

FLORIAN FRICK

CONTACT INFORMATION

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Carnegie Mellon University
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RESEARCH INTERESTS

Geometric and Topological Combinatorics, Discrete and Metric Geometry, Computational Topology and Topological Data Analysis

EDUCATION

04/2012–07/2015 Ph.D., Technische Universität Berlin
Funded via the Berlin Mathematical School, advisor: John M. Sullivan, external reviewer: Imre Bárány summa cum laude, awarded Richard-Rado-Preis of the German Math Society

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

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

EMPLOYMENT

07/2021– Associate Professor (pre-tenure), Carnegie Mellon University

09/2021–07/2022 Gastprofessor, 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

06/2019 Research in Pairs
Mathematisches Forschungsinstitut Oberwolfach (with Henry Adams and Žiga Virk)

2016–2018 AMS Simons Travel Grant

- Fall 2017 MSRI Postdoctoral Fellowship
- 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
- 2012–2015 BMS Phase II Scholarship
Funded by the German Science Foundation DFG via the Berlin Mathematical School

JOURNAL PUBLICATIONS

★ undergraduate coauthor ● graduate student coauthor

1. Vietoris thickenings and complexes have isomorphic homotopy groups with Henry Adams and Žiga Virk
J. Appl. Comput. Top. (2022), accepted pending minor revisions
<https://arxiv.org/abs/2206.08812>
2. The topology of projective codes and the distribution of zeros of odd maps with Henry Adams and Johnathan Bush
Michigan Math. J. (2022), to appear
<https://arxiv.org/abs/2106.14677>
3. Coupled embeddability with Michael Harrison
Bull. London Math. Soc. (2022), to appear
<https://arxiv.org/abs/2107.09816>
4. What can you draw? with Fei Peng★
Amer. Math. Monthly (2022), to appear
<https://arxiv.org/abs/2004.01049>
5. Spaces of embeddings: Nonsingular bilinear maps, chirality, and their generalizations with Michael Harrison
Proc. Amer. Math. Soc. **150**, 423–437 (2022)
6. A nonlinear Lazarev–Lieb theorem: L^2 -orthogonality via motion planning with Matt Superdock●
J. Topol. Anal. (2022), to appear
<https://doi.org/10.1142/S1793525321500060>
7. Barycenters of points in polytope skeleta with Michael Gene Dobbins
In *Polytopes and Discrete Geometry, Contemporary Mathematics*, vol. 764, Amer. Math. Soc., Providence, RI, 2021, pp. 83–88.
8. 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)
9. Chromatic numbers of stable Kneser hypergraphs via topological Tverberg-type theorems
Int. Math. Res. Not. IMRN **2020** (13), 4037–4061 (2020)
10. 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)

11. 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)
12. Metric thickenings, Borsuk–Ulam theorems, and orbitopes
with Henry Adams and Johnathan Bush•
Mathematika **66**, 79–102 (2020)
13. Colorful coverings of polytopes and piercing numbers of colorful d -intervals
with Shira Zerbib
Combinatorica **39** (3), 627–637 (2019)
14. 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)
15. 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)
16. Achieving rental harmony with a secretive roommate
with Kelsey Houston-Edwards• and Frédéric Meunier
Amer. Math. Monthly **126** (1), 18–32 (2019)
17. 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)
18. Metric reconstruction via optimal transport
with Michał Adamaszek and Henry Adams
SIAM J. Appl. Algebra Geom. **2** (4), 597–619 (2018)
19. 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)
20. On Reay’s relaxed Tverberg conjecture and generalizations of Conway’s thrackle conjecture
with M. Asada*, R. Chen*, F. Huang*, M. Poley*, D. Stoner*, L.H. Tsang*, and Z. Wellner*
Electronic J. Combin. **25** (3), P3.16 (2018)
21. Fair division and generalizations of Sperner- and KKM-type results
with M. Asada*, V. Pisharody*, M. Poley*, D. Stoner*, L.H. Tsang*, and Z. Wellner*
SIAM J. Discrete Math. **32** (1), 591–610 (2018)
22. On homotopy types of Euclidean Rips complexes
with Michał Adamaszek and Adrien Vakili*
Discrete Comput. Geom. **58** (3), 526–542 (2017)
23. Minkowski complexes and convex threshold dimension
with Raman Sanyal
J. Combin. Theory, Ser. A **151**, 202–206 (2017)
24. Intersection patterns of finite sets and of convex sets
Proc. Amer. Math. Soc. **145** (7), 2827–2842 (2017)
25. Hyperplane mass partitions via relative equivariant obstruction theory
with Pavle Blagojević, Albert Haase•, and Günter M. Ziegler
Documenta Math. **21**, 735–771 (2016)

