

# Hide Koerts

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## RESEARCH INTERESTS

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My research interests lie in discrete mathematics, especially structural graph theory and related discrete algorithms. My current research focuses on the interplay between graph colouring and graph operations.

## EDUCATION

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- 2023 – Present **University of Waterloo**  
PhD in Combinatorics and Optimization  
*Supervised by Sophie Spirkl*
- 2021 – 2022 **University of Waterloo**  
MMath in Combinatorics and Optimization  
*Thesis on  $k$ -connectedness and  $k$ -factors in the semi-random graph process, supervised by Jane Gao*
- 2017 – 2021 **Eindhoven University of Technology**  
BSc in Applied Mathematics and BSc in Computer Science & Engineering  
*Thesis on the  $k$ -independent set problem, supervised by Aida Abiad*

## PUBLICATIONS

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- 2026 **Intersections of graphs and  $\chi$ -boundedness** with Aristotelis Chaniotis and Sophie Spirkl, SIAM Journal on Discrete Mathematics, Vol. 40(1), 420-448.
- 2026 **Orientations of cycles in digraphs of high chromatic number and high minimum out-degree** with Benjamin Moore and Sophie Spirkl, Combinatorica, Vol. 46, 12.
- 2025 **On heroes in digraphs with forbidden induced forests** with Alvaro Carbonero, Benjamin Moore, and Sophie Spirkl, European Journal of Combinatorics, Vol. 125, 104104.
- 2025 **On the pre- and post-positional semi-random graph processes** with Pu Gao, Journal of Graph Theory, Vol. 108(4), 819-831.
- 2024 **On the  $k$ -independence number of graph products** with Aida Abiad, Discussiones Mathematicae Graph Theory, Vol. 44, 983-996.
- 2023 **On the complexity of the  $k$ -independence number and the  $h$ -diameter of a graph** with Aida Abiad, Matemática Contemporânea, Vol. 55, 30-38.
- 2021 **Near-Delaunay metrics** with Nathan van Beusekom, Kevin Buchin, Wouter Meulemans, Benjamin Rodatz, and Bettina Speckmann, Proceedings of the 33rd Canadian Conference on Computational Geometry, 1-11.
- 2020 **Restricted-weight minimum-dilation spanners on three points** with Kevin Buchin, and Herman Haverkort, Proceedings of the 32<sup>nd</sup> Canadian Conference on Computational Geometry, 240-248.

## PREPRINTS

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- 2026 **Decomposing tournaments into comparability graphs** with Pierre Aboulker, Logan Crew, Julien Duron, Xinyue Fan, Hugo Jacob, Rémy Kimbrough, Benjamin Moore, Sophie Spirkl, and Stéphan Thomassé, arXiv:2606.07748
- 2026 **Characterizing large clique number in tournaments** with Logan Crew, Xinyue Fan, Benjamin Moore, and Sophie Spirkl, arXiv:2602.09863
- 2026 **Faster 3-colouring algorithm for graphs of diameter 3** with Carla Groenland and Sophie Spirkl, arXiv:2601.13072

## TALKS

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- June 2026 Faster 3-colouring algorithm for graphs of diameter 3, WG 2026, Kortrijk, Belgium.

- March 2026 Characterizing large clique number in tournaments, *Discrete Math Seminar*, Institute for Basic Science, Korea.
- May 2025 Graph intersection and  $\chi$ -boundedness, *CanaDAM 2025*, Ottawa, Canada.
- April 2025 Graph intersection and  $\chi$ -boundedness, Department of Computer Science, Université Libre de Bruxelles, Belgium.
- April 2025 Graph intersection and  $\chi$ -boundedness, *Mathematics of Operations Research Seminar*, University of Twente, The Netherlands.
- April 2025 Graph intersection and  $\chi$ -boundedness, *Discrete Mathematics and Optimization Seminar*, Delft University of Technology, The Netherlands.
- April 2025 Graph intersection and  $\chi$ -boundedness, *Discrete Math Seminar*, University of Amsterdam, The Netherlands.
- April 2025 Graph intersection and  $\chi$ -boundedness, *Combinatorial Optimization Seminar*, Eindhoven University of Technology, The Netherlands.
- November 2024 Orientations of cycles in digraphs of high chromatic number and high out-degree, *Graphs and Matroids Seminar*, University of Waterloo, Canada.
- July 2024 Intersections of graphs and  $\chi$ -boundedness: characterizing  $\chi$ -guarding graph classes, *Graphs and Matroids Seminar*, University of Waterloo, Canada.
- November 2022  $k$ -Connectedness and  $k$ -factors in the semi-random graph process, *Graphs and Matroids Seminar*, University of Waterloo, Canada.
- July 2022 The  $k$ -independence number of graph products, *Graphs and Matroids Seminar*, University of Waterloo, Canada.
- April 2022 The  $k$ -independence number of graph products, *Graduate Research Skills Seminar*, University of Waterloo, Canada.
- August 2020 Restricted-Weight Minimum-Dilation Spanners on Three Points, *32<sup>nd</sup> Canadian Conference on Computational Geometry*, virtual.

