Curriculum Vitae of C. PFAFF, Ph.D.

APPOINTMENTS		
Queen's University, Assistant Professor		July '18 - Present
Univ. of California Santa Barbara, Ky Fan Visiting Assistant Professor		July '15 - June '18
Universität Bielefeld, Postdoctoral Research Fellow		July '14 - August '15
Université d'Aix-Marseille, Laboratoire d'Excellence Postdoctoral Fellow		Jan. '13 - June '14
Bard College at Simon's Rock, Visiting Assistant Professor		Fall '11 - Spring '12

VISITING POSITIONS

Institut des Hautes Études Scientifiques, *Bures-sur-Yvette, France*   April 2026 - May 2026
Invited Researcher

Institute for Advanced Study, *Princeton, NJ, USA*   September 2024 - July 2025
Member (not special year)

Centre de recherches mathématiques, *Montreal, QC, Canada*   Spring 2023
Thematic Semester on Geometric Group Theory

Fields Institute, *Toronto, ON, Canada*   Fall 2018
Thematic Program on Teichmüller Theory and its Connections to Geometry, Topology and Dynamics

Centre de Recerca Matemàtica, *Barcelona, Spain*   Fall 2012
Research Programme on Automorphisms of Free Groups

Mathematical Sciences Research Institute, *Berkeley, CA, USA*   Fall 2007
Associate Member (as a graduate student)

EDUCATION

Supplemental (current):, Coursera Python 3 Programming (University of Michigan) & Machine Learning Specialization (Stanford University); Deep Learning and AI in Sports (Twelve Football)

Rutgers University, Ph.D. in Mathematics (Advisor: Lee Mosher)

University of Chicago, Honors B.A. in Mathematics

HONORS/ AWARDS

Institute for Advanced Study Membership ($38,500 USD stipend), *2024-2025*.

NSERC Discovery Grant ($96,000 CAD), *2019-2025*.

NSERC Early Career Launch Supplement ($12,500 CAD), *2019-2024*.

eCampus Ontario Virtual Learning Strategy Grant ($144,812 CAD), *2021-2022*.

CANSSI Collab. Research Team Project Colleague: Sports Analytics ($200,000 CAD), *2021-2024*.

Nominated for W.J. Barnes Teaching Award, Queen's University, *2019-2020*.

Fields Institute Conference Grant ($14,250 CAD), *2019-2020*.

Queen's University Research Initiation Grant ($25,000 CAD), *2018*.

Ky Fan Visiting Assistant Professorship, UCSB, *2015 - 2018*.

GEAR Conference Grant ($26,500), *2017*.

GEAR Travel Awards ($13,610), *2016-2017*.

Humboldt Research Fellowship for Postdoctoral Researchers, not utilized, *2015*.

NSF Conference Grant DMS - 1331129 ($33,000), *2013*.

Labex Archimède Research in Residence Grant (for Lee Mosher), *2013*.

NSF Graduate Research Fellowship Honorable Mention, *2005 & 2006*.

Henry C. Torrey Graduate Fellowship (recruitment fellowship), *2004 - 2006*.

Weill Fellowship (summer funding fellowship), *2004*.

MISCELLANEOUS   USA Citizen, Canadian Permanent Resident – English Native, French & German Intermediate

PUBLICATIONS/
PREPRINTS

1) *Cannon–Thurston maps and singularity of measures on the two-sphere.* w. V. Gadre, J. Maher, C. Uyanik
arXiv: 2510.04350

2) *A "cubist" decomposition of the Handel-Mosher axis bundle and the conjugacy problem for $Out(F_r)$* w. Chi Cheuk Tsang
arXiv: 2503.16360

3) *A profinitely rigid hyperbolic free-by-cyclic group* w. N. Andrew, P. Hillen, R. Lyman
Glasgow Mathematical Journal, to appear

4) *$Out(F_r)$ train track automata I: Proper full fold decompositions*
Journal of Topology & Analysis, to appear

5) *Collar Parameters for Teichmuller Space and Measured Foliations on a Surface Research Announcement* w. D. Cooper
Comptes Rendus - Série Mathématique, to appear

6) *Low complexity among principal fully irreducible elements of $Out(F_3)$* w. N. Andrew, P. Hillen, R. Lyman
Algebraic & Geometric Topology, to appear

