FLORIAN FRICK

CONTACT INFORMATION

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RESEARCH INTERESTS

Geometric and Topological Combinatorics, Discrete and Metric Geometry, Geometric Topology and
Applied Algebraic Topology

EDUCATION

04/2012–07/2015   Ph.D., Technische Universität Berlin

    Funded via the Berlin Mathematical School, advisor: John M. Sullivan

10/2010–11/2014   M.Sc., Technische Universität Berlin

10/2007–08/2010   B.Sc., Technische Universität Berlin

EMPLOYMENT

07/2021–   Associate Professor, Carnegie Mellon University

09/2021–07/2022   Gastprofessor (W3), Acting Head of the Discrete Geometry and Topological
Combinatorics research group, Freie Universität Berlin (on leave from CMU)

07/2018–06/2021   Assistant Professor, Carnegie Mellon University

01/2018–06/2018   H. C. Wang Assistant Professor, Cornell University

08/2017–12/2017   Postdoctoral Fellow, MSRI

    In the program *Geometric and Topological Combinatorics* and Visiting Scholar, University of California, Berkeley

08/2015–07/2017   H. C. Wang Assistant Professor, Cornell University

AWARDS AND GRANTS

2021–2026   NSF CAREER Grant DMS 2042428

2019–2023   Sloan Research Fellowship

2019–2022   NSF Grant DMS 1855591

07/2016   Richard-Rado-Preis

    Dissertation award of the German Mathematics Society DMV for a thesis in discrete mathematics defended in
2014 or 2015; Juror: Ben J. Green

PUBLICATIONS

⋆ undergraduate coauthor   • graduate student coauthor

1. Roots of real-valued zero mean maps: Compositions of linear functionals and equivariant maps
   with Francesca Cantor⋆, Julia D'Amico⋆, and Eric Myzelev⋆
   arxiv:2503.19729

2. Youden's Demon is Sylvester's Problem
   with Andrew Newman and Wesley Pegden
   Mathematika (2025), to appear
   arxiv:2407.02589

3. *Appendix to* D. Kozlov, "Homology and Euler characteristic of generalized anchored configuration spaces of graphs"
   with Martin Raussen
   J. Appl. Comput. Topol. **8**, 1053–1067 (2024)
   doi.org/10.1007/s41468-024-00167-8

4. Topological methods in zero-sum Ramsey theory
   with Jacob Lehmann Duke⋆, Meenakshi McNamara⋆, Hannah Park-Kaufmann⋆, Steven Raanes⋆, Steven Simon, Darrion Thornburgh⋆, and Zoe Wellner•
   arxiv:2310.17065

5. Hausdorff vs Gromov–Hausdorff distances
   with Henry Adams, Sushovan Majhi, and Nicholas McBride•
   Discrete Comput. Geom. (2025), to appear
   arxiv:2309.16648

6. Colorful Borsuk–Ulam theorems and applications
   with Zoe Wellner•
   arxiv:2309.14539

7. Gromov–Hausdorff distances, Borsuk–Ulam theorems, and Vietoris–Rips complexes
   with Henry Adams, Johnathan Bush, Nate Clause•, Mario Gómez•, Michael Harrison, R. Amzi Jeffs, Evgeniya Lagoda•, Sunhyuk Lim, Facundo Mémoli, Michael Moy•, Nikola Sadovek•, Matt Superdock, Daniel Vargas•, Qingsong Wang, Ling Zhou•
   arxiv:2301.00246

8. Transversal generalizations of hyperplane equipartitions
   with Samuel Murray⋆, Steven Simon, and Laura Stemmler⋆
   Int. Math. Res. Not. IMRN **2024**(7), 5586–5618 (2024)
   arxiv:2210.15423

9. Unit sphere fibrations in Euclidean space
   with Daniel Asimov, Michael Harrison, and Wesley Pegden
   Proc. Edinb. Math. Soc. **67**, 287–298 (2024)
   arxiv:2210.13981

