

# Mona Merling

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## BASIC INFORMATION

University of Pennsylvania  
Department of Mathematics  
209 South 33rd Street  
Philadelphia, PA 19104-6395

*Email:* mmerling@upenn.edu  
*Webpage:* math.upenn.edu/~mmerling  
*Citizenship:* Romania & USA

## RESEARCH INTERESTS

Algebraic topology. In particular, algebraic K-theory, equivariant stable homotopy theory, and their applications to manifolds.

## ACADEMIC APPOINTMENTS

**University of Pennsylvania**, Philadelphia, PA

Assistant Professor, July 2018 -

**Johns Hopkins University**, Baltimore, MD

J.J. Sylvester Assistant Professor, July 2014 - June 2018  
Postdoctoral mentor: Jack Morava

## EDUCATION

**University of Chicago**, Chicago, IL

Ph.D. in Mathematics, June 2014  
Advisor: Peter May

M.S. in Mathematics, June 2010

**Bard College**, Annandale, NY

B.A. in Mathematics, May 2009

## INVITED ACADEMIC VISITS

**Mathematics Sciences Research Institute**, Berkeley

Floer Homotopy Theory Program, Research Member, September-December 2022

**Mathematics Sciences Research Institute**, Berkeley

Summer Stay, July 2020 (canceled due to COVID)

**Isaac Newton Institute**, Cambridge, UK

K-theory, Algebraic Cycles and Motivic Homotopy Theory Program Guest, (remote June 2022, postponed from 2020 due to COVID)

**Max Planck Institute for Mathematics**, Bonn, Germany

Research Guest, July-November 2018

**Isaac Newton Institute**, Cambridge, UK

Homotopy Harnessing Higher Structures Program Guest, July 2018 (2 weeks)

**Hausdorff Institute for Mathematics**, Bonn, Germany

Junior Trimester Program Guest, September-October 2016

**University of Copenhagen**, Denmark

Invited Visitor, August 2013 (2 weeks)

RESEARCH GRANTS	PI, NSF FRG grant DMS-2052988 “Collaborative Research: Trace Methods and Applications for Cut-and-Paste $K$ -Theory” (collaborative grant with Blumberg, Bohmann, Gerhardt, Hill, Mandell, Malkiewich, Ponto, Zakharevich)	2021-24
	PI, NSF CAREER grant DMS-1943925 “Applications of equivariant homotopy theory to manifolds”	2020-25
	PI, NSF grant DMS-1709461/1850644 “Groups, manifolds, and stable homotopy theory”	2017-20
	AMS-Simons Travel Grant	2015-17
CONFERENCE GRANTS	PI, NSF grant DMS-2017119 “Mid-Atlantic Topology Conference” (with co-PIs Block and Knudsen) School of Arts and Sciences Conference Grant, University of Pennsylvania	2020
	University Research Fund Conference Grant, University of Pennsylvania	2020
	co-PI, NSF grant DMS-1619569 “Mid-Atlantic Topology Symposium: New Directions” (with PI Morava and co-PI Riehl)	2016
EDUCATION GRANTS	Klein Family Social Justice Grant, University of Pennsylvania, <i>Grant for supporting a mathematics prison teaching program in collaboration with the Prison Teaching Initiative at Princeton</i>	2021
	NV Grant, Center for Educational Resources, Johns Hopkins University, <i>Grant for designing and implementing a narrative visual component for two mathematics classes in the form of video final presentations</i>	2016
TEACHING AWARDS	Departmental Good Teaching Award, University of Pennsylvania, math 520	2022
	Departmental Good Teaching Award, University of Pennsylvania, math 500	2021
	Departmental Good Teaching Award, University of Pennsylvania, math 123	2021
	Departmental Good Teaching Award, University of Pennsylvania, math 619	2021
	Departmental Good Teaching Award, University of Pennsylvania, math 123	2020
	Departmental Good Teaching Award, University of Pennsylvania, math 730	2020
	Departmental Good Teaching Award, University of Pennsylvania, math 410	2019
	Departmental Good Teaching Award, University of Pennsylvania, math 619	2019
	Lawrence and Josephine Graves Prize for Excellence in Undergraduate Teaching, University of Chicago	2013
VOLUMES EDITED	New directions in homotopy theory, (co-edited with N. Kitchloo, J. Morava, E. Riehl, W. S. Wilson), <i>Contemporary Mathematics</i> , Volume 707, (2018).	
PUBLICATIONS & PREPRINTS	On the functoriality of the space of equivariant smooth $h$ -cobordisms (with T. Goodwillie, K. Igusa and C. Malkiewich), <a href="https://arxiv.org/abs/2303.14892">arXiv:2303.14892</a>	
	A Farrell-Jones Isomorphism for $K$ -theory of Polyhedra (with A.M. Bohmann, T. Gerhardt, C. Malkiewich, and I. Zakharevich), <a href="https://arxiv.org/abs/2303.08172">arXiv:2303.08172</a> .	
	Deformation retraction of the group of strict contactomorphisms of the three-sphere to the unitary group (with D. DeTurck, H. Gluck, L. Lichtenfelz, J. Yang and Y. Wang), submitted, <a href="https://arxiv.org/abs/2108.08961">arXiv:2108.08961</a> .	

