

Mike Miller Eismeier

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Employment	University of Vermont Assistant Professor	2023-
	Columbia University Ritt Assistant Professor of Mathematics	2019-2023
Education	UCLA Ph.D. in Mathematics Advanced to Candidacy: February 2017 Ph.D. granted: June 2019	2014-2019
	Santa Clara University B.Sc. in Mathematics	2010-2014
Publications	<i>Monopoles, twisted integral homology, and Hirsch algebras</i> , with Francesco Lin, available at arXiv:2108.00984. To appear in <i>Geometry & Topology</i> (updated April 2023). <i>3-manifolds without any embedding in symplectic 4-manifolds</i> , with Aliakbar Daemi and Tye Lidman, available at arXiv:2207.03631. To appear in <i>Geometry & Topology</i> (updated May 2023). <i>Fourier transforms and integer homology cobordism</i> , available at arXiv:2206.07029. To appear in <i>Algebraic & Geometric Topology</i> (updated August 2023). <i>Hyperplanes in abelian groups and twisted signatures</i> , with Aiden Sagerman, <i>Topology Appl.</i> 339 (2023), Paper No. 108692. <i>The distance from a point to its opposite along the surface of a box</i> , with Edward F. Schaefer, <i>Pi Mu Epsilon Journal</i> , 14 , 2015, 143-154	
Preprints	<i>Instantons and rational homology spheres</i> , with Aliakbar Daemi, available at arXiv:2210.14071. <i>Equivariant instanton homology</i> , PhD thesis. Available at arXiv:1907.01091 (as S. Michael Miller). In review at <i>Memoirs of the AMS</i> since July 2019; revisions submitted July 2023.	
Lecture series	<i>Transversality and gluing for framed instantons</i> A minicourse on the foundations of the framed instanton theory, the appearance of obstructed gluing theory, and its relation to Floer's theory. The series concludes in a research talk on applications to surgery theory of 3-manifolds. "Gauge theory and applications" workshop, Universität Regensburg.	July 2023

Invited talks	<i>Gauge theory and indefinite 4-manifolds</i> “Geometry and topology” seminar, Dartmouth	February 2024
	<i>Chern–Simons and diffeomorphism invariants</i> “Geometry and topology” seminar, MIT	December 2023
	<i>Filtered instanton homology and cosmetic surgery</i> Gauge Theory Virtual Seminar	October 2023
	<i>Filtered instanton homology and cosmetic surgery</i> 9th KTGU Workshop, Kyoto University	October 2023
	<i>CS implies CS</i> “Topology of 3- and 4-dimensional manifolds” conference, Princeton University	July 2023
	<i>A first look at an equivariant surgery sequence</i> “Instantons and foams” conference, MIT	May 2023
	<i>Instantons, suspension, and surgery</i> The second of a pair of joint talks on joint work with Ali Daemi. “Gauge Theory and Low Dimensional Topology” conference, IMSA, U Miami	April 2023
	<i>Cobordism maps without equivariant transversality</i> 2023 Midwest Geometry Conference, Kansas State University	March 2023
	<i>Instantons and Dehn surgery</i> Colloquium, Kansas State University	March 2023
	<i>Instantons, indefinite manifolds, and Dehn surgery</i> Symplectic Geometry, Gauge Theory, and Low-Dimensional Topology Seminar, Stony Brook University	December 2022
	<i>Instantons mod 2 and indefinite 4-manifolds</i> Topology seminar, Harvard University	September 2022
	<i>Monopole Floer homology, Hirsch algebras, and twisted homology</i> Topology seminar, Princeton University	November 2021
	<i>Monopole Floer homology and twisted homology</i> Geometry/Topology seminar, Rutgers University in New Brunswick	September 2021
	<i>Invariance and functoriality in equivariant instanton homology</i> Gauge Theory Virtual seminar	May 2021
	<i>Mod 2 instanton homology and homology cobordism</i> AMS Special Session on Floer Homology in Dimensions 3 and 4 Madison, WA	September 2019
	<i>Equivariant instanton homology and group cohomology</i> Conference on Floer Homotopy Theory and Low-Dimensional Topology, University of Oregon	August 2019
<i>Equivariant instanton homology and group cohomology</i> Topology Seminar, University of Arkansas	April 2019	
<i>Equivariant instanton homology and group cohomology</i> Symplectic Geometry, Gauge Theory, and Categorification Seminar, Columbia University	December 2018	
<i>Equivariant instanton homology and group cohomology</i> Geometric Analysis Seminar, Rutgers University	October 2018	
<i>Equivariant instanton homology and group cohomology</i> Topology Seminar, Princeton University	October 2018	