7) *Controlling ball progression in soccer.* w. E. Hunter[*], H. Hong[*], D. Forestell[*], Z. Drassinower[*], A. Fialkov[*], T. Chan
SIAM Undergraduate Research Online, Vol 18, pp. 45-65, 2025

8) *Taking the High-Edge Route Through Outer Space in Rank 3.* w. D. Gagnier[*]
International Journal of Algebra and Computation, Vol. 33, Issue 08, pp. 1659 - 1685, 2023

9) *Random trees in the boundary of Outer space.* w. I. Kapovich, J. Maher, S. Taylor
Geometry & Topology, 26 (2022) 127–162

10) *Random outer automorphisms of free groups: Attracting trees and their singularity structures.* w. I. Kapovich, J. Maher, S. Taylor
Transactions of the American Mathematical Society, 375 (2022), 525-557

11) *Counting conjugacy classes of fully irreducibles: double exponential growth.* w. I. Kapovich
Geometriae Dedicata, 218.2 (2024): 39

12) *Stable Strata of Geodesics in Outer Space.* w. Y. Algom-Kfir, I. Kapovich
International Mathematics Research Notices, Vol. 2019, Issue 14, July 2019, pp. 4549–4578.

13) *Normalizers and centralizers of cyclic subgroups generated by lone axis fully irreducible outer automorphisms.* w. Y. Algom-Kfir
New York Journal of Mathematics 23 (2017), 365–381.

14) *A Dense Geodesic Ray in Reduced Outer Space.* w. Y. Algom-Kfir
Groups, Geometry, & Dynamics, vol. 12, no. 2, pp. 571–613.

15) *A Train Track Directed Random Walk on $Out(F_r)$.* w. I. Kapovich
International Journal of Algebra and Computation (IJAC). Volume No.25, Issue No. 5.

16) *Lone Axes in Outer Space.* w. L. Mosher
Algebraic & Geometric Topology 16.6 (2016): 3385-3418.

17) *$Out(F_3)$ Index Realization.*
Math. Proc. of the Cambridge Phil. Society, vol. 159, issue 03, pp. 445-458 (2015).

18) *Ideal Whitehead Graphs in $Out(F_r)$ IV.*
arxiv: arXiv:1511.08933

19) *Ideal Whitehead Graphs in $Out(F_r)$ III.*
Journal of Topology & Analysis, Volume No.08, Issue No. 02 (2016).

20) *Ideal Whitehead Graphs in $Out(F_r)$ II.*
Journal of Homotopy and Related Structures: Volume 10, Issue 2 (2015), pp 275-301.

21) *Ideal Whitehead Graphs in $Out(F_r)$ I.*
New York Journal of Mathematics, Volume 21 (2015) 417-463.

∗ Indicates an undergraduate student co-author.

PROJECTS IN PROGRESS/ PREPARATION	1) *Compactifying Teichmüller Space Using the Right Trousers.* w. D. Cooper Draft available upon request 2) *An enumerative and combinatorial description of Teichmuller space and the space of measured foliations* w. V. Schleis 3) *The nesting of $Out(F_r)$ train track automata.*

ADVISING, MENTORING

PhD Co-advisor for Paige Hillen (UCSB) ($Out(F_r)$ stretch factors, UWisconsin-Madison RTG postdoc '25-'28)	*Spring 2024 - Present*
PhD Supervisory committee for Dashti Ali (Topological data analysis for medical imaging)	*Fall 2023 - Present*
Summer research mentor for Marni Phillipson (Learning about fold lines in Culler-Vogtmann Outer Space)	*Summer 2023*
Women in Groups, Geometry, & Dynamics coMentor (Mentoring 3 female junior mathematicians on research project)	*Fall 2022- Present*
Masters Co-advisor for Sana Arastehfar (Linear temporal logic for modeling soccer player decision making)	*Fall 2022- Fall 2023*
USRA Summer Research Advisor for Damara Gagnier (Resulting joint paper published in IJAC)	*Summer 2020*
Geometric Soccer Modeling Research Group Advisor (Advising 10 Queen's undergraduate students, resulting paper under review at JSA)	*Summer 2020-Fall 2022*
Masters Co-advisor for Troy Zeier (Topological data analysis for anti- money laundering)	*Fall 2019- Summer 2020*

