

Julien CODSI

Contact



Google Scholar



juliencodsi.com

Research interests

Structural graph theory
Graph algorithms
Combinatorics
Quantum computing

Languages

French (native)
English (fluent)

Programming

Julia
Python
Rust
Java
OCaml
JavaScript
C
L^AT_EX
Git

Referee service

SODA
SIDMA
QPL
Electronic Journal of Combinatorics

Research Profile

Ph.D. candidate in Applied and Computational Mathematics at Princeton University, advised by Maria Chudnovsky. My research focuses on structural graph theory and graph algorithms, especially induced subgraphs, induced minors, tree decompositions, and tree-independence number. I also work on classical simulation of quantum circuits.

Education

2023–2027 (expected)	Ph.D. in Applied and Computational Mathematics Advisor: Professor Maria Chudnovsky. Qualifying examination passed in 2024 (probabilistic combinatorics, structural graph minors theory, and advanced algorithms).	Princeton University
2020–2021; 2022–2023	M.Sc. in Computer Science Advisor: Professor Gilles Brassard. Graduate GPA: 4.3/4.3. Research in quantum information and computation.	Université de Montréal
2021–2022	M.Sc. in Mathematics and Foundations of Computer Science Awarded with distinction. Advisor: John van de Wetering. Thesis: <i>Cutting-edge graphical stabiliser decompositions for classical simulation of quantum circuits.</i>	University of Oxford
2017–2020	B.Sc. in Mathematics and Computer Science Awarded with honours; valedictorian. GPA: 4.279/4.3.	Université de Montréal

Other Research Experience

2018–2020	Undergraduate Research Assistant Operations research with Bernard Gendron (2018), analytic number theory with Andrew Granville (2019), and graph theory with Geňa Hahn (2020). Developed and maintained the open-source Julia package LinA.jl.	Université de Montréal
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Teaching Experience

2024–present	Teaching Assistant MAT214 Numbers, Equations, and Proofs (current); MAT477 Advanced Graph Theory (Fall 2025); MAT579 Topics in Graph Theory—Structure Theorems and Algorithms (Spring 2025); MAT103 Calculus I (Fall 2024).	Princeton University
2020–2023	Teaching Assistant Algorithmics (four terms), Data Structures (three terms), Theoretical Computer Science, Operations Research, and Discrete Mathematics. Led weekly problem sessions for classes of up to 100 students and created and graded assignments.	Université de Montréal
2017–2023	Tutor Tutored undergraduate students in linear algebra, real analysis, data structures, and theoretical computer science.	Université de Montréal

Selected Honors

2021–2025	Doctoral Research Scholarship	Fonds de recherche du Québec
2021–2024	Canada Graduate Scholarship—Doctoral (\$105,000)	NSERC
2021	Google PhD Excellence Scholarship (\$25,000)	Google

Publications and Preprints

Journal articles and peer-reviewed proceedings

1. M. Chudnovsky, **J. Codsi**, S. Hajebi, and S. Spirkl. *Induced subgraphs and tree decompositions XIX: Thetas and forests*. *SIAM Journal on Discrete Mathematics*, 40(3):1000–1009, 2026.
2. M. Bucić, M. Chudnovsky, and **J. Codsi**. *Counting independent sets in structured graphs*. *Combinatorics, Probability and Computing*, 34(5):625–634, 2025.
3. **J. Codsi**, S. U. Ngueveu, and B. Gendron. *LinA: A faster approach to piecewise linear approximations using corridors and its application to mixed-integer optimization*. *Mathematical Programming Computation*, 17(2):265–306, 2025.
4. **J. Codsi** and J. van de Wetering. *Classically simulating intermediate-scale instantaneous quantum polynomial circuits through a random graph approach*. *Physical Review A*, 111(1):012422, 2025.
5. **J. Codsi** and A. Vetta. *A case study in learning in metagames: Super Smash Bros. Melee*. *Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*, 17(1):2–9, 2021.

