

THIAGO HOLLEBEN

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EDUCATION

Dalhousie University, Canada

September 2022 - current

PhD in Mathematics

Advisor: Sara Faridi

Universidade Federal do Rio de Janeiro, Brazil

August 2019 - December 2021

Master's degree in Mathematics

Dissertation title: [The log-concavity of chromatic polynomials](#).

Advisor: Seyed Hamid Hassanzadeh

Universidade Federal do Rio de Janeiro, Brazil

July 2017 - 2020

Bachelor in Applied Mathematics

Universidade Federal do Rio de Janeiro, Brazil

March 2016 - July 2017 (interrupted)

Major in Mathematics

PAPERS ACCEPTED/PUBLISHED

1. *Lefschetz properties of squarefree monomial ideals via Rees algebras*. Journal of Algebra 668, 572-599. doi.org/10.1016/j.jalgebra.2024.12.030 [arxiv:2404.12471](#). (2025)
2. *The weak Lefschetz property and mixed multiplicities of monomial ideals*. J Algebr Comb 60, 295-317. doi.org/10.1007/s10801-024-01337-8. [arxiv:2306.13274](#). (2024)
3. *The weak Lefschetz property of whiskered graphs*. Lefschetz Properties. SLP-WLP 2022. Springer INdAM Series, vol 59. Springer, Singapore. doi.org/10.1007/978-981-97-3886-1_5. With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl. [arxiv:2306.04393](#) (2023)

PREPRINTS

1. *From points to complexes: a concept of unexpectedness for simplicial complexes*. [arXiv:2510.10884](#) (Submitted) 2025
2. *Planar ternary graphs, flag spheres and Delannoy numbers*. With Margaret Bayer, Rick Danner, Marie Kramer, Yirong Yang. [arXiv:2509.21705](#) (Submitted) 2025
3. *When are Morse resolutions polyhedral?*. With Louis Bu, Sara Faridi, Iresha Madduwe Hewalage, Hasan Mahmood, Dharm Veer, Kyle Wang and Scott Wesley. [arXiv:2505.08580](#) (Submitted) 2025
4. *Spheres and balls as independence complexes*. With Susan M. Cooper, Sara Faridi, Lisa Nicklasson, Adam Van Tuyl. [arXiv:2503.18490](#) (Submitted) 2025
5. *Realizing resolutions of powers of extremal ideals*. With Trung Chau, Art Duval, Sara Faridi, Susan Morey, Liana Şega. [arxiv:2502.09585](#) (Submitted) 2025
6. *Roller Coaster Gorenstein algebras and Koszul Gorenstein algebras failing the weak Lefschetz property*. With Lisa Nicklasson [arxiv:2502.00155](#) (Submitted) 2025
7. *A probabilistic parking process and labeled IDLA*. With Pamela E. Harris, J. Carlos Martínez Mori, Amanda Priestley, Keith Sullivan and Per Wagenius [arxiv:2501.11718](#) (Submitted) 2025

8. *Coinvariant stresses, Lefschetz properties and random complexes.* [arxiv:2501.12108](#) (Submitted) 2025
9. *Spherical complexes.* With Sara Faridi. [arXiv:2311.07727](#) (Submitted) 2025

ACADEMIC ACHIEVEMENTS

Glendon McCormick Scholarship (2024)

Dalhousie University scholarship aimed at general graduate students

AARMS Graduate Scholarship (2024)

Scholarship winners are selected on the basis of academic excellence, research potential, and regional representation within Atlantic Canada.

Jane Street Graduate Research Fellowship Award Honorable mention (2024)

Professor Michael Edelstein Memorial Graduate Prize (2023)

Annual prize awarded to a graduate student in shows great promise in the mathematical sciences.

Honours undergraduate research project (2018)

Award for best undergraduate research project on the algebraic and combinatorial properties of Edge Ideals. Advisor: Seyed Hamid Hassanzadeh

INVITED TALKS

Algebraic properties of extremal ideals: one squarefree monomial ideal to rule them all. JMM, Washington D.C. January 2026 (upcoming)

From points to complexes: a notion of unexpectedness for simplicial complexes. AMS Sectional meeting, New Orleans. October 2025

Lefschetz properties and coinvariant stresses. Mathematical Congress of the Americas Special session: Influences of Combinatorics and Topology in Commutative Algebra. Miami. July 2025

Coinvariant stresses, Lefschetz properties and random complexes. Oberseminar Algebra/diskr. Mathematik und angew. Algebra/Datenanalyse 2025, Osnabrück University. April 2025