MINI-COURSES	**The parameter space of metric graphs: Culler-Vogtmann Outer Space** Summer '25 Topological and analytic methods in group theory Part II, *University of Hawai'i at Mānoa, Honolulu, HI*

	SUNY Plattsburgh, Colloquium, *Spring 2025*
	Syracuse University, Colloquium, *Fall 2024*
	California Polytechnic State University, San Luis Obispo, Colloquium, *Spring 2024*
	University of Wisconsin Milwaukee, Colloquium, *Winter 2023*
	University of Waterloo, Colloquium, *Fall 2022*
	Wellesley College, Colloquium, *Fall 2018*
	Vassar College, Colloquium, *Fall 2018*
	Amherst College, Colloquium, *Fall 2018*
	UCSB, AWM Colloquium, *Spring 2018*
	College of Charleston, Colloquium, *Winter 2018*
	Manhattan College, Colloquium, *Winter 2018*
	Queen's University, Colloquium, *Winter 2018*
	University of Florida, Colloquium, *Winter 2018*
	Hofstra, Colloquium, *Fall 2017*
	University of California Riverside, Colloquium, *Spring 2017*
	California Polytechnic State University, San Luis Obispo, Colloquium, *Winter 2017*
	California State University at Long Beach, Colloquium, *Fall 2016*
	San Jose State University, Colloquium, *Fall 2016*
	Montana State University, Colloquium, *Spring 2015*
	SUNY Buffalo, Colloquium, *Spring 2015*
	Haifa University, Colloquium, *Winter 2014*

Conference Talks	**Topological and analytic methods in group theory Part II**, University of Hawai'i at Mānoa, Honolulu, HI, *Summer 2025*
	Group Theory Day, Institute for Advanced Study (Princeton, NJ), *Fall 2024*
	Fall Eastern Sectional Meeting: AMS Special Session on Geometric Group Theory, University of Albany (Albany, NY), *Fall 2024*
	Fairfield Algebra Regional Meeting, Fairfield University (Fairfield, CT), *Fall 2023*
	2nd Canadian Geometry-Topology Seminar, l'Université du Québec a Montréal (Montreal, QC), *Fall 2022*
	36th Summer Topology Conference, University of Vienna (Vienna, Austria), *Summer 2022*
	Fall Eastern Sectional Meeting - Special Session on Effective and Quantitative Advances in Low Dimensional Topology and Geometric Group Theory, Binghamton University (Binghamton, NY), *Fall 2019*
	Fall Eastern Sectional Meeting - Special Session on Group actions on manifolds and related spaces, Binghamton University (Binghamton, NY), *Fall 2019*
	Outer Space in Bielefeld, Universität Bielefeld (Bielefeld, Germany), *Fall 2019*
	Large Scale Geometry and Applications, Fields Institute (Toronto, Canada), *Spring 2018*

Spring Southeastern Sectional Meeting - Special Session Interactions between Geometry, Group Theory and Dynamics,
Vanderbilt (Nashville, TN), *Spring 2018*

Joint Mathematics Meetings - Special Session Boundaries for groups and spaces,
San Diego, CA, *Winter 2017*

Groups explored through geometry and dynamics,
Princeton University (Princeton, NJ), *Fall 2017*

Fall Eastern Sectional - Special Session on Geometric Group Theory,
University at Buffalo (Buffalo, NY), *Fall 2017*

Spring Eastern Sect. - Special Session on Comp. & Algorithmic Group Theory,
Hunter College (New York City, NY), *Spring 2017*

Spring Eastern Sectional - Special Session on Infinite Permutation Groups, Totally Disconnected Locally Compact Groups, & Geometric Group Theory,
Hunter College (New York City, NY), *Spring 2017*

AWM Research Symposium - Special Session in Geometric Group Theory,
University of California, Los Angeles (Los Angeles, CA), *Spring 2017*

Southern California Women in Mathematics Symposium,
University of Southern California (Los Angeles, CA), *Winter 2017*

Dubrovnik VIII - Geom. Topology, Geom. Group Theory and Dyn. Systems,
Inter-University Centre (Dubrovnik, Croatia), *Summer 2015*