Multiplicative equivariant  $K$ -theory and the Barratt-Priddy-Quillen theorem, (with B. Guillou, J.P. May and A. Osorno), *Advances in Mathematics*, Volume 414 (2023), arXiv:2001.05563.

Equivariant infinite loop space theory. The space level story, (with J.P. May and A. Osorno), arXiv:1704.03413, to appear in *Memoirs of the AMS*.

The equivariant parametrized  $h$ -cobordism theorem, the non-manifold part, (with C. Malkiewich), *Advances in Mathematics*, Volume 399 (2022), arXiv:2001.05563.

Cut and paste invariants of manifolds via algebraic  $K$ -theory, (with R. Hoekzema, L. Murray, C. Rovi, J. Semikina), *Topology and its Applications*, Volume 316 (2022), arXiv:2001.00176.

Coassembly is a homotopy limit map, (with C. Malkiewich), *Annals of K-Theory* Volume 5 Issue 3 (2020), pages 373–394, arXiv:1904.05858.

Symmetric monoidal  $G$ -categories and their strictification, (with B. Guillou, J.P. May and A. Osorno), *Quarterly Journal of Mathematics*, Volume 71, Issue 1 (2020), pages 207–246, arXiv:1809.03017.

Equivariant  $A$ -theory, (with C. Malkiewich), *Documenta Mathematica*, 24 (2019), pages 815–85, arXiv:1609.03429.

A symmetric monoidal and equivariant Segal machine, (with B. Guillou, J.P. May and A. Osorno), *Journal of Pure and Applied Algebra*, Volume 226 (6) (2019), pages 2425–2454, arXiv:1711.09183.

Motivic homotopical Galois extensions, (with A. Beaudry, K. Hess, M. Kedziorek, and V. Stojanoska), *Topology and its Applications*, Volume 235 (2018), pages 290–338, arXiv:1611.00382.

Equivariant algebraic  $K$ -theory of  $G$ -rings, *Mathematische Zeitschrift*, 285(3), (2017), pages 1205–1248, arXiv:1505.07562.

Categorical models for equivariant classifying spaces, (with B. Guillou and J.P. May), *Algebraic and Geometric Topology*, 17-5 (2017), pages 2565–2602, arXiv:1201.5178.

Unbased calculus for functors to chain complexes, (with M. Basterra, K. Bauer, A. Beaudry, R. Eldred, B. Johnson and S. Yeakel), *Contemporary Mathematics*, Vol. 641 (2015), pages 29–48, arXiv:1409.1553v2.

Function fields with class number indivisible by a prime  $l$ , (with M. Daub, J. Lang, A. Pacelli, N. Pitiwan, M. Rosen), *Acta Arithmetica*, 150 (2011), pages 339–359, arXiv:0906.3728.

Gassmann equivalent dessins, (with R. Perlis), *Communications in Algebra*, Vol. 38, Issue 6 (2010), pages 2129–2137.

