BOYU ZHANG

ADDRESSKirwan Hall 44184176 Campus Dr, College Park, MD 20742EMAILbzh@umd.eduWEBSITEhttps://www.math.umd.edu/~bzh/

ACADEMIC APPOINTMENTS

2022- : Assistant Professor (tenure-track), University of Maryland at College Park, Maryland
2021-2022: Assistant Professor, Princeton University, New Jersey
2018-2021: Instructor of Mathematics, Princeton University, New Jersey

EDUCATION

2013-2018: Harvard University, Massachusetts Ph.D. in Mathematics Advisor: Clifford Taubes Thesis: Several compactness results in gauge theory and low dimensional topology

2009-2013: Peking University, Beijing, China. B.S. in Mathematics

PUBLICATIONS AND PREPRINTS

- 21. On the topology of stable minimal hypersurfaces in a homeomorphic S^4 (with Chao Li), arXiv 2503.19313.
- 20. Dax invariant for closed embedded surfaces and the mapping class group of $\Sigma \times S^2$ (with Jianfeng Lin and Yi Xie), arXiv 2501.16083.
- On the mapping class groups of 4-manifolds with 1-handles (with Jianfeng Lin and Yi Xie), arXiv 2501.11821.
- ℤ/2 harmonic 1-forms, ℝ-trees, and the Morgan-Shalen compactification (with Siqi He and Richard Wentworth), arXiv 2409.04956.
- 17. Ring structures in singular instanton homology (with Yi Xie), arXiv 2307.08845.
- A deformation of Asaeda-Przytycki-Sikora homology (with Zhenkun Li and Yi Xie), arXiv 2302.11109. Accepted by Algebr. Geom. Topol.
- Instanton homology and knot detection on thickened surfaces (with Zhenkun Li and Yi Xie), Selecta Math., 29, Article number: 84 (2023)
- A note on the existence of U-cyclic elements in periodic Floer homology (with Dan Cristofaro-Gardiner, Daniel Pomerleano, Rohil Prasad), arxiv 2110.13844, accepted by Proc. Amer. Math. Soc.
- 13. The smooth closing lemma for area-preserving surface diffeomorphisms (with Dan Cristofaro-Gardiner and Rohil Prasad), arxiv 2110.02925
- On Floer minimal knots in sutured manifolds (with Zhenkun Li and Yi Xie), Trans. Amer. Math. Soc. Ser. B 9 (2022), 499-516

- 11. On meridian-traceless SU(2)-representations of link groups (with Yi Xie), Adv. Math. 418 (2023).
- 10. Equivariant Cerf theory and perturbative SU(n) Casson invariants (with Shaoyun Bai), arXiv 2009.01118.
- 9. Instantons and Khovanov skein homology on $I\times T^2$ (with Yi Xie), Quantum Topology, 16 (2025), no. 1, pp. 75–115
- Two detection results of Khovanov homology on links (with Zhenkun Li and Yi Xie), Trans. Amer. Math. Soc. 374 (2021), 6649-6664.
- 7. On links with Khovanov homology of small ranks (with Yi Xie), Math. Res. Lett. Volume 29 (2022), 1261 1277.
- Classification of links with Khovanov homology of minimal rank (with Yi Xie), arXiv 1909.10032, J. Eur. Math. Soc. (2023)
- 5. Instanton Floer homology for sutured manifolds with tangles (with Yi Xie), arXiv 1907.00547, accepted by J. Differential Geom.
- 4. On the compactness problem for a family of generalized Seiberg-Witten equations in dimension three (with Thomas Walpuski), Duke Math. J. 170(17): 3891-3934.
- Rectifiability and Minkowski bounds for the zero loci of Z/2 harmonic spinors in dimension 4, Commun. Anal. Geom. Volume 30 (2022) Number 7: 1633 1681
- Modulo 2 counting of Klein-bottle leaves in smooth taut foliations, Algebr. Geom. Topol., 2018 Aug 22; 18(5): 2701-2727.
- Monopoles and foliations without holonomy-invariant transverse measure, J. Symplectic Geom., Volume 20, Number 1, 191–258, 2022.

