MAX MISTERKA

Boston, Massachusetts | misterka@mit.edu | github.com/compiler64

EDUCATION

Massachusetts Institute of Technology August 2023 – May 2026
Bachelor of Science in Mathematics with Computer Science GPA 5.0/5.0
Bachelor of Science in Physics; Minor in Economics

- Relevant courses: Machine Learning (graduate), Reinforcement Learning (graduate), Randomized Algorithms (graduate), Numerical Methods (graduate), Quantum Computation (graduate), Seminar in Information Theory, Design and Analysis of Algorithms, Large-Scale Decision-Making and Inference, Intermediate Microeconomics, Macroeconomics, Statistics, Statistical Thermodynamics.

EXPERIENCE

OpenAI Launchpad Research Program **August 2025–January 2026**

- An invite-only research program run by OpenAI including a three-day visit to the OpenAI offices in San Francisco, CA and mentorship by an OpenAI researcher for six months.
- Investigated whether we can predict LLM hallucination on coding and LaTeX typesetting tasks using linear probes on the activations of GPT-OSS, and found that better-than-chance prediction is possible given the last layer's activations but difficult at earlier layers of the model.

Undergraduate Researcher, MIT Fluids and Health Network **June 2025–January 2026**

- Developed novel mathematical models of the spread of epidemics using advanced techniques in probability theory, random walk theory, and differential equations.
- Compared the results of my mathematical models with the outputs of my computational simulations and with previous models in the literature to assess accuracy, and found that my models outperform standard models (relative error reduced by 58 percentage points on average) in important cases.

Undergraduate Researcher, MIT Learning Matter Lab **August 2024–May 2025**

- Coauthored "Transferable Learning of Reaction Pathways from Geometric Priors" [1].
- Developed machine learning collective variables for enhanced sampling in molecular dynamics (MD) simulations.
- Deployed and managed MD simulations on high-performance computing clusters, and analyzed the resulting physical observables such as the free energy difference between two molecular states.
- Performed comprehensive literature reviews on state-of-the-art enhanced sampling techniques.

MIT Undergraduate Practice Opportunities Program **September 2024–May 2025**

- Participated in UPOP, a yearlong career development program for sophomores at MIT.
- Learned skills for effective teamwork at the 24-hour UPOP Team Training Workshop.

MIT PRIMES-USA Mathematical Research Project **January 2022–April 2023**

- Coauthored "Generalized n-series and de Rham complexes" [2] with Sanath Devalapurkar.
- Presented a poster at the Joint Mathematics Meetings in January 2023.
- Generalized around ten of the key theorems in calculus and combinatorics to a much wider setting called s-calculus, which has applications in the theory of formal group laws.

Independent Mathematical Research **August 2016–December 2022**

- Various mathematical research in combinatorics, number theory, and topology including annual poster presentations (5 times) and one talk at the James Madison University SUMS conference.

PUBLICATIONS

[1] Nam, J.; Steiner, M.; **Misterka, M.**; Yang, S.; Singhal, A.; Gómez-Bombarelli, R. Transferable Learning of Reaction Pathways from Geometric Priors. *J Phys Chem Lett* 16, 11690-11699, arxiv:2504.15370, 2025

[2] Devalapurkar, S. K.; **Misterka, M.** (equal contribution). Generalized n-series and de Rham complexes. arxiv:2304.04739, 2023

SKILLS

- Python (Numpy, Matplotlib, Pandas, Scikit-Learn, PyTorch), Java, C, C++, C#, Assembly, HTML, JavaScript, R, and Wolfram.

HONORS

- **Sigma Pi Sigma** physics honor society inductee (2026).
- **Putnam Math Competition** top 200 (2025).
- **Regeneron Science Talent Search** 4th place winner ($100,000) in 2023.
- **USA Math Olympiad** (qualifier, 2022) and **US National Chemistry Olympiad** (2nd place in Virginia, 2022).
- **National Merit Finalist** (2022).

CLUBS AND ORGANIZATIONS

- **MIT Battlecode** **2023–2026**
  Engine Team Lead Developer (manager of a 10-person team of programmers); Lecture Coordinator
- **MIT AI Alignment** **2024–2026**
  Policy Strategist and founding member of the Government Outreach Team; Technical AI Safety Reading Group participant
- **Beta Theta Pi Fraternity** **2024–2025**
  Recruitment Chairman (co-manager of a 30-person team)
- **MIT First-Year Pre-Orientation Program: Discover Mathematics** **2025**
  Counselor; Event Organizer