## CONFERENCES ATTENDED

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- June 2026 WG 2026, Kortrijk, Belgium.
- August 2025 Eurocomb'25, Budapest, Hungary.
- August 2025 Koper-Leipzig Graph Theory Workshop, Koper, Slovenia.
- May 2025 CanaDAM 2025, Ottawa, Canada.
- September 2024 BIRS Workshop on New Perspectives in Colouring and Structure, Banff, Canada.
- July 2024 Fulkerson 100, University of Waterloo, Canada.
- May 2024 One-Day Meeting in Combinatorics, Mathematical Institute, University of Oxford, UK.
- May 2024 EPIT 2024 - Graphs and Algorithms: Conjectures, Aussois, France.
- March 2023 2023 Session 1:  $\chi$ -boundedness, Sparse (Graph) Coalition, virtual.
- May 2022 26<sup>th</sup> Ontario Combinatorics Workshop, University of Waterloo, Canada.
- August 2020 32<sup>nd</sup> Canadian Conference on Computational Geometry, virtual.

## RESEARCH VISITS

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- March 2026 Seokbeom Kim, *Discrete Mathematics Group, Institute for Basic Science*.
- April 2025 Linda Cook, *Korteweg-de Vries Institute for Mathematics, University of Amsterdam*.

## WORK EXPERIENCE

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2025 – Present **Fencing Coach / University of Waterloo**

- 2021 – Present **Teaching Assistant / University of Waterloo**
- MATH239 Introduction to Combinatorics, *Winter 2022, Spring 2022, Fall 2022, Spring 2023, Fall 2023*
  - MATH600 Introduction to Mathematical Software for Teachers, *Fall 2024*
  - CO250 Introduction to Optimization, *Fall 2021*
  - CO342 Introduction to Graph Theory, *Spring 2024*
  - CO353 Computational Discrete Optimization, *Winter 2023, Winter 2024*
  - CO370 Deterministic Operations Research Models, *Winter 2024*
- March 2021 – June 2021 **Research Intern / Sioux Mathware**
- Full-time internship on developing and implementing algorithms for routing and scheduling waste collection on a municipal level.
- 2019 – 2020 **Student Assistant / Eindhoven University of Technology**
- 2ILCO Algorithms
  - 2IAB0 Data Analytics for Engineers

## ACADEMIC EXPERIENCE

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### Reviewer

- Innovations in Graph Theory
- Journal of Graph Theory
- Discrete Mathematics
- Electronic Journal of Combinatorics
- International Workshop on Graph-Theoretic Concepts in Computer Science
- European Conference on Combinatorics, Graph Theory and Applications
- Australasian Journal of Combinatorics
- Portugaliae Mathematica

### Women in Math Directed Research Program Mentor

- Research project on the interplay between Tyshevich Decompositions and graph operations, *Fall 2024, Winter 2025*

### Women in Math Directed Reading Program Mentor

- Project on graph products, *Spring 2024*
- Project on graph powers, *Winter 2026*

### Organizer

- Co-organizer reading group on  $\chi$ -boundedness, *Winter 2024*.

### Mentor for Undergraduate Research Assistants

- *Spring 2023*

## AWARDS

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- 2026 Distinguished Service Award, Women in Mathematics, University of Waterloo
- 2023 William Tutte Postgraduate Scholarship, University of Waterloo (\$700)
- 2023 Sinclair Graduate Scholarship, University of Waterloo (\$1300)
- 2021 – 2023 International Master's Award of Excellence, University of Waterloo (5 × \$2500)

## PERSONAL INTERESTS

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Passionate foil fencer on the University of Waterloo fencing varsity team, participant of international tournaments and national championships.

Avid outdoor hiker and backpacker, including walking the Nijmeegse Vierdaagse (4 × 50km) and yo-yo hiking the Kungsleden (880km).

Enthusiastic SET player, a combinatorial card game.