BOYU ZHANG

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ACADEMIC APPOINTMENT
2021-present: 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

RESEARCH INTEREST
I am interested in gauge theory, Floer homology, and their interactions with geometric structures on 3 and 4-dimensional manifolds such as knots and links, foliations, contact structures, and symplectic structures.

PUBLICATIONS AND PREPRINTS
1. A note on the existence of U-cyclic elements in periodic Floer homology (with Dan Cristofaro-Gardiner, Daniel Pomerleau, Rohil Prasad), arxiv 2110.13844
2. The smooth closing lemma for area-preserving surface diffeomorphisms (with Dan Cristofaro-Gardiner and Rohil Prasad), arxiv 2110.02925
3. On Floer minimal knots in sutured manifolds (with Zhenkun Li and Yi Xie), arXiv 2108.10933, to appear in Transactions of the American Mathematical Society.
4. On meridian-traceless $SU(2)$–representations of link groups (with Yi Xie), arXiv 2104.04839.
5. Equivariant Cerf theory and perturbative $SU(n)$ Casson invariants (with Shaoyun Bai), arXiv 2009.01118.
6. Instantons and Khovanov skein homology on $I \times T^2$ (with Yi Xie), arXiv 2005.12863.
7. Two detection results of Khovanov homology on links (with Zhenkun Li and Yi Xie), Trans. Amer. Math. Soc. 374 (2021), 6649-6664.
8. On links with Khovanov homology of small ranks (with Yi Xie), arXiv 2005.04782, to appear in Mathematical Research Letters.
9. Classification of links with Khovanov homology of minimal rank (with Yi Xie), arXiv 1909.10032, to appear in Journal of the European Mathematical Society.
10. Instanton Floer homology for sutured manifolds with tangles (with Yi Xie), arXiv 1907.00547.
11. 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.
12. Rectifiability and Minkowski bounds for the zero loci of $\mathbb{Z}/2$ harmonic spinors in dimension 4, arXiv 1712.06254, to appear in Communications in Analysis and Geometry.
13. Modulo 2 counting of Klein-bottle leaves in smooth taut foliations, Algebraic & Geometric Topology. 2018 Aug 22;18(5): 2701-27.
14. A monopole Floer invariant for foliations without transverse invariant measure, arXiv 1603.08136, to appear in Journal of Symplectic Geometry.

INTERDISCIPLINARY COLLABORATIONS
1. Yue Wang, Boyu Zhang, Jérémie Kropp, Nadya Morozova: Inference on tissue transplantation experiments, Journal of Theoretical Biology, Volume 520.
2. Hui Zhao, Kehua Su, Chencen 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 EXPERIENCE
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 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)
Qualifying Exam Tutorial (Summer 2015, Harvard)
Summer Tutorial: Knots and Links (Summer 2015, Harvard)
Math 1b: Calculus, Series, and Differential Equations. (Spring 2015, Harvard)
Qualifying Exam Tutorial (Summer 2014, Harvard)

SERVICES
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 present
RESEARCH TALKS

Jan 2022  Interdisciplinary Science Seminar, Harvard University
Nov 2021  Geometry Seminar, University of Kansas
Oct 2021  Geometry Seminar, University of Virginia
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  Plenary talk at the 14th East Asian Conference on Geometric Topology, 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

AWARDS AND FELLOWSHIPS

1. 2017: Harvard University, Graduate School of Arts and Sciences, Merit Fellowship
2. 2013: Peking University, School of Mathematical Sciences, Xiao-Song Lin award
3. 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.