

Nicholas A. Gabriel

[[website](#)] [[github](#)]

Research and Work Experience:

The George Washington University

Research Assistant, Advisor: Dr. Neil Johnson

Washington, DC

May 2019 - present

Neural operators for many-body complex systems: [[paper](#)] [[github](#)]

Proposed a novel operator learning framework for modeling many-body complex systems, successfully combining advanced architectures for graph neural networks and neural operators. Scalability in both system size and model size was demonstrated on benchmarks with millions of nodes. Trained the largest physics-informed neural operator to date, ROMA-H (1.4B params), using the NVIDIA GH200 Superchip.

Graph learning for foreign influence detection: [[paper](#)] [[github](#)]

Developed a framework for detecting foreign influence on social media using graph learning and feature attribution to identify models and features that can generalize across influence operation campaigns.

Data Collection/Web Scraping: [[github](#)]

Led data collection efforts for social media tracking of foreign influence and extremist communities. Wrote data collection tools for social media using Python Selenium, BeautifulSoup, and Gmail API.

LLM finetuning: [[github](#)]

LoRA finetuned Llama-3-8B on a corpus of news article text related to semiconductors using torchtune. News article text was collected using the newsdata API and preprocessed with the fineweb-2 pipeline.

Brookhaven National Laboratory

Intern, Advisor: Dr. David Jaffe

Upton, NY

June 2016 - August 2016

Developed software for simulation and statistical analysis of radioactive sources for calibration of the PROSPECT experiment antineutrino detector. Primary deliverables: Bash scripts, NumPy and SciPy code, and CERN ROOT modules.

Massachusetts General Hospital

AAPM Undergraduate Fellow, Advisor: Dr. Alexei Trofimov

Boston, MA

June 2015 - August 2015

Prototyped a Python gaze tracking interface for use in proton radiotherapy treatment of ocular melanoma using PyQt and OpenCV.

Education:

The George Washington University

Ph.D. Physics

Washington, DC

exp. 2025

The George Washington University

M.S. Physics

Washington, DC

2021

University of Mary Washington

B.S. Mathematics (with honors), B.S. Physics

Fredericksburg, VA

2017

Technical Skills:

Languages/Libraries: Python, C, Bash, Hugging Face, BLAS, TeX, CUDA C, MATLAB, Mathematica

Software:

Python: Pandas/Dask, NumPy, PyTorch, JAX, PyG, Jraph, scikit-learn, statsmodels, SpaCy, NLTK, Gensim, Selenium, BeautifulSoup, torchtune, LLama

Linux/SWE/HPC: Git, SSH, Vim, Conda, Slurm, SQL, Elasticsearch, cloud computing

ML/AI: Transformers, physics-informed neural networks, neural operators, graph neural networks, message passing neural networks, graph learning, NLP, LLM, fine-tuning, LoRA/QLoRA, multimodal learning, uncertainty quantification (UQ), Explainable AI (XAI)

Math/Stats: Differential Geometry, Numerical Analysis, Functional Analysis, Partial Differential Equations, Multivariate Timeseries Analysis, Graph Theory, Experimental Design