IAN MERTZ

Contact
https://iuuk.mff.cuni.cz/~iwmertz
iwmertz@iuuk.mff.cuni.cz

Employment
Computer Science Institute (IUUK)
Faculty of Mathematics and Physics
Charles University, Czech Republic

EDUCATION & FUNDING

EDUCATION (PRIMARY)

Charles University (Prague, Czech Republic) . . . . *Fall 2024 -*
Postdoctoral researcher
Advisor: Michal Koucký

University of Warwick (Coventry, UK) . . . . *Fall 2022 - Fall 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:*
Advisor: Toniann Pitassi   *New Approaches to Depth and Space*

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

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

Fully Characterizing Lossy Catalytic Computation
Marten Folkertsma, Ian Mertz, Florian Speelman, Quinten Tupker
Innovations in Theoretical Computer Science (ITCS) (to appear), 2024.

The Structure of Catalytic Space: Capturing Randomness and Time via Compression
James Cook, Jiatu Li, Ian Mertz, Ted Pyne
Electronic Colloquium on Computational Complexity (ECCC), TR24-106, 2024.

Tree Evaluation is in Space O(log n · log log n)
James Cook, Ian Mertz
SIAM Journal of Computing (SICOMP), **STOC 2024 special issue** (to appear).
ACM Symposium on Theory of Computing (STOC '24), pp. 1268-1278, 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, 2021.

Automating Cutting Planes is NP-hard
Mika Göös, Sajin Koroth, 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
STOC 2024 (Vancouver, BC, Canada) . . . . *June 26, 2024*
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
Czech Academy of Sciences Complexity Seminar (Prague, Czech Republic) . . . . *November 1, 2024*
Quantinuum London Research Seminar (London, UK) . . . . *September 9, 2024*
Online Complexity Seminar (Oxford-Warwick) (Zoom) . . . . *July 26, 2024*
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, Czech Republic) . . . . *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

Centrum Wiskunde & Informatica...*July 2024*
Florian Speelman (Universiteit van Amsterdam), Quinten Tupker (Centrum Wiskunde & Informatica)

Simon Fraser University .... *July 2024*
Valentine Kabanets (Simon Frasier University)

Rutgers University - New Brunswick .... *Fall 2023*
Michael Saks (Rutgers University), Michal Koucký (Charles University)

McGill University .... *November 2023*
Robert Robere (McGill University), Pierre McKenzie (Université de Montréal)

Universidade de Lisboa... *October 2023*
Bruno Loff (Universidade de Lisboa)

Cambridge University...*September 2023*
Sergii Strelchuk (Cambridge University), Sathya Subramanian (Cambridge University)

University of Warwick..*July 2022*
Igor Carboni Oliveira (University of Warwick)

Charles University .... *June 2022*
Michal Koucký (Charles University)

Columbia University...*2021-2024 (various)*
Toniann Pitassi (Columbia University)

Heidelberg Laureate Forum (HLF) .... *September 2019*
Invited graduate student participant

Heidelberg Laureate Forum (HLF) .... *September 2016*
Invited undergraduate student participant

Kyoto University...*Summer 2015*
Kazuo Iwama (Kyoto University)

SERVICE

ORGANIZING POSITIONS

Latin American Symposium on Theoretical Informatics (LATIN 2024) ....*March 18-22, 2024*
Puerto Varas, Chile
Served on the Program Committee, including follow-up reviews for conditional acceptances.

Computer Science Welfare and Communication Committee (WCC) .... *Spring 2023 - Fall 2024*
University of Warwick
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 to that end.

ToniCS: Celebrating the Contributions and Influence of Toniann Pitassi .... *March 27-29, 2023*
Simons Institute for the Theory of Computing
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*
Simons Institute for the Theory of Computing
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*
University of Toronto
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 cal-
ligraphy, 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*), Computational Complexity, 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 2023, June 2024*
CCC 2023 (University of Warwick), STOC 2024 (Simon Frasier University)
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.

Last updated: 04/11/2024