Bielefeld-Münster Seminar on Groups, Geometry and Topology,
Universität Bielefeld (Bielefeld, Germany), *Winter 2014*

Geometric Group Theory in Bonn,
Max Planck Institute (Bonn, Germany), *Fall 2014*

Geometry on Groups and Spaces ICM Satellite Conference,
KAIST (Daejeon, Korea), *Summer 2014*

KAIST Geometric Topology Fair,
Jeonju, Korea, *Summer 2013*

Cool-down Workshop for Conference on Automorphisms of Free Groups,
Centre de Recerca Matemática (Barcelona, Spain), *Fall 2012*

Opening Workshop on Automorphisms of Free Groups,
Centre de Recerca Matemática (Barcelona, Spain), *Fall 2012*

46th Spring Topology and Dynamics Conference Special Session,
Universidad Nacional Autonoma de Mexico (Mexico City, Mexico), *Spring 2012*

Workshop on Geometric Group Theory, Part II,
Louisiana State University (Baton Rouge, LA), *Summer 2011*

Geometric Group Theory Conference,
Technion (Haifa Israel), *Summer 2011*

OSU Workshop on the Torelli Group, Mapping Class Group, and $Out(F_n)$,
Ohio State University (Columbus, OH), *Summer 2011*

SELECT SEMINAR TALKS

McGill Geometric Group Theory Seminar, *Fall 2025*

Yale University Geometry & Topology Seminar, *Spring 2025*

Princeton University Topology Seminar, *Spring 2025*

Institute of Advanced Study "What is" Seminar, *Fall 2024*

McGill Geometric Group Theory Seminar, *Fall 2024*

Université de Montréal Surfaces Learning Seminar, *Fall 2024*

New York Group Theory Seminar, *Fall 2024*

Brandeis Topology Seminar, *Fall 2024*

University of Albany Algebra/Topology Seminar, *Fall 2024*

CUNY Geometry & Topology Seminar, *Fall 2024*

University of California Santa Barbara Topology Seminar, *Summer 2023*

SFU Sports Analytics Virtual Seminar Series, *Spring 2023*

New York Group Theory Seminar, *Winter 2023*

l'Université du Québec a Montréal, CIRGET Working Group Seminar *Summer 2022*

McGill University, Geometric Group Theory Seminar, *Fall 2021*

University of Washington, Rainwater Seminar, *Spring 2019*

Hunter College, GRECS Seminar, *Fall 2018*

CUNY Graduate Center, Algebra Seminar, *Fall 2018*

UIUC, Geometry, Groups & Dynamics/GEAR Seminar, *Spring 2018*

University of Pennsylvania, Geometry-Topology Seminar, *Winter 2017*

CUNY, Topology Seminar *Fall 2017*

University of Virginia, Algebra Seminar, *Fall 2017*

San Francisco State University, Geometry & Topology Seminar, *Spring 2017*

University of South California, Geometry & Topology Seminar, *Spring 2017*

UIUC, Geometry, Groups & Dynamics/GEAR Seminar, *Spring 2017*

Claremont Topology Seminar, *Fall 2016*

University of Virginia, Geometry Seminar, *Fall 2016*

University of Illinois Chicago, Geometry, Topology, and Dynamics Seminar, *Winter 2015*

Wawrick University, Geometry & Topology Seminar, *Spring 2015*

SUNY Buffalo, Topology Seminar, *Spring 2015*

Univ. of Utah, Max Dehn Seminar on Geom., Top., Dyn., & Groups, *Winter 2014*

UIUC, Geometry, Groups & Dynamics/GEAR Seminar, *Winter 2014*

University of Oklahoma, Geometry and Topology Seminar, *Winter 2014*

Technion, Geometry and Topology Seminar, *Winter 2014*

École Normale Supérieure de Lyon, Séminaire de Géométrie et Dynamique, *Summer 2014*

Hebrew University, Algebra seminar, *Spring 2014*

Université de Rennes 1, Séminaire de théorie ergodique, *Spring 2014*

Institut de Mathématiques de Toulouse, Séminaire de Géométrie, *Spring 2014*

Yale University, Geometry and Topology Seminar, *Fall 2013*

University of Chicago, Geometry/Topology Seminar, *Fall 2013*

University of Illinois at Chicago, Geometry, Topology, and Dynamics Seminar, *Winter 2013*

