

Gil Goldshlager

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Researcher developing algorithms for scalable, high-precision scientific machine learning.

Research and Education

University of California, Berkeley

Fall 2022 - Spring 2027

- Ph.D. candidate in applied mathematics - expected May 2027, advised by Professor Lin Lin.
- Department of Energy Computational Science Graduate Fellow and Simons Dissertation Fellow in Mathematics.
- Developed the SPRING algorithm, a state-of-the-art optimizer for neural wavefunction simulations of quantum many-body systems. SPRING has been adopted by multiple research groups and has been used in cutting-edge simulations of over 200 electrons.
- Developed foundational theory for SPRING and related “subsampling natural gradient” optimizers, providing a new perspective on optimization algorithms for high-precision scientific machine learning.
- Published eight papers across NeurIPS, ICML, and top venues in applied math, computational physics, and computational chemistry.
- Earned the Bernard Friedman Memorial Prize for best Ph.D. thesis in applied mathematics.
- Invited speaker at major [chemistry](#) and [physics](#) workshops plus ETH Zurich Colloquium in Applied and Computational Mathematics.

Massachusetts Institute of Technology

Fall 2013 - Spring 2017

- B.S. in Mathematics with Computer Science. GPA: 5.0/5.0

Selected Publications

- Gil Goldshlager, Jiang Hu, and Lin Lin. A sketch-and-project analysis of subsampled natural gradient algorithms (ICML 2026).
- Andres Guzman-Cordero, Felix Dangel, Gil Goldshlager, and Marius Zeinhofer. Improving energy natural gradient descent through Woodbury, momentum, and randomization (NeurIPS 2025).
- Gil Goldshlager, Nilin Abrahamsen, and Lin Lin. A Kaczmarz-inspired approach to accelerate the optimization of neural network wavefunctions (JCP 2024).

Experience

Research Consultant, Actuate Innovation

Summer 2020 - Spring 2021

- Conducted research on climate science, energy systems, energy and climate technologies, economics, and public policy.

Software Engineer, Coda Project Inc.

Summer 2017 - Winter 2019

- Full-stack engineer and twenty-fifth employee, with deep involvement in product and business strategy.
- Led the design and implementation of a major feature that enabled users to sync tabular data from external apps into Coda.
- Coordinated engineering and product teams to develop a data model which handled the myriad complexities of external APIs while exposing a simple, powerful interface to the user. Supported dozens of apps including GitHub, JIRA, Google Calendar, and Shopify.

Software Engineering Intern, 20n

Summer 2016

- Contributed to the development of a novel computational approach for discovering biosynthesis pathways for valuable chemicals.

Bioinformatics Researcher, Tel Aviv University, Ron Shamir Lab

Summer 2015

- Developed a novel algorithm for the *de novo* assembly of large metagenomic datasets.

Complexity Theory Researcher, MIT, under Dana Moshkovitz

Fall 2014 - Spring 2015

- Proved a new upper bound on the complexity of approximating a class of constraint satisfaction problems known as k-CSP.

Technologies

- Python, JAX, PyTorch, NumPy, SciPy, SLURM, JavaScript, TypeScript, React
- Git, LaTeX

Other Activities

- MIT ultimate frisbee team captain *Fall 2015 - Spring 2017*
- World Ultimate Championship competitor *Summer 2016*
- Research Science Institute (RSI) for mathematics *Summer 2012*
- USA Math Olympiad Summer Training Program (USAJMO winner) *Summer 2009*