INTERDISCIPLINARY COLLABORATIONS

- 2. Yue Wang, Boyu Zhang, Jérémie Kropp, Nadya Morozova: Inference on tissue transplantation experiments, Journal of Theoretical Biology, Volume 520.
- Hui Zhao, Kehua Su, Chenchen Li, Boyu Zhang, Lei Yang, Na Lei, Xiaoling Wang, Steven J. Gortler, Xianfeng Gu: Mesh Parametrization Driven by Unit Normal Flow, Computer Graphics Forum, Volume 39, Issue 1.

TEACHING

MATH 848Z: Selected Topics in Geometry and Topology; Topology of 4-Manifolds (Spring 2025) MATH 140: Calculus I (Fall 2024) MATH 734: Algebraic Topology (Spring 2024) MATH 410: Advanced Calculus (Spring 2023) MATH 432: Introduction to Topology (Fall 2022 and Fall 2023)

MAT 204: Advanced Linear Algebra with Applications (Spring 2022, Princeton)

MAT 215: Single Variable Analysis with an Introduction to Proofs (Fall 2021, Princeton)
MSRI graduate summer school: Gauge Theory in Geometry and Topology (Summer 2021)
MAT 92: Topics in Gauge Theory (Spring 2021, Princeton)
MAT 175: Mathematics for Economics and Life Sciences (Fall 2020 and Spring 2021, Princeton)
MAT 567: Topics in Low Dimensional Topology (Spring 2020, Princeton)
MAT 92: Morse Theory (Fall 2019, Princeton)
MAT 175: Mathematics for Economics and Life Sciences (Fall 2019, Princeton)
MAT 175: Mathematics for Economics and Life Sciences (Fall 2019, Princeton)
MAT 104: Calculus II (Fall 2018, Spring 2019, Princeton)
Math 1b: Calculus, Series, and Differential Equations. (Spring 2017, Harvard)
Undergraduate Tutorial: Morse Theory (Spring 2016, Harvard)
Summer Tutorial: Knots and Links (Summer 2015, Harvard)
Math 1b: Calculus, Series, and Differential Equations. (Spring 2015, Harvard)
Qualifying Exam Tutorial (Summer 2015, Harvard)
Math 1b: Calculus, Series, and Differential Equations. (Spring 2015, Harvard)
Qualifying Exam Tutorial (Summer 2015, Harvard)

SELECTED SERVICES AND OUTREACH

Co-organizer of the Brin Maryland Mathematics Camp Member of the organizational committee for the University of Maryland High School Math Competition Co-organizer of the DC Jail College Bridge Math program by Petey-Greene in 2023 Co-organizer of the Geometry and Topology seminar at the University of Maryland at College Park Co-organizer of the Brin Mathematics Research Center workshop on *Low-dimensional topology and homeomorphism groups* in 2022

Co-organizer of the MSRI graduate summer school on *Gauge Theory in Geometry and Topology* in 2021 Co-organizer of Princeton Topology Seminar from 2018 to 2022

GRANTS AND AWARDS

- 1. 2024-2027: NSF standard grant DMS-2405271
- 2. 2023-2028: Simons Foundation Travel Support for Mathematicians
- 3. 2017: Harvard University, Graduate School of Arts and Sciences Merit Fellowship
- 4. 2013: Peking University, School of Mathematical Sciences, Xiao-Song Lin award
- 5. 2011,2012: S-T. Yau College Students Mathematics Contests, 4 gold medals and 2 silver medals

LANGUAGES

Native speaker of Chinese, fluent in English. Passed the French and German reading exams at Harvard.

