

Maxine Elena Calle

Pronouns: she/her or they/them

Email: callem@sas.upenn.edu

Web: web.sas.upenn.edu/callem

EDUCATION

University of Pennsylvania

Ph.D. Candidate in Mathematics

NSF Graduate Research Fellow

– Thesis advisor: Mona Merling

Philadelphia, PA

2020–current

M.A. in Mathematics

2022

– Thesis advisor: Jonathan Block

– Thesis title: “An Introduction to Symplectic Geometry for Lagrangian Floer Homology”

Reed College

B.A. in Mathematics, concentration in Philosophy

Phi Beta Kappa

– Thesis advisor: Kyle Ormsby

– Thesis title: “Morse Theory and Flow Categories”

Portland, OR

2016–2020

RESEARCH INTERESTS

Algebraic topology, category theory, and homotopy theory. Especially higher algebraic K -theory, equivariant stable homotopy theory, and applications to manifolds.

PAPERS AND PUBLICATIONS

Research publications and preprints

- *A combinatorial K -theory perspective on the edge reconstruction conjecture in graph theory.* Joint with J. J. Gould. 2023. 15 pages.
- *Equivariant algebraic K -theory for symmetric monoidal Mackey functors.* Joint with D. Chan and M. Péroux. 2023. 20 pages. Available at arXiv:2312.04705. *Submitted.*
- *A linearization map for genuine equivariant algebraic K -theory.* Joint with D. Chan and A. Mejia. 2023. 33 pages. Available at arXiv:2309.08025. *Submitted.*
- *Equivariant Trees and Partition Complexes.* Joint with J.E. Bergner, P. Bonventre, D. Chan, and M. Sarazola. 2023. 31 pages. Available at arXiv:2302.08949. *Submitted.*
- *The Spectrum of the Burnside Tambara Functor of a Cyclic Group.* Joint with S. Ginnett. 2023. *Journal of Pure and Applied Algebra*: Vol. 227, Iss. 8, 107344. 23 pages.
- *The Tambara Structure of the Trace Ideal on Cyclic Groups.* Joint with S. Ginnett, with an appendix by H. Chen and X. Chen. 2020. *Journal of Algebra*: Vol. 560, pp.114–143.
- *Sharp Sectional Curvature Bounds and a New Proof of the Spectral Theorem.* Joint with C. Dunn. 2020. *Involve, a Journal of Mathematics*: Vol. 13, No. 3, pp.445–454.
- *k -Plane Constant Curvature Conditions.* 2019. *Rose-Hulman Undergraduate Mathematics Journal*: Vol. 20, Iss. 2, Article 6. 20 pages.

Other publications

- *Bringing Math into The Conversation: My Summer as a Mass Media Fellow*. In *Notices of the American Mathematical Society*, February 2024, pp.274–275.
- *A brief illustrated guide to ‘scissors congruence’ – an ancient geometric idea that’s still fueling cutting-edge mathematical research*. Co-authored with M. Merling. 2023. *The Conversation U.S.*
- *Proving Fermat’s last theorem: 2 mathematicians explain how building bridges within the discipline helped solve a centuries-old mystery*. Co-authored with D. Bressoud. 2023. *The Conversation U.S.*

FELLOWSHIPS AND AWARDS

Academic and research

- Herbert S. Wilf Memorial Award for excellence in research and communication
University of Pennsylvania, Mathematics Department 2023-2024
- Dean’s Scholar
University of Pennsylvania, School of Arts & Sciences 2023
- Graduate Research Fellowship
National Science Foundation 2020–2025
- Calabi Scholar
University of Pennsylvania, Mathematics Department 2020–2025
- Benjamin Franklin & Fontaine Fellowship
University of Pennsylvania 2020–2025
- Phi Beta Kappa
Reed College 2020
- Commendation for Academic Achievement
Reed College 2016-2020

Teaching

- Master TA
University of Pennsylvania, Mathematics Department 2023-current
- Inclusive & Equitable Teaching Fellow
Center for Teaching and Learning at the University of Pennsylvania 2023-2024
- Good Teaching Award, Math 3700
University of Pennsylvania, Mathematics Department Fall 2022

Service, communication, and outreach

- Postdoctoral/Advanced Graduate Ambassadorship
Lisa Simonyi and the Women and Mathematics Program at the Institute for Advanced Study 2023-2024
- Mass Media Fellow
American Association for the Advancement of Science
Sponsored by the American Mathematical Society and hosted by The Conversation U.S. 2023
- Penn Graduate Community-Engagement Research Fellow
The Netter Center at the University of Pennsylvania Summers 2021 and 2022
- Elevating Mathematics competition, honorable mention (joint with L. Williams)
National Academies of Sciences, Engineering, and Medicine 2020
- MAA MathFest Outstanding Presentation Award
Joint Mathematics Meetings 2019