26. Nerve complexes of circular arcs
with Michał Adamaszek, Henry Adams, Chris Peterson, and Corrine Previte-Johnson
Discrete Comput. Geom. **56** (2), 251–273 (2016)
27. Tverberg plus constraints
with Pavle Blagojević and Günter M. Ziegler
Bull. London Math. Soc. **46** (5), 953–967 (2014)

NON-REFEREED PUBLICATIONS

28. The topological Tverberg problem beyond prime powers
Oberwolfach Reports (2020), to appear
29. Generalizations of the Borsuk–Ulam theorem
Oberwolfach Reports (Kalai Gil, Novik Isabella, Santos Francisco, Welker Volkmar, eds.): Geometric, Algebraic, and Topological Combinatorics. Oberwolfach Rep. 16 (2019), 2395–2472. doi: 10.4171/OWR/2019/39
30. Tverberg’s theorem: A pearl in combinatorial convexity
with Imre Bárány
Emissary 1 & 11–12, Fall 2017
lead article for the MSRI program in Geometric and Topological Combinatorics
31. Counterexamples to the topological Tverberg conjecture
Oberwolfach Reports **12**(1), 318–321 (2015)
32. A minimal irreducible triangulation of S^3
Combinatorial Methods in Topology and Algebra, Springer INdAM Series **12**, 49–52 (2015)
edited by B. Benedetti, E. Delucchi, L. Moci

PREPRINTS

33. Colorful words and d -Tverberg complexes
with Amzi Jeffs
<https://arxiv.org/abs/2205.04776>, submitted
34. Vertex numbers of simplicial complexes with free abelian fundamental group
with Matt Superdock
<https://arxiv.org/abs/2109.11952>, submitted
35. On inscribed trapezoids and affinely 3-regular maps
with Michael Harrison
<https://arxiv.org/abs/2109.05985>, submitted
36. Embedding dimensions of simplicial complexes on few vertices
with Mirabel Hu*, Verity Scheel*, and Steven Simon
<https://arxiv.org/abs/2109.04855>, submitted
37. The geometry of fair division
submitted to *Snapshots of modern mathematics from Oberwolfach*
<https://www.math.cmu.edu/~ffrick/geometry-fair-division.pdf>
38. On affine Tverberg-type results without continuous generalization
<https://arxiv.org/abs/1702.05466>, to be rewritten

THESES

39. Combinatorial restrictions on cell complexes
Dissertation, Technische Universität Berlin
advised by John M. Sullivan (2015)
40. Local to global volume bounds for manifold triangulations
Master's thesis, Technische Universität Berlin
advised by John M. Sullivan (2014)

SELECTED INVITED TALKS

- 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

2021– Amzi Jeffs, NSF postdoc fellowship
 2020 Nóra Frankl

2020– Andrew Newman
 2019–2021 Michael Harrison

ADVISING AND MENTORING OF STUDENTS

2021–2022 Advised FU Berlin graduate student Jonathan Kliem, will defend in July 2022
 2018–2021 Advised CMU graduate student Matt Superdock, graduated in August 2021
 2018– Advised CMU graduate student Zoe Wellner
 Summer 2021 Advised four undergraduates jointly with Steven Simon (Bard College)
 Summer 2019 Advised two undergraduate students within Carnegie Mellon’s Summer Undergraduate Research Fellowship
 Summer 2018 Led research program on *Topological Methods in Discrete Geometry*
 Within Cornell’s Summer Program for Undergraduate Research. Advised eight students for eight weeks, joint publications appeared in *Israel J. Math.* and *Topol. Meth. Nonlinear Anal.*
 06/2017 External reviewer and committee member for Albert Haase’s Ph.D. thesis
 Freie Universität Berlin, advised by Günter M. Ziegler
 Summer 2017 Led research program on *Topological Methods in Discrete Geometry*
 Within Cornell’s Summer Program for Undergraduate Research. Advised nine students for eight weeks, joint publications appeared in *Forum Math. Sigma* and *J. Combin. Theory, Ser. B*
 Summer 2016 Led research program on *Topological Methods in Discrete Geometry*
 Within Cornell’s Summer Program for Undergraduate Research. Advised eight students for eight weeks, two joint publications—published in *SIAM J. Discrete Math.* and *Electronic J. Combin.*
 2015–2018 Putnam coach at Cornell University
 2015–2018 Co-organizer of First-Year Exam at Cornell University

OUTREACH

2016–2017 Faculty advisor for the Math Explorer’s Club
 Weekend workshop for middle and high school students, taught by graduate students (at Cornell University)
 02/2016 Instructor for a weekend workshop for secondary math teachers
 Module on using elementary geometry and combinatorics for fair division problems (at Cornell University)

TEACHING

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

REFEREEING

Referee for journals, conferences, contributions to book projects, and book manuscripts (about 15–20/year); 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

September 7, 2022