Samuel S. Schiavone

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Profile

I am a Ph.D. mathematician, researcher, and programmer, who combines mathematical abstraction with computational tools in order to discover, analyze, and elucidate. I specialize in translating theoretical concepts into practical solutions.

Education

Dartmouth College — Hanover, New Hampshire
Ph.D. in Mathematics — *Sep 2019*

The University of Vermont — Burlington, Vermont
M.S. in Mathematics — *Dec 2013*

Amherst College — Amherst, Massachusetts
B.A. in Mathematics, magna cum laude, Phi Beta Kappa — *May 2010*

Experience

Research Scientist — Sep 2019 – Aug 2025
Massachusetts Institute of Technology — *Cambridge, Massachusetts*

- Conducted research in computational arithmetic geometry.
- Devised and implemented algorithms to compute mathematical objects, wrote mathematical proofs, and chronicled my research in academic articles.
- Aided in the development and maintenance of the L-functions and Modular Forms Database (https://www.lmfdb.org/), working both with data in PostgreSQL and Python on the backend and in Flask, Jinja, and HTML on the frontend.
- Instructed 65 undergraduate students in courses in linear algebra, algebraic geometry, mathematical communication, and Belyi maps.

Graduate Student Instructor — Sep 2016 - Sep 2019
Dartmouth College — *Hanover, New Hampshire*

- Instructed 90 undergraduate students in courses in calculus, linear algebra, and differential equations.
- Prepared and gave lectures 3 to 4 times per week.
- Evaluated students' performance on homework assignments, quizzes, and exams.

Graduate Teaching Assistant — Sep 2014 - Aug 2016
Dartmouth College — *Hanover, New Hampshire*

- Led evening tutorial sessions 3 times per week, responding to students' questions about homework.
- Graded students' exams.

Research Assistant — Jan 2014 - Sep 2014
Dartmouth College — *Hanover, New Hampshire*

- Worked with Professor John Voight to improve and extend results from our publication, *Numerical calculation of three-point branched covers of the projective line*.

Graduate Teaching Fellow — Jan 2012 - Dec 2013
The University of Vermont — *Burlington, Vermont*

- Instructed 130 undergraduate students in courses in calculus and discrete math.
- Planned and gave lectures 3 times per week.
- Evaluated students' performance on homework assignments, quizzes, and exams.

Mathematics Instructor — July 2013
The Joshua M. Stimson Mathematics Program — *North Haverhill, New Hampshire*

- Instructed 5 middle school students in a mathematics enrichment program at Haverhill Cooperative Middle School.
- Designed a curriculum focusing on combinatorics, probability, and number theory.
- Planned daily lessons and activities with an emphasis on discovery and inquiry.

English Teaching Assistant Oct 2010 - Apr 2011
French Ministry of National Education *Vendôme, France*

- Instructed 150 French middle school students in English in two schools, as a part of the Teaching Assistant Program in France.
- Planned lessons focusing on oral expression and comprehension, grammar, and vocabulary.

Undergraduate Researcher June 2009 - July 2009
The Claremont Colleges *Claremont, California*

- Studied formal groups over the p-adic numbers at the NSF-sponsored research program for undergraduates, working in a small group under Professor Ghassan Sarkis.
- Chronicled results in an individual final paper.
- Presented results at WIMIN conference (Smith College, Northampton, Massachusetts) and at undergraduate poster competition at 2010 Joint Math Meetings (San Francisco, California).