RESEARCH TALKS

Apr 2025	Geometry Seminar, Lehigh University
Apr 2025	Topology Seminar, Princeton University
Apr 2025	Knots in Washington Conference (plenary talk), George Washington University
Mar 2025	Topology Seminar, George Washington University
Mar 2025	Geometric Topology Seminar, Columbia University
Feb 2025	Seminar on Mapping Class Groups of Four Manifolds, University of Glasgow
Dec 2024	Knots in Washington Conference, George Washington University
Nov 2024	Geometry and topology Seminar, Duke University
Sep 2024	Topology, Algebraic Geometry, and Dynamics Seminar, George Mason University
May 2024	Gauge Theory, Low-Dimensional Topology, and Geometric Analysis Conference,
Rutgers University	
May 2024	Geometry and Topology Seminar, MIT
Apr 2024	Knots in Washington Conference (plenary talk), George Washington University
Mar 2024	Conference on Floer homology, low-dimensional topology, and algebra,
Princeton University	
Feb 2024	Geometry and Topology seminar, University of Washington
Dec 2023	Knots in Washington conference, George Washington University
Oct and Dec 2023 Gauge theory seminar, Rutgers University at New Brunswick	
Oct 2023	Geometry seminar, University of Virginia
Sep 2023	Geometry and Topology seminar, University of Washington at St. Louis
Sep 2023	AMS Sectional meeting, University of Buffalo
Aug 2023	Hua Luogeng Youth Forum, Chinese Academy of Sciences
Jul 2023	Graduate Student Topology and Geometry Conference (plenary talk), Harvard University
Apr 2023	Conference on Gauge Theory and Low Dimensional Topology, University of Miami
Apr 2023	AMS sectional meeting
Nov 2022	Gauge Theory and Topology Seminar, Harvard University
Sep 2022	Symplectic Geometry Seminar, Stony Brook University and Simons Center
Jun 2022	Workshop on Geometric Analysis and Calibrated Geometries, ETH Zurich
Mar 2022	Colloquium, Rutgers University at Newark
Feb 2022	Southeast China Topology Workshop
Jan 2022	Interdisciplinary Science Seminar, Harvard University
Nov 2021	Geometry Seminar, University of Kansas
Oct 2021	Geometry Seminar, University of Virginia
Jun 2021	Knot Theory Seminar, University of Warsaw
May 2021	Geometric Analysis Conference, Rutgers University
May 2021	Topology Seminar, UCSD
$Mar \ 2021$	AMS sectional meeting
Feb 2021	Geometry and Topology Seminar, University of Waterloo

- Nov 2020 Geometric analysis seminar, Rutgers University
- Nov 2020 Geometry, Topology and Dynamics seminar, Boston College
- Nov 2020 Topology Seminar, Stanford University
- Oct 2020 Geometry and Topology Seminar, Caltech
- Oct 2020 AMS sectional meeting
- Sep 2020 Trends in low-dimensional topology seminar
- Jun 2020 Regensburg low-dimensional geometry and topology seminar
- Feb 2020 Topology Seminar, Princeton University
- Feb 2020 Symplectic Topology Seminar, IAS
- Jan 2020 Symplectic Geometry, Gauge Theory, and Categorification Seminar, Columbia University
- Jan 2020 Topology seminar, UCSD
- Dec 2019 Topology seminar, Chinese Academy of Sciences
- Dec 2019 Workshop on gauge theory and Floer homology, Peking University
- Dec 2019 SIAM Conference on Analysis of Partial Differential Equations, La Quinta, California
- Dec 2019 AMS sectional meeting, University of Florida
- Oct 2019 Geometry and Topology Seminar, Michigan State University
- Oct 2019 Topology seminar, MIT
- Jul 2019 Short talk at the IAS/IPAM summer program, Park City
- May 2019 Georgia Topology Conference, University of Georgia
- Jan 2019 The 14th East Asian Conference on Geometric Topology (plenary talk), Peking University
- Nov 2018 Topology Seminar, Rutgers University
- Oct 2018 Geometry and Topology Seminar, Stony Brook University
- Mar 2018 Analysis and PDE Seminar, Stanford University
- Feb 2018 Topology Seminar, Princeton University
- Feb 2018 Geometry and Topology Seminar Michigan State University
- Dec 2017 Embedding questions in symplectic topology: Dusa McDuff, workshop at Tsinghua Sanya International Mathematics Forum
 - Apr 2017 Floer homologies and topology of 4-manifolds, University of Massachusetts, Amherst
 - Jan 2017 Geometry and Topology Seminar, Peking University
 - Dec 2016 Topology Seminar, Princeton University
 - Oct 2016 Geometry and Topology Seminar, California Institute of Technology
 - Sep 2016 Geometry Seminar, University of Virginia
 - Sep 2016 Geometry and Topology Seminar, Massachusetts Institute of Technology
 - Sep 2016 S-T. Yau's Student seminar, Harvard University

Last updated: April 14, 2025