
Education

- 2021 – **University of Illinois**, *Ph.D. Mathematics*, *GPA – 4.0*
- 2017 – 2021 **Princeton University**, *Bachelors of Arts, Mathematics*, *GPA – 3.8*
Senior Thesis: *Vector Bundles on Symplectic 4-Manifolds*
- 2016 – 2017 **Grand Rapids Community College**, *High School Dual Enrollment*

Experience

Papers

- Jul. 2023 **Bicategories, Biequivalence, and Bi-Interpretability**, *Submitted to the Journal of Symbolic Logic*, arxiv:2011.14056v2
With V. Pagano and I. M. J. McInnis.
- Jun. 2021 **An Operator-Based Approach for Modeling Influence Diffusion in Complex Social Networks**, *Journal of Social Computing*, Vol. 2, Iss. 2
With C. Jian, W. Li, S. Wu, and Q. Bai

Research and Independent Work

- Aug. 2023 – **Year-round Intern**, *Sandia National Laboratories*, Livermore, CA (remote)
- Supervisor: Jon Aytac.
 - Graduate intern in formal methods team.
 - Specializing in applications of topos theory to programming language semantics.
- Jun. 2023 – **MARTIANS Intern**, *Sandia National Laboratories*, Albuquerque, NM
- Aug. 2023
- Mathematics intern in formal methods.
 - Studied categorical semantics of programming languages and compilers.
- Jun. 2022 – **Cohomological Algebra Reading Course**, *University of Illinois*, Urbana, IL
- Aug. 2022
- Organized and registered summer reading course on cohomological algebra, spectral sequences, and their applications to topology, knot theory and K-theory.
- Jun. 2020 – **Mathematical Logic Research Intern**, *Princeton University*, Princeton, NJ
- Sep. 2020
- Led and trained team of mathematics undergraduates in topos theory and categorical logic
 - Developed novel results establishing the equivalence of classes of predicate theories with constructions in category theory
 - *Bicategories, Biequivalence, and Bi-Interpretability*, submitted for publication.
- Sep. 2019 – **Fluid Dynamics Seminar**, *Princeton University*
- Jan. 2020
- Studied properties of solutions of the Euler equations and Navier-Stokes equations with class of mathematics upperclassmen.
 - Presented series of lectures based around the Lagrangian model of fluid solutions.
 - Wrote expository paper summarizing seminar discussion.

- Jun. – Aug. **ICT Research Intern**, *University of Tasmania*, Hobart, TAS, Australia
- 2019
- Investigated information flow in internet communities.
 - Proposed new theoretical model based on principles of thermodynamics that captures more nuanced user interactions than the standard model.
 - Developed a Python library to test new model against the state-of-the-art on both simulated and real data.
 - Presented research to UTAS research team of faculty and graduate students.
- Jun. – Aug. **SPIDER Research Intern**, *Princeton University*
- 2018
- Calibrated various thermistors and diodes to serve as cryogenic thermometers to monitor the SPIDER balloon-based polarimeter.
 - Developed a series of libraries and scripts in Bash and Python to collect months of thermal data, filter noise, and process the data to fit a unique calibration curve to each thermometer.
 - Wrote Python and Bash scripts to render covariance maps to test for biases in cosmic microwave background data.

Selected Talks

- Mar. 2024 **The Wedge Calculus**, *University of Illinois Singular Geometry Seminar*
- Mar. 2024 **Hodge Theory and Cohomology**, *University of Illinois Graduate Geometry-Topology Seminar*
- Oct. 2023 **Realizability (and the Curry-Howard Correspondence)**, *University of Illinois Graduate Logic Seminar*
- Mar. 2023 **Ultralogic**, *University of Illinois Graduate Logic Seminar*
- Oct. 2022 **Homotopical Ideas in First-Order Logic**, *University of Illinois Graduate Homotopy Theory Seminar*
- Oct. 2022 **A Survey of Categorical Logic**, *University of Illinois Graduate Logic Seminar*

Awards and Honors

- 2021 - (2024) University of Illinois Graduate College Fellowship
- Fall 2019 Princeton McGraw Center for Learning Profiles in Curiosity Panel Speaker
- Spring 2019 Princeton McGraw Center for Learning Profiles in Curiosity Award

Service

- Feb. 2024 – **UIUC Singular Geometry Seminar**, *Co-organizer*
Co-organized with Gabriele La Nave
- Jan. 2024 – **UIUC Graduate Geometry-Topology Seminar**, *Organizer*
- Jun. 2022 **Symmetries, Groups, and Physics**, *Illinois Geometry Lab*
Invited speaker, giving a presentation of theoretical mathematics and its connection to physics to high-achieving high-school students at the Summer Illinois Mathematics camp.

References

Professor Gabriele La Nave, lanave@illinois.edu

Ph.D. advisor

Professor Hans Halvorson, hhalvors@princeton.edu

Advisor for summer research and independent work on categorical logic

Professor Quan Bai, quan.bai@utas.edu.au

Advisor for UTAS ICT project

Languages

English Native speaker

Spanish Conversationally fluent

French Reading proficient