

# Dowling Wong

*Machine Learning Research Engineer — ML Systems for Noisy Time-Series Decision-Making*

[🌐 Dowling's Website](#) [🐙 Github](#) [🌐 LinkedIn Profile](#) [✉️ dowlingwong@gmail.com](#)

**Machine Learning Research Engineer** focused on building end-to-end ML systems for noisy, high-throughput time-series data, spanning simulation, signal processing, model training, and deployment on GPU-accelerated, containerized distributed infrastructure under real-world latency constraints.

## EDUCATION

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### Karlsruhe Institute of Technology

Oct 2024 – Present

*PhD Candidate, Institut für Experimentelle Teilchenphysik*

*Karlsruhe, BW, Germany*

- Built time-series reconstruction and triggering pipelines under noise and latency constraints, using attention-based models for event reconstruction, likelihood-based parameter estimation, and reinforcement learning for sequential triggering decisions under uncertainty.
- Developed a unified maximum-likelihood estimator linking Optimal Filtering, EMPCA, and linear autoencoders, interpreting EMPCA as a noise-aware linear autoencoder under known noise covariance
- Technical owner of a multi-user, GPU-backed ML platform (JupyterHub + k8s+ HTCondor) supporting distributed training workloads; designed containerized execution, explicitly balancing latency vs throughput tradeoffs. Prototyping Kubernetes and Luigi-based automation for monitoring, fault detection, and workflow recovery.

### Brandeis University

Aug 2021 - May 2024

*Bachelor of Science in Physics with high honors*

*Waltham, MA, USA | GPA: 3.69/4.00*

- Completion of Master's with focus: Data Science in High Energy Physics, Theoretical and Mathematical Physics

### Franklin W. Olin College of Engineering

Aug 2022 - May 2024

*College Certificate in Electrical & Computer Engineering*

*Needham, MA, USA | GPA: 3.92/4.00*

- Digital Signal Processing, Full-Stack Development, Robotics (Path Planning & Behavior Trees), PCB Design

## SKILLS

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**Languages:** Python (advanced), C/C++ (advanced), Java (proficient), SQL/Bash (proficient), JS/React (familiar)

**Machine Learning:** PyTorch(Advanced), JAX, TensorFlow, Keras, Bayesian ML (posterior inference), simulation-based inference (normalizing flows)

**Scientific Computing & DSP:** Kalman/Optimal/FIR filtering, CUDA-accelerated FFT, Docker/Singularity, HTCondor cluster workflows

**Robotics & Embedded Systems:** ROS (navigation & perception), database-backed full-stack applications, Nvidia Jetson and Xilinx FPGA prototyping.

## RESEARCH & EXPERIENCE

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### PhD Researcher in AI for Physics | Karlsruhe Institute of Technology & CERN CMS

Oct 2024 – Present

- Research in cryogenic detector signal processing and machine learning, including likelihood-based reconstruction and GPU-accelerated filtering for multi-channel time-series data, analyzing memory bandwidth and data movement bottlenecks.
- Constructed database and automated scalable data workflows for CERN's CMS upgrade at KIT

### Visiting Student | Massachusetts Institute of Technology

Jun 2023 – Jun 2024

- Built online neural network classifiers for particle identification using FermiLab fix-target beam dump datasets

### Research Assistant | Brandeis Univ. & FermiLab

May 2022 – Jun 2024

- Optimized Kalman filters for track/vertex reconstruction and implemented multiclass particle classifiers

## SELECTED COURSEWORK

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Data Science in Physics (MIT), Advanced Mathematical Physics (BU), Graduate Quantum Mechanics II, Statistical Physics, Particle Phenomenology, General Relativity, Differential Geometry, Digital Signal Processing, Robotics & Embedded Systems (navigation, VSLAM, Kalman filtering), Full-Stack Development