

# Thomas Brazelton

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EMPLOYMENT	<b>Harvard University</b> NSF Postdoctoral Research Fellow	Cambridge, MA 2023—2026
EDUCATION	<b>The University of Pennsylvania</b> Ph.D, Mathematics NSF Graduate Research Fellow	Philadelphia, PA 2018—2023
	<b>The Johns Hopkins University</b> B.A. + M.A., Mathematics	Baltimore, MD 2014—2018
PREPRINTS	<ol style="list-style-type: none"><li>12. <math>\mathbb{A}^1</math>-Brouwer degrees in Macaulay2, with N. Borisov, F. Espino, T. Hagedorn, Z. Han, J. Lopez Garcia, J. Louwsma, G. Ong, and A. Tawfeek. 13 pages, 2024. To appear in <i>J. Software Alg. Geom.</i>.</li><li>11. Equivariant enumerative geometry, 38 pages, 2022. Submitted, available at arXiv:2210:08622.</li><li>10. An enriched degree of the Wronski map, 24 pages, 2022. Submitted, available at arXiv:2206:01143.</li></ol>	
PUBLICATIONS	<ol style="list-style-type: none"><li>9. Residue sums of Dickson polynomials over finite fields, with J. Harrington, M. Litman, T. H. W. Wong. <i>J. Number Theory</i> <b>264</b> (2024) pp. 1—26.</li><li>8. Lifts, transfers, and degrees of univariate maps, with S. McKean. <i>Mathematica Scandinavica</i> <b>129</b> (2023) pp. 5—38.</li><li>7. Bézoutians and the <math>\mathbb{A}^1</math>-degree, with S. McKean and S. Pauli <i>Algebra &amp; Number Theory</i> <b>17(11)</b>, 2023.</li><li>6. Homotopy Mackey functors of equivariant algebraic <math>K</math>-theory. <i>Journal of Pure and Applied Algebra</i>, <b>226(8)</b>, August 2022.</li><li>5. An introduction to <math>\mathbb{A}^1</math>-enumerative geometry. In Neumann F., Pál A. (eds) <i>Homotopy Theory and Arithmetic Geometry — Motivic and Diophantine Aspects</i>. Lecture notes in Mathematics, vol <b>2292</b>. Springer, Cham. 2021.</li><li>4. A note on semilinearization and twisted group rings. <i>Communications in Algebra</i>, <b>49:8</b>, 3380—3386, 2021.</li><li>3. The trace of the local <math>\mathbb{A}^1</math>-degree, with R. Burklund, M. McKean, M. Montoro, M. Opie. <i>Homology, Homotopy and Applications</i> <b>23(1)</b> (2021) pp. 1—14.</li><li>2. Zeros of newform Eisenstein series on <math>\Gamma_0(N)</math>, with V. Jakicic, <i>J. Number Theory</i> <b>190</b> (2018) pp. 109—130.</li><li>1. On consecutive primitive <math>n</math>th roots of unity modulo <math>q</math>, with J. Harrington, S. Kannan, and M. Litman, <i>J. Number Theory</i> <b>174</b> (2017) pp. 494—504.</li></ol>	
SOFTWARE	<b>A1BrouwerDegrees</b> , a Macaulay2 package for $\mathbb{A}^1$ -Brouwer degree computation and working with symmetric bilinear forms, with N. Borisov, F. Espino, T. Hagedorn, Z. Han, J. Lopez Garcia, J. Louwsma, G. Ong, and A. Tawfeek.	
PROFESSIONAL SERVICE	<i>Co-Organizer</i> , Mid-Atlantic Topology Conference 2024, Northeastern University <i>Co-Organizer</i> , AMS Special Session on Homotopy Theory, JMM 2024 <i>Project leader</i> , Macaulay2 Workshop 2023	
RESEARCH TALKS	Enumerative Geometry Beyond Spaces, Banff Workshop on Applied and Computational Enumerative Geometry, Fields Institute Université du Québec à Montréal, LACIM Seminar Algebra Seminar, University of Pennsylvania Geometry/Topology Seminar, University of Pennsylvania CIMAT Topology Seminar University of Minnesota Topology Seminar University of Chicago Algebraic Topology Seminar	Aug 2024 Jun 2024 Apr 2024 Apr 2024 Apr 2024 Feb 2024 Feb 2024 Feb 2024