Publications

1. Bouchet, T., Hanselman, J., Pieper, A., & **Schiavone, S.** (2025). "Mumford-type Shimura curves contained in the Torelli locus." *Preprint*. arXiv:2510.00093.
2. van Bommel, R., Costa, E., Elkies, N. D., Keller, T., **Schiavone, S.**, & Voight, J. (2024). "17T7 is a Galois group over the rationals." *Preprint*. arXiv:2411.07857.
3. Combes, L., Jones, J. W., Paulhus, J., Roe, D., Roy, M., & **Schiavone, S.** (2024). "Creating a dynamic database of finite groups." *Preprint*. arXiv:2409.09189.
4. Hanselman, J., Pieper, A., & **Schiavone, S.** (2024). "Equations of genus 4 curves from their theta constants." *Preprint*. arXiv:2402.03160.
5. Assaf, E., Babei, A., Breen, B., Costa, E., Duque-Rosero, J., Horawa, A., Kieffer, J., Kulkarni, A., Molnar, G., **Schiavone, S.**, & Voight, J. (2024). A database of basic numerical invariants of Hilbert modular surfaces. In *LuCaNT: LMFDB, computation, and number theory. Conference, Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, Rhode Island, USA, July 10–14, 2023* (pp. 285–312). American Mathematical Society (AMS). arXiv:2301.10302.
6. Hanselman, J., **Schiavone, S.**, & Sijsling, J. (2021). Gluing curves of genus 1 and 2 along their 2-torsion. *Mathematics of Computation*, *90*(331), 2333–2379. arXiv:2005.03587.
7. Musty, M., **Schiavone, S.**, Sijsling, J., & Voight, J. (2019). A database of Belyi maps. In *ANTS XIII. Proceedings of the thirteenth algorithmic number theory symposium, University of Wisconsin-Madison, WI, USA, July 16–20, 2018* (pp. 375–392). Mathematical Sciences Publishers (MSP). arXiv:1805.07751.
8. **Schiavone, S.** (2019). *On Algebras of Low Rank and on Belyi Maps*, PhD dissertation, Dartmouth College.
9. Klug, M., Musty, M., **Schiavone, S.**, & Voight, J. (2014). Numerical calculation of three-point branched covers of the projective line. *LMS Journal of Computation and Mathematics*, *17*, 379–430. arXiv:1311.2081.

Selected Development

Development for the L-functions and modular forms database (LMFDB) May 2018 – Present
Full Stack Web Development *Remote*

- Collaborated on a joint open-source project to create an accessible repository of data in algebra and number theory, used by over 30,000 researchers and educators in math
- Co-created two sections of an online database: added data to the backend using Python and PostgreSQL; designed webpages to display the data using Flask, Jinja, and HTML
- Supervised four undergraduate students in the creation of a Magma and SageMath package to compute additional data
- Connected to other sections of the LMFDB by identifying and linking to related objects using scripts written in Python and SageMath

Computations of Mumford-type Abelian Varieties Feb 2024 – Present
Academic Research *Cambridge, Massachusetts*

- Contributed key computational analysis to a 4-person team to produce the first explicit examples of abelian fourfolds of Mumford type, resolving a decades-old open problem in arithmetic geometry.

- Engineered and executed a large-scale parallel computation in Magma and SageMath using number field data from the LMFDB.
- Combined practical programming skills with theoretical expertise to analyze data and observe evidence of abelian fourfolds of Mumford type in the resulting data.
- Produced a code repository (SamSchiavone/Mumford-type) containing scripts to reproduce and analyze these abelian fourfolds.
- Chronicled results in a research article (arXiv:2510.00093).
- Presented results at two invited talks in number theory seminars at Harvard University and the University of Wisconsin–Madison.

Computations in Inverse Galois Theory Jan 2022 – Nov 2024
Academic Research *Cambridge, Massachusetts*

- Collaborated on a team of 6 researchers to solve an open mathematical problem in computational number theory.
- Combined theoretical expertise with practical programming skills in Python, PostgreSQL, SageMath, and Magma to produce a research article and two repositories of code, one a general Magma package (edgarcosta/EichlerShimuraHMF) and the other tailored to a specific example (SamSchiavone/17T7).
- Chronicled results in a research article (arxiv:2411.07857).
- Presented results in two invited talks to audiences of 30-50 researchers at VaNTAGe and Simons AGNTC annual meeting.
- Synthesized detailed understanding of theoretical results in arithmetic geometry with technical programming expertise to give an explicit solution to an open mathematical problem.

Skills

Programming Languages: Python, PostgreSQL, SageMath, Magma, R

Programming Tools: Git, Pandas, Numpy, Scikit-learn, Flask, Jinja, GNU Parallel

Languages: English (native), French (fluent), Spanish (intermediate)