10. Random complexes with free involution
    with Andrew Newman
    Israel J. Math. (2023), to appear
    arxiv:2210.11316

11. Vietoris thickenings and complexes have isomorphic homotopy groups
    with Henry Adams and Žiga Virk
    J. Appl. Comput. Topol. **7**, 221–241 (2023)
    arxiv:2206.08812

12. Colorful words and d-Tverberg complexes
    with Amzi Jeffs
    Comb. Theory **4**(1), Paper No. 3, 13 p. (2024)
    arxiv:2205.04776

13. Vertex numbers of simplicial complexes with free abelian fundamental group
    with Matt Superdock•
    Ars. Math. Contemp. **25** , #1.05, 16 p. (2025)
    arxiv:2109.11952

14. On inscribed trapezoids and affinely 3-regular maps
    with Michael Harrison
    Proc. Roy. Soc. Edinburgh Sect. A **154**, 1024–1032 (2024)
    arxiv:2109.05985

15. Embedding dimensions of simplicial complexes on few vertices
    with Mirabel Hu⋆, Verity Scheel⋆, and Steven Simon
    Ann. Comb. **27**, 993–1003 (2023)
    arxiv:2109.04855

16. Coupled embeddability
    with Michael Harrison
    Bull. Lond. Math. Soc. **54** (5), 1609–1629 (2022)
    arxiv:2107.09816

17. The topology of projective codes and the distribution of zeros of odd maps
    with Henry Adams and Johnathan Bush
    Michigan Math. J. **74**(4), 775–796 (2024)
    arxiv:2106.14677

18. Spaces of embeddings: Nonsingular bilinear maps, chirality, and their generalizations
    with Michael Harrison
    Proc. Amer. Math. Soc. **150**, 423–437 (2022)
    arxiv:2010.11996

19. What can you draw?
    with Fei Peng⋆
    Amer. Math. Monthly **130** (1), 5–19 (2023)
    arxiv:2004.01049

20. The geometry of fair division
    Snapshots of modern mathematics from Oberwolfach **2023** (7)
    https://doi.org/10.14760/SNAP-2023-007-EN

21. Metric thickenings, Borsuk–Ulam theorems, and orbitopes
    with Henry Adams and Johnathan Bush•
    Mathematika **66**, 79–102 (2020)
    arxiv:1907.06276

22. A nonlinear Lazarev–Lieb theorem: L^2-orthogonality via motion planning
    with Matt Superdock•
    J. Topol. Anal. **14** (3), 569–585 (2022)
    arxiv:1906.04417

23. Borsuk–Ulam theorems for products of spheres and Stiefel manifolds revisited
    with Yu Hin Chan⋆, Shujian Chen⋆, and J. Tristan Hull⋆
    Topol. Methods Nonlinear Anal. **55** (2), 553–564 (2020)
    arxiv:1902.00935

24. Fair splittings by independent sets in sparse graphs
    with Alexander Black⋆, Umur Cetin⋆, Alexander Pacun⋆, and Linus Setiabrata⋆
    Israel J. Math. **236**, 603–627 (2020)
    arxiv:1809.03268

25. Barycenters of points in polytope skeleta
    with Michael Gene Dobbins
    Contemp. Math. **764**, 83–88 (2021)
    arxiv:1809.01613

26. Splitting loops and necklaces: Variants of the square peg problem
    with Jai Aslam⋆, Shujian Chen⋆, Sam Saloff-Coste⋆, Linus Setiabrata⋆, and Hugh Thomas
    Forum Math. Sigma **8**, e5 (2020)
    arxiv:1806.02484

27. Neural codes, decidability, and a new local obstruction to convexity
    with Aaron Chen• and Anne Shiu
    SIAM J. Appl. Algebra Geom. **3** (1), 44–66 (2019)
    arxiv:1803.11516