CONFERENCE  
PROCEEDINGS

$G$ -manifolds and algebraic  $K$ -theory, *Oberwolfach reports*, Report No. 31, (2018), pages 37–40.

OTHER  
PUBLICATIONS

Encouraging Curiosity, Self-Directed Study and Belonging in Penn Students: The Di-

rected Reading Program in Math, *Penn Almanac (Talk about Teaching and Learning)*, Volume 69 Issue 25 (2023).

Widening the Pipeline (with J. Hartmann), *Notices of the AMS (Early Career section)*, Volume 67, Number 11, (2020).

The User's Guide Project: Giving Experiential Context to Research Papers, (with C. Malkiewich, D. White, L. Wolcott, and C. Yarnall), *Journal of Humanistic Mathematics*, Volume 5 Issue 2 (2015), pages 186–188.

PHD STUDENT  
SUPERVISION

Thomas Brazelton, University of Pennsylvania, expected PhD completion 2023  
(co-advised with Kirsten Wickelgren at Duke)

Elijah Gunther, University of Pennsylvania, expected PhD completion 2023

Andres Mejia, University of Pennsylvania, expected PhD completion 2024

Maxine Calle, University of Pennsylvania, expected PhD completion 2025

Kartik Tandon, University of Pennsylvania, expected PhD completion 2027

MASTERS  
THESIS  
SUPERVISION

Saad Slaoui, University of Pennsylvania spring 2019

Yinfeng Lu, University of Pennsylvania spring 2023

Zhong Zhang, University of Pennsylvania spring 2023

Oualid Merzouga, University of Pennsylvania spring 2023

POSTDOC  
MENTORSHIP

Maximilien Peroux, University of Pennsylvania 2020-23

Ningchuan Zhang, University of Pennsylvania 2020-23

TEACHING  
EXPERIENCE

**Princeton Prison Teaching Initiative**, Co-Instructor

Spring 2023 Math in the Courtroom (South Woods State Prison, *BA level class*)

Spring 2022 math 015 Basic College Mathematics (South Woods State Prison)

Fall 2021 math 020 College Algebra (Garden State Correctional Facility)

**University of Pennsylvania**, Instructor

Spring 2023 math 619 Algebraic Topology III (graduate)

Spring 2023 math 130 Introduction to Calculus

Spring 2022 math 520 Representation Theory of Finite Groups

Fall 2021 math 500 Topology

Fall 2021 math 123 Community Math Teaching Project (ABCS class)

Spring 2021 math 619 Algebraic Topology III (graduate)

Fall 2020 math 123 Community Math Teaching Project (ABCS class)

Spring 2020 math 730 Algebraic  $K$ -theory (graduate, Kan seminar style)

Fall 2019 math 410 Complex Analysis

Spring 2019 math 619 Algebraic Topology III (graduate)

Spring 2019 math 370 Abstract Algebra

### **Johns Hopkins University, Instructor**

Spring 2018 math 106 Calculus I for biology  
Fall 2017 math 727 Topics in Algebraic Topology (graduate)  
Fall 2017 math 615 Algebraic Topology I (graduate)  
Spring 2017 math 422 Representation Theory  
Spring 2017 math 616 Algebraic Topology II (graduate)  
Spring 2016 math 422 Representation Theory  
  
Spring 2016 math 401 Advanced Algebra  
Fall 2015 math 401 Advanced Algebra  
Fall 2015 math 328 Non-Euclidean geometry (inquiry based learning style)  
Spring 2015 math 107 Calculus II for biology  
Fall 2014 math 328 Non-Euclidean geometry (inquiry based learning style)

### **University of Chicago, Instructor**

Winter 2014 math 176 Geometry IBL (co-taught with John Boller)  
Spring 2013 math 112 Studies in mathematics  
Winter 2013 math 153 Calculus III  
Fall 2012 math 152 Calculus II  
Spring 2012 math 112 Studies in mathematics  
Winter 2012 math 106 Precalculus II  
Fall 2011 math 105 Precalculus I

