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 — Fall 2024 -
Assistant Professor

Columbia University — Fall 2023 - Spring 2024
Ritt Assistant Professor

Education

Princeton University — 2017 - 2022
Ph.D. in Mathematics
Advisor: John Pardon

Tsinghua University — 2013 - 2017
B.S. of Mathematics, working under the supervision of Si Li and Pin Yu
Senior Thesis: Gauge Theory and Hitchin Integrable Systems

Short Visits

Simons Center for Geometry and Physics, Stony Brook — Spring 2023
Postdoctoral Associate

Mathematical Sciences Research Institute, Berkeley — Fall 2022
McDuff Postdoctoral Fellow, mentored by Mohammed Abouzaid
Program: Floer Homotopy Theory

University of Cambridge — Spring 2019
Visiting Graduate Student
Host: Ivan Smith

Papers

9. Cohomological splitting over rationally connected bases (with Daniel Pomerleano and Guangbo Xu), arXiv:2406.00931
8. Equivariant formality in complex-oriented theories (with Daniel Pomerleano), arXiv:2405.05821
7. 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, *Compos. Math. (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, *Duke Math. J. (to appear)*.
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.

INVITED TALKS

- 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
- Sympletic 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

GRANTS	• 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)
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

TEACHING

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: Duke Mathematical Journal, Geometry and Topology, Journal of Modern Dynamics

ORGANIZATIONAL ACTIVITIES

I (co-)organized the following learning seminars.

At Columbia University:

Spring 2024	Enumerative Invariants and Birational Transformations.

At Princeton University:

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 will organize a summer school on symplectic geometry at Rutgers University.

LANGUAGES   Chinese (Native), English (Fluent)