28. On the generalized Erdős–Kneser conjecture: Proofs and reductions
    with Jai Aslam⋆, Shuli Chen⋆, Ethan Coldren⋆, and Linus Setiabrata⋆
    J. Combin. Theory, Ser. B **135**, 227–237 (2019)
    arxiv:1712.03456

29. Chromatic numbers of stable Kneser hypergraphs via topological Tverberg-type theorems
    Int. Math. Res. Not. IMRN **2020** (13), 4037–4061 (2020)
    arxiv:1710.09434

30. Colorful coverings of polytopes and piercing numbers of colorful *d*-intervals
    with Shira Zerbib
    Combinatorica **39** (3), 627–637 (2019)
    arxiv:1710.07722

31. Metric reconstruction via optimal transport
    with Michał Adamaszek and Henry Adams
    SIAM J. Appl. Algebra Geom. **2** (4), 597–619 (2018)
    arxiv:1706.04876

32. Achieving rental harmony with a secretive roommate
    with Kelsey Houston-Edwards• and Frédéric Meunier
    Amer. Math. Monthly **126** (1), 18–32 (2019)
    arxiv:1702.07325

33. On affine Tverberg-type results without continuous generalization
    to be rewritten
    arxiv:1702.05466

34. Fair division and generalizations of Sperner- and KKM-type results
    with M. Asada⋆, V. Pisharody⋆, M. Polevy⋆, D. Stoner⋆, L.H. Tsang⋆, and Z. Wellner⋆
    SIAM J. Discrete Math. **32** (1), 591–610 (2018)
    arxiv:1701.04955

35. On Reay's relaxed Tverberg conjecture and generalizations of Conway's thrackle conjecture
    with M. Asada⋆, R. Chen⋆, F. Huang⋆, M. Polevy⋆, D. Stoner⋆, L.H. Tsang⋆, and Z. Wellner⋆
    Electronic J. Combin. **25** (3), P3.16 (2018)
    arxiv:1608.04279

36. Minkowski complexes and convex threshold dimension
    with Raman Sanyal
    J. Combin. Theory, Ser. A **151**, 202–206 (2017)
    arxiv:1607.07814

37. Intersection patterns of finite sets and of convex sets
    Proc. Amer. Math. Soc. **145** (7), 2827–2842 (2017)
    arxiv:1607.01003

38. On homotopy types of Euclidean Rips complexes
    with Michał Adamaszek and Adrien Vakili*
    Discrete Comput. Geom. **58** (3), 526–542 (2017)
    arxiv:1602.04131

39. Barycenters of Polytope Skeleta and Counterexamples to the Topological Tverberg Conjecture, via Constraints
    with Pavle Blagojević and Günter M. Ziegler
    J. Europ. Math. Soc. (JEMS) **21** (7), 2107–2116 (2019)
    arxiv:1510.07984

40. Hyperplane mass partitions via relative equivariant obstruction theory
    with Pavle Blagojević, Albert Haase•, and Günter M. Ziegler
    Documenta Math. **21**, 735–771 (2016)
    arxiv:1509.02959

41. Topology of the Grünbaum–Hadwiger–Ramos hyperplane mass partition problem
    with Pavle Blagojević, Albert Haase•, and Günter M. Ziegler
    Trans. Amer. Math. Soc. **370** (10), 6795–6824 (2018)
    arxiv:1502.02975

42. Counterexamples to the topological Tverberg conjecture
    Oberwolfach Reports **12** (1), 318–321 (2015)
    arxiv:1502.00947

43. Nerve complexes of circular arcs
    with Michał Adamaszek, Henry Adams, Chris Peterson, and Corrine Previte-Johnson
    Discrete Comput. Geom. **56** (2), 251–273 (2016)
    arxiv:1410.4336

44. Tverberg plus constraints
    with Pavle Blagojević and Günter M. Ziegler
    Bull. Lond. Math. Soc. **46** (5), 953–967 (2014)
    arxiv:1401.0690

