

Shaoyun Bai

CONTACT INFORMATION	Department of Mathematics Massachusetts Institute of Technology Cambridge, MA 02139 USA	Email: shaoyunb@mit.edu
RESEARCH INTERESTS	Symplectic Topology, Low-dimensional Topology, Algebraic Topology, Algebraic Geometry, Dynamical Systems	
EMPLOYMENT	Massachusetts Institute of Technology Assistant Professor Columbia University Ritt Assistant Professor	Fall 2024 - Fall 2023 - Spring 2024
EDUCATION	Princeton University Ph.D. in Mathematics Advisor: John Pardon Tsinghua University B.S. of Mathematics, working under the supervision of Si Li and Pin Yu Senior Thesis: Gauge Theory and Hitchin Integrable Systems	2017 - 2022 2013 - 2017
SHORT VISITS	Simons Center for Geometry and Physics, Stony Brook Postdoctoral Associate Mathematical Sciences Research Institute, Berkeley McDuff Postdoctoral Fellow, mentored by Mohammed Abouzaid Program: Floer Homotopy Theory University of Cambridge Visiting Graduate Student Host: Ivan Smith	Spring 2023 Fall 2022 Spring 2019
PAPERS	<ol style="list-style-type: none">11. 3D mirror symmetry in positive characteristic (with Jae Hee Lee), arXiv:2503.2359010. Bordism and resolution of singularities, with applications to Gromov–Witten theory (with Mohammed Abouzaid), arXiv:2412.044519. Cohomological splitting over rationally connected bases (with Daniel Pomerleano and Guangbo Xu), arXiv:2406.009318. Equivariant formality in complex-oriented theories (with Daniel Pomerleano), arXiv:2405.058217. Franks’ dichotomy for toric manifolds, Hofer–Zehnder conjecture, and gauged linear sigma model (with Guangbo Xu), arXiv:2309.07991.6. Arnold conjecture over integers (with Guangbo Xu), arXiv:2209.08599.5. An integral Euler cycle in normally complex orbifolds and \mathbb{Z}-valued Gromov–Witten type invariants (with Guangbo Xu), arXiv:2201.02688.4. On the Rouquier dimension of wrapped Fukaya categories and a conjecture of Orlov (with Laurent Côté), arXiv:2110.10663, <i>Compos. Math.</i> (2023).3. Bifurcations of embedded curves and towards an extension of Taubes’ Gromov invariant to Calabi–Yau 3-folds (with Mohan Swaminathan), arXiv:2106.01206, <i>Duke Math. J.</i> (2024).2. A symplectic formula of generalized Casson invariants, arXiv:2102.03665.1. Equivariant Cerf theory and perturbative $SU(n)$ Casson invariants (with Boyu Zhang), arXiv:2009.01118.	

GRANTS

- 2025, National Science Foundation conference grant DMS-2448532: “Rutgers Symplectic Summer School 2025” (co-PI, joint with Guangbo Xu, \$29,619)
- 2024-2027, National Science Foundation research grant DMS-2404843: “Curve counting beyond rational numbers” (\$183,897)
- 2024, AIM SQuaRE funded, “Finite characteristic and mixed Hodge structures in symplectic geometry and mirror symmetry”(with Sheel Ganatra, Kai Hugtenberg, Yusuf Baris Kartal, Jae Hee Lee, Daniel Pomerleano)

INVITED TALKS

- Institut Mittag-Leffler “Homotopy Theory and Floer Homology,” June 23 - June 27, 2025
- CUHK MIST workshop, June 2 - June 6, 2025
- UPenn “Math-Physics seminar”, April 15, 2025
- Duke “Geometry-Topology Seminar”, March 17, 2025
- Stony Brook “Symplectic Geometry, Gauge Theory, and Low-Dimensional Topology Seminar,” February 28, 2025
- Boston College “Algebraic Geometry Seminar”, November 7, 2024
- CUHK-Shenzhen “Global Young Scholars’ Forum”, November 2, 2024
- UCLA “Participating Topology Seminar”, October 23, 2024
- UCLA-USC-Caltech “Los Angeles Area Joint Topology Seminar (LATOP)”, October 21, 2024
- University of Toronto “Symplectic Seminar”, October 9, 2024
- Johns Hopkins “Algebraic Geometry Seminar”, September 3, 2024
- Kylerec workshop “Recent Developments in Gromov–Witten theory”, June 24-28, 2024
- Tsinghua YMSC “Online Differential Geometry Seminar”, May 21, 2024
- Princeton/IAS “Joint Symplectic Seminar”, April 8, 2024
- Sorbonne Université “ Séminaire de Géométrie Enumérative”, March 15, 2024
- Jussieu & Orsay minicourse on Floer homology, March 11, 13, 14, 2024
- Berkeley-Davis-Santa Cruz-Stanford “Northern California Symplectic Geometry Seminar”, March 4, 2024
- South Denmark Centre for Quantum Mathematics “QM Research Seminar”, February 22, 2024
- Columbia “Informal Mathematical Physics Seminar”, February 12, 2024
- Columbia “Informal Mathematical Physics Seminar”, February 5, 2024
- 3rd Global Youth Forum, IGP-USTC-China, January 4, 2024
- Berkeley “Informal String-Math Seminar”, October 23, 2023
- Columbia “Michael Zhao Memorial Student Colloquium”, October 17, 2023
- Humboldt Universität zu Berlin “Workshop on SFT 10”, August, 2023
- Chinese Academy of Sciences “ Hua Loo-Keng Lecture Series”, August 4, 2023
- Edinburgh “Hodge Seminar”, May 10, 2023
- Chinese Academy of Sciences “ Hua Loo-Keng Lecture Series”, April 28, 2023
- Minnesota “Differential Geometry and Symplectic Topology Seminar”, March 16, 2023
- Montréal “Local Symplectic Seminar”, March 3, 2023
- Maryland “Geometry-Topology Seminar”, February 20, 2023
- Harvard “Gauge Theory and Topology Seminar”, February 3, 2023
- Stony Brook “Symplectic Geometry, Gauge Theory, and Low-Dimensional Topology Seminar”, February 2, 2023
- IMSA University of Miami “Homological Mirror Symmetry”, January 23-27, 2023
- Symplectic Zoominar, January 20, 2023
- MSRI “Floer Homotopical Methods in low dimensional and symplectic topology”, November 14-18, 2022
- MIT “Symplectic Seminar”, October 20, 2022
- Stanford “Topology Seminar”, October 18, 2022

