Matthew Yacavone

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Education

B.S. Haverford College, High Honors, Haverford, PA — May 2019

Major: Mathematics, *GPA:* 4.0 | *Minor:* Computer Science, *GPA:* 4.0 | *Overall GPA:* 3.8

- Graduate-level mathematics courses in Algebraic Topology, University of Pennsylvania

Research Experience

Thesis on Knot Theory and Cluster Algebras, with Josh Sabloff & Elizabeth Milićević — Fall 2018 - Spring 2019

- Discovered a new connection between knot theory and abstract algebra, resulting in a paper, *Cluster Algebras and the HOMFLY Polynomial*, being prepared for publication. Preprint available: https://arxiv.org/abs/1910.10267
- Delivered an hour-long weekly seminar for my advisors, and a final 20 minute public talk on my results.

Cubical Type Theory in Agda, partially Independent Study with Richard Eisenberg — Fall 2018 - Present

- Investigation of programs and mathematics enriched by Homotopy Type Theory.
- Resulted in two accepted pull requests (1,2) to the open-source agda/cubical library.

Real World Compiler Implementation (Haskell), with Richard Eisenberg — Summer 2018

- Committed a patch to the Glasgow Haskell Compiler extending Haskell's type system, involving core changes to the parser, renamer, and type checker. Worked with the GHC community during a long public review process.
- Presented a lightning talk at the ICFP'19 Haskell Implementors' Workshop on my contribution.

Mathematics Research in Knot Theory, with Josh Sabloff — Summer 2017 - Present

- Developed with two peers a constructive and computational analog of an existing result in Legendrian knot theory.
- I later generalized this proof, resulting in a co-authored paper, *Legendrian Satellites and Decomposable Concordances*, currently being prepared for publication. Preprint available: https://arxiv.org/abs/1710.00943
- Created a robust user interface in Python for manipulating and collecting data on these knots (based on Gridlink).

Computer Science Research in Compiler Optimizations, with David Wonnacott — Summer 2016

- Implemented a compiler optimization, developed with a colleague, for certain tail recursive functions in the Glasgow Haskell Compiler. Resulted in an ICFP student research symposium poster presented by my colleague.

Additional Relevant Experience

Mathematics Peer Tutor and Math Writing Center Employee, Haverford College — Spring 2017 – Spring 2019

Independent Study on Homotopy Type Theory, with Richard Eisenberg — Spring 2017

- Studied the Homotopy Type Theory book together, formalized the book in Coq as we progressed.

Course Assistant and Grader for Multivariable Calculus, Haverford College — Fall 2017

Skills and Interests

- *Fluent in:* Haskell, Agda, Coq, Python | *Proficient with:* C/C++, emacs | *Familiar with:* Javascript, Idris, Java
- Theatrical lighting design (lighting designer for 8 student productions)
- Music theory and piano composition.

Selected Professional Activities

- **Summer School on Higher Topos Theory and Univalent Foundations**, University of Leeds — 2019
- **DeepSpec Summer School**, Princeton University — 2018
- **Oregon Programming Languages Summer School**, University of Oregon — 2017