TEACHING EXPERIENCE

The University of Pennsylvania	Philadelphia, PA
Teaching Assistant <i>Math 2600: Honors Calculus II</i> <i>Math 3700: Algebra</i>	Spring 2023 Fall 2022
Facilitator <i>Inclusive & Equitable Teaching in Mathematics Mini-Course</i> <i>Mathematics Department TA Training</i> <i>School of Arts & Sciences Graduate TA Training: Inclusive & Equitable Teaching at Penn</i>	Fall 2023 Fall 2023 Fall 2023
Prison Teaching Initiative at Princeton University	
Instructor at South Woods State Prison <i>Math-015: Beginning Mathematics</i>	Bridgeton, NJ Spring 2022
Instructor at Garden State Youth Correctional Facility <i>Math-015: Beginning Mathematics</i>	Crosswicks, NJ Fall 2021
Mathematics Tutor at South Woods State Prison <i>Math-010: Number Systems, Math-015: Beginning Mathematics,</i> <i>Math-020: Elementary Algebra</i>	Bridgeton, NJ Spring 2023–current
Reed College	Portland, OR
Individual Tutor <i>Math 111: Calculus, Math 112: Introduction to Analysis, Math 113: Discrete Structures,</i> <i>Math 201: Linear Algebra, Math 202: Vector Calculus, Math 311: Complex Analysis,</i> <i>Math 321: Real Analysis, and Math 332: Abstract Algebra</i>	Spring 2017–Spring 2020
Course Assistant <i>Math 202: Vector Calculus</i>	Fall 2018–Spring 2020
Mathematics Grader <i>Math 202: Vector Calculus</i>	Fall 2018
Drop-in Tutor at the Math Help Center	Spring 2019–Spring 2020

OTHER EXPERIENCE AND SERVICE

Seminar and conference organization	
• MIT Talbot Workshop Talbot 2023: Computations in stable motivic homotopy theory, <i>co-organizer with A. Holeman, L. Keenan, E. Sukarto, and L. Yang</i> Talbot 2024: Topological cyclic homology of ring spectra, <i>co-organizer with A. Holeman, A. Karapetyan, L. Keenan, and E. Sukarto</i>	2023–current
• GeMTRAK at the University of Pennsylvania, <i>co-organizer with M. Ong and H. Stufflebeam</i>	2024
• Graduate Geometry/Topology Seminar at the University of Pennsylvania, <i>co-organizer with A. Mejia</i>	2022–2023
• Graduate Pizza Seminar at the University of Pennsylvania, <i>co-organizer with K. Canzius</i>	2021–2022
• UP GRADe workshop at the University of Pennsylvania, <i>co-organizer with</i> <i>A. Gibney, J. Hartmann, M. Merling, M. Ong, and E. Urheim</i>	October 2021

Community building and mentorship

- **Directed Reading Program** at the University of Pennsylvania, *co-organizer with L. Ferreira Guilhoto and mentor for the following projects:* Fall 2023–current
 - Talia Becker Calazans, *Combinatorial topology* Fall 2023
 - Elena Isasi Theus, *Algebraic topology and the mathematical basis of topological data analysis* Spring 2023
 - *Fundamentals of computational applied topology* Fall 2022
 - Cianán Conefrey-Shinozaki, *2D topological quantum field theories* Spring 2022
 - Michael Zeng, *Simplicial homotopy theory* Fall 2021
- **Prison Education Program** at Eastern University, *volunteer* 2024–current
- **Prison Teaching Initiative** at Princeton University, *volunteer* 2021–current
- **GeMs in Math** group at the University of Pennsylvania, *co-coordinator* 2021–current
- **STEMGeMs** at Reed College, *co-leader and department liaison* 2019–2020
- **Peer Mentor Program** at Reed College, *mentor* 2017–2018

Science communication and outreach

- **The Conversation U.S.** Summer 2023–current
Freelancer and AMS-AAAS 2023 Mass Media Fellow
- **Math Circles in West Philadelphia** project at the University of Pennsylvania Summer 2022
Graduate fellow, joint project with M. Ong, mentored by M. Merling and Y. Ou Philadelphia, PA
- **Mathematics Enrichment and Academically-Based Community Service** project at the University of Pennsylvania Summer 2021
Graduate fellow mentored by M. Merling Philadelphia, PA

