

Nicolas Bridges

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RESEARCH INTERESTS

Quantum topology, Hopf algebras, topological quantum field theory, fusion categories, low dimensional topology

EMPLOYMENT AND EDUCATION

Graduate Teaching Assistant August 2021 — Present
Purdue University, West Lafayette, IN

Doctor of Philosophy in Mathematics August 2021 — Present
Purdue University, West Lafayette, IN
Advisor: Shawn Xingshan Cui
Coadvisor: Eric Samperton

Bachelor of Science in Pure Mathematics August 2017 — May 2021
Magna Cum Laude
University of Arkansas, Fayetteville, AR
Advisor: Matthew Day
Thesis Title: *Non-Cyclic Finite Covers of $P(-2n, 4n - 1, 4n + 1)$ Pretzel Knots*

Bachelor of Science in Computational Physics August 2017 — May 2021
University of Arkansas, Fayetteville, AR

PAPERS AND PREPRINTS

Towards a complexity-theoretic dichotomy for TQFT invariants (with Eric Samperton)
<https://doi.org/10.48550/arXiv.2503.02945>

Involutory Hopf group-coalgebras and invariants of flat bundles over 4-manifolds (with Shawn Cui)
<https://doi.org/10.48550/arXiv.2503.08861>

Invariants from involutory Hopf algebras of 3-manifolds with embedded framed links (in progress, with Shawn Cui)

Anomalous branch locus defects in homotopy quantum field theories (in progress, with Eric Samperton)

CONFERENCES AND INVITED TALKS

AMS 2025 Spring Western Sectional Meeting (Speaker) May 3-4, '25
California Polytechnic
Title: *Involutory Hopf group-coalgebras and invariants of flat bundles over 4-manifolds*

Hopf25 (Poster) April 22-26, '25
ULB Brussels
Title: *Involutory Hopf group-coalgebras and invariants of flat bundles over 4-manifolds*

Graduate Student Topology and Geometry Conference (Speaker) April 12, '25
Indiana University
Title: *Involutory Hopf group-coalgebras and invariants of flat bundles over 4-manifolds*

Graduate Student Topology and Geometry Conference (Poster) April 12, '25
Indiana University
Title: *Invariants from involutory Hopf algebras of 3-manifolds with embedded framed links*

Topolodays Student Topology Seminar (Speaker) Feb. 20, '25
Purdue University

Title: *Flat Bundles of 4-Manifolds and Colored Trisection Diagrams*

Topology Seminar (Speaker)

Oct. 9, '24

Purdue University

Title: *An Extension of the Kuperberg Invariant for Three-Manifolds from Involutory Hopf Algebras*

CMND Thematic Program in Topology and Field Theory

June 10-14, '24

International Conference (Attendee)

Notre Dame, Indiana

CMND Thematic Program in Topology and Field Theory

June 3-7, '24

Grad Student/Post Doc Week (Poster)

Notre Dame, Indiana

Title: *A Generalization of Two Invariants of Three-Manifolds from Involutory Hopf Algebras*

QuaSy-Con II (Speaker)

May 24-26, '24

Notre Dame, Indiana

Title: *A Generalization of Two Invariants of Three-Manifolds from Involutory Hopf Algebras*

Topological Quantum Computing, ICMS (Attendee)

Oct. 9-13, '23

Edinburgh, Scotland

TEACHING EXPERIENCE

Purdue University

Graduate TA

- Fall 2021: Recitation for MA 162 (Calculus 2)
 - Led two forty-student classes in supplemental instruction which included writing and grading quizzes
- Spring 2022: Recitation for MA 262 (Linear Algebra and Differential Equations)
 - Led two forty-student classes in supplemental instruction which included writing and grading quizzes
- Summer 2022: Instructor for MA 162 (Calculus 2)
 - Led a ten-student class in primary instruction which included preparing lectures and writing and grading quizzes
- Fall 2022: Instructor for MA 16010 (Applied Calculus 1)
 - Led two forty-student classes in primary instruction which included preparing lectures and writing and grading quizzes
- Fall 2023 & Spring 2024/2025: Instructor for MA 137 (Math for Elementary School Teachers 1)
 - Led a twenty-student class in primary instruction which included preparing lectures, writing and grading quizzes, and preparing and grading exams

AWARDS

Purdue Excellence in Teaching Award

2023-2024

The Graduate School Excellence in Teaching Award is the highest honor presented by the University in recognition of graduate student teachers. Graduate students selected for this award must have demonstrated excellence in teaching and mentoring at the undergraduate and/or graduate level.

Purdue Teaching Academy Graduate Teaching Award

2024

This award honors graduate students with teaching responsibilities from across campus for their dedication to Purdue students and their outstanding teaching contributions. Recipients are selected by each academic department for their commitment to undergraduate education. Departments may select one recipient for every 50 graduate teaching assistants they support.

REFERENCES

Prof. Shawn Xingshan Cui

Associate Professor, Department of Mathematics, Purdue University, West Lafayette, IN

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Prof. Eric Samperton

Assistant Professor, Department of Mathematics, Purdue University, West Lafayette, IN

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