### **University of Chicago, College Fellow**

Spring 2011 math 256 Basic Algebra III (mentor: Liang Xiao)  
Winter 2011 math 255 Basic Algebra II (mentor: Rina Anno)  
Fall 2010 math 254 Basic Algebra I (mentor: David Constantine)

## TALKS

### **Mini courses and lecture series**

Algebraic K-theory of spaces, Regensburg, Germany, July 2023 (upcoming)

Scissors Congruence, Algebraic K-Theory, and Trace Methods, June 2023 (upcoming)

Algebraic structures in topology, San Juan, Puerto Rico, May 2022

### **Conference and Colloquium Talks**

Homotopy Theory and Algebraic Geometry, Essen, Germany, August 2023 (upcoming)

Homotopy: fruit of the fertile furrow, Isaac Newton Institute, Cambridge, June 2023 (upcoming)

Higher Invariants in Equivariant and Geometric Topology, IMSA, Miami, May 2023 (upcoming)

Midwest Topology Conference, Purdue, Lafayette, April 2023 (upcoming)

Spring Topology and Dynamics Conference, semi plenary talk, March 2023 (online)

Floer homotopical methods in low dimensional and symplectic topology, MSRI, Berkeley, November 2022

Equivariant Techniques in Stable Homotopy Theory, AIM, San Jose, October 2022

AMS Sectional Meeting, Special session on algebraic K-theory, Utah, October 2022

Connections Workshop: Floer Homotopy Theory, MSRI, Berkeley, September 2022

Follow-up Workshop to Junior Trimester Program “Topology,” Hausdorff Institute for Mathematics, Bonn, September 2022.

Algebraic Topology and Topological Data Analysis: A Conference in Honor of Gunnar Carlsson, IMA, Minneapolis, August 2022

Algebra and Number Theory Day, Johns Hopkins, September 2021.

New perspectives on  $K$ - and  $L$ -theory, Münster, September 2020, postponed.

International Workshop on Algebraic Topology, Beijing International Center for Mathematical Research, Peking University, August 2020, postponed.

$(\infty, n)$ -categories, factorization homology, and algebraic K-theory, MSRI, Berkeley, March 2020 (moved online)

Equivariant stable homotopy theory and  $p$ -adic Hodge theory, Banff International Research Station, Canada, March 2020

Colloquium, Bryn Mawr, November, 2019

Mid-Atlantic Topology Conference, University of Virginia, Charlottesville, October 2019

International Workshop on Algebraic Topology, Shanghai Center for Mathematical Sciences, Fudan University, August 2019

Four manifolds: Confluence of high and low dimensions, Fields Institute, Toronto, July 2019

Graduate Student Conference in Algebra, Geometry, and Topology (Keynote speaker), Temple University, June 2019

Cornell Topology Festival, Ithaca, May 2019

AMS Sectional Meeting, Special Session on Equivariant Homotopy and Trace Methods, University of Hawaii, March 2019

Equivariant and Motivic Homotopy Conference (Homotopy Harnessing Higher Structures Program), Isaac Newton Institute, Cambridge, August 2018

Topologie, Oberwolfach, July 2018

Equivariant Homotopy Theory and K-theory, FU Berlin, June 2018

AMS Sectional Meeting, Special Session on Homotopy Theory, Vanderbilt University, Nashville, April 2018

Tetrahedral Geometry and Topology Seminar, Lancaster, April 2018

AMS Sectional Meeting, Special Session on Homotopy Theory, Ohio State University, Columbus, March 2108

Midwest Topology Seminar, Northwestern, Evanston, March 2018

Colloquium, Florida State University, December 2017

Colloquium, University of Pennsylvania, December 2017

Colloquium, Notre Dame University, December 2017

Colloquium, University of Melbourne, November 2017

Lloyd Roeling Conference, University of Louisiana, Lafayette, November 2017

AMS Sectional Meeting, Algebraic Topology Special Session, Buffalo, September 2017

