Shiyue Li

Department of Mathematics, Brown University
151 Thayer Street, Providence, RI 02912, USA

Research

Combinatorial algebraic geometry: K-theory, Chow cohomology, Hodge structures, and intersection theory of moduli spaces of curves; geometric models and invariants of matroids; tropical geometry; algebro-geometric applications in combinatorics.

Education

Brown University. Providence, RI.
Ph.D. in Mathematics. 2019-Present
M.Sc. in Mathematics. May 2022
Advisor: Melody Chan.

Yale University. New Haven, CT.
M.Sc. in Mathematics. Lang Fellow. May 2019

Harvey Mudd College. Claremont, CA.
B.Sc. in Mathematics, with Distinction and Honors. May 2017
HSA Concentration in Music.
Thesis: *Tropical derivation of cohomology rings of heavy/light Hassett spaces.*

Publications & Preprints

9. **Equivariant log-concavity of independence sequences of claw-free graphs** 2022
   Draft available at `shiyue.li`
8. **K-rings of wonderful varieties and matroids** 2022
   with Matt Larson, Sam Payne, Nicholas Proudfoot.
   arXiv 2210.03169.
7. **Wonderful compactifications and rational curves with cyclic action** 2022
   with Emily Clader, Chiara Damiolini, Rohini Ramadas.
   arXiv 2208.05463.
6. **Equivariant log-concavity of graph matchings** 2022
   Algebraic Combinatorics (to appear). arXiv 2202.08828.
5. **Intersecting psi-classes on tropical Hassett spaces** 2021
   with Marvin Anas Hahn.
   Combinatorial Theory **2**(3), DOI:10.5070/C62359165. arXiv 2108.00875.
4. **Premutohedral complexes and rational curves with cyclic action** 2021
   with Emily Clader, Chiara Damiolini, Daoji Huang, Rohini Ramadas,
   manuscripta mathematica. DOI:10.1007/s00229-022-01419-6. arXiv 2104.06526.
3. **Relative Bott-Samelson varieties** 2020
   arXiv 2011.04814.
2. **Topology of tropical moduli spaces of weighted stable curves in higher genus** 2020
   with Siddarth Kannan, Stefano Serpente, Claudia Yun.
   Advances in Geometry (to appear). arXiv 2010.11767.
1. **Chow ring of heavy/light Hassett spaces via tropical geometry** 2019
   with Siddarth Kannan, Dagan Karp.
   Journal of Combinatorial Theory, Series A. **178**C (2021) 105348.

Awards & Fellowships

Coline M. Makepeace Fellowship at Brown	2021-2022
Robert Willets Carle Scholarship at Yale	2018-2019
Kenneth and Mary Wang Fellowship at Yale	2017-2018
Lang Fellowship at Yale	2017-2018
Harvey S. Mudd Merit Award	2013-2017
Yu Yuen Kit So International Scholarship at Harvey Mudd	2013-2017
Dean's List at Harvey Mudd (all semesters)	2013-2017
China National Linguistics Olympiad 3rd Place	2013
China National Linguistics Olympiad Team 2nd Place	2013

Invited Talks

Fields Institute Seminar (online)	Dec 2022
University of Washington Algebra and Algebraic Geometry Seminar	Nov 2022
MIT-Harvard-MSR Combinatorics Seminar, Harvard University	Nov 2022
AMS Special on Combinatorial Algebraic Geometry, UMass Amherst	Oct 2022
AWM Research Symposium, University of Minnesota	Jun 2022
RATCOW, University of Oregon	Jun 2022
BATMOBILE, Brown University	May 2022
Combinatorial and Nonlinear Day, Brown University	Apr 2022
Joint Mathematics Meetings AWM Special Session	Apr 2022
Canadian Math Society: Combinatorics and Geometry of Moduli Spaces	Dec 2021
Front Range Algebraic Geometry and Number Theory	Sep 2021
SIAM Conference on Applied Algebraic Geometry	Aug 2021
Moduli Across the Pandemic	Apr 2021
Tropical Geometry in Frankfurt (TGiF) Seminar	Apr 2021
AMS Spring Eastern Sectional Meeting on Moduli of Curves	Mar 2021
Algebra Seminar, Brown	Nov 2020
American Graduate Student Algebraic Geometry Seminar	Oct 2020
AMS Spring Eastern Sectional Meeting on Moduli of Curves (cancelled)	Mar 2020