Preprints

6. M. Chudnovsky, **J. Codsi**, M. Krnc, and M. Milanič. *Excluding paths and bicliques*. arXiv:2607.13995, 2026.
7. M. Chudnovsky, **J. Codsi**, A. E S, and D. Lokshtanov. *Induced-minor-closed classes have linear, square-root, or sub-polynomial tree-independence*. arXiv:2607.12090, 2026.
8. M. Chudnovsky, **J. Codsi**, J. P. Gollin, M. Milanič, and V. Sivashankar. *Tree-independence number and forbidden induced subgraphs: Excluding a 6-vertex path and a $(2, t)$ -biclique*. arXiv:2604.01999, 2026.
9. M. Chudnovsky, **J. Codsi**, A. E S, and D. Lokshtanov. *Induced minors and coarse tree decompositions*. arXiv:2603.11379, 2026.
10. **J. Codsi** and T. Laakkonen. *Unifying graph measures and stabilizer decompositions for the classical simulation of quantum circuits*. arXiv:2603.06377, 2026.
11. **J. Codsi**, S. Cristancho, A. Divoux, and V. Sivashankar. *Extremal graphs for the Lights Out problem*. arXiv:2602.07241, 2026.
12. M. Chudnovsky, **J. Codsi**, D. Fischer, and D. Lokshtanov. *Induced minors and subpolynomial treewidth*. arXiv:2512.18835, 2025.
13. I. S. Ai, M. Chudnovsky, and **J. Codsi**. *Localized Erdős–Pósa property for subdivisions*. arXiv:2512.21530, 2025.
14. M. Chudnovsky and **J. Codsi**. *Tree-independence number VI: Thetas and pyramids*. arXiv:2509.15458, 2025.
15. M. Chudnovsky, **J. Codsi**, D. Lokshtanov, M. Milanič, and V. Sivashankar. *Tree independence number V: Walls and claws*. arXiv:2501.14658, 2025.

Other scholarly work

16. **J. Codsi**. *Cutting-edge graphical stabiliser decompositions for classical simulation of quantum circuits*. Master’s thesis, University of Oxford, 2022.
17. **J. Codsi**. *Book chapter in “16 déambulations sensibles: De l’esthétique des mathématiques”*. Edited by Bertrand Jouve, L’Art-Dit, 2023.

Selected Talks

2026	A Tale of the Tree-Independence Number Graph Theory Seminar.	Georgia Tech
2026	Les dessiner pour mieux les simuler Séminaire quantique ÉTS.	ÉTS Montréal
2026	Distinct distances and the polynomial method IV Combinatorics Learning Seminar.	Princeton University
2025	The weak Hedetniemi's conjecture Combinatorics Learning Seminar.	Princeton University
2025	Tree independence number of graphs with no induced $S_{t,t,t}$, $K_{t,t}$, and line graph of subdivided walls Solving Problems on Graphs: From Structure to Algorithms.	Dagstuhl Seminar
2024	Quantum Computing for the Working PACM Student Program in Applied and Computational Mathematics.	Princeton University
2023	Classically Simulating Quantum Supremacy IQP Circuits through a Random Graph Approach Quantum Physics and Logic Conference.	QPL 2023
2023	Efficiently Simulating Quantum Circuits with the ZX-Calculus	Bellairs Cryptography Workshop
2021	A Case Study in Learning in Metagames: Super Smash Bros. Melee 17th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment.	AAAI AIIDE 2021
2019	Piecewise Linear Approximation with a Performance Guarantee for Solving MINLPs	Optimization Days 2019

Additional Honors and Awards

2018–2020	Undergraduate Research Award (three times; \$6,500 each)	NSERC
2020	Excellence Award (\$500) Awarded for having one of the highest GPAs at the university.	Université de Montréal
2019	Jacques Saint-Pierre Grant (\$3,000) Awarded to the student with the highest GPA in the department.	Université de Montréal
2018	DIRO Excellence Award (\$2,000) Awarded for having one of the highest GPAs in the department.	Université de Montréal
2018	Second place, Theoretical Computer Science Competition	CS Games

Academic and Community Service

2024–present	Organizer, PACM Social Organize social events for the Program in Applied and Computational Mathematics community.	Princeton University
2018–2021	Organizer, weekly undergraduate mathematics talks	Université de Montréal
2019–2020	Competition Organizer and Graduate Student Representative	DIRO Student Association, Université de Montréal
2018–2021	Web Administrator, Mathematics Club Maintained the student mathematics club website.	Université de Montréal