

# Matt McManus

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**Research Interests:** LLM-Driven Macro Forecasting, Scientific Machine Learning, Physics-Informed Neural Networks

## EDUCATION

### Massachusetts Institute of Technology

Master of Engineering, Computer Science; GPA: 5.0/5.0

Cambridge, MA

Aug. 2023 - Jun. 2024

**Thesis:** "Inertial Navigation System Drift Reduction Using Scientific Machine Learning"

**Research Focus:** LLM-Driven Macro Forecasting, Reinforcement Learning for LLMs, Scientific ML

### Massachusetts Institute of Technology

Bachelor of Science, Mathematics & Computer Science

Cambridge, MA

Sep. 2019 - Feb. 2024

**Activities:** Phi Kappa Theta, MIT Pokerbots President, MITHack, MIT Squash Team

## RESEARCH EXPERIENCE

### Research Assistant

2022 – 2024

MIT Julia Lab

Cambridge, MA

- Developed physics-informed neural-ODE framework reducing inertial navigation drift by 60% in GPS-denied environments
- Implemented scientific ML algorithms using Julia and PyTorch for real-time navigation systems
- Published master's thesis on novel approaches to sensor fusion using neural differential equations

### Quantitative Analyst

May 2022 – Aug. 2022

Delphi Digital

New York, NY

- Conducted quantitative analysis of cryptocurrency markets and DeFi protocols using Python and SQL

### Quantitative Research Intern (Part-time)

2023 – 2024

Two Sigma

New York, NY

- Conducted fast-cycle experiments on factor discovery and regime detection for systematic trading strategies
- Researched ML applications to alternative data analysis and signal generation
- Developed automated backtesting framework for evaluating quantitative investment strategies

## PUBLICATIONS

**McManus, M.** (2024). "Inertial Navigation System Drift Reduction Using Scientific Machine Learning." *Master's Thesis*, Massachusetts Institute of Technology.

**McManus, M.** (2023). "Evaluating the Performance of GPT-3 in Simulated Cybersecurity Scenarios: A Focus on Graph-Based Problems." *Computers & Security*, 128, 103–118.

Chowdhuri, R., **McManus, M.**, & Vogelbaum, E. H. (2022). "Low Complexity Solutions for Interpolating Deep Neural Networks." *Journal of Machine Learning Research*, 23(47), 1–28.

## PROJECTS & RESEARCH

**Physics-Informed Navigation System:** Neural-ODE framework achieving 60% reduction in inertial navigation drift using PyTorch and JAX

**LLM-Driven Macro Forecasting:** Research applying LLMs to economic forecasting, achieving 25% improvement in prediction accuracy

**GPT-3 Cybersecurity Evaluation:** Single-authored research on LLM performance in cybersecurity scenarios (Published in *Computers & Security*)

## INDUSTRY EXPERIENCE

### Bridgewater Associates

New York, NY

ML Engineer / Research Scientist - AIA Labs

Sept. 2024 - Present

- Lead development of proprietary AI models for macro investing using LLMs and reinforcement learning
- Research novel applications of LLMs to economic forecasting and market regime detection
- Promoted within 6 months due to exceptional research contributions and AI/ML expertise

Investment Engineer Intern

Jun. 2023 - Aug. 2023

- Developed quantitative models for systematic investment strategies using ML techniques

## TECHNICAL SKILLS

**Programming:** Python, Julia, C++, SQL, JavaScript, R, Scala, Java, Go

**ML/AI:** PyTorch, TensorFlow, JAX, Transformers, Scientific ML, RL, Hugging Face, XGBoost

**Research Tools:** Jupyter, Git, Docker, Scientific Computing, Neural ODEs, Physics-Informed NNs

**Specialized:** LLM-Driven Forecasting, Navigation Systems, Quantitative Finance

## LEADERSHIP & ACHIEVEMENTS

**Leadership:** MIT Pokerbots President (2023-2024), organized competition for 250+ students

**Athletics:** MIT Varsity Squash Team member, competed in NESCAC tournaments

**Honors:** MIT Pokerbots Competition 1st Place, HackMIT Award Winner, Phi Kappa Theta