Outreach Talks

Growing up in Sciences, Bowdoin College	Apr 2023
Summer Undergrad Math Research at Yale (SUMRY) Colloquium	Jul 2020
Johns Hopkins Center for Talented Youth Colloquium	Mar 2020
Yale Undegraduate Mathematics Society (YUMS) Colloquium	Nov 2019
Department Undergrad Group (DUG) Colloquium at Brown	Oct 2019

Professional Service

Referee

International Mathematics Research Notices

Teaching

Sheridan Teaching Certificate I — Fall 2021

Brown University, Providence, RI

Math 100 Introductory Calculus, Part II, TA	Fall 2022
Math 100 Introductory Calculus, Part II, TA	Spring 2022
Math 100 Introductory Calculus, Part II, TA	Spring 2021
Math 100 Introductory Calculus, Part II, TA	Fall 2020

Canada/USA Mathcamp 2019, Portland, OR — Summer 2019

Introduction to Group Theory
Young tableaux and Representation Theory
Young tableaux and Combinatorics
Young tabelaux and Probability

Canada/USA Mathcamp 2018, Golden, CO — Summer 2018
Algebraic Number Theory
Geometric Group Theory
Modular Forms
Tropical Plane Curves
Rational Points on Elliptic Curves

Yale University, New Haven, CT
Math 225 Linear Algebra and Matrix Theory, TA — Fall 2018
Math 112 Calculus, TA — Spring 2018

Mentoring

Summer Undergraduate Math Research at Yale

1. Topological zeta functions of matroids — Summer 2020
   Co-mentor: Max Kutler.
   Mentees: Dawit Mengesha, Robert Miranda, Brian Sun.

Canada/USA Mathcamp Projects

1. Research project. — Summer 2019
   Mentee: Ilaria Seigal.
2. Schubert calculus. — Summer 2019
   Mentees: Alice Jenkins, Jeremy Zhou.
3. Primes of the form $x^2 + ny^2$. — Summer 2018
   Mentee: Reed Jacobs.
4. Enumerative geometry. — Summer 2018
   Mentees: Simran Khunger, Rupert Li.
5. Group actions and Sylow's theorems. — Summer 2018
   Mentees: Serena An.

Brown Mathematics Directed Reading Program

1. Ideals, Varieties and Algorithms. — Fall 2020
   Mentees: Deven Carmichael, Joseph Hlavinka.
2. Foundations of Algebraic Geometry. — Spring 2020
   Mentees: Dominick Joo, Elliott Lehrer, Joshua Lebo.

Women in Sciences at Yale

1. Mentee: Alara Değirmenci. — Fall 2018

Organizing

American Mathematics Society Student Chapter at Brown, Chair — 2019-2021
Brown Math Diversity and Inclusiveness Committee, Member — 2019-2020
Brown University ACCRIP, Graduate Representative — 2019-2020
AMS Graduate Conferences, Organizer — 2020
Brown Math Directed Reading Program, Organizer — 2019-2020
Yale University Womxn in Mathematics (Intersections), Co-organizer — 2018
Yale Math Directed Reading Program, Organizer — 2018
Yale Graduate and Professional Student Senate, Senator — 2017-2018
Harvey Mudd College Math Club, President — 2016-2017
Caltech-Harvey Mudd Math Competition, Organizer — 2015-2016

Other Professional Positions

Google Research, Mountain View, CA — Summer 2016
Mentors: Caroline Pantofaru, Malcolm Slaney.

Designed pipelines and algorithms using deep learning models and computer vision techniques on synchronized audio and video signals to solve a saliency detection problem.

Howard Hughes Medical Institute, Pomona, CA Summer 2014
Mentors: Blerta Shtylla.
Mathematical modeling on parA and parB proteins in bacterial DNA segregation.

Summer Science Program, Socorro, NM Summer 2012
Research on orbit determination of solar-system body. Implemented programs in Python using iterative Gaussian method to determine the orbit elements based on the observation data of Asteroid 1998QS52 in Etscorn Observatory.
Paper and results archived in Harvard-Smithsonian Center for Astrophysics.

Languages Mandarin Chinese (Native), English (Bilingual), French (Conversational).

Hobbies Alpinism, piano, poetry.