- MSRI Floer Homotopy Theory Program Seminar, September 22, 2022
- Chinese Academy of Sciences “2022 Morningside Center of Mathematics Geometry Summer School”, August 15-20, 2022
- MIT “Boston Informal Symplectic Seminar”, April 29, 2022
- Tel Aviv “Seminar in Real and Complex Geometry”, April 28, 2022
- Princeton/IAS “Joint Symplectic Seminar”, April 11, 2022
- MIT “Boston Informal Symplectic Seminar”, April 1, 2022
- Hebrew University “Topology and Geometry Seminar”, March 22, 2022
- Simons Center “Recent developments in Lagrangian Floer theory” workshop, March 15, 2022
- University of Georgia “Geometry Seminar”, March 4, 2022
- Columbia “Enumerative Geometry Seminar”, February 28, 2022
- Iowa “Topology Seminar”, February 10, 2022
- University of Miami “Joint ICMS & IMSA Seminar”, November 22, 2021
- Stanford “Symplectic Geometry Seminar”, November 8, 2021
- Princeton “Topology Seminar”, September 30, 2021
- Western Hemisphere Virtual Symplectic Seminar, September 24, 2021
- University of Kansas “Geometry Seminar”, September 10, 2021
- Symplectic Zoominar (CRM-Montréal, Princeton/IAS, Tel Aviv and Paris), March 26, 2021
- MIT “Geometry and Topology Seminar”, November 9, 2020
- Stanford “Topology Seminar”, November 3, 2020
- Texas A&M “Topology Seminar”, October 14, 2020

SELECTED HONORS

- MSRI McDuff Postdoctoral Fellowship, Fall 2022
- Tsinghua Xuetang Mathematics Talent Program, 2015-2017
- Prizes of S.T. Yau College Students Mathematics Contests, 2016

MENTORSHIP

- PhD students under communication: Guangxi Yan (MIT), Sunny Zhang (Harvard).
- Thesis committee: Zihong Chen (MIT).
- Qualifying exam committee: Yonghwan Kim (MIT).

TEACHING

At MIT:

Fall 2024 18.937: Topics in Geometric Topology, Instructor.
 Spring 2025 18.952: Theory of Differential Forms, Instructor.
 Fall 2025 18.01: Calculus, Instructor.

At Columbia University:

Fall 2023 MATH 1201 Calculus III: Multi-variable Calculus, Instructor.
 Spring 2024 MATH 1201 Calculus III: Multi-variable Calculus, Instructor.

At Princeton University:

Spring 2022 MAT 218 Multivariable Analysis and Linear Algebra II, Grader.
 Fall 2021 MAT 201 Multivariable Calculus, Preceptor.
 Spring 2021 MAT 355 Introduction to Differential Geometry, Grader.
 Fall 2020 MAT 103 Calculus I, Preceptor.
 Spring 2020 MAT 355 Introduction to Differential Geometry, Grader.
 Fall 2019 MAT 216 Accelerated Honors Analysis I, Grader.
 Fall 2018 MAT 216 Accelerated Honors Analysis I, Grader.

- REFeree SERVICE
- Annals of Mathematics ($\times 2$)
 - Geometric and Functional Analysis
 - Geometry and Topology
 - Journal of Differential Geometry ($\times 2$)
 - Journal of Symplectic Geometry
 - Quick opinions: Annales Henri Lebesgue, Duke Mathematical Journal, Geometry and Topology, Journal of Modern Dynamics, Transactions of the American Mathematical Society
- ORGANIZATIONAL ACTIVITIES
- I (co-)organized the following seminars.
- At MIT:
- Fall 2024– MIT Symplectic Seminar.
- At Columbia University:
- Fall 2023 & Spring 2024 Symplectic Geometry and Gauge Theory Seminar
- Spring 2024 Enumerative Invariants and Birational Transformations.
- At Princeton University (Learning Seminars):
- Fall 2020 Siefring’s Intersection Theory for Contact 3-manifolds.
- Spring 2020 Nearby Lagrangian Conjecture and Sheafy Symplectic Topology.
- Fall 2019 Combinatorial and Symplectic Khovanov Homology.
- Fall 2019 Symplectic Cohomology of Cotangent Bundles and Loop Spaces.
- OTHER SERVICES
- I am the maintainer of AIM’s problem list on “Floer theory on symmetric products and Hilbert schemes,” see this webpage.
 - In June 2024, I served as a mentor for the Kylerec workshop.
 - In August 2024, Guangbo Xu and I organized a summer school on symplectic geometry at Rutgers University.
 - I spoke at Harvard-MIT Math Tournament, giving a public lecture on symplectic geometry to high school students.
- LANGUAGES
- Chinese (Native), English (Fluent)