Hidde Koerts

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RESEARCH INTERESTS

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

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

2026 **Faster 3-colouring algorithm for graphs of diameter 3** *with Carla Groenland and Sophie Spirkl*, Proceedings of the 52nd International Workshop on Graph-Theoretic Concepts in Computer Science (WG 2026), Vol. 376, 19:1-19:13, Leibniz International Proceedings in Informatics (LIPIcs)

2026 **Intersections of graphs and χ-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 32nd Canadian Conference on Computational Geometry, 240-248.

PREPRINTS

2026 **Tree-independence number of $K_{1,d}$-free graph classes** *with Kenny Bešter Štorgel, Mujin Choi, and Đorđe Vasić*, arXiv:2606.20256

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

TALKS

June 2026 Characterizing large clique number in tournaments, *BIRS Workshop on Cross-Community Collaborations in Combinatorics*, Banff, Canada.

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 χ-boundedness, *CanaDAM 2025*, Ottawa, Canada.

April 2025 Graph intersection and χ-boundedness, Department of Computer Science, Université Libre de Bruxelles, Belgium.

April 2025 Graph intersection and χ-boundedness, *Mathematics of Operations Research Seminar*, University of Twente, The Netherlands.

April 2025 Graph intersection and χ-boundedness, *Discrete Mathematics and Optimization Seminar*, Delft University of Technology, The Netherlands.

April 2025 Graph intersection and χ-boundedness, *Discrete Math Seminar*, University of Amsterdam, The Netherlands.

April 2025 Graph intersection and χ-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 χ-boundedness: characterizing χ-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, *32nd Canadian Conference on Computational Geometry*, virtual.

CONFERENCES ATTENDED

June 2026 SiMEGG: Structures in Matroids, Embedded Graphs and Graphs, ICMS, Edinburgh, UK.

June 2026 BIRS Workshop on Cross-Community Collaborations in Combinatorics, Banff, Canada.

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: χ-boundedness, Sparse (Graph) Coalition, virtual.

May 2022 26th Ontario Combinatorics Workshop, University of Waterloo, Canada.

August 2020 32nd Canadian Conference on Computational Geometry, virtual.

RESEARCH VISITS

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

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**

- 2ILC0 Algorithms
- 2IAB0 Data Analytics for Engineers

ACADEMIC EXPERIENCE

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
- Frontiers of Mathematics
- Portugaliae Mathematica

Women in Math Directed Research Program Mentor

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

Women in Math Directed Reading Program Mentor

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

Organizer

- Co-organizer reading group on χ-boundedness, *Winter 2024*.

Mentor for Undergraduate Research Assistants

- *Spring 2023*

AWARDS

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 \times $2500)*

PERSONAL INTERESTS

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.