University of Chicago No Boundaries Seminar	Feb 2024
Northeastern Topology Seminar	Jan 2024
UC-Irvine Topology Seminar	Jan 2024
UCLA Topology Seminar	Jan 2024
AMS Special Session on Equivariant Algebra	Jan 2024
eCHT Research Seminar	Nov 2023
Texas A&M Geometry Seminar	Nov 2023
MIT Topology Seminar	Oct 2023
Notre Dame Algebraic Geometrty & Commutative Algebra Seminar	May 2023
University of Maryland Algebra & Number Theory Seminar	Mar 2023
Tulane University Algebraic Geometry & Geometric Topology Seminar	Feb 2023
Emory University Algebra Number Theory Seminar	Feb 2023
University of Waterloo Geometry/Topology Seminar	Feb 2023
University of Virginia Topology Seminar	Feb 2023
Brown University Algebraic Geometry Seminar	Feb 2023
JMM Special Session on Applied Enumerative Geometry	Jan 2023
UCLA Topology Seminar	Nov 2022
Rochester University Topology Seminar	Nov 2022
Binghamton University Graduate Conference (BUGCAT)	Nov 2022
Binghamton University Topology Seminar	Nov 2022
AMS Special Session on $K$ -theory and Chromatic Homotopy Theory, U-Utah	Oct 2022
Johns Hopkins University Topology Seminar	Oct 2022
Loyola University Chicago Topology, Algebra, Combinatorics & Operators Seminar	Oct 2022
UChicago Topology Seminar	Oct 2022
Young Topologists Meeting 2022, Copenhagen	Jul 2022
Homotopy Theory with Applications to Arithmetic and Geometry, Fields Institute	Jun 2022
GROOT (Graduates Reminisce Online On Topology)	Jun 2022
Algebraic Structures in Topology, San Juan	Jun 2022
Algebra Seminar, Texas A&M University	Mar 2022
FRG Grant on Trace Methods	Jan 2022
SECANT 2021, Cedar Crest College	Jan 2022
Topology/Geometry Seminar, University of Oregon	Nov 2021
Geometry/Topology Seminar, University of Pennsylvania	Nov 2021
Algebra Seminar, University of Pennsylvania	Nov 2021
Young Topologists Meeting 2020/2021	Jul 2021
Algebra Seminar, University of Pennsylvania	Apr 2020
Binghamton University Graduate Conference (BUGCAT)	Nov 2020
Geometry/Topology Seminar, University of Pennsylvania	Oct 2020
AMS Fall Sectional, UW-Madison	Sep 2019
PIMS Workshop on Arithmetic Topology	Jun 2019
Rényi Institute Number Theory Seminar, Budapest	Sep 2016

#### AWARDS AND FELLOWSHIPS

<b>NSF Postdoctoral Research Fellowship</b>	2023—2026
<b>AMS Travel Grant</b>	2022
<b>Graduate Fellow for Teaching Excellence,</b> Penn Center for Teaching and Learning	2022—2023
<b>Moez Alimohamed Graduate Student Award for Distinguished Teaching in</b> <b>Mathematics,</b> University of Pennsylvania	2021
<b>Graduate Fellow for Equitable and Inclusive Teaching,</b> Penn Center for Teaching and Learning	2021—2022
<b>Master TA,</b> University of Pennsylvania Mathematics Department	2021—2023
<b>Dean's Scholar,</b> University of Pennsylvania Honored as one of nine doctoral students across the School of Arts & Sciences.	2020—2021
<b>Good Teaching Award,</b> University of Pennsylvania Mathematics Department	Fall 2020