45. A minimal irreducible triangulation of S^3
    Combinatorial Methods in Topology and Algebra, Springer INdAM Series **12**, 49–52 (2015)

SELECTED INVITED TALKS

03/2025   Spring Topology and Dynamics Conference

01/2025   AMS Special Session *Geometric and Topological Combinatorics*
    Joint Mathematics Meetings, Seattle

01/2025   AMS Special Session *The Open Neighborhood of Applied Topology*
    Joint Mathematics Meetings, Seattle

07/2024   Special Session *Discrete and Combinatorial Homotopy, Theory and Applications*

Joint Meeting AMS-UMI, Palermo, Italy

01/2024   AMS Special Session *Discrete Homotopy Theory*

Joint Mathematics Meetings, San Francisco

01/2024   AMS Special Session *Topological and Algebraic Approaches for Optimization*

Joint Mathematics Meetings, San Francisco

12/2023   *Geometric, Algebraic, and Topological Combinatorics*, MF Oberwolfach

06/2023   *New trends from Classical Theorems in Geometry, Combinatorics, and Topology*

Casa Matemática Oaxaca, Mexico

05/2023   *GMZ 60: Geometry, Topology, Community*, Freie Universität Berlin, Germany

04/2023   Discrete Math / Algebra Seminar, University of Delaware

10/2022   Combinatorics and Discrete Geometry Seminar, Cornell University

10/2022   Algebra Combinatorics Geometry Seminar, University of Pittsburgh

06/2022   Seminar on Nonlinear Algebra, Max Planck Institute, Leipzig

05/2022   *Colloquia in Combinatorics*, Queen Mary University, London

05/2022   *Bridging Applied and Quantitative Topology* (online)

11/2021   *Facets of Complexity*, Freie Universität Berlin

10/2021   AMS Special Session *Geometric and Topological Combinatorics and Their Applications*
(online)

AMS Fall Central Sectional (formerly at Creighton University)

06/2021   Applied Algebraic Topology Research Network (online)

04/2021   Colloquium, Bard College (online)

03/2021   AMS Special Session *Applied Combinatorics* (online)

Spring Eastern Sectional Meeting (formerly at Brown University)

03/2021   Topology and Geometry Seminar, University of Haifa (online)

02/2021   Topology Seminar, Northeastern University (online)

01/2021   Facets of Complexity, Berlin (online)

10/2020   Combinatorics Seminar, University of Washington (online)

09/2020   *Discrete Geometry*, MF Oberwolfach (online)

08/2020   *Topological Combinatorics Workshop*, Charles University, Prague (online)

05/2020   Discrete Math Seminar, Iowa State University (online)

