Cesai Li
Curriculum Vitae

Contact Information

Office Address:	Department of Mathematics and Statistics
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Education

Ph.D. in Mathematics, Boston University   2024–present

Bachelor of Science in Mathematics, University of British Columbia   2020–2024
Graduated with Distinction

Research Interests

Mathematical physics, quantum field theory, factorization algebra, algebraic structures of quantum observables, applications of category theory and homological algebra in mathematical physics

Research Experience and Projects

- **Calculating Jones polynomial with quantum group invariants**, Boston University   2025 Summer–Fall
  Advisor: Brian Williams
  - Studied functorial TQFT, quantum groups, Hopf algebra, tensor categories, Penrose graphical notation, Reshetikhin-Turaev invariants of knots and links
  - Developed an algorithm coded in Python to calculate the Jones polynomial of a knot by realizing the diagram of the knot as the Penrose graphical notation of a certain subcategory of the tensor category $U_q(\mathfrak{sl}_2)^{fd}$-mod, utilizing category theory, Hopf algebra, topology, representation theory

- **Research Assistant**, University of Saskatchewan   2023 Summer
  Advisor: Alex Weekes
  - Topic: *On the monopole formula and its generalizations*; studied algebraic geometry, combinatorics, mathematical physics, mirror symmetry, Coulomb branches (Braverman-Finkelberg-Nakajima construction)

Teaching Experience

- **Teaching Fellow** for CAS MA 242C Linear Algebra, BU   2025 Fall
  - Led five weekly discussion sessions, supported student learning and success through guidance and engagement; provided constructive feedback to students on exams; coordinated with instructor and graders to ensure grading consistency and support course delivery

- **Instructor of Record** for CAS MA 116 Statistics II, BU   2025 Summer 2
  Overall student evaluation: 4.65 / 5

- **Instructor of Record** for CAS MA 116 Statistics II, BU   2025 Summer 1
  Overall student evaluation: 4.13 / 5

- **Teaching Assistant** for MATH 100 Differential Calculus, UBC   2022 Fall

Honours and Awards

- Dean's Fellowship, for an amount of 28958 USD, Boston University   2024 Fall–2025 Spring

- The Canadian Federation of University Women Gaming Education Award   2023

- Dean's Honour List, University of British Columbia   2021

Community Involvement

- **Directed Reading Program Mentor**, Boston University · 2025 Spring
  Mentee: Zhengkai Li
    - Topic: *Complete classification of finitely generated abelian groups*

- **Volunteer Tutor**, UBC · 2023 Fall–2024 Spring
    - Offered algebra and analysis tutoring to four undergraduate students in mathematics, with a focus on fostering women in mathematics

Talks and Presentations

- Research group seminar · Nov 12, 2025
  Topic: *Infinite category constructions: simplicial sets, quasicategories, and simplicial categories*

- Research group seminar · Sep 17, 2025
  Topic: *Computations with the Jones polynomial*

- CASMA 722 Differential Topology II course final report presentation · Apr 22, 2025
  Topic: *Examples of vertex algebras*

- CASMA 721 Differential Topology I course final report presentation · Dec 6, 2024
  Topic: *Homogeneous spaces in differential topology and Lie groups*

Conferences and Workshops Attended

- New England Algebraic Topology and Mathematical Physics Seminar · NOV 15, 2025
  — A miniconference in topology and quantum field theory at Boston University, Boston, MA

- Homotopical algebra in geometry, topology, and physics · JUN 20-24, 2025
  at Northwestern University, Evanston, IL

- Physical Mathematics of QFT Summer School 2025 · JUN 09-13, 2025
  at University of Massachusetts Amherst, Amherst, MA

- GTA: Philadelphia 2025 10th Annual Graduate Student Conference · MAY 30-JUN 01, 2025
  in Algebra, Geometry, and Topology at Temple University, Philadelphia, PA

- New England Algebraic Topology and Mathematical Physics Seminar · NOV 2–3, 2024
  — A miniconference in topology and quantum field theory at Providence College, Providence, RI