	<b>NSF Graduate Research Fellow</b>	2019 — 2024
	<b>Calabi Fellow</b> , University of Pennsylvania Mathematics Department	2017 — 2020
	<b>J.J. Sylvester Award for Excellence in Mathematics</b> (Johns Hopkins)	May 2018
	<b>NSF GRFP</b> , Honorable Mention	2018
	<b>William Lowell Putnam Award</b> (Johns Hopkins)	May 2016
TEACHING	<b>Harvard University</b>	
	MATH266, Unstable motivic homotopy theory	Fall 2024
	<b>Electronic Computational Homotopy Theory Seminar (eCHT)</b>	
	<i>Co-organizer</i> , Quadratically enriched curve counting	Fall 2024
	Designed and co-organized with Sabrina Pauli.	
	<i>Co-organizer</i> , Algebraic, motivic, and topological vector bundles	Fall 2023
	Designed and co-organized with Morgan Opie.	
	<b>University of Pennsylvania</b>	
	<i>Instructor of record</i> , MATH8100 Enumerative Geometry	Spring 2023
	Designed and taught an inquiry-based learning course on enumerative geometry for graduate students and advanced undergrads.	
	<b>Penn Directed Reading Program</b>	Fall 2019 — Spring 2023
	Co-founded and co-organized the DRP at Penn with Mona Merling (Fall 2019), co-organized with George Wang (Spring 2020 — Spring 2021), and with Marielle Ong (Fall 2021 — Present). Mentor for the following projects:	
	$\mathbb{A}^1$ -Milnor numbers, Zhong Zhang	Spring 2023
	Algebraic geometry from an $\mathbb{A}^1$ -viewpoint, Zhong Zhang	Fall 2022
	Enumerative geometry and string theory II, Zhong Zhang	Spring 2022
	Enumerative geometry and string theory, Zhong Zhang	Fall 2021
	Category theory and homotopy theory, Abigail Timmel	Spring 2020
	Group theory and applications, Stephanie Wu	Fall 2019
	Persistent homology, Mira Wattal (JHU)	Spring 2018
	<b>Princeton Prison Teaching Initiative</b>	Spring 2021 — Spring 2022
	Volunteer math instructor for South Woods State Prison in New Jersey.	
	<i>Instructor/Team Leader for MATH015</i>	Spring 2022
	<i>Instructor for MATH020</i>	Fall 2021
	<i>Grader for MATH015</i>	Spring 2021
	<b>Penn Summer Prep</b>	Philadelphia, PA
	<i>Instructor</i> , Introduction to Voting Theory	Summer 2021
	Designed and taught a two-week course on voting theory for advanced high school students.	
	<b>University of Pennsylvania</b>	Philadelphia, PA
	<i>Teaching Assistant</i> , MATH 370 Algebra I	Spring 2021
	<i>Teaching Assistant</i> , MATH 114 Calculus II	Fall 2020
	<b>The Johns Hopkins University</b>	Baltimore, MD
	<i>Teaching Assistant</i> , AS.110.421 Dynamical Systems	Spring 2018
	<i>Teaching Assistant</i> , AS.110.202 Calculus III	Fall 2017
FACILITATION	<b>Center for Teaching and Learning, University of Pennsylvania</b>	
	<i>Designing Problems for STEM Classes</i>	Fall 2022
	Designed a university-wide workshop on scaffolding and backwards design in problem sets in STEM.	

	<i>Inclusive and Equitable Teaching in STEM</i>	Spring 2022
	Designed and facilitated a five-session mini-course on inclusive and equitable teaching in STEM disciplines for graduate students.	
	<i>Inclusive and Equitable Teaching</i>	Fall 2021
	Co-facilitated a five-session mini-course on inclusive and equitable teaching for graduate students.	
EXPOSITORY TALKS	Texas A&M Undergrad Math Society <i>Gimbal lock and covering spaces</i>	Nov 2022
	Penn Undergrad Math Society <i>A hands-on introduction to homotopy</i>	Nov 2022
	Penn Geometry/Topology Grad Seminar <i>Local homotopy theory and Galois descent</i>	Sep 2022
	<i>The algebraic vector bundle problem</i>	Feb 2022
	<i>Euler characteristics of real algebraic manifolds</i>	Oct 2021
	MIT Talbot Workshop, 2021 <i>Ambidexterity</i>	Oct 2021
	Penn General Robotics, Automation, Sensing & Perception Laboratory <i>A brief introduction to topology</i>	Oct 2019
	Moravian College REU Seminar <i>A hands-on introduction to homotopy</i>	Jun 2019
	University of Pennsylvania Graduate Pizza Seminar <i>How to prevent nuclear war and then decide what to watch on Netflix</i>	Feb 2023
	<i>Elliptic curves and the NSA</i>	Jan 2020
	<i>Gimbal lock</i>	Dec 2020
	<i>Social choice and topology</i>	Mar 2019
	<i>The generalized Poincaré conjecture</i>	Oct 2018
	Johns Hopkins Undergraduate Mathematics Seminar <i>A Crash Course in Homotopy Theory</i>	Apr 2018
SELECTED CONFERENCES AND WORKSHOPS (* INDICATES ONLINE)	Enumerative Geometry Beyond Spaces, Banff	Aug 2023
	PCMI Research Program in Motivic Homotopy Theory	Jul 2023
	International Workshop on Algebraic Topology, Shanghai	Jun 2024
	Algebraic Structures in Topology II, San Juan	Jun 2024
	Workshop on Computational and Applied Enumerative Geometry, Fields Institute	Jun 2024
	Motives in Mainz	Mar 2024
	Joint Mathematics Meetings 2024, San Francisco	Jan 2024
	European Autumn School in Topology 2023	Sep 2023
	Stacks Project Workshop 2023, Ann Arbor	Aug 2023
	Recent Advances in Algebraic $K$ -Theory, IHES	Jul 2023
	Motivic and non-commutative aspects of enumerative geometry, Nijmegen	Jul 2023
	Scissors $K$ -theory and Trace Methods, Indiana University	Jun 2023
	Macaulay2 Workshop, University of Minnesota	May 2023
	Mid-Atlantic Topology Conference, Philadelphia	Apr 2023
	Joint Mathematics Meeting, Boston	Jan 2023
	Banff Workshop on Toric Degenerations	Dec 2022
	Binghamton University Graduate Conference in Algebra & Topology	Nov 2022
	AMS Sectional, Salt Lake City	Oct 2022
	Young Topologists Meeting, Copenhagen	Jul 2022
	Homotopical Methods in Fixed Point Theory, CU-Boulder	Jul 2022
	Homotopy Theory with Applications to Arithmetic and Geometry, Fields Institute	Jun 2022
	Algebraic $K$ -theory, motivic cohomology and motivic homotopy theory, INI	Jun 2022
	Algebraic Structures in Topology, San Juan	Jun 2022
	Graduate Student Conference in Algebra, Geometry, & Topology, Temple University	May 2022
	MIT Talbot Workshop: Ambidexterity in Chromatic Homotopy Theory, Plymouth MA	Oct 2021
	Mathematics Teacher-Scholar Symposium, Reed College*	May 2021