02/2020   Combinatorics Seminar, University of Michigan

11/2019   Atlanta Lecture Series on Combinatorics and Graph Theory

Emory University

11/2019   AMS Special Session *Topological Complexity and Related Topics*

AMS Fall Southeastern Sectional Meeting, University of Florida

11/2019   AMS Special Session *Geometric and Topological Combinatorics*

AMS Fall Southeastern Sectional Meeting, University of Florida

10/2019   *Helly and Tverberg type Theorems*, CMO, Oaxaca, Mexico

09/2019   AMS Special Session *Algebraic and Geometric Combinatorics*

AMS Fall Central Sectional Meeting, University of Wisconsin–Madison

08/2019   *Geometric, Algebraic, and Topological Combinatorics*, MF Oberwolfach

05/2019   Math Club, SUNY Stony Brook

04/2019   Geometry Seminar, CUNY and New York University

04/2019   Algebra/Topology Seminar, University at Albany SUNY

01/2019   *ERC Workshop: Adventures in Combinatorial Geometry*

Ein Gedi, Israel

01/2019   AMS Special Session *Geometric and Topological Combinatorics*

Joint Mathematics Meetings, Baltimore

11/2018   Theoretical Biology Seminar, Pennsylvania State University

10/2018   Math Club, Carnegie Mellon University

07/2018   Combinatorics and Geometry Seminar, University of Washington

04/2018   Combinatorics Seminar, Georgia Tech

04/2018   Discrete Math Seminar, UMass Amherst

04/2018   Colloquium, Lehigh University

04/2018   Topology and Robotics Seminar, Lehigh University

03/2018   *ERC Workshop: Geometric Transversals and Epsilon-Nets*

Ein Gedi, Israel

02/2018   Topology and Geometry Seminar, Binghamton University

01/2018   Colloquium, University of California, Davis

01/2018   AMS Special Session *Topological Data Analysis*

Joint Mathematics Meetings, San Diego

01/2018   Colloquium, University of Illinois at Chicago

12/2017   Colloquium, Northeastern University

12/2017   Colloquium, Carnegie Mellon University

12/2017   Colloquium, Washington University in St. Louis

10/2017   *Geometric and Topological Combinatorics: Modern Techniques and Methods*

Mathematical Sciences Research Institute, Berkeley

08/2017   SIAM Minisymposium on *Geometry of Materials*

SIAM Conference on Applied Algebraic Geometry, Atlanta

06/2017	Discrete Geometry Seminar, Freie Universität Berlin
05/2017	*Conference on Discrete Geometry and Algebraic Combinatorics*, South Padre Island
04/2017	Geometry Seminar, New York University
03/2017	Topology Seminar, University of Rochester
02/2017	Discrete Geometry and Combinatorics Seminar, Cornell University
01/2017	Combinatorics Seminar, University of Washington
01/2017	Algebra & Discrete Mathematics Seminar, University of California, Davis
12/2016	*Topology and Geometry in a Discrete Setting*, ICERM, Providence
11/2016	Applied Algebraic Topology Research Network, online seminar
10/2016	*Transversal, Helly and Tverberg type Theorems*, CMO, Oaxaca, Mexico
09/2016	Special Session *Combinatorics, at the Crossroads of Algebra, Geometry, and Topology*

AMS Sectional Meeting at Bowdoin College

09/2016	Topology and Geometric Group Theory Seminar, Cornell University
07/2016	*Symposium on Discrete Mathematics*, Freie Universität Berlin
07/2016	Smorgasbord Seminar, Cornell University
06/2016	Pattern Analysis Lab, Colorado State University
05/2016	*Topology Festival*, Cornell University
03/2016	Combinatorics Seminar, The Ohio State University
01/2016	Algebra & Discrete Mathematics Seminar, University of California, Davis
01/2016	AMS Special Session *Algebraic and Topological Methods in Combinatorics*

Joint Mathematics Meetings, Seattle

10/2015	Oliverclub (Department Colloquium), Cornell University
10/2015	Combinatorics Seminar, University of Miami
10/2015	Topology and Geometry Seminar, Binghamton University
09/2015	Topology and Geometric Group Theory Seminar, Cornell University
06/2015	Algebra and Topology Seminar, University of Copenhagen
06/2015	Applied Topology Seminar, EPF Lausanne
03/2015	Discrete Geometry and Combinatorics Seminar, Cornell University
03/2015	ERC Workshop *Discrete Models in Geometry and Topology*

Freie Universität Berlin

02/2015	*Geometric and Algebraic Combinatorics*, MF Oberwolfach
11/2014	Topological Combinatorics Seminar, Freie Universität Berlin
07/2014	*Workshop Applied Algebraic Topology*, CIEM, Castro Urdiales, Spain
04/2014	*Topology with combinatorial and geometric flavor*

Adam Mickiewicz University, Poznán

POSTDOCS MENTORED OR CO-MENTORED

2023–	Marta Pavelka
2022–	Alan Lew
2022–2023	Ali Mohammad Nezhad
2021–	Amzi Jeffs, NSF postdoc fellowship
2020	Nóra Frankl
2020–	Andrew Newman
2019–2021	Michael Harrison

PHD STUDENTS GRADUATED

2024	Zoe Wellner
2022	Jonathan Kliem (at FU Berlin)
2021	Matt Superdock

EXTERNAL PHD COMMITTEES

09/2023   Tatiana Levinson
>Freie Universität Berlin, advised by Pavle Blagojević

05/2022   Olakunle Abawonse
>Binghamton University, advised by Laura Anderson

06/2017   Albert Haase
>Freie Universität Berlin, advised by Günter M. Ziegler

UNDERGRADUATE RESEARCH ADVISING

2018–   Advised eight CMU undergraduates on honor's theses, research amd reading projects.