Cascade Topology Conference, University of British Columbia, Vancouver, May 2017

Colloquium, Reed, Portland, November 2016

Operations in Highly Structured Homology Theories, Banff, Canada, May 2016

Equivariant Derived Algebraic Geometry, Banff, Canada, February 2016

Trace Methods Summer School, Regensburg, August 2015

Equivariant and Motivic Homotopy Theory, Reed, Portland, May 2015

AMW Workshop at AMS Joint Meetings, San Antonio, January 2015

Young Topologists Meeting, Copenhagen, June 2014 (contributed talk)

MSRI Connections for Women Workshop, MSRI, Berkeley, January 2014

AMS Joint Meetings, Special Session on Homotopy Theory, Baltimore, January 2014

AMS Special Session Homotopy Theory and Algebraic K-theory, Riverside, November 2013

Graduate Student Topology Conference, Notre Dame, April 2013 (contributed talk)

AMS Joint meetings, Washington DC, January 2009 (contributed talk)

AMS Joint meetings, San Diego, January 2008 (contributed talk)

AMS Joint meetings, New Orleans, January 2007 (contributed talk)

## **Seminar Talks**

Northeastern topology seminar, January 2023

UCLA topology seminar, December 2022

UWashington topology seminar, November 2022

Berkeley topology seminar, October 2022

UCSD topology seminar, October 2022

Lehmann College topology seminar, September 2022

FRG Scissors congruence K-theory seminar, September 2022

electronic Computational Homotopy Theory seminar, September 2022

Columbia topology seminar, May 2022

Bard College Seminar, online, April 2021

University of Aberdeen Topology Seminar, online, March 2021

UKentucky Topology seminar, online, March 2021

CORONA Geometry Seminar, online, October 2020

UCLA Topology Seminar, online, May 2020

Temple Topology Seminar, September 2019

Michigan State University Topology Seminar, April 2019

Princeton Topology Seminar, March 2019

MIT Topology Seminar, March 2019

University of Pennsylvania Topology Seminar, February 2019

Johns Hopkins Topology Seminar, February 2019

University of Münster Topology Seminar, November 2018

University of Wuppertal Topology Seminar, November 2018

École Polytechnique Federale de Lausanne Topology Seminar, October 2018

University of Bochum Topology Seminar, October 2018

University of Copenhagen Topology Seminar, September 2018

University of Regensburg Topology Seminar, July 2018



Penn State Altoona Topology Seminar, October 2017  
Notre Dame Topology Seminar, March 2017  
Maryland University Topology Seminar, January 2017  
Wayne State Topology Seminar, November 2016  
Rochester Topology Seminar, October 2016  
Hausdorff Institute for Mathematics Seminar, Bonn, September 2016  
University of Virginia Topology Seminar, October 2015  
UIUC Topology Seminar, May 2015  
UCSD Number Theory/Topology Seminar, March 2015  
Johns Hopkins Topology Seminar, March 2015  
MIT Topology Seminar, December 2014  
Penn State Altoona Topology Seminar, May 2014  
Northwestern Topology Seminar, December 2013  
UIUC Topology Seminar, February 2013

**Talks for undergraduates**

University of Chicago summer REU, July 2022 (online)  
University of Chicago summer REU, July 2021 (online)  
Penn Undergraduate Mathematics Society, September 2020 (online)  
University of Chicago summer REU, June 2020 (online)  
University of Chicago summer REU, July 2016  
Undergraduate Conference on Geometry and Topology (faculty talk), University of Texas, Austin, February 2016

**SERVICE**

Associate Editor on the Bulletin of the AMS Editorial Board for Book Reviews, 2024-2028.  
Team Leader (with Julia Semikina), Collaborative workshop on scissors congruence and algebraic  $K$ -theory, 2023-24.  
Prison Teaching Initiative, volunteer teacher for accredited college math classes, spring 2021-present  
Co-organizer (with Julia Hartmann, Angela Gibney, Yumeng Ou), FEW (Fund to

Encourage Women) event, April 2023

Co-organizer (with Cary Malkiewich, Jeremy Miller, and Jenny Wilson), Scissors congruence, algebraic K-theory and Steinberg modules, American Institute for Mathematics, June 2024