Institute for Mathematics and Democracy 2021*	May 2021
Graduate Student Conference in Geometry and Topology*	Apr 2021
Midwest Topology Conference*	Apr 2021
Binghamton University Graduate Conference in Algebra and Topology*	Nov 2020
ICERM: Monodromy and Galois groups in enumerative geometry*	Aug–Sep 2020
Regensburg Transatlantic Transchromatic Homotopy Theory Conference II*	Aug 2020
IHES Motivic, Equivariant and Non-commutative Homotopy Theory*	July 2020
Motives and What Not, Universität Regensburg*	May 2020
Midwest Topology Seminar*	May 2020
MAGUS*	May 2020
Motives & Stacks, Universität Duisburg-Essen	Sep 2019
European Autumn School in Topology 2019, Utrecht	Sep 2019
AMS Fall Sectional, UW-Madison	Sep 2019
PIMS Workshop on Arithmetic Topology, UBC	Jun 2019
Graduate Student Conference in Algebra, Geometry, & Topology, Temple University	Jun 2019
Arizona Winter School 2019: Topology and Arithmetic	Mar 2019
Homotopy Theory Summer Berlin 2018	Jun 2018
Joint Mathematics Meeting, Atlanta	Jan 2017

SERVICE	<b>Penn Homotopy Theory Seminar</b>	Spring 2021 — Spring 2023
	Co-founder/co-organizer of the Penn homotopy theory seminar with Andres Mejia.	
	<b>Penn Graduate Student Seminar</b>	Fall 2019 — Spring 2020
	Co-organizer of the graduate student seminar in the mathematics department with Marielle Ong.	
	<b>The Franklin Institute Science Museum</b>	2018 — 2022
EXPERIENCE	Volunteer science presenter with Team Boson, responsible for running tables at exhibits and discussing science with the public.	
	<b>Johns Hopkins Math Club</b>	2015 — 2018
	President (2017-2018), Vice President (2016-2017), organizer of speakers and events, test writer / grader / organizer for the Johns Hopkins Math Tournament, held yearly for high school students in the greater DC area. Founder of the Johns Hopkins Undergraduate Math Seminar.	
	<b>Noblis, Inc</b>	Reston, VA
	PhD intern in post-quantum cryptography.	Summer 2018
	<b>Texas A&amp;M REU</b>	College Station, TX
	Analytic number theory, supervised by Dr. Matthew Young.	Summer 2017
	<b>Muhlenberg College REU</b>	Allentown, PA
	Number theory, supervised by Dr. Joshua Harrington.	Summer 2016