2023–   Advised nine undergraduate students within my REU *Geometry and Topology in a Discrete Setting*.

2022   Advisor for Pablo Agustin Martin Torres Master's thesis at Freie Universität Berlin.

Summer 2021   Advised four undergraduate students.

Summer 2019   Advised two undergraduate students.

2016–2018   Led undergraduate summer research program on *Topological Methods in Discrete Geometry*. Advised 24 students.

TEACHING

Fall 2024	Discrete Math (graduate course)
Fall 2024	Topological Methods in Combinatorics (graduate course)

Spring 2024	Algebraic Topology (graduate course)
Fall 2023	General Topology (graduate course)
Fall 2023	Discrete Mathematics (graduate course)
Fall 2022	General Topology (graduate course)
Fall 2022	Discrete Mathematics (graduate course)
Summer 2022	Geometry and Topology in a Discrete Setting (graduate course, co-taught with Pavle Blagojević as a block course)
Summer 2022	Student Seminar in Discrete Geometry (graduate course)
Summer 2022	Discrete Geometry II (graduate course)
Winter 2021/22	Discrete Geometry III (graduate course)
Winter 2021/22	Discrete Geometry I (undergraduate course, co-taught with Christian Haase)
Spring 2021	Graph Theory (undergraduate course)
Fall 2020	Discrete Mathematics (graduate course)
Fall 2020	Algebraic Topology (graduate course)
Spring 2020	Differential Geometry of Curves and Surfaces (undergraduate course)
Fall 2019	Discrete Mathematics (graduate course)
Spring 2019	Graph Theory (undergraduate course, co-taught with Wesley Pegden)
Fall 2018	Algebraic Topology (graduate course)
Spring 2018	Prove it! (undergraduate, introduction to proof-based mathematics)
Spring 2018	Introduction to Combinatorics (upper-level undergraduate)
Spring 2017	Seminar in Geometry: Discrete and Metric Geometry
Fall 2016	Topics in Topology: Equivariant Cohomology
Fall 2016	Introduction to Combinatorics (upper-level undergraduate)
Fall 2016	Putnam Practice Sessions (Co-organizer)
Spring 2016	Calculus II
Fall 2015	Putnam Practice Sessions (Co-organizer)
Fall 2015	Calculus I

EDITORIAL ACTIVITIES

2024–	Handling Editor, *Combinatorial Theory*

REFEREEING

Referee for journals, conferences, contributions to book projects, and book manuscripts; program committee member FPSAC 2019

ORGANIZING

- Co-organizer of the MSRI Summer School *Topological Toolbox for Discrete Mathematicians*
- Co-organizer of the BMS Summer School *Geometry and Topology in a Discrete Setting*

- Co-organizer of the special session *Algebraic, Geometric, and Topological Methods in Combinatorics* at the AMS Spring Eastern Sectional Meeting at Northeastern in April 2018

- Organizer of the *Geometric and Topological Combinatorics Postdoc Seminar* at MSRI during Fall 2017

- Co-organizer of *Topology Festival* at Cornell University

- Co-organizer of *Topology and Geometric Group Theory Seminar* at Cornell University

- Co-organizer of the special session *Geometry and Combinatorics of Cell Complexes* at the Mathematical Congress of the Americas 2017

- Co-organizer of minisymposium *Symmetric simplicial complexes and polytopes* at SIAM Conference on Applied Algebraic Geometry 2017

March 26, 2025