

# FLORIAN FRICK

## CONTACT INFORMATION

Department of Mathematical Sciences  
Carnegie Mellon University  
Pittsburgh, PA 15213  
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www.math.cmu.edu/~ffrick/

## 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. Youden's Demon is Sylvester's Problem  
with Andrew Newman and Wesley Pegden  
arxiv:2407.02589
2. *Appendix to D. Kozlov, "Homology and Euler characteristic of generalized anchored configuration spaces of graphs"*  
with Martin Raussen  
*J. Appl. Comput. Topol.* (2024)  
doi.org/10.1007/s41468-024-00167-8
3. 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
4. Hausdorff vs Gromov–Hausdorff distances  
with Henry Adams, Sushovan Majhi, and Nicholas McBride●  
arxiv:2309.16648
5. Colorful Borsuk–Ulam theorems and applications  
with Zoe Wellner●  
arxiv:2309.14539
6. 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
7. Transversal generalizations of hyperplane equipartitions  
with Samuel Murray★, Steven Simon, and Laura Stemmler★  
*Int. Math. Res. Not. IMRN* (2023), to appear  
arxiv:2210.15423
8. Unit sphere fibrations in Euclidean space  
with Daniel Asimov, Michael Harrison, and Wesley Pegden  
*Proc. Edinb. Math. Soc.* (2023), to appear  
arxiv:2210.13981
9. Random complexes with free involution  
with Andrew Newman  
*Israel J. Math.* (2023), to appear  
arxiv:2210.11316
10. 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
11. Colorful words and d-Tverberg complexes  
with Amzi Jeffs  
*Comb. Theory* (2023), to appear  
arxiv:2205.04776

12. Vertex numbers of simplicial complexes with free abelian fundamental group with Matt Superdock<sup>•</sup>  
*Ars. Math. Contemp.* (2023), to appear  
arxiv:2109.11952
13. On inscribed trapezoids and affinely 3-regular maps with Michael Harrison  
*Proc. Roy. Soc. Edinburgh Sect. A* (2023), to appear  
arxiv:2109.05985
14. Embedding dimensions of simplicial complexes on few vertices with Mirabel Hu<sup>\*</sup>, Verity Scheel<sup>\*</sup>, and Steven Simon  
*Ann. Comb.* **27**, 993–1003 (2023)  
arxiv:2109.04855
15. Coupled embeddability with Michael Harrison  
*Bull. Lond. Math. Soc.* **54** (5), 1609–1629 (2022)  
arxiv:2107.09816
16. The topology of projective codes and the distribution of zeros of odd maps with Henry Adams and Johnathan Bush  
*Michigan Math. J.* (2023), to appear  
arxiv:2106.14677
17. Spaces of embeddings: Nonsingular bilinear maps, chirality, and their generalizations with Michael Harrison  
*Proc. Amer. Math. Soc.* **150**, 423–437 (2022)  
arxiv:2010.11996
18. What can you draw? with Fei Peng<sup>\*</sup>  
*Amer. Math. Monthly* **130** (1), 5–19 (2023)  
arxiv:2004.01049
19. The geometry of fair division  
*Snapshots of modern mathematics from Oberwolfach 2023* (7)  
<https://doi.org/10.14760/SNAP-2023-007-EN>
20. Metric thickenings, Borsuk–Ulam theorems, and orbitopes with Henry Adams and Johnathan Bush<sup>•</sup>  
*Mathematika* **66**, 79–102 (2020)  
arxiv:1907.06276
21. A nonlinear Lazarev–Lieb theorem:  $L^2$ -orthogonality via motion planning with Matt Superdock<sup>•</sup>  
*J. Topol. Anal.* **14** (3), 569–585 (2022)  
arxiv:1906.04417
22. Borsuk–Ulam theorems for products of spheres and Stiefel manifolds revisited with Yu Hin Chan<sup>\*</sup>, Shujian Chen<sup>\*</sup>, and J. Tristan Hull<sup>\*</sup>  
*Topol. Methods Nonlinear Anal.* **55** (2), 553–564 (2020)  
arxiv:1902.00935
23. Fair splittings by independent sets in sparse graphs with Alexander Black<sup>\*</sup>, Umur Cetin<sup>\*</sup>, Alexander Pacun<sup>\*</sup>, and Linus Setiabrata<sup>\*</sup>  
*Israel J. Math.* **236**, 603–627 (2020)  
arxiv:1809.03268