University of Illinois Urbana-Champaign, Group Theory Seminar, *Winter 2013*

CUNY Graduate Center, Algebra Seminar, *Fall 2013*

Seoul National University, *Summer 2013*

Universite Paris-Sud 11, Higher Teichmüller-Thurston spaces, *Spring 2013*

Brown University, Geometry Topology Seminar, *Spring 2013*

University of Michigan, Topology Seminar, *Spring 2012*

Michigan State University, Low Dimensional Topology Seminar, *Spring 2012*

University at Albany, SUNY Geometry and Topology Seminar, *Spring 2012*

University of Illinois Urbana-Champaign, Group Theory Seminar, *Winter 2012*

Rutgers-Newark, Topology/Geometry Seminar, *Spring 2010*

CUNY Graduate Center, Geometry and Topology Seminar, *Spring 2010*

TEACHING HONORS/AWARDS	**eCampus Ontario Virtual Learning Strategy Grant ($144,812 CAD)**, *2021-2022.*
	Nominated for W.J. Barnes Teaching Award, Queen's University, *2019-2020.*
	Student Submitted Essay About as "Math Hero" for Association for Women in Mathematics Essay Contest, Queen's University, *2019.*

INSTRUCTIONAL OUTREACH	**Co-Host of Friends of Tracking Youtube Channel** (21k subscribers, educational soccer analytics youtube channel)	*2021-Present*
	VLS eCampus Ontario 2 semester course "Gentle Approach to Math, Excel, Stats: Useful Tools for Business, Economics, and the Social Sciences" (with 2 economics professors, my role included videos, embedded questions, practice problems for 10 modules)	*2021-2022*
	Four Directions Indigenous Student Centre Math Tutor	*2020-Present*
	Advanced Mathematics Bootcamp videos, self-quizzes, notes	*Summer 2020-Present*
	Illuminating Mathematics via Sweet potatoes and sports youtube series	*Summer 2020-Present*
	Faculty Advisor for Queen's Directed Reading Program in Math	*2019-Present*
	Mathquest Instructor (high school girl's math camp)	*Summer 2019*
	Smith College Lunch Talk	*Fall 2018*
	Bryn Mawr Distressing Math Collective Lecture	*Fall 2018*
	UCSB AWM Chapter Special Lecture	*Spring 2018*
	Academic Advisor for 2 College Students	*Fall 2011- Spring 2012*
	Founder & Committee Head - Rutgers Directed Reading Program	*2005-2008*
	Mentor in Rutgers Directed Reading Program in Mathematics	*2005-2008*
	University of Chicago Young Scholars Program Counselor	*Summer 2003*
	University of Chicago Young Scholars Program Assistant	*2001-2004*
	Bard College at Simon's Rock Mathclub Faculty Advisor	*Fall 2011- Spring 2012*

MINI-COURSES	**The parameter space of metric graphs: Culler-Vogtmann Outer Space**	Summer '25
	Topological and analytic methods in group theory Part II, *University of Hawai'i at Mānoa, Honolulu, HI*	

LEARNING SEMINARS ORGANIZED		
	Queen's Virtual Geometric Sports Analytics Seminar	*Spring '20- Fall '21*
	Interdisciplinary Topological Data Analysis Learning Seminar	*Fall '19 - Winter '20*

READING COURSES ORGANIZED		
	Advanced Topology Reading Course	Winter'23
	Graduate Algebraic Topology Reading Course	Fall '22-Winter'23

COURSES TAUGHT

Queen's University

Math 402 (Enumerative Combinatorics)	Fall'23
Advanced Topology Reading Course	Winter'23
Graduate Algebraic Topology Reading Course	Fall '22-Winter'23
Math 499 (Introduction to Topology Metric Spaces)	Fall '22
Math 126A (Diff. and Int. Calculus for Econ. & Soc. Sci.)	Fall '22,23
Math 126B (Diff. and Int. Calculus for Econ. & Soc. Sci.)	Winter '21,22,23
Math 341 (Differential Geometry)	Fall '20
Math 121B (Diff. and Int. Calculus)	Winter '20
Math 499 (Introduction to Topology)	Fall '19
Math 210 (Rings and Fields)	Winter '19,20,21,22
Math 387 (Adv. Persp. on Elementary Geometry)	Winter '19