Scientific committee (with Andrew Blumberg, Anna Marie Bohmann, Teena Gerhardt, Mike Hill, Cary Malkiewich, Michael Mandell, Kate Ponto, Inna Zakharevich), Scissors Congruence, Algebraic K-Theory, and Trace Methods, Indiana University, June 2023

Co-organizer (with Alexander Kupers, Thomas Goodwillie, Manuel Krannich), Spaces of manifolds: algebraic and geometric approaches, Banff International Research Station, 2024

Co-organizer (with Jonathan Block, Rob Ghrist, Ben Knudsen, Tony Pantev, Maximilien Peroux and Ningchuan Zhang), Mid-Atlantic Topology Conference, April 2023 (postponed from 2020 due to COVID)

Co-organizer (with Maxine Calle, Angela Gibney, Julia Hartmann, Marielle Ong and Ellen Urheim), UP GRADe workshop for underrepresented groups in mathematics, Fall 2021

Co-organizer (with Jonathan Block), Summer Bridge Workshop in Algebraic Topology, University of Pennsylvania, Summer 2021

Co-organizer (with Herman Gluck and Davi Maximo), Geometry-Topology Seminar, University of Pennsylvania, Spring 2019-present

Co-organizer (with Herman Gluck and Davi Maximo), PATCH at Penn, University of Pennsylvania, Spring 2019-present

Co-organizer (with Herman Gluck), Summer Bridge Workshop in Algebraic Topology, University of Pennsylvania, Summer 2020

Co-organizer (with Andrew Blumberg, Anna Marie Bohmann, Akhil Mathew, Emily Riehl, and Dylan Wilson), Midwest Topology Seminar/ May Day 2019, University of Chicago, October 2019

Co-organizer (with Julia Hartmann), Workshop on Math Advice and Networking at the University of Pennsylvania (WOMAN UP), September 2019

Team Leader (with Carmen Rovi) for the Women in Topology III Workshop (proposed a research project and collaborated on a resulting publication with our group), 2019-20

NSF panelist, Topology Panel, x3

Co-organizer (with Thomas Brazelton), Directed Reading Program, PILOT University of Pennsylvania chapter, fall 2019

Organizer, Directed Reading Program, PILOT Johns Hopkins chapter, 2017-2018

Future Scholars Program (wrote yearly exam and selected the Baltimore high schoolers for math classes at JHU), Johns Hopkins, 2016&2017

Volunteer, John Rurah Middle School Math Lab, Baltimore, Spring 2017

Co-organizer (with Nitu Kitchloo, Jack Morava, Emily Riehl, and Steve Wilson), Second Mid-Atlantic Topology Conference, Johns Hopkins, March 2016

Organizer, Johns Hopkins Algebraic Topology Seminar, Johns Hopkins, 2015-2018

Co-organizer (with Carl McTague), Johns Hopkins Algebraic Topology Seminar, Johns Hopkins, 2014-2015

Author and co-editor in *The User's Guide Project: Giving Experiential Context to Research Papers*

Committee member and mentor for the Directed Reading Program, University of Chicago, 2012-2014

Co-organizer (with Evangelia Gazaki, Chris Skalit, and Preston Wake), Algebraic K-theory Student Seminar, University of Chicago, spring 2013

PROFESSIONAL DEVELOPMENT	Inclusive Teaching Seminar, University of Pennsylvania, <i>Yearlong monthly seminar offered by the Center for Teaching and Learning</i>	2019-20
DEPARTMENT SERVICE	Major advisor Directed Reading Program Faculty Mentor Graduate Admissions Committee Prize Committee Prize Committee, Chair	2023- 2019- 2018-19, 2019-20, 2020-21, 2021-22, 2022-23 2018-19, 2023 2019-20, 2020-21, 2021-22
SERVICE TO THE UNIVERSITY	Faculty House Fellow, Fisher-Hassenfeld House Faculty House Fellow, Harrison House Faculty Advisory Board of the Netter Center for Community Partnerships Natural Science and Math Panel (as invited junior colleague) Penn Graduate Community-Engaged Research Mentorship Program, Netter Center Senior Faculty Mentor Faculty Mentor	2023- 2020-2022 2022- spring 2023 summer 2022 summer 2021