24. Barycenters of points in polytope skeleta  
with Michael Gene Dobbins  
*Contemp. Math.* **764**, 83–88 (2021)  
arxiv:1809.01613
25. 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
26. 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
27. 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
28. Chromatic numbers of stable Kneser hypergraphs via topological Tverberg-type theorems  
*Int. Math. Res. Not. IMRN* **2020** (13), 4037–4061 (2020)  
arxiv:1710.09434
29. Colorful coverings of polytopes and piercing numbers of colorful  $d$ -intervals  
with Shira Zerbib  
*Combinatorica* **39** (3), 627–637 (2019)  
arxiv:1710.07722
30. Metric reconstruction via optimal transport  
with Michał Adamaszek and Henry Adams  
*SIAM J. Appl. Algebra Geom.* **2** (4), 597–619 (2018)  
arxiv:1706.04876
31. 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
32. On affine Tverberg-type results without continuous generalization  
to be rewritten  
arxiv:1702.05466
33. 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
34. 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
35. Minkowski complexes and convex threshold dimension  
with Raman Sanyal  
*J. Combin. Theory, Ser. A* **151**, 202–206 (2017)  
arxiv:1607.07814

36. Intersection patterns of finite sets and of convex sets  
*Proc. Amer. Math. Soc.* **145** (7), 2827–2842 (2017)  
 arxiv:1607.01003
37. On homotopy types of Euclidean Rips complexes  
 with Michał Adamaszek and Adrien Vakili\*  
*Discrete Comput. Geom.* **58** (3), 526–542 (2017)  
 arxiv:1602.04131
38. 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
39. 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
40. 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
41. Counterexamples to the topological Tverberg conjecture  
*Oberwolfach Reports* **12** (1), 318–321 (2015)  
 arxiv:1502.00947
42. 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
43. Tverberg plus constraints  
 with Pavle Blagojević and Günter M. Ziegler  
*Bull. Lond. Math. Soc.* **46** (5), 953–967 (2014)  
 arxiv:1401.0690
44. A minimal irreducible triangulation of  $S^3$   
*Combinatorial Methods in Topology and Algebra*, Springer INdAM Series **12**, 49–52 (2015)

#### SELECTED INVITED TALKS

- 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, Poznań

#### 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– projects.	Advised eight CMU undergraduates on honor's theses, research and reading projects.
Summer 2023 <i>Discrete Setting</i> .	Advised four undergraduate students within my REU <i>Geometry and Topology in a Discrete Setting</i> .
2022 Berlin.	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 <i>Topological Methods in Discrete Geometry</i> . Advised 24 students.

## TEACHING

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)

<i>Spring 2021</i>	Graph Theory (undergraduate course)
<i>Fall 2020</i>	Discrete Mathematics (graduate course)
<i>Fall 2020</i>	Algebraic Topology (graduate course)
<i>Spring 2020</i>	Differential Geometry of Curves and Surfaces (undergraduate course)
<i>Fall 2019</i>	Discrete Mathematics (graduate course)
<i>Spring 2019</i>	Graph Theory (undergraduate course, co-taught with Wesley Pegden)
<i>Fall 2018</i>	Algebraic Topology (graduate course)
<i>Spring 2018</i>	Prove it! (undergraduate, introduction to proof-based mathematics)
<i>Spring 2018</i>	Introduction to Combinatorics (upper-level undergraduate)
<i>Spring 2017</i>	Seminar in Geometry: Discrete and Metric Geometry
<i>Fall 2016</i>	Topics in Topology: Equivariant Cohomology
<i>Fall 2016</i>	Introduction to Combinatorics (upper-level undergraduate)
<i>Fall 2016</i>	Putnam Practice Sessions (Co-organizer)
<i>Spring 2016</i>	Calculus II
<i>Fall 2015</i>	Putnam Practice Sessions (Co-organizer)
<i>Fall 2015</i>	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

July 5, 2024