University of California Santa Barbara

Math 3A (Calculus I)	Spring '17, Winter '18
Math 3B (Calculus II)	Fall '15, Fall '16, Spring '17
Math 34B (Calculus for Social & Life Sciences II)	Spring '17
Math 8 (Transition to Higher Mathematics)	Winter '16, Spring '17, Fall '17
Math 108A (Advanced Linear Algebra I)	Spring '18
Math 108B (Advanced Linear Algebra II)	Fall '17
Math 117 (Methods of Analysis)	Spring '16

Universität Bielefeld

Graph Theory I	Fall 2014
Graph Theory II	Spring 2015

Bard College at Simon's Rock

Elementary Functions (Precalculus)	Fall '11, Spring '12
Calculus	Spring '12
Geometric Group Theory	Fall '11

Rutgers University

Calculus I	Summer '08
Multivariable Calculus (Calculus III)	Summer '07
Differential Equations for Engineers	Summer '09

ORGANIZATIONAL SERVICE	**Co-Organizer** Surfaces, Tropical Geometry, and Physics Working Group	*Fall '25*
	Co-Organizer Join IAS/PU Groups and Dynamics Seminar	*Spring '25*
	Co-Organizer "JMM Session, Low-dimensional topology" (Conference)	*Jan '22*
	Scientific Committee "Young Geometric Group Theory X" (Conference)	*2020*
	Queen's Virtual Geometric Sports Analytics Seminar	*Spring '20- Fall '21*
	Co-Organizer "Random walks in math, physics, and society" (Covid Canceled Conference)	*Summer '20*
	Co-Organizer Queen's Interdisciplinary Topological Data Analysis Learning Seminar	*Fall '19 - Winter '20*
	Co-Organizer Queen's University Dynamics, Geometry, & Groups Seminar	*Fall '18 - Winter '19*
	Scientific Committee "Groups explored through geometry & dynamics" (Conference)	*Fall 2017*
	Co-Organizer "Groups explored through geometry & dynamics" (Conference)	*Fall 2017*
	Co-Organizer University of California Santa Barbara Topology Seminar	*Fall '16 - Spring '18*
	Co-Organizer Universität Bielefeld Oberseminar Gruppen & Geometrie	*Fall '14 - Spring '15*
	Organizer & Co-PI "Special Program on Geometry of Outer Space"	*Summer 2013*
	Organizer Graduate Student Geometric Group Theory Seminar	*Fall '08 - Spring '09*
	Organizer Graduate Student Mapping Class Group & Teichmüller Theory Seminar	*Spring 2008*
	Committee Head Rutgers Directed Reading Program Committee	*2005 - 2008*
	A Primary Organizer Asha for Education International Conference	*Spring 2007*
	University of Chicago Math Club President	*2002 - 2003*

DEPARTMENTAL SERVICE		
	Departmental Curriculum Committee	*2023-2024*
	Departmental EDI Committee Representative	*2022-2023*
	2022 Lorne Cambpell Lecture Co-Chair	*2021-2023*
	Colloquium Co-Chair	*2021-2023*
	Departmental Graduate Committee	*2020-2022*
	Departmental Postdoctoral Committee	*2018-2020*
	Departmental Ontario Graduate Scholarship Committee	*2019*

THESIS COMMITTEES		
	Paige Hillen, UCSB Math PhD	*Summer 2025.*
	Sana Arastehfar, Computing Masters	*Fall 2023.*
	Andrew Buchanan, Physics Masters	*Fall 2023.*
	Brennan Cruse, Computing Masters	*Spring 2022.*
	Troy Zeier, Mathematics Masters	*Fall 2022.*
	Colin Lewis, Physics, Engineering Physics and Astronomy PhD	*Fall 2019.*

ELECTIVE TRAINING COMPLETION		
	Leadership Coaching	*2020-2023*
	Occupational Health & Safety for Supervisors Training	*Summer 2019*
	Mental Health First Aid Training	*Summer 2019*
	Identifying and Responding to Students in Distress Training	*Summer 2019*
	Employment Equity Representative Training	*Fall 2018*