooking, costume design, and critical historical analysis of Japanese film. Facilitated outreach activities such as public trivia challenges, as well as contributed video content and information.

EXTERNAL TEACHING POSITIONS

Program in Algorithmic and Combinatorial Thinking (PACT) *Summer 2012 - 2016*
Princeton University

In 2016 gave a weekly lecture series on complexity theory. In previous years graded and assisted with creating assignments for a summer course on discrete mathematics and theoretical computer science, taught by Professor Rajiv Gandhi (Department of Computer Science, University of Pennsylvania). Led discussions on homework and topics covered. Was available for help and information on topics covered in lecture, and on general topics in theoretical computer science.

Rutgers Young Scholars Program in Discrete Mathematics *Summer 2014*
Rutgers University-New Brunswick

Oversaw students for a summer course on discrete mathematics aimed at high school students, led by Professor Joseph Rosenstein (Department of Mathematics, Rutgers University-New Brunswick). Assisted with homework and led group discussions about the homework and material covered, gave a lecture on connections between graph theory and theoretical computer science. Evaluated student performance and engagement and communicated with administration about required changes in the course plan.

REVIEW WORK

Journals

SIAM Journal of Computing (*SICOMP*), Discrete Optimization, Information and Computation, Information Processing Letters (*IPL*)

Conferences

Symposium on Theory of Computation (*STOC*), Symposium on Foundations of Computer Science (*FOCS*), Computational Complexity Conference (*CCC*), International Colloquium on Automata, Languages, and Programming (*ICALP*), Innovations in Theoretical Computer Science (*ITCS*), Latin American Theoretical Informatics (*LATIN*), Foundations of Software Technology and Theoretical Computer Science (*FSTTCS*), International Symposium on Mathematical Foundations of Computer Science (*MFCs*), European Symposium on Algorithms (*ESA*)

TEACHING ASSISTANTSHIPS

University of Toronto

- CSC 2426* - Fundamentals of cryptography (*graduate course*) *Fall 2020*
- CSC 463* - Computational complexity and computability *Winter 2017, Winter 2018*
- CSC 373* - Algorithm design, analysis, and complexity *Summer 2017*
- CSC 236* - Introduction to the theory of computation *Fall 2020*
- CSC 165* - Mathematical expression and reasoning for Computer Science *various (7 times)*

Rutgers University-New Brunswick

- CS509* - Foundations of Computer Science (*graduate course; grading only*) *Fall 2015*

COMMUNITY SERVICE

SafeToC..... July 17-20 2023

CCC 2023 (University of Warwick)

Served as a point of contact for any potential interpersonal issues throughout the conference.

Evergreen Forum Tech Assistant.....*Summer 2021 - Fall 2022*

Princeton Senior Resource Center

Ran technical assistance for multiple semester-long weekly lecture series' over Zoom.

Vaccine Navigator..... *Spring - Fall 2021*

Princeton Senior Resource Center

Tracked and booked vaccine appointments for senior citizens during the COVID-19 epidemic.