	<i>Equivariant instanton homology and group cohomology</i> Geometry and Topology Seminar, MIT	September 2018
	<i>Equivariant instanton homology and group cohomology</i> Conference on Gauge Theory and Applications, Universität Regensburg	July 2018
	<i>Equivariant instanton homology and group cohomology</i> Seminar in Topology and Symplectic Geometry, Stony Brook University	May 2018
Student-oriented talks	<i>Instantons: from physics to exotic topology</i> Michael Zhao Memorial Student Colloquium, Columbia University	February 2023
	<i>dg-Algebras, twisted homology, and homotopy commutativity</i> Michael Zhao Memorial Student Colloquium, Columbia University	September 2021
	<i>ℓ^p is not ℓ^q</i> Undergraduate Math Society Lecture, Columbia University	February 2021
	<i>The winding number throughout mathematics</i> Undergraduate Math Society Lecture, Columbia University	October 2020
	<i>Triangulations and homology cobordism</i> Graduate Student Mathematics Colloquium, University of Arkansas	April 2019
Awards	At Columbia University:	
	Received Presidential Award for Outstanding Teaching One of 5 recipients (of 600 nominees).	Spring 2023
	Finalist, Presidential Award for Outstanding Teaching 10 finalists, 600 nominees.	Spring 2022
	Nominee, Mark Van Doren Award for Teaching 12 nominees.	Spring 2022
	Department of Mathematics Junior Faculty Recognition Award for Excellence in Teaching	Spring 2021
	At UCLA:	
	Pacific Journal Prize	June 2019
	UCLA Dissertation Year Fellowship	June 2018
	O'Neill Memorial Travel Grant	May 2017
	Horn-Moez Prize for excellence in first-year graduate studies	June 2015
Teaching	Instructor (UVM)	
	MATH 3551 (Abstract Algebra I)	Fall 2023
	MATH 3555 (Abstract Algebra II)	Spring 2024
	Instructor (Columbia)	
	Math 1201 (Multivariable Calculus I)	Fall 2019, Spring 2020, Summer 2020 Fall 2021, Spring 2022
	Math 1202 (Multivariable Calculus II)	Spring 2021
	Math 1207 (Honors Math A)	Fall 2022

Math 1208 (Honors Math B)	Spring 2023
Math 2010 (Linear Algebra)	Spring 2021
Math 3952 (Undergraduate seminar)	Spring 2023
Math 4501 (Topology)	Fall 2020, Fall 2021

Teaching assistant (UCLA)

Math 31B (Integral Calculus)	Fall 2014
Math 32A (Multivariable Calculus)	Fall 2015, Fall 2017
Math 33A (Linear Algebra)	Winter 2015
Math 123 (Foundations of Geometry)	Winter 2018
Math 132 (Complex Analysis)	Spring 2015, Summer 2016
Math 170B (Probability Theory II)	Summer 2015
Math 225A (Differential Topology)	Fall 2015, Fall 2016, Fall 2017
Math 225B (Differential Geometry)	Winter 2015, Winter 2016, Winter 2017
Math 225C (Algebraic Topology)	Spring 2016

Mentorship

Jointly supervised graduate research Spring 2024
 With Spencer Backman, helped PhD student Sienna Untner develop a research project, towards submitting an NSF Graduate Fellowship proposal in the Fall.

Supervised senior thesis Summer 2022-Spring 2023
 Columbia University, with Arjun Kunidoor.
 Topic: Atiyah–Singer’s index theorem and the early history of instantons.

Joint research with undergraduate Spring 2022, Summer 2022
 Columbia University, with Aiden Sagerman. Led to the publication ‘Hyperplanes in abelian groups and twisted signatures’.

Directed independent study courses 2019-2024
 University of Vermont. Two courses, three students. Topics in abstract algebra.
 Columbia University. Eight courses, thirteen students.
 Topics: History of Lagrange multipliers; differential topology; point-set topology; algebraic topology; integral geometry; advanced linear algebra (twice); differential geometry for electromagnetism

Service

Served as referee 2020-2023
 Journal of Differential Geometry (twice); Communications in Analysis and Geometry; Geometry & Topology (thrice); Mathematische Annalen; Michigan Mathematics Journal

Organized SGGTC seminar 2019-2020; 2022-2023
 Columbia University

TA for minicourse on Instanton Floer homology July 2019
 PCMI Graduate Student Summer School

Took official notes for Floer Homotopy conference/summer school Summer 2017
 UCLA

Organized Graduate Student Seminar Fall 2015-Winter 2017
 UCLA