Justin Lawrence

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Education

Institution	Degree	Subject Area	Dates
University of British Columbia	MSc	Mathematics	2024-Present
University of British Columbia	BSc	Honours Mathematics, minor in Physics	2019-2024

Research Statement

My current research work under Dr. Rachel Ollivier and Dr. Sabin Cautis is on computing rigid dualizing complexes for various algebras relevant to representation theory, with an eye towards applications to the mod p local Langlands program.

I've also done past work with a more topological focus as an undergraduate, along with work studying various phenomena in physics. Details of these are outlined in the relevant section; I still do some work on the project with Dr. Ben Williams on knot group representations.

Publications and Preprints

[1] Justin Lawrence, Nicholas Rouse, and Ben Williams. *Extending degree-2 Azumaya algebras with C2-actions and examples from character varieties of knot groups.* 2025. arXiv: 2510.25149 [math.RA]. URL: https://arxiv.org/abs/2510.25149.

Teaching Experience

List of Courses Taught

For this table, office hours and running activities during lecture are grouped under tutorial. Grading is only marked if it was consistently done across the term; exam-only grading is not listed.

Session	Course Code	Course Name	Tutorial	Grading
W1 2020	Sci001	Science One	X	
W1 2024	MLC	Math Learning Centre	X	
W1 2024	Math220	Mathematical Proof	X	X
W2 2025	Math220	Mathematical Proof		X
W1 2025	MLC	Math Learning Centre	X	
W1 2025	Math 422/501	Fields and Galois Theory		X

Science One is an enriched first-year science program offered at UBC, comprising mathematics, biology, physics, and chemistry, for which I was a TA for mathematics and physics. The MLC is a drop-in math help centre run by the mathematics department at UBC.

Undergraduate Research Experience

Representations of Knot Groups
May 2023 - August 2023

- Worked with Dr. Ben Williams on characterizing the representations of knot groups in complex special linear groups.
- Determined the actions of knot symmetries on the corresponding knot groups and their representations.

Orbital Debris Simulations
May 2022 - January 2023

- Worked with Dr. Aaron Boley on modelling satellite collisions and resulting debris cascades in the low Earth orbit environment.
- Created and implemented multiple atmospheric debris models, based on a JASON-created model, using Python/Numpy.

Dark Matter Signal Modelling
May 2021 - August 2021

- Worked as part of the SuperCDMS collaboration.
- Projected detector response to dark matter signals using alternative dark matter halo model.
- Projected sensitivity of future detectors and re-analyzed past runs using alternative model.

Technical skills

Programming Languages/Tools	C, C++, Python, Sage, Magma, MATLAB, Matplotlib/Scipy/Numpy, Linux (Debian/CentOS), basic knowledge of x86 Assembly.
Other	Able to read mathematical texts in French.

Other Projects and Roles

Algebra Textbook
December 2023 - Present

Sole Contributor

- Cumulative text covering fundamental topics in algebra, written in a style halfway between personal notes and a published textbook.
- Completed chapters include those on Groups, Rings, Universal Algebras, Modules, Categories, and Field Extensions/Galois Theory.

UBC Physics Society
August 2023 - April 2024

Academic Coordinator

- Helped lead the creation of a mathematical methods workshop on linear algebra for quantum mechanics, and a later workshop on numerical/computational methods in physics.

UBC Rocket
September 2019 - August 2021

Team Member

- Helped design and build a microbial fuel cell to test power output on both a team-constructed rocket and in a simulated low-g environment.
- Designed and helped build/test the circuit used for data collection.
- Wrote the code used for data collection/processing.

Thermodynamics Textbook *August 2020*

Co-Contributor

- Co-wrote a 70-page package for the thermodynamics unit of the Science One physics course at UBC with Ryohei Weil.
- Text included an overview of concepts, derivations of formulae, and practice questions with solutions.
- The text was actively being provided to students as a resource in the course as of spring 2024.

Awards

- Faculty of Science Graduate Award (2024)
- British Columbia Graduate Scholarship (2024)
- UBC Science Scholar (2020-2024)
- G.C. Webber Memorial Prize in Mathematics (2024)
- Stanley M. Grant Scholarship in Mathematics (2021, 2023)
- Dean of Science Scholarship (2023)
- NSERC USRA (Summer 2022, 2023)
- Gordon Merritt Shrum Memorial Scholarship (2022)
- Charles and Jane Banks Scholarship (2020-2022)
- Trek Excellence Scholarship for Continuing Student (2020-2022)
- John Collison Memorial Scholarship in Mathematics (2022)
- Physics and Astronomy Undergraduate Scholarship (2021)
- The Erich Vogt First Year Summer Research Experience award recipient (received 2020, deferred to 2021)
- Arthur Whitehead Memorial Science One Achievement Scholarship (2020)