Cameron Ryan

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Education

Northeastern University Boston, MA
B.S. Mathematics and Physics Expected May 2027

GPA: 3.9

Relevant Coursework: Linear Algebra, Graph Theory, Advanced Probability and Statistics, Real Analysis, Modern Physics, Advanced Group Theory, Quantum Mechanics, Electricity and Magnetism I, Thermodynamics and Statistical Mechanics, Classical Dynamics, Topology, Mathematical and Computational Problem Solving Methods for Physics, Fourier Series and PDEs, Statistics and Stochastic Processes, Machine Learning and Statistical Learning Theory I

Research Experience

Lawrence Livermore National Laboratory
Intern, Mentor: Shusen Liu Summer 2026
University of Rochester Laboratory for Laser Energetics
Intern, Mentor: Shuai Zhang Summer 2025
Intern, Mentor: Richard Kidder Summers 2022, 2023

Publications

1. **Ryan, C.**, Narayanaswamy, V. S., Thopalli, K., & Liu, S. "Unsupervised Latent Space Alignment with Hyperspherical Geodesic Matching." NeurIPS 2026 Workshop on Symmetry and Geometry in Neural Representations (Extended Abstract Track)

   [OpenReview] [PDF] [arXiv]

2. **Ryan, C.**, Hetti Kankanamalage, Y. P., & Zhang, S. "High Pressure Material Phase Identification with Gaussian Kernel Neural Networks." arXiv preprint arXiv:2611.12840 [cond-mat.mtrl-sci], 2026.

   [arXiv]

3. Babbitt, G. A., Rajendran, M., Lynch, M. L., Asare-Bediako, R., Mouli, L. T., **Ryan, C. J.**, Srivastava, H., Rynkiewicz, P., Phadke, K., Reed, M. L., et al. "ATOMDANCE: Kernel-based Denoising and Choreographic Analysis for Protein Dynamic Comparison." *Biophysical Journal*, 123(17), 2705–2715, 2024. [DOI]

Academic Projects

1. Ryan, C., Descoteaux, A., Liu, S., Ryan, A., & Kroon, L. "Benchmarking On-Policy vs. Off-Policy Reinforcement Learning for Complex Visual Tasks: A Case Study in Minecraft Wood Collection." Applied Math Capstone, Northeastern University, 2026. [PDF]

2. Ryan, C. "Learning Capacity of a Perceptron." Final project, Mathematical and Computational Problem Solving Methods for Physics, Northeastern University, 2026. [PDF] [GitHub]

3. Ryan, C. "Containerized Application Management for Cloud Based Scientific Analysis." University of Rochester Laboratory for Laser Energetics, 2022. [PDF]

Posters & Presentations

- "High Pressure Material Phase Identification with Gaussian Kernel Neural Networks." Poster, IFE-SURE Symposium, University of Rochester Laboratory for Laser Energetics — August 2026. [PDF]
- "High Pressure Material Phase Classification Using Machine Learning." Presentation, AI/ML Group, University of Rochester Laboratory for Laser Energetics — February 2026. [PDF]
- "High Pressure Material Phase Classification with Spatially Weighted Dynamic Graph Convolutional Neural Networks." Poster, IFE-SURE Symposium, University of Rochester Laboratory for Laser Energetics — August 2025. [PDF]

Software Projects

- **Wikipedia Search Engine** — A search engine focused on Wikipedia pages. Creates embeddings for text and images using open source CLIP models, stored and queried via a vector database. All components are containerized with Docker for modular management.
  [GitLab]
- **Naturify** — An iOS app for identifying plants, animals, and fungi from photos. Trained a visual transformer on 10,000 species using PyTorch on an Nvidia A100 GPU. Also includes a geolocation model that predicts nearby species from latitude/longitude coordinates.
  [iOS App] [Web demo]
- **Image Garden** — An iOS app that performs semantic searches on photos in your photo library using a CLIP neural network.
  [iOS App]
- **wordLab** — An iOS app for taking notes and querying them with AI.
  [iOS App]
- **Earth Explore** — An iOS app that classifies birds from their calls using a neural network.
  [iOS App]
- **Floral — JAX Neural Network Library** — A JAX-based Python neural network library. Allows creating, training, and saving neural networks with a clean API. Available on PyPI.
  [GitHub]
- **Stock Prediction Neural Network** — Predicts future stock returns from historical returns by outputting a normal distribution over expected future performance.
  [GitHub]