Positivity via commutative algebra. Working ALgebra Knowledge Seminar (WALKS), Syracuse University. February 2025 (online)

Simplicial complexes arising from integer programs. Graduate Online Combinatorics Colloquium. October 2024. (online)

Roller-Coaster, graphs and Perazzo forms. Joint AMS-UMI meeting, Palermo. July 2024

Lefschetz properties of monomial ideals via Rees algebras. AMS Sectional meeting, San Francisco. May 2024

Lefschetz properties of monomial ideals via Rees algebras. COMA/NAG Graduate seminar, MSRI/SLMath. May 2024

Rees algebras and Lefschetz properties of squarefree monomial ideals. Commutative Algebra section: Canadian Mathematics Society winter meeting, Montreal. December 2023

Rees algebras and Lefschetz properties of squarefree monomial ideals. Stockholm Commutative Algebra seminar. October 2023 (online)

CONTRIBUTED TALKS

Playing dominos in the correct dimension. Science Atlantic - Mathematics, Statistics, and Computer Science Conference 2025. Cape Breton. October 2025

Coinvariant stresses, Lefschetz properties and random complexes. Workshop on weak and strong Lefschetz properties across mathematics. Sophus Lie Conference Center, Nordfjordeid, Norway. June 2025

Coinvariant stresses, Lefschetz properties and random complexes. Combinatorial Algebra meets Algebraic Combinatorics, Toronto. January 2025

Lefschetz properties and analytic spread. Combinatorics and Geometry in Ioannina. September 2024

Lefschetz properties of squarefree monomial ideals via Rees algebras. Lefschetz properties in Algebra, Geometry, Topology and Combinatorics, Poland. June 2024

Powers of a simplex: Resolutions meet Partitions. Combinatorial Algebra meets Algebraic Combinatorics, Montreal. January 2024

The weak Lefschetz property and mixed multiplicities of monomial ideals. Workshop on Lefschetz Properties in Algebra, Geometry, Topology and Combinatorics, Fields institute. May 2023

The weak Lefschetz property and mixed multiplicities of squarefree monomial ideals. International Centre for Theoretical Physics summer school, Italy. May 2023

Homological invariants of ternary graphs. Banff International Research Station workshop: Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra. April 2023

Homological invariants of ternary graphs. Southern Regional Algebra Conference, Tulane university. March 2023 (online)

A brief dictionary between Algebra and Combinatorics. Semana de Integração Acadêmica da Universidade Federal do Rio de Janeiro, Brazil 2018 (in portuguese)

TEACHING POSITIONS

At Dalhousie University

Instructor of record: Differential and Integral Calculus II (online) - Summer 2024/2025

Instructor of record: Engineering Mathematics II - Summer 2023/2024

Lectures for algebraic topology class - Fall 2024

Lectured, prepared assignments and marked assignments for the last month of the algebraic topology course for graduate and undergraduate students while the instructor was on leave.

Teaching assistant: Applied Graph Theory - Fall 2025/2026

Teaching assistant: Matrix Theory and Linear Algebra I - Fall 2025/2026, Fall 2024/2025, Winter 2023/2024, Fall 2023/2024

Teaching assistant: Calculus for the Life and Social Sciences - Fall 2023/2024, Winter 2022/2023

At Federal University of Rio de Janeiro

Teaching assistant: Algebra III (Galois Theory) - Second semester of 2019

Teaching assistant: Real analysis I - Second semester of 2019

Teaching assistant: Scientific computing I (Numerical Calculus I) - Second semester of 2018

Teaching assistant: Algebra II (Group and ring theory) - First semester of 2019

Teaching assistant: Algebra I (Modular arithmetic) - Second semester 2019

Teaching assistant: Calculus I - First semester of 2019

ORGANIZATION OF CONFERENCES AND SEMINARS

Co-organizer (with T. Chau) of special session at JMM 2026: Combinatorial Aspects in Commutative Algebra

Co-organizer (with A. Dochtermann and S. Grate) of special session at 2025 Fall South-eastern AMS sectional meeting: Algebraic combinatorics and combinatorial commutative algebra

Co-organizer (with L. Carmona, B. Farah, C. Herkenhoff, G. Miranda, R. Peregrino, G. Radke, F. Sinnecker) of Week of Applied Mathematics and Mathematical Engineering (SEM²Ap) Co-organized virtual Week of Applied Mathematics and Mathematical Engineering (SEM²Ap) in 2020 More info on: [Youtube](#), [Instagram](#)

SKILLS

Programming: Macaulay2, Sage, Python, Javascript, Julia