SELECTED WORKSHOPS

- **SQuaREs Program** at American Institute of Mathematics January 2025
Team member for “An algebraic approach to Thom spectra” Pasadena, CA
- **AIM Workshop** at American Institute of Mathematics July 2024
Participant in “Scissors congruences, algebraic K-theory and Steinberg modules” Caltech, CA
- **SQuaREs Program** at American Institute of Mathematics February 2024
Team member for “Two-dimensional nested cobordisms and TQFTs with substructure” Pasadena, CA
- **BIRS Workshop** at the Banff International Research Station January 2024
Participant in “Higher Segal Spaces and their Applications” Banff (Canada)
- **BIRS Workshop** at the Banff International Research Station November 2023
Participant in “Spaces of Manifolds: Algebraic and Geometric Approaches” Banff (Canada)
- **Women in Topology IV** at the Hausdorff Institute August 2023
Participant in research project on cobordism categories Bonn (Germany)
- **RTG Collaborative Workshop in Homotopy Theory** August 2022
Participant in research project on equivariant homotopy theory Lexington, VA
- **Séminaire de Mathématiques Supérieures** at the University of British Columbia July 2022
MSRI-participant in graduate summer school on Floer homotopy theory Vancouver, BC (Canada)
- **MIT Talbot Workshop** June 2022
In-person participant in workshop on scissors congruence and algebraic K-theory New Lebanon, NY
- **Illustrating Mathematics** workshop at the Park City Math Institute Summer 2021
Participant in graduate summer school workshop “Blender for Mathematicians” Online

- **Collaborative Mathematics Research Group** at Reed College
Participant in undergraduate research program on algebraic topology Summer 2019
Portland, OR
- **Women and Mathematics** workshop at the Institute for Advanced Study
Undergraduate participant in workshop on geometric analysis May 2019
Princeton, NJ
- **NSF REU** program at California State University, San Bernardino
Participant in undergraduate research program on differential geometry Summer 2018
San Bernardino, CA

SELECTED TALKS AND PRESENTATIONS

Conference Talks

- Joint Mathematics Meetings, Special Session: Equivariant techniques in stable homotopy theory
A linearization map for equivariant A -theory January 2024
San Francisco, CA
- Joint Mathematics Meetings, Special Session: Topics in equivariant algebra
Ideals in the Burnside Tambara functor on a cyclic group January 2024
San Francisco, CA
- Binghamton University Graduate Combinatorics, Algebra, and Topology Conference (BUGCAT)
Equivariant Partition Complexes and Trees November 2022
Binghamton, NY
- Nebraska Conference for Undergraduate Women in Mathematics
The Tambara Structure of the Trace Ideal January 2020
Lincoln, NE
- Undergraduate Mathematics Symposium
Putting the 'k' in Curvature: k -Plane Constant Curvature Conditions November 2018
Chicago, IL
- Northwest Undergraduate Mathematics Symposium
Putting the 'k' in Curvature: k -Plane Constant Curvature Conditions November 2018
Salem, OR

Invited Seminar Talks

- University of Minnesota Topology Seminar
All connective G -spectra come from K -theory January 2024
Minnesota, MN
- Loyola University TACO Seminar
Equivariant Partition Complexes and Trees November 2023
Chicago, IL
- Michigan State University RTG Seminar
Nested Cobordisms and TQFTs November 2023
East Lansing, MI
- SUNY Binghamton Geometry and Topology Seminar
Nested Cobordisms and TQFTs September 2023
Binghamton, NY
- UCLA Algebraic Topology Seminar
Equivariant Partition Complexes and Trees May 2023
Los Angeles, CA
- UCSD Topology Seminar
Equivariant Partition Complexes and Trees May 2023
San Diego, CA
- Purdue University Topology Seminar
Equivariant Partition Complexes and Trees April 2023
Lafayette, IN
- University of Rochester Topology Seminar
Equivariant Partition Complexes and Trees April 2023
Rochester, NY
- University of Virginia Topology Seminar
Equivariant Partition Complexes and Trees February 2023
Charlottesville, VA

Expository Talks

Spaces of Manifolds: Algebraic and Geometric Approaches BIRS seminar <i>The stable parametrized h-cobordism theorem: the K-theory part</i>	online October 2023
Scissors Congruence, Algebraic K -Theory, and Trace Methods summer school <i>Cut-and-paste K-theory of manifolds and square K-theory</i>	Bloomington, IN June 2023
Purdue University Graduate Topology Seminar <i>A Tour of Equivariant Cohomology</i>	April 2023 Lafayette, IN
MIT Talbot 2022: Scissors congruence and algebraic K -theory <i>Square K-theory and Manifold Invariants</i>	New Lebanon, NY June 2022
Penn Graduate Pizza Seminar <i>Configuration spaces are cool</i> <i>A bit about 2D-TQFTs</i> (short talk) <i>Ideas of Morse Theory and Floer Theory</i>	Philadelphia, PA October 2023 February 2023 September 2022
Penn Graduate Geometry/Topology Seminar <i>Operads, Trees, and Loops</i> <i>An Introduction to Finite Type Knot Invariants</i> <i>Cut-and-Paste Manifolds</i> <i>A Taste of Symplectic Geometry</i> <i>Morse Theory and Flow Categories</i>	Philadelphia, PA October 2023 February 2023 October 2022 April 2022 September 2021

Talks for Undergraduates

Penn Undergraduate Mathematics Society (PUMS) speaker series <i>Configurations in the plane</i> (short talk) <i>Scissors Congruence: how to cut up shapes and get away with it</i>	Philadelphia, PA November 2023 December 2022
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